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INSTITUTO DE BIOLOGIA
PROGRAMA DE PÓS-GRADUAÇÃO EM BIOLOGIA ANIMAL

TESE DE DOUTORADO

**REVISÃO DE *HEBRUS* CURTIS, 1833 (INSECTA: HEMIPTERA: HETEROPTERA:
HEBRIDAE) DA REGIÃO NEOTROPICAL**

CLEILTON LIMA FRANCO

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Dra. Juliana Mourão dos Santos Rodrigues

Tese apresentada ao Programa de Pós-graduação em Biologia Animal da Universidade Federal Rural do Rio de Janeiro como parte dos requisitos para a Obtenção do título de Doutor em Biologia Animal.

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RESUMO

FRANCO, C. L. **REVISÃO DE *HEBRUS* CURTIS, 1833 (INSECTA: HEMIPTERA: HETEROPTERA: HEBRIDAE) DA REGIÃO NEOTROPICAL**. 2026. 275f. Tese (Doutorado em Biologia Animal). Instituto de Ciências Biológicas e da Saúde. Universidade Federal Rural do Rio de Janeiro. Seropédica. RJ.

O gênero *Hebrus* Curtis, 1833, pertencente à família Hebridae (Hemiptera: Heteroptera: Gerromorpha), compreende mais de 220 espécies distribuídas em duas subfamílias e 12 gêneros, sendo os percevejos conhecidos como pequenos insetos semiaquáticos, com comprimento variando entre 1,3 e 3,7 mm, cobertos por cerdas e com antenas longas, caracterizadas pelo quarto artigo antenal superficialmente dividido por uma constrição. Globalmente, são conhecidas mais de 180 espécies de *Hebrus*. Na região Neotropical, o conhecimento sobre a fauna de *Hebrus* é escasso, devido à raridade nas coletas e às dificuldades de estudo, sendo muitos táxons conhecidos apenas pela série-tipo e descritos sem ilustrações ou com base apenas em espécimes fêmeas. Os representantes desse gênero geralmente habitam vegetação emergente de lagoas, riachos, manguezais e vegetação flutuante, sendo também capturados em armadilhas luminosas. O presente estudo revisou taxonomicamente as espécies do gênero que ocorrem na região Neotropical. A revisão teve ênfase na localização do material-tipo e espécimes adicionais, sempre que possível. Todas as espécies estudadas foram fotografadas e examinadas com o intuito de padronizar o estudo morfológico externo do gênero. Após o estudo dos espécimes-tipo, foi possível redescrever 25 espécies e propor duas sinonímias (sinônimos juniores entre parênteses): *Hebrus bilineatus* Champion, 1898; *H. burmeisteri* Lethierry & Severin, 1896; *H. camposi* Drake & Chapman, 1954; *H. catus* Drake & Chapman, 1958 (= *H. elimatus* Drake & Cobben, 1960); *H. concinnus* Uhler, 1894; *H. consolidus* Uhler, 1894; *H. ecuadoris* Drake & Harris, 1943; *H. engaeus* Drake & Chapman, 1958; *H. gloriosus* Drake & Harris 1943; *H. hirsutus* Champion, 1898; *H. hungerfordi* Drake & Harris 1943; *H. lacunatus* Drake & Chapman, 1958; *H. laeviventris* Champion, 1898; *H. major* Champion, 1898; *H. nubilus* Drake & Harris, 1943; *H. parvulus* Stål, 1860; *H. paulus* Drake & Harris, 1943; *H. pilosidorsus* Polhemus & Chapman, 1970; *H. plaumanni* Porter, 1952 (= *H. limnaeus* Drake & Chapman, 1958); *H. priscus* Drake & Harris, 1943; *H. pudoris* Drake & Harris, 1943; *H. sobrinus* Uhler, 1877; *H. spiculus* Polhemus & McKinnon, 1983; *H. sulcatus* Champion, 1898; e *H. usingeri* Drake & Harris 1943. Adicionalmente, foram descritas nove novas espécies para o Brasil e uma para Argentina, além de novas ocorrências para a região Neotropical. O estudo é relevante para ampliar o conhecimento sobre a biodiversidade dos Hebridae na região Neotropical, contribuindo para a taxonomia e distribuição geográfica desses percevejos semi-aquáticos, com importantes registros fotográficos e mapas de distribuição atualizados, evidenciando novas áreas de ocorrência e aumentando a compreensão sobre a diversidade e biogeografia do grupo.

Palavras-chave: Percevejos semi-aquáticos, Neotrópico, taxonomia

ABSTRACT

FRANCO, C. L. **REVIEW OF HEBRUS CURTIS, 1833 (INSECTA: HEMIPTERA: HETEROPTERA: HEBRIDAE) FROM THE NEOTROPICAL REGION.** 2026. 275f. Thesis. (PhD in Animal Biology. Instituto de Ciências Biológicas e da Saúde. Universidade Federal Rural do Rio de Janeiro. Seropédica. RJ.

The genus *Hebrus* Curtis, 1833, belonging to the family Hebridae (Hemiptera: Heteroptera: Gerromorpha), comprises over 220 species distributed across two subfamilies and 12 genera. These bugs are known as small semiaquatic insects, measuring between 1.3 and 3.7 mm in length, covered with setae, and featuring long antennae characterized by the fourth antennal segment superficially divided by a constriction. Globally, more than 180 species of *Hebrus* are known. In the Neotropical region, knowledge about *Hebrus* fauna is scarce due to their rarity in collections and study difficulties, with many taxa known only from the type series and described without illustrations or based solely on female specimens. Representatives of this genus typically inhabit marginal vegetation of ponds, streams, mangroves, and floating vegetation and are also captured in light traps. The present study provides a taxonomic revision of the species of this genus occurring in the Neotropical region, emphasizing the location of type material and additional specimens whenever possible. All studied species were photographed and examined to standardize the external morphological study of the genus. Following the examination of type specimens, 25 species were redescribed, and two synonymies were proposed (junior synonyms in parentheses): *Hebrus bilineatus* Champion, 1898; *H. burmeisteri* Lethierry & Severin, 1896; *H. camposi* Drake & Chapman, 1954; *H. catus* Drake & Chapman, 1958 (= *H. elimatus* Drake & Cobben, 1960); *H. concinnus* Uhler, 1894; *H. consolidus* Uhler, 1894; *H. ecuadoris* Drake & Harris, 1943; *H. engaeus* Drake & Chapman, 1958; *H. gloriosus* Drake & Harris, 1943; *H. hirsutus* Champion, 1898; *H. hungerfordi* Drake & Harris, 1943; *H. lacunatus* Drake & Chapman, 1958; *H. laeviventris* Champion, 1898; *H. major* Champion, 1898; *H. nubilus* Drake & Harris, 1943; *H. parvulus* Stål, 1860; *H. paulus* Drake & Harris, 1943; *H. pilosidorsus* Polhemus & Chapman, 1970; *H. plaumanni* Porter, 1952 (= *H. limnaeus* Drake & Chapman, 1958); *H. priscus* Drake & Harris, 1943; *H. pudoris* Drake & Harris, 1943; *H. sobrinus* Uhler, 1877; *H. spiculus* Polhemus & McKinnon, 1983; *H. sulcatus* Champion, 1898; and *H. usingeri* Drake & Harris, 1943. Additionally, nine new species were described for Brazil and one for Argentina, along with new records for the Neotropical region. This study is relevant for expanding knowledge on the biodiversity of Hebridae in the Neotropical region, contributing to the taxonomy and geographic distribution of these semiaquatic bugs, providing important photographic records and updated distribution maps, highlighting new occurrence areas, and enhancing the understanding of the group's diversity and biogeography.

Keywords: Semiaquatic bugs, Neotropics, taxonomy

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Introdução geral

Hemiptera (Insecta) é a maior e mais diversa ordem de insetos hemimetábolos, com cerca de 106 mil espécies distribuídas mundialmente (Grazia *et al.*, 2024). Dentre os hemípteros, os percevejos (subordem Heteroptera) são divididos em sete infraordens (Štys & Kerzhner, 1975). Representantes das infraordens Gerromorpha, Nepomorpha e Leptopodomorpha estão associados primariamente a corpos de água doce, existindo ainda alguns terrestres e outros tolerantes ou restritos à água salgada ou salobra (Schuh & Slater, 1995). Estes três táxons juntos incluem mais de 4.800 espécies (Polhemus & Polhemus, 2008).

Na região Neotropical, há cerca de 1.300 espécies descritas de heterópteros aquáticos ou semiaquáticos, distribuídas em Gerromorpha (ca. 500 espécies), Nepomorpha (ca. 750 espécies) e Leptopodomorpha (ca. 40 espécies) (Polhemus & Polhemus, 2008). Dentro de Gerromorpha, a família Hebridae compreende mais de 220 espécies, divididas em duas subfamílias (Hebrinae e Hyrcaninae) e 12 gêneros (quatro fósseis): †*Archaeohebrus* Zhang, Ren & Yao, 2024; *Austrohebrus* Andersen & Weir, 2004; *Hebrometra* Cobben, 1982; *Hebrus* Curtis, 1831; *Hyrcanus* Distant, 1910; *Lipogomphus* Berg, 1879; *Merragata* White, 1877; †*Miohebrus* Garrouste & Nel, 2010; *Neotimasius* Andersen, 1981; *Nieserius* Zettel, 1999; †*Palaeohebrus* Martins-Neto, 1997; †*Stenohebrus* Polhemus, 1995; e *Timasius* Distant, 1909 (Polhemus & Polhemus, 2008; Kment *et al.*, 2016; Stella & Pall, 2018; Zhang *et al.*, 2024).

O gênero *Hebrus* é o mais amplamente distribuído e diverso da família, incluindo mais de 164 espécies globalmente (GBIF, 2025). Delas, 28 foram registradas na região Neotropical, das quais a maioria é conhecida somente da série-tipo (Moreira *et al.*, 2011; Moreira, 2015; ITIS, 2025). *Hebrus* pode ser diferenciado dos demais gêneros de Hebridae pela antena longa, com o artículo IV subdividido superficialmente no meio por uma região pouco esclerosada (Andersen, 1982). Os hábitos de vida da maioria das espécies são desconhecidos (Moreira, 2015), mas há registros de indivíduos coletados em macrófitas, bancos de folhiço, em raízes expostas em riachos, manguezais, dentro ou sobre vegetação flutuante de rios (Andersen, 1982; Schuh & Slater, 1995; Nieser & Melo, 1997; Moreira, 2015; Zettel & Tran, 2016), assim como em armadilhas de luz próximas a esses locais (Rodrigues *et al.*, 2023).

Devido aos seus hábitos crípticos e pequeno tamanho (menos de 3.0 mm de comprimento), os hebrídeos são pouco coletados e estudados (Zettel & Tran, 2016). Além disso, muitas espécies

foram descritas de forma incompleta e/ou sem ilustrações, ou baseadas somente em exemplares fêmeas (Moreira, 2015; Stella & Pall, 2018; Moreira, 2025). A quase ausência de características diagnósticas externas faz com que a apropriada identificação e delimitação de espécies dependa em grande parte do exame dos parâmeros dos machos, os quais nem sempre estão ilustrados na literatura (Drake & Chapman, 1958).

Justificativa

Não há dúvida de que os humanos estão destruindo a biodiversidade em um ritmo alarmante e de que, embora os esforços de pesquisa atuais sejam impressionantes, eles são minúsculos em comparação com a quantidade de diversidade desconhecida e a urgência e importância da tarefa (Purvis & Hector, 2000; Ripple *et al.*, 2017).

Nesse contexto de extinção em massa e mudanças climáticas, muitos *Hebrus* ainda são pouco conhecidos e há um grande número de espécies não descritas (Drake & Chapman, 1958; Polhemus & Polhemus, 2007; Moreira, 2015). As principais dificuldades para o estudo taxonômico do gênero são as escassas informações fornecidas na maioria das descrições originais até a década de 1950, o pequeno tamanho dos indivíduos e a falta de caracteres diagnósticos claros (Moreira, 2015). Adicionalmente, sabe-se que há várias espécies reconhecidas como novas aguardando serem descritas (FFF Moreira, *comun. pess.*). Para minimizar esses problemas, apresenta-se aqui uma revisão da fauna de *Hebrus* registrada na região Neotropical.

Muitas vezes, são encontrados espécimes identificados erroneamente em coleções entomológicas e na literatura, o que impede o avanço do conhecimento acerca da ecologia e evolução deste táxon. O presente trabalho contribuirá para a apropriada delimitação e identificação das espécies do gênero *Hebrus* ocorrentes na área de estudo. A compilação de dados sobre espécimes-tipo e bibliografia será, ainda, fonte de consulta para aqueles que venham a se dedicar ao estudo do grupo.

Em relação à distribuição das espécies de *Hebrus*, é evidente a lacuna de coletas no Brasil e em outros países da América. Além disso, no país, a maioria dos registros geográficos coincidem com as regiões Norte e Sudeste, onde há (ou houve) especialistas trabalhando com estes insetos. Os dados de distribuição geográfica contidos na tese, compilados e novos, contribuirão, portanto, para o melhor entendimento da real distribuição desses insetos no continente. Como

um todo, a tese diminuirá duas das sete lacunas de informação acerca da biodiversidade (Hortal *et al.*, 2015): lineanna (taxonomia e sistemática) e wallaceanna (distribuição geográfica).

Objetivos

Geral

- Revisar taxonomicamente os representantes do gênero *Hebrus* ocorrentes na região Neotropical.

Específicos

- Realizar estudo detalhado das espécies de *Hebrus* da região Neotropical e delimitá-las com base na morfologia externa e morfologia da terminália masculina;
- Descrever ou redescrever e ilustrar as espécies consideradas válidas;
- Compilar e fornecer dados sobre espécimes-tipo e bibliografia atualizada acerca das espécies representadas;
- Confeccionar mapas de distribuição geográfica.

Material e métodos

Revisão taxonômica

A identificação dos exemplares foi realizada com base em descrições originais (e.g., Stål, 1860; Drake & Harris, 1943; Porter, 1952; Drake & Chapman, 1958), além de comparações com material-tipo ou de referência. Para cada espécie, foram fornecidos: lista sinonímica, diagnose de táxons já descritos, redescritção de táxons pobremente conhecidos ou descrição de táxons inéditos, distribuição geográfica conhecida, bibliografia, ilustrações e mapa de distribuição.

O levantamento de caracteres morfológicos foi realizado a partir de empréstimo ou visita as coleções. Os espécimes e estruturas do corpo foram fotografados e medidos sob microscópio estereoscópico e editados pelo programa Photoshop versão 22.0. Para detalhes, principalmente de estruturas genitais masculinas, as peças foram dissecadas e posteriormente ilustradas com

programa Adobe Illustrator versão 29.0.1. Para tanto, a terminália masculina foi destacada do exemplar, imersa em solução de KOH 10% e mantida aquecida por aproximadamente 15 minutos, para remover os tecidos gordurosos e musculares. Posteriormente, a estrutura foi lavada em água e imersa em água oxigenada aquecida por cinco minutos para que ocorresse o clareamento e, finalmente, imersa em álcool 70% aquecido, para auxiliar na remoção de bolhas de ar. Após todo o procedimento, a genitália foi acondicionada em glicerina, observada, desenhada e armazenada em microtubo junto ao espécime.

As abreviaturas usadas para medições são as seguintes: comprimento do corpo (CC), comprimento da cabeça (CCA), largura da cabeça através dos olhos (LA), largura dos olhos (LO), largura interocular (LI), comprimento dos antenômeros I–IV [sem intersegmentares] (ANT I, ANT II, ANT III, ANT IV), largura anterior do pronoto (LAP), largura umeral do pronoto (LUP), comprimento do pronoto na linha média (CP), largura do mesoscutelo (LMES), comprimento do mesoscutelo (CMES), largura do metanoto (LMET), comprimento do metanoto (CMET), comprimento da perna anterior (CPA), comprimento da perna média (CPM), comprimento da perna posterior (CPP), comprimento do fêmur (CF), comprimento da tíbia (CT), comprimento dos tarsômeros I e II (TAR I, TAR II). Todas as medições foram dadas em milímetros e em suas dimensões máximas. Quando disponíveis, pelo menos cinco machos e cinco fêmeas de cada forma alar, de cada espécie, foram examinados em detalhes para descrições e medidas.

Quando as coordenadas geográficas de determinadas localidades não estavam disponíveis, as informações disponíveis nas etiquetas foram utilizadas para obter um posicionamento aproximado. Mapas de distribuição das espécies foram confeccionados no programa QGIS 3.10.7 (QGIS Development Team 2020), com base em dados da literatura e etiquetas dos espécimes.

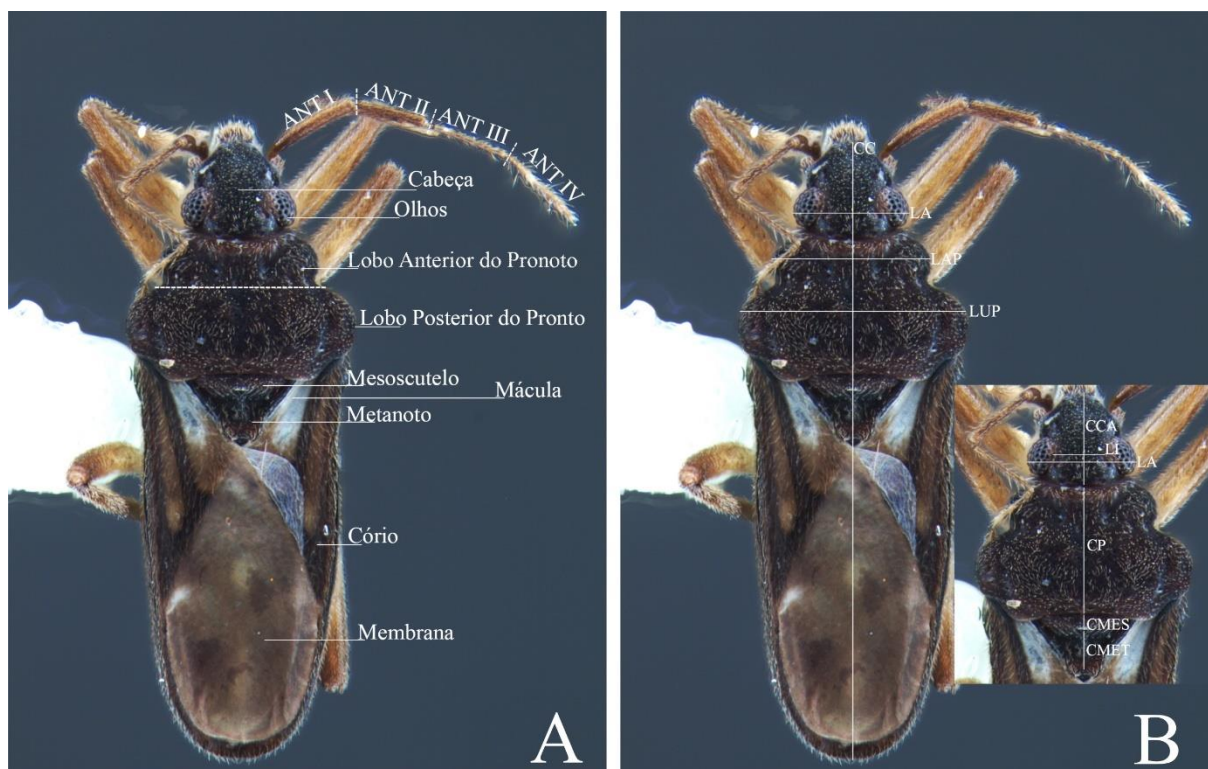


Figure 1. *Hebrus limai* sp. nov. [ANT I, ANT II, ANT III, ANT IV, comprimento dos antenômeros I–IV [sem intersegmentos]; CC, comprimento do corpo; CCA, comprimento da cabeça; CMES, comprimento do mesoscutelo; CP, comprimento do pronoto na linha média; LA, largura da cabeça através dos olhos; LAP, largura anterior do pronoto; LI, largura interocular; LMES, largura do mesoscutelo; LMET, largura do metanoto; LO, largura dos olhos; LUP, largura umeral do pronoto.

Os quatros capítulos da tese foram formatados de acordo com as regras das revistas que serão submetidos: (i) Revisão de *Hebrus* Curtis, 1833 (Hemiptera: Heteroptera: Hebridae) ocorrentes no Brasil, com a descrição de nove novas espécies – *Biodiversity Data Journal*; (ii) Revisão de *Hebrus* Curtis, 1833 (Hemiptera: Heteroptera: Hebridae) da América Central e do Sul, exceto Brasil e Argentina – *European Journal of Taxonomy*; (iii) Revisão de *Hebrus* Curtis, 1833 (Hemiptera, Heteroptera, Hebridae) registrados no México – *ZooKeys*; e (iv) Revisão de *Hebrus* Curtis, 1833 (Hemiptera: Heteroptera: Hebridae) da Argentina, com a descrição de uma nova espécie – *Journal of the International Heteropterists' Society*.

Capítulo 1: A review of *Hebrus* Curtis, 1833 (Hemiptera: Heteroptera: Hebridae) of Brazil, with the description of nine new species

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Abstract

Background

Hebridae (Hemiptera: Heteroptera: Gerromorpha), or velvet water bugs, are poorly studied in the Neotropical region, with many species known only from their type series. This family is currently represented by nine species and the following three genera in Brazil: *Hebrus* Curtis, 1833; *Lipogomphus* Berg, 1879; and *Merragata* White, 1877. Six species of *Hebrus* have been recorded from the country, distributed across six states: *H. gloriosus* Drake & Harris, 1943 (Mato Grosso), *H. limnaeus* Drake & Chapman, 1958 (Santa Catarina), *H. parvulus* Stål, 1860 (Espírito Santo, Rio de Janeiro, and São Paulo), *H. paulus* Drake & Harris, 1943 (Mato Grosso), *H. plaumanni* Porter, 1952 (Santa Catarina), and *H. priscus* Drake & Harris, 1943 (Mato Grosso, Mato Grosso do Sul, and São Paulo). Due to the insufficient and often not illustrated descriptions, the identity and limits of these species are obscure.

New information

In this paper, we present a review of the *Hebrus* occurring in Brazil, including the description of nine new species (*H. alagoensis*, *H. azevedoi*, *H. canejoi*, *H. cunhai*, *H. franciscanus*, *H. giehlai*, *H. inpa*, *H. limai*, and *H. nordestinus*), redescriptions and illustrations of previously known species, and geographic distribution maps. We also propose a new synonymy between *H. plaumanni* (senior) and *H. limnaeus* (junior).

Keywords

Aquatic insects, Neotropical region, South America, taxonomy, velvet water bugs.

Introduction

Hebridae, or velvet water bugs, comprise nine extant genera and more than 220 species worldwide (Schuh and Slater 1995, Polhemus and Polhemus 2008, Kment et al. 2016; Stella and Pall 2018). The following three genera and nine species have been recorded from Brazil: *Hebrus* Curtis, 1833, with six species (*H. gloriosus* Drake & Harris, 1943; *H. limnaeus* Drake & Chapman, 1958; *H. parvulus* Stål, 1860; *H. paulus* Drake & Harris, 1943; *H. plaumanni* Porter, 1952; and *H. priscus* Drake & Harris, 1943); *Lipogomphus* Berg, 1879, with one species (*L. lacuniferus* Berg, 1879); and *Merragata* White, 1877, with two species (*M. hebroides* White, 1877 and *M. sessoris* Drake & Harris, 1943) (Moreira 2024). Most of these species are very rarely collected or studied and are therefore known only from their type series (Moreira 2015).

Representatives of *Hebrus* are characterized by the long antennae, with article IV subdivided in the middle by a superficial constriction (“false joint”; Andersen 1982). The habits of most of them are unknown, mainly because of their small body size, but the specimens are usually collected on the marginal vegetation alongside pools, lakes, streams, and mangroves (Polhemus and Polhemus 1989, Zettel 2004, Moreira 2015).

In Brazil, the known distribution of the genus is restricted to six states, representing only 19% of the country’s federative units: Mato Grosso, Mato Grosso do Sul (Central-West Region), Espírito Santo, Rio de Janeiro, São Paulo (Southeast Region), and Santa Catarina (South Region) (IBGE 2023, Moreira 2024). Furthermore, these bugs were previously recorded from just three of the six Brazilian biomes: Atlantic Forest, Cerrado, and Pantanal (Moreira 2025).

In this paper, we present a review of the *Hebrus* occurring in Brazil, including the description of nine new species, redescriptions and illustrations of five previously known species, and geographic distribution maps. We also propose a new synonymy between *H. plaumanni* (senior) and *H. limnaeus* (junior).

Materials and methods

Specimens examined are deposited in the following collections: California Academy of Sciences, San Francisco, United States (CAS); Coleção Entomológica do Instituto Oswaldo

Cruz, Fundação Oswaldo Cruz, Rio de Janeiro, Brazil (CEIOC); Coleção de Entomologia da Universidade Federal do Tocantins, Porto Nacional, Brazil (CEUFT); Coleção Zoológica do Maranhão, Universidade Estadual do Maranhão, Caxias, Brazil (CZMA); Instituto Nacional de Pesquisas da Amazônia, Manaus, Brazil (INPA); Museu Paraense Emílio Goeldi, Belém, Brazil (MPEG); Museu de Zoologia, Universidade de São Paulo, São Paulo, Brazil (MZUSP); National Museum of Natural History, Smithsonian Institution, Washington D.C., United States (NMNH); Naturhistoriska riksmuseet, Stockholm, Sweden (NHRS); and Snow Entomological Museum Collection, University of Kansas, Lawrence, United States (SEMC).

At the NMNH, series of photographs at different focal depths were taken using a Canon EOS 5D digital camera and subsequently stacked into composite images with Visionary Digital software. At SEMC, images were captured in focal series with a Canon EOS 6D Mark II digital camera and processed using Helicon Focus 8.2.7 and Zerene Stacker (Version 1.04, Build T2023-06-11-1120). At CAS, photographs were acquired using a Keyence VHX-7000 digital microscope. Additional images were obtained from staff or collaborating institutions, using the equipment and methods available at each site. All images were edited and final figure plates were assembled in Adobe Photoshop CS5. Distribution maps were produced using QGIS 2.6.1 (QGIS Development Team 2020). The list of species is organized alphabetically. Collecting information is written as follows: country in all-capitals; states in bold; a bullet point (•) indicates the beginning of a record; an n-dash precedes a state name in bold; within each record, different fields are delimited by a semicolon; a single field can be composed of several elements, which are separated by commas.

Abbreviations used for measurements are as follows: body length (BL), head length (HL), head width through eyes (HW), eye width (EYE), minimum interocular width (IOW), length of antennomeres I–IV [without intersegmental pieces] (ANT I, ANT II, ANT III, ANT IV), anterior width of pronotum (AWP), humeral width of pronotum (HWP), pronotum length on midline (PL), mesoscutellum width (MESW), mesoscutellum length (MESL), metanotum width (METW), metanotum length (METL), length of fore leg segments (FORELEG), length of middle leg segments (MIDLEG), length of hind leg segments (HINDLEG), femoral length (FEM), tibial length (TIB), length of tarsomeres I–II (TAR I, TAR II). All measurements are given in millimeters and were always taken in their maximum dimensions, except for the minimum interocular distance.

Results and Discussion

Taxon treatments

Hebrus alagoensis sp. nov.

Figs. 1, 41

Type material examined. Holotype. BRAZIL – **Alagoas** • Viçosa, Cachoeira do Anel; alt. 333 m; 09°19'03"S, 36°17'39"W; 21.V.2019; J.M.S. Rodrigues, H. Rodrigues, W. Sousa & F.F.F. Moreira leg.; 1 macropterous female, CEIOC 83098.

Description

Macropterous female (Fig. 1). **Holotype.** BL 2.15; HL 0.35; HW 0.48; EYE 0.10; IOW 0.26; ANT I 0.25; ANT II 0.17; ANT III 0.24; ANT IV 0.44; AWP 0.64; HWP 0.89; PL 0.46; MESW 0.34; MESL 0.05; METW 0.38; METL 0.16; FORELEG, FEM 0.45, TIB 0.46, TAR I 0.03, TAR II 0.13; MIDLEG, FEM 0.42, TIB 0.46, TAR I 0.03, TAR II 0.10; HINDLEG, FEM 0.59, TIB 0.61, TAR I 0.03, TAR II 0.14.

General color brown, except proximal half of antennomere I, ventral region of head, labium, meso- and metasterna, coxae, proximal 2/3 of femora and tibiae light brown to yellowish. Eyes reddish-brown. Forewings dark brown to black, with a pair of large basal white maculae starting below pronotum and reaching apex of metanotal elevation, and a narrow median white macula apically (Fig. 1A). Body covered by short, decumbent setae; longer setae on antennae, legs, and abdomen.

Head wider than long; width through eyes 1.4 times length; interocular width 2.6 times eye width. Buccula slightly curved. Antennomere I cylindrical, slightly curved; antennomere II cylindrical; antennomeres III–IV approximately half as wide as antennomere I. Antennal formula: $IV > I > III > II$.



Figure 1. *Hebrus alagoensis* **sp. nov.**, macropterous female holotype. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Pronotum, dorsal view. **D.** Habitus, lateral view. Scale bars: 1.0 mm (**A**, **B**, **D**); 0.2 mm (**C**).

Pronotum with a transverse row of moderately deep punctations on collar and a transverse row of eight deep punctations between lobes; most central two punctations on row between lobes larger than others and placed close together, giving impression of a single deep punctation in dry specimens; posterior lobe with a row of small punctations adjacent to posterior margin, continuing laterally close to humeri, and more irregular small punctations on disc; humeri elevated (Fig. 1C). Mesoscutellum approximately 7 times wider than long. Metanotal elevation subtrapezoidal, approximately 2.4 times wider than long; disc with raised margins and two

submedian depressions divided by a median carina; apex slightly excavated at middle (Fig. 1A). Forewings reaching posterior margin of abdomen; sides slightly folded by abdominal laterotergites. Abdominal laterotergites elevated, sinuous, median third slightly reflected over mediotergites (Fig. 1A, 1D). Venter of abdomen narrowed on segments VI–VII (Fig. 1B, 1D).

Diagnosis

Body covered by short, decumbent setae; longer setae on antennae, legs, and abdomen; without distinct pruinosity around eyes or pronotal punctations; most central two punctations on row between pronotal lobes larger than others and placed close together, giving impression of a single deep punctation in dry specimens; metanotal elevation with median carina, apex slightly excavated at middle; forewings with a pair of large basal white maculae starting below pronotum and reaching apex of metanotal elevation, and a narrow median white macula apically (Fig. 1A); female abdominal laterotergites elevated, sinuous, median third slightly reflected over mediotergites (Fig. 1A, 1D); venter of female abdomen narrowed on segments VI–VII (Fig. 1B, 1D).

Notes

Although males of *H. alagoensis* **sp. nov.** are not yet known, the modifications of the female abdomen in this species are unique among those that occur in Brazil (Fig. 1A, 1B, 1D). *Hebrus alagoensis* **sp. nov.** shares with *H. alvearensis* Stella & Pall, 2018, *H. plaumanni* (Figs. 34–39), and *H. priscus* (Fig. 40–43) the most central two punctations on the row between lobes larger than others and placed close together, seeming to be a single deep punctation in dry specimens. *Hebrus alvearensis* differs from the new species by the presence of four white maculae on the apical portion of the forewings (Stella and Pall 2018: 476, fig. 2) (vs. a narrow median white macula) and the slightly smaller body length (1.94 vs. 2.15). The new species differs from *H. plaumanni* and *H. priscus* by the apex of the metanotal elevation (slightly vs. clearly excavated), and the pair of large white maculae on the basal portion of the forewings (vs. small in *H. plaumanni*, and small and diffuse in *H. priscus*).

Etymology

The specific epithet, *alagoensis*, refers to the state where the type specimen was collected.

Distribution

Brazil: Alagoas (Fig. 41).

***Hebrus azevedoi* sp. nov.**

Figs. 2, 3, 41

Type material examined. Holotype. BRAZIL – **Pará** • Paragominas, Rio Capim, Cikel, 03°36'05"S, 48°44'52"W; 24.IX.2012; L.B. Calvão leg.; 1 macropterous female, CEIOC XXX.

Paratype. BRAZIL – **Pará** • Barcarena, Rio Pará, floresta alterada, 01°34'25"S, 48°42'36"W; 27.XI.2018; E.J. Cunha leg.; 1 macropterous female, CEIOC XXX.

Description

Macropterous female (Fig. 2). **Holotype (Paratype).** BL 2.32 (2.27); HL 0.40 (0.38); HW 0.54 (0.53); EYE 0.13 (0.13); IOW 0.28 (0.26); ANT I 0.27 (0.27); ANT II 0.22 (0.23); ANT III 0.32 (0.31); ANT IV 0.56 (0.53); AWP 0.66 (0.65); HWP 0.97 (0.96); PL 0.57 (0.43); MESW 0.40 (0.43); MESL 0.09 (0.10); METW 0.28 (0.30); METL 0.18 (0.17); FORELEG; FEM 0.55 (0.54), TIB 0.60 (0.57), TAR I 0.03 (0.03), TAR II 0.14 (0.14); MIDLEG; FEM 0.51 (0.51), TIB 0.57 (0.58), TAR I 0.04 (0.04), TAR II 0.14 (0.14); HINDLEG; FEM 0.63 (0.64), TIB 0.70 (0.71), TAR I 0.04 (0.04), TAR II 0.15 (0.15).

General color brown, except antenna, buccula, labium, and legs light brown to yellow. Forewings brownish, with a pair of large basal white maculae starting below pronotum and reaching apex of metanotal elevation, and three fainter maculae apically (Fig. 2A, 2D; 3A). Body covered by moderately long, decumbent setae.

Head wider than long, width through eyes 1.35 times length; interocular width about twice eye width. Buccula ventrally curved, conically produced posteriorly. Antennomere I cylindrical, slightly curved; antennomere II cylindrical; antennomeres III–IV approximately half as wide as antennomere I. Antennal formula: IV > III > I > II. Pronotum with a transverse row of moderately deep punctations on collar and a transverse row of ten moderately deep punctations between lobes; most central two punctations on row between lobes clearly distinguished in dry specimens; posterior lobe with a row of small punctations adjacent to posterior margin, continuing laterally close to humeri, and more irregular small punctations on disc; humeri elevated (Fig. 2A, 2D; 3A). Mesoscutellum about 4.4 times wider than long. Metanotal elevation subtrapezoidal, about 1.6 times wider than long; disc with raised margins and two

submedian depressions divided by a median carina; apex clearly excavated at middle. Forewings almost reaching posterior margin of abdomen; sides not folded, exposing narrow lateral area of abdominal laterotergites. Abdominal laterotergites not distinctly elevated or sinuous, not reflected over mediotergites (Fig. 2A, C; 3A). Venter of abdomen not narrowed posteriorly (Fig. 2B, 3B).

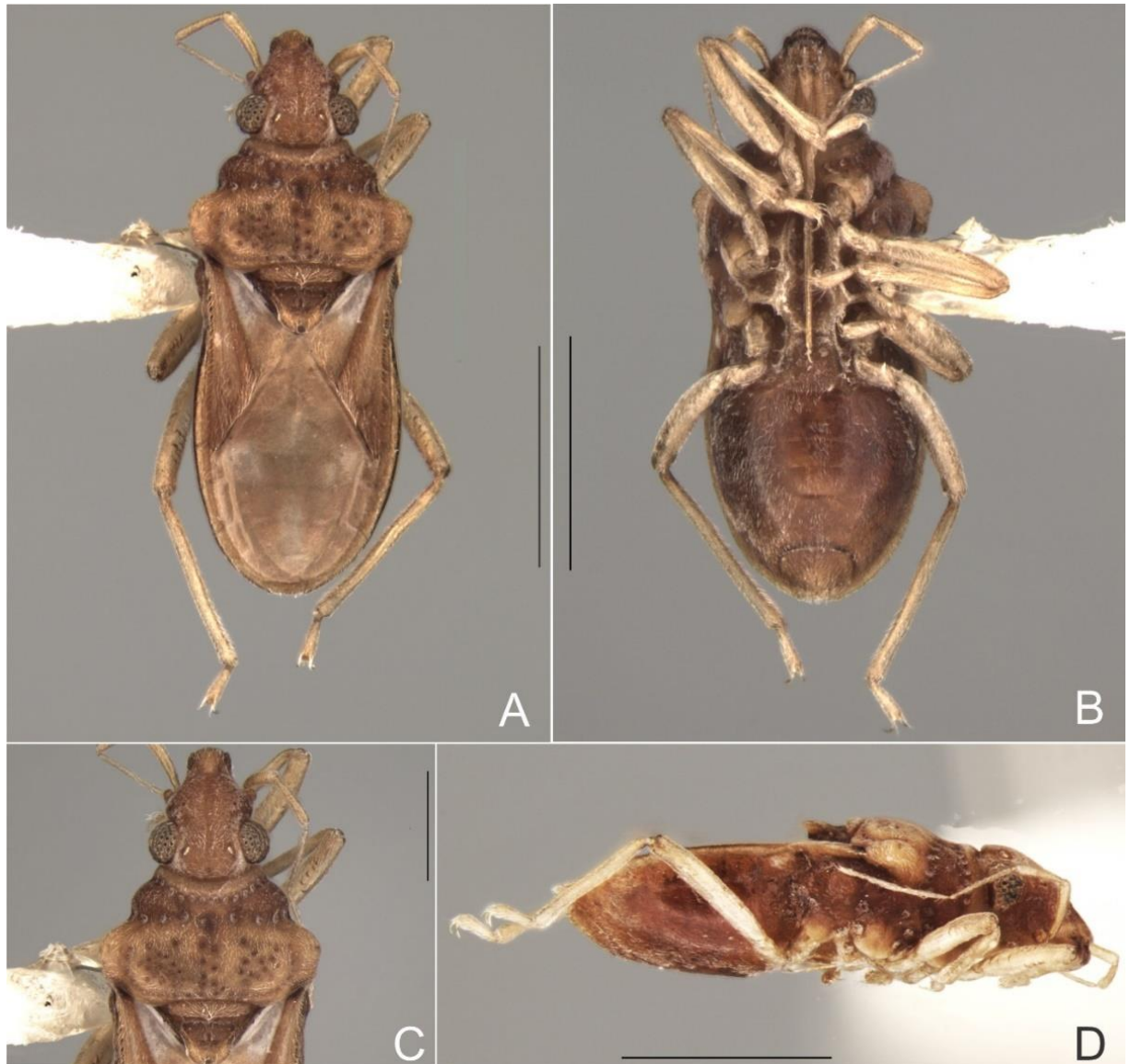


Figure 2. *Hebrus azevedoi* sp. nov., macropterous female holotype. A. Habitus, dorsal view. B. Habitus, ventral view. C. Head and thorax, dorsal view. D. Habitus, lateral view. Scale bars: 1.0 mm (A, B, D); 0.5 mm (C).

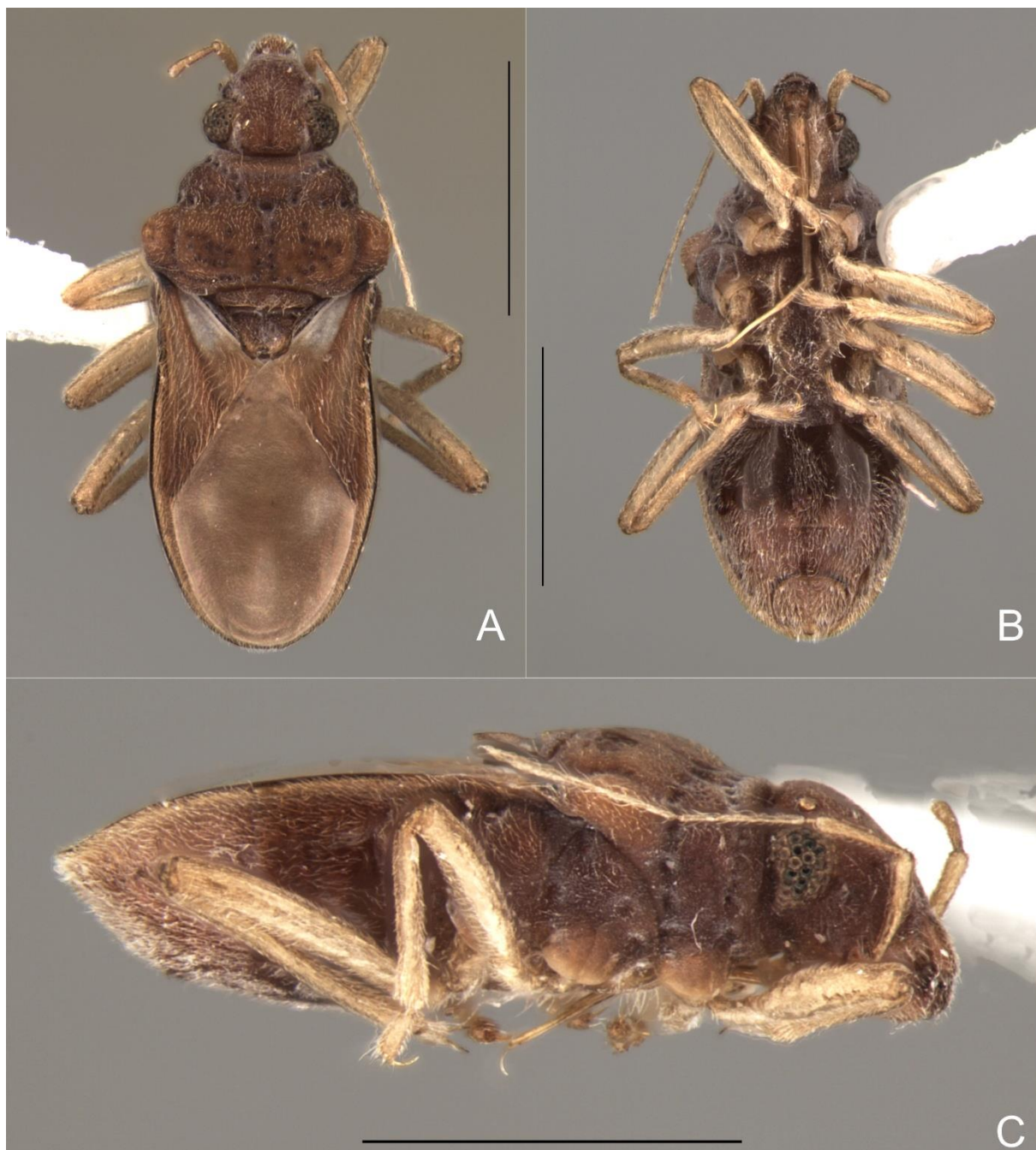


Figure 3. *Hebrus azevedoi* **sp. nov.**, macropterous female paratype. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Habitus, lateral view. Scale bars: 1.0 mm.

Macropterous male. Unknown.

Diagnosis

Body covered by moderately long, decumbent setae; without distinct pruinosity around eyes or pronotal punctations; most central two punctations on row between pronotal lobes clearly

distinguished in dry specimens; metanotal elevation with median carina, apex clearly excavated at middle; forewings with a pair of large basal white maculae starting below pronotum and reaching half of metanotal elevation, and three fainter maculae apically (Fig. 2A, C, 3A); female abdominal laterotergites not distinctly elevated or sinuous, not reflected over mediotergites (Fig. 2A); venter of female abdomen not narrowed posteriorly (Fig. 2B, 3B).

Notes

Hebrus azevedoi **sp. nov.** shares several characteristics with *H. cunhai* **sp. nov.** and both occur in the eastern portion of the state of Pará. *Hebrus cunhai* **sp. nov.** overlaps with *H. azevedoi* **sp. nov.** in the municipality of Paragominas and they share several features, like the similar size and general color, unremarkable body vestiture, the metanotal elevation with a median carina, the forewings with three faint apical maculae, and the unmodified female abdomen. However, the former has the most central two punctations on the row between the pronotal lobes larger than the others and placed close together, giving the impression of a single deep punctation in dry specimens (vs. punctations clearly distinguished in dry specimens), and bears a slight excavation at the apex of the metanotal elevation (Figs. 6A, 6D, 7D–F) (vs. apex clearly excavated at middle; Fig. 2A, 2C, 3A). *Hebrus azevedoi* **sp. nov.** is also comparable to *H. gloriosus* in terms of body size, general yellowish color, and excavated posterior margin of the metanotal elevation. However, they can be immediately distinguished by the following features: 1) moderately long, decumbent setae on body in the former (Fig. 2) (vs. long, erect setae; Figs. 12–14); pronotal collar more or less concolorous with posterior lobe (Fig. 2A, 2D, 3A, 3C) (vs. distinctly contrasting; Figs. 12A, 12C, 13A–B, 14A, 14C); and the different maculae on forewings (compare Fig. 2 and Figs. 12A, 13A–B, 14A). *Hebrus canejoi* **sp. nov.** and *H. franciscanus* **sp. nov.** share the similar yellowish-brown color and unremarkable body vestiture with *H. azevedoi* **sp. nov.**, but they are readily separated from it by the much smaller body length (1.31–1.46 vs. 2.32).

Etymology

This species is dedicated to Prof. Dr. Carlos Augusto Silva de Azevêdo (Universidade Estadual do Maranhão), in recognition of his significant contribution to the study of aquatic insects in the state of Maranhão, Brazil.

Distribution

Brazil: Pará (Fig. 41).

***Hebrus canejoi* sp. nov.**

Figs. 4, 5, 41

Type material examined. Holotype. BRAZIL – **Rio Grande do Norte** • Poço Branco, Represa no Rio Ceará-Mirim, rede D; 05°38'01"S, 35°39'11"W; 21.IX.2019; A.L. Melo & R.P.R. Canejo leg.; 1 macropterous male, CEIOC XXX.

Description

Macropterous male (Fig. 4). **Holotype.** BL 1.46; HL 0.30; HW 0.34; EYE 0.06; IOW 0.18; ANT I 0.12; ANT II 0.13; ANT III 0.15; ANT IV 0.24; AWP 0.40; AWP 0.62; PL 0.32; MESW 0.28; MESL 0.04; METW 0.24; METL 0.14; FORELEG, FEM 0.30, TIB 0.28, TAR I 0.03, TAR II 0.12; MIDLEG, FEM 0.30, TIB 0.30, TAR I 0.02, TAR II 0.11; HINDLEG, FEM 0.42, TIB 0.44, TAR I 0.02, TAR II 0.10.

General coloration light brown, except for base of ocellus, transverse areas on both pronotal lobes, mesoscutellum, part of metanotal elevation, and abdominal sterna darker brown. Eye yellowish-brown. Legs light yellow. Forewings brown, with a pair of large white basal maculae starting below pronotum and slightly surpassing apex of metanotal elevation, and four oval white maculae apically: one more basal, a pair on sides, and one more elongated and distal (Fig. 6A). Body densely covered by long, decumbent white setae.

Head slightly wider than long; width across the eyes 1.13 times length; interocular width 3 times eye width. Buccula elongated, slightly curved. Antennomere I cylindrical, slightly curved; antennomere II cylindrical; antennomeres III–IV thinner than I–II. Antennal formula: IV > III > II > I. Pronotum slightly depressed between lobes, with a transverse row of moderately deep punctations on collar, a moderately shallow rounded impression centrally, and a row of ten moderately deep punctations between lobes; most central two punctations on row between lobes clearly distinguished in dry specimens; posterior lobe slightly depressed at anterior half, with two pairs of deep punctations on anterior portion posteriorly to the central punctations between lobes, and a row of smaller punctuations adjacent to posterior margin, continuing laterally near humeri; humerus elevated (Fig. 4A). Mesoscutellum 7 times wider than long. Metanotal elevation trapezoidal, 1.71 times wider than long; disc with raised

margins, forming a uniform central depression, without median carina; apical margin with a subquadrate notch (Fig. 4A). Forewings reaching posterior margin of abdomen. Venter of abdomen without distinct notches or projections (Fig. 4B, 4C). Paramere curved, with rounded apex (Fig. 5).

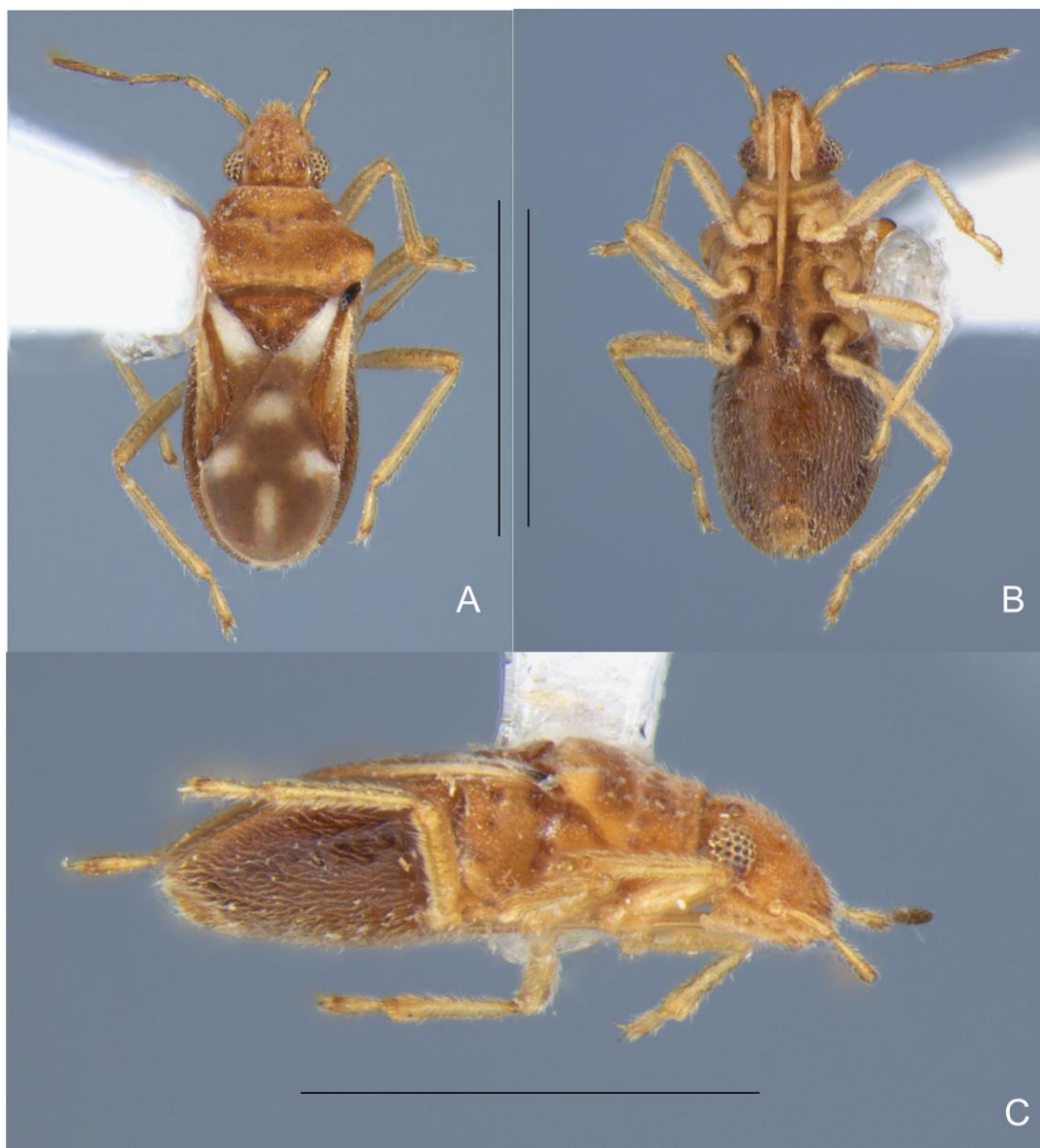


Figure 4. *Hebrus canejo* **sp. nov.**, macropterous male, holotype, habitus. **A.** Dorsal view. **B.** Ventral view. **C.** Lateral view. Scale bars: 1.0 mm.

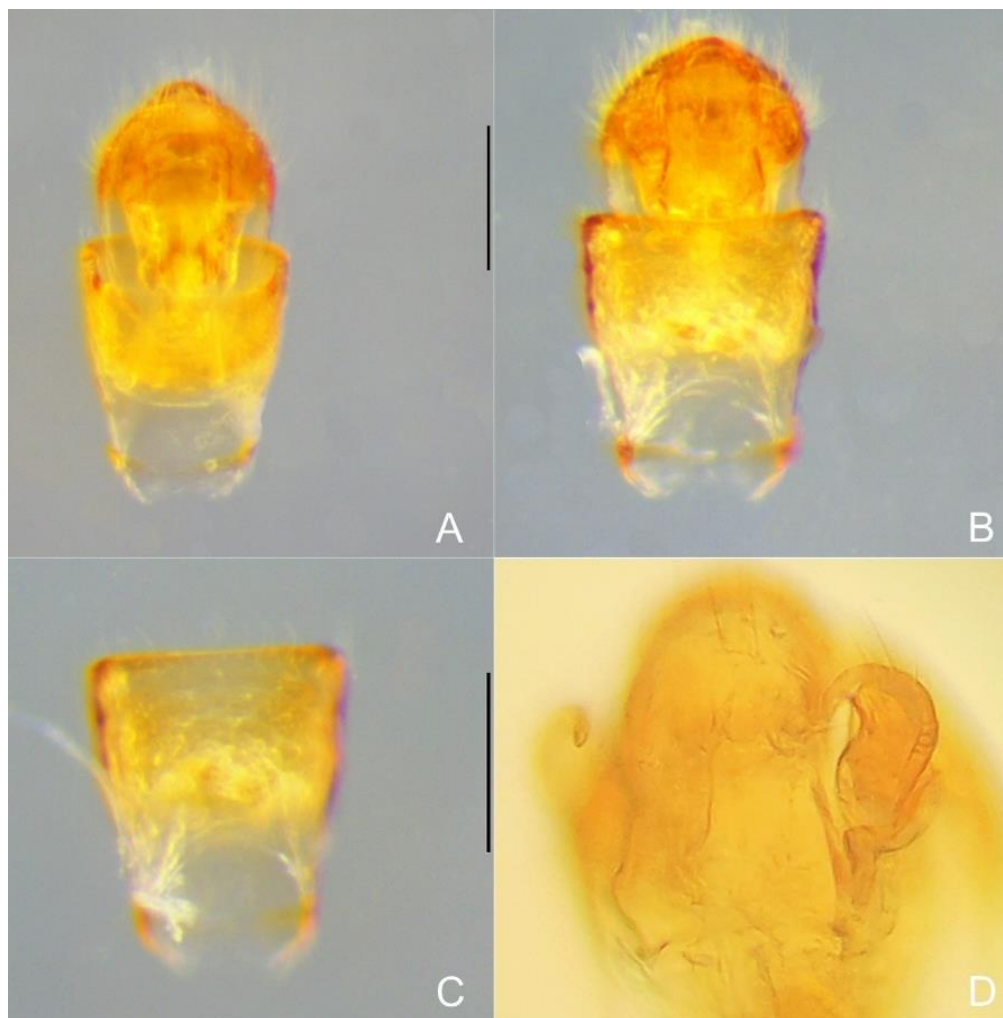


Figure 5. *Hebrus canejai* sp. nov., holotype, male genitalia. **A–C.** Genital capsule: **A.** Dorsal view. **B–C.** Ventral view. **D.** Paramere. Scale bars: 0.1 mm (**A, B, C**).

Diagnosis

Body covered by long, decumbent white setae; without distinct pruinosity around eyes or pronotal punctations; most central two punctations on row between pronotal lobes clearly distinguished in dry specimens; metanotal elevation without median carina, apex with subquadrate notch (Fig. 4A); forewings with a pair of large white basal maculae starting below pronotum and slightly surpassing apex of metanotal elevation, and four oval white maculae apically (Fig. 4A); venter of male abdomen without distinct notches or projections (Fig. 4B, 4C); paramere curved, with rounded apex (Fig. 7).

Notes

Hebrus canejoi **sp. nov.** is most similar to *H. franciscanus* **sp. nov.** (Fig. 8) and *H. parvulus* (Figs. 26–29). The new species can be distinguished from *H. parvulus* based on the smaller body length (1.46 vs. ~2.0–2.4), the lighter general color (compare Figs. 4, 26, 27 and 29), the notch at the apex of the metanotal elevation (vs. apex truncated), and the differently shaped paramere (compare Fig. 5D with 28D). *Hebrus franciscanus* **sp. nov.** is most similar to *H. canejoi* **sp. nov.** However, the former is slightly smaller (body length 1.31 vs. 1.46), has the apical margin of the metanotal elevation truncated (vs. with a subquadrate notch), and bears differently shaped paramere (compare Fig. 5D and 8E). They are both comparable with *H. parvulus*, but this is a larger (body length ~2.0–2.4) and darker species (Figs. 26, 27, 29), with three apical white forewings maculae instead of four, and a different paramere (Fig. 28D).

Etymology

This species is named in honor of our lab colleague MSc. Rafael Pablo Rodrigues Canejo, who collected the type specimen in his home state.

Distribution

Brazil: Rio Grande do Norte (Fig. 41).

Hebrus cunhai **sp. nov.**

Figs. 6, 7, 41

Type material examined. Holotype. BRAZIL – **Pará** • Paragominas, Rio Capim, Cikel,; 03°34'43"S, 48°46'51"W; 16.IX.2012; L.B. Calvão leg.; 1 macropterous male, CEIOC XXXX.

Paratypes. BRAZIL – **Pará** • same data as holotype, except 03°42'30"S, 48°43'05"W; 14.IX.2012; 1 macropterous female, CEIOC XXXX • Tailândia, Rio Acará, Agropalma, palma, 01°55'40"S, 48°02'00"W; 29.VIII.2015; E.J. Cunha leg.; 1 macropterous male, MPEG XXXX • Ipixuna, Rio Capim, fazenda, pasto; 02°44'01"S, 47°28'56"W; 29.VII.2015; E.J. Cunha leg.; 1 macropterous female, CEIOC XXXX. • Parauapebas, Parauapebas/Itacaiúnas, Flona [Floresta Nacional] de Carajás, 06°22'30"S, 50°20'23"W; 09.X.2020; F.G. Carvalho leg.; 1 macropterous female, CEIOC XXX.

Description

Macropterous male (Fig. 6). **Holotype (Paratype)**. BL 2.15 (2.40); HL 0.42 (0.31); HW 0.48 (0.45); EYE 0.13 (0.11); IOW 0.28 (0.24); ANT I 0.23 (0.23); ANT II 0.20 (0.20); ANT III 0.25 (0.26); ANT IV lost (0.39); AWP 0.48 (0.43); HWP 0.80 (0.80); PL 0.57 (0.61); MESW 0.36 (0.34); MESL 0.06 (0.07); METW 0.32 (0.32); METL 0.18 (0.20); FORELEG; FEM 0.47 (0.44), TIB 0.47 (0.49), TAR I 0.05 (0.05), TAR II 0.15 (0.16); MIDLEG; FEM 0.46 (0.48), TIB 0.47 (0.52), TAR I 0.05 (0.05), TAR II 0.16 (0.13); HINDLEG; FEM 0.64 (0.47), TIB 0.69 (0.55), TAR I 0.05 (lost), TAR II 0.18 (lost).

General color dark brown, except antenna, buccula, labium, legs, and terminalia light brown to yellow. Forewings brownish, with a pair of large white maculae starting below pronotum and slightly surpassing apex of metanotal elevation, and three fainter maculae apically (Fig. 6A). Body covered by moderately long, decumbent setae, longer on abdomen.

Head wider than long, length 1.14 times width through eyes; width between eyes 2.15 times eye width. Buccula ventrally curved, conically produced posteriorly (Fig. 6D). Antennomere I cylindrical, slightly curved, antennomere II cylindrical; width of antennomeres III–IV approximately half than antennomere I. Antennal formula: IV > III > I > II.

Pronotum with a transverse row of moderately deep punctations on collar and a row of eight moderately deep punctations between lobes; most central two punctations on row between lobes larger than others and placed close together, giving impression of a single deep punctation in dry specimens; posterior with a row of smaller punctuations adjacent to posterior margin, continuing laterally near humeri; disc with six rows of small punctations; humerus elevated (Fig. 6A). Mesoscutellum 6 times wider than long. Metanotal elevation subtrapezoidal, 1.7 times wider than long; disc with raised margins and two submedian depressions divided by a median carina; apex slightly excavated at middle. Forewings reaching posterior margin of abdomen. Venter of abdomen without distinct notches or projections (Fig. 6B, 6C). Paramere long, with subquadrate apex and two thorn-shaped projections (Fig. 6E).



Figure 6. *Hebrus cunhai* sp. nov., macropterous male holotype. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Habitus, lateral view. **D.** Head and thorax, dorsal view. **E.** Genital capsule, and Paramere lateral view. Scale bars: 1.0 mm (**A–C**); 0.5 mm (**D**).

Macropterous females (Fig. 7). **Paratypes.** BL 2.14–2.26; HL 0.30–0.44; HW 0.46–0.47; EYE 0.09–0.13; IOW 0.25–0.27; ANT I 0.24–0.28; ANT II 0.20–0.24 ANT III 0.23–0.25 ANT IV 0.42–0.45; AWP 0.43–0.456; HWP 0.83–0.90; PL 0.50–0.60; MESW 0.37–0.38; MESL 0.06–0.09; METW 0.27–0.32; METL 0.15–0.23; FORELEG; FEM 0.42–0.46, TIB 0.47–0.48, TAR I 0.03–0.05, TAR II 0.13–0.16; MIDLEG; FEM 0.45–0.49, TIB 0.47–0.52, TAR I 0.03–0.05, TAR II 0.13–0.16; HINDLEG; FEM 0.45–0.67, TIB 0.43–0.73, TAR I 0.03–0.06, TAR II 0.14–0.17.

Very similar to male but slightly lighter. Abdominal laterotergites not distinctly elevated or sinuous, not reflected over mediotergites (Fig. 7A–C); venter of female abdomen not narrowed posteriorly.



Figure 7. *Hebrus cunhai* sp. nov., macropterous females paratypes. **A–C.** Habitus, dorsal view. **D–F.** Head and thorax, dorsal view. Scale bars: 1.0 mm (**A, B, C**); 0.5 mm (**D, E, F**).

Diagnosis

Body covered by moderately long, decumbent setae, longer on abdomen; without distinct pruinosity around eyes or pronotal punctations; most central two punctations on row between pronotal lobes larger than others and placed close together, giving impression of a single deep punctation in dry specimens; metanotal elevation with median carina, apex slightly excavated at middle (Fig. 6A, 6D); forewings with a pair of large white maculae starting below pronotum and slightly surpassing apex of metanotal elevation, and three fainter maculae apically (Fig. 6A, 6D); female abdominal laterotergites not distinctly elevated or sinuous, not reflected over mediotergites (Fig. 7A–C); venter of female abdomen not narrowed posteriorly; venter of male abdomen without distinct notches or projections; paramere long, with subquadrate apex and two thorn-shaped projections (Fig. 6E).

Notes

Hebrus cunhai **sp. nov.** overlaps with *H. azevedoi* **sp. nov.** in the municipality of Paragominas and they share several features, like the similar size and general color, unremarkable body vestiture, the metanotal elevation with a median carina, the forewings with three faint apical maculae, and the unmodified female abdomen. However, the former has the most central two punctations on the row between the pronotal lobes larger than the others and placed close together, giving the impression of a single deep punctation in dry specimens (vs. punctations clearly distinguished in dry specimens), and bears a slight excavation at the apex of the metanotal elevation (Fig. 6A, 6D) (vs. apex clearly excavated at middle; Fig. 2A, 2C). Additionally, the basal white maculae of the forewings are larger in *H. cunhai* **sp. nov.** (compare Fig. 2A, 2C and Fig. 6A, 6D).

Etymology

This species is named in honor of Dr. Erlane José Cunha (Universidade Federal do Pará), in recognition of his significant contribution to the study of aquatic insects in the state of Pará, Brazil.

Distribution

Brazil: Pará (Fig. 41).

Hebrus franciscanus **sp. nov.**

Figs. 8, 41

Type material examined. Holotype. BRAZIL – **Alagoas** • Piaçabuçu, Rio São Francisco; 10°23'55"S, 36°26'46"W; 02.V.2018; C.F.B. Floriano, J.M.S. Rodrigues & O.M. Magalhães leg.; 1 macropterous male, CEIOC 83101.

Description

Macropterous male (Fig. 8). **Holotype.** BL 1.31; HL 0.29; HW 0.34; EYE 0.07; IOW 0.20; ANT I 0.12; ANT II 0.14; ANT III 0.14; ANT IV 0.23; AWP 0.39; HWP 0.52; PL 0.28; MESW 0.24; MESL 0.04; METW 0.26; METL 0.16; FORELEG, FEM 0.30, TIB 0.30, TAR I 0.03, TAR II 0.11; MIDLEG, FEM 0.30, TIB 0.30, TAR I 0.02, TAR II 0.10; HINDLEG, FEM 0.40, TIB 0.44, TAR I lost, TAR II lost.

General color light brown, except base of ocellus, transverse areas on both pronotal lobes, mesoscutellum and abdominal sterna darker brown. Eye reddish-brown. Legs yellow. Forewings dark brown, with a pair of large white maculae starting below pronotum and surpassing apex of metanotal elevation, and four oval white maculae apically: one more basal, one pair on sides, and one more elongated and more distal (Fig. 8A). Body densely covered by long, decumbent white setae.

Head wider than long; width through eyes 1.17 times length; interocular width 2.86 times eye width. Buccula elongated, slightly curved. Antennomere I cylindrical, slightly curved; antennomere II cylindrical; width of antennomeres III–IV approximately half of antennomere I. Antennal formula: $IV > II = III > I$. Pronotum slightly depressed medially on anterior lobe, with a transverse row of moderately deep punctations on collar, a moderately shallow rounded impression centrally, and a row of ten moderately deep punctations between lobes; two most central punctations on row between lobes clearly distinguished in dry specimens; posterior lobe depressed on anterior half, with two pairs of deep punctations centrally on anterior region, following central punctations between lobes, and a row of smaller punctations adjacent to posterior margin, continuing laterally close to humeri; humeri elevated (Fig. 8A, 8D). Mesoscutellum 6 times wider than long. Metanotal elevation trapezoidal, 1.62 times wider than long; disc with raised margins, forming a uniform central depression, without carina; apical margin truncated (Fig. 8A). Forewings almost reaching posterior margin of abdomen. Venter of abdomen without distinct notches or projections (Fig. 8B, 8D). Paramere strongly curved, with apex slightly pointed (Fig. 8E).

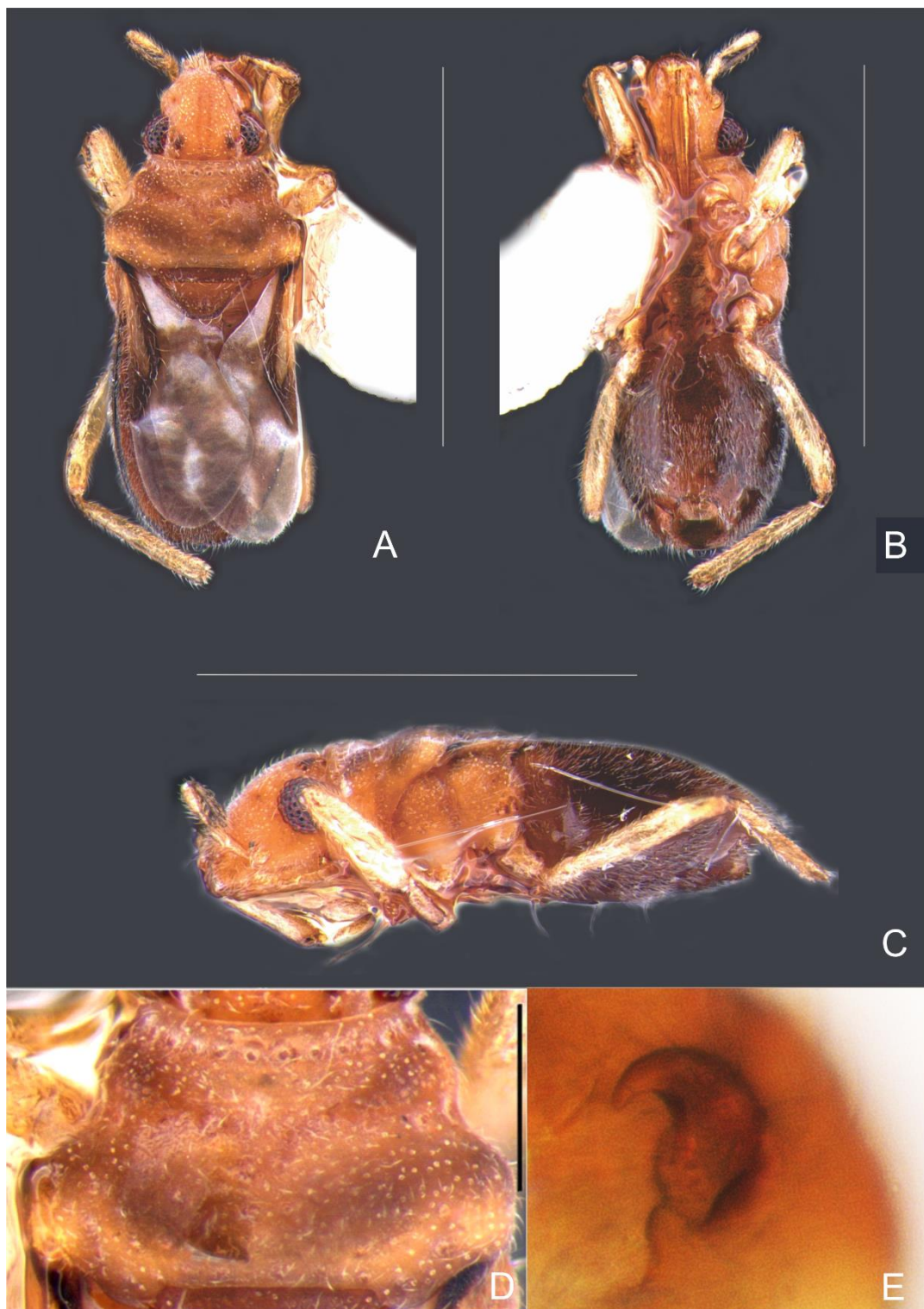


Figure 8. *Hebrus franciscanus* **sp. nov.**, macropterous male, holotype. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Habitus, lateral view. **D.** Pronotum, dorsal view. **E.** Paramere lateral view. Scale bars: 1.0 mm (**A–C**), 0.2 mm (**D**).

Diagnosis

Body densely covered by long, decumbent white setae; without distinct pruinosity around eyes or pronotal punctations; most central two punctations on row between pronotal lobes clearly distinguished in dry specimens; metanotal elevation without median carina, apex truncated (Fig. 8A); forewings with a pair of large white maculae starting below pronotum and surpassing apex of metanotal elevation, and four oval white maculae apically (Fig. 8A); venter of male abdomen without distinct notches or projections (Fig. 8B, 8D); paramere strongly curved, with apex slightly pointed (Fig. 18E).

Notes

For a comparison between *H. franciscanus* **sp. nov.** and *H. canejo* **sp. nov.**, see the notes in the description *H. canejo* **sp. nov.**

Etymology

The specific epithet, *franciscanus*, refers to São Francisco River, where the type specimen was collected.

Distribution

Brazil: Alagoas (Fig. 41).

Hebrus giehl **sp. nov.**

Figs. 9, 10, 11, 42, Table 1

Type material examined. Holotype. BRAZIL – **Goiás** • Aragarças, córrego de água quente [afluente do Rio Araguaia]; 15°52'58.7"S, 52°00'16.6"W; 24.V.2014; N.F.S. Giehl leg.; 1 macropterous male, CEIOC XXX. **Paratypes.** • Same data as holotype; 7 macropterous males, 10 macropterous females, CEIOC xxxx • Aragarças, Rio Araguaia; 15°52'58.7"S, 52°00'16.6"W; 24.V.2014; N.F.S. Giehl leg.; 9 macropterous males, 11 macropterous females, CEIOC xxxx • Same, except; 31.V.2016; F.F.F. Moreira; F.S. Motta; T.S. Martins; J.M.S. Rodrigues legs.; 3 macropterous males, 22 macropterous females, CEIOC 9005.

Additional material examined. BRAZIL – **Alagoas** • Igaci, Rodovia BR-316, Rio Lunga; 09°31'52"S, 36°31'59"W; 06.VII.2018; C.F.B. Floriano, J.M.S. Rodrigues & J.F. Barbosa leg.; 1 macropterous male, CEIOC 83106 • Same, except alt. 235 m; 09°31'56"S, 36°31'57"W;

23.V.2019; J.M.S. Rodrigues, W. Sousa & F.F.F. Moreira leg.; 1 macropterous male, CEIOC 83107. – **Ceará** • Aiuaba, Estação Ecológica de Aiuaba, estrada, light trap; alt. 634 m; 06°43'33.1"S, 40°18'23.4"W; 05.IV.2021; C.C. Gonçalves leg.; 6 macropterous males, CEIOC xxxx • Same, except J.M.S Rodrigues leg.; 4 macropterous males, 5 macropterous females, CEIOC xxxx • Same, except R. Carrenho leg.; 2 macropterous males, 1 macropterous female, CEIOC xxxx Same, except lagoa; 470 m a.s.l.; 06°36'28.8"S, 40°09'00.9"W; 05.VI.2021; J.M.S. Rodrigues & F.F.F. Moreira leg. • Same, except J.M.S. Rodrigues leg.; 16 macropterous males, 21 macropterous females, CEIOC • Same, except estrada, light trap; alt. 505 m; 06°41'50.7"S, 40°16'54.8"W; 08.IV.2021; C.C. Gonçalves leg.; 15 macropterous males, CEIOC xxxx • Same, except A.S. Freitas leg.; 2 macropterous females, CEIOC xxxx • Same, except J.M.S. Rodrigues leg.; 33 macropterous males, CEIOC xxxx.

Description

Macropterous male (Fig. 9, Table 1). General color dark brown to black, except antenna, buccula, labium, legs, and terminalia light brown to yellow. Forewings brown, with a pair of small diffuse white macula starting below pronotum and reaching approximately middle of metanotal elevation, and three fainter maculae apically (Fig. 9A, 9C). Body covered by moderately long decumbent setae, longer on antennae, legs, and abdomen.

Head wider than long, length 1.8 times width through eyes; width between eyes 1.8 times eye width. Buccula ventrally curved, conically produced posteriorly. Antennomere I cylindrical, slightly curved, antennomere II cylindrical; antennomeres III–IV thinner than antennomere I. Antennal formula: $IV > III > I > II$. Pronotum with a transverse row of moderately deep punctations on collar and a transverse row of eight moderately deep punctations between lobes; most central two punctations on row between lobes clearly distinguished in dry specimens; posterior lobe with a row of small punctations adjacent to posterior margin, continuing laterally close to humeri, and more irregular small punctations on disc; humeri elevated (Fig. 9A, 9C). Mesoscutellum about 4.6 times wider than long. Metanotal elevation subtrapezoidal, about 1.8 times wider than long; disc with raised margins and two submedian depressions divided by a median carina; apex without median notch. Forewings exposing lateral margin of abdominal laterotergites, reaching posterior margin of abdomen. Posterior margin of abdominal sternum VII with a central notch (Fig. 9B, 9D). Abdominal segment VIII with a curved projection ventrally (Fig. 10C, 10F). Paramere concave, with a basal projection, projected apically (Fig. 12E).

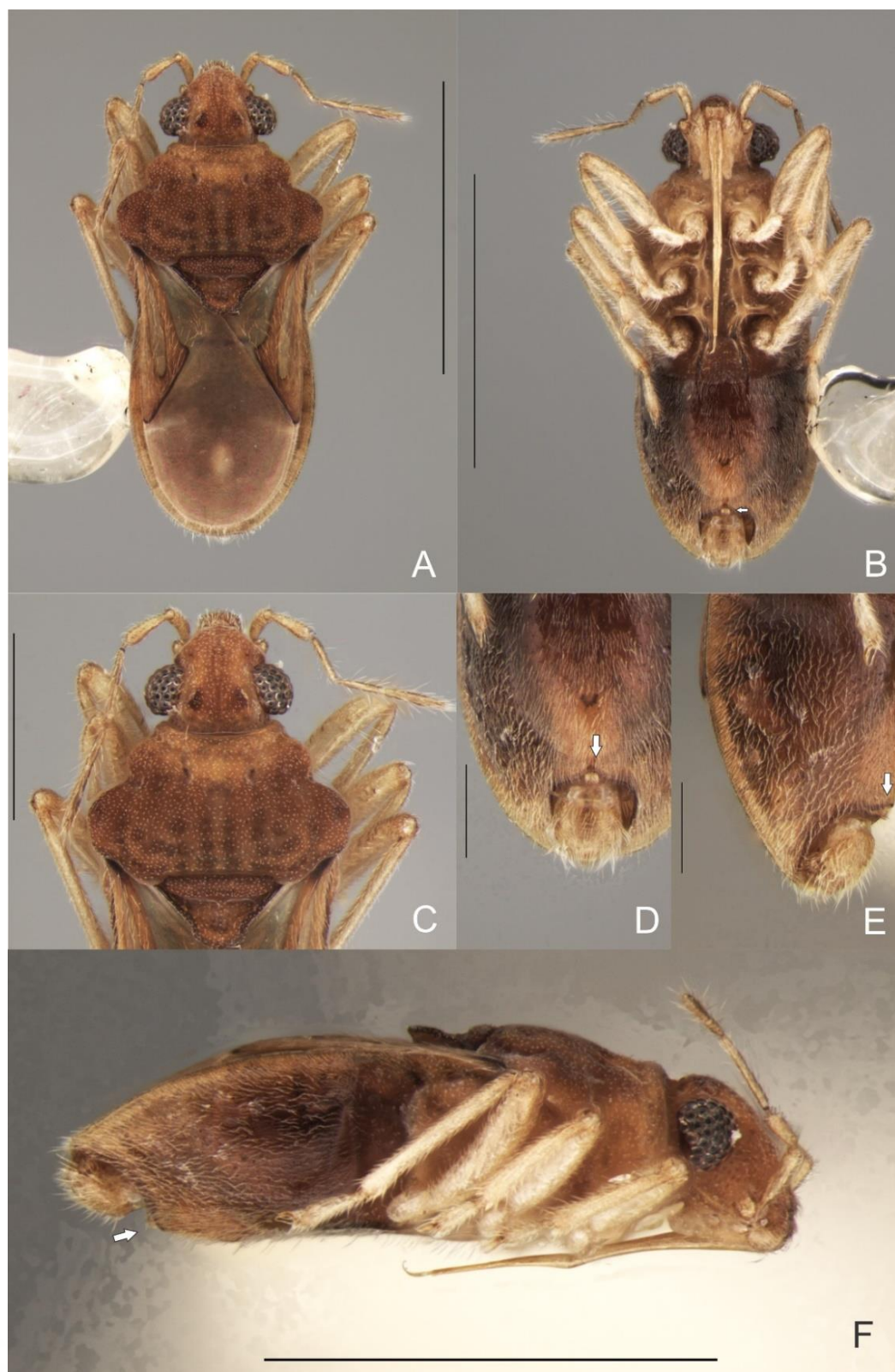


Figure 9. *Hebrus giehlai* sp. nov., macropterous male holotype. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Head and thorax, dorsal view. **D.** Part of abdomen, ventral view. **E.** Part of abdomen, lateral view. **F.** Habitus, lateral view. White arrow indicating projection (**B**, **D**, **E**, **F**) and notch (**B**, **F**). Scale bars: 1.0 mm (**A**, **B**, **F**); 0.5 mm (**C**), 0.2 mm (**D**, **E**).

Table 1. Measurements obtained from the holotype, and five males and five females paratypes of *Hebrus giehlai* **sp. nov.**

Structure	Male holotype	Paratypes					
		Males			Females		
		Min	Mean	Max	Min	Mean	Max
Body length	1.50	1.50	1.51	1.57	1.56	1.69	1.80
Head length	0.21	0.19	0.21	0.24	0.17	0.24	0.34
Head width through eyes	0.37	0.37	0.38	0.39	0.39	0.41	0.43
Maximum eye width	0.10	0.10	0.10	0.10	0.08	0.09	0.10
Interocular width	0.18	0.18	0.18	0.20	0.21	0.22	0.23
Length of antennomere I	0.14	0.13	0.13	0.16	0.09	0.10	0.12
Length of antennomere II	0.11	0.11	0.11	0.11	0.12	0.13	0.14
Length of antennomere III	0.16	0.16	0.16	0.16	0.10	0.15	0.17
Length of antennomere IV	0.22	0.22	0.24	0.26	0.33	0.33	0.34
Pronotum length at midline	0.42	0.42	0.46	0.52	0.48	0.50	0.55
Anterior width of pronotum	0.66	0.66	0.69	0.72	0.71	0.74	0.83
Humeral width of pronotum	0.32	0.32	0.34	0.36	0.34	0.36	0.41
Mesoscutellum length	0.28	0.28	0.30	0.32	0.31	0.32	0.36
Mesoscutellum width	0.06	0.05	0.05	0.06	0.06	0.06	0.07
Metanotum length	0.28	0.26	0.28	0.30	0.27	0.29	0.32
Metanotum width	0.13	0.13	0.14	0.15	0.16	0.16	0.17
Foreleg							
Length of femur	0.31	0.31	0.33	0.35	0.32	0.33	0.37
Length of tibia	0.32	0.32	0.33	0.35	0.33	0.35	0.37
Length of tarsomere I	0.03	0.03	0.03	0.03	0.03	0.04	0.05
Length of tarsomere II	0.13	0.11	0.12	0.13	0.1	0.11	0.12
Midleg							
Length of femur	0.34	0.32	0.33	0.36	0.32	0.33	0.34
Length of tibia	0.32	0.31	0.31	0.32	0.33	0.34	0.35
Length of tarsomere I	0.03	0.03	0.03	0.04	0.03	0.03	0.04
Length of tarsomere II	0.11	0.11	0.11	0.12	0.10	0.11	0.13
Hindleg							
Length of femur	0.42	0.42	0.43	0.45	0.39	0.44	0.48
Length of tibia	0.49	0.49	0.50	0.54	0.51	0.52	0.55
Length of tarsomere I	0.04	0.02	0.03	0.04	0.03	0.03	0.04
Length of tarsomere II	0.13	0.13	0.14	0.16	0.15	0.15	0.16

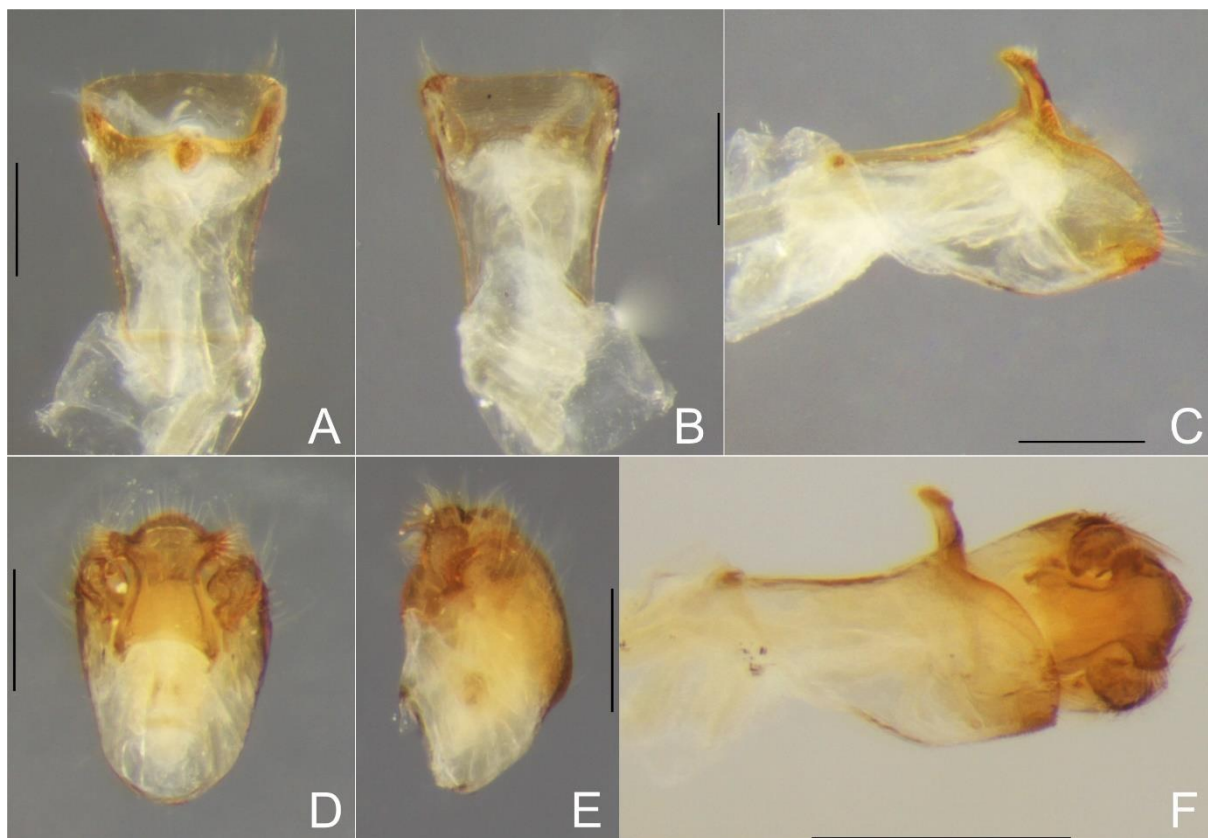


Figure 10. *Hebrus giehlæ* **sp. nov.**, paratype, male genitalia. **A–C.** Abdominal segment VIII: **A.** Dorsal view. **B.** Ventral view. **C.** Lateral view. **D–F.** Genital capsule: **D.** Ventral view. **E.** Lateral view. **F.** Ventral view. Scale bars: 0.1 mm (**A, B, C, D**), Scale bar: 0.2 (**F**).

Macropterous female (Fig. 11, Table 1). Similar to male. Abdominal laterotergites not distinctly elevated or sinuous, not reflected over mediotergites (Fig. 11B). Venter of abdomen not narrowed posteriorly (Fig. 11B). Posterior margin of abdominal sternum VII without notch (Fig. 11B). Abdominal segment VIII without ventral projection (Fig. 11B).



Figure 11. *Hebrus giehliae* **sp. nov.**, macropterous female, paratype, habitus. **A.** Dorsal view. **B.** Ventral view. Scale bars: 1.0 mm.

Diagnosis

Body covered by moderately long decumbent setae, longer on antennae, legs, and abdomen; without distinct pruinosity around eyes or pronotal punctations; most central two punctations on row between pronotal lobes clearly distinguished in dry specimens; metanotal elevation with median carina, apex without notch (Figs. 9A, 9C, 11A); forewings with a small diffuse white macula starting below pronotum and reaching approximately middle of metanotal elevation, and three fainter maculae apically (Figs. 9A, 9C, 11A); female abdominal laterotergites not distinctly elevated or sinuous, not reflected over mediotergites (Fig. 11); venter of female abdomen not narrowed posteriorly (Fig. 11B); posterior margin of male abdominal sternum VII with a central notch (Fig. 9B, 9D); male abdominal segment VIII with a curved projection ventrally (Fig. 9C); paramere concave, with a basal projection, projected apically (Fig. 10E).

Notes

Representatives of *H. giehliae* **sp. nov.** were collected in a small hot spring tributary to Araguaia River. Males can be immediately recognized by the notched posterior margin of abdominal sternum VI (Fig. 9B, 9D), the curved projection on the venter of abdominal segment VII (Fig.

9B, 9D-F) and the oddly shaped paramere (Fig. 10E). Females can be distinguished from those of superficially similar species (*H. nordestinus* **sp. nov.** and *H. priscus*) by the combination of most central two punctations on row between pronotal lobes clearly distinguished in dry specimens, apex of metanotal projection without notch (Fig. 11A), and forewings with a small diffuse white macula starting below pronotum and reaching approximately middle of metanotal elevation, and three fainter maculae apically (Fig. 11A).

Etymology

This species is named in honor of Dr. Nubia França da Silva Giehl (Universidade do Estado de Mato Grosso), in recognition of her important contribution to the study of aquatic insects in central-western Brazil.

Distribution

Brazil: Goiás, Ceará (Fig. 42).

Hebrus gloriosus Drake & Harris, 1943

Figs. 12, 13, 14, 42

Hebrus gloriosus Drake & Harris, 1943: 47 (original description).

Type material examined. Holotype. BRAZIL – [Mato Grosso] • Chapada [dos Guimarães]; [−15.5, −55.7]; 1 submacropterous female, Drake Collection, NMNH. **Paratype.** Same data as holotype; 1 submacropterous female, Drake Collection, NMNH.

Additional material examined. BRAZIL – Amazonas • Manaus, Reserva Ducke, 25 km NE of Manaus, pond along Igarapé Barro Branco; [−2.88, −59.97]; 50 m a.s.l.; 25.VIII.1989; D.A. Polhemus & J.T. Polhemus leg.; 1 macropterous female, 1 submacropterous female, 1 submacropterous male, J.T. Polhemus Collection, NMNH • Same, except in marginal vegetation in impounded area of forest stream; 120 m a.s.l.; 22.VII.1973; R.T. Schuh leg.; 1 submacropterous male, J.T. Polhemus Collection, NMNH.

Redescription

Females (Figs. 12, 13A, 13B). **Submacropterous holotype (Macropterous paratype).** BL 2.32 (2.35); HL 0.50 (0.52); HW 0.51 (0.52); EYE 0.12 (0.12); IOW 0.27 (0.27); OL 0.17

(0.16); ANT I 0.35 (0.32); ANT II 0.22 (0.22); ANT III 0.41 (lost); ANT IV 0.55 (lost); AWP 0.67 (0.67); HWP 0.85 (0.86); PL 0.50 (0.47); MESW 0.35 (0.37); MESL 0.05 (0.05); METW 0.40 (0.40); METL 0.15 (0.16); FORELEG, FEM 0.62 (0.65), TIB 0.65 (0.70), TAR I lost (0.05), TAR II lost (0.17); MIDDLEG, FEM lost (0.62), TIB lost (0.62), TAR I lost (0.03), TAR II lost (0.17); HINDLEG, FEM 0.80 (0.77), TIB 0.82 (0.82), TAR I 0.05 (0.03), TAR II 0.25 (0.25). **Submacropterous / Macropterous Non-types.** BL 2.20 / 2.40; HL 0.40 / 0.45; HW 0.50 / 0.50; EYE 0.12 / 0.11; IOW 0.25 / 0.25; OL 0.17 / 0.17; ANT I 0.27 / 0.30; ANT II 0.20 / 0.21; ANT III 0.35 / 0.35; ANT IV 0.47 / 0.56; AWP 0.62 / 0.65; HWP 0.77 / 0.90; PL 0.47 / 0.57; MESW 0.36 / 0.37; MESL 0.05 / 0.07; METW 0.30 / 0.42; METL 0.15 / 0.20; FORELEG, FEM 0.57 / 0.60, TIB 0.65 / 0.60, TAR I 0.03 / 0.03, TAR II 0.16 / 0.16; MIDDLEG, FEM 0.57 / 0.60, TIB 0.57 / 0.60, TAR I 0.03 / 0.03, TAR II 0.15 / 0.15; HINDLEG, FEM 0.75 / 0.77, TIB 0.77 / 0.80, TAR I 0.03 / 0.03, TAR II 0.17 / 0.20.

General color yellowish-brown, except for: head, posterior lobe of pronotum, mesonotum, metanotal elevation; apex of antennomere III and entire antennomere IV whitish-yellow; pronotal collar whitish (Figs. 12A, 12C, 13A). Forewings brown, darker on membrane; with veins lighter becoming lighter distally; with a pair of large white maculae starting below pronotum and surpassing apex of metanotal elevation, another whitish macula centrally, and a third on apical margin (Figs. 12A, 13A). Dorsum of body densely covered by long, erect golden-brown setae; legs and abdomen with moderately long light yellow setae (Figs. 12C–E).

Head as wide as long to slightly wider than long; width through eyes 1.0–1.25 times length; interocular width about 2.2 times eye width. Buccula elongated, almost straight (Figs. 12D, 12E). Antennomere I cylindrical, slightly curved; antennomere II cylindrical; antennomeres III–IV thinner than antennomere I. Antennal formula: IV > III > I > II. Pronotum with a transverse row of small, moderately deep punctations on collar; anterior lobe with two large, deep punctations submedially; a row of eight punctations between lobes; most central two punctations on row between pronotal lobes clearly distinguished in dry specimens; posterior lobe with a row of small punctations adjacent to posterior margin, continuing laterally close to humeri, two longitudinal rows submedially, and a few sparse small punctations on disc; humeri elevated (Figs. 12A, 12C). Mesoscutellum about 7 times wider than long. Metanotal elevation trapezoidal, about 2.50 times wider than long; disc with raised margins and two submedian depressions divided by a median carina; apex with a wide median notch (Figs. 12A, 12C). Forewings with variable degree of development: almost completely covering abdominal

laterotergites and surpassing posterior margin of abdomen (Fig. 12A), exposing abdominal laterotergites more and not reaching posterior margin of abdomen (Fig. 12A), or exposing abdominal laterotergites even more and slightly surpassing posterior margin of abdominal mediotergite VI (Fig. 12B). Abdominal laterotergites not distinctly elevated or sinuous, not reflected over mediotergites (Fig. 12A). Venter of abdomen not narrowed posteriorly (Fig. 12B).

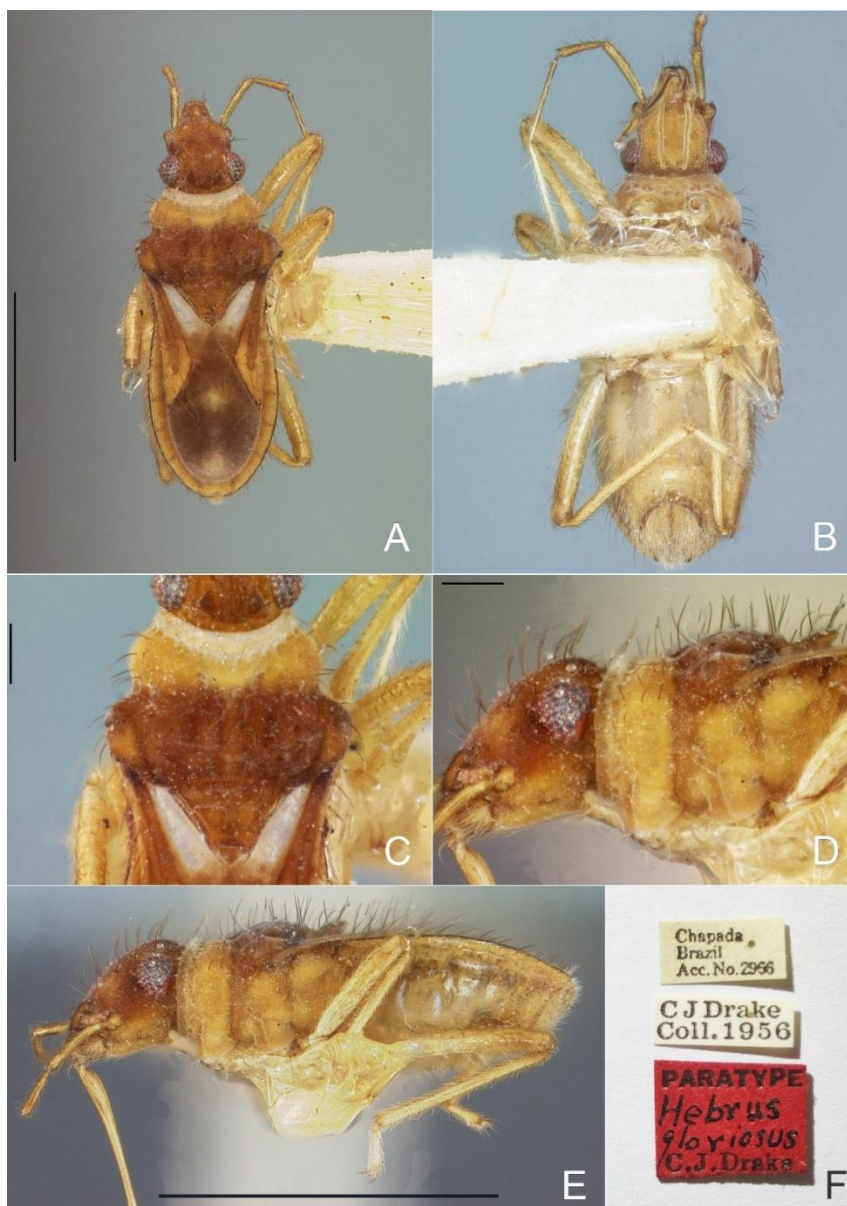


Figure 12. *Hebrus gloriosus*, submacropterous female, holotype. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Part of head and thorax, dorsal view. **D.** Head and thorax, lateral view. **E.** Habitus, lateral view, **F.** labels. Scale bars: 1.0 mm (**A, B, E**), 0.2 mm (**C, D**).



Figure 13. *Hebrus gloriosus*, habitus. **A.** Macropterous female. **B.** Submacropterous female from Amazonas. Scale bars: 1.0 mm.

Submacropterous males (Fig. 14). **Non-types.** BL 2.00–2.03; HL 0.35–0.37; HW 0.47; EYE 0.12; IOW 0.25; OL 0.15–0.16; ANT I 0.30; ANT II 0.17; ANT III 0.32–0.37; ANT IV 0.42–0.47; AWP 0.60; HWP 0.70; PL 0.45–0.47; MESW 0.30–0.31; MESL 0.05; METW 0.30–0.31; METL 0.15; FORELEG, FEM 0.57, TIB 0.57–0.60, TAR I 0.02–0.03, TAR II 0.15; MIDLEG, FEM 0.57–0.60, TIB 0.55–0.56, TAR I 0.02–0.03, TAR II 0.13–0.15; HINDLEG, FEM 0.72–0.75, TIB 0.75, TAR I 0.03, TAR II 0.18.

Similar to female. Posterior portion of abdominal sternum VI and anterior portion of VII forming a triangular projection.

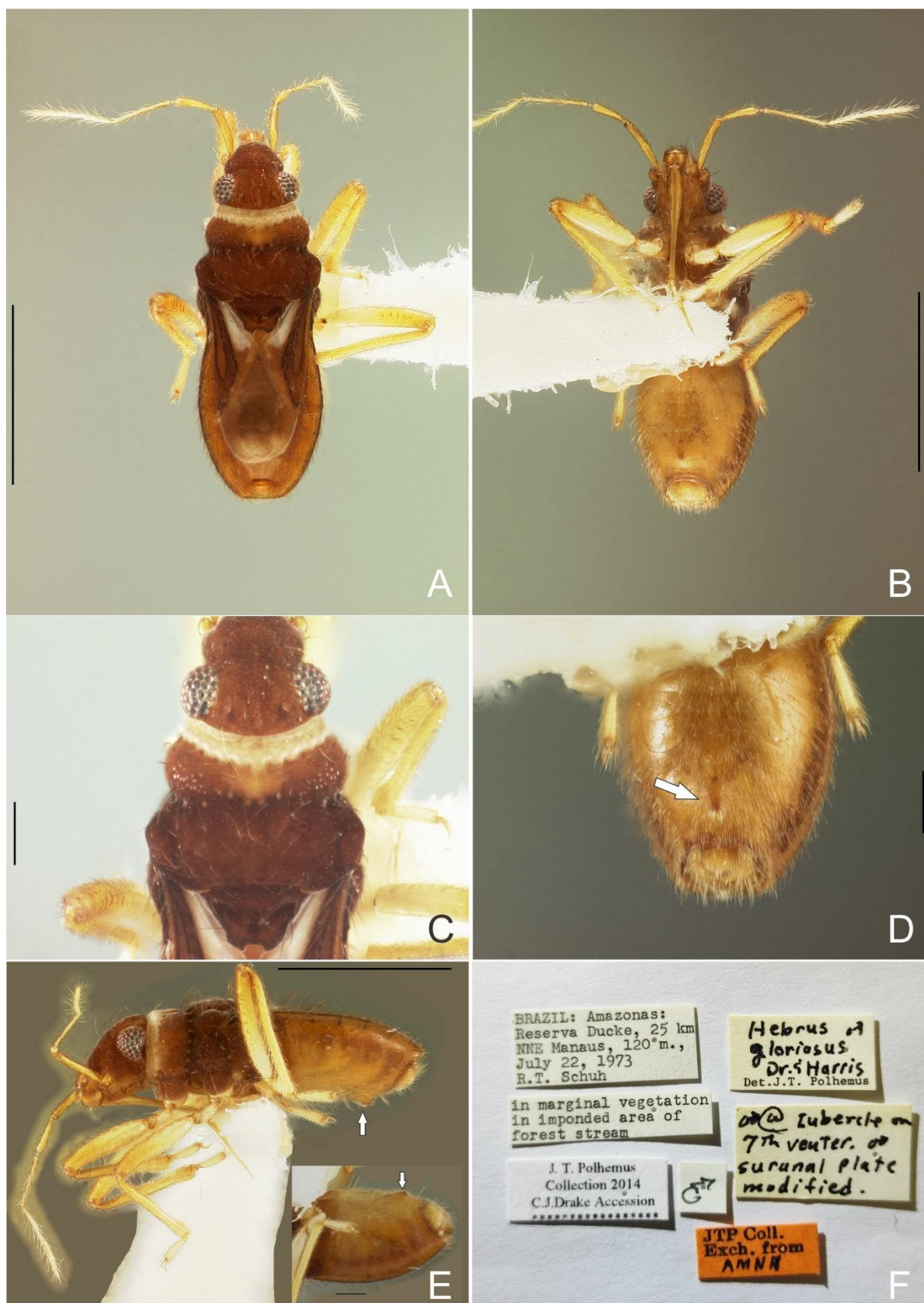


Figure 14. *Hebrus gloriosus*, submacropterous male from Amazonas. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Part of head and thorax, dorsal view. **D.** Part of abdomen, ventral

view. **E.** Habitus, lateral view, White arrows show abdominal projection. **F.** labels. Scale bars: 1.0 mm (**A, B, E**), 0.2 mm (**C, D, part E**).

Diagnosis

Dorsum of body densely covered by long, erect golden-brown setae (Figs. 12C–E, 13A, 13B); without distinct pruinosity around eyes or pronotal punctations; most central two punctations on row between pronotal lobes clearly distinguished in dry specimens; metanotal elevation with median carina, apex with a wide median notch (Figs. 12C, 13A, 13B, 14A, 14C); forewings (even in submacropterous specimens) with a pair of large white maculae starting below pronotum and surpassing apex of metanotal elevation, another whitish macula centrally, and a third on apical margin (Figs. 13A, 14A); female abdominal laterotergites not distinctly elevated or sinuous, not reflected over mediotergites (Fig. 13A, 14A); venter of female abdomen not narrowed posteriorly (Fig. 12B); posterior portion of male abdominal sternum VI and anterior portion of VII forming a triangular projection (Fig. 14B, 14D).

Notes

The male of *H. gloriosus* was previously unknown and displays a distinct projection on the posterior region of the abdomen (Fig. 14B, 14D). Unfortunately, we could not dissect and draw the paramere during our short visit to the NMNH to study the *Hebrus* material deposited there. Even females of this species can be easily identified based on the contrasting whitish color of antennomere IV and the pronotal collar (Figs. 12A, 13A), in addition to the dorsum of the body densely covered by long, erect golden-brown setae. The pattern of forewings maculae (Figs. 12A, 13A) is also not usual when compared to other species occurring in Brazil. Our material from Amazonas constitutes the first record of this species from the state. *Hebrus gloriosus*, *H. laeviventris* Champion, 1898, and *H. hirsutus* Champion, 1898 share similar body size, general yellowish-brown coloration, and a trapezoidal metanotal elevation with a median carina. However, they clearly differ in dorsal vestiture, forewing maculation pattern, and the shape of the apical notch of the metanotal elevation. *H. laeviventris* is characterized by a dorsum with short, recumbent, and inconspicuous setae and a simple forewing pattern, with a large white macula on the clavus and only two rounded maculae on the membrane; the metanotal elevation has a deep, distinctly quadrangular apical notch, and the abdomen lacks evident modifications. *H. gloriosus* is distinguished by a dorsum densely covered with long, erect, golden-brown setae, a highly contrasting forewing pattern with large basal white maculae surpassing the metanotal

elevation, whitish antennomere IV and pronotal collar, and, in males, a triangular projection formed by abdominal sterna VI and VII. *H. hirsutus* is characterized by extremely long, erect, dark setae, a more complex forewing maculation pattern with multiple membrane maculae, and a subquadrate apical notch of the metanotal elevation, with no evident abdominal modifications.

Distribution

Brazil: Amazonas, Mato Grosso (Fig. 42).

***Hebrus inpa* sp. nov.**

Figs. 15, 16, 17, 18, 42

Type material examined. Holotype. [BRAZIL] – [Amazonas] • [Presidente Figueiredo or Manaus]; [between IX.2002 and II.2003]; [A.M.O. Pes, D.L.V. Pereira & T.E. Bobot leg.]; 1 macropterous male, INPA XXXX. **Paratypes.** Same data as holotype; 2 macropterous females, XXXX.

Additional material examined. BRAZIL – **Amazonas** • Reserva Ducke, 25 km NE of Manaus, pond along Igarapé Barro Branco; [–2.88, –59.97]; 50 m a.s.l.; 25.VIII.1989; D.A. Polhemus & J.T. Polhemus leg.; 4 macropterous males, 6 macropterous females, J.T. Polhemus Collection, NMNH • Same, except Igarapé da Anta; [–2.9, –60.0]; 60 m a.s.l.; 25.VIII.1989; 2 macropterous males, 2 macropterous females; J.T. Polhemus Collection, NMNH • Reserva Ducke, 25 km NE Manaus; 120 m a.s.l.; 22.VII.1973; R.T. Schuh leg.; 3 macropterous males, 3 macropterous females; J.T. Polhemus Collection, NMNH.

Description

Macropterous male (Fig. 15). **Holotype.** BL 1.62; HL 0.25; HW 0.35; EYE 0.08; IOW 0.19; ANT I 0.16; ANT II 0.12; ANT III lost; ANT IV lost; AWP 0.42; HWP 0.60; PL 0.35; MESW 0.25; MESL 0.06; METW 0.24; METL 0.13; FORELEG, FEM 0.33, TIB 0.36, TAR I 0.03, TAR II 0.10; MIDLEG, FEM 0.37, TIB 0.40, TAR I 0.03, TAR II 0.11; HINDLEG, FEM 0.48, TIB 0.60, TAR I 0.03, TAR II 0.15.

General color dark brown, except antenna, buccula, labium, and legs light brown to yellow. Forewings with a pair of a large white maculae starting below pronotum and slightly surpassing apex of metanotal elevation, and five white maculae on membrane: one basally, one centrally,

one on each side, and one near apex (Figs. 15A). Body covered by moderately long, decumbent setae.

Head wider than long, length 1.4 times width through eyes; width between eyes about 2.4 eye width. Buccula ventrally curved, conically produced posteriorly. Antennomere I cylindrical, slightly curved; antennomere II cylindrical; antennomeres III–IV with about half width of antennomere I. Pronotum with a transverse row of moderately deep punctations on collar and a transverse row of eight moderately deep punctations between lobes; most central two punctations on row between lobes larger than others and placed close together, giving impression of a single deep punctation in dry specimens; posterior lobe with a row of small punctations adjacent to posterior margin, continuing laterally close to humeri, and four rows of small punctations on disc; humeri elevated (Figs. 15A, 17A, 18A). Mesoscutellum about 4.3 times wider than long. Metanotal elevation subtrapezoidal, about 1.8 times wider than long; disc with raised margins and two submedian depressions divided by a median carina; apex with a curved notch centrally. Forewings exposing lateral margins of abdominal laterotergites, almost reaching posterior margin of abdomen. Venter of abdomen without distinct notches or projections (Figs. 15B, 18B). Paramere with the apex more elongated and the basal half rounded, bearing long setae (Fig. 16C, 16D).

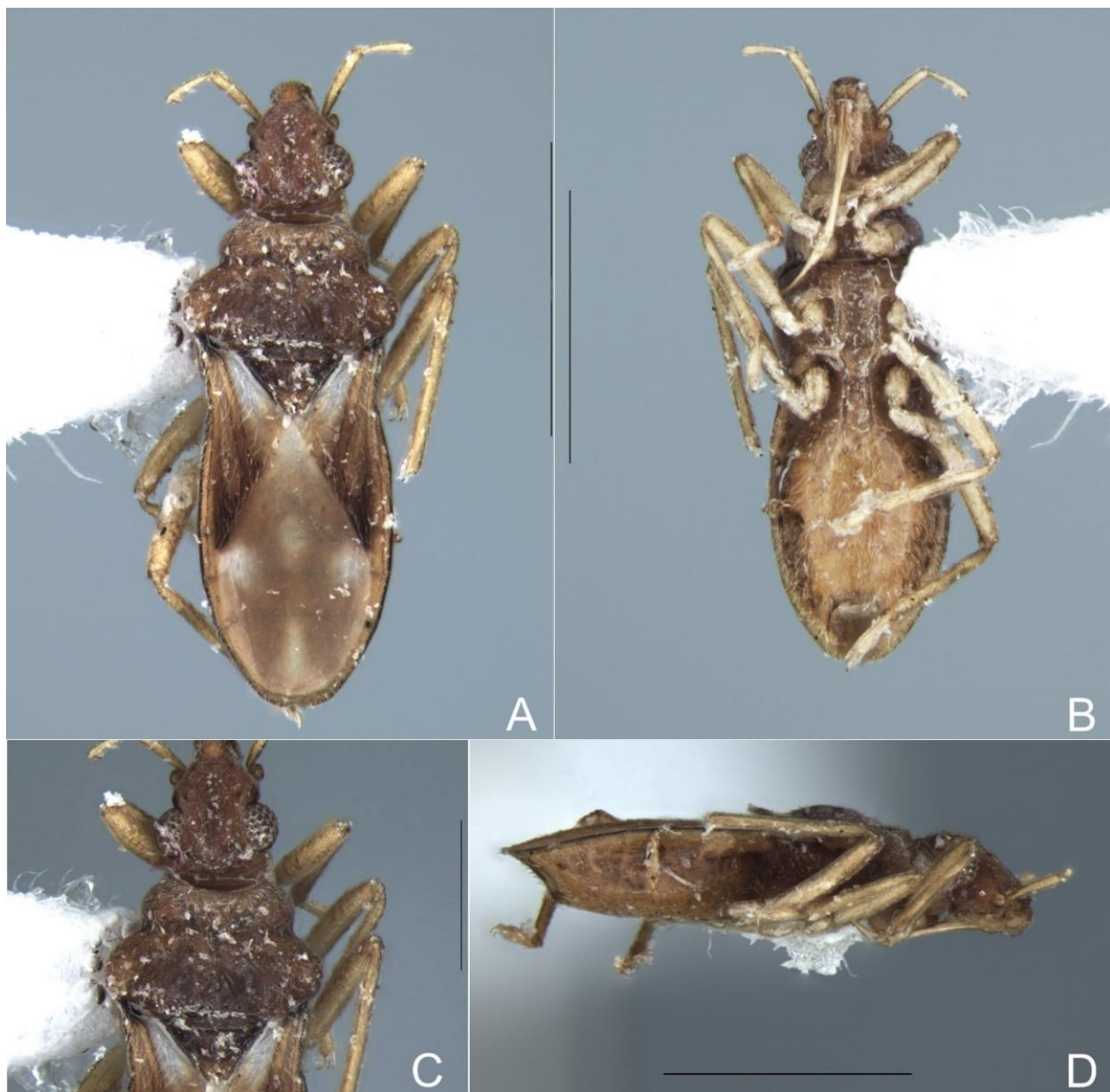


Figure 15. *Hebrus inpa* sp. nov., habitus. macropterous male holotype. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Head and thorax, dorsal view. **D.** Habitus, lateral view. Scale bars: 1.0 mm (**A, B, D**); 0.5 mm (**C**).

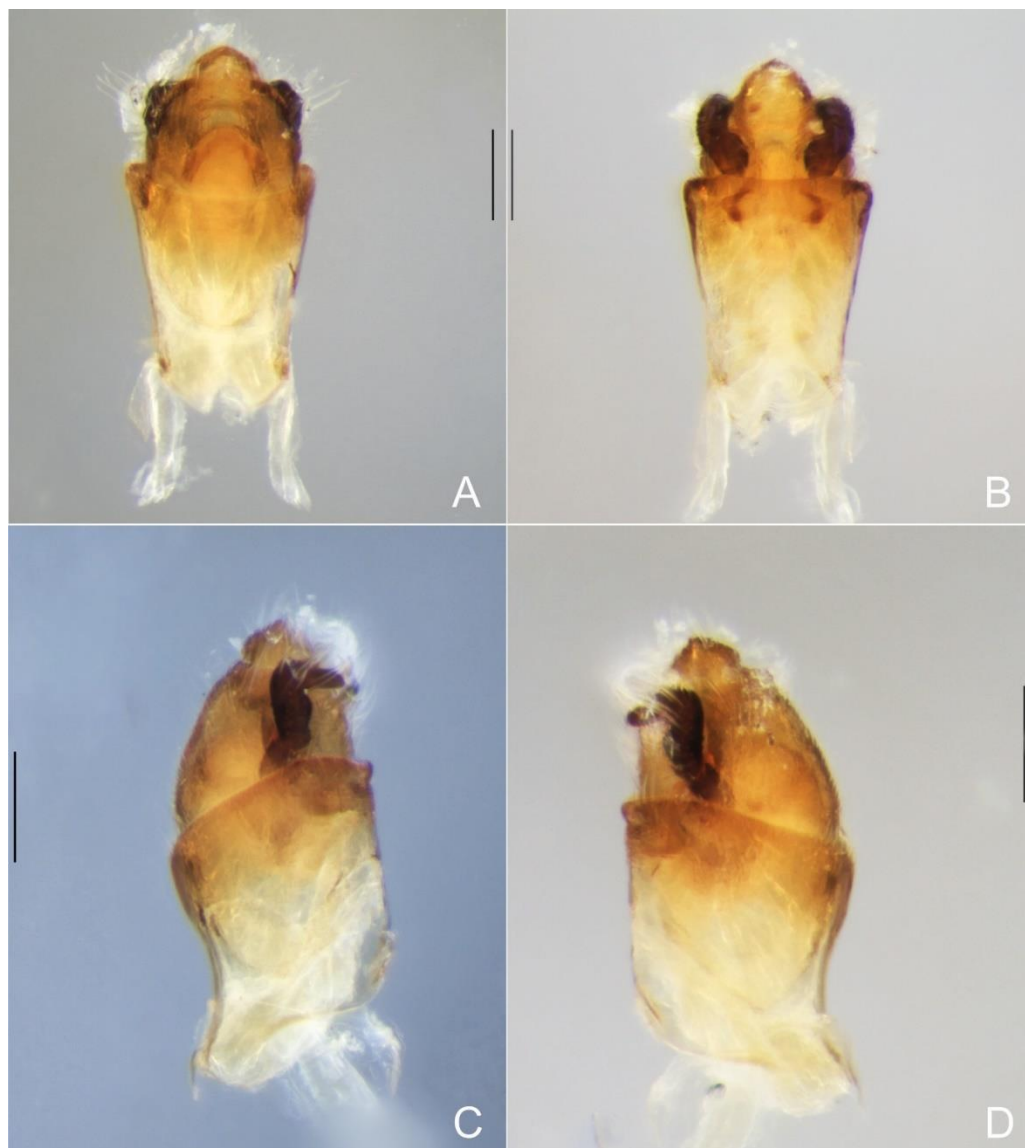


Figure 16. *Hebrus inpa* sp. nov., holotype, male genitalia. **A–C.** Abdominal segment VIII: **A.** Dorsal view. **B.** Ventral view. **C.** Right lateral view. **D.** Left lateral view. Scale bars: 0.1 mm (**A, B, C, D**).

Macropterous females (Figs. 17). **Paratypes.** BL 1.24–1.65; HL 0.22–0.28; HW 0.26–0.35; EYE 0.06–0.09; IOW 0.15–0.29; ANT I 0.18–0.20; ANT II 0.12–0.14; ANT III 0.17–0.20; ANT IV 0.22–0.28; AWP 0.32–0.44; HWP 0.45–0.61; PL 0.25–0.33; MESW 0.19–0.25; MESL 0.03–0.04; METW 0.10–0.20; METL 0.13–0.14; FORELEG: FEM 0.30–0.32, TIB 0.34–0.38, TAR I 0.03, TAR II 0.10; MIDLEG: FEM 0.34–0.37, TIB 0.38–0.39, TAR I 0.03, TAR II 0.10–0.11; HINDLEG: FEM 0.49–0.51, TIB 0.61–0.62, TAR I 0.03, TAR II 0.15.

Similar to male. Abdominal laterotergites not distinctly elevated or sinuous, not reflected over mediotergites (Figs. 17A, 18B). Venter of abdomen not narrowed posteriorly (Figs. 17B, 18D).

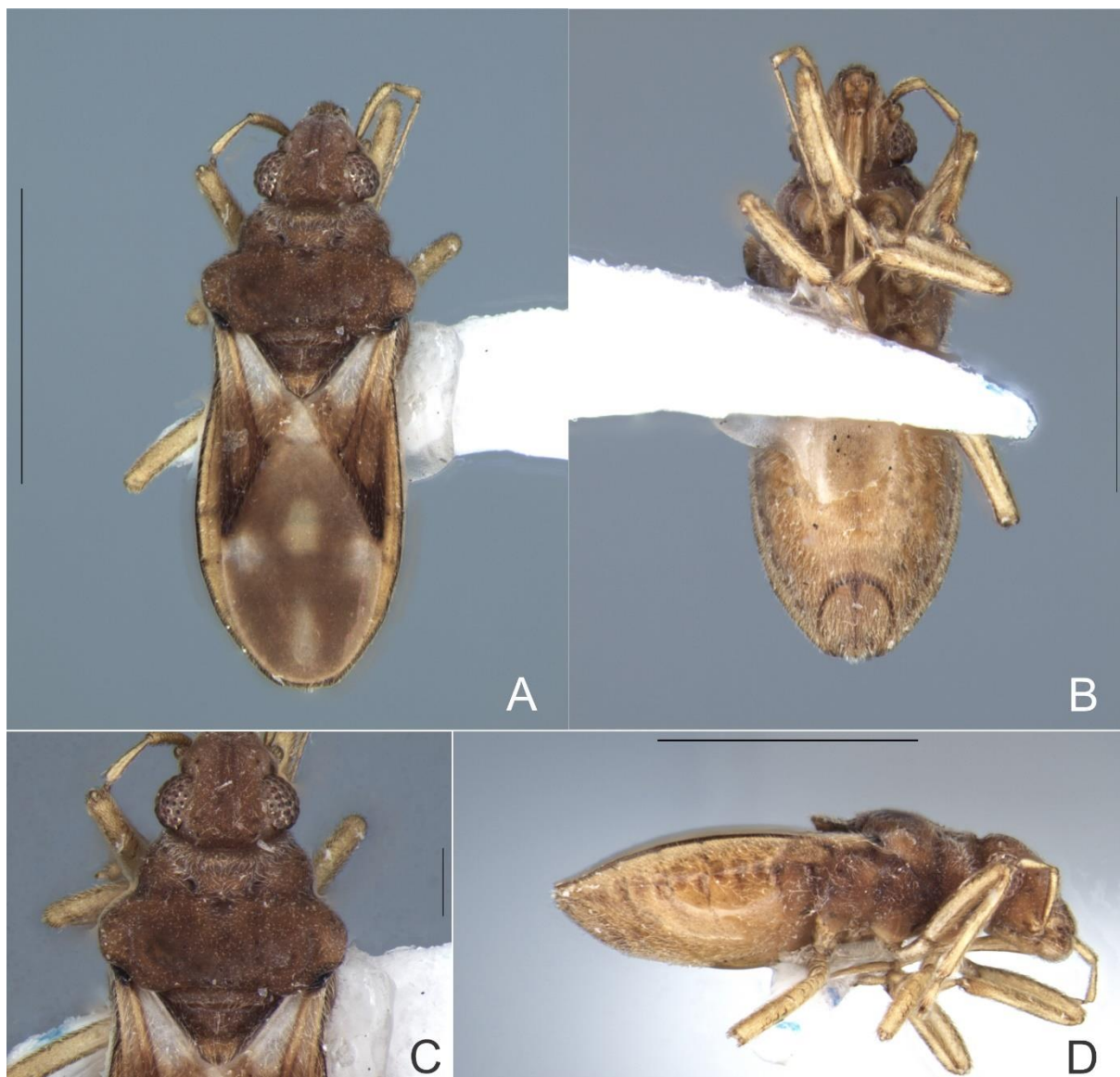


Figure 17. *Hebrus inpa* sp. nov., macropterous female, paratype, habitus. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Head and thorax, dorsal view. **D.** Habitus, lateral view. Scale bars: 1.0 mm (**A, B, D**); 0.5 mm (**C**).

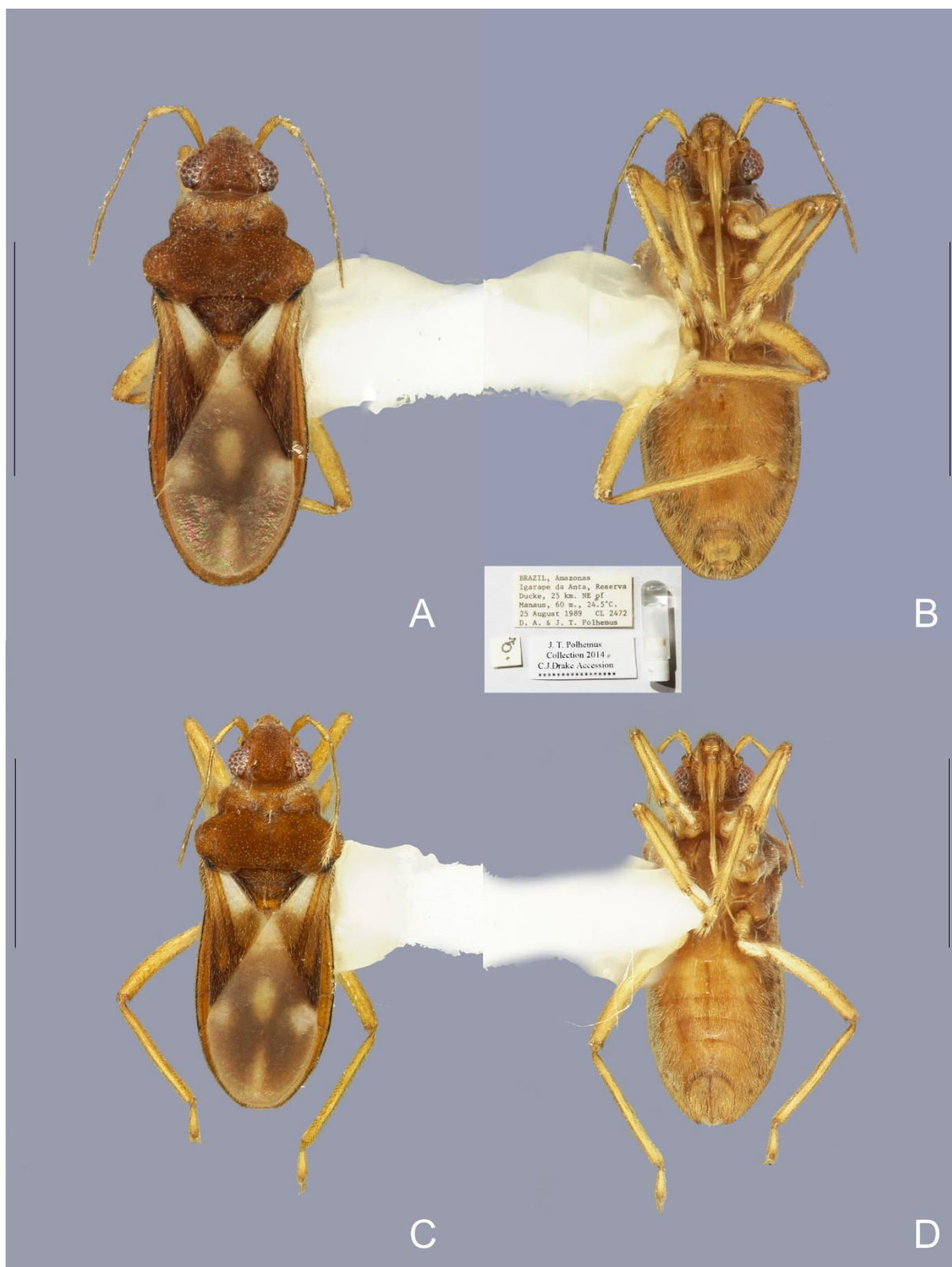


Figure 18. *Hebrus inpa* sp. nov., non-types, habitus. **A, B.** Macropterous male, and labels. **C.** Macropterous female. **A, C.** Dorsal view. **B, D.** Ventral view. Scale bars: 1.0 mm.

Diagnosis

Body covered by moderately long, decumbent setae; without distinct pruinosity around eyes or pronotal punctations; most central two punctations on row between pronotal lobes larger than others and placed close together, giving impression of a single deep punctation in dry specimens; metanotal elevation with median carina, apex with a curved notch centrally (Figs. 15A, 18A, 18D); forewings with a pair of a large white maculae starting below pronotum and slightly surpassing apex of metanotal elevation, and five white maculae on membrane (Figs. 15A, 18A, 18D); female abdominal laterotergites not distinctly elevated or sinuous, not reflected over mediotergites (Figs. 15A, 18A, 18D); venter of female abdomen not narrowed posteriorly (Figs. 17B, 18D); venter of male abdomen without distinct notches or projections (Figs. 17B, 19D); Paramere with the apex more elongated and the basal half rounded, bearing long setae (Fig. 16C).

Notes

Collecting information on the types of *H. inpa* **sp. nov.** is uncertain. The specimens were not properly labelled and the little information we provide in our list of type material examined is available in Pereira (2004). This is the only species occurring in Brazil in which the forewings display five white maculae on the membrane, in addition to the pair of basal maculae starting below the pronotum (Figs. 15A, 17A). This characteristic can be used in combination with the other diagnostic features mentioned above to identify both sexes. Males can also be identified based on the shape of the paramere (Fig. 16C, 16D). *Hebrus inpa* **sp. nov.**, *H. gloriosus* Drake & Harris, 1943 and *H. paulus* Drake & Harris, 1943 share the brownish coloration, forewings with a pair of large white maculae surpassing the apex of the metanotal elevation, pronotum with eight punctations between lobes (median ones larger), elevated humeri, trapezoidal metanotal elevation with a median carina and apical notch, and non-elevated female abdominal laterotergites. *Hebrus inpa* **sp. nov.** is distinguished by its smaller size, decumbent setation, narrower curved apical notch of the metanotal elevation, five maculae on the wing membrane, male abdomen without projections, and paramere with elongated apex and long setae (Figs. 15A, 15C). *Hebrus gloriosus* differs by its larger size, long erect dorsal setae, wide apical notch, and male abdominal sterna VI–VII forming a triangular projection (Figs. 12C, 12D, 13A–B, 14A), whereas *H. paulus* is characterized by whitish pruinosity, very short dorsal setae, rounded apical notch with a short median carina, a single rounded macula on the wing membrane, and male sternum VIII ventrally excavated (Figs. 30, 31)

Etymology

The species is named in honor of the Instituto Nacional de Pesquisas da Amazônia (INPA).

Distribution

Brazil: Amazonas (Fig. 42).

***Hebrus limai* sp. nov.**

Figs. 19, 20, 21, 42

Type material examined. Holotype. BRAZIL – **Piauí** • Batalha, Cachoeira do Urubu, light trap; 03°54'48"S, 42°06'48"W; 17.X.2018; A.S. Carvalho leg.; 1 macropterous male, CZMA.

Paratypes. BRAZIL – **Piauí** • same data as holotype; 1 macropterous male, 1 macropterous female, CEIOC XXXXX.

Description

Macropterous males (Fig. 19, 20). **Holotype (Paratype).** BL 2.25 (2.34); HL 0.35 (0.35); HW 0.43 (0.43); EYE 0.10 (0.10); IOW 0.24 (0.23); ANT I 0.38 (0.38); ANT II 0.27 (0.27); ANT III 0.27 (0.27); ANT IV 0.37 (0.36); AWP 0.61 (0.55); HWP 0.85 (0.81); PL 0.48 (0.47); MESW 0.35 (0.34); MESL 0.08 (0.06); METW 0.31 (0.29); METL 0.17 (0.15); FORELEG; FEM 0.48 (0.52), TIB 0.51 (0.58), TAR I 0.05 (0.05), TAR II 0.21 (0.21); MIDLEG; FEM 0.51 (0.58), TIB 0.60 (0.68), TAR I 0.04 (0.05), TAR II 0.19 (0.20); HINDLEG; FEM 0.60 (0.77), TIB 0.68 (0.83), TAR I 0.05 (0.05), TAR II 0.20 (0.20).

General color dark-brown, except antenna, pronotal collar, and legs light-brown to yellow; pleura, sterna and terminalia blackish. Eyes brown. Forewings brown, with a pair of large white maculae starting below pronotum and reaching to slightly surpassing apex of metanotal elevation, a faint rounded macula centrally, and a fainter narrow macula distally (Fig. 21A, 22A). Body densely covered by moderately long, decumbent golden setae.

Head wider than long; width through eyes approximately 1.2 times length; interocular width 2.3–2.4 times eye width. Buccula elongated, slightly curved. Antennomere I cylindrical, slightly curved; antennomere II cylindrical; width of antennomeres III–IV approximately half of antennomere I. Antennal formula: I > IV > III ~ II. Pronotum with a transverse row of moderately deep punctations on collar and a transverse row of ten moderately deep punctations between lobes; most central two punctations on row between lobes clearly distinguished in dry

specimens; posterior lobe with a row of small punctations adjacent to posterior margin, continuing laterally close to humeri, two longitudinal rows medially, and a few sparse small punctations on disc; humeri elevated (Fig. 19A, 20A, 20D). Mesoscutellum 4.4–5.6 times wider than long. Metanotal elevation trapezoidal, 1.8–1.9 times wider than long; disc with raised margins and two submedian depressions divided by a median carina; apex with a wide median notch (Fig. 19A). Forewings almost reaching posterior margin of abdomen. Venter of abdomen without distinct notches or projections (Fig. 19B, 20B). Paramere strongly curved, tapered at apex (Fig. 20E).

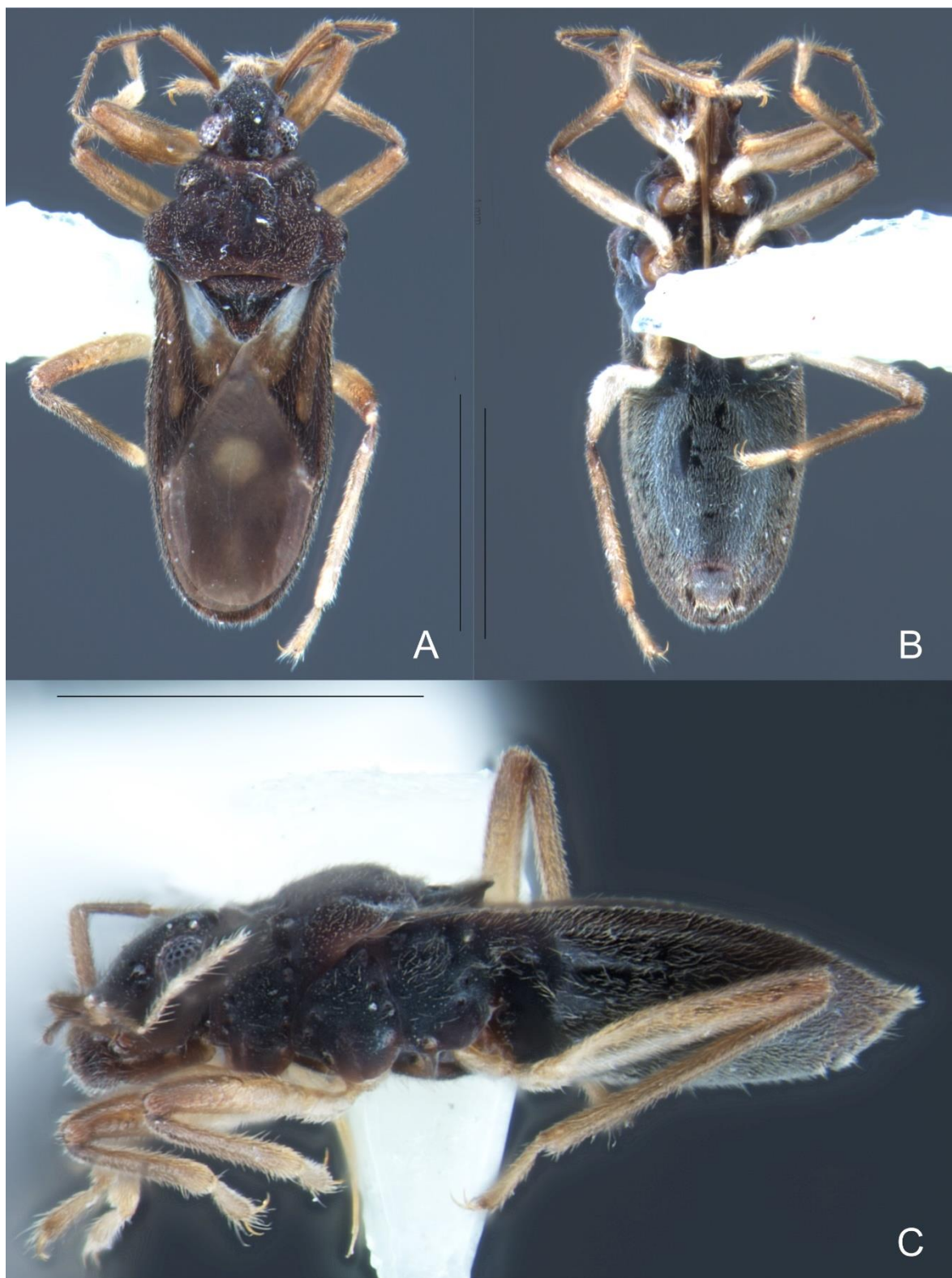


Figure 19. *Hebrus limai* **sp. nov.**, macropterous male. holotype, habitus. **A.** Dorsal view. **B.** Ventral view. **D.** Lateral view. Scale bars: 1.0 mm

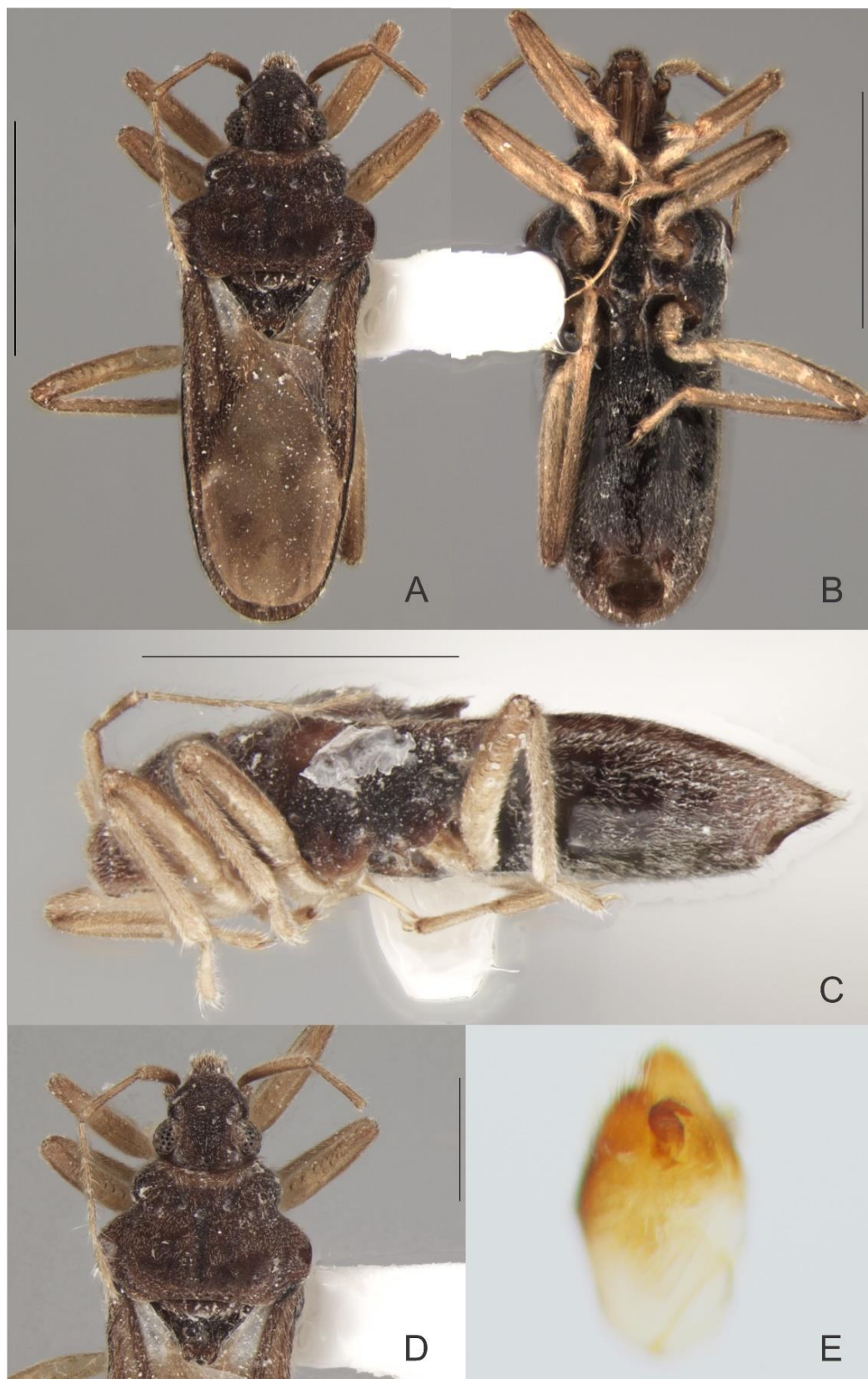


Figure 20. *Hebrus limai* sp. nov., macropterous male. paratype, habitus. **A.** Dorsal view. **B.** Ventral view. **C.** Lateral view. **D.** Head and thorax, dorsal view. **E.** Genital capsule, and Paramere lateral view. Scale bars: 1.0 mm (**A–C**), 0.5 mm (**D**).

Macropterous female (Fig. 21). **Paratype**. BL 2.60; HL 0.35; HW 0.48; EYE 0.11; IOW 0.26; ANT I 0.30; ANT II 0.28; ANT lost III lost; ANT IV lost; AWP 0.67; HWP 0.98; PL 0.55; MESW 0.45; MESL 0.10; METW 0.21; METL 0.37; FORELEG; FEM 0.66, TIB 0.70, TAR I 0.05, TAR II 0.22; MIDLEG; FEM 0.70, TIB 0.64, TAR I 0.05, TAR II 0.20; HINDLEG; FEM 0.90, TIB 0.94, TAR I lost, TAR II lost.

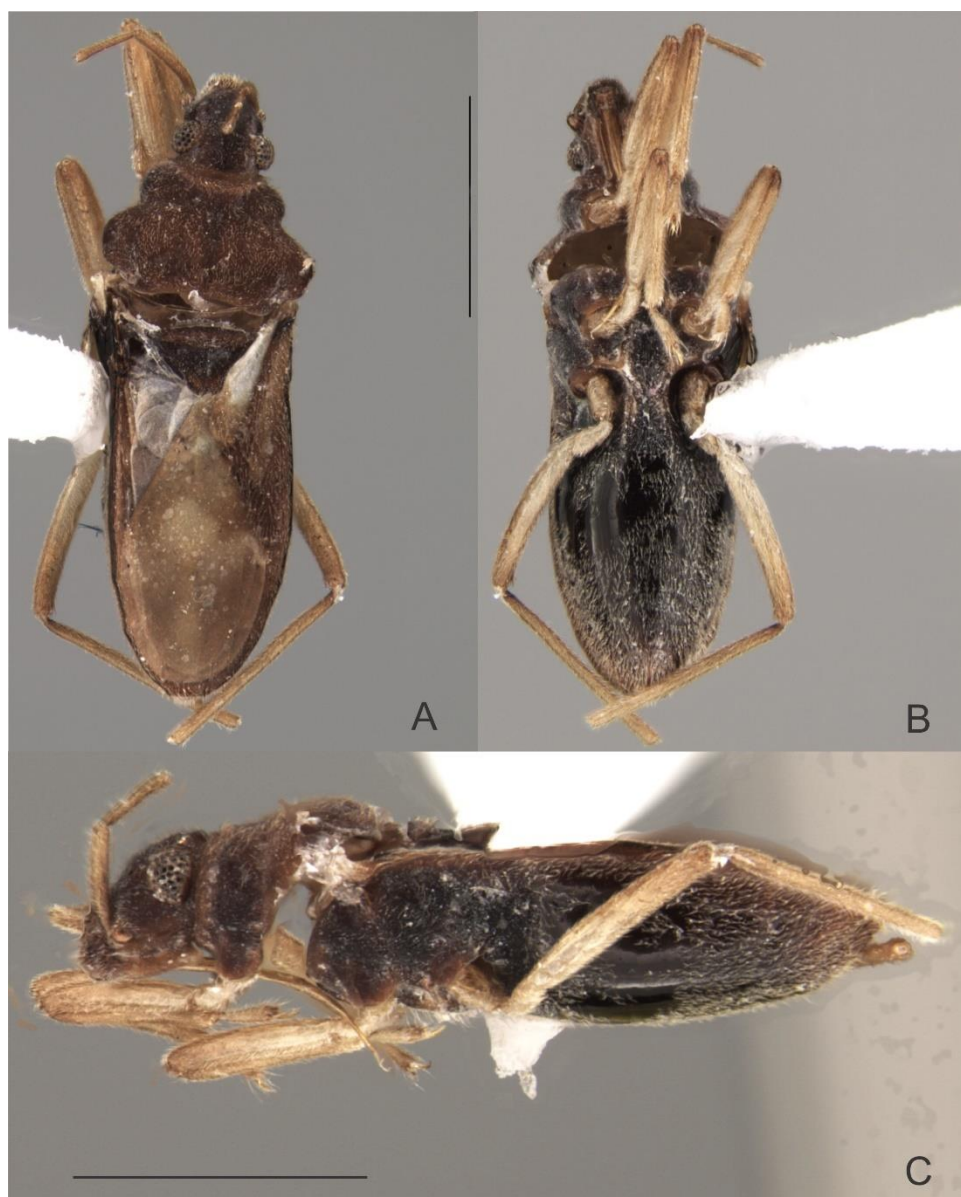


Figure 21. *Hebrus limai* **sp. nov.** female macropterous paratype. habitus. **A.** Dorsal view. **B.** Ventral view. **C.** Lateral view. Scale bars: 1.0 mm.

Similar to macropterous male, except for the following: body longer; general color slightly lighter, with central and apical forewings maculae very faint (Fig. 21A); width of head through eyes about 1.1 times length; interocular width about 2.4 times eye width; mesoscutellum 4.5

times wider than long; metanotal elevation about 1.8 times wider than long. Abdominal laterotergites not strongly elevated or reflected over mediotergites (Fig. 21A); venter of abdomen not narrowed posteriorly (Fig. 21B).

Diagnosis

Body densely covered by moderately long, decumbent golden setae; without distinct pruinosity around eyes or pronotal punctures (Figs. 19A, 20A, 21A); most central two punctations on row between pronotal lobes clearly distinguished in dry specimens (Figs. 19A, 20A, 20D); metanotal elevation with median carina, apex with a wide median notch (Figs. 19A, 20A, 20D); forewings with a pair of large white maculae starting below pronotum and reaching to slightly surpassing apex of metanotal elevation, a faint rounded macula centrally, and a fainter narrow macula distally (Figs. 19A, 20A, 21A); female abdominal laterotergites not distinctly elevated or sinuous, not reflected over mediotergites (Fig. 21A); venter of female abdomen not narrowed posteriorly (Fig. 21B); venter of male abdomen without distinct notches or projections (Fig. 19B, 20B); paramere strongly curved, tapered at apex (Fig. 20E).

Notes

Hebrus limai **sp. nov.** is most similar to *H. alagoensis* **sp. nov.** and *H. alvearensis*, but it can be distinguished by its larger body size (2.25–2.60 mm), the presence of large basal white maculae on the hemelytra associated with additional central and apical maculae, and a trapezoidal metanotal elevation approximately 1.8–1.9 times wider than long, with a well-marked apical notch. Sexual dimorphism is moderate, with females being larger, exhibiting lighter wing coloration, and having a wider abdomen without posterior narrowing. *Hebrus alagoensis* **sp. nov.** has a smaller body size (approximately 2.15 mm), darker wings with two large basal maculae and a narrow apical macula, as well as elevated abdominal laterotergites and a posteriorly narrowed abdomen (Fig. 1). *Hebrus alvearensis* differs from both species by its smaller size (1.84–1.95 mm), a wing pattern characterized by a pearly-white marking on the clavus and small pale spots on the membrane, and a short, triangular metanotal elevation lacking an apical incision (Stella & Pall 2018: 476, fig. 2). *Hebrus limai* **sp. nov.** also resembles *H. plaumanni* (Figs. 32–34, 36), but it can be easily distinguished by the sculpture of the pronotum, the maculae on the forewings (Figs. 32A, 33A, 34A, 36A), and the shape of the paramere (Fig. 35). The paramere of *H. limai* **sp. nov.** is characterized by a strongly curved shape with a tapered

apex (20E), whereas that of *H. alvearensis* is hook-shaped, with a more robust base, a rounded apex, and well-developed apical setae (Stella & Pall 2018: 476, fig. 2).

Etymology

We dedicate this species in honor of Dr. Lucas Ramos Costa Lima in recognition of his important contribution to the knowledge of aquatic insects in the state of Piauí, Brazil.

Distribution

Brazil: Piauí (Fig. 42).

Hebrus nordestinus sp. nov.

Figs. 22, 23, 24, 25, 42, Table 2

Type material examined. Holotype. BRAZIL – **Ceará** • Aiuaba, Estação Ecológica de Aiuaba, Casa da Gameleira, light trap; 06°41'51"S, 40°16'52"W; 09.IV.2019; R. Carrenho leg.; 1 macropterous male, CZMA. **Paratypes.** BRAZIL – **Ceará** • same data as holotype; 3 macropterous males, 1 macropterous female, CEIOC 83102 • Aiuaba, Estação Ecológica de Aiuaba, Sítio Volta de Cima, sede do ICMBio, light trap; alt. 460 m; 06°36'09"S, 40°07'43"W; 10.IV.2019; J.M.S. Rodrigues leg.; 1 macropterous female, CEIOC 83103 • Same, except Sítio Volta de Baixo; alt. 441 m; 06°37'31"S, 40°08'01"W; 14.IV.2019; J.M.S. Rodrigues leg.; 1 macropterous male, CEIOC 83104 • Same, except Sítio do Martins; alt. 476 m; 06°40'00"S, 40°10'30"W; 12.IV.2019; J.M.S. Rodrigues leg.; 2 macropterous females, CEIOC 83105 • Same, except estrada, light trap; alt. 493 m; 06°42'00.9"S, 40°11'31"W; 03.IV.2021; A.S. de Freitas leg.; 1 macropterous male, CEIOC xxxx • Same, except J.M.S. Rodrigues leg.; 7 macropterous males, 6 macropterous females, CEIOC xxxx • Same, except C.C. Gonçalves col.; 2 macropterous female, CEIOC xxxx • Same, except estrada ao lado do brejo, light trap; alt. 486 m; 06°41'31.2"S, 40°11'13.1"W; 04.IV.2021; J.M.S. Rodrigues leg.; 16 macropterous males, 18 macropterous females, CEIOC xxxx • Same, except estrada, light trap; alt. 634 m; 06°43'33.1"S, 40°18'23.4"W; 05.IV.2021; C.C. Gonçalves leg.; 2 macropterous males, 1 macropterous female, CEIOC xxxx • Same, except J.M.S. Rodrigues leg.; • Same, except R. Carrenho leg.; 1 macropterous males, 1 macropterous female, CEIOC xxxx • Same, except estrada, próxima ao riacho da Gameleira, light trap; alt. 493 m; 06°41'13.4"S, 40°16'05.7"W; 06.IV.2021; A.S. de Freitas leg.; 1 macropterous male, CEIOC xxxx • Same, except estrada,

light trap; alt. 505 m; 06°41'50.7"S, 40°16'54.8"W; 08.IV.2021; C.C. Gonçalves leg.; 2 macropterous males, 19 macropterous females, CEIOC xxxx • Same, except A.S. Freitas leg.; 2 macropterous females, CEIOC xxxx • Same, except J.M.S. Rodrigues leg.; 9 macropterous males, 64 macropterous females, CEIOC xxxx • Ubajara, Córrego da Murim, beca; 28.X.2011; 1 macropterous male, MZUSP.

Additional material examined. BRAZIL – **Bahia** • Lençóis, Parque Nacional da Chapada Diamantina, Ribeirão do Meio, light trap; 12°35'16.8"S, 41°23'16.2"W; 331 m a.s.l; 08.V.2021; J.M.S. Rodrigues col.; 1 macropterous male, 2 macropterous females, CEIOC xxx • Lençóis, Parque Nacional da Chapada Diamantina, Rio Capivara, light trap; 12°32'23.7"S, 41°22'34.1"W; 329 m a.s.l; 09.V.2021; J.M.S. Rodrigues col.; 3 macropterous males, 3 macropterous females, CEIOC xxx • Mucugê, Parque Nacional da Chapada Diamantina, trilha para o Córrego de Pedras, light trap; 13°00'02.7"S, 41°23'46.5"W; 982 m a.s.l; 26.VIII.2018; R. Carrenho col.; 1 macropterous female, CEIOC xxx.

Description

Macropterous males (Figs. 22, 23, Table 2). General color light brown, except base of ocelli, entire antennomere I and proximal 2/3 of II, collar and posterior lobe of pronotum, mesoscutellum, metanotal elevation, part of metasternum, abdominal sterna I–VI medially and lateral areas of V, vein M and most of forewings dark brown. Forewings with a pair of small white maculae starting below humeri and slightly surpassing mesoscutellum, and a whitish oval or rounded macula distally (Figs. 22A, 23A). Eyes reddish-brown. Body covered by short, decumbent setae; longer setae on antennae, base of forewings, legs, and abdomen.

Head wider than long; width through eyes 1.1–1.4 to times length; interocular width 2.2–2.6 times eye width. Buccula narrow, slightly conical posteriorly. Antennomere I cylindrical, slightly curved; antennomere II cylindrical; width of antennomeres III–IV approximately half of antennomere I. Antennal formula: IV > III > I > II. Pronotum with a transverse row of moderately deep punctations on collar and ten moderately deep punctations between the lobes, most central two punctations on row between lobes closed placed but clearly distinguished in dry specimens; posterior lobe with a row of small punctations adjacent to posterior margin, continuing laterally close to humeri, and four longitudinal rows of three or four small punctations; humeri elevated (Fig. 22C). Mesoscutellum 5.2–6.4 times wider than long. Metanotal elevation subtrapezoidal, 2.0–2.7 times wider than long; disc with raised margins

and two submedian depressions divided by a straight median carina; apex with a weak median notch (Fig. 22A, 23A). Forewings exposing narrow lateral margins of abdominal laterotergites, reaching or almost reaching posterior margin of abdomen. Abdomen with a projection ventrally between segments VII and VIII (Figs. 22B, 22D, 23A, 23D, 23E). projection of sub-square segment VII. Paramere concave, with two tapering projections: one on mesal margin and one on apex (Fig. 24).

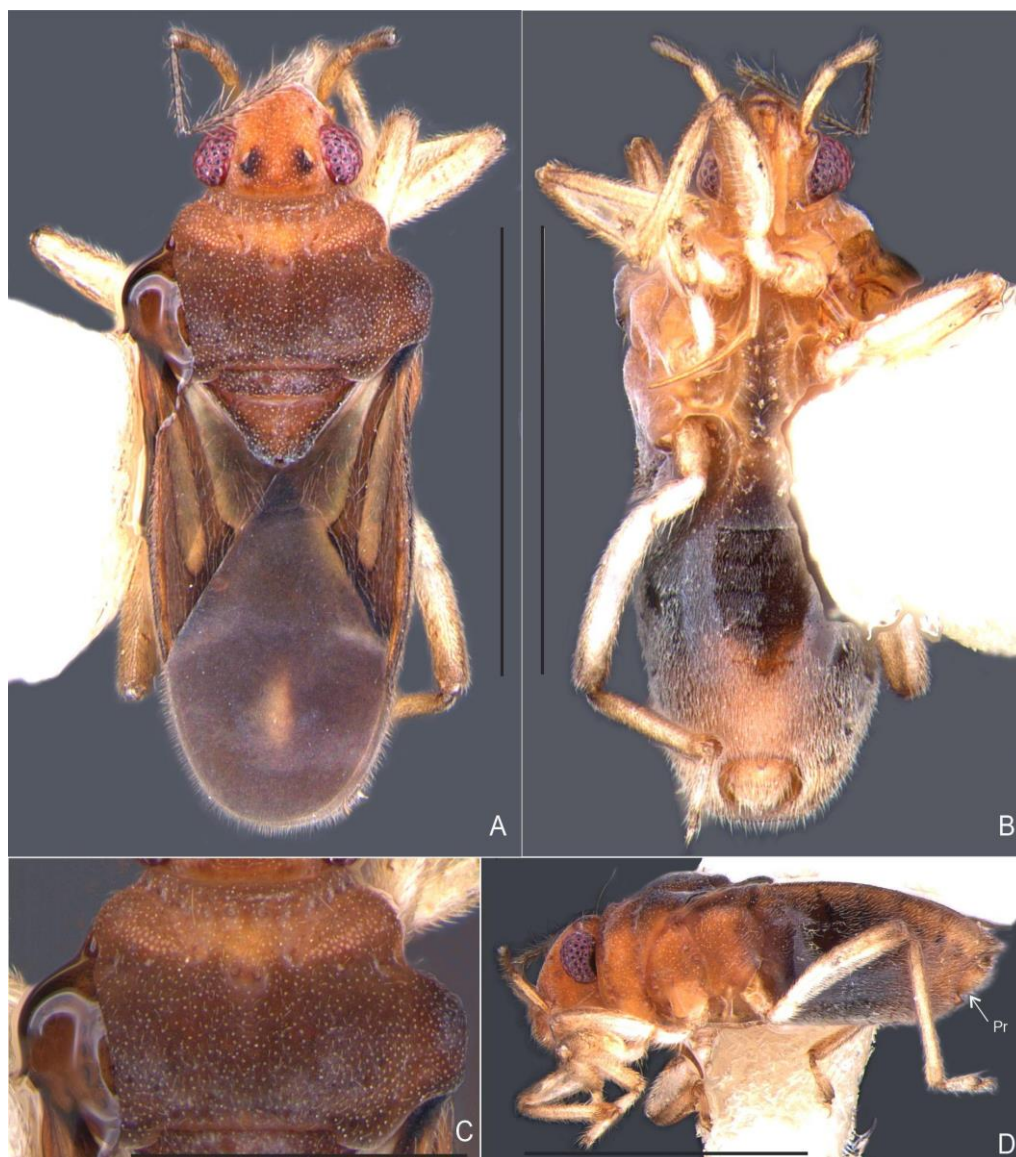


Figure 22. *Hebrus nordestinus* sp. nov., macropterous male, holotype. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Pronotum, dorsal view. **D.** Habitus, lateral view. Scale bars: 1.0 mm (**A**, **B**, **D**), 0.5 mm (**C**). [Pr, projection].

Macropterous female. Similar to macropterous male, except for the following: body longer; general color lighter; pronotum and abdomen entirely light-brown (Fig. 25A, 25C); width of

head through eyes 1.2–1.6 times length; interocular width 2.0–2.7 times eye width; antennal formula: $IV > III > I > II$; mesoscutellum 5.1–6.0 times wider than long; metanotal elevation 2.0–3.0 times wider than long. Abdominal laterotergites not strongly elevated or reflected over abdomen (Fig. 25A, 25C). Venter of abdomen not narrowed posteriorly (Fig. 25B).

Table 2. Measurements obtained from the holotype and six male and five female paratypes of *Hebrus nordestinus* sp. nov.

	Holotype	Paratypes					
	Male	Males			Females		
Structure		Min	Mean	Max	Min	Mean	Max
Body length	1.68	1.62	1.76	1.91	1.90	1.99	2.08
Head length	0.33	0.30	0.35	0.41	0.30	0.35	0.41
Head width through eyes	0.43	0.40	0.43	0.47	0.44	0.47	0.50
Maximum eye width	0.11	0.10	0.11	0.12	0.10	0.11	0.12
Interocular width	0.21	0.21	0.22	0.23	0.22	0.24	0.27
Length of antennomere I	0.16	0.15	0.15	0.16	0.16	0.16	0.18
Length of antennomere II	0.13	0.13	0.14	0.15	0.12	0.13	0.15
Length of antennomere III	0.18	0.18	0.19	0.21	0.17	0.18	0.20
Length of antennomere IV	0.27	0.30	0.31	0.33	0.32	0.34	0.37
Pronotum length at midline	0.39	0.38	0.41	0.44	0.40	0.45	0.46
Anterior width of pronotum	0.53	0.50	0.53	0.57	0.51	0.55	0.60
Humeral width of pronotum	0.77	0.71	0.78	0.85	0.84	0.87	0.90
Mesoscutellum length	0.05	0.05	0.05	0.06	0.06	0.06	0.07
Mesoscutellum width	0.32	0.30	0.32	0.34	0.34	0.35	0.36
Metanotum length	0.14	0.14	0.15	0.16	0.14	0.16	0.18
Metanotum width	0.38	0.30	0.33	0.37	0.36	0.39	0.42
		Foreleg					
Length of femur	0.40	0.37	0.41	0.45	0.36	0.38	0.40
Length of tibia	0.39	0.36	0.38	0.40	0.37	0.41	0.45
Length of tarsomere I	0.04	0.03	0.03	0.04	0.03	0.03	0.04
Length of tarsomere II	0.11	0.11	0.11	0.12	0.11	0.12	0.13
		Midleg					
Length of femur	0.36	0.36	0.38	0.40	0.36	0.39	0.42
Length of tibia	0.36	0.34	0.35	0.37	0.36	0.41	0.46
Length of tarsomere I	0.03	0.03	0.03	0.04	0.03	0.03	0.04
Length of tarsomere II	0.11	0.11	0.11	0.11	0.11	0.11	0.12
		Hindleg					
Length of femur	0.52	0.45	0.49	0.54	0.51	0.53	0.57
Length of tibia	0.54	0.50	0.53	0.56	0.58	0.58	0.58
Length of tarsomere I	0.04	0.04	0.04	0.05	0.03	0.03	0.04
Length of tarsomere II	0.12	0.14	0.16	0.18	0.14	0.14	0.15

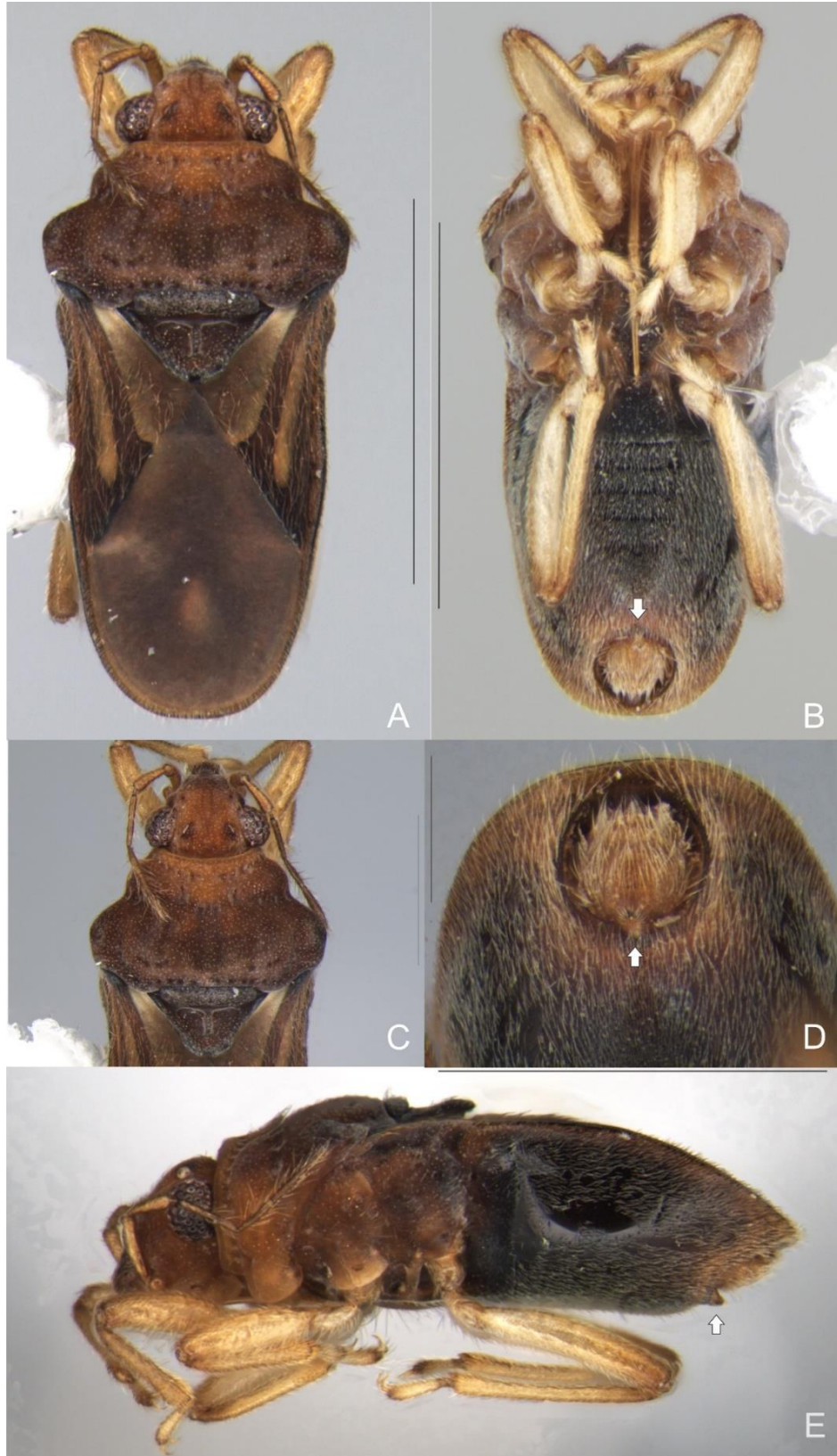


Figure 23. *Hebrus nordestinus* **sp. nov.** macropterous male, paratype, habitus. **A.** Dorsal view. **B.** Ventral view. **C.** Head and thorax, dorsal view. **D.** Apex of abdomen, Ventral view. **E.** Lateral view. White arrow indicating projection. Scale bars: 1.0 mm (**A, B, E**), 0.5 mm (**C**), 0.2 mm (**D**).

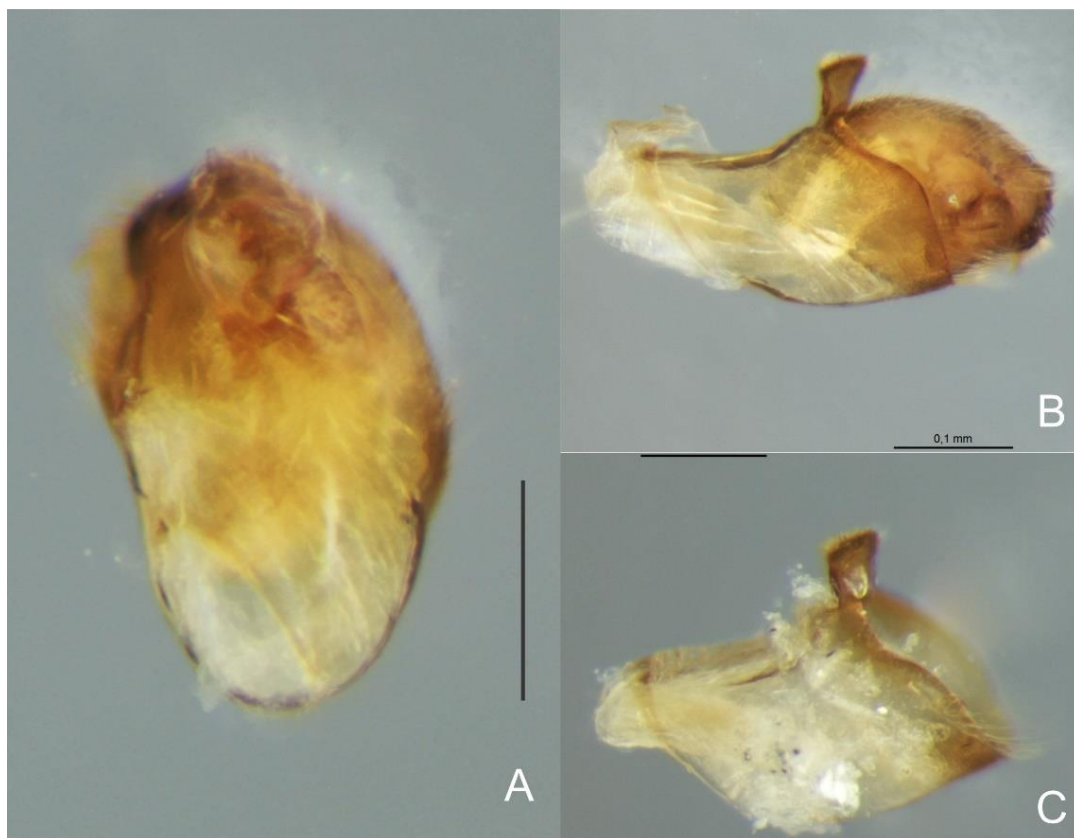


Figure 24. *Hebrus nordestinus* **sp. nov.** paratype, male genitalia. genital capsule. **A.** Dorsal view. **B.** Segment VIII and genital capsule, lateral view. **C.** Right lateral view. **D.** Segment VIII, left lateral view. Scale bars: 0.1 mm (**A**, **C**).

Diagnosis

Body covered by short, decumbent setae; longer setae on antennae, base of forewings, legs, and abdomen; without distinct pruinosity around eyes or pronotal punctures (Figs. 22A, 23A, 23C); most central two punctations on row between pronotal lobes clearly distinguished in dry specimens (Fig. 22C, 23C); metanotal elevation with median carina, apex with a weak median notch (Figs. 22A, 23A); forewings a pair of small white maculae starting below humeri and slightly surpassing mesoscutellum, and a whitish oval or rounded macula distally (Fig. 22A, 23A, 22C); female abdominal laterotergites not distinctly elevated or sinuous, not reflected over mediotergites (Fig. 25A); venter of female abdomen not narrowed posteriorly (Fig. 25B); male abdomen with a projection in the abdominal sternum VIII (Figs. 22B, 22D, 23E); paramere concave, with two tapering projections: one on mesal margin and one on apex (Fig. 24).



Figure 25. *Hebrus nordestinus* **sp. nov.**, macropterous female, paratype, habitus. **A.** Dorsal view. **B.** Ventral view. **E.** Lateral view. Scale bars: 1.0 mm.

Notes

Hebrus nordestinus **sp. nov.**, resembles *H. giehlae* **sp. nov.**, *H. plaumanni*, and *H. priscus* in coloration pattern and general body shape, but differs from these species by the sculpture of the pronotum. Males of *H. nordestinus* **sp. nov.**, and *H. giehlae* **sp. nov.**, bear a single ventral projection on abdominal sternite VIII, which is curved and rounded in *H. giehlae* **sp. nov.**, (Figs. 9B, 9D, 9E, 10C, 10F), whereas in *H. nordestinus* **sp. nov.**, this projection is subquadrate (Figs. 22B, 23B, 23D, 23E, 24B, 24C). The shape of the paramere in *H. plaumanni* (Fig. 35) also distinguishes this species from *H. nordestinus* **sp. nov.**, (Figs. 24A). *Hebrus priscus* may be confused with *H. nordestinus* **sp. nov.**, and *H. giehlae* **sp. nov.**, based on general appearance; however, it differs by the absence of a projection on sternite VIII and by the morphology of the paramere (Fig. 10E).

Etymology

The specific epithet, *nordestinus*, refers to the northeastern region of Brazil, where the type-specimens were collected.

Distribution

Brazil: Ceará (Fig. 42).

Hebrus parvulus Stål, 1860

Figs. 26, 27, 28, 29, 43

Hebrus parvulus Stål, 1860: 60 (original description).

Naeogeus parvulus: Kirkaldy (1900): 241 (new combination).

Hebrus parvulus: Harris (1942): 124 (original combination).

Type material examined. Holotype. BRAZIL – [Rio de Janeiro] • F. Sahlb.[erg] leg.; 1 submacropterous female, NHRS.

Additional material examined. BRAZIL – Espírito Santo • Iúna, Rogério Waterfall; –20.3680, –41.8315; 1087 m; 22.III.2022; J.C. Santos, J.M.S. Rodrigues, N.O. Paiva, B. Clarkson leg.; 4 submacropterous males, 1 submacropterous female, CEIOC 81868 – [Rio de Janeiro] • Petrópolis [–22.5, –43.2]; 1831; F. Sahlberg leg.; 1 submacropterous female, NMNH.

Redescription

Submacropterous males (Fig. 26A–C). **Non-types.** BL 1.92–2.40; HL 0.31–0.42; HW 0.44–0.48; OL 0.11–0.13; IOW 0.22–0.28; ANT I 0.23–0.24; ANT II 0.20–0.22; ANT III 0.22–0.26; ANT IV 0.39–0.42; AWP 0.56–0.61; HWP 0.74–0.80; PL 0.42–0.48; MESW 0.32–0.36; MESL 0.06–0.07; METW 0.27–0.32; METL 0.16–0.20; FORELEG, FEM 0.42–0.47, TIB 0.47–0.49, TAR I 0.04–0.05, TAR II 0.14–0.16; MIDLEG, FEM 0.42–0.48, TIB 0.47–0.52, TAR I 0.04–0.05, TAR II 0.13–0.16; HINDLEG, FEM 0.47–0.64, TIB 0.53–0.69, TAR I 0.04–0.05, TAR II 0.12–0.18.

General color dark brown, with darker transverse areas on both pronotal lobes, mesoscutellum, metanotal elevation, and abdominal sterna. Eye reddish-brown. Legs light yellow, with darker areas on edges of segments. Forewings dark brown, with a pair of large basal white maculae starting below pronotum and surpassing apex of metanotal elevation, and three oval white maculae: a pair on the sides and one more elongated and distal (Fig. 26A). Body densely covered by long, decumbent golden setae.

Head wider than long; width across eyes approximately 1.2 times length; interocular width approximately 2.2 times eye width. Buccula elongated, slightly curved (Fig. 26C). Antennomere I cylindrical, slightly curved; antennomere II cylindrical; width of antennomeres III–IV approximately half of antennomere I. Antennal formula: IV > III > I > II. Pronotum slightly depressed medially on anterior lobe, with a transverse row of moderately deep punctations on collar, a moderately shallow rounded impression centrally, and eight moderately deep punctations posteriorly, between lobes; most central two punctations on row between lobes clearly distinguished in dry specimens; posterior lobe with a row of small punctations adjacent to posterior margin, continuing laterally close to humeri, and more irregular small punctations on disc; humeri elevated (Fig. 26A, 26C). Mesoscutellum 5.15 times wider than long. Metanotal elevation trapezoidal, approximately 1.8 times wider than long; disc with raised margins, forming a uniform central depression, without carina; apical margin truncated (Fig. 26A). Forewings exposing large portions of abdominal laterotergites, slightly surpassing anterior margin of abdominal mediotergite VII. Venter of abdomen without distinct notches or projections (Fig. 26B, 26C). Paramere curved, with apex rounded (Fig. 28D).

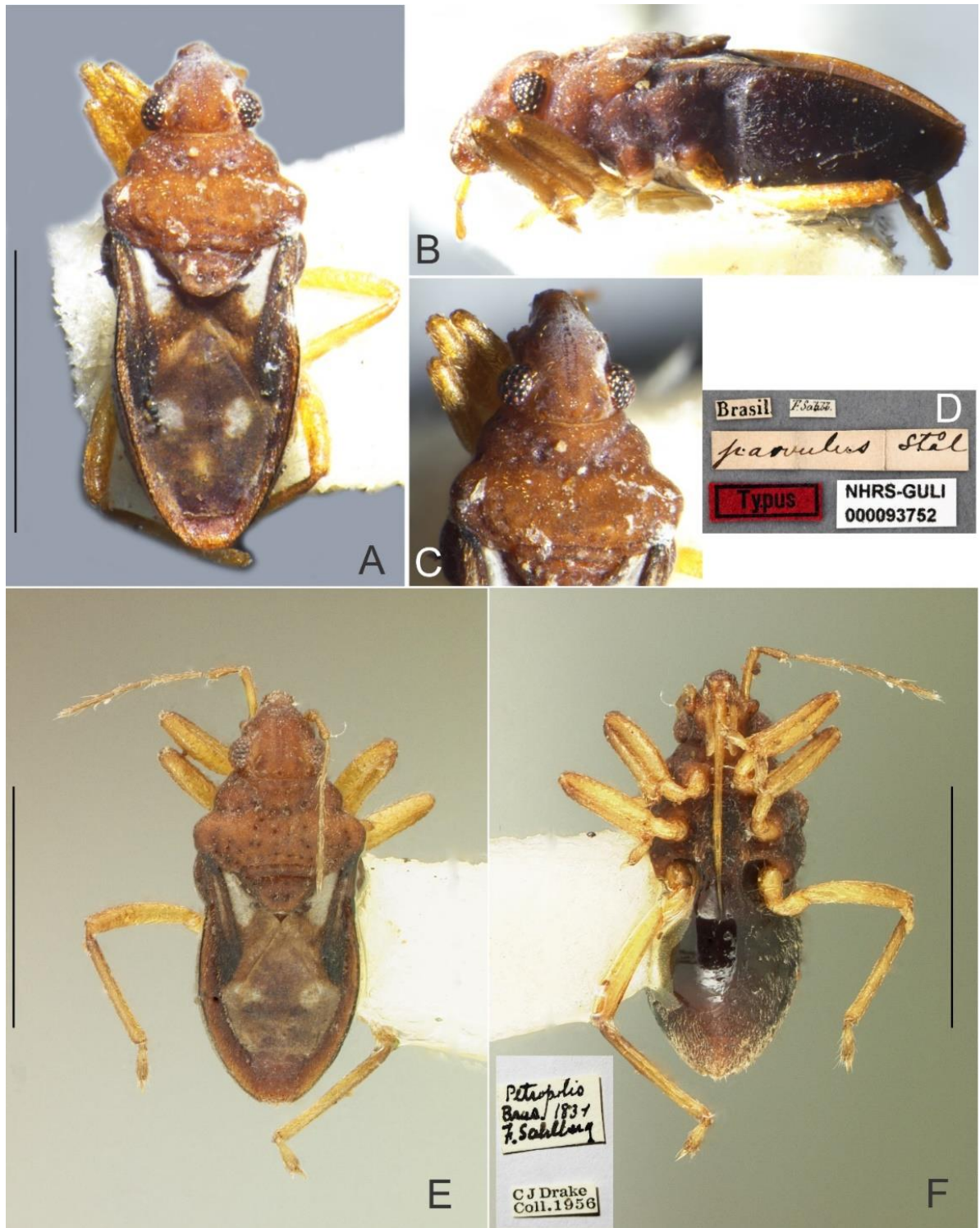


Figure 26. *Hebrus parvulus*, submacropterous females. A–C. Holotype. A. Habitus, dorsal view. B. Habitus, lateral view. C. Head and part of thorax, dorsal view, D. labels. E–F. Non-type historical specimen, habitus. E. Habitus, dorsal view. F. Habitus, ventral view, and labels. Scale bars: 1.0 mm.

Submacropterous female (Figs. 26E, 26F, 29). **Non-type.** BL 1.78; HL 0.35; HW 0.38; OL 0.09; IOW 0.20; ANT I 0.19; ANT II 0.17; ANT III 0.20; ANT IV 0.34; AWP 0.46; HWP 0.65; PL 0.37; MESW 0.25; MESL 0.05; METW 0.28; METL 0.12; FORELEG, FEM 0.40, TIB 0.46, TAR I 0.02, TAR II 0.12; MIDLLEG, FEM 0.32, TIB 0.34, TAR I 0.02, TAR II 0.10; HINDLEG, FEM 0.43, TIB 0.48, TAR I 0.04, TAR II 0.15.

Similar to submacropterous male. Abdominal laterotergites not strongly elevated or reflected over abdomen (Figs. 26E, 26F). Venter of abdomen not narrowed posteriorly (Figs. 26E, 29B).

Diagnosis

Body densely covered by long, decumbent golden setae; without distinct pruinosity around eyes or pronotal punctures (Figs. 26C, 27B, 29B); most central two punctations on row between pronotal lobes clearly distinguished in dry specimens (Fig. 26C); metanotal elevation without median carina, apex truncated (Figs. 26A, 27A, 29A); forewings with a pair of large basal white maculae starting below pronotum and surpassing apex of metanotal elevation, and three oval white maculae: a pair on the sides and one more elongated and distal (Figs. 26A, 26E, 29A); female abdominal laterotergites not distinctly elevated or sinuous, not reflected over mediotergites (Figs. 26E, 26F, 29A); venter of female abdomen not narrowed posteriorly (Figs. 26E, 29B); male abdomen without distinct notches or projections (Fig. 26B, 27A, 27C); A row of spines on the dorsal region of the genital capsule; paramere curved, with the apex rounded (Fig. 28D).



Figure 27. *Hebrus parvulus*, habitus. Submacropterous male. **A.** Dorsal view. **B.** Ventral view. **C.** Lateral view. Scale bars: 1.0 mm.

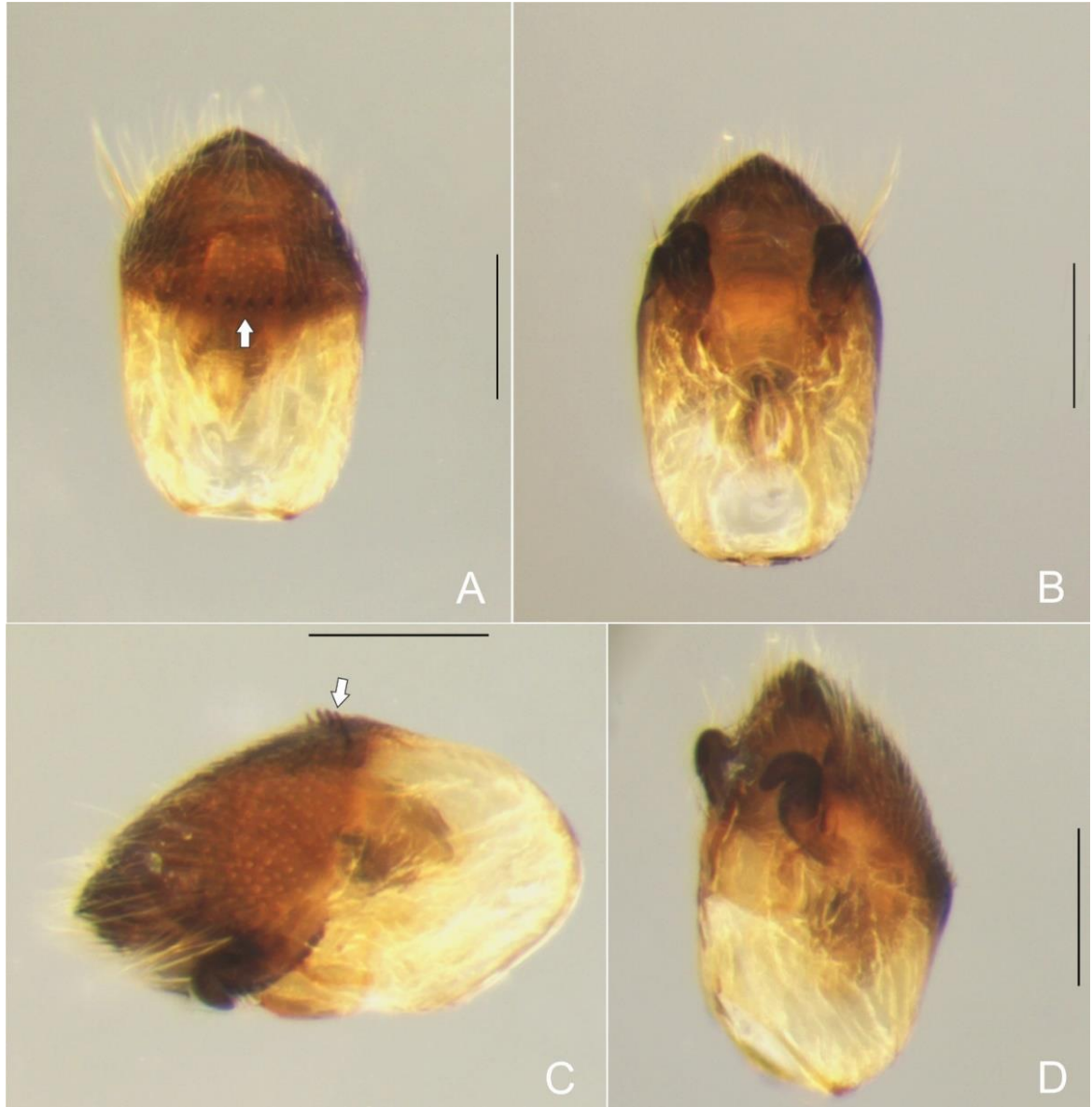


Figure 28. *Hebrus parvulus*, habitus. genital capsule **A.** Dorsal view. **B.** Ventral view. **C, D.** Lateral view. White arrow indicating the row of spines on the dorsal region of the genital capsule. Scale bars: 0.1 mm.



Figure 29. *Hebrus parvulus*, habitus. Submacropterous female. **A.** Dorsal view. **B.** Ventral view. **C.** Lateral view. Scale bars: 1.0 mm.

Notes

The presence of three white maculae on the forewings membrane makes *H. parvulus* similar to *H. azevedoi* **sp. nov.**, *H. cunhai* **sp. nov.**, and *H. giehlai* **sp. nov.** However, *Hebrus giehlai* **sp. nov.** is distinctly smaller than the others (body length ~1.5 vs. at least 1.9) and its males display a series of unique abdominal modifications (Fig. 9B, 9D, 9E, 9F). *Hebrus cunhai* **sp. nov.**, has

distinct coloration greyish pruinosity around the eyes and some of the pronotal punctures (Figs. 6A, 6D, 7A, 7B, 7C). *Hebrus parvulus* can be distinguished from the other two species based on the uncarinated metanotal elevation without apical excavation (Figs. 26A, 27A, 29A) (vs. carinated and excavated; Figs. 2A, 2C, 3A); from *H. azevedoi* **sp. nov.** by the longer basal maculae on the forewings (compare Figs. 2A, 2E and Figs. 26A, 26C, 27A, 29A); and from *H. cunhai* **sp. nov.** by the completely different paramere (compare Fig. 6E with Fig. 29D).

Distribution

Brazil: Espírito Santo, Rio de Janeiro, São Paulo (Fig. 43). The occurrence in Panama mentioned by Drake & Harris (1943) and repeated by other authors (Froeschner, 1999; Tuñon, *et al.* 2015) but not by Drake & Chapman (1958) is probably mistaken.

Hebrus paulus Drake & Harris, 1943

Figs. 30, 31, 43

Hebrus paulus Drake & Harris, 1943: 47 (original description).

Type material examined. Holotype. BRAZIL – [Mato Grosso] • Chapada [dos Guimarães]; [–15.5, –55.7]; 1 submacropterous female, Drake Collection, NMNH.

Additional material examined. BRAZIL – [Mato Grosso] • Chapada [dos Guimarães]; 1 macropterous male, 2 macropterous females, J.T. Polhemus Collection, NMNH.

Redescription

Submacropterous female (Fig. 30). **Holotype.** BL 1.60; HL 0.32; HW 0.37; EYE 0.08; IOW 0.21; OL 0.12; ANT I 0.15; ANT II 0.11; ANT III 0.18; ANT IV 0.32; AWP 0.50; HWP 0.62; PL 0.35; MESW 0.40; MESL 0.06; METW 0.42; METL 0.15; FORELEG, FEM 0.37, TIB 0.36, TAR I 0.02, TAR II 0.12; MIDLEG, FEM 0.40, TIB 0.35, TAR I 0.02, TAR II 0.12; HINDLEG, FEM 0.47, TIB 0.47, TAR I 0.02, TAR II 0.13. **Macropterous females** (Fig. 31). **Non-types.** BL 2.12–2.17; HL 0.37–0.40; HW 0.45–0.46; EYE 0.10–0.11; IOW 0.18–0.25; OL 0.15; ANT I 0.25; ANT II 0.15–0.16; ANT III lost; ANT IV lost; AWP 0.62; HWP 0.87; PL 0.47–0.48; MESW 0.35; MESL 0.06; METW 0.37–0.40; METL 0.16–0.17; FORELEG, FEM 0.50–0.52, TIB 0.47–0.50, TAR I 0.02, TAR II 0.12; MIDLEG, FEM 0.50–0.52, TIB 0.47–

0.50, TAR I 0.02, TAR II 0.12; HINDLEG, FEM 0.67–0.70, TIB 0.67–0.70, TAR I 0.03, TAR II 0.17.

General color light brown, except for head dorsally, posterior lobe of pronotum, and forewing veins dark brown (Fig. 30A, 30D). Base of ocellus, humerus and apex of veins darker. Forewings with a pair of large white maculae starting below pronotum and slightly surpassing apex of metanotal elevation, and a rounded yellowish macula centrally on membrane (indistinct in the submacropterous holotype) (Fig. 30A). Vertex of head, posterior lobe of pronotum, and corium with very short golden setae. Labrum, antenna, legs, and abdomen densely covered by moderately long yellowish to brown setae. Whitish pruinosity on apex of head dorsally, posterior pronotal lobe, and laterally between meso- and metathorax (Fig. 30D).

Head slightly wider than long; width through eyes approximately 1.2 times length; interocular width 2.6 times eye width. Buccula elongated, straight, with apex blunt (Fig. 30C). Antennomere I cylindrical, slightly curved; antennomere II cylindrical; width of antennomeres III–IV approximately half of antennomere I. Antennal formula: $IV > III > I > II$. Pronotum with a transverse row of moderately large, deep punctations on collar; anterior lobe with two moderately large, deep punctations submedially; a transverse row of eight deep punctations between lobes; most central two punctations on row between lobes clearly distinguished in dry specimens; posterior lobe with a row of small punctations adjacent to posterior margin, continuing laterally close to humeri, a shallow median longitudinal groove, and a few indistinct punctations on disc; humeri elevated (Fig. 30A, 30D). Mesoscutellum 6.6 times wider than long. Metanotal elevation trapezoidal, about 2.8 times wider than long; disc with raised margins and a median depression with a short median carina; apex with a moderately deep, rounded median notch (Fig. 30D). Forewings variable: exposing large portions of abdominal laterotergites and reaching anterior margin of abdominal mediotergite VII, or narrowly exposing abdominal laterotergites and reaching posterior margin of abdomen. Abdominal laterotergites not strongly elevated or reflected over abdomen (Fig. 30A, 30D). Venter of abdomen not narrowed posteriorly (Fig. 30B).

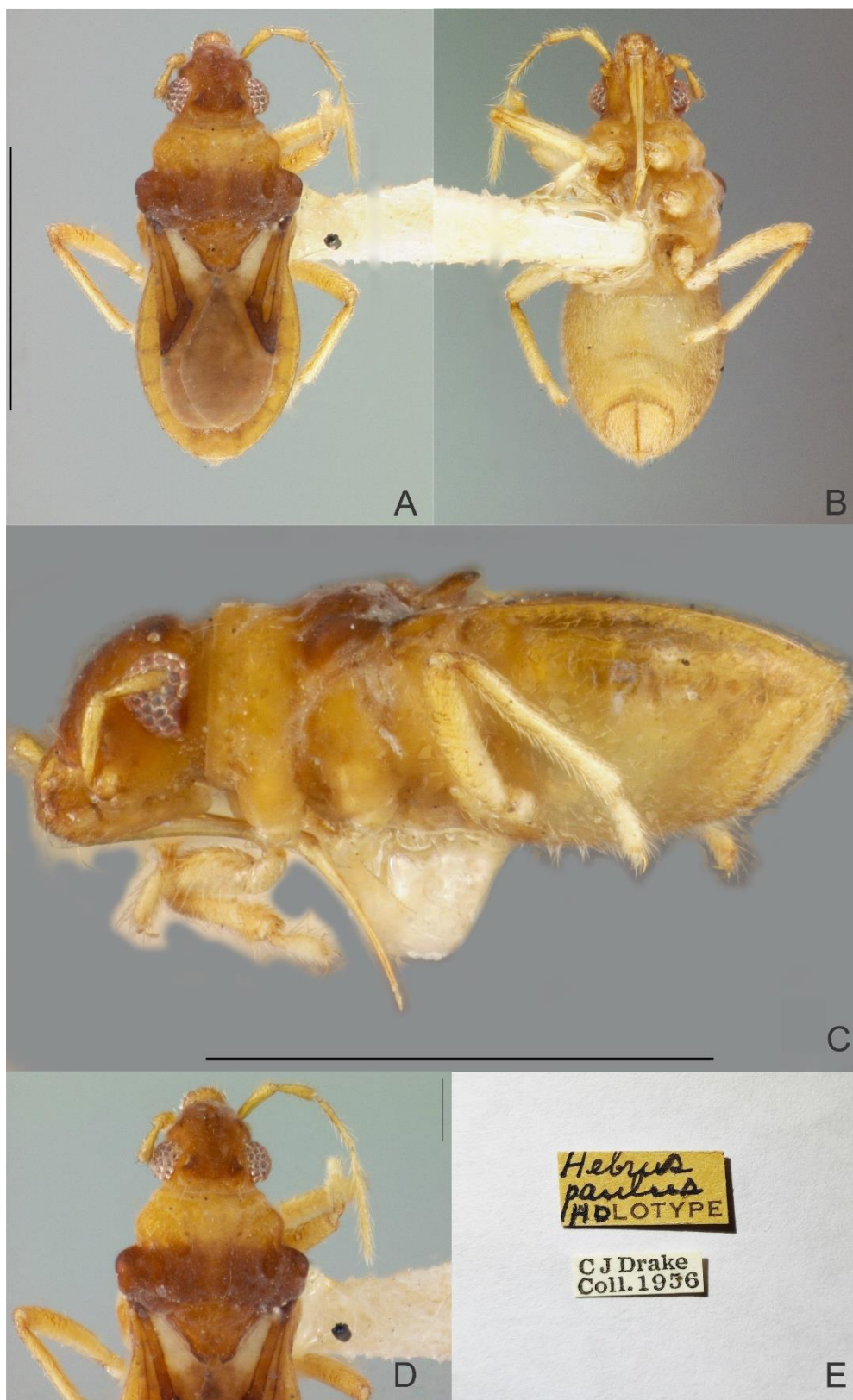


Figure 30. *Hebrus paulus*. submacropterous female, holotype. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Habitus, lateral view. **D.** Head, thorax and part of abdomen, dorsal view. **E.** labels. Scale bars: 1.0 mm (A–C), 0.2 mm (D).

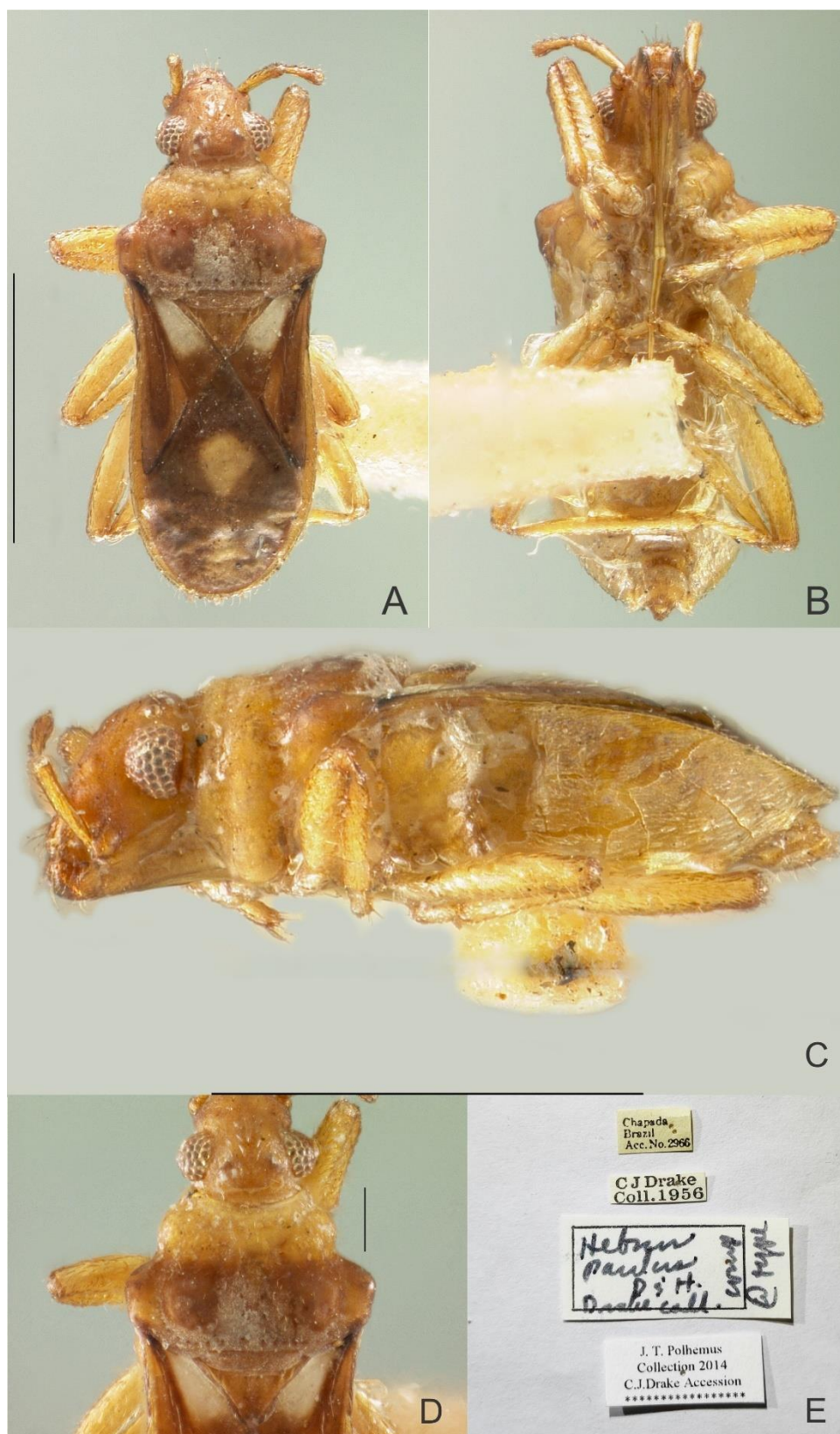


Figure 31. *Hebrus paulus*. submacropterous male. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Habitus, lateral view. **D.** Head, thorax and part of abdomen, dorsal view. **E.** labels. Scale bars: 1.0 mm (A–D). 0.2 mm (D).

Macropterous females (Fig. 31), are considerably larger than the submacropterous female in almost all body measurements. Body length (BL) shows the most striking difference, ranging from 2.12–2.17 mm in macropterous females compared to 1.60 mm in the submacropterous female. Macropterous females exhibit a larger body size, wider head, larger eyes, longer antennae, proportionally larger wings, and considerably longer legs. The submacropterous female is smaller and more compact; some thoracic measurements (MESW, METW) may be slightly larger proportionally, which is common due to wing reduction. It shows the same pattern of markings as the macropterous male.

Macropterous male (Fig. 31). **Non-type.** BL 1.97; HL 0.37; HW 0.45; EYE 0.10; IOW 0.22; OL 0.15; ANT I 0.26; ANT II 0.15; ANT III lost; ANT IV lost; AWP 0.60; HWP 0.80; PL 0.47; MESW 0.32; MESL 0.06; METW 0.35; METL 0.17; FORELEG, FEM 0.50, TIB 0.47, TAR I 0.02, TAR II 0.15; MIDLEG, FEM 0.50, TIB 0.45, TAR I 0.02, TAR II 0.12; HINDLEG, FEM 0.62, TIB 0.62, TAR I 0.03, TAR II 0.17.

Similar to macropterous females. Forewings narrowly exposing abdominal laterotergites and reaching posterior margin of abdomen. Abdomen without distinct notches or projections; VIII ventrally excavated (Fig. 31B).

Diagnosis

Vertex of head, posterior lobe of pronotum, and corium with very short golden setae; labrum, antenna (Figs. 30A, 30C, 31A, 31C), legs, and abdomen densely covered by moderately long yellowish to brown setae; whitish pruinosity on apex of head dorsally, posterior pronotal lobe, and laterally between meso- and metathorax (Figs. 30D, 31D); most central two punctations on row between pronotal lobes clearly distinguished in dry specimens (Fig. 30D, 31D); metanotal elevation with a short median carina, apex with a moderately deep, rounded median notch (Figs. 30D, 31D); forewings with a pair of large white maculae starting below pronotum and slightly surpassing apex of metanotal elevation, and a rounded yellowish macula centrally on membrane (Figs. 30A, 31A); female abdominal laterotergites not distinctly elevated or sinuous, not reflected over mediotergites (Figs. 30A, 30C); venter of female abdomen not narrowed posteriorly (Figs. 30B); Abdomen without distinct notches or projections; VIII ventrally excavated.(Fig. 33B).

Notes

Hebrus paulus is superficially similar to *H. gloriosus*, with which it coexists in Chapada dos Guimarães. However, the two can be easily distinguished by the following features of *H. paulus*: 1) dorsum of body without long, erect setae (Figs. 30A, 30D, 31A, 31D) (vs. with long, erect setae; Figs. 12A, 12C, 12D, 12E); 2) whitish pruinosity on apex of head dorsally, posterior pronotal lobe, and laterally between meso- and metathorax (Fig. 30A, 30D, 31A, 31D) (vs. without such pruinose areas; Figs. 12A, 12C, 13A, 13B); pronotal collar concolorous with rest of anterior lobe (30A, 30D, 31A, 31D) (vs. strongly contrasting; Figs. 12A, 12C, 13A, 13B, 16A); and 3) male abdomen without ventral projections (vs. with a projection; Figs. 14B, 14D, 14E).

Distribution

Brazil: Mato Grosso (Fig. 43).

Hebrus plaumanni Porter, 1952

Figs. 32, 33, 34, 35, 36, 43

Hebrus plaumanni Porter, 1952: 12 (original description; partim, holotype, allotype, one male paratype, one female paratype).

Hebrus limnaeus Drake & Chapman, 1958: 324 (**new synonym**).

Type material examined. Holotype of *H. plaumanni*. BRAZIL – [Santa Catarina] • [Seara], Nova Teutônia; [–27.13, –52.35]; 22.XII.1935; F. Plaumann leg.; 1 macropterous male, CAS 10042. **Allotype of *H. plaumanni*.** BRAZIL – [Santa Catarina] • Same data as holotype; 1 macropterous female, CAS 8604787. **Paratypes of *H. plaumanni*.** BRAZIL – [Santa Catarina] • Same data as holotype; 1 macropterous male, 1 macropterous female, SEMC. **Holotype of *H. limnaeus*.** BRAZIL – Santa Catarina • [Seara], Nova Teutônia; [–27.13, –52.35]; 26.V.1941; F. Plaumann leg.; 1 macropterous male and slide-mounted paramere, Drake Collection, NMNH.

Redescription

Macropterous males (Fig. 32). **Holotype (Paratypes).** BL 1.95 (1.97–2.06); HL 0.42 (0.38–0.40); HW 0.43 (0.40–0.44); EYE 0.10 (0.09–0.10); IOW 0.23 (0.22); OL 0.15 (0.14); ANT I 0.26 (0.25–0.26); ANT II 0.18 (0.16–0.18); ANT III 0.23 (0.23–lost); ANT IV 0.41 (0.41–lost); AWP 0.56 (0.55–0.57); HWP 0.81 (0.75–0.79); PL 0.43 (0.42–0.44); MESW 0.31 (0.25–0.26);

MESL 0.05 (0.05–0.06); METW 0.38 (0.36); METL 0.15 (0.15); FORELEG, FEM 0.48 (0.48–0.50), TIB 0.45 (0.46), TAR I 0.02 (0.02), TAR II 0.13 (0.13); MIDLEG, FEM 0.50 (0.50–0.51), TIB 0.45 (0.46), TAR I 0.02 (0.02–lost), TAR II 0.12 (0.12–lost); HINDLEG, FEM lost (0.63), TIB lost (0.63), TAR I lost (0.02), TAR II lost (0.15–0.16).

General color brown. Head slightly darker dorsally, light brown to yellow ventrally. Antennomeres I–II light brown to yellow; III–IV darker. Pronotum brown, with lateral margins and some depressions darker. Mesoscutelum and metanotal elevation brown, with margins dark brown. Acetabula light at apex; legs yellow. Venter of abdomen dark brown to black. Forewings light brown; veins brown with apex darker; base with a pair of small white maculae starting below pronotum and reaching half of metanotal elevation; membrane matte light brown, with a pair of small transversal whitish macula near apex of veins (Figs. 32A, 32D). Vertex of head, pronotum, corium and clavus of forewing with moderately short brownish setae. Apex of head dorsally, head ventrally, antennae and legs densely covered by moderately long yellowish to brown setae. Abdomen with dense, moderately long whitish-yellow setae. Light pruinosity on the vertex of head, thoracic terga and sides of abdominal sterna.

Head slightly wider than long; width through eyes 1.02–1.10 times length; interocular width 2.2–2.4 times eye width. Buccula elongated, with tapered apex slightly curved mesally. Antennomere I cylindrical, slightly curved; antennomere II cylindrical. Antennal formula: IV > I > III > II. Pronotum with a transverse row of small, moderately deep punctations on collar; a transverse, undefined row of eight moderately large punctations between lobes; most central two punctations on row between lobes clearly distinguished in dry specimens, inserted on a longitudinal deep groove that reaches almost two thirds of posterior lobe; posterior lobe with a row of small punctations adjacent to posterior margin, continuing laterally close to humeri, one median longitudinal row of small punctations, and a few sparse small punctations on disc; humeri elevated (Figs. 32A, 32D). Mesoscutellum 4.2–6.2 times wider than long. Metanotal elevation trapezoidal, 2.4–2.5 times wider than long; disc with raised margins and two submedian depressions divided by a median carina; apex with a moderately deep, rounded median notch (Figs. 32A, 32D). Forewings exposing narrow lateral margin of abdominal laterotergites, reaching posterior margin of abdomen. Venter of abdomen without distinct notches or projections (Figs. 32B). Paramere curved; apex pointed (Fig. 35A paratype).

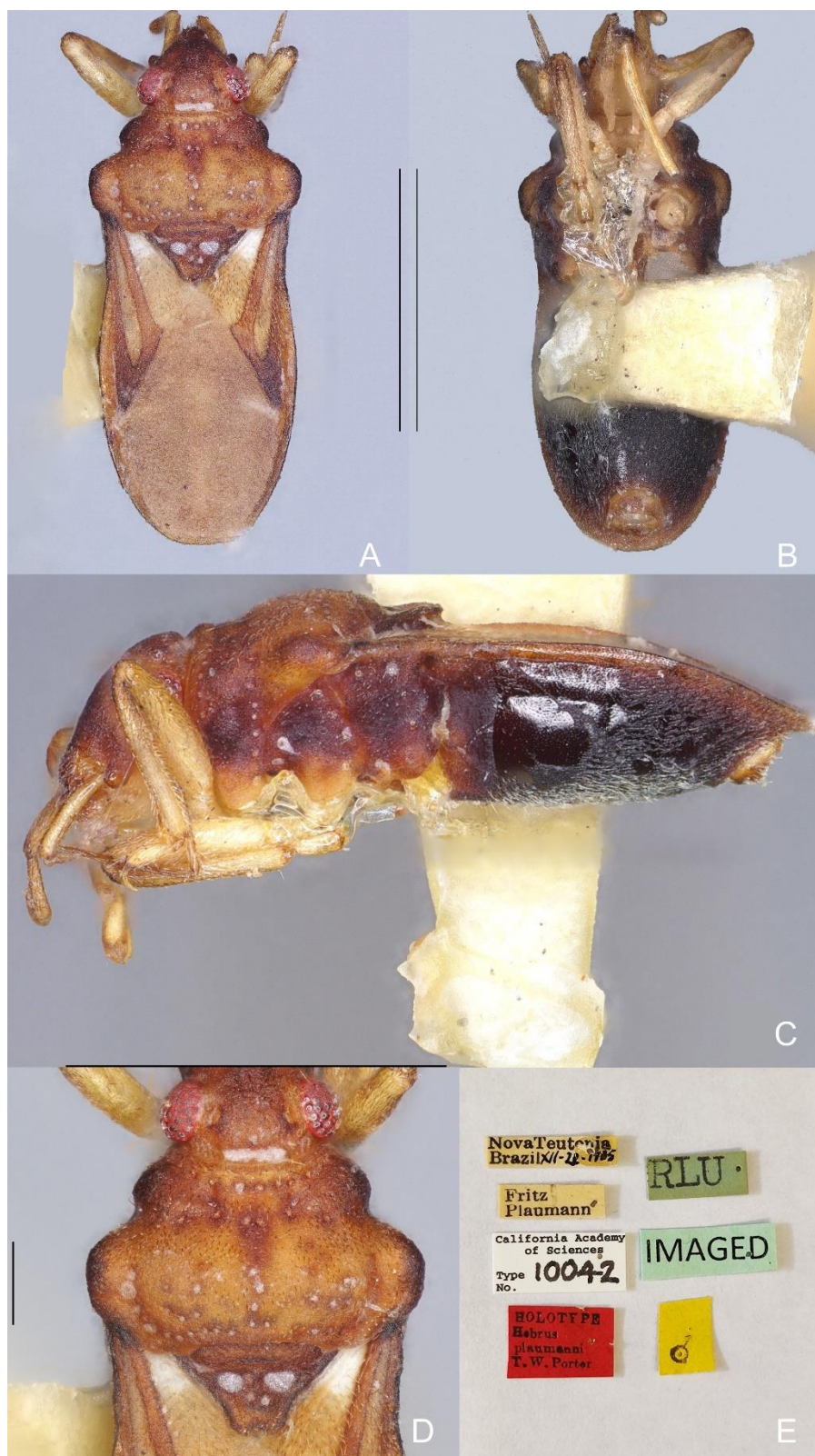


Figure 32. *Hebrus plaumanni*. Macropterous male, holotype. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Habitus, lateral view. **D.** Head, thorax, and part of abdomen, dorsal view. **E.** labels. Scale bars: 1.0 mm (A–C), 0.2 mm (D).

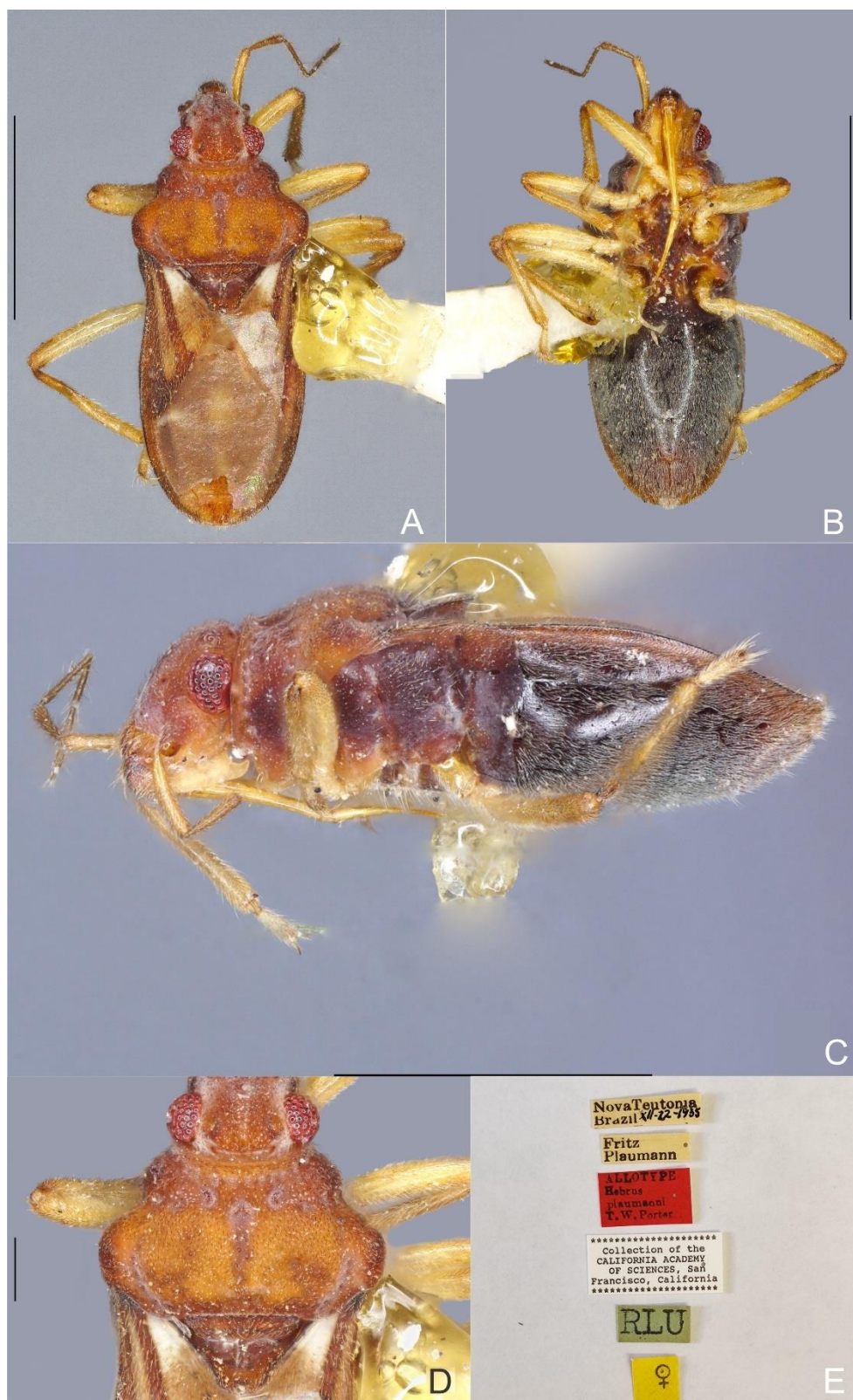


Figure 33. *Hebrus plaumanni*. macropterous female, allotype. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Habitus, lateral view. **D.** Head, thorax, and part of abdomen, dorsal view. **E.** labels. Scale bars: 1.0 mm (A–C), 0.2 mm (D).

Macropterous females (Figs. 33, 34). **Paratype.** BL 2.15; HL 0.45; HW 0.47; EYE 0.10; IOW 0.26; OL 0.15; ANT I 0.27; ANT II 0.19; ANT III 0.22; ANT IV 0.40; AWP 0.60; HWP 0.87; PL 0.47; MESW 0.35; MESL 0.06; METW 0.43; METL 0.18; FORELEG, FEM 0.51, TIB 0.50, TAR I 0.02, TAR II 0.15; MIDDLEG, FEM 0.55, TIB 0.50, TAR I 0.02, TAR II 0.13; HINDLEG, FEM 0.75, TIB 0.70, TAR I 0.02, TAR II 0.16.

Similar to macropterous male. Body length longer; longitudinal pronotal sulcus slightly deeper. Abdominal laterotergites not strongly elevated or reflected over abdomen (Figs. 33B, 34B). Venter of abdomen not narrowed posteriorly (Figs. 33B, 34B).

Diagnosis

Vertex of head, pronotum, corium and clavus of forewing with moderately short brownish setae; apex of head dorsally, head ventrally, antennae and legs densely covered by moderately long yellowish to brown setae; abdomen with dense, moderately long whitish-yellow setae; light pruinosity on the vertex of head, thoracic terga and sides of abdominal sterna; most central two punctations on row between pronotal lobes clearly distinguished in dry specimens (Figs. 32D, 33D, 36D) metanotal elevation with carina, apex with a moderately deep, rounded median notch (Figs. 32D, 33D, 36D); forewings with a pair of small white maculae starting below pronotum and reaching half of metanotal elevation, and a pair of small transversal whitish macula near apex of veins (Figs. 32A, 32D, 33D, 36A, 36D); female abdominal laterotergites not distinctly elevated or sinuous, not reflected over mediotergites (Figs. 33B, 34B); venter of female abdomen not narrowed posteriorly (Figs. 33B, 34B); male abdomen without distinct notches or projections (Figs. 32B, 36B); paramere curved, apex pointed (Fig. 35).



Figure 34. *Hebrus plaumanni*, macropterous female, paratype, habitus. **A.** Dorsal view. **B.** Ventral view.

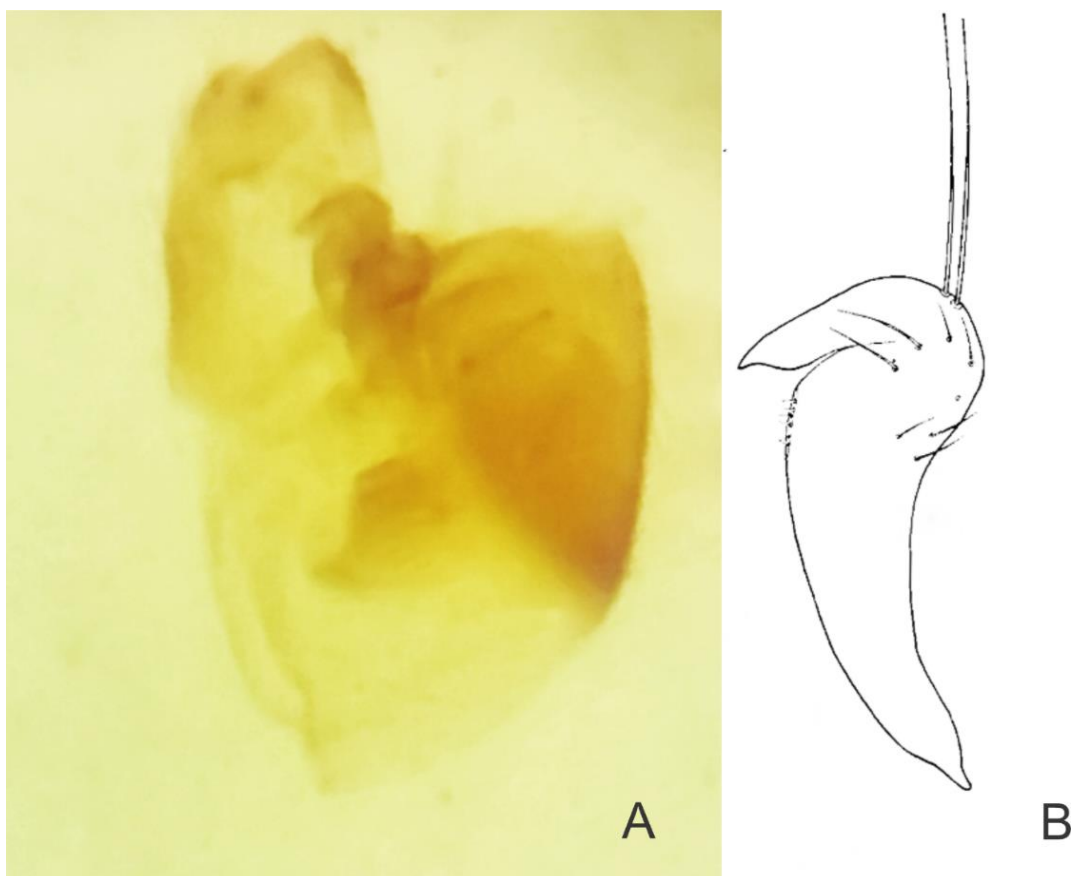


Figure 35. *Hebrus plaumanni* **A** Genital capsule and parameter of *H. plaumanni*, macropterous male, paratype preserved on a slide in the SEMC. **B.** Paramere de *Hebrus limnaeus* (= *Hebrus plaumanni*), macropterous male, holotype Drake & Chapman, 1958.

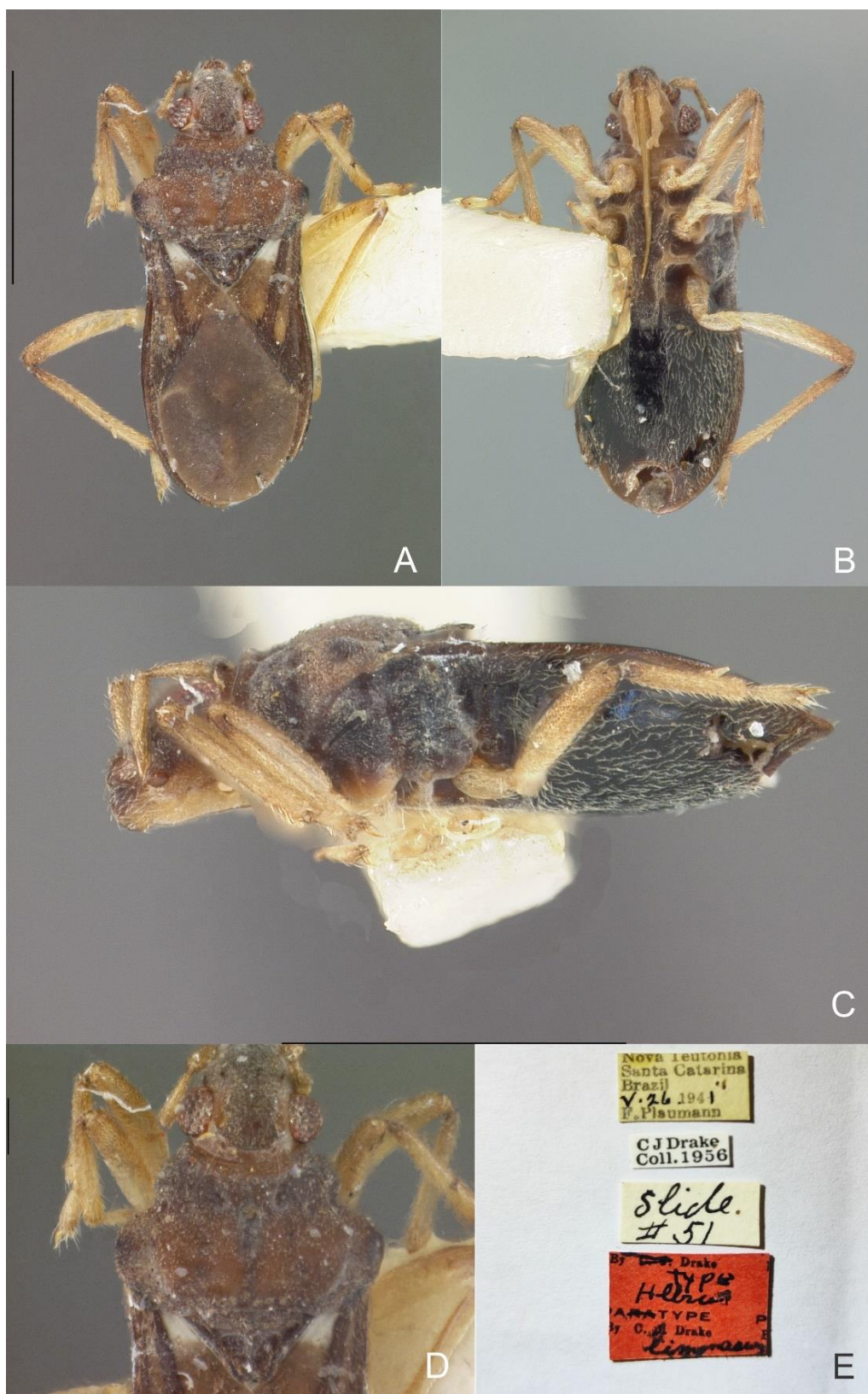


Figure 36. *Hebrus limnaeus* (= *Hebrus plaumanni*), macropterous male, holotype. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Habitus, lateral view. **D.** Head, thorax, and part of abdomen, dorsal view. **E.** labels. Scale bars: 1.0 mm (A–C), 0.2 mm (D).

Notes

From what we observed in the collections that we visited; it seems that the terminalia of the holotype of the former species was lost at some point during its description. This led them to believe that the paramere of *H. limnaeus* (preserved on a slide in the NMNH) (Fig. 36) would be different from that of *H. plaumanni* and that the basal forewings maculae would be shorter, when they are not (compare maculae on Figs. 32A, 33A, 34A). But when comparing the parameres of the species, we believe it to be the same species. Due to the lack of any significant differences between *H. plaumanni* and *H. limnaeus*, which share the same type locality, we propose synonymizing them.

Distribution

Brazil: Santa Catarina (Fig. 43). The record from Colombia (Padilla-Gil 2013) is highly questionable.

Hebrus priscus Drake & Harris, 1943

Figs. 37, 38, 39, 40, 43

Hebrus priscus Drake & Harris, 1943: 57 (original description).

Type material examined. Holotype. BRAZIL – **Mato Grosso** • Cuiabá; [−15.6, −56.1]; Aug.; 1 macropterous female, Drake Collection, NMNH. **Allotype [= paratype].** BRAZIL – **Mato Grosso** • Cuiabá; [−15.6, −56.1]; 1 macropterous male, Drake Collection, NMNH.

Additional material examined. BRAZIL – **Ceará** • Aiuaba, Estação Ecológica de Aiuaba, estrada ao lado do brejo, light trap; alt. 486 m; 06°41'31.2"S, 40°11'13.1"W; 04.IV.2021; J.M.S. Rodrigues leg.; • Same, except estrada, light trap; alt. 634 m; 06°43'33.1"S, 40°18'23.4"W; 05.IV.2021; C.C. Gonçalves leg.; 1 macropterous males, 1 macropterous female, CEIOC xxxx • Same, except estrada, próxima ao riacho da Gameleira, light trap; alt. 493 m; 06°41'13.4"S, 40°16'05.7"W; 06.IV.2021; A.S. de Freitas leg.; 1 macropterous male, CEIOC xxxx • Same, except J.M.S. Rodrigues leg.; 15 macropterous males CEIOC xxx. – **Mato Grosso [do Sul]** • Corumbá; [−19.0, −57.7]; 1 macropterous female, J.T. Polhemus Collection, NMNH.

Redescription

Macropterous female (Fig. 37). **Holotype (Non-type)**. BL 1.95 (1.80); HL 0.35 (0.30); HW 0.45 (0.41); EYE 0.11 (0.10); IOW 0.22 (0.20); OL 0.15 (0.13); ANT I 0.18 (0.15); ANT II 0.12 (0.11); ANT III 0.20 (lost); ANT IV 0.38 (lost); AWP 0.57 (0.52); HWP 0.82 (0.80); PL 0.46; (0.41) MESW 0.36 (0.36); MESL 0.06 (0.06); METW 0.38 (0.40); METL 0.16 (0.15); FORELEG, FEM 0.37 (glued), TIB 0.38 (glued), TAR I 0.02 (glued), TAR II 0.10 (glued); MIDLEG, FEM 0.41 (glued), TIB 0.35 (glued), TAR I 0.02 (glued), TAR II 0.10 (glued); HINDLEG, FEM 0.52 (glued), TIB 0.57 (glued), TAR I 0.02 (glued), TAR II 0.12 (glued).

General color light brown to brown, except for head centrally from ocelli to apex, lateral areas of anterior lobe of pronotum, humeri, margins of metanotal elevation and apical margin of forewings veins, thoracic sterna, and abdomen dark brown to black. Antennae, head ventrally (including buccula and labium), and legs yellowish. Forewings with a pair of small diffuse white maculae starting below pronotum and reaching about half of metanotal elevation, and a faint oval whitish macula on membrane (Fig. 37A, 37D). Vertex of head, pronotum, and corium and clavus of forewings with very short golden setae. Antenna, legs and abdomen densely covered by moderately long yellowish setae. Whitish pruinosity on head dorsally, scattered on pronotum, and on sides and venter of thorax (Fig. 37A, 37B).

Head slightly wider than long; width through eyes approximately 1.3 times length; interocular width 2.0 times eye width. Buccula elongated, straight, with apex rounded. Antennomere I cylindrical, slightly curved; antennomere II cylindrical; width of antennomeres III–IV approximately half of antennomere I. Antennal formula: IV > III > I > II. Pronotum with a transverse row of small, moderately deep punctations on collar; anterior lobe with two moderately large, deep punctations submedially; a large, deep median punctation centrally, between lobes; sides with minute black denticles; posterior lobe with a row of small punctations adjacent to posterior margin, continuing laterally close to humeri, a moderately deep median longitudinal groove, and a some indistinct punctations on disc; humeri elevated (Fig. 37A, 37D). Mesoscutellum 6.0 times wider than long. Metanotal elevation trapezoidal, about 2.4 times wider than long; disc with raised margins and a median depression with a short median carina; apex with a moderately deep rounded median notch (Fig. 37A, 37D). Abdominal laterotergites slightly elevated. Forewings exposing narrow lateral margins of abdominal laterotergites, reaching posterior margin of abdomen. Abdominal laterotergites not strongly elevated or reflected over abdomen (Fig. 37A). Venter of abdomen not narrowed posteriorly (Fig. 37B).

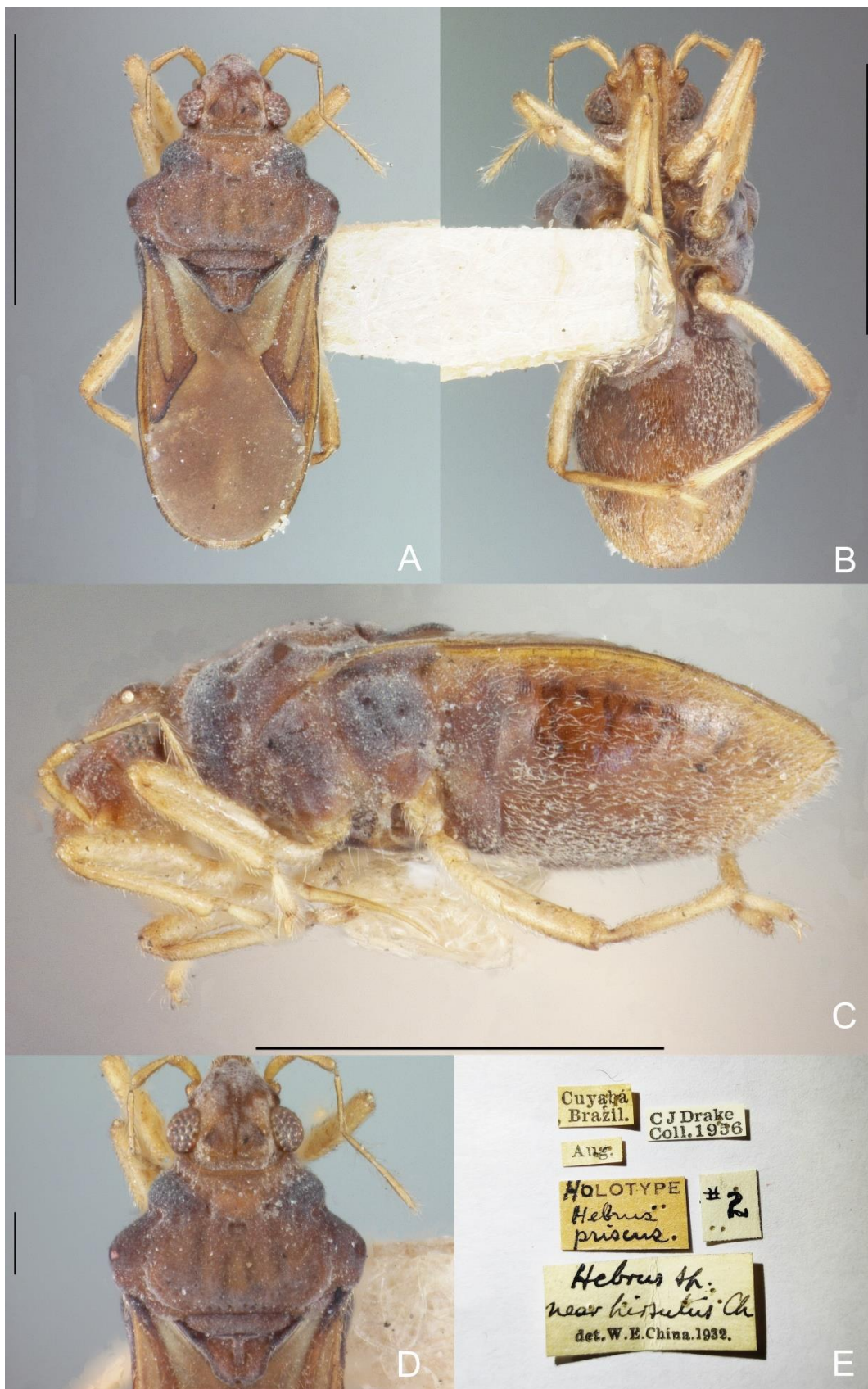


Figure 37. *Hebrus priscus*. macropterous female, holotype. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Habitus, lateral view. **D.** Part of head, thorax, and part of abdomen, dorsal view. **E.** labels Scale bars: 1.0 mm (A–C), 0.2 mm (D).

Macropterous male (Fig. 38). **Paratype**. BL 1.77; HL 0.30; HW 0.45; EYE 0.10; IOW 0.22; OL 0.15; ANT I 0.17; ANT II 0.12; ANT III lost; ANT IV lost; AWP 0.55; HWP 0.78; PL 0.42; MESW 0.32; MESL 0.07; METW 0.36; METL 0.15; FORELEG, FEM 0.37, TIB 0.37, TAR I 0.02, TAR II 0.10; MIDDLEG, FEM 0.40, TIB 0.35, TAR I 0.02, TAR II 0.10; HINDLEG, FEM 0.50, TIB 0.55, TAR I 0.02, TAR II 0.12.

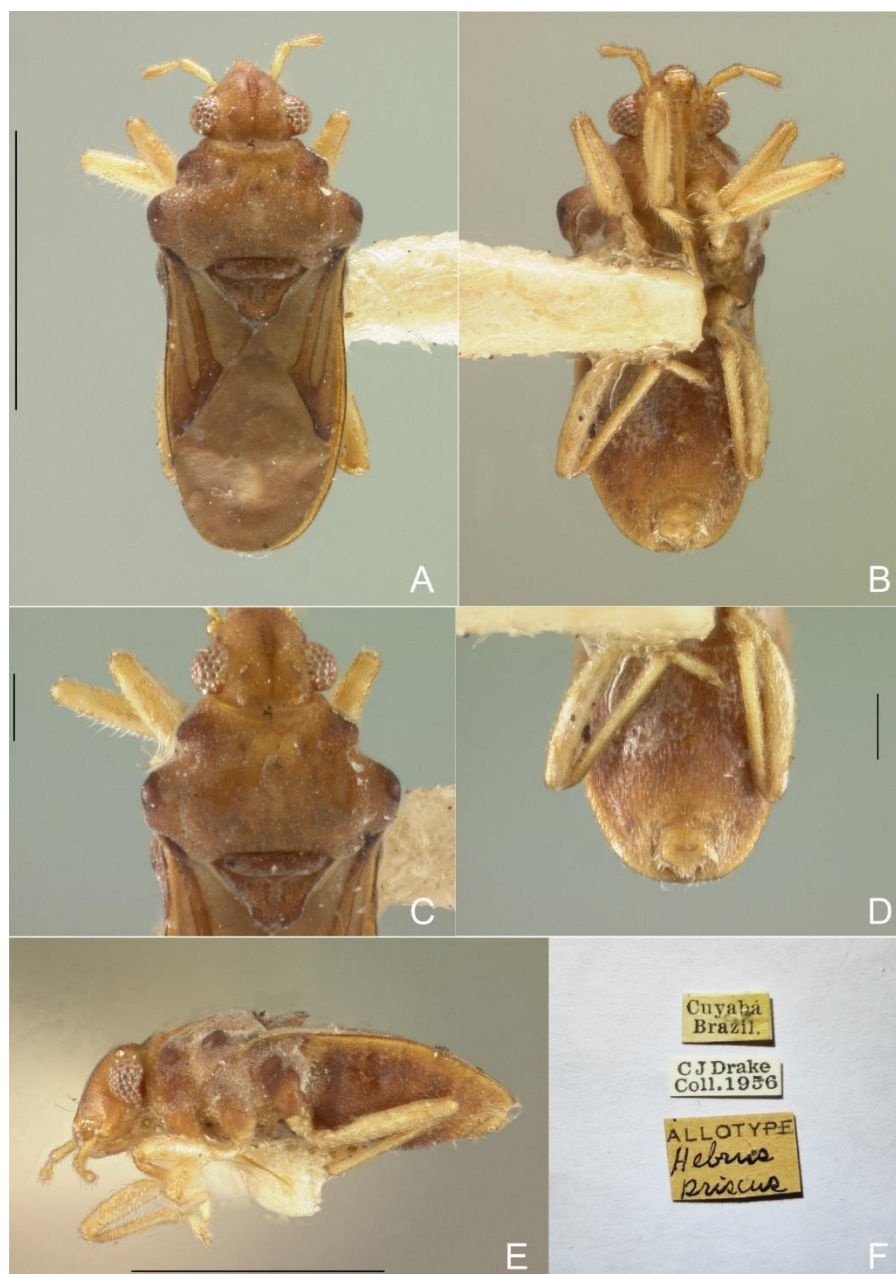


Figure 38. *Hebrus priscus*. macropterous male, allotype. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Part of head, thorax, and part of abdomen, dorsal view. **D.** Part of abdomen, ventral view. **E.** Habitus, lateral view. **F.** Labels. Scale bars: 1.0 mm (**A–B, E**), 0.2 mm (**C–D**).

Similar to macropterous female. General color lighter, body shorter. Venter of abdomen without distinct notches; genital capsule with a small ventral projection, paramere concave (Fig. 40).



Figure 39. *Hebrus priscus*. macropterous males, Ceará, Aiuaba. **A.** Habitus, dorsal view. **B, C.** Habitus, ventral view. **D.** Part of abdomen, ventral view. **E.** Part of abdomen, lateral view. Scale bars: 1.0 mm (A–C), 0.1 mm (D–E).

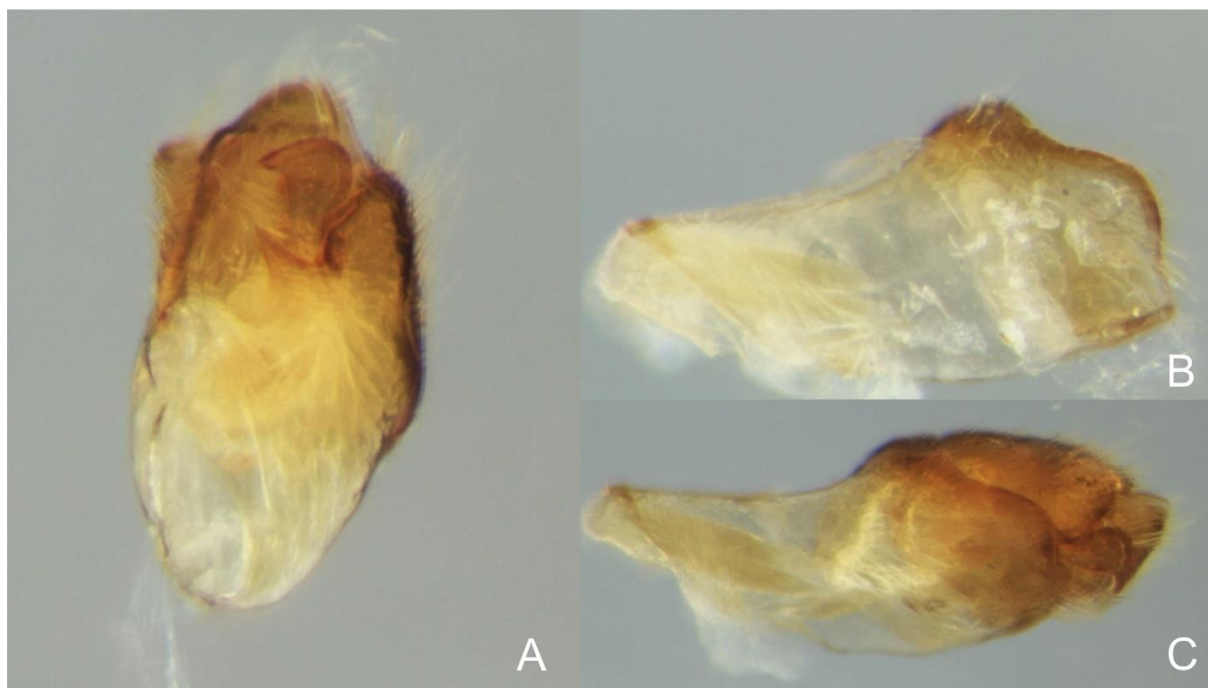


Figure 40. *Hebrus priscus*. macropterous male, Ceará, Aiuaba. **A.** Genital capsule, and paramere, lateroventral view. **B.** Segment VIII, lateral view. **C.** Segment VIII, genital capsule, and paramere, lateral view.

Diagnosis

Vertex of head, pronotum, and corium and clavus of forewings with very short golden setae; antenna, legs, and abdomen densely covered by moderately long yellowish setae; whitish pruinosity on head dorsally, scattered on pronotum, and on sides and venter of thorax (Figs. 37A, 38A, 39A); most central two punctations on row between pronotal lobes larger than others and placed close together, giving impression of a single deep punctation in dry specimens (Fig. 37A, 37D, 38A, 38C, 39A); metanotal elevation with carina, apex with a moderately deep rounded median notch (Figs. 37D, 38C); forewings with a pair of small diffuse white macula starting below pronotum and reaching about half of metanotal elevation, and a faint oval whitish macula on membrane (Figs. 37A, 38A, 39A); female abdominal laterotergites not distinctly elevated or sinuous, not reflected over mediotergites; venter of female abdomen not narrowed posteriorly; genital capsule with a small ventral projection, paramere concave (Fig. 40).

Notes

Among species that occur in Brazil, the small, diffuse, basal white maculae found on the forewings of *H. priscus* are shared only with *H. giehliae* **sp. nov.** and *H. nordestinus* **sp. nov.** However, the three can be distinguished based on the following characteristic of *H. priscus*: 1) male abdominal segment VIII without projection (Fig. 37B, 38B, 38D, 39 B–E (vs. with a projection ventrally; Figs. 9B, 9D, 9E, 23B, 23D, 23E). *H. priscus* also resembles *H. catu* Drake & Chapman, 1958, but *H. catus* presents the following characteristics: male abdomen sometimes with a projection ventrally between segments VII and VIII (absent in the non-type specimen dissected); paramere curved distally, with a small preapical projection.

Distribution

Brazil: Ceará, Mato Grosso, Mato Grosso do Sul, São Paulo. Peru (Fig. 43). The occurrence in Panama (Porter 1950, Drake and Chapman 1953) is highly questionable. The locality that Drake & Chapman (1953) associated with Paraguay is actually a lake in the state of São Paulo.

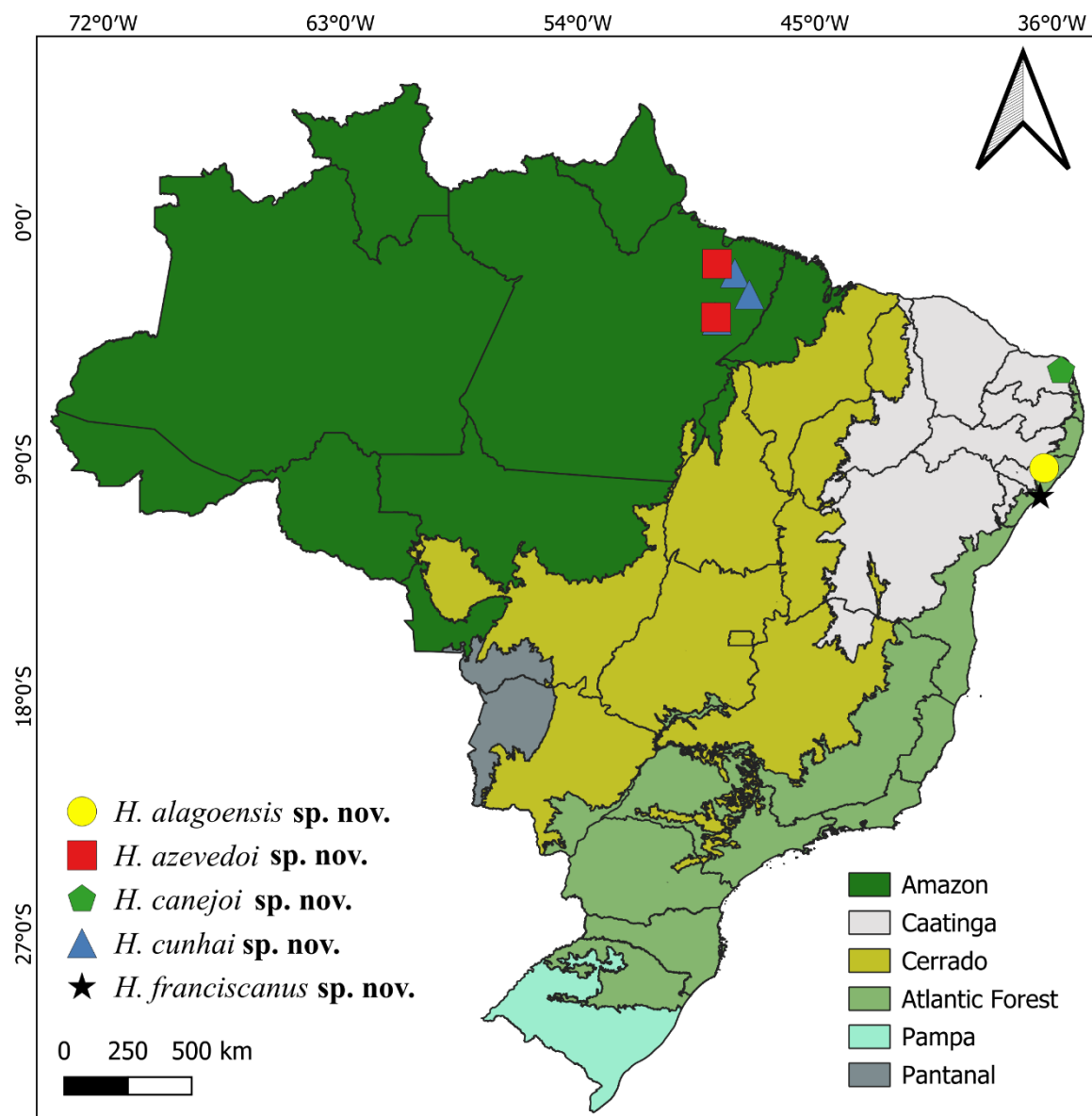


Figure 41. Geographic distribution of *Hebrus* recorded from Brazil. *H. alagoensis* sp. nov. (yellow circle), *H. azevedoi* sp. nov. (red squares), *H. canejoii* sp. nov. (green pentagon), *H. cunhai* sp. nov. (blue triangles), *H. franciscanus* sp. nov. (black star).

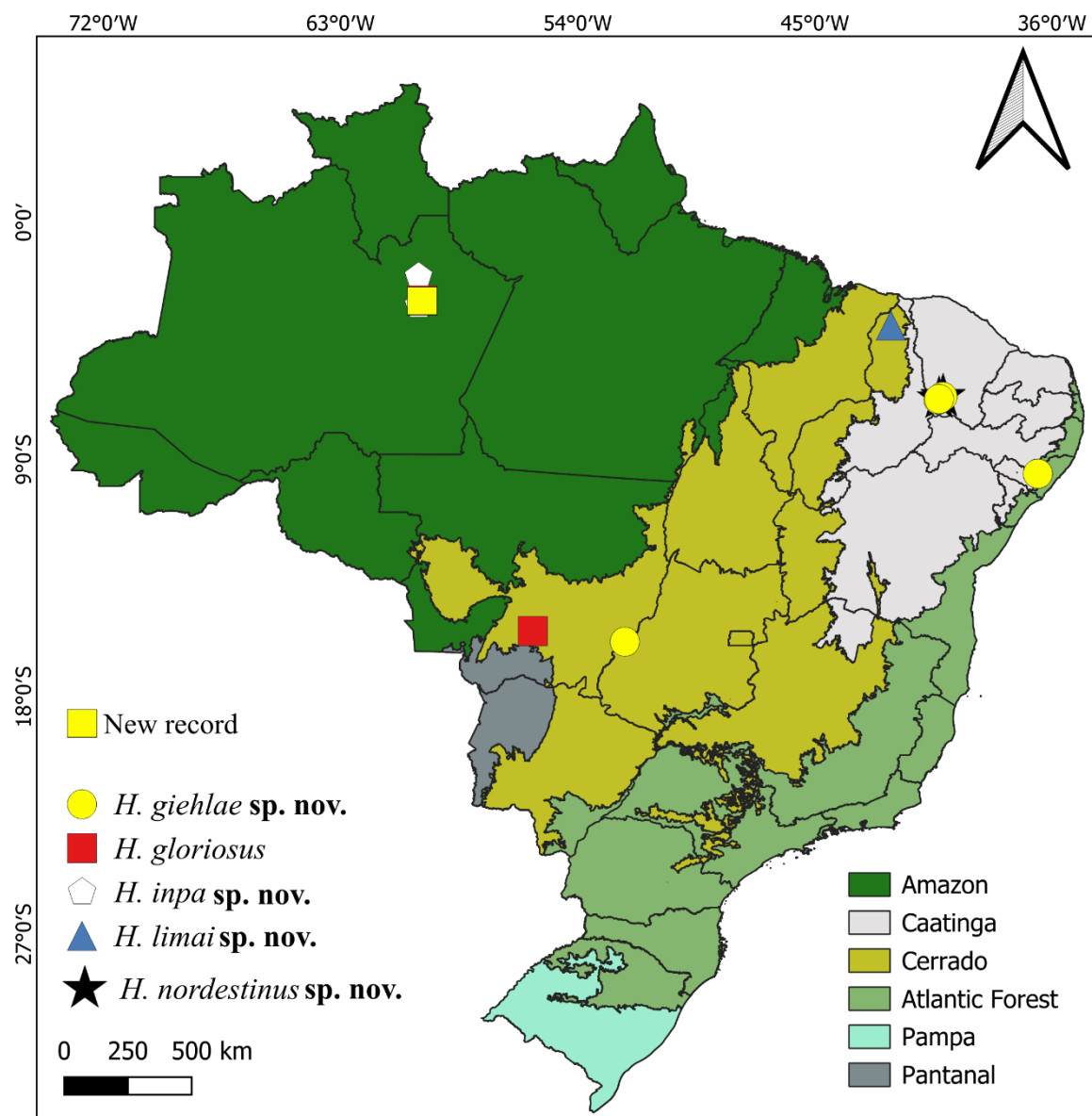


Figure 42. Geographic distribution of *Hebrus* recorded from Brazil. *H. giehlai* **sp. nov.** (yellow circles), *H. gloriosus* (red square), *H. inpa* **sp. nov.** (white pentagon), *H. limai* **sp. nov.** (blue triangles), *H. nordestinus* **sp. nov.** (black stars).

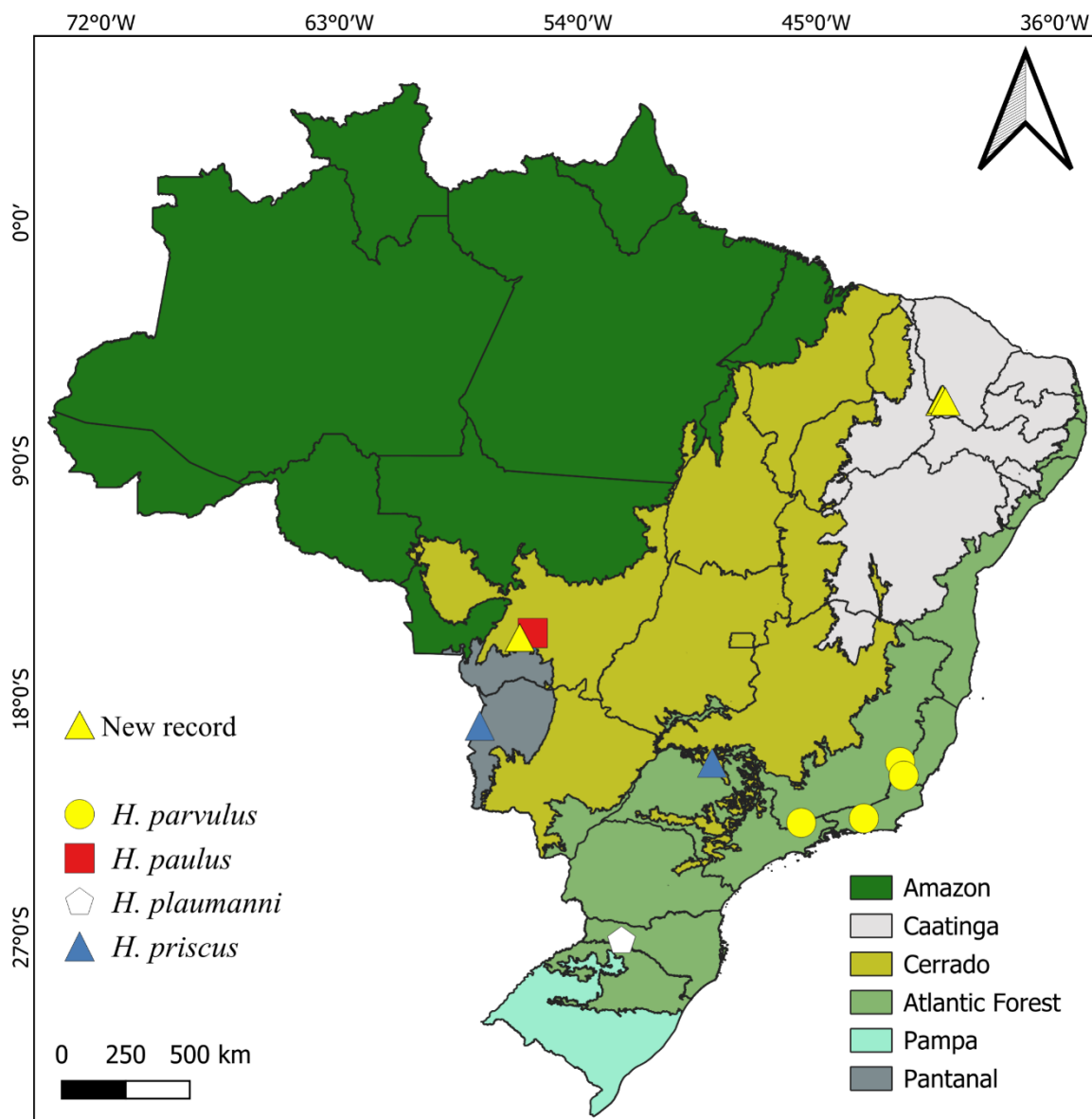


Figure 43. Geographic distribution of *Hebrus* recorded from Brazil. *H. parvulus* (yellow circle), *H. paulus* (red square), *H. plaumanni* (white pentagons), *H. priscus* (blue triangles).

In this study, five previously described species of *Hebrus* recorded from Brazil were redescribed and illustrated: *Hebrus gloriosus* Drake & Harris, 1943, *H. parvulus* Stål, 1860, *H. paulus* Drake & Harris, 1943, *H. plaumanni* Porter, 1952, and *H. priscus* Drake & Harris, 1943. In addition, nine new species are described and illustrated herein: *Hebrus alagoensis* **sp. nov.**, *H. azevedoi* **sp. nov.**, *H. canejoii* **sp. nov.**, *H. cunhai* **sp. nov.**, *H. franciscanus* **sp. nov.**, *H. giehlæ* **sp. nov.**, *H. inpa* **sp. nov.**, *H. limai* **sp. nov.**, and *H. nordestinus* **sp. nov.** We also propose a new synonymy, with *Hebrus plaumanni* recognized as the senior synonym of *H. limnaeus* Drake & Chapman, 1958. Before this revision, five species of *Hebrus* were known

from Brazil; despite the synonymy, the description of nine new species increases the number of recognized Brazilian species to fourteen, representing a substantial expansion of the known diversity of the genus in the country.

The present revision expands knowledge of *Hebrus* in Brazil, both taxonomically and biogeographically. Before this study, the genus was recorded from only six Brazilian states and restricted to three biomes, Atlantic Forest, Cerrado, and Pantanal (Moreira et al. 2011; 2025). By describing nine new species, redescribing previously known taxa, and compiling updated distributional data, this study considerably broadens the known geographic and ecological distribution of *Hebrus* in the country (Porter 1950, Drake and Chapman 1953).

The newly described species and new distributional records extend the occurrence of the genus to additional Brazilian biomes, including the Amazon Forest and Caatinga, and substantially increase its representation in the Atlantic Forest and Cerrado. At the biome level, some previously known species, such as *Hebrus gloriosus* and *H. priscus*, occur in more than one biome, indicating broader ecological tolerance. Finally, recognition of biome-level distributions strengthens the taxonomic framework of *Hebrus* in Brazil by providing an ecological context for species delimitation and distribution.

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Capítulo 2: A review of *Hebrus* Curtis, 1833 (Hemiptera: Heteroptera: Hebridae) from Central and South America, except Brazil and Argentina

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Abstract. Hebridae (Hemiptera: Heteroptera: Gerromorpha) is a family with over 220 species divided into two subfamilies and 12 genera. These small insects, measuring 1.3–3.7 mm, resemble tiny veliids and are rarely collected due to their secretive nature. Representatives of *Hebrus* Curtis, 1833, the type genus of this family, typically hide among the vegetation near water sources and are occasionally found on brackish water. The Neotropical region has records of 28 *Hebrus* species, most of which are known only from the type series and often inadequately described. Here, we present a review of the *Hebrus* fauna of Central America and South America, except Brazil and Argentina, including redescriptions of 12 species, a new synonym, new records, photographs, and distribution maps.

Keywords. Distribution records, Neotropical species, vegetation habitat, velvet water bugs.

Introduction

Hebridae (Hemiptera: Heteroptera: Gerromorpha) comprise more than 220 species divided into two subfamilies and 12 genera (Polhemus & Polhemus 2008; Kment *et al.* 2016; Stella & Pall 2018; Zhang *et al.* 2024). Individuals of this family are some of the smallest gerromorphans, with lengths ranging from 1.3 to 3.7 mm. They resemble small veliids and, due to their size and often secretive behavior, they are rarely encountered by collectors who are not looking for them (Schuh & Weirauch 2020).

Representatives of *Hebrus* Curtis, 1833, the type genus of Hebridae, typically hide among the marginal vegetation of pools, lakes, and streams, occasionally being found in brackish water (Moreira 2015). They are poorly represented in most collections and are rarely studied, probably because of the difficulties to collect them and to analyze their morphology (Zettel & Tran 2016). The Neotropical region has records of 28 *Hebrus* species, most of which are known only from the type series. Furthermore, many species have been described incompletely and/or without illustrations, or are based solely on female specimens (Moreira 2015).

Here, we present a review of the *Hebrus* fauna of Central America and South America, except Brazil and Argentina, including redescriptions of the following 12 species: *H. camposi* Drake & Chapman, 1954; *H. catus* Drake & Chapman, 1958; *H. concinnus* Uhler, 1894; *H. consolidus* Uhler, 1894; *H. ecuadoris* Drake & Harris, 1943; *H. hungerfordi* Drake & Harris, 1943; *H. laeviventris* Champion, 1898; *H. major* Champion, 1898; *H. pilosidorsus* Polhemus & Chapman, 1970; *H. pudoris* Drake & Harris, 1943; *H. spiculus* Polhemus & McKinnon, 1983; and *H. sulcatus* Champion, 1898. We also present a new synonym, new records, photographs, and distribution maps.

Material and methods

Material examined is deposited in the following collections: American Museum of Natural History, New York, United States (AMNH); Natural History Museum, London, United Kingdom (NHM); Naturhistorisches Museum Wien, Viena, Austria (NHMW); National Museum of Natural History, Smithsonian Institution, Washington D.C., United States (NMNH); Snow Entomological Museum Collection, University of Kansas, Lawrence, United States (SEMC); and Colección de Insectos, Museo de Historia Natural “Luis Gonzalo Andrade”, Universidad Pedagógica y Tecnológica de Colombia, Tunja, Colombia (UPTC).

Within the NMNH, C.J. Drake Collection is herein abbreviated as CJDC and J.T. Polhemus Collection as JTPC.

In the NMNH AntLab, we obtained photographs using a JVC KY-F75U digital camera and Automontage Pro Version 5.03.0061. In the SEMC we used a Canon EOS 6D Mark II digital camera, Helicon Focus 8.2.7, and Zerene Stacker Version 1.04 Build T2023-06-11-1120. We obtained photographs from the staff or at other institutions using varied equipment and methods available at each site. We prepared final figures with Photoshop CS5.

Collecting information of the material examined is written as follows: country in all-capitals; states in bold; a bullet point (•) indicates the beginning of a record; an n-dash precedes a state name in bold; within each record, different fields are delimited by a semicolon; a single field can be composed of several elements, which are separated by commas. We produced distribution maps based on literature data and specimen labels using QGIS 3.10.7 (QGIS Development Team 2020).

Abbreviations used for measurements are as follows: body length (BL), head length (HL), head width through eyes (HW), eye width (EYE), minimum interocular width (IOW), length of antennomeres I–IV [without intersegmental pieces] (ANT I, ANT II, ANT III, ANT IV), anterior width of pronotum (AWP), humeral width of pronotum (HWP), pronotum length on midline (PL), mesoscutellum width (MESW), mesoscutellum length (MESL), metanotum width (METW), metanotum length (METL), length of fore leg segments (FORELEG), length of middle leg segments (MIDLEG), length of hind leg segments (HINDLEG), femoral length (FEM), tibial length (TIB), length of tarsomeres I–II (TAR I, TAR II). All measurements are given in millimeters and were always taken in their maximum dimensions, except for the minimum interocular distance.

Results

***Hebrus camposi* Drake & Chapman, 1954**

Hebrus camposi Drake & Chapman, 1954: 151 (original description).

Figs. 1, 2, 33A

Type material examined. Holotype. ECUADOR – [Guayas] • Guayaquil; [–2.2, –79.9]; 20.X.1952; F. Campos leg.; 1 macropterous ♂, CJDC, NMNH. **Paratypes.** Same data as holotype; 2 macropterous ♀, CJDC, NMNH • Same, except 1941; C.L. Fagan leg.; 2 macropterous ♀, NMNH.

Redescription

Macropterous male (Fig. 1). **Holotype.** BL 1.85; HL 0.30; HW 0.45; EYE 0.11; IOW 0.25; ANT I 0.17; ANT II 0.12; ANT III 0.20; ANT IV 0.35; AWP 0.55; HWP 0.82; PL 0.42; MESW 0.37; MESL 0.07; METW 0.37; METL 0.17; FORELEG, FEM 0.40, TIB 0.40, TAR I 0.02, TAR II 0.13; MIDLEG, FEM 0.40, TIB 0.40, TAR I 0.02, TAR II 0.15; HINDLEG, FEM 0.55, TIB 0.60, TAR I 0.03, TAR II 0.15.

General color dark brown, except antennomeres I, II and apex of IV, buccula, labium, legs (except apices of femora, bases of tibiae, and apices of tarsi) light brown to yellow. Forewings: corium white between dark brown veins, with apex light brown; clavus with a large white macula reaching middle of metanotal elevation at wing margin and surpassing it near vein, occupying 3/4 of clavus, apex light brown; membrane light brown, with a faint white macula basally, a pair of transverse white maculae adjacent to apex of veins, and three irregular white macular apically (Fig. 1A). Abdomen brown.

Vertex of head, posterior lobe of pronotum, mesoscutellum and metanotal elevation with short golden setae. Antennomeres densely covered with brown setae, decumbent on I and II, mostly erected on III and IV. Veins and brownish region of clavus with moderately long golden setae. Legs and abdomen with dense, moderately long yellowish setae; apex of tibiae with dark brown setae. Tegument with whitish pruinosity bordering eyes, on apex of head dorsally, sides of head, anterior lobe of pronotum, and sides and venter of thorax (Fig. 1A, 1C).

Head wider than long; width through eyes approximately 1.3 times length; interocular width 2.3 times eye width. Buccula elongated, straight (Fig. 1E). Antennomere I cylindrical, slightly curved; antennomere II cylindrical; width of antennomeres III–IV approximately half of antennomere I. Antennal formula: IV > III > I > II. Pronotum with a transverse row of small, moderately deep punctations on collar; anterior lobe with two large deep punctations submedially; a central pair of smaller deep punctations between lobes; sides with minute black denticles; posterior lobe with a row of small punctations adjacent to posterior margin,

continuing laterally close to humeri, two longitudinal rows submedially, and sparse small punctations on disc; humeri elevated (Fig. 1A, 1C). Mesoscutellum 5.3 times wider than long. Metanotal elevation trapezoidal, 2.2 times wider than long; disc with raised margins and two submedian depressions divided by a median carina; apex rounded, without median notch (Fig. 1A, 1C). Forewings exposing narrow lateral margins of abdominal laterotergites, almost reaching posterior margin of abdomen.

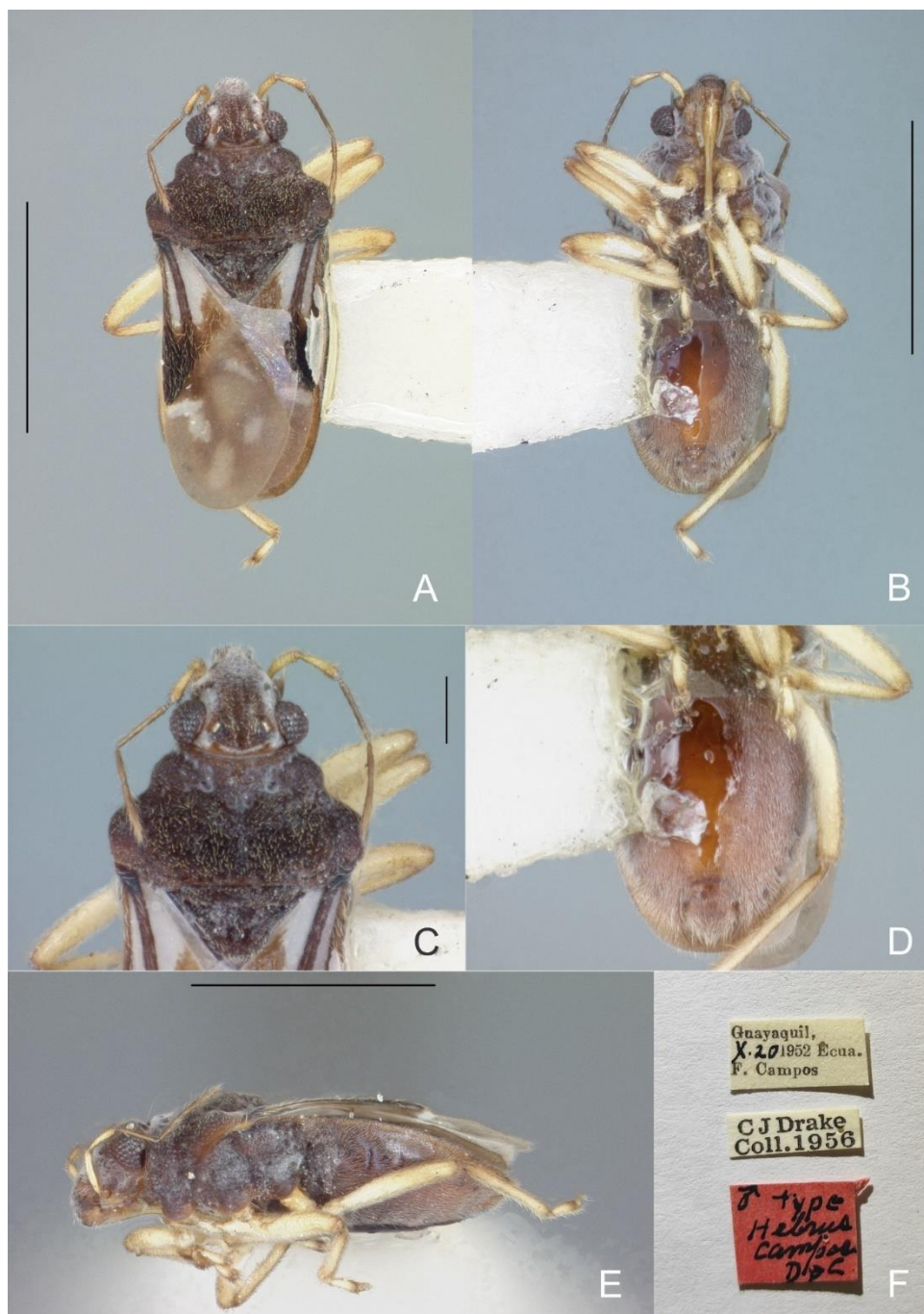


Figure 44. *Hebrus camposi*. macropterous male, holotype. **A.** Habitus, dorsal view, and labels. **B.** Habitus, ventral view. **C.** Head, thorax, and part of abdomen, dorsal view. **D.** Part of

abdomen, ventral view. **E.** Habitus, lateral view. **F.** labels. Scale bars: 1.0 mm (**A, B, E**), 0.2 mm (**C, D**).

Macropterous female (Fig. 2). **Paratypes.** BL 1.95–1.97; HL 0.30; HW 0.46–0.47; EYE 0.12; IOW 0.25; ANT I 0.17–0.20; ANT II 0.12–0.15; ANT III lost–0.22; ANT IV lost–0.37; AWP 0.57–0.60; HWP 0.87–0.90; PL 0.42–0.45; MESW 0.37–0.42; MESL 0.07; METW 0.40–0.42; METL 0.17; FORELEG, FEM 0.40, TIB 0.37–0.40, TAR I 0.02, TAR II 0.12; MIDLEG, FEM 0.40–0.42, TIB 0.40, TAR I 0.02, TAR II 0.15; HINDLEG, FEM 0.57–0.60, TIB 0.57–0.60, TAR I 0.02–0.03, TAR II 0.12.

Similar to macropterous male, except for the following: body longer; width of head through eyes about 1.5 times length; interocular width about 2.1 times eye width; mesoscutellum 5.3–6.0 times wider than long; metanotal elevation about 2.3–2.5 times wider than long. Abdominal laterotergites not distinctly elevated or reflected over abdominal mediotergites (Fig. 2).

Diagnosis. BL ~1.8–2.0; general color dark brown, with golden setae dorsally (Figs. 1A, 2A); head and thorax with pruinose areas (Figs. 1A, 2A); Forewings with a distinct pattern of white maculae; apex light brown. Clavus bearing a large white macula reaching the middle of the metanotal elevation at the wing margin and surpassing it near the vein, occupying approximately three-fourths of the clavus; apex light brown. Membrane light brown, with a faint basal white macula, a pair of transverse white maculae adjacent to the apices of the veins, and three irregular white maculae apically (Fig. 1A, 2A); metanotal elevation with median carina, without notch at apex (Figs. 1A, 1C, 2A); male and female abdomen without distinct modifications (Fig. 1A–B, 2A–B).

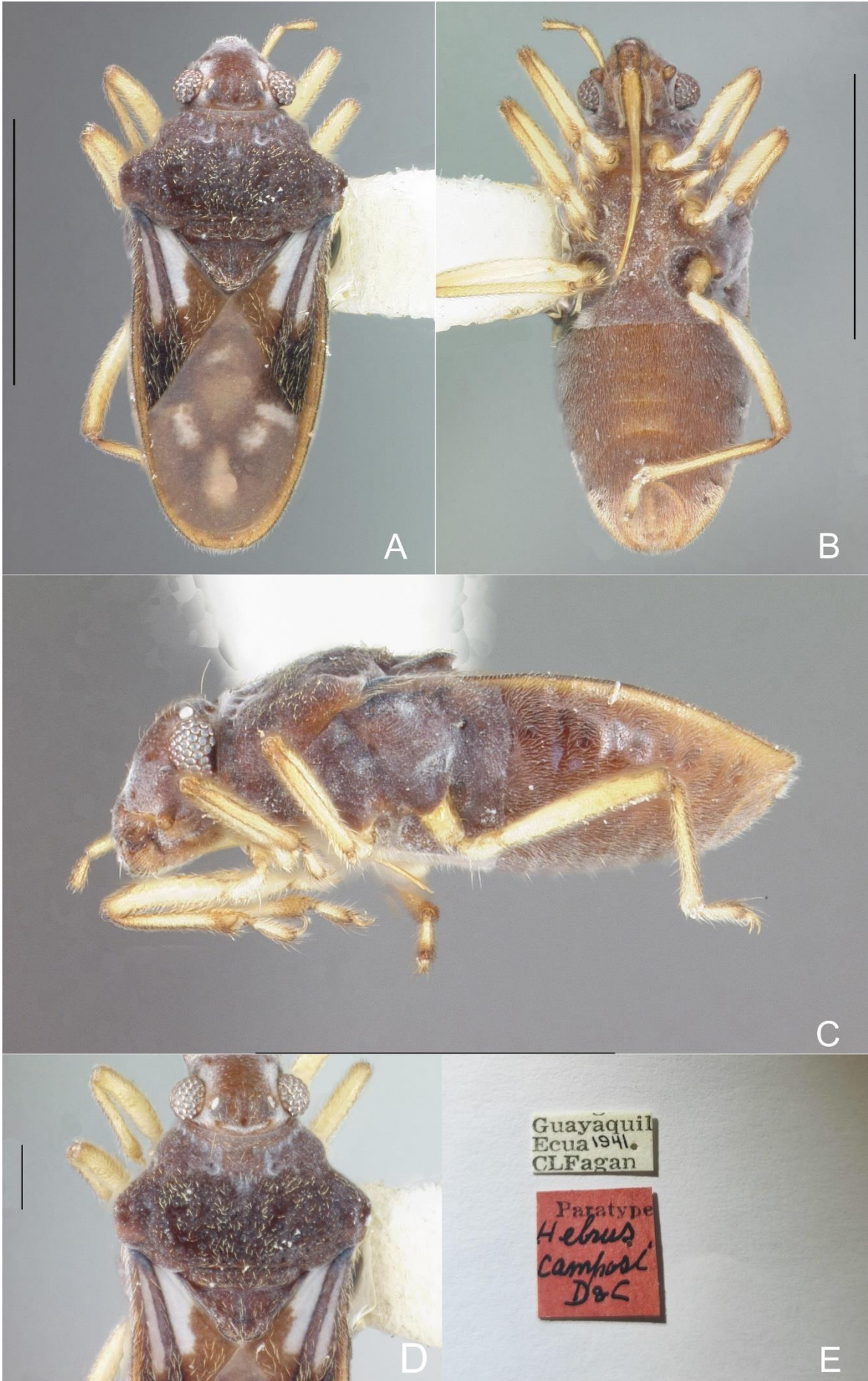


Figure 45 *Hebrus camposi*. macropterous female, paratype. **A.** Habitus, dorsal view. **B.** Habitus, ventral view, and labels. **C.** Head, thorax, and part of abdomen, dorsal view. **D.** Habitus, lateral view. Scale bars: 1.0 mm (**A–C**), 0.2 mm (**D**).

Notes.

Hebrus camposi is closely related to *H. catus* and *H. concinnus* by sharing the general body shape, head wider than long, elongated buccula, antennomeres III–IV narrower than antennomere I, trapezoidal metanotal elevation with a median carina, and forewings exposing narrow lateral margins of the abdominal laterotergites. *Hebrus camposi* can be readily distinguished from *H. catus* by the larger and more conspicuous white macula on the clavus, occupying approximately three-fourths of its length (Figs. 1A, 2A) (vs a small basal macula in *H. catus*) (Figs. 5A, 6A, 6C), by the more complex pattern of white maculae on the membrane, and by the metanotal elevation lacking an apical notch (Figs. 1A, 1C, 2A, 2D, 3A, 3C, 6A, 6C) (distinctly notched in *H. catus*). In addition, males of *H. catus* may present a ventral abdominal projection between segments VII and VIII (Figs. 3B, 3D, 5B, 6B), a feature absent in *H. camposi* (Fig. 1B). From *H. concinnus*, *H. camposi* differs by its darker general coloration, the much larger white macula on the clavus, and the absence of narrow, elongated maculae on the apical half of the membrane (Fig. 1A), which are characteristic of *H. concinnus*. Moreover, the metanotal elevation in *H. concinnus* is also not notched apically but differs (Figs. 7A, 8A, 8C, 9A).

Distribution. Ecuador (Drake & Chapman 1954; present study) (Fig. 33A).

Hebrus catus Drake & Chapman, 1958

Hebrus catus Drake & Chapman, 1958: 324 (original description).

Hebrus elimatus Drake & Cobben, 1960: 40 (**new synonym**).

Figs. 3, 4, 5, 6, 32A, 33A

Type material examined. Holotype of *H. catus*. PANAMA – [Panama] • Canal Zone; [9.0, –79.5]; 02.X.1939; C.J. Drake leg.; 1 macropterous ♂ and slide #54, CJDC, NMNH. **Holotype of *H. elimatus*.** CURAÇAO • Piscadera, innerbaai [inner bay], langs kant tussen gras [along side between grass]; 08.XI.1956; [R.H. Cobben leg.]; 1 submacropterous ♂, CJDC, NMNH. **Allotype (= paratype) of *H. elimatus*.** CURAÇAO • same data as holotype; 1 macropterous

♀, CJDC, NMNH. **Paratypes of *H. elimatus*.** CURAÇAO • same data as holotype, 1 macropterous ♂ and 1 slide, CJDC, NMNH. BONAIRE • Goto meer, [inter alia under stones along the unovergrown salt water line of the salinja]; [12.24, -68.37]; 30.V.1957; R.H. Cobben leg.; 2 macropterous ♀, CJDC, NMNH.

Additional material examined. PANAMA – Colón • Devils Beach, Ft. Sherman, CL 2842; [9.37, -79.95]; 18.I.1993; J.T. Polhemus & A. Gillogly leg.; 1 macropterous ♂, 1 macropterous ♀, JTPC, NMNH.

Redescription

Macropterous males (Fig. 3). **Holotype of *H. catus* (non-type).** BL 1.55 (1.42); HL 0.25 (0.22); HW 0.38 (0.37); EYE 0.10 (0.10); IOW 0.20 (0.20); ANT I 0.17 (0.15); ANT II 0.11 (0.10); ANT III lost (0.18); ANT IV lost (0.31); AWP 0.47 (0.45); HWP 0.70 (0.67); PL 0.42 (0.30); MESW 0.27 (0.30); MESL 0.05 (0.05); METW 0.27 (0.30); METL 0.15 (0.15); FORELEG, FEM 0.37 (0.35), TIB 0.37 (0.32), TAR I lost (0.02), TAR II lost (0.10); MIDLEG, FEM 0.40 (0.35), TIB 0.40 (0.32), TAR I lost (0.02), TAR II lost (0.10); HINDLEG, FEM 0.50 (0.42), TIB 0.50 (0.47), TAR I lost (0.02), TAR II lost (0.11). **Paratypes of *H. elimatus*** (Fig. 4). BL 1.67–1.72; HL 0.31–0.32; HW 0.41–0.42; EYE 0.10; IOW 0.21–0.22; ANT I 0.20; ANT II 0.12–0.15; ANT III 0.17–0.20; ANT IV 0.32; AWP 0.52–0.56; HWP 0.75; PL 0.37; MESW 0.32–0.35; MESL 0.06–0.07; METW 0.35–0.37; METL 0.15; FORELEG, FEM 0.37, TIB 0.37, TAR I 0.02, TAR II 0.10–0.12; MIDLEG, FEM 0.40–0.42, TIB 0.37, TAR I 0.02, TAR II 0.12; HINDLEG, FEM 0.60, TIB 0.62, TAR I 0.02, TAR II 0.15.

General color light brown to dark brown; legs and antennae lighter than body. Forewings: corium brown between dark brown veins; clavus brown, with a small white macula at base reaching middle to apex of metanotal elevation; membrane brown, with three irregular white maculae — a pair of transversal maculae adjacent lateral to apex of veins and one closer to apex (Fig. 3A).

Body covered by very short yellowish setae; longer setae on forewing veins, legs, and abdomen. Legs with dense, decumbent, moderately long light brown setae interspaced with many erect setae, especially on tibiae.

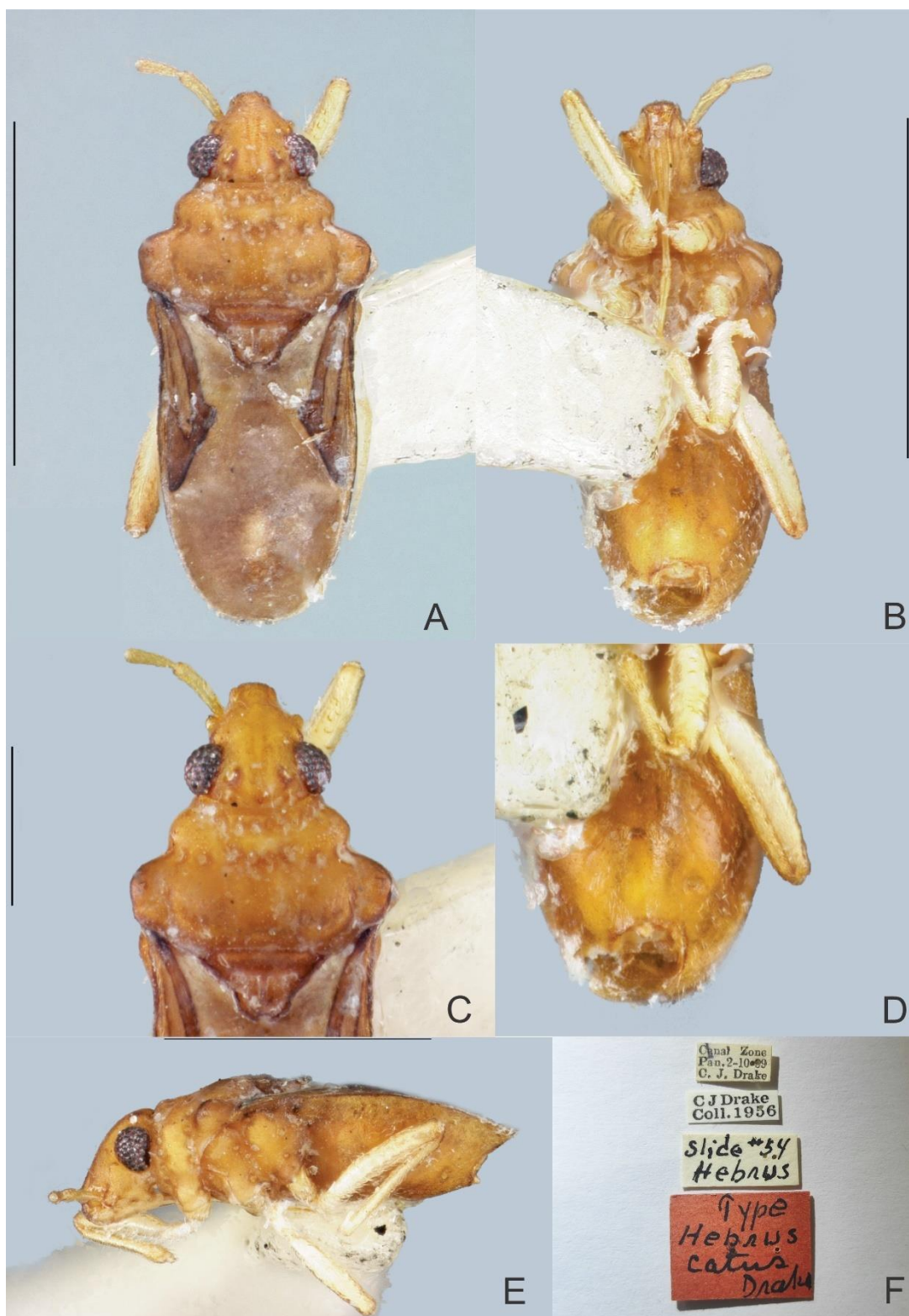


Figure 46. *Hebrus catus*, macropterous male, holotype. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Head, thorax, and part of abdomen, dorsal view. **D.** Apex of abdomen, ventral view. **E.** Habitus, lateral view. **F.** labels. Scale bars: 1.0 mm (A–B, E), 0.5 mm. (C, D).

Head wider than long; width through eyes approximately 1.1–1.5 times length; interocular width 2.0–2.2 times eye width. Buccula elongated, straight (Fig. 3E). Antennomere I cylindrical, slightly curved; antennomere II cylindrical; width of antennomeres III–IV approximately half of antennomere I. Antennal formula $IV > I \sim III > II$. Mesoscutellum 5.4–7.0 times wider than long. Metanotal elevation trapezoidal, 1.8–2.8 times wider than long; disc with raised margins and two submedian depressions divided by a median carina; apex with a small (Fig. 3A, 3C) to (Fig. 3A–B) medium median notch. Forewings exposing narrow lateral margins of abdominal laterotergites, reaching posterior margin of abdomen. Abdomen sometimes with a projection ventrally between segments VII and VIII (Fig. 3B, 3D). Paramere curved distally, with a small preapical projection (Fig. 5E *Hebrus elimatus* (= *Hebrus catus*), 32A).

Submacropterous male (Fig. 4A). Similar to macropterous male, except for forewings exposing larger portions of abdominal laterotergites, reaching apex of abdominal mediotergite VI, and lacking apical macula on membrane.

Figure 47. *Hebrus elimatus* (= *Hebrus catus*). **A–C.** Submacropterous male, holotype, and labels. **D–F.** Submacropterous female allotype. **A, D.** Habitus, dorsal view, and labels. **B, E.** Head, thorax, and part of abdomen, dorsal view. **C, F.** Habitus, lateral view. Scale bars: 1.0 mm (**A, C, D, F**), 0.2 mm (**B, E**).

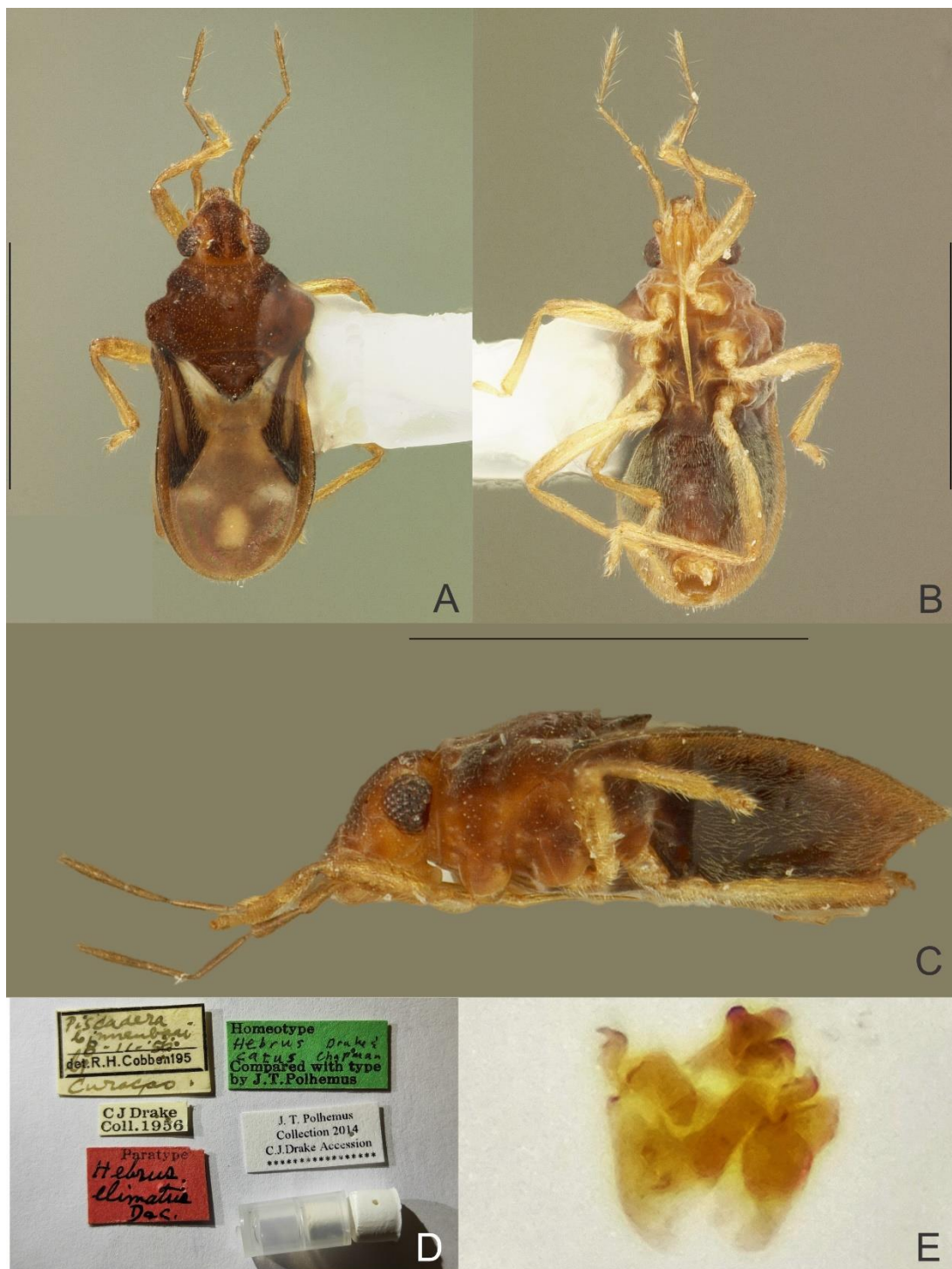


Figure 48. *Hebrus elimatus* (= *Hebrus catus*), macropterous male, paratype. **A.** Habitus, dorsal view, and labels. **B.** Habitus, ventral view. **C.** Habitus, lateral view. **D.** labels. **E.** Capsule genital (broken), and paramere. Scale bars: 1.0 mm.

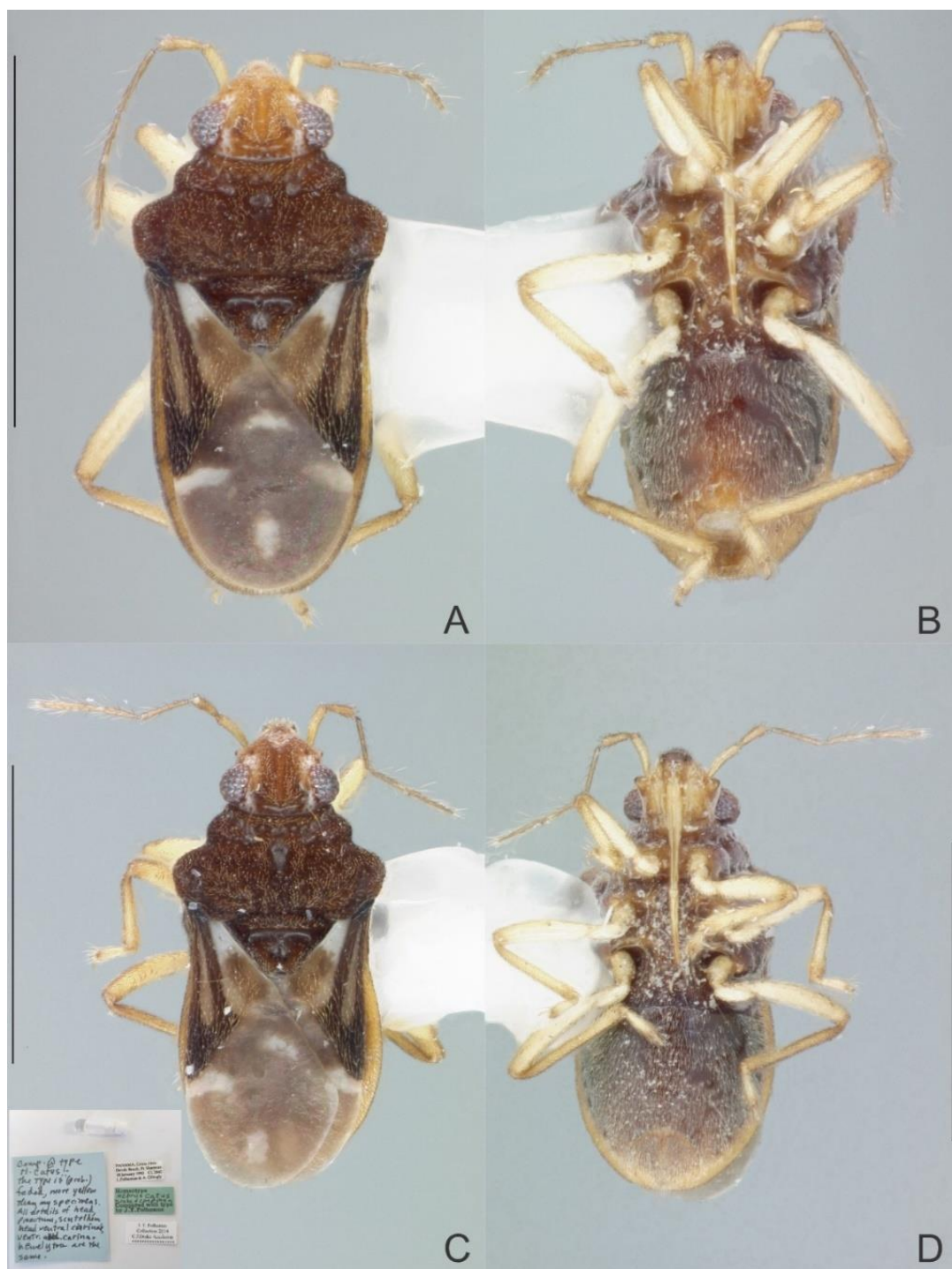


Figure 49. *Hebrus catus*, non-types, habitus. **A, B.** Macropterous male. **C, D.** Macropterous female. **A, C.** Dorsal view, and labels. **B, D.** Ventral view. Scale bars: 1.0 mm.

Macropterous females (Figs. 3D, 3E, 3F, 6C, 6D). **Non-type.** BL 1.55; HL 0.27; HW 0.40; EYE 0.10; IOW 0.20; ANT I 0.15; ANT II 0.10; ANT III 0.17; ANT IV 0.32; AWP 0.47; HWP 0.72; PL 0.32; MESW 0.35; MESL 0.05; METW 0.35; METL 0.15; FORELEG, FEM 0.35, TIB 0.32, TAR I 0.02, TAR II 0.10; MIDLEG, FEM 0.35, TIB 0.32, TAR I 0.02, TAR II 0.10; HINDLEG, FEM 0.45, TIB 0.45, TAR I 0.02, TAR II 0.12. **Paratypes of *H. elimatus*.** BL

1.97–1.98; HL 0.32–0.35; HW 0.45–0.47; EYE 0.10; IOW 0.25; ANT I 0.22; ANT II 0.15; ANT III 0.21–0.22; ANT IV 0.35; AWP 0.57; HWP 0.83–0.85; PL 0.45; MESW 0.37; MESL 0.07; METW 0.41–0.42; METL 0.17; FORELEG, FEM 0.41–0.42, TIB 0.37–0.42, TAR I 0.02, TAR II 0.10–0.12; MIDDLEG, FEM 0.40–0.42, TIB 0.37–0.40, TAR I 0.02, TAR II 0.10–0.12; HINDLEG, FEM 0.55–0.60, TIB 0.57–0.62, TAR I 0.02, TAR II 0.15.

Similar to macropterous male. Abdomen wider, with lateral margins more bowed.

Diagnosis. BL ~1.4–2.0; general color brown, with yellowish setae (Figs. 3A, 4A, 5A, 6A); forewings with pair of small white maculae on clavus and three irregular maculae on membrane (Fig. 3A, 4A, 5A, 6A); metanotal elevation with median carina, apex notched (Figs. 3A, 3C, 4A, 3B, 3D, 4A, 4E, 5A, 6A, 6D); male abdomen sometimes with a projection ventrally between segments VII and VIII (Fig. 3B, 3D) (absent in the non-type specimen dissected); paramere curved distally, with a small preapical projection (Fig. 32A).

Notes. Dr. J.T. Polhemus left a note in the box of *H. elimatus* specimens deposited in the NMNH stating that it could be a synonym of *H. catus* based on the descriptions and paramere shape. After examining the type series of the two species and additional material from Panama identified as *H. elimatus*, we agree with his opinion. The types of *H. elimatus* are slightly larger, with the basal maculae of the forewings a little longer and a narrower notch at the apex of the metanotal elevation. However, they share many similarities in color and structure with *H. catus*, especially the characteristic paramere with a small preapical projection (Fig. 5E, 32A).

A male paratype of *H. elimatus* dissected at NMNH with the projection located between sterna VII and VIII (Fig. 4, 5) observed in the holotype of *H. catus* (Fig. 3B, 3D), but it is also absent in a non-type specimen from Panama that we dissected. Therefore, we consider that *H. catus* and *H. elimatus* should be treated as synonyms, with priority to the former.

In addition to the locality labels, the non-type material from Colón that we examined has the following information: “Compared @ type *H. catus* – the type is (prob.) faded, more yellow than my specimens. All details of head, pronotum, scutellum, head ventral carinae, ventr. abd. carina, hemelytra are the same.” // “Homeotype *Hebrus catus* Drake & Chapman / Compared with type by J.T. Polhemus”. These specimens are indeed darker and have the forewings maculae much better defined than in the holotype of *H. catus* (compare Figs. 3A, 4A).

Additionally, the most central two punctations in the row between the pronotal are so closely placed that they give the impression of being a single larger punctation. Nonetheless, we believe that these variations are of minor importance and agree with J.T. Polhemus' identification as *H. catus*.

Hebrus catus (including *H. elimatus*) shares with *H. consolidus* and *H. spiculus* the general body shape typical of the genus, macropterous condition in both sexes, body length ranging from approximately 1.5–2.1 mm, head wider than long with an elongated buccula, trapezoidal metanotal elevation bearing a median carina, and forewings exposing the lateral margins of the abdominal laterotergites. However, *H. catus* can be distinguished by its smaller average size, light to dark brown coloration (Figs. 3, 4), forewings with two small basal maculae on the clavus and three irregular maculae on the membrane (Figs. 3A, 4B, 6A, 6C), and by the male paramere curved distally with a small preapical projection (Fig. 5E, 32A); additionally, males may present a ventral projection between abdominal sterna VII and VIII (Fig. 3B, 3D), although this character is variable. *Hebrus consolidus* differs markedly by its reddish-brown coloration, presence of silvery spots on the head, a large basal white macula on the clavus clearly surpassing the apex of the metanotal elevation (Figs. 7A, 8A, 8C, 9A), four irregular maculae on the membrane, a weakly notched metanotal apex, absence of abdominal modifications in both sexes, and a sickle-shaped paramere lacking additional projections (Fig. 32B). In contrast, *Hebrus spiculus* is readily recognized by its dark brown coloration combined with areas of whitish pruinosity and a bluish-green metallic sheen on the head and thorax, moderately long golden dorsal setae (Figs. 28A, 29A), a metanotal elevation with a deeper and more rounded apical notch (Fig. 28A, 28D, 29A), and a highly distinctive paramere bearing a mesal spur and a distal hook (Fig. 32G), characters that clearly separate it from both *H. catus* and *H. consolidus*.

Distribution. Aruba (Drake & Cobben 1960), Bonaire (Drake & Cobben 1960; present study), Curaçao (Drake & Cobben 1960; de Kort Gommers & Nieser 1969; present study), Panama (Drake & Chapman 1958; present study) (Fig. 33A). Existing records from Colombia (Padilla-Gil 2012, 2013, 2017, 2019a, 2019b) need verification.

***Hebrus concinnus* Uhler, 1894**

Hebrus concinnus Uhler, 1894a: 221 (original description).

Naeogeus concinnus: Kirkaldy (1900): 241 (new combination).

Hebrus concinnus: Harris (1942): 124 (original combination).

Figs. 7, 8, 9, 32B, 33A

Type material examined. Syntype. GRENADA • Mount Gay Est. [Estate], Leeward side; [12.05, -61.73]; H.H. Smith leg.; 1 macropterous ♀, NHM 01633309.

Additional material examined. COLOMBIA – Boyacá • Puerto Boyacá; 5.97, -74.59; 28.I.2020; P. Mondragón leg.; 1 macropterous ♀, UPTC. GRENADA • Balthazar (Windward side); [12.1, -61.6]; H.H. Smith leg.; 1 macropterous ♂, CJDC, NMNH • Mount Gay Est. [Estate] (Leeward side); [12.05, -61.73]; H.H. Smith leg.; 1 macropterous ♀, CJDC, NMNH.

Redescription

Macropterous female (Fig. 7). **Syntype (non-type).** BL 2.05 (2.12); HL 0.30 (0.37); HW 0.45 (0.45); EYE 0.11 (0.10); IOW 0.22 (0.22); ANT I 0.24 (0.25); ANT II 0.15 (0.17); ANT III 0.26 (lost); ANT IV 0.44 (lost); AWP 0.59 (0.60); HWP 0.89 (0.90); PL 0.43 (0.47); MESW 0.37 (0.37); MESL 0.07 (0.07); METW 0.40 (0.40); METL 0.17 (0.17); FORELEG, FEM 0.42 (0.47); TIB 0.47 (glued); TAR I glued (glued), TAR II glued (glued); MIDLEG, FEM 0.45 (glued), TIB 0.49 (glued), TAR I 0.03 (glued), TAR II 0.13 (glued); HINDLEG, FEM 0.58 (glued), TIB 0.70 (0.66), TAR I 0.03 (0.03), TAR II 0.17 (0.17).

General color light brown, except base of ocellus, eyes, and margins of metanotal elevation dark brown. Forewings: corium light brown between brown veins; veins darker apically; clavus light brown, with a small whitish macula at base; membrane brown, with three narrow maculae on apical half – one longitudinal placed medially and a pair of weakly distinguishable transverse lateral maculae (Fig. 7A). Legs yellow, darker at edges.

Tegument dorsally with very short yellowish setae, longer on forewing veins and abdomen; legs with dense, decumbent, moderately long light brown setae interspersed with many erect setae, especially on tibiae.

Head wider than long; width through eyes approximately 1.5 times length; interocular width 2.0 times eye width. Buccula elongated, slightly curved (Fig. 7C). Antennomere I cylindrical, slightly curved; antennomere II cylindrical; width of antennomeres III–IV approximately half of antennomere I. Antennal formula: IV > III > I > II. Pronotum with a transverse row of small moderately deep punctations on collar and a transverse row of eight deep punctations between the lobes; most central two punctations in row between lobes closely placed, giving impression

of a single deep punctation; posterior lobe with a row of small punctations adjacent to the posterior margin, continuing laterally near humeri, and more irregular small punctations on disc; humeri elevated (Fig. 7A). Mesoscutellum 5.2 times wider than long. Metanotal elevation trapezoidal, 2.35 times wider than long; disc with raised margins and two submedian depressions divided by a median carina; apex rounded, without median notch. Forewings exposing narrow lateral margin of abdominal laterotergites, almost reaching posterior margin of abdomen. Paramere curved apace (Fig. 32B).

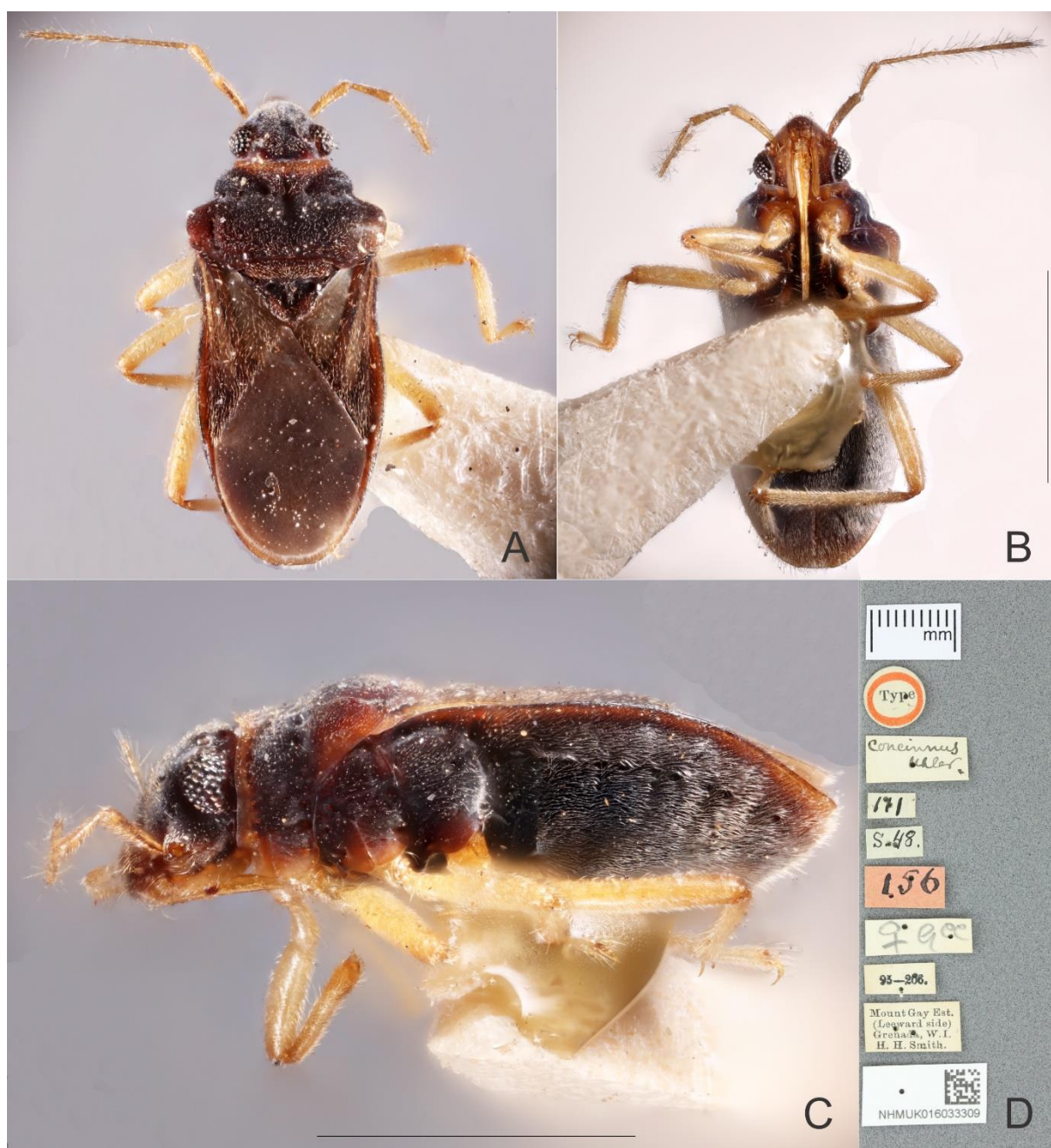


Figure 50. *Hebrus concinnus*, macropterous female, syntype (NHMUK016033309), habitus. A. Dorsal view. B. Ventral view. C. Lateral view, D. labels. Scale bars: 1.0 mm.

Macropterous male (Fig. 8). **Non-type.** BL 1.82; HL 0.32; HW 0.40; EYE 0.20; IOW 0.08; ANT I 0.25; ANT II 0.16; ANT III 0.27; ANT IV 0.42; AWP 0.55; HWP 0.78; PL 0.42; MESW 0.37; MESL 0.07; METW 0.40; METL 0.17; FORELEG, FEM 0.47, TIB 0.42, TAR I 0.02, TAR II 0.12; MIDLEG, FEM 0.47, TIB 0.42, TAR I 0.02, TAR II 0.12; HINDLEG, FEM 0.62, TIB 0.62, TAR I 0.02, TAR II 0.15.

Similar to male but slightly larger.

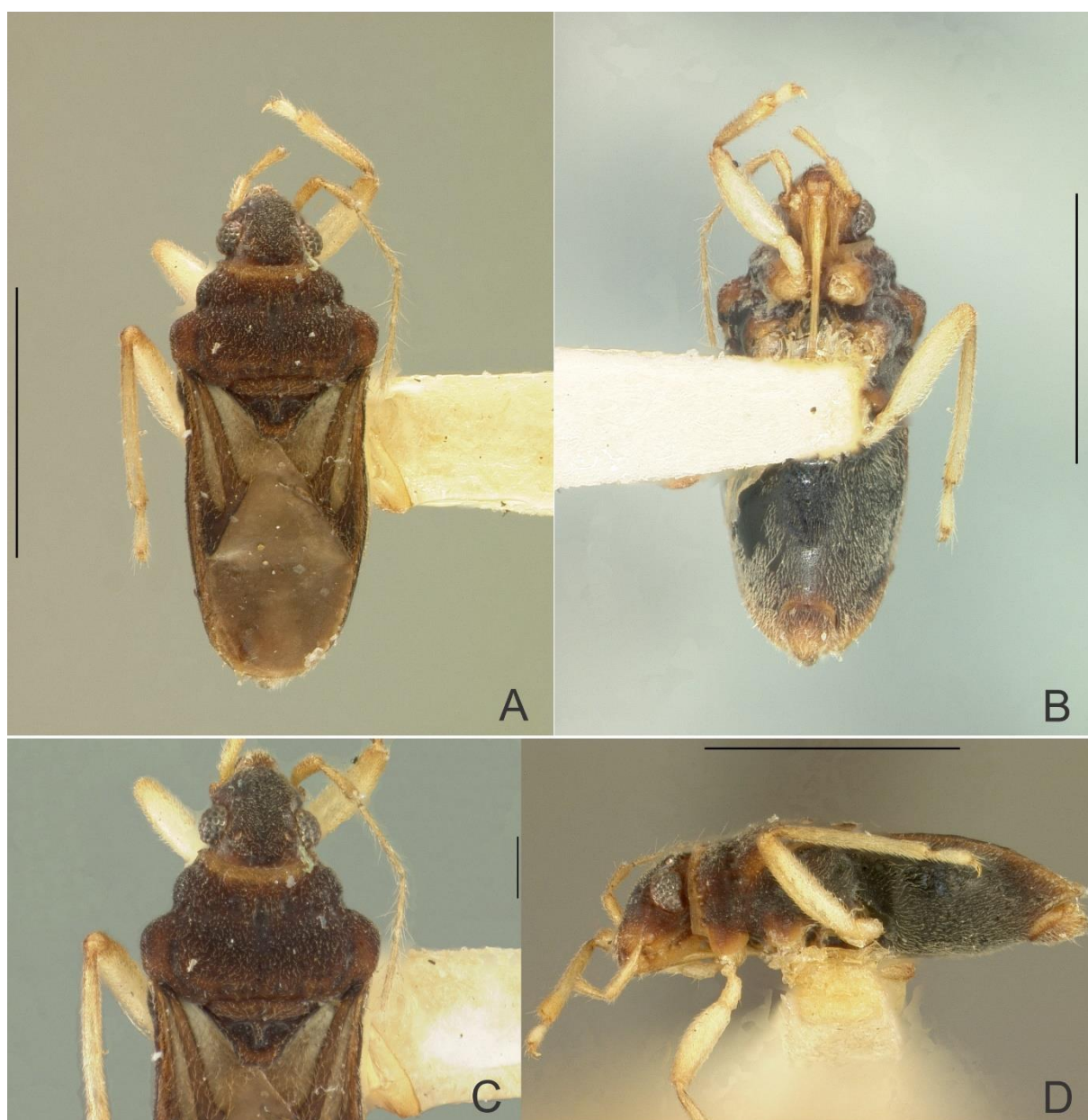


Figure 51. *Hebrus concinnus*, habitus. macropterous male from Balthazar, Grenada. **A.** Dorsal view. **B.** Ventral view. **C.** Head, thorax, and part of abdomen, dorsal view. **D.** Lateral view. Scale bars: 1.0 mm (**A, B, D**). 0.2 mm (**C**).

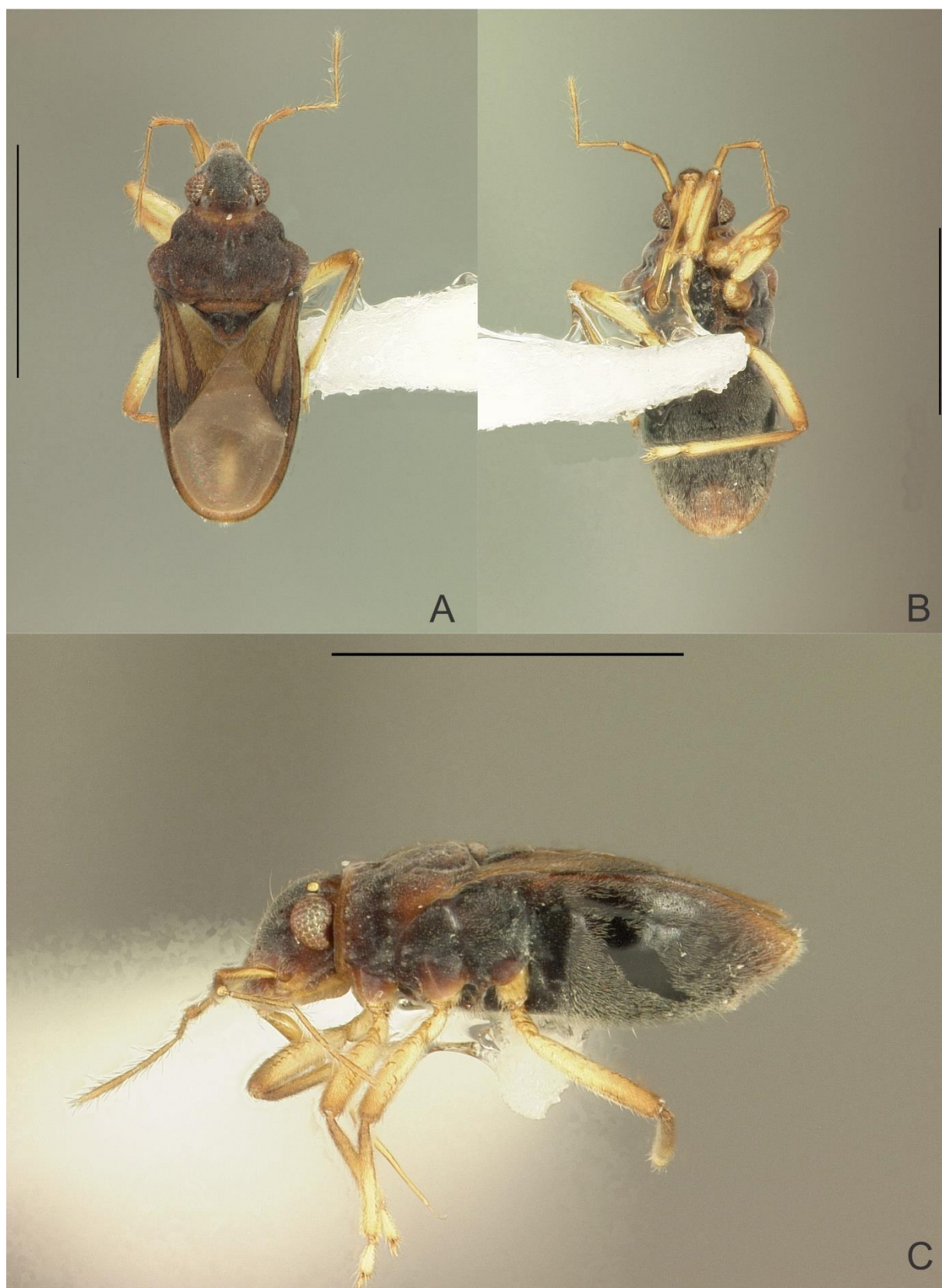


Figure 52. *Hebrus concinnus*, habitus. macropterous female from Honduras. **A.** Dorsal view. **B.** Ventral view. **C.** Lateral view. Scale bars: 1.0 mm.

Diagnosis. BL ~1.8–2.2; general color light brown, with yellowish setae on dorsum of body (Figs. 7A, 8A, 9A); forewings with pair of small whitish maculae on clavus and three narrow maculae on membrane (Figs. 7A, 8A, 9A); metanotal elevation with median carina, apex not notched (Figs. 7A, 8A, 8C, 9A); male and female abdomen without distinct modifications (Figs. 7B, 8B, 9B); paramere curved at apex, sickle-shaped (Fig. 23B).

Notes.

Hebrus concinnus, *H. consolidus*, *H. ecuadoris*, and *H. hungerfordi* share the general morphology typical of the genus, including an elongate body, macropterous forewings exposing the lateral margins of the abdominal laterotergites, a median carina on the metanotal elevation, a pronotum with well-defined transverse rows of punctations, and the absence of evident abdominal modifications in both males and females. In addition, all species exhibit golden or yellowish dorsal setae and sickle-shaped parameres, although varying in apical shape. *H. concinnus* is distinguished by its relatively smaller size (BL ~1.8–2.2), light brown general coloration, clavus with small whitish maculae (Figs. 7A, 8A, 8C, 9A), and membrane with three narrow maculae, as well as a metanotal elevation with a rounded, non-notched apex (Fig. 8C). *H. consolidus* is similar in size but differs in having a reddish-brown coloration, a clavus with a large basal white macula surpassing the apex of the metanotal elevation, and a membrane with four irregular maculae (Figs. 10A, 11A); it also differs by the weakly notched apex of the metanotal elevation and a more tapered paramere (Fig. 32C). *H. ecuadoris* is the largest species among those compared (males and females usually >2.3 mm), with predominantly dark brown coloration contrasting with yellowish areas on the head, thorax, and appendages, a higher density and length of setae, a more sculpturally complex pronotum (Figs. 13A, 13C, 14A, 14C, 14D, 14E), and a relatively narrower metanotal elevation with a well-defined median notch at the apex, in addition to a slight projection of abdominal sternite VII in males (Figs. 13B, 14B). *H. hungerfordi* is characterized by its larger body size (BL ~2.2–2.6), brown to reddish-brown coloration, a distinctive wing pattern with a basal white macula on both corium and clavus and a single oval macula on the membrane, a metanotal elevation with a truncated, non-notched apex (Fig. 15A, 16A), and a uniquely elongate paramere with a rounded basal projection and a long, robust preapical seta, clearly distinguishing it from the other species examined.

Distribution. Canada (Kirkaldy & Torre-Bueno 1909; Van Duzee 1917), Colombia (present study), Costa Rica (Drake & Harris 1943; Pacheco-Chaves *et al.* 2014), Cuba (Ragués 1910; Alayo 1967, 1974), Curaçao (Drake & Cobben 1960), Grenada (Uhler, 1894a; Drake & Harris, 1943; Porter, 1950; present study), Guatemala (Champion, 1898; Blatchley, 1926; Drake & Harris 1943), Mexico (Drake & Harris 1943), Panama (Champion 1898), Peru (Drake & Harris 1943), United States (Uhler 1894a, 1895; Torre-Bueno 1908, 1912; Kirkaldy & Torre-Bueno 1909; Van Duzee 1917; Britton 1920; Blatchley 1926; Brimley 1938; Drake & Harris 1943; Froeschner 1949; Porter 1950; Chapman 1958, 1959; Drake & Chapman 1958; Wilson 1958; Bobb 1974; Purcell 1981; Henry & Froeschner 1988; Epler 2006; Harp & Robison 2006; Harp *et al.* 2008) (Fig. 33A).

Records from California and Washington states (Uhler 1894a; repeated by other authors), USA, may have been based on misidentifications (Menke 1979; Henry & Froeschner 1988). Specimens examined by Hungerford (1918) were later identified as *H. burmeisteri* Lethierry & Severin, 1896 (Hungerford & Beamer 1925; Porter 1950).

***Hebrus consolidus* Uhler, 1894**

Hebrus consolidus Uhler, 1894a: 222 (original description).

Naeogeus consolidus: Kirkaldy (1900): 241 (new combination).

Hebrus consolidus: Harris (1942): 124 (original combination).

Figs. 10, 11, 12, 32C, 33B

Type material examined. Syntype. GRENADA • Mount Gay Est. [Estate] (Leeward side); [12.05, -61.73]; H.H. Smith leg.; 1 macropterous ♂, NHM 01633308.

Additional material examined. COLOMBIA – **Boyacá** • Puerto Boyacá; 5.97, -74.59; 28.I.2020; P. Mondragón leg.; 1 macropterous ♀, UPTC. GRENADA • 1891; H.E. Summers leg.; 1 macropterous ♂, 1 macropterous ♀, CJDC, NMNH • Mount Gay Est. [Estate] (Leeward side); [12.05, -61.73]; H.H. Smith leg.; 1 macropterous ♀, P.R. Uhler Collection, NMNH.

Redescription

Macropterous males (Fig. 10). **Syntype (non-type).** BL 1.75 (1.72); HL 0.30 (0.27); HW 0.43 (0.43); EYE 0.20 (0.22); IOW 0.10 (0.10); ANT I 0.20 (0.20); ANT II 0.13 (0.12); ANT III lost (0.17); ANT IV lost (0.32); AWP 0.50 (0.52); HWP 0.78 (0.80); PL 0.40 (0.37); MESW 0.35

(0.37); MESL 0.06 (0.05); METW 0.37 (0.38); METL 0.15 (0.17); FORELEG, FEM 0.39 (0.40), TIB 0.38 (0.37), TAR I 0.02 (0.02), TAR II 0.10 (0.12); MIDDLEG, FEM glued (0.42), TIB glued (0.40), TAR I 0.02 (0.02), TAR II 0.13 (0.12); HINDLEG, FEM 0.50 (0.55), TIB 0.55 (0.60), TAR I 0.03 (lost), TAR II 0.13 (lost).



Figure 53. *Hebrus consolidus*, macropterous male, syntype (NHMUK 016033308), habitus. **A.** Dorsal view. **B.** Ventral view. **C.** Lateral view **D.** labels. Scale bars: 1.0 mm.

General color reddish-brown. Head with a silvery spot anterior to eye and another along mesal eye margin (Fig. 10A). Base of ocellus, eye, margins of metanotal elevation, and forewing veins darker brown. Labium yellow-testaceous; buccula testaceous. Forewings: corium whitish basally, light brown apically, between dark brown veins; veins darker basally and apically; clavus brown, with a large white macula basally clearly surpassing apex of metanotal elevation; membrane matte brown, with four irregular maculae — one basal (almost imperceptible in some cases), a lateral pair, and one closer to apex (Fig. 10A). Legs yellow, darker at edges of segments.

Tegument dorsally with very short yellowish setae, longer on forewing veins and abdomen (Fig. 10B). Legs with dense, decumbent, moderately long light brown setae interspersed with many erect setae, especially on tibiae.

Head wider than long; width through eyes approximately 1.4 times length; interocular width 2.0 times eye width. Buccula elongated, slightly curved (Fig. 10C). Antennomere I cylindrical, slightly curved; antennomere II cylindrical; width of antennomeres III–IV approximately half of antennomere I. Antennal formula: $IV > I > III > II$ (non-type). Pronotum with a transverse row of small moderately deep punctations on collar and a transverse row of eight deep punctations between lobes; most central two punctations in row between lobes clearly separated; posterior lobe with a row of small punctations adjacent to the posterior margin, continuing laterally near the humeri, and small, more irregular punctations on disc; humeri elevated (Fig. 10A). Mesoscutellum 5.8 times wider than long. Metanotal elevation trapezoidal, 2.2 times wider than long; disc with raised margins and two submedian depressions divided by a median carina; apex slightly curved, with a weak median notch (Fig. 10A). Forewings exposing lateral margins of abdominal laterotergites, almost reaching posterior margin of abdomen. Paramere tapered at apex, sickle-shaped (Fig. 32C).

Macropterous female (Fig. 11). **Non-type.** BL 1.82; HL 0.32; HW 0.45; EYE 0.23; IOW 0.10; ANT I 0.20; ANT II 0.12; ANT III 0.17; ANT IV 0.35; AWP 0.55; HWP 0.82; PL 0.40; MESW 0.37; MESL 0.05; METW 0.40; METL 0.17; FORELEG, FEM 0.40, TIB 0.37, TAR I 0.02, TAR II 0.12; MIDLEG, FEM 0.40, TIB 0.37, TAR I 0.02, TAR II 0.12; HINDLEG, FEM 0.52, TIB 0.55, TAR I lost, TAR II lost.

Similar to macropterous male but slightly larger.

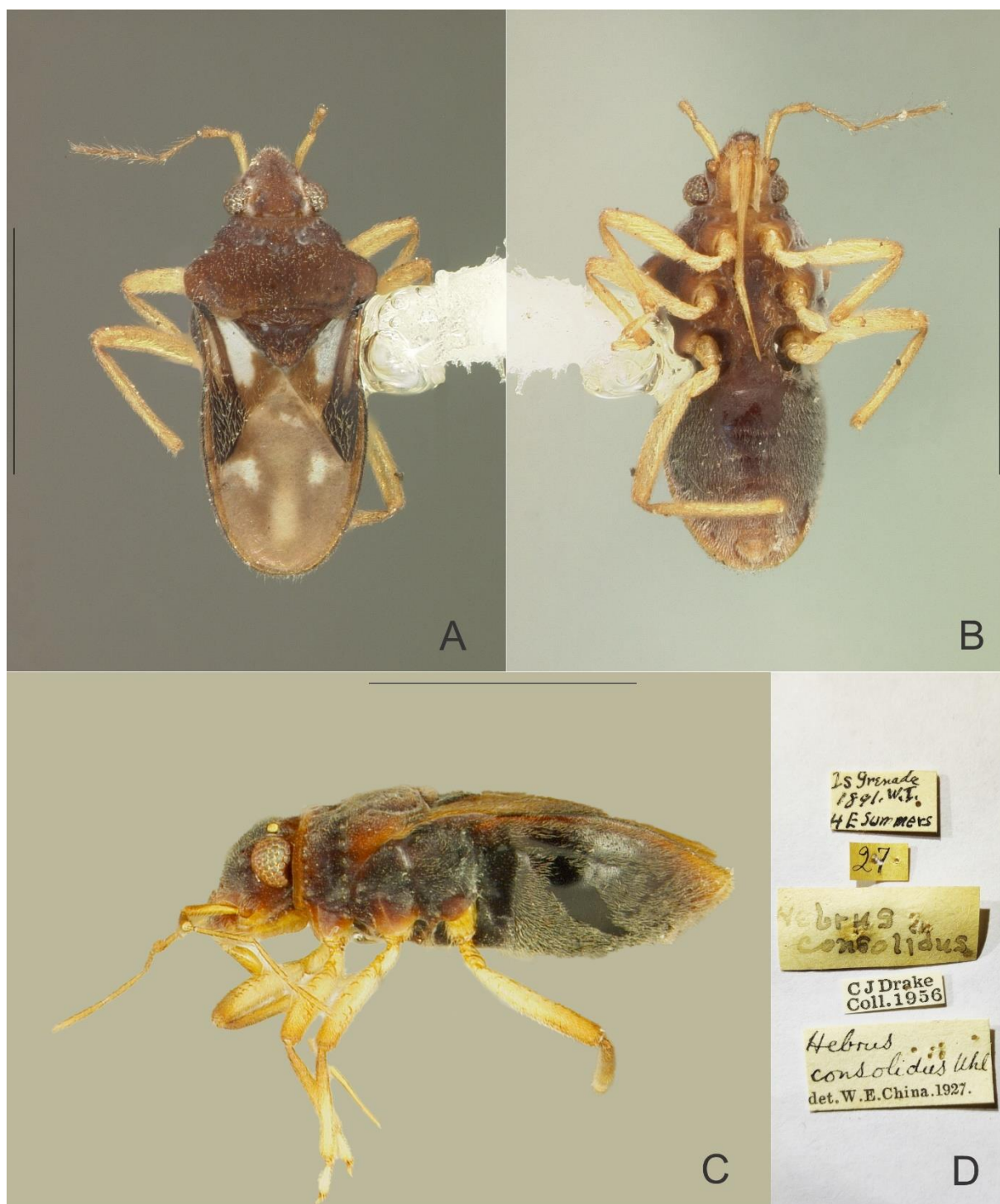


Figure 54. *Hebrus consolidus*, habitus. macropterous male. **A.** Dorsal view. **B.** Ventral view. **C.** Lateral view. **D.** labels. Scale bars: 1.0 mm.

Diagnosis. BL ~1.7–1.9; general color reddish-brown, with yellowish setae on dorsum of body (Figs. 10A, 11A, 12A); forewings with pair of large white maculae on clavus and four irregular maculae on membrane (Figs. 10A, 11A, 12A); metanotal elevation with median carina, weakly

notched at apex (Figs. 10A, 11A, 12A); male and female abdomen without distinct modifications (Figs. 10B, 11B, 12B); paramere tapered at apex, sickle-shaped (Fig. 32C).

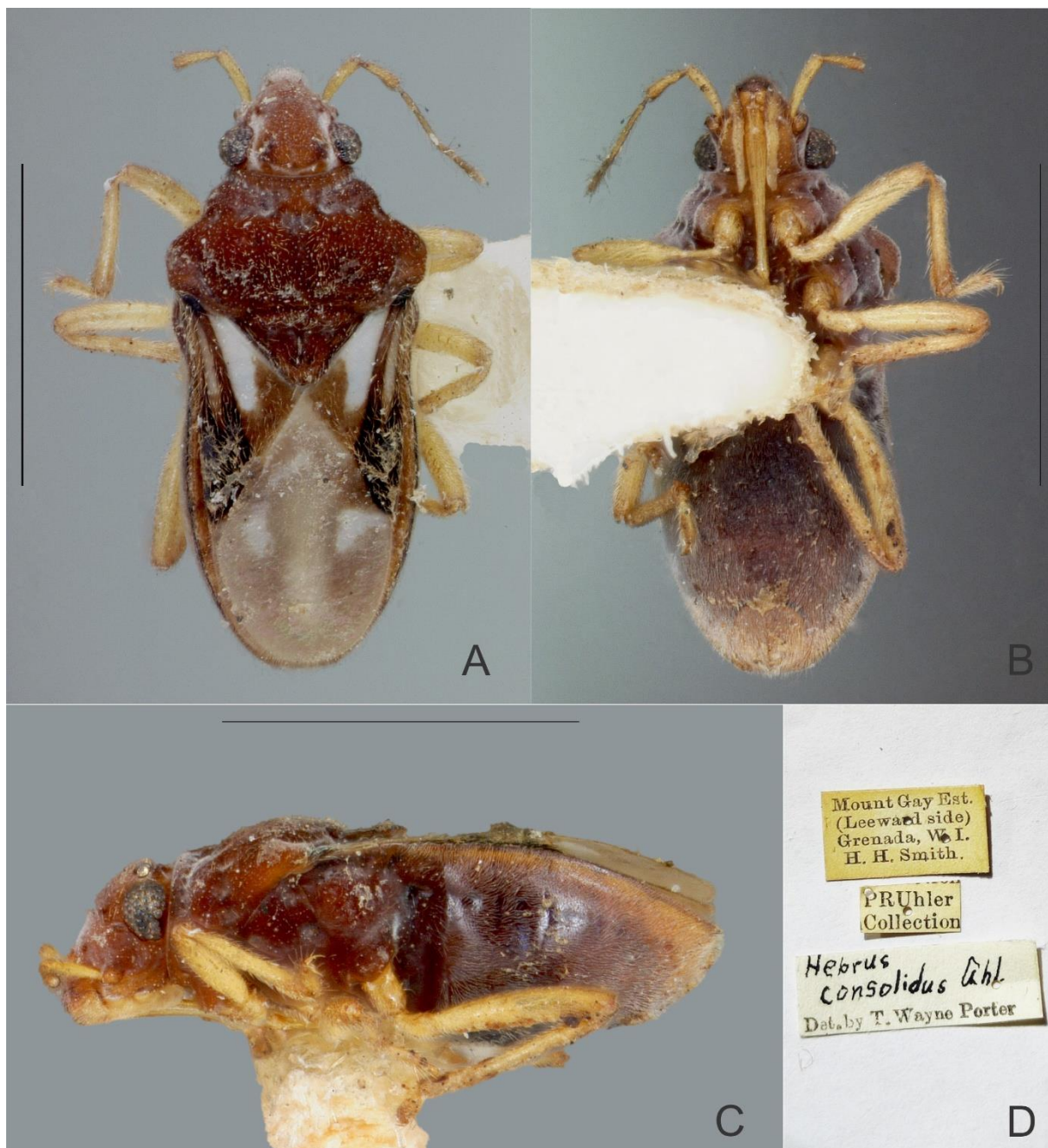


Figure 55. *Hebrus consolidus*, habitus. macropterous female. **A.** Dorsal view. **B.** Ventral view. **C.** Lateral view. **D.** labels. Scale bars: 1.0 m.

Notes.

Comparative characters of *Hebrus consolidus*, *H. concinnus*, *H. ecuadoris*, and *H. hungerfordi* are discussed under *H. concinnus*

Distribution. Colombia (present study), Costa Rica (Drake & Harris 1943; Porter 1950; Pacheco-Chaves *et al.* 2014), Cuba (Alayo 1967, 1974; Nieser 1977), Curaçao (Drake & Cobben 1960; de Kort-Gommers & Nieser 1969), Grenada (Uhler 1894a; Blatchley 1926; Drake & Harris 1943; Porter 1950; present study), Guatemala (Champion 1898; Drake & Harris 1943; Drake & Chapman 1953), Honduras (Porter 1950), Jamaica (Drake & Harris 1943; Porter 1950), Mexico (Porter 1950; Drake & Chapman 1953), Panama (Champion 1898; Drake & Harris 1943; Drake & Chapman 1953), Puerto Rico (Porter 1950), United States (Barber 1914; Blatchley 1926; Glick 1939; Drake & Harris 1943; Porter 1950, 1954; Drake & Chapman 1953; Chapman 1958; Wilson 1958; Frost 1964; Schaefer & Drew 1964; Gosselink & Cordes 1979; Huggins & Harp 1983; Cochran & Harp 1990; Chordas *et al.* 1996; Epler 2006; Harp *et al.* 2008; Parys *et al.* 2013; Medley *et al.* 2015; Mercer *et al.* 2017; Pintar *et al.* 2021), Trinidad & Tobago (Drake & Chapman 1953) (Fig. 33B).

The record from Kansas (Hungerford & Beamer 1925) refers to *H. burmeisteri* (Drake & Harris 1943). The only record from Texas (Clark 1973) needs verification.

***Hebrus ecuadoris* Drake & Harris, 1943**

Hebrus ecuadoris Drake & Harris, 1943: 55 (original description).

Hebrus ecuadorensis: Froeschner (1981): 38 (incorrect subsequent spelling).

Hebrus ecuadorensis: Buzzetti & Cianferoni (2011): 118 (incorrect subsequent spelling).

Figs. 13, 14, 33B

Type material examined. Holotype. ECUADOR – [Esmeraldas] • [San Lorenzo], Cachabe [San Javier de Cachabí]; [1.07, –78.78]; 1 macropterous ♂, CJDC, NMNH.

Additional material examined. ECUADOR – Napo [Sucumbíos] • Sta [Santa] Cecilia, blacklight; [0.09, –77.00]; 16.V.1975; P.J. Spangler leg.; 1 macropterous ♂, 1 macropterous ♀, JTPC, NMNH. PERU – Junín • Tinkabeni [San Juan de Boca Tinkaveni], 120 km SE Satipo; [–11.83, –74.08]; 850 m a.s.l.; 04.VIII.1972; R.T. Schuh & J.C. Schuh leg.; 1 macropterous ♀, JTPC, NMNH.

Redescription

Macropterous males (Fig. 13). **Holotype (non-type).** BL 2.35 (2.22); HL 0.37 (0.32); HW 0.46 (0.43); EYE 0.12 (0.12); IOW 0.22 (0.20); ANT I 0.35 (0.30); ANT II 0.20 (0.20); ANT

III 0.32 (0.30); ANT IV 0.56 (0.50); AWP 0.60 (0.57); HWP 0.91 (0.90); PL 0.47 (0.47); MESW 0.37 (0.37); MESL 0.07 (0.07); METW 0.37 (0.40); METL 0.20 (0.20); FORELEG, FEM 0.62 (0.52), TIB 0.57 (0.47), TAR I 0.03 (lost), TAR II 0.15 (lost); MIDLEG, FEM lost (0.52), TIB lost (0.50), TAR I lost (0.02), TAR II lost (0.12); HINDLEG, FEM 0.77 (0.70), TIB 0.80 (0.75), TAR I 0.05 (0.02), TAR II 0.20 (0.12).

General color dark brown, except head at base and adjacent to eyes, collar, labrum, buccula, antenna, mesoscutellum, metanotal elevation, and legs yellowish. Forewings: brown; veins darker; clavus with a small whitish macula at base surpassing apex of mesoscutellum; membrane with three maculae — a pair of transversal maculae adjacent to apex of veins and a larger irregular macula closer to apex (imperceptible in the holotype) (Fig. 13A). Venter of abdomen shiny dark brown, lighter posteriorly (Fig. 13B, 13D).

Vertex of head, posterior lobe of pronotum, mesoscutellum and metanotal elevation with very short golden setae. Antenna densely covered by light brown to yellow setae; decumbent on antennomeres I and II; mostly erected on III and IV. Mesoscutellum and metanotal elevation with long yellowish setae. Corium and clavus with moderately long golden setae. Legs and abdomen with dense, moderately long yellowish setae. Pruinosity on head, pronotal anterior lobe and humerus, and sides of thorax.

Head wider than long; width through eyes approximately 1.2 times length; interocular width 1.8 times eye width. Buccula elongated, straight; apex globose (Fig. 13E). Antennomere I cylindrical, slightly curved; antennomere II cylindrical; width of antennomeres III–IV approximately half of antennomere I. Antennal formula: $IV > I \geq III > II$. Pronotum swollen laterally, with a transverse row of small, moderately deep punctations on collar; anterior lobe with two large, deep punctations submedially; transverse row of eight deep punctations between lobes; most central two punctations on row between lobes clearly separated; posterior lobe with a row of small punctations adjacent to posterior margin, continuing laterally close to humeri, two longitudinal rows submedially, a deep longitudinal impression in the middle, and a few sparse small punctations on disc; humeri elevated (Fig. 13A, 13C). Mesoscutellum about 5.3 times wider than long. Metanotal elevation trapezoidal, 1.85 times wider than long; disc with raised margins and two submedian depressions divided by a median carina; apex with median notch (Fig. 13C). The male (Fig. 13D, holotype) exhibits a median concavity at the apex, a feature that is absent in the male (Fig. 14B non-type). The abdominal sternite VII is slightly

projected. Forewings exposing narrow lateral margins of abdominal laterotergites, reaching posterior margin of abdomen.

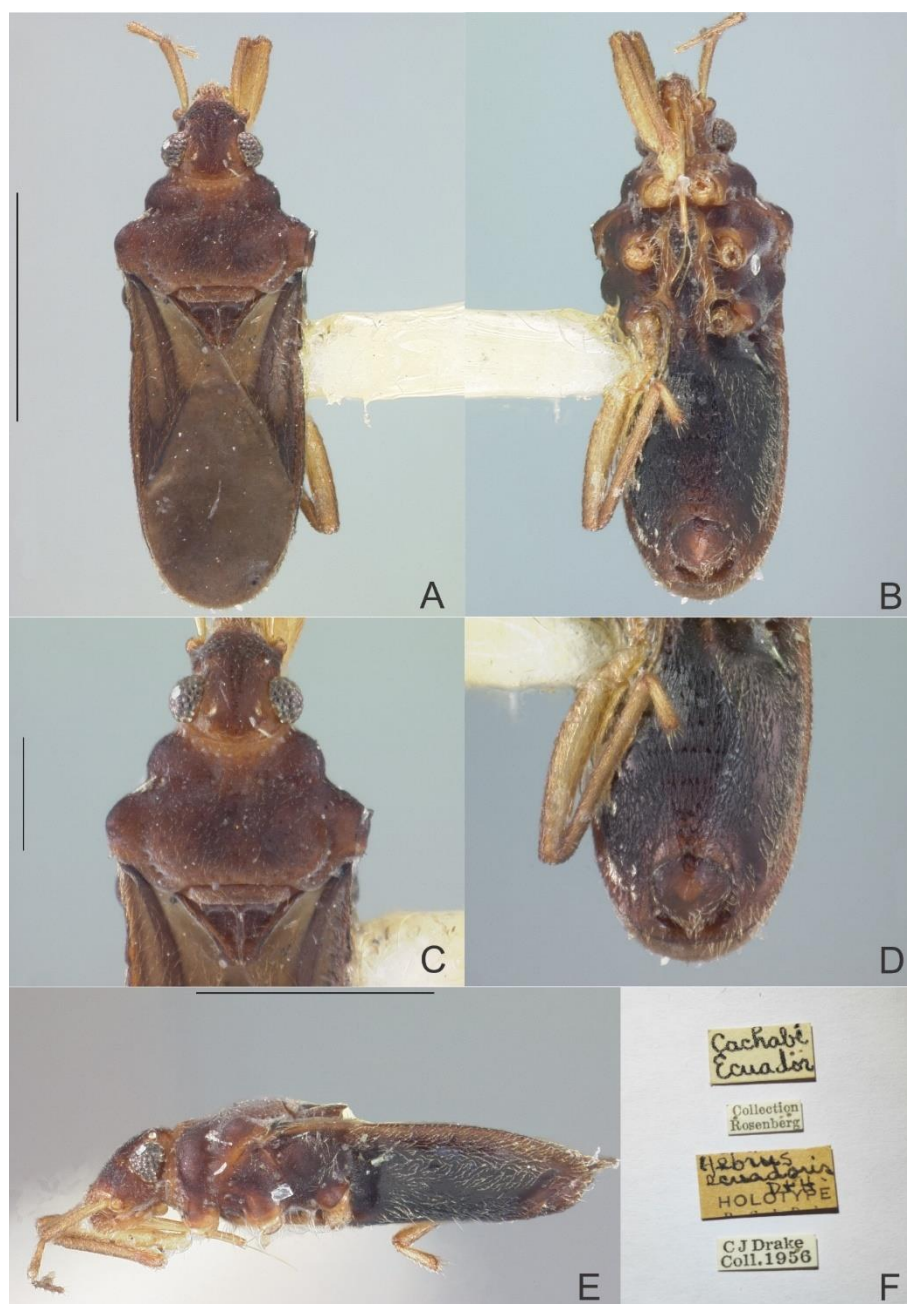


Figure 56. *Hebrus ecuadoris*, macropterous male, holotype. **A.** Habitus, dorsal view, and labels. **B.** Habitus, ventral view. **C.** Head, thorax, and part of abdomen, dorsal view. **D.** Apex of abdomen, ventral view. **E.** Habitus, lateral view. **F.** labels. Scale bars: 1.0 mm (**A–B, E**), 0.5 mm. (**C, D**).

Macropterous female (Fig. 14C, 14D). **Non-types.** BL 2.37–2.42; HL 0.35–0.37; HW 0.45; EYE 0.12; IOW 0.22; ANT I 0.30–0.32; ANT II 0.16–0.20; ANT III 0.28–0.30; ANT IV 0.45–

0.52; AWP 0.60–0.62; HWP 0.95–0.98; PL 0.47–0.50; MESW 0.45; MESL 0.07; METW 0.47; METL 0.20–0.22; FORELEG, FEM 0.50–0.55, TIB 0.45–0.50, TAR I 0.02–0.03, TAR II 0.12–0.15; MIDLEG, FEM 0.47–0.57, TIB 0.42–0.52, TAR I 0.02, TAR II 0.10–0.12; HINDLEG, FEM 0.72–0.75, TIB 0.80, TAR I 0.02, TAR II 0.12–0.17.

Similar to macropterous male, except for the following: body longer; width of head through eyes about 1.1–1.3 times length; mesoscutellum 6.4 times wider than long; metanotal elevation about 2.1–2.3 times wider than long. Abdominal laterotergites not distinctly elevated or reflected over mediotergites.

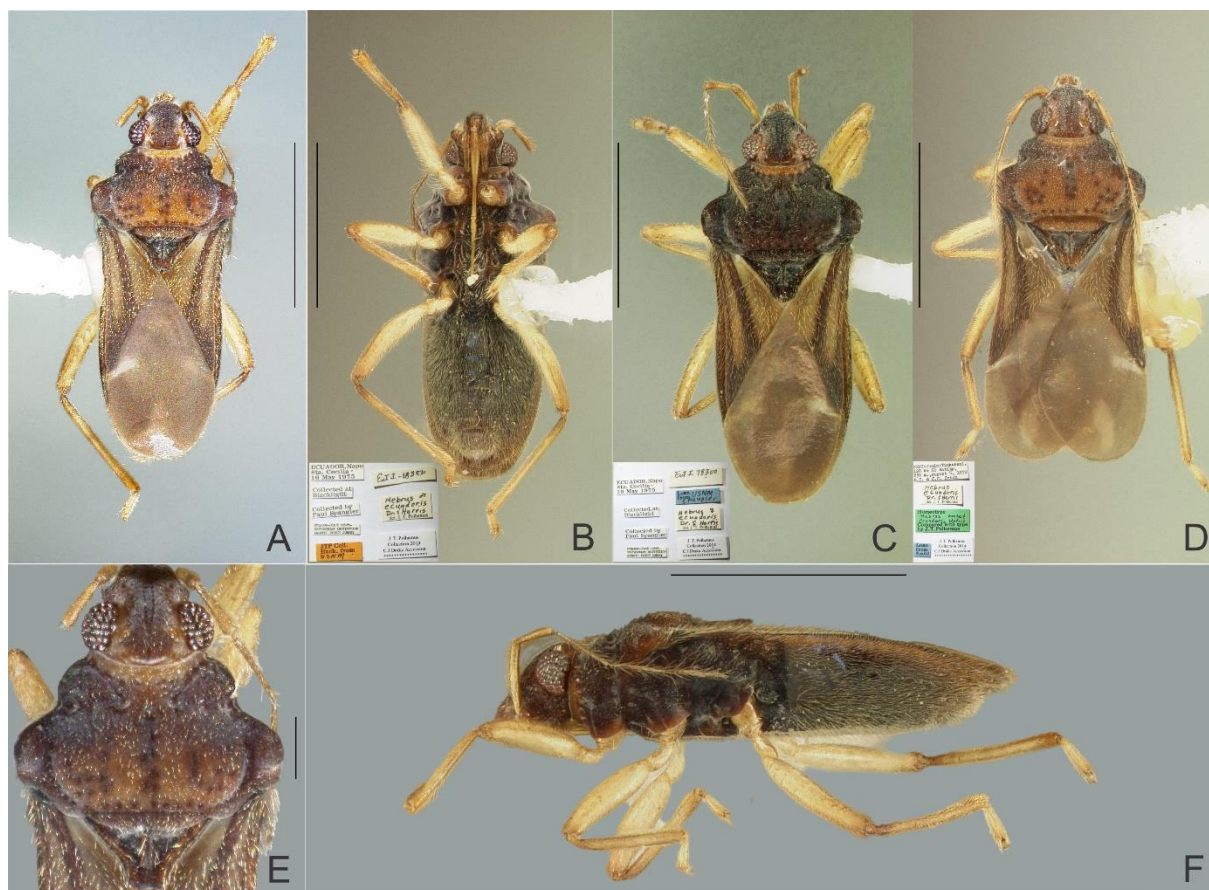


Figure 57. *Hebrus ecuadoris*. **A, B, E, F.** macropterous male from Ecuador. **A.** Habitus, dorsal view. **B.** Habitus, ventral view, and labels. **C, D.** Macropterous females, habitus, dorsal view, , and labels. **C.** From Ecuador. **D.** From Peru. **E.** Head, thorax, and part of abdomen, dorsal view. **F.** Habitus, lateral view. Scale bars: 1.0 mm (**A–D, F**), 0.2 mm (**E**).

Diagnosis. BL ~2.2–2.5; general color dark brown, with golden setae on dorsum of body (Figs. 13A, 14A, 14C, 14D); forewings with pair of small white maculae on clavus and three maculae on membrane (a pair adjacent to apex of veins and one closer to apex) (Figs. 13A, 14A,

14C,14D); metanotal elevation with median carina, notched at apex (Figs. 13A, 13C, 14A, 14C, 14E); male and female abdomen without distinct modifications (Fig. 10B).

Notes. There is some variation when comparing the non-type specimens with the holotype. The material from Napo is darker (especially the female, Fig. 14C) and has more evident pronotal punctations and forewings maculae. The male from Ecuador (14A), and female from Peru (Fig. 14D) is lighter dorsally, with light brown pronotal disc and mesosternum, and yellowish antenna. This last specimen bears a label that reads “homeotype *Hebrus ecuadoriensis* Drake & Harris compared with type by J.T. Polhemus”.

Hebrus ecuadoris, *H. hungerfordi*, *H. major*, and *H. sulcatus* share a macropterous body, a general brown to dark-brown coloration, dorsum with golden setae, forewings exposing narrow lateral margins of the abdominal laterotergites, and a trapezoidal metanotal elevation with a median carina. They differ, however, in body size, forewing maculation pattern, and the morphology of the metanotal elevation. *Hebrus major* is readily recognized by its larger body size and the well-developed longitudinal sulcus on the pronotum, as well as by the wide apical notch of the metanotal elevation (Figs. 21A, 22A, 23A, 23C). *Hebrus ecuadoris* exhibits a more complex wing pattern, with small white maculae on the clavus and three maculae on the membrane, and a metanotal elevation with a median apical notch (Figs. 13A, 13C, 14A, 14C, 14D, 14E). *Hebrus sulcatus* differs by the deep median sulcus on the posterior lobe of the pronotum and by the subquadrate apical notch of the metanotal elevation (Figs. 30A, 31A). *Hebrus hungerfordi* is distinguished from the others by its reduced wing pattern, with a single macula on the clavus and a single oval macula on the membrane, and by the metanotal elevation with a truncated apex, lacking a median notch (Figs. 14A, 15A).

Distribution. Ecuador (Drake & Harris 1943; present study), Peru (present study) (Fig. 33B).

***Hebrus hungerfordi* Drake & Harris, 1943**

Hebrus hungerfordi Drake & Harris, 1943: 58 (original description).

Figs. 15, 16, 32D, 33B

Type material examined. Holotype. ECUADOR – [Chimborazo] • Naranjapata, 1850 ft [feet]; [−2.27, −79.08]; 14.XII.1933; F.X. Williams leg.; 1 macropterous ♂, SEMC. **Allotype (= paratype)** • Same data as holotype; 1 macropterous ♀ (wings partially broken off), SEMC.

Redescription

Macropterous male (Fig. 15). **Holotype.** BL 2.25; HL 0.41; HW 0.44; EYE 0.11; IOW 0.23; ANT I lost; ANT II lost; ANT III lost; ANT IV lost; AWP 0.61; HWP 0.92; PL 0.48; MESW 0.41; MESL 0.07; METW 0.47; METL 0.23; FORELEG, FEM 0.51, TIB 0.51, TAR I 0.02, TAR II 0.18; MIDLEG, FEM 0.55, TIB 0.53, TAR I 0.03, TAR II 0.12; HINDLEG, FEM 0.73, TIB glued, TAR I lost, TAR II lost.

Vertex of head, posterior lobe of pronotum, mesoscutellum, and metanotal elevation with very short golden setae. Apex of head with dense dark setae; vertex with a few scattered, erect dark setae. Corium and clavus with moderately long golden setae. Legs and abdomen with dense, moderately long yellowish setae. Tegument with whitish pruinosity bordering eyes, at apex of head dorsally, sides of head, anterior lobe of pronotum, and sides and venter of thorax (Fig. 15A).

Head slightly wider than long, with a median depression; width through eyes approximately 1.1 times length; interocular width 2.1 times eye width. Buccula elongated, almost straight (Fig. 15C). Antenna lost. Pronotum with a transverse row of small, moderately deep punctations on collar; anterior lobe with two moderately large, deep punctations submedially; a central, moderately large, deep punctation between lobes; a median groove starting at central punctation and continuing for two-thirds of posterior lobe; posterior lobe with a row of small punctations adjacent to posterior margin, continuing laterally close to humeri, and scattered indistinct punctations on disc; humeri elevated (Fig. 15A). Mesoscutellum 5.8 times wider than long. Metanotal elevation trapezoidal, about 2 times wider than long; disc with raised margins and two submedian depressions divided by a median carina; apex truncated, without median notch (Fig. 15A). Forewings exposing narrow lateral margins of abdominal laterotergites, reaching posterior margin of abdomen. Paramere elongated, with a rounded basal projection and a long, thick preapical seta (Fig. 32D).

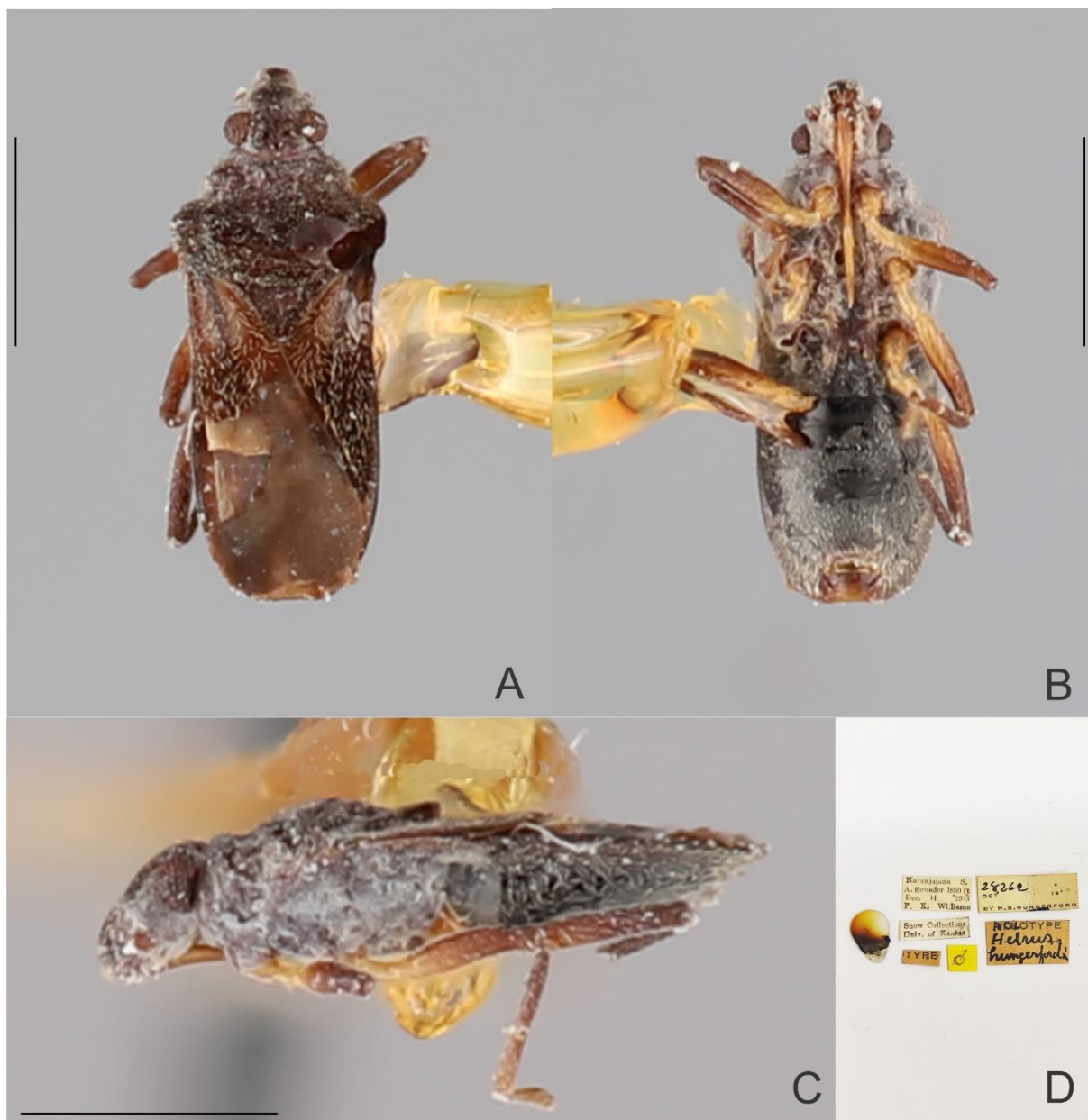


Figure 58. *Hebrus hungerfordi*, habitus. macropterous male, holotype. **A.** Dorsal view. **B.** Ventral view. **C.** Lateral view, **D.** labels. Scale bars: 1.0 mm.

Macropterous female (Fig. 16). **Allotype (= paratype)**. BL 2.55; HL 0.46; HW 0.48; EYE 0.12; IOW 0.23; OL 0.15; ANT I 0.33; ANT II lost; ANT III lost; ANT IV lost; AWP 0.71; HWP 1.08; PL 0.56; MESW 0.51; MESL 0.07; METW 0.56; METL 0.25; FORELEG lost; MIDDLEG lost; HINDLEG, FEM 0.82, TIB 0.94, TAR I glued, TAR II glued.

Similar to macropterous male but slightly larger, lighter and more reddish.

Diagnosis. BL ~2.2–2.6; general color brownish, with golden setae on dorsum of body (Fig. 15A); forewings corium and clavus each with a white macula on basal half, membrane with an

oval macula medially near apex (Fig. 15A); metanotal elevation with median carina, not notched at apex (Fig. 15A, 16A); male and female abdomen without distinct modifications (Fig. 14B, 16B).

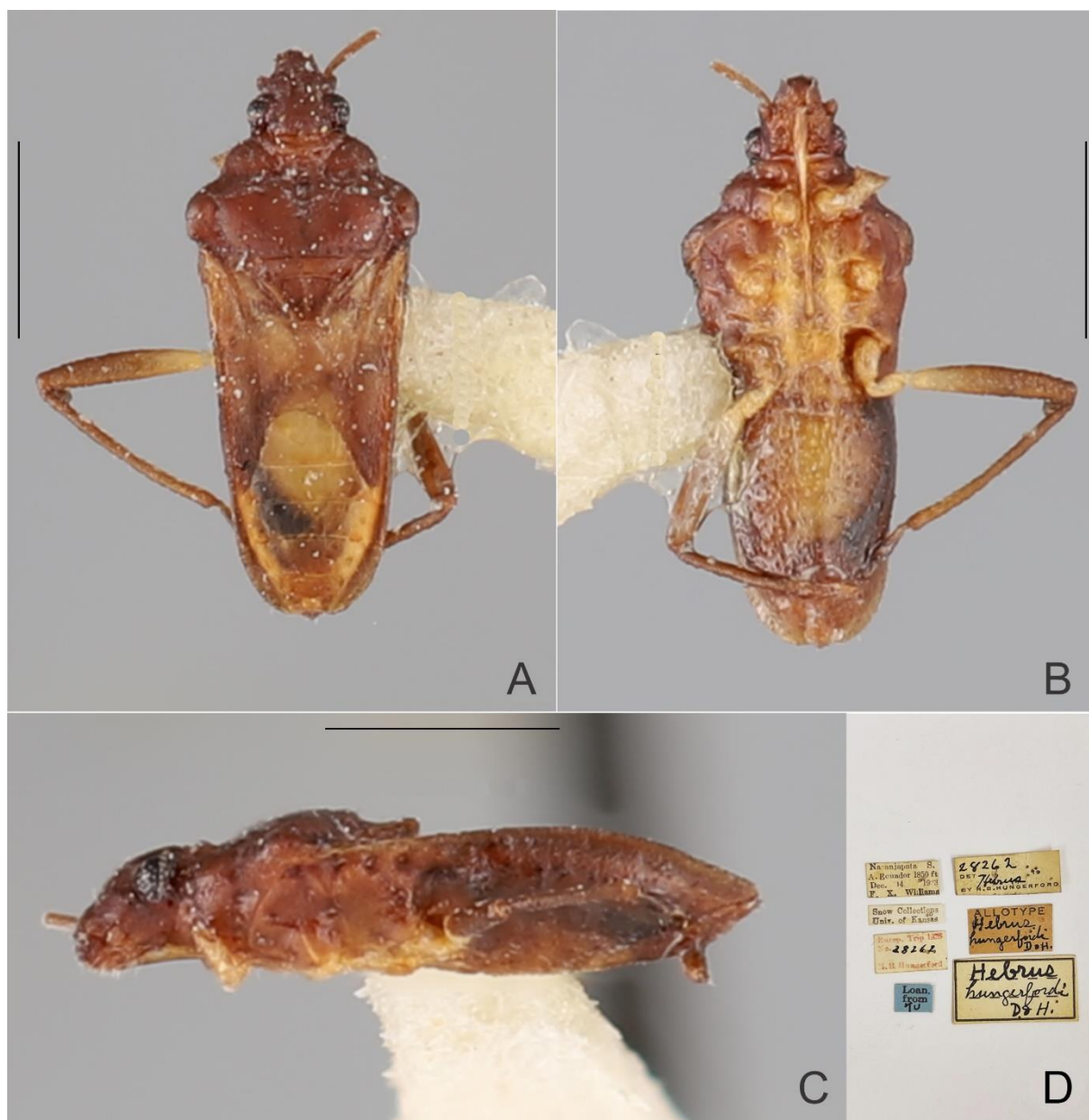


Figure 59. *Hebrus hungerfordi*, habitus, macropterous female, allotype. **A.** Dorsal view. **B.** Ventral view. **C.** Lateral view. **D.** labels. Scale bars: 1.0 mm.

Notes.

Comparative characters of *Hebrus hungerfordi*, *Hebrus ecuadoris*, *H. major*, and *H. sulcatus* are discussed under *H. ecuadoris*.

Distribution. ~~Ecuador~~ Ecuador (Drake & Harris 1943; Porter 1950; present study) (Fig. 33B).

***Hebrus inpa* Franco, Rodrigues, Floriano & Moreira, in prep.**

Hebrus inpa Franco, Rodrigues, Floriano & Moreira, in prep. (original description).

Figs. 17, 33B

Material examined. FRENCH GUIANA – [Saint-Georges] • Réserve Naturelle Nationale des Nouragues, Camp Inselberg; 4.0892, -52.6772; 16.X.2016; A. Khila, F.F.F. Moreira, A. Crumière & W. Toubiana leg., 1 macropterous ♀, CEIOC XXXX.



Figure 60. *Hebrus inpa* macropterous female. **A.** Dorsal views. **B.** Ventral views, Scaler 1.0 mm.

Diagnosis.

Body covered by moderately long, decumbent setae; without distinct pruinosity around eyes or pronotal punctations; most central two punctations on row between pronotal lobes larger than others and placed close together, giving impression of a single deep punctation in dry specimens; metanotal elevation with median carina, apex with a curved notch centrally (Figs.

17A); forewings with a pair of a large white maculae starting below pronotum and slightly surpassing apex of metanotal elevation, and five white maculae on membrane (Fig. 17A); female abdominal laterotergites not distinctly elevated or sinuous, not reflected over mediotergites (Fig. 17A); venter of female abdomen not narrowed posteriorly.

Distribution. Brazil (Franco et al., *in prep.*), French Guiana (present study) (Fig. 33B).

***Hebrus laeviventris* Champion, 1898**

Hebrus laeviventris Champion, 1898: 120 (original description).

Naeogeus laeviventris: Kirkaldy (1900): 241 (new combination).

Hebrus laeviventris: Harris (1942): 124 (original combination).

Figs. 18, 19, 20, 34A

Type material examined. Syntypes. PANAMA – [Chiriquí] • Tolé; [8.23, –81.68]; 1 macropterous ♂, 1 macropterous ♀, NHMUK 016033306; 1 macropterous ♂, JTPC, NMNH.

Additional material examined. COSTA RICA – **Puntarenas** • N. [North of] Palmar Norte; [8.98, –83.47]; 28.XII.1969; J.T. Polhemus leg.; 1 macropterous ♂, 1 macropterous ♀, JTPC, NMNH. PANAMA – **Panama** • Rocky stream crossing Gamboa Road; [9.12, –79.61]; 50 m a.s.l.; 07.I.1993; J.T. Polhemus & A. Gillogly leg.; 2 macropterous ♂, JTPC, NMNH.

Redescription

Macropterous male (Fig. 18 A). **Syntype (non-types).** BL 1.97 (1.97–2.02); HL - (0.30–0.35); HW - (0.43–0.45); EYE - (0.10–0.11); IOW - (0.22); ANT I 0.25 (0.25–0.27); ANT II lost (0.17–0.20); ANT III lost (0.30); ANT IV lost (0.37–0.42); AWP - (0.57); HWP - (0.78–0.82); PL - (0.45–0.47); MESW - (0.30–0.32); MESL - (0.07); METW - (0.32–0.35); METL - (0.17); FORELEG, FEM 0.52 (0.52–0.55), TIB 0.51 (0.50–0.52), 0.02 TAR I (0.02), TAR II 0.15 (0.12–0.15); MIDLEG, FEM 0.55 (0.55), TIB 0.52 (0.52–0.55), TAR I 0.02 (0.02–0.03), TAR II 0.13 (0.13–0.15); HINDLEG, FEM 0.60 (0.67–0.70), TIB 0.60 (0.72–0.80), TAR I 0.03 (0.03), TAR II 0.18 (0.15–0.17).

General color yellowish-brown, except head and posterior lobe of pronotum yellow; antennomere IV yellowish-white; mesoscutellum and metanotal elevation brown; costal vein light brown; pronotal collar yellow (Fig. 18D, 18E). Forewings: corium light brown; clavus

light brown, with a large white macula surpassing apex of metanotal elevation; membrane light brown, with two rounded yellow to brown maculae — one central and one apical (Fig. 18D, 18E). Sides of abdomen with shiny dark mark (Fig. 18A).

Body sparsely covered dorsally by short, recumbent pale setae. Legs and abdomen with dense, moderately long light yellow setae. Head slightly wider than long; width across eyes 1.2–1.4 times length; interocular width about 2.2 times eye width. Buccula elongated, slightly curved (Fig. 18C, 18F). Antennomere I cylindrical, slightly curved; antennomere II cylindrical; width of antennomeres III–IV approximately half that of antennomere I. Antennal formula: $IV > III > I > II$. Pronotum with a transverse row of small, moderately deep punctations on collar; anterior lobe with two large, deep punctations submedially; a row of eight punctations between lobes; most central two punctations on row between lobes clearly separated; posterior lobe with a row of small punctations adjacent to posterior margin, continuing laterally near humeri, two submedian longitudinal rows, and scattered small punctations on disc; humeri elevated (Fig. 18D, 18E). Mesoscutellum approximately 4.5 times wider than long. Metanotal elevation trapezoidal, 2.0 times wider than long; disc with raised margins and two submedian depressions divided by a median carina; apex with a deep, quadrangular median notch (Fig. 18D, 18 E). Forewings leaving portions of abdominal laterotergites exposed, almost reaching posterior margin of abdomen.

Macropterous female (Fig. 20). **Non-types.** BL 2.00–2.16; HL 0.35–0.37; HW 0.43–0.45; EYE 0.10; IOW 0.22; ANT I 0.25; ANT II 0.17; ANT III 0.30; ANT IV 0.37–0.45; AWP 0.57–0.60; HWP 0.80–0.87; PL 0.43–0.46; MESW 0.35–0.37; MESL 0.07; METW 0.35–0.37; METL 0.17–0.20; FORELEG, FEM 0.50–0.55, TIB 0.47–0.52, TAR I 0.02, TAR II 0.12–0.13; MIDLEG, FEM 0.52–0.55, TIB 0.47–0.51, TAR I 0.03, TAR II 0.13; HINDLEG, FEM 0.65–0.72, TIB 0.72–0.75, TAR I 0.03, TAR II 0.17.

Similar to macropterous male but slightly larger, with darker mesoscutellum and metanotal elevation.



Figure 61. *Hebrus laeviventris*, syntypes, habitus. macropterous males. **A.** Ventral view and labels. **B.** Ventral view of the buccula. **C.** Lateral view. **D–G.** macropterous males (NHMUK 016033306), **D, E.** dorsal view, and labels. **F, G.** Lateral view. Scale bars: 1.0 mm (**A, C–G**).0.2 mm (**B**).



Figure 62. *Hebrus laeviventris*, macropterous males (non-type), habitus. **A.** Ventral view. **B.** Ventral view. **C.** Lateral view. **D.** labels. Scale bars: 1.0 mm.



Figure 63. *Hebrus laeviventris*, macropterous female, habitus. **A.** Dorsal view. **B.** Ventral view. **C.** Lateral view. **D.** labels. Scale bars: 1.0 mm.

Diagnosis. BL ~1.9–2.2; general color yellowish-brown, with yellow areas on collar and venter, and sparse cover of short, recumbent pale setae on dorsum (Figs. 18D, 18E, 19A, 20A); forewings with a pair of large basal macula and a pair of rounded maculae on membrane (Figs. 18D, 18E, 19A, 20A); metanotal elevation with median carina, apex with deep quadrangular median notch (Figs. 18D, 18E, 19A, 20A); male and female abdomen without distinct modifications (Figs. 18A, 19B, 20B).

Notes.

Hebrus laeviventris and *H. inpa* share several diagnostic features typical of the genus, including macropterous condition in both sexes, forewings partially exposing the abdominal laterotergites, a pronotum with a transverse row of punctations on the collar and another between the lobes, elevated humeri, and a metanotal elevation bearing a median carina with paired submedian depressions. In both species, the abdomen lacks conspicuous ventral modifications in males and females, and the antennal segments III–IV are distinctly narrower than antennomere I. However, *H. laeviventris* can be readily distinguished by its larger body size (BL ~1.9–2.2), yellowish-brown general coloration with yellow areas on the pronotal collar and venter, sparse cover of short, recumbent pale setae on the dorsum, and by the forewing pattern consisting of a pair of large basal maculae and two rounded maculae on the membrane. In contrast, *H. inpa* is smaller (BL ~1.2–1.6), darker overall, with the body covered by moderately long, decumbent setae, and exhibits a more complex forewing pattern, with a pair of large white maculae extending from below the pronotum to slightly beyond the apex of the metanotal elevation and five distinct white maculae on the membrane (Fig. 17A). Additionally, the metanotal elevation of *H. laeviventris* bears a deep, quadrangular median notch at the apex (Figs. 18D, 18E, 19A), whereas in *H. inpa* the apical notch is shallow and distinctly curved (Fig. 17A). The pronotal punctation pattern also differs, with *H. laeviventris* presenting the two central punctations between the lobes clearly separated, while in *H. inpa* these punctations are larger and closely placed, often appearing as a single punctation in dry specimens.

Distribution. Costa Rica (present study), Panama (Champion, 1898; present study) (Fig. 34A). Porter's (1950) records from Brazil and Peru based on females need verification. They might actually refer to *H. gloriosus* Drake & Harris, 1943.

***Hebrus major* Champion, 1898**

Hebrus sobrinus: Uhler (1894b): 288 (misidentification).

Hebrus major Champion, 1898: 118 (original description).

Naeogeus hirsutus: Kirkaldy (1900): 241 (new combination).

Hebrus hirsutus: Harris (1942): 124 (original combination).

Hebrus acapulcana Drake & Chapman, 1954: 152 (synonym by Drake & Chapman, 1958: 322).

Figs. 21, 22, 23, 32E, 34A

Type material examined. Holotype. MEXICO – Veracruz • Orizaba; [18.85, –97.10]; II.1883; Bilimek leg.; 1 macropterous ♂; NHMW 000711.

Additional material examined. COSTA RICA – San José • 1932; H. Schmidt leg.; 1 macropterous ♂, SEMC. UNITED STATES – Arizona • [Coconino], Oak Creek Can. [Canyon]; [34.94, –111.75]; 28.VI.1958; L.D. Beamer leg.; 1 macropterous ♀, SEMC • [Pima], Sabino Canyon; [32.32, –110.81]; 07.VII.1950; R.H. Beamer leg.; 1 macropterous ♂, SEMC.

Redescription

Macropterous male (Fig. 21, 22). **Holotype (non-type).** BL 3.00 (2.77); HL 0.44 (0.50); HW 0.55 (0.52); EYE 0.12 (0.11); IOW 0.30 (0.30); ANT I 0.42 (0.35); ANT II 0.26 (0.23); ANT III 0.34 (0.30); ANT IV lost (0.46); AWP 0.80 (0.74); HWP 1.20 (1.07); PL 0.44 (0.61); MESW 0.53 (0.56); MESL 0.11 (0.07); METW 0.44 (0.58); METL 0.25 (0.23); FORELEG, FEM 0.66 (0.61), TIB 0.66 (0.61), TAR I 0.04 (0.02), TAR II 0.17 (0.16); MIDLEG, FEM 0.66 (0.66), TIB lost (0.61), TAR I lost (0.03), TAR II lost (0.16); HINDLEG, FEM lost (0.90), TIB lost (0.90), TAR I lost (0.03), TAR II lost (0.20).

Head dark brown; area around eyes reddish brown. Eye dark brown; ocellus yellowish. Antenniferous tubercle dark brown with reddish-brown apex. Antenna, labium, and legs yellow. Pronotum with anterior lobe reddish-brown; posterior lobe light brown. Mesoscutellum brown. Metanotal elevation dark brown. Thoracic pleura reddish-brown. Forewings: brown; veins darker; clavus with a white basal macula reaching about half of metanotal elevation; membrane with a pair of transversal maculae adjacent to apex of veins (Fig. 21A). Abdominal sterna dark brown, with reddish lateral margins. Vertex of head with a pair of rows of punctations converging medially; longitudinal sulcus absent. Antennomere I robust, slightly curved at the base; II slightly curved, robust at apex; III–IV thinner than I–II.

Pronotum with a longitudinal sulcus along median line, from collar to distal portion of posterior lobe, deeper on anterior lobe; a row of punctations on collar; a transverse row of punctations between lobes, with the most central three punctations deep; posterior lobe with a longitudinal row of three punctations on each side of longitudinal sulcus; a row of punctations between humeral angle and posterior margin; humeri elevated (Fig. 21A). Mesoscutellum suboval. Metanotal elevation about 1.75 times wider than long, trapezoidal, with a longitudinal carina; posterior margin with a wide notch (Fig. 21A). Thoracic pleura with punctations; sides of

acetabula impunctate. Forewings exposing narrow lateral margins of abdominal laterotergites, reaching posterior margin of abdomen. Paramere curved; apex turned down, similar to a parrot beak (Fig. 32E).



Figure 64. *Hebrus major*, macropterous male, holotype (NHMW000711). **A.** Habitus, dorsal view. **B.** Habitus, lateral view. **C.** labels. Scale bars: 1.0 mm.

Submacropterous female (Fig. 23). Similar to macropterous male, except for forewings exposing larger portions of abdominal laterotergites, reaching apex of abdominal mediotergite VI, apical macula on membrane, and brownish-orange color.

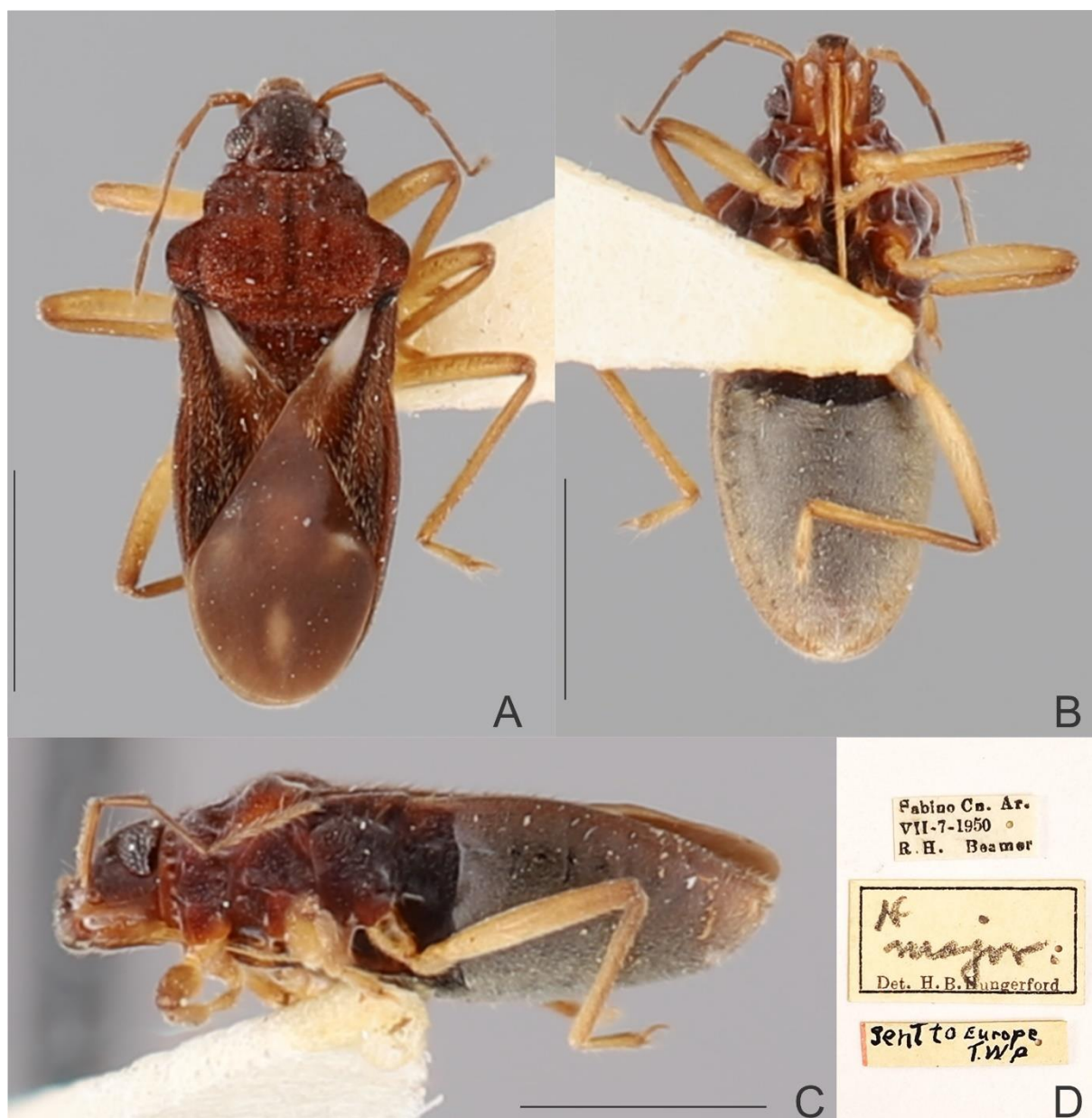


Figure 65. *Hebrus major*. macropterous male from Arizona. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Habitus, lateral view **D.** labels. Scale bars: 1.0 mm.

Short golden setae covering head, pronotum, thoracic pleura, mesoscutellum, metanotal elevation, coriaceous part of forewings, legs, and abdomen.

Diagnosis. BL ~2.7–3.0; general color reddish-brown with dark-brown areas, dorsum with short golden setae (Figs. 21A, 22A, 22C); clavus with a white macula reaching about half of metanotal elevation, membrane with a pair of transversal maculae adjacent to apex of veins (Figs. 21A, 22A, 22C); metanotal elevation with median carina, apex with wide notch (Figs. 21A, 22A, 22C); male and female abdomen without distinct modifications (Fig. 22B, 22D).

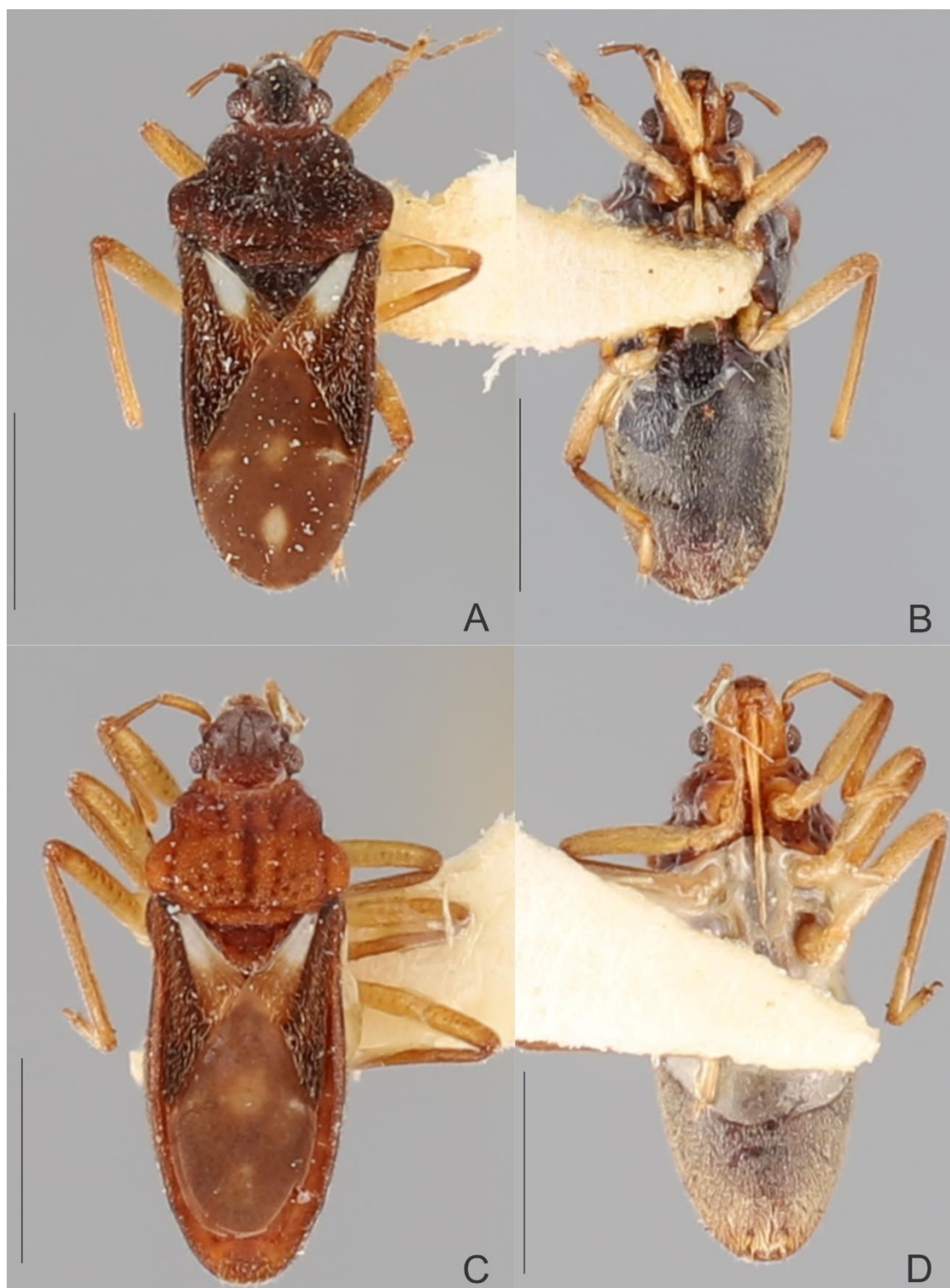


Figure 66. *Hebrus major*. **A–B.** Macropterous male from Costa Rica. **C–D.** Submacropterous female from Arizona. **A, C.** Habitus, dorsal view. **B, D.** Habitus, ventral view. Scale bars: 1.0 mm.

Notes. *Hebrus major* probably represents a complex of species that wait description (Stevens & Polhemus 2008). *Hebrus major*, *H. spiculus*, *H. ecuadoris*, and *H. consolidus* share the general pattern typical of the genus, including a macropterous body, predominantly dark brown to reddish-brown coloration, forewings with pale maculae on the clavus and membrane, a trapezoidal metanotal elevation with a median carina and a notched apex, and the absence of evident abdominal modifications in both males and females. However, *H. major* is readily distinguished from the others by its larger body size (BL ~2.7–3.0), more reddish coloration, a large white macula on the clavus reaching about half of the metanotal elevation (Fig. 21A, 22A, 23A, 23C), and especially by the shape of the paramere (Fig. 32E), which is curved with the apex directed ventrally, resembling a parrot's beak (Fig. 32E). *Hebrus spiculus* differs by its smaller size (BL ~1.7–2.1), the presence of a bluish-green metallic sheen on the vertex, pronotum, scutellum, and metanotal elevation, three maculae on the membrane (two subapical and one faint apical) (Fig. 28A, 28D, 29A), and a distinctive paramere with a mesal spur and a distal hook (Fig. 32G). *Hebrus ecuadoris* shows an intermediate body size (BL ~2.2–2.5), a wing pattern with small maculae on the clavus and three well-defined maculae on the membrane, a metanotal elevation with two submedian depressions separated by a median carina (Figs. 13A, 13C, 14A, 14C, 14D, 14E), and a slight projection of abdominal sternite VII in the male (Figs. 14B, 14D, 15B), in addition to subtle differences in the depth of the apical notch of the metanotal elevation (Figs. 13A, 13C, 14A, 14C, 14D, 14E). Finally, *H. consolidus* is distinguished by its smaller size (BL ~1.7–1.8), generally lighter and more reddish coloration, a very well-developed white macula on the clavus clearly surpassing the apex of the metanotal elevation (Figs. 10A, 11A, 12A), the presence of up to four maculae on the membrane, and a sickle-shaped paramere, tapering apically (Fig. 32C). Taken together, these differences in body size, wing maculation pattern, metanotal elevation sculpture, and paramere morphology allow consistent separation of these closely related species.

Distribution. Colombia (Alvarez & Roldán-Pérez 1983; Molano & Morales 2006; Morales & Molano 2008; Padilla-Gil 2013, 2017; Fernández-Herrera & Ballesteros-Correa 2015; Morales & García-Alzate 2016), Costa Rica (Drake & Harris 1943; Porter 1950; present study), Mexico (Uhler 1894b; Champion 1898; Drake & Harris 1943; Porter 1950; Drake & Chapman 1954; Stevens & Polhemus 2008; Cantú-A. *et al.* 2013; Zettel *et al.* 2023; present study), United States (Drake & Harris 1943; Porter 1950; Henry & Froeschner 1988; Stevens & Polhemus 2008; present study) (Fig. 34A).

The presence in California (Drake & Chapman 1958) needs verification (Menke 1979). Some of the material from Arizona (Drake & Harris 1943; Porter, 1950) may be misidentified *H. longivillus* (Henry & Froeschner, 1988).

***Hebrus pilosidorsus* Polhemus & Chapman, 1970**

Hebrus pilosidorsus Polhemus & Chapman, 1970: 52 (original description).

Figs. 24, 34A

Type material examined. Holotype. PERU – **Junín** • San Ramón, Estancia Naranjal; [–11.12, –75.36]; 1000 m a.s.l.; 20–27.VII.1965; P. Wygodzinsky & B. Wygodzinsky leg.; 1 brachypterous ♀, AMNH 00343453.

Redescription

Brachypterous female (Fig. 24). **Holotype.** BL 1.91; HL 0.33; HW 0.46; EYE 0.11; IOW 0.25; ANT I 0.22; ANT II 0.17; ANT III 0.27; ANT IV 0.35; AWP 0.59; HWP 0.80; PL 0.40; MESW 0.40; MESL 0.05; METW 0.43; METL 0.14; FORELEG, FEM 0.40, TIB 0.48, TAR I 0.02, TAR II 0.13; MIDLEG, FEM 0.43, TIB 0.52, TAR I 0.03, TAR II 0.14; HINDLEG, FEM 0.64, TIB 0.66, TAR I 0.03, TAR II 0.20.

General color yellowish-brown, except for antennomere IV dark brown; posterior lobe of pronotum, mesoscutellum, and metanotal elevation brown; forewing veins brown, darker at base and apex; pronotal collar yellow. Forewings: brown; clavus with a large, faint, whitish macula surpassing apex of metanotal elevation; membrane without maculae (Fig. 24A).

Body densely covered dorsally by long, erect golden-brown setae. Legs and abdomen with dense, moderately long, light yellow setae. Head slightly wider than long; width across eyes 1.4 times length; interocular width about 2.2 times eye width. Buccula elongated (Fig. 22C). Antennomere I cylindrical, slightly curved; antennomere II cylindrical; width of antennomeres III–IV approximately half that of antennomere I. Antennal formula: IV > III > II > I.

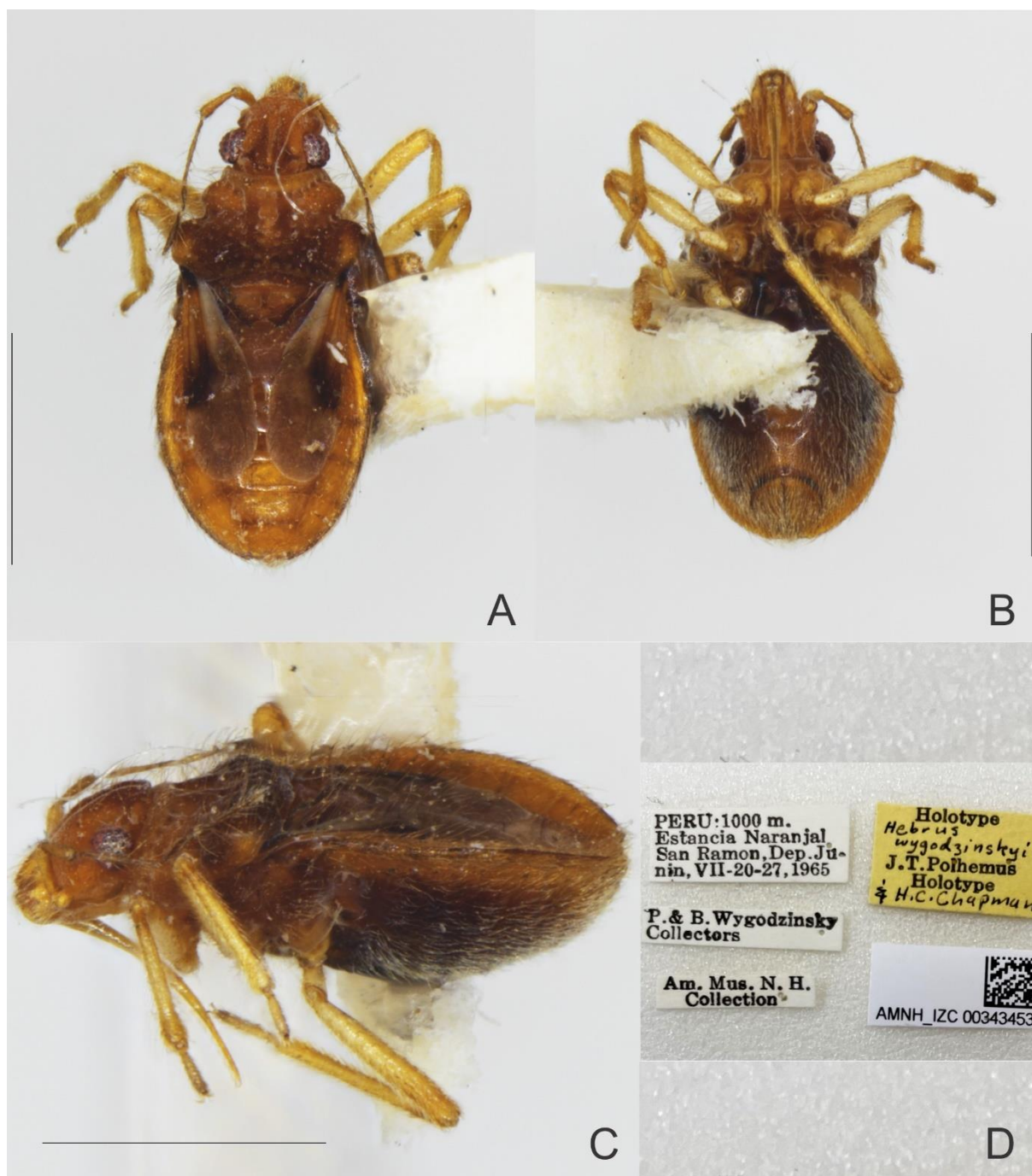


Figure 67. *Hebrus pilosidorsus*, brachypterous female, holotype (AMNH 00343453). **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Habitus, lateral view. **D.** labels. Scale bars: 1.0 mm.

Pronotum with a transverse row of small, moderately deep punctations on collar; anterior lobe with two large, deep punctations submedially; a row of eight punctations between lobes; most central two punctations on row between lobes clearly separated; posterior lobe marked by deep punctations and a row of small punctations adjacent to posterior margin, continuing laterally near humeri, two submedian longitudinal rows, and scattered small punctations on disc; humeri

elevated (Fig. 24A). Mesoscutellum approximately 8.0 times wider than long. Metanotal elevation trapezoidal, 3.0 times wider than long; disc with raised margins and two submedian depressions divided by a median carina; apex with a deep, wide median notch (Fig. 24A). Forewings exposing most of abdominal laterotergites, surpassing middle of mediotergite V (Fig. 24A).

Brachypterous male. Unknown

Macropterous male. Unknown

Macropterous female. Unknown

Diagnosis. BL ~1.9; general color yellowish-brown, with some darker areas and dense cover of long, erect golden-brown setae dorsally (Fig. 24A); brachypterous forewings with a pair of large basal macula, without maculae on membrane (Fig. 24A); metanotal elevation with median carina, apex with deep wide median notch (Fig. 24A); female abdomen without distinct modifications (Fig. 24A).

Notes. The specimen that we redescribed above is labelled as the holotype of “*Hebrus wygodzinskyi* J.T. Polhemus & H.C. Chapman”, not of *H. pilosidorsus*. All other information on the labels (Fig. 24C) matches the information provided by Polhemus & Chapman (1970) in their description of *H. pilosidorsus*. We believe that the authors of this species initially intended to name it in honor of P. Wygodzinsky, but eventually realized that it would be a homonym of *H. wygodzinskyi* Hoberlandt, 1951, described from Angola. A new label with the actual name of the species was never added to the specimen.

Distribution. Peru (Polhemus & Chapman, 1970; present study) (Fig. 34A).

***Hebrus pudoris* Drake & Harris, 1943**

Hebrus pudoris Drake & Harris, 1943: 56 (original description).

Figs. 25, 26, 27, 32F

Type material examined Holotype. MEXICO – Mexico • Temascaltepec, Real de Arriba; [19.04, -100.00]; 22.V.1933; H.E. Hinton & R.L. Usinger leg.; 1 macropterous ♂, CAS 7100.

Paratypes. • Same data as holotype; 2 macropterous ♀; CAS 8604788, 8604789.

Additional material examined. MEXICO – Mexico • Temascaltepec, Real de Arriba; [19.04, –100.00]; 23.V.1933; H.E. Hinton & R.L. Usinger leg.; 3 macropterous ♂, 5 macropterous ♀, CAS 8604790–8604797.

Redescription

Macropterous males (Fig. 25, 27A). **Holotype (Non-type).** BL 1.80 (1.85); HL 0.33 (0.36); HW 0.40 (0.40); EYE 0.10 (0.10); IOW 0.21 (0.20); ANT I 0.18 (0.18); ANT II 0.11 (0.13); ANT III 0.23 (lost); ANT IV 0.31 (lost); AWP 0.48 (0.51); HWP 0.81 (0.85); PL 0.40 (0.40); MESW 0.38 (0.35); MESL 0.05 (0.05); METW 0.43 (0.40); METL 0.18 (0.18); FORELEG, FEM 0.41 (0.41), TIB 0.41 (0.41), TAR I 0.03 (0.02), TAR II 0.15 (0.15); MIDLEG, FEM 0.45 (0.45), TIB 0.41 (0.41), TAR I 0.02 (0.02), TAR II 0.16 (0.13); HINDLEG, FEM 0.56 (0.58), TIB 0.61 (0.65), TAR I 0.02 (0.02), TAR II 0.15 (0.15).

General color brown. Head ventrally light brown to yellow. Basal half of antennomere I dorsally, and I and II ventrally light brown; III and IV darker. Pronotum brown with median area of collar, lateral areas of both lobes, and punctations dark brown. Thoracic sterna dark brown; prosternum, acetabula, and legs light brown to yellow. Forewings: veins dark brown, darker at base and apex; corium brown, lighter towards apex; clavus brown, lighter at apex, with a small white macula at base surpassing apex of mesoscutellum; membrane brown, with some dark brown texture, two small transversal yellowish maculae near apex of veins, and an oval yellowish macula medially near apex (Fig. 25A). Abdomen dark brown; sides of sterna II–VI, VII centrally, and entire VIII lighter.

Head, pronotum, mesoscutellum, and metanotal elevation with short golden setae. Antennae with many decumbent and some erected yellowish to golden setae. Corium and clavus with moderately long golden setae. Thoracic pleura and abdomen with long yellowish setae.

Head slightly wider than long; width through eyes 1.1–1.2 times length; interocular width about twice 2.0 times eye width. Vertex of head with a pair of longitudinal carinae forming a median sulcus (Fig. 25A, 25C). Buccula elongated, straight, with apex rounded and slightly turned mesally (Fig. 25E). Antennal formula: IV > III > I > II. Pronotum broadly sulcate, with a transverse row of small, moderately deep punctations on collar; anterior lobe with a transversal irregular row of eight moderately large, deep punctations, the two most central very closely placed in a large, deep median sulcus that crosses all pronotum longitudinally; posterior lobe

with many longitudinal rows of small punctations inserted in deep furrows; two most central rows inserted in the large median sulcus; humeri elevated (Fig. 25A, 25C). Mesoscutellum 7.0–7.6 times wider than long. Metanotal elevation trapezoidal, 2.2–2.4 times wider than long; disc with raised margins and a median depression with a median carina; apex with a rounded median notch (Fig. 25A, 25C). Forewings exposing lateral margins of abdominal laterotergites, reaching posterior margin of abdomen. Paramere rounded at Apex, with a pair of projections (Fig. 32F).

Macropterous female (Fig. 26). **Paratypes.** BL 1.95–2.00; HL 0.35–0.40; HW 0.43; EYE 0.10; IOW 0.21; ANT I 0.16–0.19; ANT II 0.11; ANT III 0.21–0.23; ANT IV 0.30–0.31; AWP 0.51–0.55; HWP 0.85–0.88; PL 0.45; MESW 0.36–0.38; MESL 0.05; METW 0.46–0.48; METL 0.19–0.20; FORELEG, FEM 0.41–0.43, TIB 0.40–0.41, TAR I 0.02, TAR II 0.13–0.15; MIDLEG, FEM 0.45, TIB 0.41–0.43, TAR I 0.02, TAR II 0.13; HINDLEG, FEM 0.53–0.61, TIB 0.63–0.65, TAR I 0.02–0.03, TAR II 0.15–0.16.

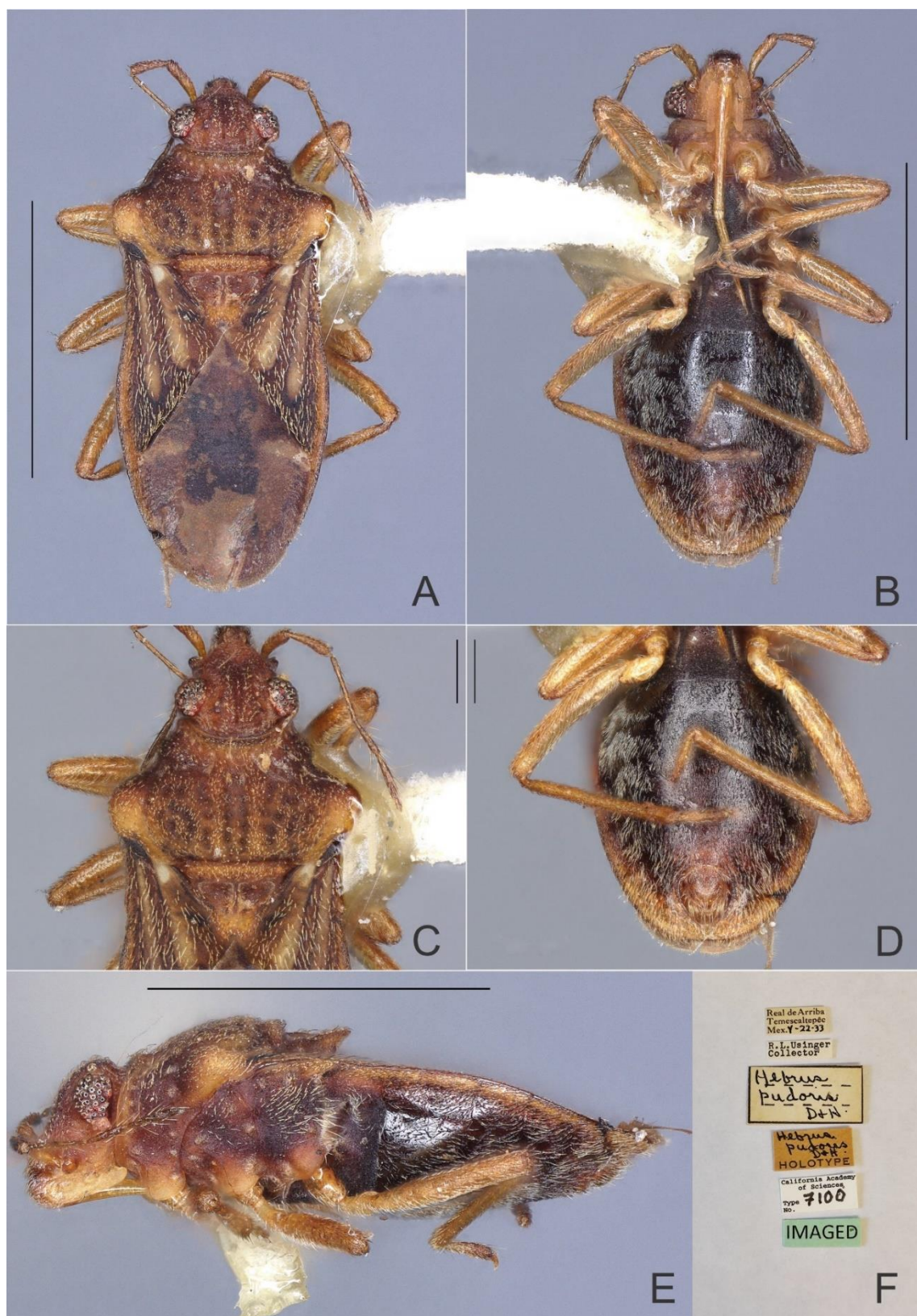


Figure 68. *Hebrus pudoris*. macropterous male, holotype. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Head, thorax, and part of abdomen, dorsal view. **D.** Apex of abdomen, ventral view. **E.** Habitus, lateral view. **F.** labels. Scale bars: 1.0 mm (A, B, E), 0.2 mm. (C, D).

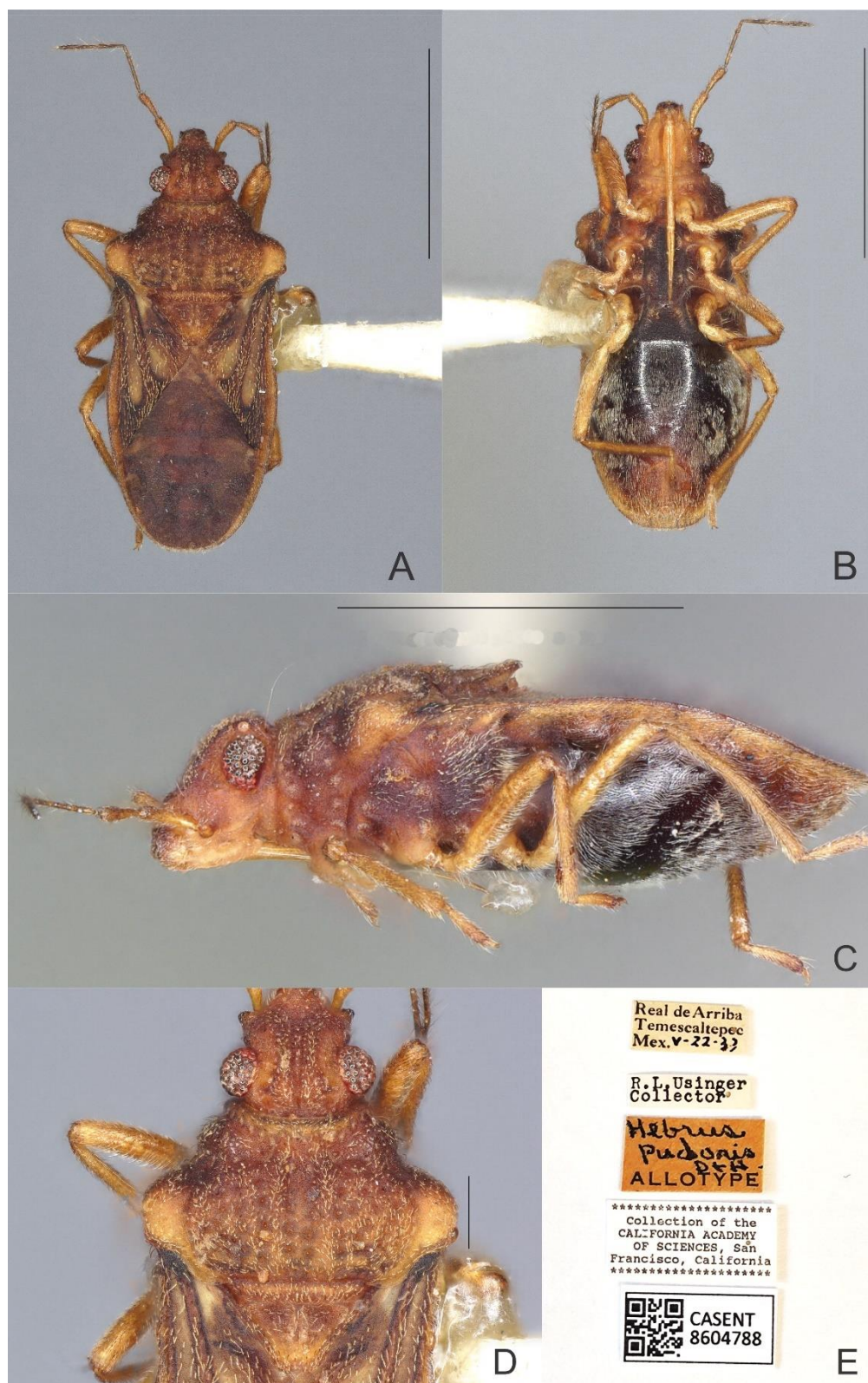


Figure 69. *Hebrus pudoris*. macropterous female, allotype. **A.** Habitus, dorsal view. **B.** Habitus, ventral view, and labels. **C.** Habitus, lateral view. **D.** Head, thorax, and part of abdomen, dorsal view. **E.** labels. Scale bars: 1.0 mm (A–C), 0.2 mm. (D).

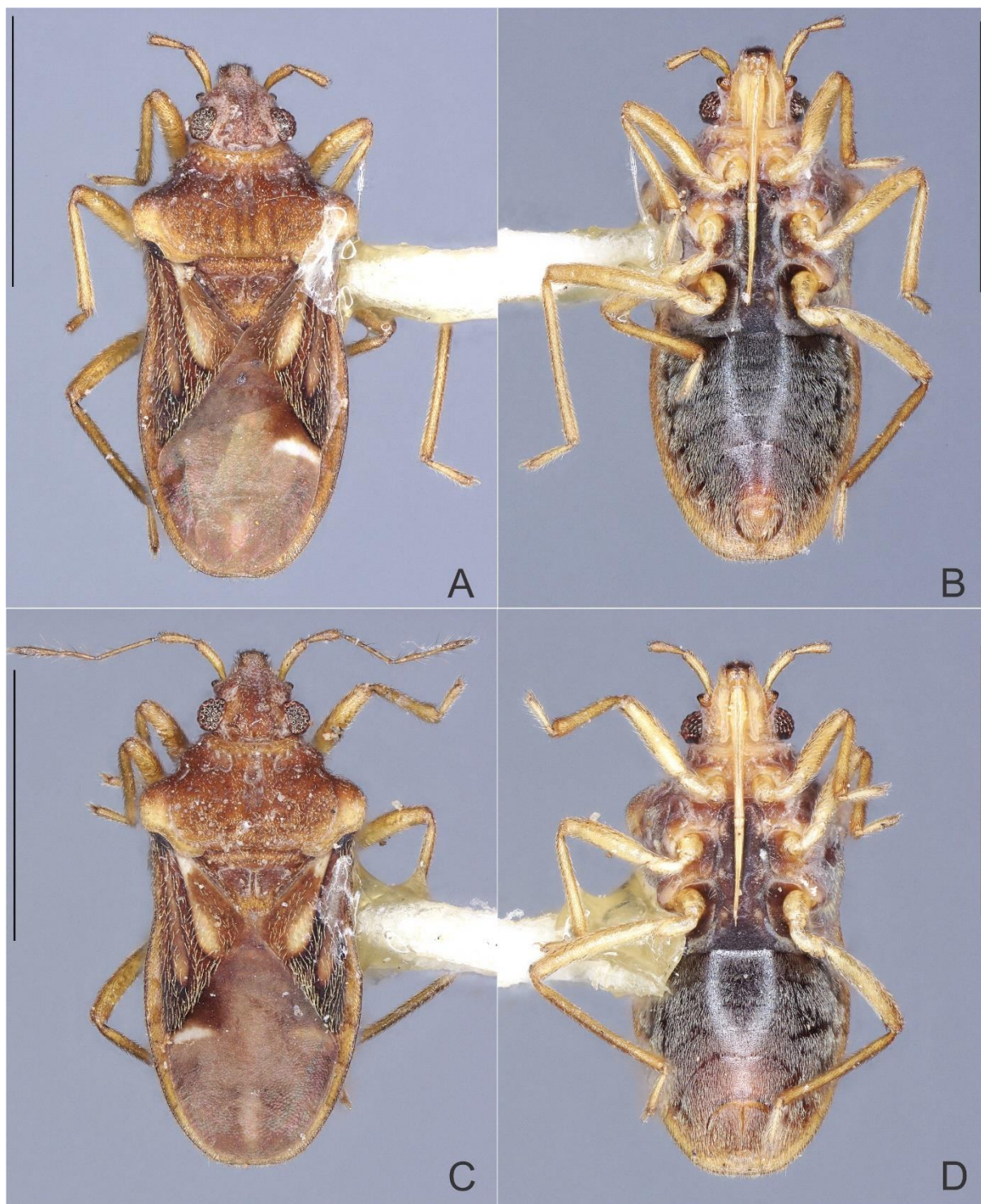


Figure 70. *Hebrus pudoris*, habitus. **A, B.** Macropterous male. **C, D.** Macropterous female. **A, C.** Dorsal view. **B, D.** Ventral view. Scale bars: 1.0 mm.

Macropterous female. Similar to macropterous male but slightly larger.

Diagnosis. BL ~1.8–2.0; general color light brown, dorsum with golden setae (Figs. 25A, 26A, 27A, 27D); clavus with small white macula at base, membrane with three yellowish maculae (Figs. 25A, 25C, 26A, 26D, 27A, 27D); metanotal elevation with median carina, apex with rounded median notch (Figs. 25A, 25C, 26A, 26D, 27A, 27D); male and female abdomen without distinct modifications. The structure of the head and pronotum (Figs. 25A, 25C, 26A, 26D, 27A, 27D) are also characteristic in this species, head slightly wider than long, with a pair of longitudinal carinae on vertex forming a distinct median sulcus; Pronotum broadly sulcate, with a conspicuous deep median longitudinal sulcus extending across both lobes, anterior lobe bearing a transverse irregular row of eight large, deep punctations, and posterior lobe with multiple longitudinal rows of punctations inserted in deep furrows, Forewings macropterous, exposing lateral margins of abdominal laterotergites, clavus with a small white macula at base surpassing the apex of the mesoscutellum.

Notes.

Hebrus pudoris and *H. sulcatus* share several diagnostic features typical of the genus, head wider than long with a median longitudinal groove or sulcus on the vertex, pronotum distinctly sulcate with deep punctations, elevated humeri, trapezoidal metanotal elevation with raised margins and a median carina, and forewings reaching the posterior margin of the abdomen and exposing the lateral margins of the abdominal laterotergites. Both species also present a small whitish macula on the clavus surpassing the apex of the mesoscutellum and transverse pale maculae on the membrane near the apex of the veins. However, *H. pudoris* differs from *H. sulcatus* by its smaller body size (BL 1.80–2.00 vs. 2.16–2.46), lighter general coloration (brown vs. dark brown to black) (25A, 26A, 27A), and by the more conspicuous and continuous deep median longitudinal sulcus on the pronotum extending across both lobes, with the anterior lobe bearing a transversal irregular row of eight large punctations (25C, 26D). In contrast, *H. sulcatus* exhibits a pronotum with two large submedian punctations on the anterior lobe and a transverse row of eight deep punctations between lobes, with the median sulcus less extensive (Fig. 30A–C). Additionally, the metanotal elevation in *H. pudoris* is proportionally wider (2.2–2.4 times wider than long) and bears a single median depression, whereas in *H. sulcatus* it is relatively narrower (about 1.66 times wider than long) and characterized by two submedian depressions separated by a median carina and a subquadrate apical notch (Fig. 30A–C). The antennal proportions also differ, with antennal formula $IV > III > I > II$ in *H. pudoris* versus $IV > I \geq III > II$ in *H. sulcatus*.

Distribution. Costa Rica (Porter, 1950; Drake & Chapman, 1953), Mexico (Drake & Harris, 1943; Porter, 1950; present study) (Fig. 34B).

***Hebrus spiculus* Polhemus & McKinnon, 1983**

Hebrus spiculus Polhemus & McKinnon, 1983: 114 (original description).

Figs. 28, 29, 32G

Type material examined. Holotype. COSTA RICA – **San José** • 31 mi. [miles] S. [South of] San Isidro del General; [9.15, –83.38]; 06.I.1970; J.T. Polhemus leg.; 1 macropterous ♂, JTPC, NMNH. **Allotype (= paratype).** COSTA RICA – **San José** • Same data as holotype; 1 macropterous ♀, JTPC, NMNH. **Paratypes.** COSTA RICA – **San José** • Same data as holotype; 1 macropterous ♂, 5 macropterous ♀, JTPC, NMNH – **Puntarenas** • N. [North of] Palmar Norte; [8.97, –83.47]; 28.XII.1969; J.T. Polhemus leg.; 1 macropterous male ♂, 4 macropterous ♀, JTPC, NMNH • Barranca, Rio de Barranca; [9.96, –84.73]; 10.I.1970; J.T. Polhemus leg.; 1 macropterous ♀, JTPC, NMNH • San Vito de Java; [8.83, –82.96]; 29.XII.1969; J.T. Polhemus leg.; 1 macropterous ♂, JTPC, NMNH. PANAMA – [**Panama Oeste**] • San Carlos; [8.49, –79.95]; 09.I.1970; J.T. Polhemus leg.; 1 macropterous ♂, 1 macropterous ♀, JTPC, NMNH.

Additional material examined. COLOMBIA – **Antioquia** • Rio Claro at Nature Res. [Reserve] 13 km W [West] of Doradal; [5.92, –74.85]; 250 m a.s.l.; 21.VII.1989; D.A. Polhemus & J.T. Polhemus leg.; 11 macropterous ♂, 2 macropterous ♀, JTPC, NMNH. PANAMA – [**Colón**] • Small stream at Km 17 on Pipeline Road; [9.23, –79.70]; 05.I.1993; J.T. Polhemus & A. Gillogly leg.; 3 macropterous ♀, JTPC, NMNH. – [**Panama**] • Rocky stream crossing Gamboa Road; [9.12, –79.61]; 50 m a.s.l.; 07.I.1993; J.T. Polhemus & A. Gillogly leg.; 2 macropterous ♂; JTPC, NMNH. – **Chiriquí** • Hartman's Finca, 3 Km NE of Santa Clara; [8.87, –82.74]; 10.I.1993; J.T. Polhemus & A. Gillogly leg.; 2 macropterous ♂, JTPC, NMNH.

Redescription

Macropterous male. (Fig. 28) **Holotype (Paratype).** BL 1.80 (1.77); HL 0.27 (0.28); HW 0.40 (0.40); EYE 0.10 (0.10); IOW 0.20 (0.20); ANT I 0.17 (0.16); ANT II 0.13 (0.12); ANT III 0.22 (0.22); ANT IV 0.32 (0.31); AWP 0.51 (0.50); HWP 0.72 (0.72); PL 0.38 (0.40); MESW

0.30 (0.30); MESL 0.07 (0.07); METW 0.33 (0.35); METL 0.15 (0.15); FORELEG, FEM 0.45 (0.42), TIB 0.40 (0.37), TAR I 0.02 (lost), TAR II 0.12 (lost); MIDDLEG, FEM 0.45 (0.45), TIB 0.42 (0.37), TAR I 0.02 (0.02), TAR II 0.10 (0.10); HINDLEG, FEM 0.60 (0.55), TIB 0.57 (0.57), TAR I 0.02 (0.02), TAR II 0.13 (0.15).

General color dark brown, except for antenna, venter of head (including buccula and labium), and legs light brown to yellow. Forewings: veins darker at base and apex; clavus with a medium-sized white macula almost reaching apex of metanotal elevation; membrane with a pair of transversal whitish maculae adjacent to apex of veins and a fainter macula closer to apex (Fig. 28A). Vertex of head, pronotum, mesoscutellum, and metanotal elevation with a bluish-green metallic sheen.

Corium and clavus of forewings with moderately long golden setae. Antenna, legs, and abdomen densely covered by moderately long yellowish to brown setae; decumbent on antennomeres I and II, mostly erected on III and IV. Tegument with whitish pruinosity on head dorsally – a narrow basal stripe that continues bordering the eyes and finishes at antenna – and laterally, anterior lobe of pronotum and sides of thorax (Fig. 28A).

Head slightly wider than long; width through eyes approximately 1.7 times length; interocular width 2.0 times eye width. Buccula elongated, straight, with apex slightly pointed (Fig. 28C). Antennomere I cylindrical, slightly curved; antennomere II cylindrical; width of antennomeres III–IV approximately half of antennomere I, except the apical half of IV, with similar width of I. Antennal formula: $IV > III > I > II$. Pronotum with a transverse row of small, moderately deep punctations on collar; anterior lobe with two moderately large, deep punctations submedially; two central punctations between lobes very closely placed, giving impression of a single deep punctation; posterior lobe with a shallow median sulcus starting near central punctations and not reaching posterior margin; a row of small punctations adjacent to posterior margin, continuing laterally close to humeri, and more irregular small punctations on disc; humeri elevated (Fig. 28A, 28C). Mesoscutellum 4.3 times wider than long. Metanotal elevation trapezoidal, about 2.2 times wider than long; disc with raised margins and a median depression with a short median carina; apex with a moderately deep, rounded median notch (Fig. 28A, 28C). Abdominal laterotergites slightly elevated. Forewings exposing narrow lateral margins of abdominal laterotergites, almost reaching posterior margin of abdomen. Paramere with a mesal spur and a distal hook (Fig. 32G).

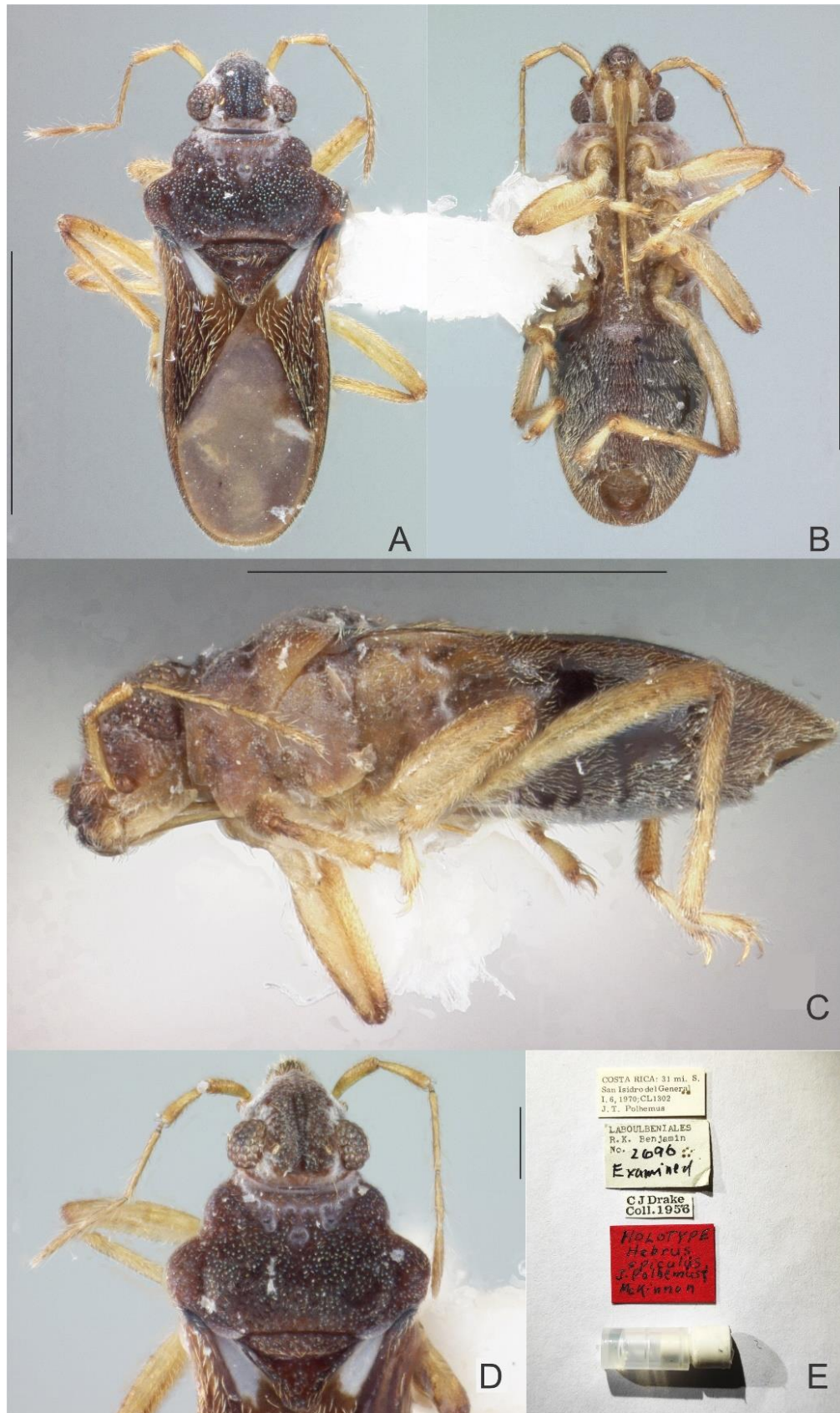


Figure 71. *Hebrus spiculus*. macropterous male, holotype. **A.** Habitus, dorsal view, and labels. **B.** Habitus, ventral view. **C.** Habitus, lateral view. **D.** Head, thorax, and part of abdomen, dorsal view. **E.** labels. Scale bars: 1.0 mm (A–C), 0.2 mm (D).

Macropterous female (Fig. 29). **Paratypes.** BL 1.92–2.02; HL 0.30–0.33; HW 0.42; EYE 0.10; IOW 0.21–0.22; ANT I 0.17; ANT II 0.13; ANT III 0.22; ANT IV 0.32–0.35; AWP 0.52–0.55; HWP 0.80; PL 0.42 (0.43); MESW 0.32; MESL 0.06; METW 0.35–0.36; METL 0.17; FORELEG, FEM 0.42, TIB 0.40, TAR I 0.02, TAR II 0.12; MIDLLEG, FEM 0.43–0.45, TIB 0.40, TAR I 0.02, TAR II 0.11; HINDLEG, FEM 0.55–0.57, TIB 0.57–0.60, TAR I 0.02, TAR II 0.13.

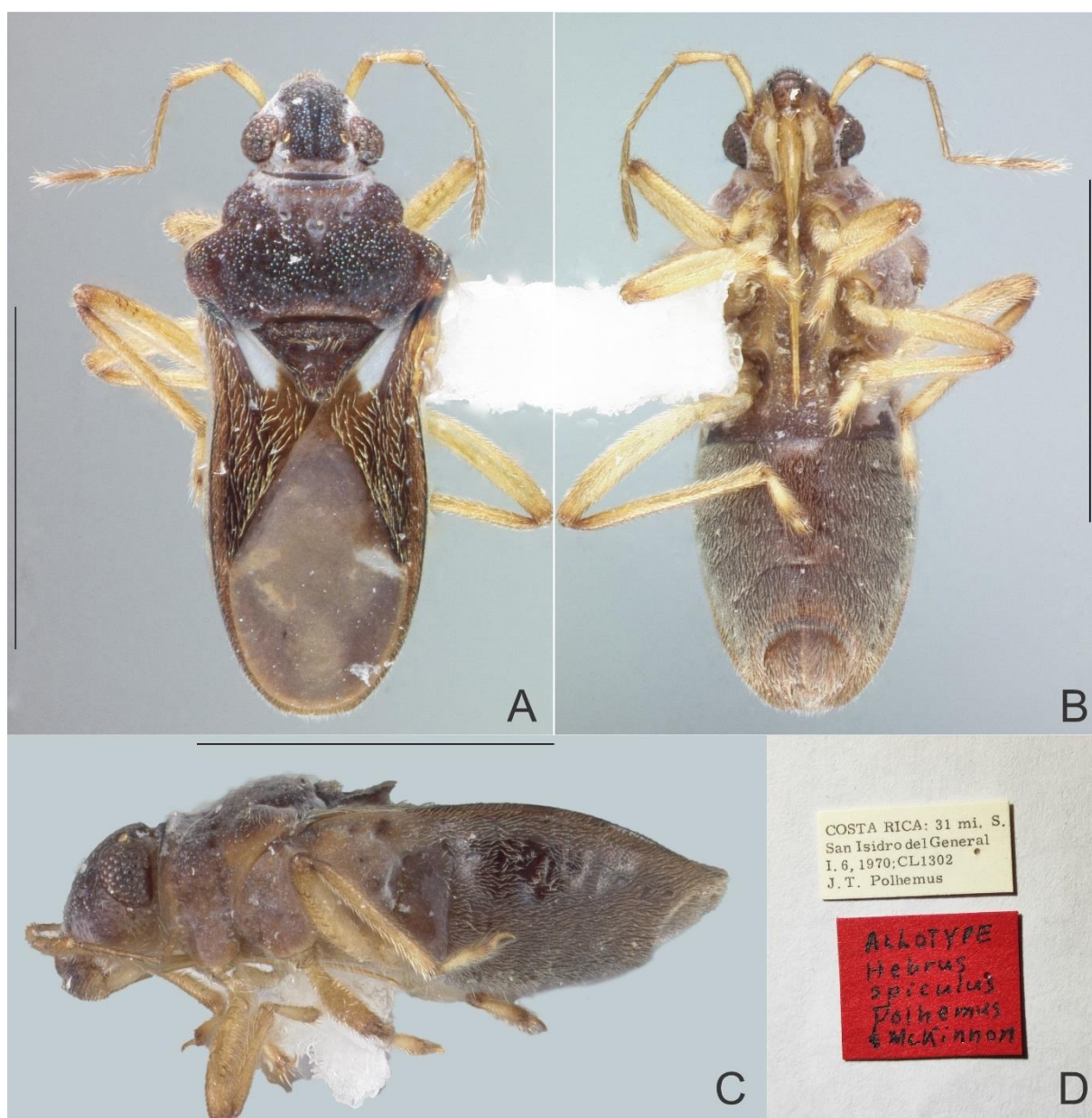


Figure 72. *Hebrus spiculus*. macropterous female, allotype. **A.** Habitus, dorsal view **B.** Habitus, ventral view. **C.** Habitus, lateral view. **D.** labels. Scale bars: 1.0 mm.

Similar to macropterous male but slightly larger.

Diagnosis. BL ~1.7–2.1; general color dark brown, with areas of pruinosity and metallic sheen, and moderately long golden setae dorsally (Figs. 28A, 29A); forewings with a pair of medium-sized basal macula, with three maculae on membrane (Figs. 28A, 29A); metanotal elevation with short median carina, apex with moderately deep rounded median notch (Figs. 28A, 28D, 29A); male and female abdomen without distinct modifications (Figs. 28B, 29B); paramere with a mesal spur and a distal hook (Fig. 32G).

Notes.

Comparative characters of *Hebrus spiculus*, *Hebrus ecuadoris* and *H. consolidus* are discussed under *H. major*.

Distribution. Colombia (Polhemus & McKinnon 1983; present study), Costa Rica (Polhemus & McKinnon 1983; Pacheco-Chaves *et al.* 2014; present study), Panama (Polhemus & McKinnon 1983; present study) (Fig. 34B).

Hebrus sulcatus Champion, 1898

Hebrus sulcatus Champion, 1898: 120 (original description).

Naeogeus sulcatus: Kirkaldy (1900): 241 (new combination).

Hebrus sulcatus: Harris (1942): 124 (original combination).

Figs. 30, 31, 34B

Type material examined. Syntypes. PANAMA – [Chiriquí] • Bugaba; [8.48, –82.63]; 2 macropterous ♂, 1 macropterous ♀, NHM 016033307.

Redescription

Macropterous male (Fig. 30A). **Syntypes.** BL 2.36 (2.46); HL 0.39 (0.40); HW 0.50 (0.49); EYE 0.13 (0.12); IOW 0.24 (0.23); ANT I 0.38 (0.37); ANT II 0.20 (0.21); ANT III 0.38 (0.35); ANT IV 0.48 (0.55); AWP 0.63 (0.64); HWP 0.94 (0.93); PL 0.49 (0.49); MESW 0.42 (0.44); MESL 0.06 (0.06); METW 0.40 (0.39); METL 0.24 (0.22); FORELEG, FEM glued (0.46), TIB

glued (0.49), TAR I glued, TAR II glued; MIDLEG, FEM glued (0.51), TIB glued (0.57), TAR I glued (0.03), TAR II glued (0.14); HINDLEG, FEM 0.62 (0.60), TIB 0.74 (glued), TAR I 0.02 (0.02), TAR II 0.16 (0.18).

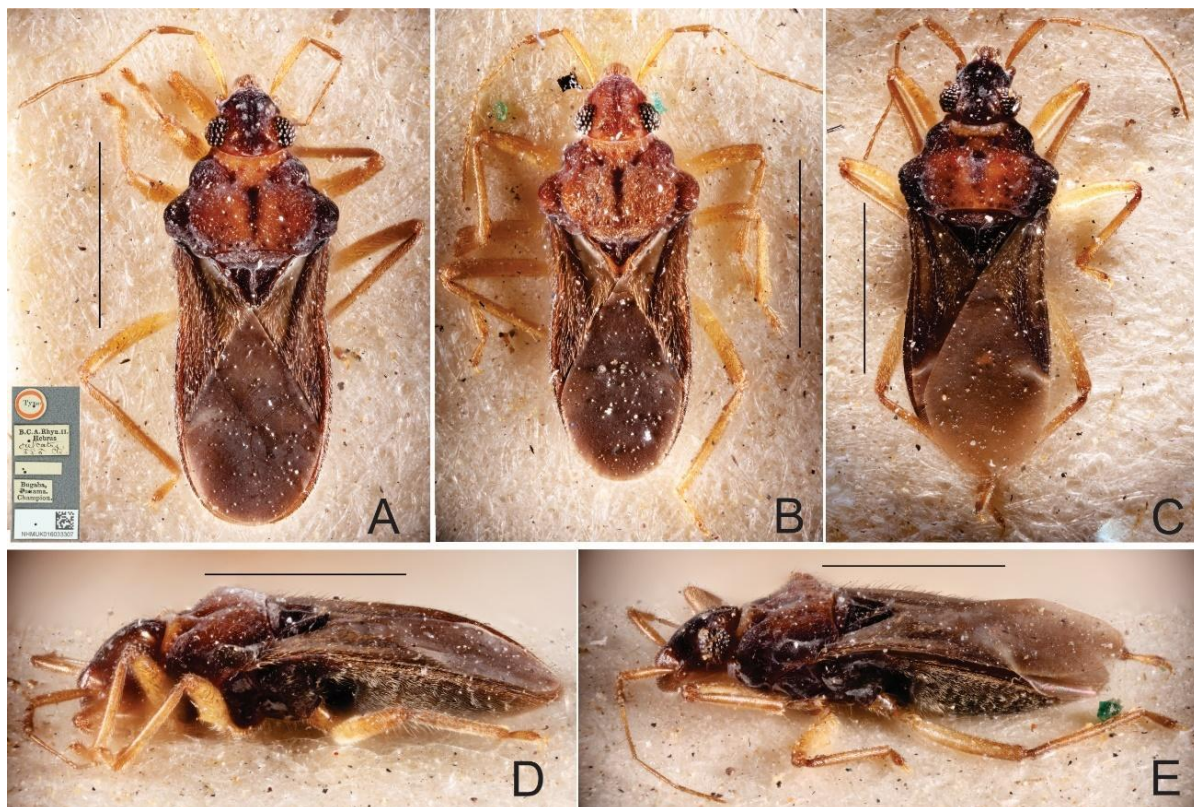


Figure 73. *Hebrus sulcatus*, syntypes **A**, **C**. macropterous males, **B**. macropterous female (NHMUK 016033307), habitus. **A–C**. Dorsal view. **D**, **E**. Lateral view. Scale bars: 1.0 mm.

General color dark brown to black, with variable lighter, more reddish, areas on head, collar and disc of pronotum, mesoscutellum, and margins of metanotal elevation. Forewings: brown; veins darker; clavus with a small diffuse white macula surpassing apex of mesoscutellum; membrane with a pair of faint, transverse, narrow, whitish maculae adjacent to apex of veins (Fig. 30A).

Posterior lobe of pronotum, mesoscutellum, and metanotal elevation with very short golden setae. Mesoscutellum and metanotal elevations with long yellowish setae. Corium and clavus with moderately long golden setae. Legs and abdomen with dense, moderately long yellowish setae. Tegument with pruinosity on dorsum of head, marginally on pronotum, and on sides of thorax (Fig. 30A).

Head with thin median groove on vertex; wider than long; width through eyes approximately 1.2 times length; interocular width 1.8 times eye width. Antennomere I cylindrical, slightly curved; antennomere II cylindrical; width of antennomeres III–IV approximately half of antennomere I. Antennal formula: $IV > I \geq III > II$. Pronotum with a transverse row of small, moderately deep punctations on collar; anterior lobe with two large and deep punctations submedially; a transverse row of eight deep punctations between lobes; most central two punctations on row between lobes very closely placed, giving impression of a single deep punctation; posterior lobe deeply grooved medially, disc with scattered punctations; a row of small punctations adjacent to posterior margin, continuing laterally close to humeri; humeri elevated (Fig. 30A). Mesoscutellum about 7 times wider than long. Metanotal elevation trapezoidal, 1.66 times wider than long; disc with raised margins and two submedian depressions divided by a median carina; apex with a subquadrate median notch (Fig. 20A). Forewings exposing narrow lateral margins of abdominal laterotergites, reaching posterior margin of abdomen.

Macropterous female (Fig. 30B). **Paratype.** BL 2.16; HL 0.36; HW 0.47; EYE 0.11; IOW 0.25; ANT I 0.36; ANT II 0.21; ANT III 0.34; ANT IV 0.55; AWP 0.60; HWP 0.87; PL 0.45; MESW 0.35; MESL 0.06; METW 0.37; METL 0.20; FORELEG, FEM 0.46, TIB 0.54, TAR I 0.02, TAR II 0.14; MIDLEG, FEM 0.45, TIB 0.52, TAR I 0.03, TAR II 0.12; HINDLEG, FEM 0.60, TIB 0.64, TAR I 0.02, TAR II 0.17.

Similar to macropterous male but slightly smaller, with more uniform reddish-brown coloration.



Figure 74. *Hebrus sulcatus*, syntypes (NHMUK 016033307), macropterous specimens, habitus dorsal views, and label.

Diagnosis. BL ~2.1–2.5; general color dark brown to black, with variable lighter, reddish-brown areas (Figs. 30A); forewings with a pair of small diffuse white maculae basally and a pair of narrow faint maculae on membrane near apex of veins (Figs. 30A); metanotal elevation with median carina, apex with subquadrate median notch (Figs. 30A, 30B); male and female abdomen without distinct modifications.

Notes.

Comparative characters of *H. sulcatus*, *Hebrus ecuadoris*, *H. major*, and *Hebrus hungerfordi* are discussed under *H. ecuadoris*.

Distribution. Panama (Champion 1898; present study) (Fig. 34B).

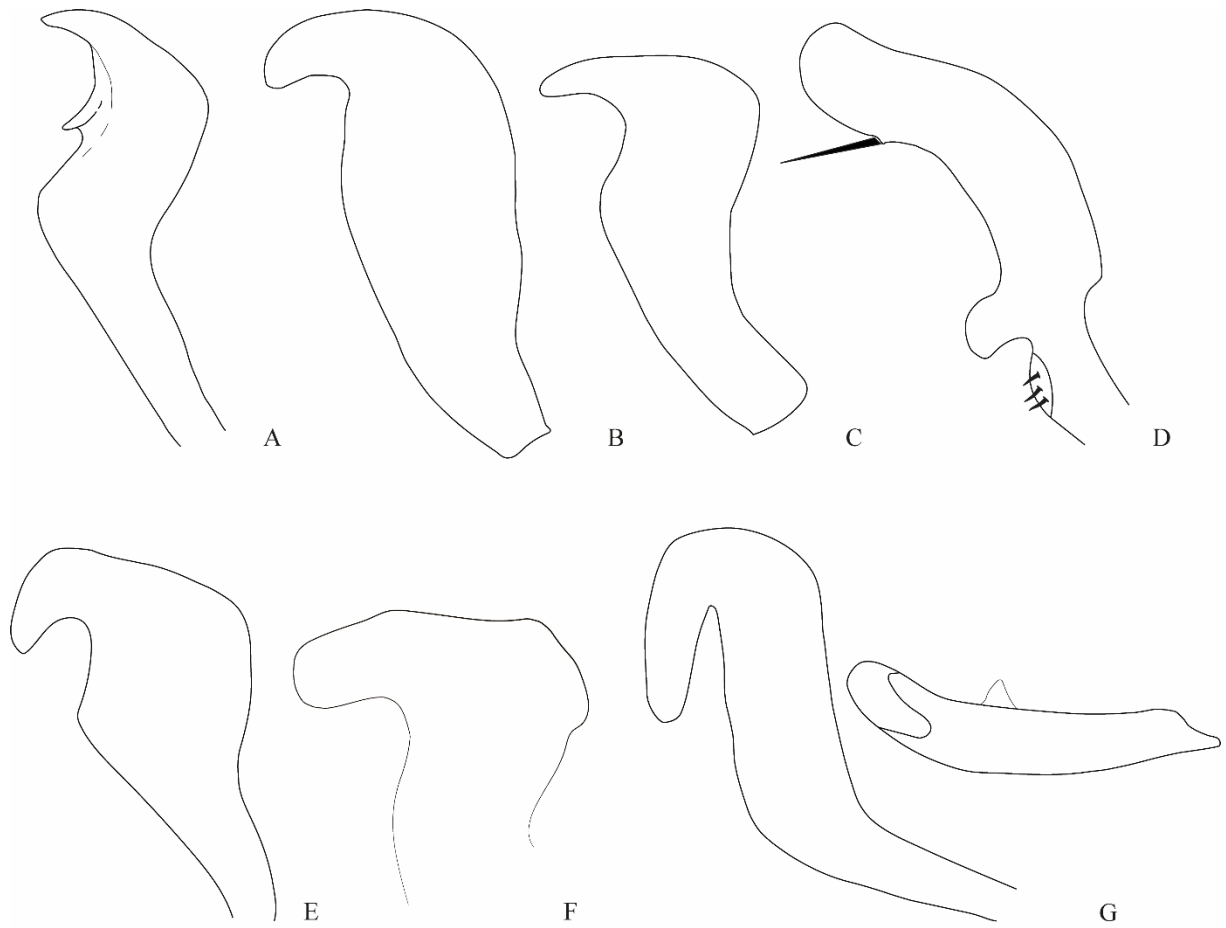


Figure 75. Parameres, schematic drawings. **A.** *Hebrus catus* Drake & Cobben, 1960. **B.** *H. concinnus* Drake & Chapman, 1958. **C.** *H. consolidus* Drake & Chapman, 1958. **D.** *H. hungerfordi* Porter, 1950. **E.** *H. major* Drake & Chapman, 1958. **F.** *H. pudoris* Porter, 1950. **G.** *H. spiculus* Polhemus & McKinnon 1983.

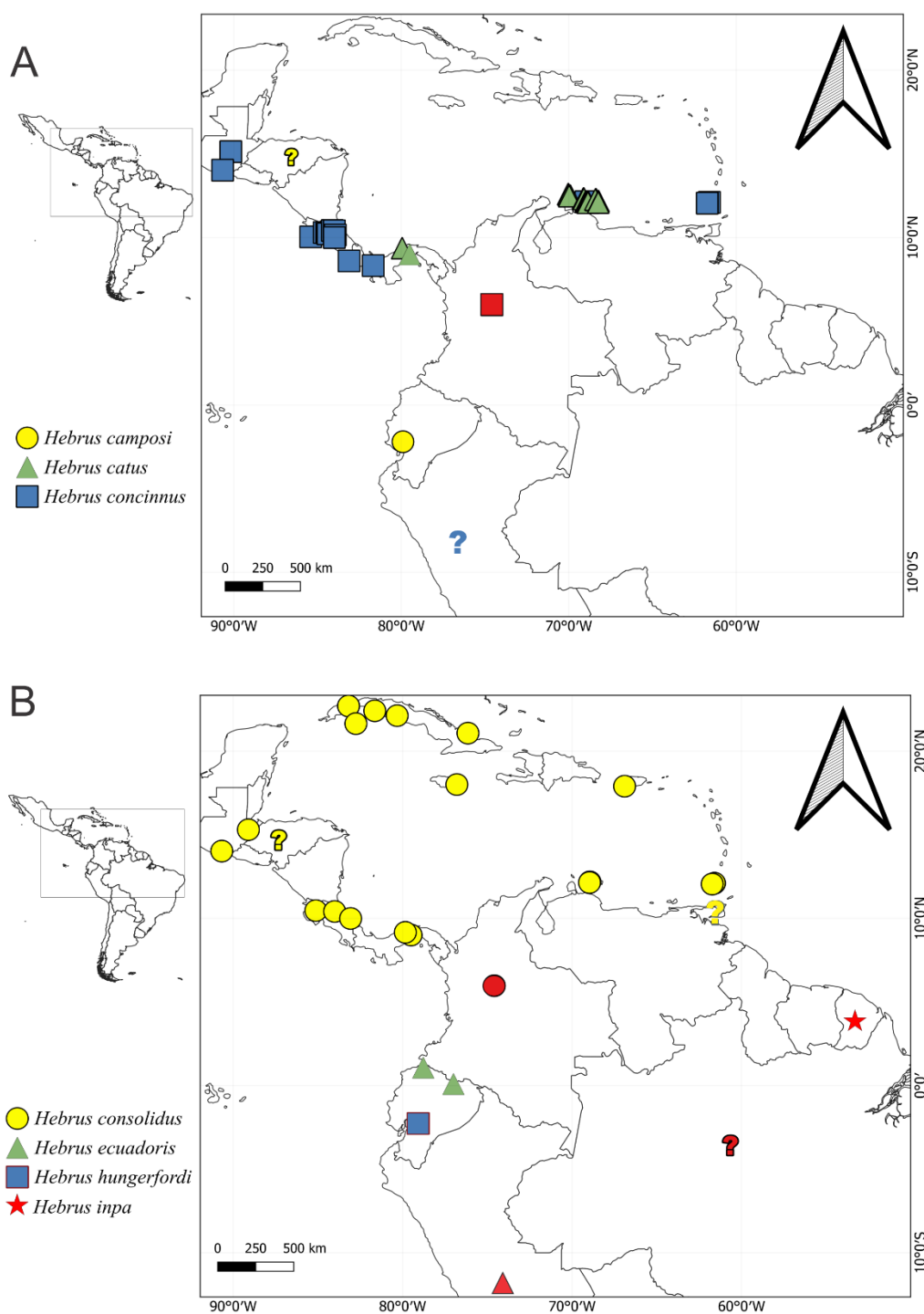


Figure 76. Geographic distribution of *Hebrus* recorded of Central America and South America, except Brazil and Argentina. **A.** *H. camposi* (yellow circles, yellow question mark), *H. catus* (green triangles), *H. concinnus* (blue squares, blue question mark). **B.** *H. consolidus* (yellow circles and question mark), *H. ecuadoris* (green triangles, red triangles), *H. hungerfordi* (blue squares), *H. inpa* (red question mark and red star). Question mark indicates unspecified locality.

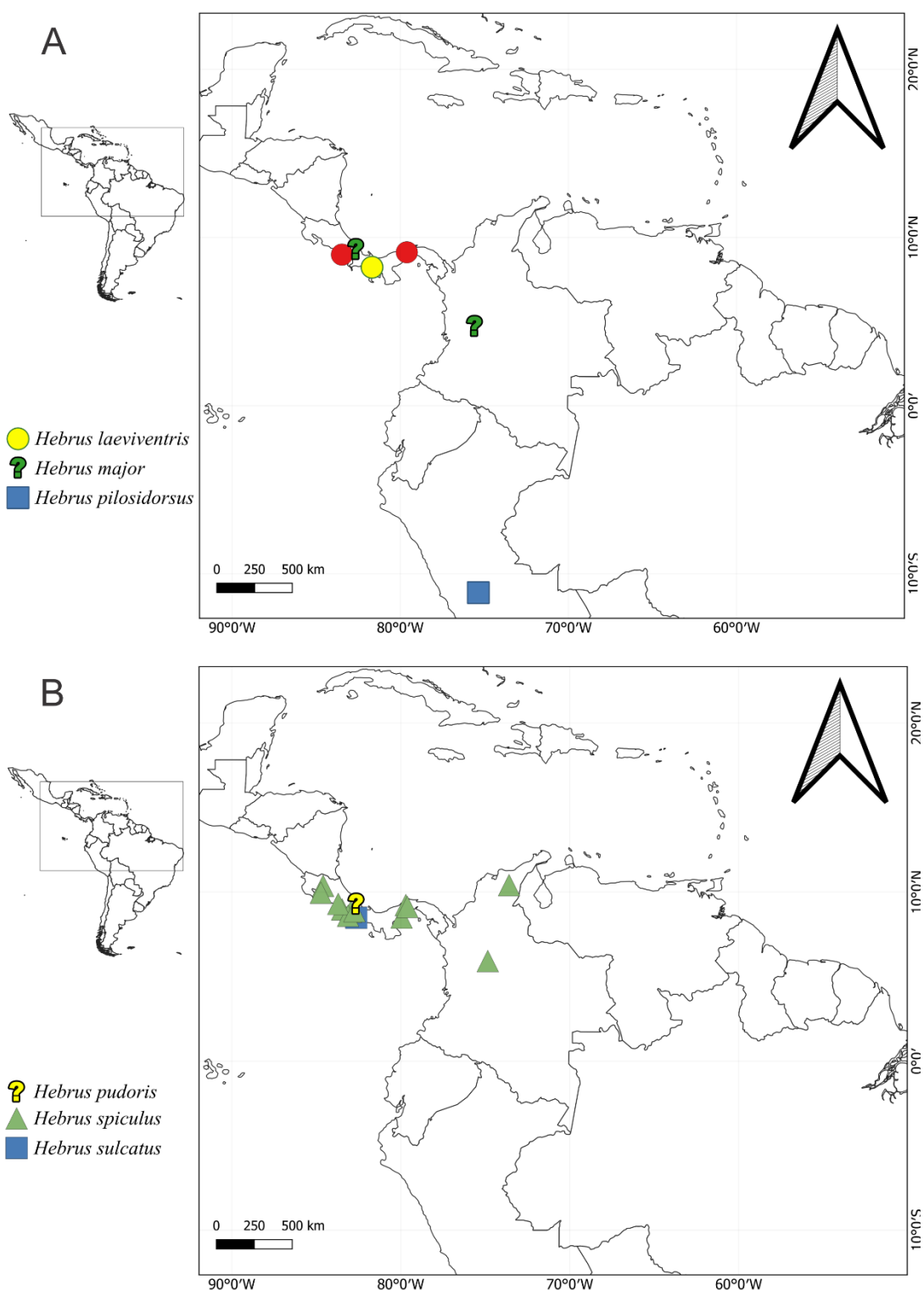


Figure 77. Geographic distribution of *Hebrus* recorded of Central America and South America, except Brazil and Argentina. **A.** *H. laeviventris* (yellow circles), *H. major* (green question mark), *H. pilosidorsus* (blue square). **B.** *H. pudoris* (yellow question mark), *H. spiculus* (green triangles), *H. sulcatus* (blue square). Question mark indicates unspecified locality.

Discussion

The present revision significantly improves the taxonomic knowledge of *Hebrus* Curtis, 1833 in Central America and South America, excluding Brazil and Argentina, regions where the genus has remained poorly known and inadequately documented. Although Hebridae comprise more than 220 described species worldwide, Neotropical representatives of *Hebrus* are still largely known from their original descriptions, often based on limited material and lacking detailed morphological information or illustrations (Champion 1898; Uhler 1894; Drake & Harris 1943; Drake & Chapman 1954, 1958).

The redescrptions of 12 species presented herein address several long-standing taxonomic issues, including incomplete original descriptions, insufficient morphometric data, and the absence of male-based diagnostic characters. Early descriptions of Neotropical *Hebrus* were produced under methodological constraints and rarely included characters currently considered essential for species delimitation. By standardizing measurements, redescrbing external morphology, and providing photographic documentation, the present study facilitates reliable identification and comparison among closely related species.

The proposed new synonymy contributes to nomenclatural stability within *Hebrus* and reduces redundancy in the Neotropical fauna. Similar problems of synonymy and poorly defined species have been highlighted in previous studies on Hebridae and other Gerromorpha (Polhemus & Polhemus 2008; Zettel & Tran 2016; Schuh & Weirauch 2020), emphasizing the importance of revising historical taxa based on direct examination of type and non-type material.

New distributional records considerably expand the known geographic ranges of several species, reinforcing the notion that *Hebrus* diversity in the Neotropics is underestimated. The scarcity of records likely reflects limited targeted collecting and the cryptic habits of these small semiaquatic bugs, which inhabit marginal vegetation and are easily overlooked in general aquatic surveys (Moreira 2015). The updated distribution maps presented here provide a more accurate framework for future faunistic, ecological, and biogeographic studies.

The examination of material from multiple institutional collections was essential for this revision, highlighting the importance of museum holdings in resolving taxonomic problems in Hebridae. By integrating historical specimens with modern imaging techniques, this study establishes a solid morphological baseline for Neotropical *Hebrus* and provides a reference for subsequent taxonomic and faunistic investigations.

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Capítulo 3. A review of *Hebrus* Curtis, 1833 (Hemiptera, Heteroptera, Hebridae) recorded from Mexico

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Hebridae (Hemiptera: Heteroptera: Gerromorpha) is a family comprising more than 220 species arranged in two subfamilies and 12 genera of minute semiaquatic bugs. *Hebrus* Curtis, 1833, the type genus of the family, is widely distributed in the Neotropical region, where 28 species have been recorded to date. Most Neotropical species of *Hebrus* are poorly known, being represented only by their type series and frequently described incompletely, often without illustrations or based solely on female specimens. In Mexico, the Hebridae fauna includes three genera and 14 species, with *Hebrus* accounting for the majority of the records. Herein, we present a comprehensive review of the *Hebrus* fauna of Mexico, including the redescription of six species, diagnoses of five species, new country and state records, high-resolution photographs, and updated distribution maps. This study aims to clarify species limits, improve taxonomic knowledge of Mexican *Hebrus*, and provide a robust foundation for future faunistic, systematic, and biogeographic studies involving Hebridae in the Neotropical region.

Keywords. Mexico fauna, Neotropical region, taxonomy, velvet water bugs

Introduction

Hebridae (Hemiptera: Heteroptera: Gerromorpha), or velvet water bugs, comprises more than 220 species divided into 12 genera and two subfamilies of small insects, with body lengths ranging from 1.3 to 3.7 mm (Polhemus and Polhemus 2008; Kment et al. 2016; Stella and Pall 2018; Zhang et al. 2024). The following three genera and 14 species have been recorded from Mexico: *Hebrus* Curtis, 1833, with 11 species (*Hebrus bilineatus* Champion, 1898; *H. burmeisteri* Lethierry & Severin, 1896 *H. concinnus* Uhler, 1894; *H. consolidus* Uhler, 1894; *H. hirsutus* Champion, 1898; *H. lacunatus* Drake & Chapman, 1958; *H. major* Champion, 1898; *H. nubilus* Drake & Harris, 1943; *H. pudoris* Drake & Harris, 1943; *H. sobrinus* Uhler, 1877; *H. usingeri* Drake & Harris, 1943); *Lipogomphus* Berg, 1879, with one species (*Lipogomphus brevis* (Champion, 1898)); and *Merragata* White, 1877, with two species (*M. quieta* Drake, 1952 and *M. truxal* Porter, 1955). Most of these species are rarely collected or studied and are therefore known only from their type series (Moreira 2015). Furthermore, many species were described incompletely and/or without illustrations, or are based solely on female specimens (Moreira 2015).

Here, we present a review of the *Hebrus* fauna of Mexico, including the redescription of six species known from the country, as well as new records, photographs, and distribution maps.

Methods

Material examined is deposited in the following collections: California Academy of Sciences, San Francisco, United States (CAS); Coleção Entomológica do Instituto Oswaldo Cruz, Rio de Janeiro, Brazil (CEIOC); Museum für Naturkunde, Berlin, Alemanha (MFN); Natural History Museum, London, United Kingdom (NHM); Naturhistorisches Museum Wien, Viena, Austria (NHMW); National Museum of Natural History, Smithsonian Institution, Washington D.C., United States (NMNH); and Universidad Nacional Autónoma de México, Cidade do México, México (UNAM). Within the NMNH, C.J. Drake Collection is herein abbreviated as CJDC and J.T. Polhemus Collection as JTPC.

We took the photographs using a Leica M205 C stereomicroscope coupled with a digital camera and captured using the Leica LAS version 4.7.1 imaging system (CEIOC), a JVC KY-F75U digital camera and with an automontage Pro Version 5.03.0061 (NMNH AntLab), and Reysen Digital Microscope VHX-7000 (CAS). We also obtained photographs from staff at other

institutions using various equipment and methods available at each location. We prepared final plates with Adobe Photoshop CS5.

Collecting information of the material examined is written as follows: country in all-capitals; states in bold; a bullet point (•) indicates the beginning of a record; an n-dash precedes a state name in bold; within each record, different fields are delimited by a semicolon; a single field can be composed of several elements, which are separated by commas. We produced distribution maps based on literature data and specimen labels using QGIS 3.10.7 (QGIS Development Team 2020).

Abbreviations used for measurements are as follows: body length (BL), head length (HL), head width through eyes (HW), eye width (EYE), minimum interocular width (IOW), length of antennomeres I–IV [without intersegmental pieces] (ANT I, ANT II, ANT III, ANT IV), anterior width of pronotum (AWP), humeral width of pronotum (HWP), pronotum length on midline (PL), mesoscutellum width (MESW), mesoscutellum length (MESL), metanotum width (METW), metanotum length (METL), length of fore leg segments (FORELEG), length of middle leg segments (MIDLEG), length of hind leg segments (HINDLEG), femoral length (FEM), tibial length (TIB), length of tarsomeres I–II (TAR I, TAR II). All measurements are given in millimeters and were always taken in their maximum dimensions, except for the minimum interocular distance.

In the distribution section of represented species, only the first known reference is provided for each country or territory, while all known references are provided for the records from Mexico.

Results

***Hebrus bilineatus* Champion, 1898**

Hebrus bilineatus Champion, 1898: 119 (original description).

Naeogeus bilineatus: Kirkaldy (1900): 241 (new combination).

Hebrus bilineatus: Harris (1942): 124 (original combination).

Figs. 1, 2, 23

Type material examined. Holotype. MEXICO – [Mexico D.F.] • Chapult [Chapultepec]; [19.42, –99.19]; II.1883; 1 macropterous ♀, NHMW 000703.

Additional material examined. MEXICO – **Jalisco** • Est. Biol. [Estación de Biología] Chamela; [19.49, –105.00]; 28.X.1988; E. Ramirez leg.; 2 macropterous ♂, 3 macropterous ♀ UNAM – **Nayarit** • 7 MiE [miles East] of San Blas; [21.59, –105.21]; 21.IV.1964; J.T. Polhemus & M.S. Polhemus leg.; 1 macropterous ♂, NHMW 000031584 – **Veracruz** • Minatitlán, Pantano Santa Alejandria; 6°22'57"N, 74°59'52" W; 24.VI.2011; H. Clebsch & L. Clebsch leg.; 1 macropterous ♂, 1 macropterous ♀, UNAM.

Redescription

Macropterous female (Fig. 1). Holotype (Polhemus "homeotype"). BL 2.00 (1.89); HL 0.30 (0.32); HW 0.45 (0.44); EYE 0.10 (0.10); IOW 0.26 (0.22); ANT I 0.23 (0.20); ANT II 0.16 (0.13); ANT III 0.23 (0.18); ANT IV 0.26 (0.38); AWP 0.58 (0.55); HWP 0.90 (0.85); PL 0.46 (0.42); MESW 0.38 (0.38); MESL 0.07 (0.06); METW 0.40 (0.42); METL 0.18 (0.18); FORELEG glued; MIDLEG glued; HINDLEG, FEM 0.54, TIB glued, TAR I glued, TAR II glued.

Head reddish-brown; dorsum dark brown anterior to eye. Eye dark brown. Pronotum reddish-brown, with dark brown areas on anterior lobe (Fig. 1A). Mesoscutellum, metanotal elevation, and thoracic pleura dark brown. Acetabula reddish-brown. Legs yellowish-brown (Fig. 1A). Forewings: brown; veins darker at base and apex; corium mostly white between veins; clavus with an inverted V-shaped macula surpassing apex of metanotal elevation; membrane matte-brown, with a pair of oblique whitish maculae laterally adjacent to apex of veins and a longitudinal macula closer to apex (Fig. 1A). Abdominal sterna dark brown; lateral margin reddish-brown.

Head with a pair of parallel rows of punctures converging medially; longitudinal groove not visible. Buccula prominent (Fig. 1B). Antennomere I robust, slightly curved; II cylindrical, wider at apex; III and IV with about half width of I. Antennal formula: IV > I = III > II.

Pronotum with a transverse row of punctures adjacent to anterior margin; anterior lobe protruding at central portion, with a deep punctation on each side; posterior lobe with two deep, parallel punctations followed by a longitudinal groove along median line to posterior margin; a row of punctures between humeral angle and the posterior margin. Mesoscutellum 5.4 times wider than long. Metanotal elevation about 2.2 times wider than long; subtriangular; median carina not reaching apex; posterior margin rounded, not notched. Thoracic pleura with punctations; sides of acetabula impunctate. Forewings exposing lateral margins of abdominal laterotergites, not reaching posterior margin of abdomen.

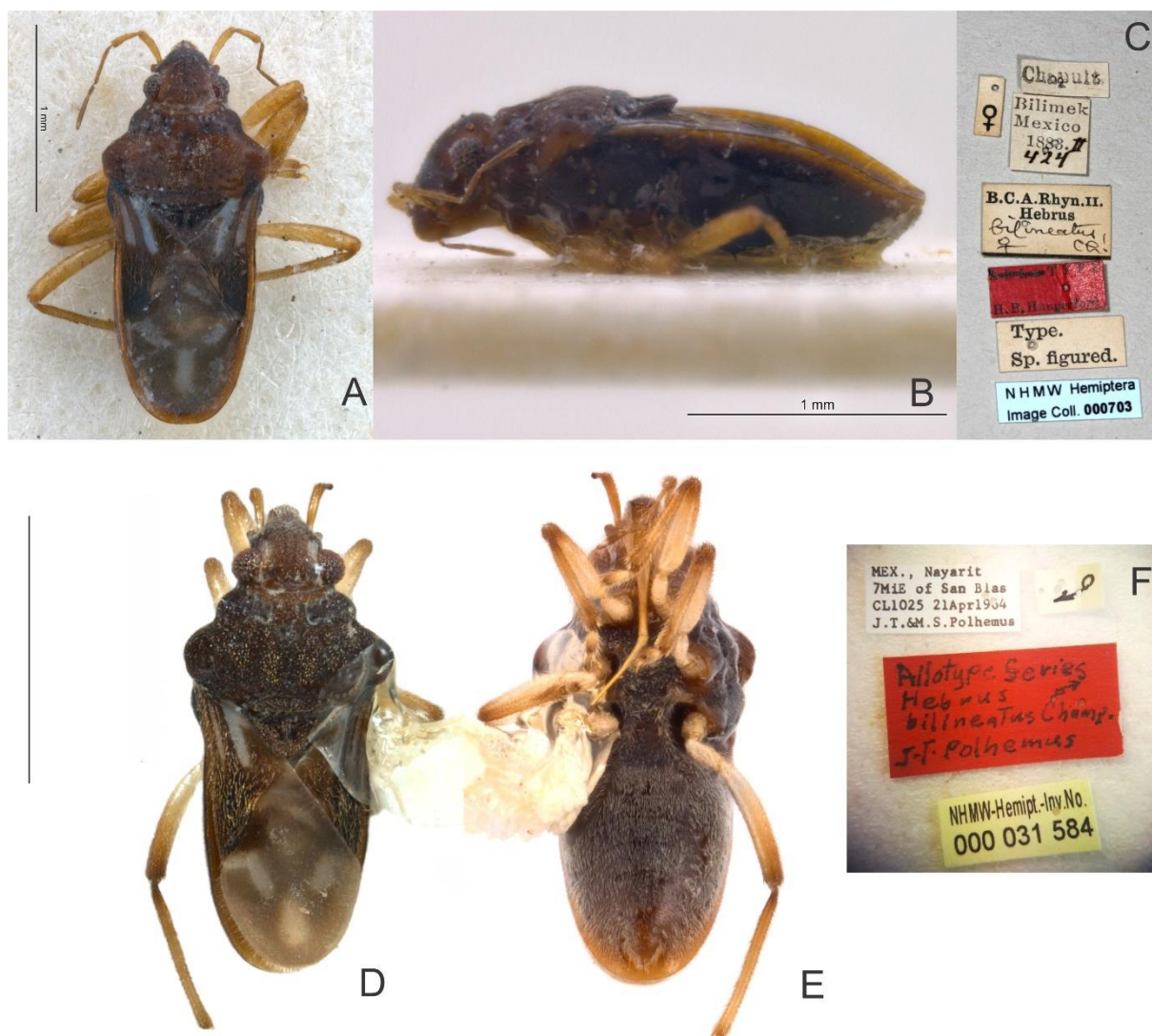


Figure 78. *Hebrus bilineatus*. **A–C.** macropterous female, holotype (NHMW 000703). **D–F.** macropterous male, non-type (NHMW 000031584). **A, D.** Habitus, dorsal view. **B.** Habitus, lateral view. **C.** labels. **E.** Habitus, ventral view. **F.** labels. Scale bars: 1.0 mm.

Macropterous male (Fig. 1D, 1E). **Non-type.** BL 1.72; HL 0.30; HW 0.43; EYE 0.10; IOW 0.24; ANT I 0.20; ANT II 0.16; ANT III 0.18; ANT IV 0.22; AWP 0.52; HWP 0.79; PL 0.40; MESW 0.30; MESL 0.06; METW 0.35; METL 0.16; FORELEG, FEM 0.34, TIB 0.40, TAR I 0.02, TAR II 0.10; MIDLEG, FEM 0.34, TIB 0.42, TAR I 0.02, TAR II 0.09; HINDLEG, FEM 0.47, TIB 0.59, TAR I lost, TAR II lost.

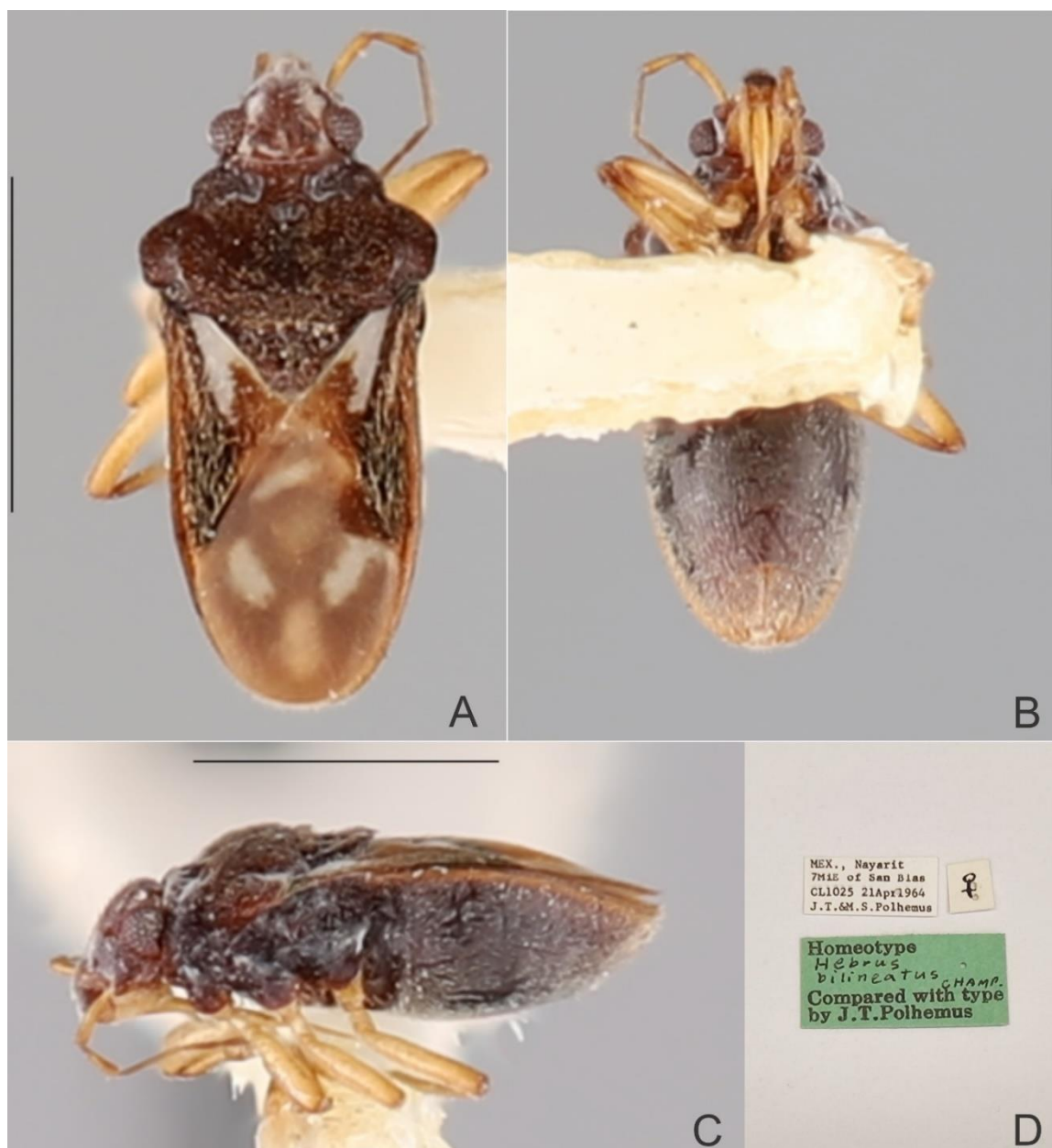


Figure 79. *Hebrus bilineatus*. macropterous female, homeotype. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Habitus, lateral view. **D.** labels. Scale bars: 1.0 mm.

Similar to macropterous female but slightly smaller. Antennal formula $IV > I > III > II$.

Diagnosis. BL ~1.7–2.0; general color reddish-brown to dark-brown (Fig. 1A, 1D); corium and clavus each with a large white macula, membrane with three whitish maculae (Fig. 1A, 1D); metanotal elevation with median carina, apex rounded, not notched (Fig. 1A, 1D); male and female abdomen without distinct modifications.

Discussion.

Hebrus bilineatus and *H. burmeisteri* share the general habitus typical of the genus, including small macropterous body (BL ~1.7–2.0), general coloration reddish-brown to dark brown, pronotum lighter with darker areas mainly on the anterior lobe, mesoscutellum and metanotal elevation darker and contrasting with the pronotum, and forewings bearing large white maculae on corium and clavus and several whitish maculae on the membrane. Both species also share a metanotal elevation about twice as wide as long, with a distinct median carina and rounded apex, antennal formula $IV > I > III > II$, and abdomen without evident sexual modifications. *Hebrus bilineatus* can be readily distinguished from *H. burmeisteri* by the head lacking a well-defined median furrow (Figs. 1A, 1D, 2A) (present and deep in *H. burmeisteri* (Figs. 3A, 4A, 5A, 5D, 6A)), pronotum without a deep median furrow bordered by parallel carinae, metanotal elevation subtriangular with median carina not reaching the apex and posterior margin rounded without a median notch (Figs. 1A, 1D, 2A) (vs. trapezoidal elevation with two submedian depressions and a small median notch at apex in *H. burmeisteri* (Figs. 3A, 4A, 5A, 5D, 6A, 6D)), and forewings not reaching the posterior margin of the abdomen (Figs. 1A, 1D, 2A) (usually reaching it in *H. burmeisteri* (Figs. 3A, 4A, 5A, 5D, 6A)). Additionally, *H. burmeisteri* exhibits conspicuous whitish pruinosity around the eyes and on the pronotal collar, very short golden dorsal setae, and a strongly curved paramere with tapered apex and long apical setae (Figs. 3A, 4A, 5A, 5D, 6A, 6D), characters not observed in *H. bilineatus*.

Notes. The male specimen from Nayarit deposited in the NHMW bears a label that reads “Allotype Series *Hebrus bilineatus* ♂ Champ. J.T. Polhemus”. This specimen is not part of the type-series of the species, which includes only the female holotype.

Distribution. Mexico (Champion 1898; Benjamin 1979; Zettel et al. 2023; present study) (Fig. 22).

The record from Florida, United States (Blatchley 1926) actually corresponds to *H. buenoi* Drake & Harris, 1943 (Chapman 1958). Drake and Harris (1943) briefly mentioned the occurrence of *H. bilineatus* in Panama in their introduction, but did not include it in the discussion about the species itself. The occurrence in Panama was not repeated by Drake & Chapman (1958) and seems to be just an error. It was repeated by Froeschner (1999) and Tuñón et al. (2015).

Distribution in Mexico. Chiapas (Benjamin 1979), Jalisco (present study), Mexico D.F. (Champion 1898; Zettel et al. 2023; present study), Nayarit, Veracruz (present study) (Fig. 22).

***Hebrus burmeisteri* Lethierry & Severin, 1896**

Hebrus pusillus Burmeister, 1835: 214 (in part, nee Fallen).

Hebrus burmeisteri Lethierry & Severin, 1896: 51 (replacement name).

Naeogeus burmeisteri: Kirkaldy (1900): 241 (new combination).

Hebrus burmeisteri: Harris (1942): 124 (original combination).

Figs. 3, 4, 5, 6, 22A, 23

Material examined. UNITED STATES – **Nova York** • [Thompkins]; Ithaca; [42.45 -76.38]; 22.VI.1917; H. B. Hungerford leg.; 1 macropterous ♂ SEMC. – **Michigan**; 1 macropterous ♂ SEMC.

Type material examined. Holotype (Fig. 3). UNITED STATES – **Pennsylvania** • Cers. Nv.; 3414; E. Ramirez leg.; 1 macropterous ♂ (MFN e4c60) • **Paratypes** same data holotype; 1 macropterous ♂ (MFN 3d58e) (Fig. 4), 4 macropterous ♀ (MFN 32670f; MNF 185292; MFN b8b013; MFN cca2cc) (Fig. 5).

Redescription

Macropterous males. Non-type. BL 1.85–2.03; HL 0.32–0.38; HW 0.42–0.46; EYE 0.10–0.11; IOW 0.23; ANT I 0.20–0.22; ANT II 0.14; ANT III 0.18; ANT IV 0.34; AWP 0.55–0.59; HWP 0.80–0.89; PL 0.40–0.44; MESW 0.36–0.38; MESL 0.05–0.06; METW 0.40–0.42; METL 0.18–0.20; FORELEG, FEM 0.42–0.44, TIB 0.40, TAR I 0.02, TAR II 0.13–0.15; MIDLEG, FEM 0.42–0.50, TIB 0.40–0.43, TAR I 0.02, TAR II 0.12–0.15; HINDLEG, FEM 0.56–0.58, TIB 0.60–0.63, TAR I 0.02, TAR II 0.13–0.15.

General color reddish-brown to dark brown, except the base of the ocellus, the eyes, and a collar of grayish dots. Pronotum reddish-brown, with dark brown areas concentrated mainly in the anterior lobe. Mesoscutellum and metanotal elevation dark brown, contrasting with the pronotum; margins of metanotal elevation, and forewing veins dark brown. Thoracic pleurae are dark. Forewings: light brown; veins darker at base; corium with large white macula for about half of length; clavus with a large white macula half surpassing of metanotal elevation;

membrane with several maculae — exhibiting oblique whitish spots near the apex of the veins and a longitudinal, one rounded on center, (Figs. 3A, 4A); some membrane maculae more evident than others. Legs are dark yellow (Figs. 3B, 4B).

Vertex of head, posterior lobe of pronotum; mesonotum, metanotal elevation, corium, and clavus of forewings with very short golden setae. Legs and abdomen with dense and moderately long yellowish setae. Tegument with whitish pruinosity bordering the eyes and the collar of punctations.

Head wider than long; width through eyes approximately 1.2 times its length; interocular width about 2 times eye width; with a well-marked median furrow. Bucculae elongated, straight, with apex slightly pointed inwards (Fig. 6C). Antennomere I cylindrical, slightly curved; antennomere II cylindrical; width of antennomeres III–IV approximately half of antennomere I. Antennal formula: $IV > I > III > II$. Pronotum with a transverse row of small and moderately deep punctations on collar; a deep median furrow extending longitudinally from collar to the posterior margin, emarginated by two parallel elevated carinae; anterior lobe with two large and deep punctations in the median region, and a central, bigger and deep punctation between lobes, lateral regions with minute black denticles; posterior lobe with a row of small punctations adjacent to posterior margin, continuing laterally close to humeri, and many shallow punctations on disc; humeri elevated (Fig. 3A). Mesoscutellum 6.3 times wider than long. Metanotal elevation trapezoidal, about 2.1 times wider than long; disc with raised margins and two submedian depressions divided by a straight median carina; apex rounded, with a small median notch (Fig. 6A, 6C). Forewings reach the posterior margin of abdomen. Paramere strongly curved, apex tapered, with long apical setae (Fig. 22A).

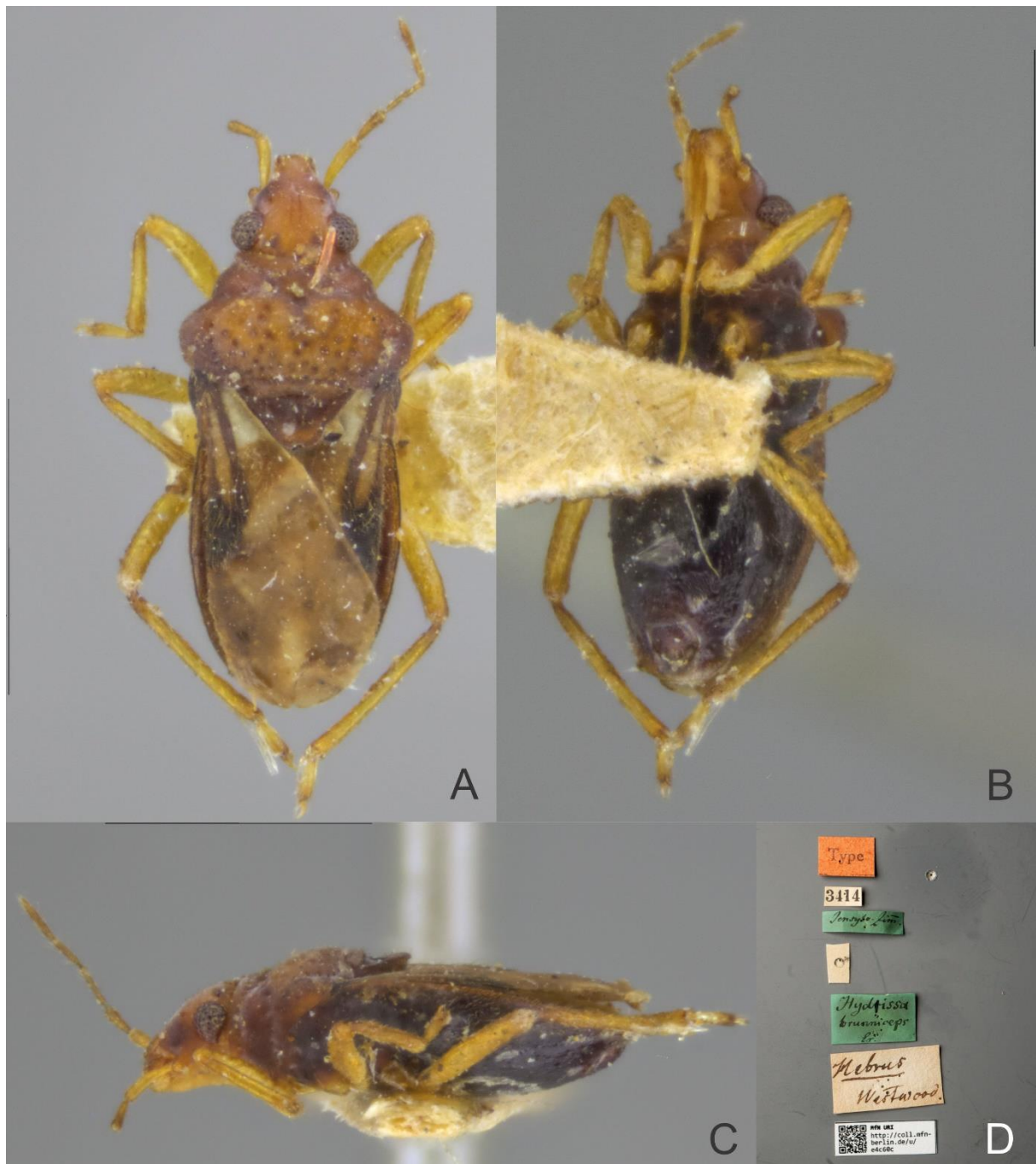


Figure 80. *Hebrus burmeisteri*. macropterous male, holotype. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Habitus, lateral view. **D.** labels. Scale bars: 1.0 mm.



Figure 81. *Hebrus burmeisteri*. macropterous male, paratype. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Habitus, lateral view. **D.** labels. Scale bars: 1.0 mm.

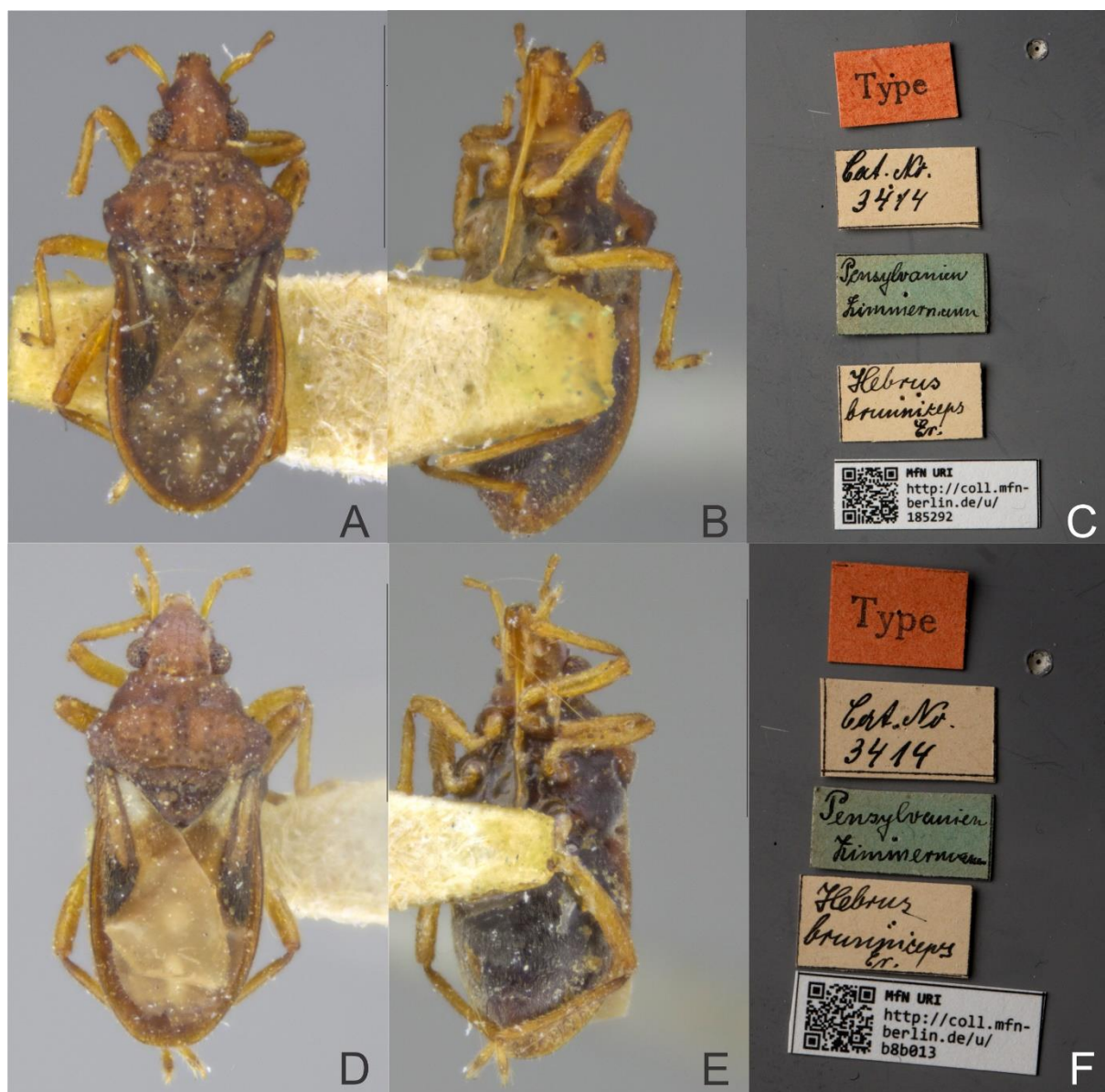


Figure 82. *Hebrus burmeisteri*. macropterous females, paratype. A, D. Habitus, dorsal view. B, E. Habitus, ventral view. C, F. labels. Scale bars: 1.0 mm.

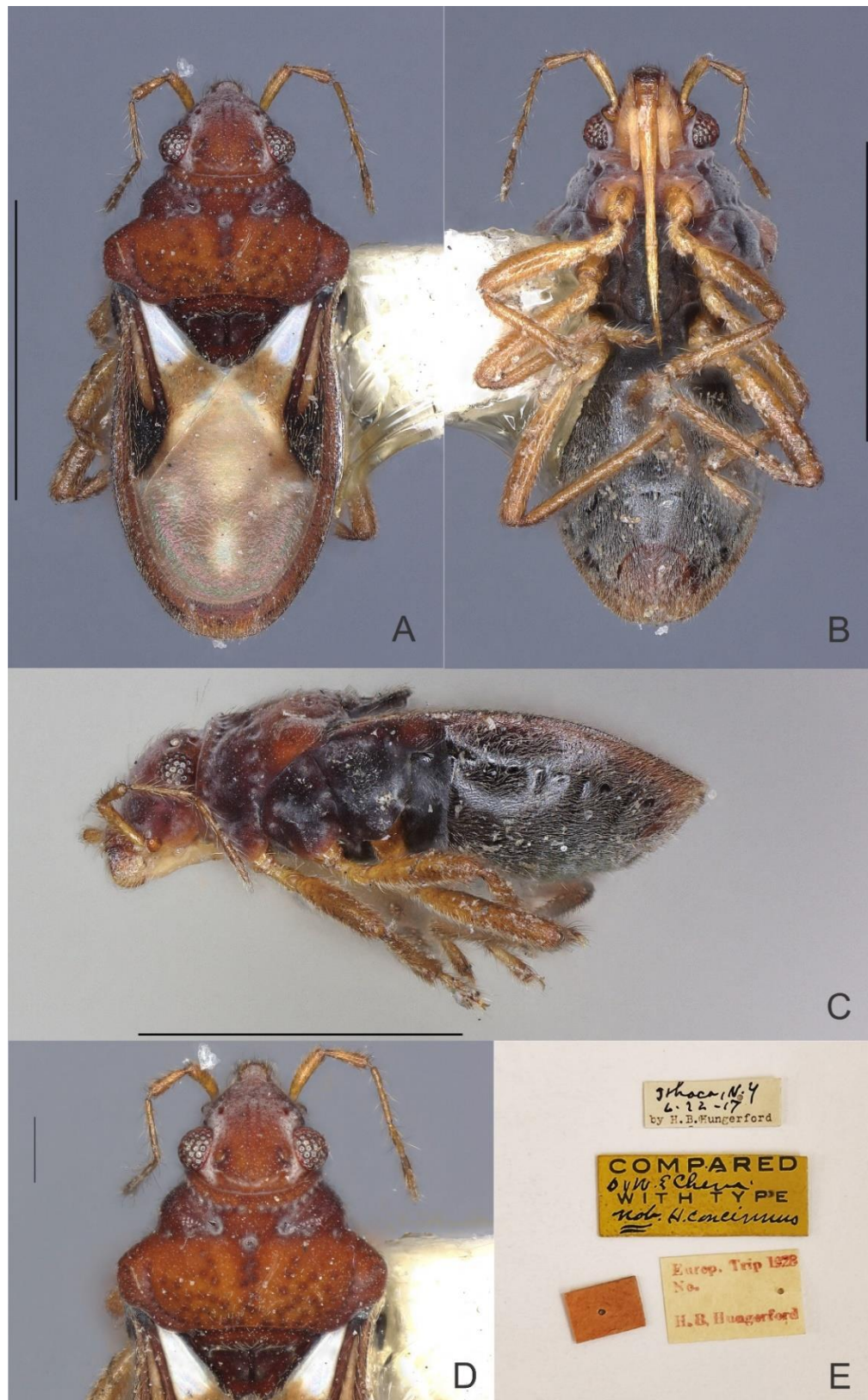


Figure 83. *Hebrus burmeisteri*. macropterous female, non-type. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Habitus, lateral view. **D.** Head, thorax, and part of abdomen, dorsal view. **E.** labels. Scale bars: 1.0 mm (A–C), 0.2 mm. (D).

Macropterous female similar to the male, but with forewings not covering the entire abdomen.

Diagnosis.

BL ~ 1.85–2.03, with general coloration reddish-brown to dark brown (Figs. 3A, 4A, 5A, 5D, 6A). Pronotum lighter, with dark areas mainly concentrated on the anterior lobe; mesoscutellum and metanotal elevation darker, contrasting with the pronotum (Figs. 3A, 4A, 5A, 5D, 6A, 6D). Forewings light brown, with a large white macula on the corium, a broad white macula on the clavus, and several whitish maculae on the membrane (Figs. 3A, 4A, 5A, 5D, 6A). Tegument with whitish pruinosity around the eyes and on the pronotal collar; very short golden setae on the dorsum and longer yellowish setae on the legs and abdomen (Figs. 3B, 4B, 5B, 5E, 6B). Pronotum with a deep median furrow bordered by two carinae, anterior lobe with deep punctations, and humeri elevated. Metanotal elevation trapezoidal, about twice as wide as long, with a straight median carina, two submedian depressions, and a rounded apex with a small median notch. Paramere strongly curved, with a tapered apex and long apical setae (Fig. 22A).

Discussion.

Comparative characters of *H. burmeisteri* are discussed under *H. bilineatus*.

Distribution. Canada (Chagnon & Fournier 1948), United States (Lethierry & Severin 1896), Mexico (Drake & Chapman 1958; present study).

Distribution in Mexico. Mexico (Drake & Chapman 1958; present study) (Fig. 23).

***Hebrus concinnus* Uhler, 1894**

Hebrus concinnus Uhler, 1894a: 221 (original description).

Naeogeus concinnus: Kirkaldy (1900): 241 (new combination).

Hebrus concinnus: Harris (1942): 124 (original combination).

Figs. 7, 23

Material examined. MEXICO – **Chiapas** • Bonampak; [16.70, -91.07]; 20.V.1984; A. Ibaria leg.; 2 macropterous ♀, UNAM • Palenque; [17.48, -92.05]; 19.V.1984; A. Ibaria leg.; 1 macropterous ♀ [broken], UNAM.

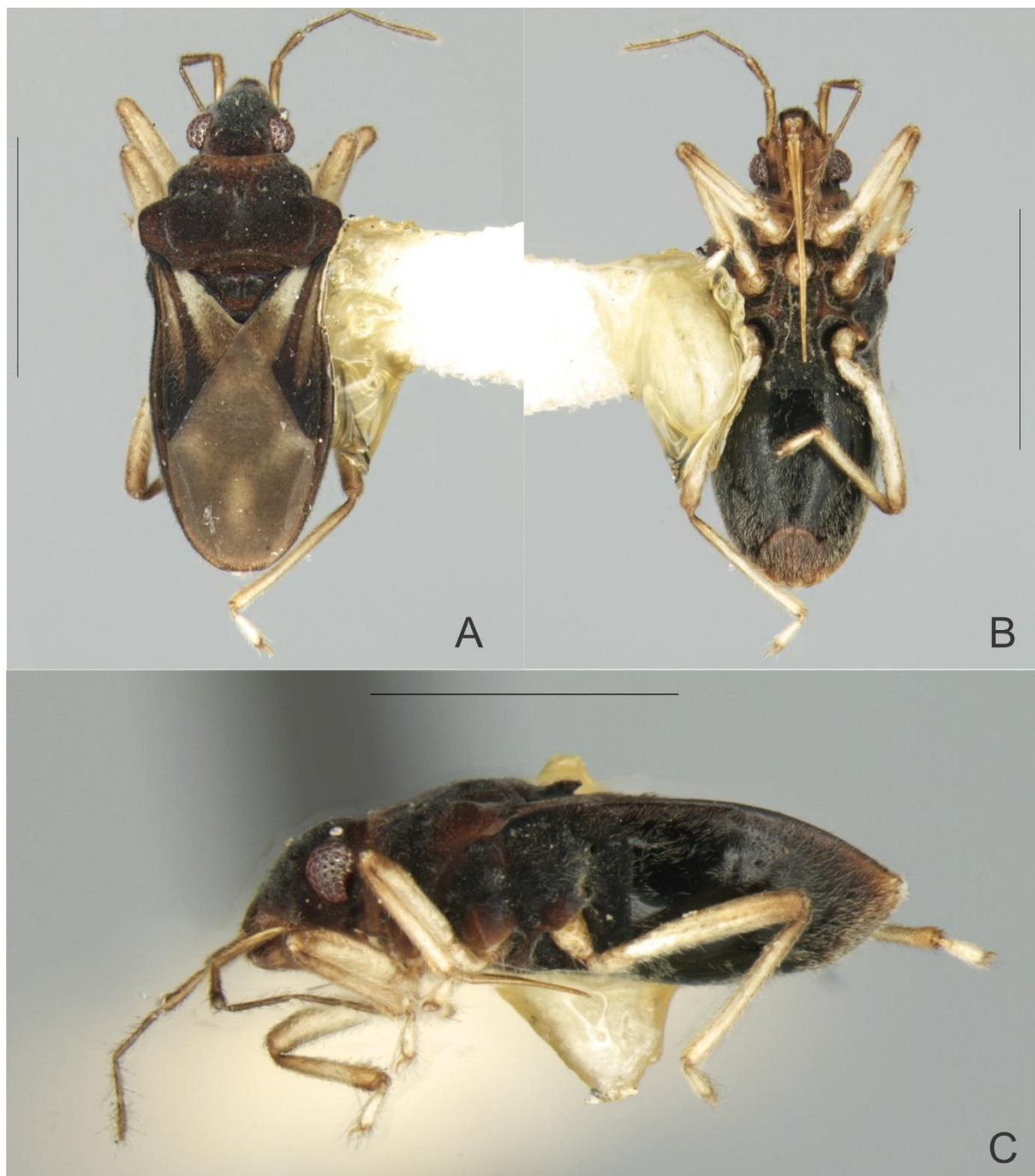


Figure 84. *Hebrus concinnus*. macropterous female, **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Habitus, lateral view. Scale bars: 1.0 mm.

Diagnosis. BL ~1.8–2.2; general color light brown, with yellowish setae on dorsum of body; forewings with pair of small whitish maculae on clavus and three narrow maculae on membrane; metanotal elevation with median carina, apex not notched; male and female abdomen without distinct modifications (Fig. 7A); paramere curved at apex, sickle-shaped (Franco et al. (*in prep.*)).

Discussion.

For a detailed treatment of this species, see Franco et al. (*in prep.*) review of the *Hebrus* of Central America and part of South America.

Distribution. Canada (Kirkaldy & Torre-Bueno 1909), Colombia (Franco et al. *in prep.*), Costa Rica (Drake & Harris 1943), Cuba (Ragués 1910), Curaçao (Drake & Cobben 1960), Grenada (Uhler 1894a), Guatemala (Champion 1898), Mexico (Drake & Harris 1943; present study), Panama (Champion 1898), Peru (Drake & Harris 1943), United States (Uhler 1894a).

Records from California and Washington states (Uhler 1894a; repeated by other authors) may have been based on misidentifications (Menke 1979; Henry & Froeschner 1988). Specimens examined by Hungerford (1918) were later identified as *H. burmeisteri* Lethierry & Severin, 1896 (Hungerford & Beamer 1925; Porter 1950).

Distribution in Mexico. Chiapas (present study) (Fig. 23).

Drake & Harris (1943) provided no details for their record from Mexico.

Hebrus consolidus Uhler, 1894

Fig. 23

Hebrus consolidus Uhler, 1894a: 222 (original description).

Naeogeus consolidus: Kirkaldy (1900): 241 (new combination).

Hebrus consolidus: Harris (1942): 124 (original combination).

Diagnosis. BL ~1.7–1.9; general color reddish-brown, with yellowish setae on dorsum of body; forewings with pair of large white maculae on clavus and four irregular maculae on membrane; metanotal elevation with median carina, weakly notched at apex; male and female abdomen without distinct modifications; paramere tapered at apex, sickle-shaped (Franco et al. (*in prep.*)).

For a detailed treatment of this species, see Franco et al. (*in prep.*) review of the *Hebrus* of Central America and part of South America.

Distribution. Colombia (Franco et al. (in prep.)), Costa Rica (Drake & Harris 1943), Cuba (Alayo 1967), Curaçao (Drake & Cobben 1960), Grenada (Uhler 1894a), Guatemala (Champion 1898), Honduras (Porter 1950), Jamaica (Drake & Harris 1943), Mexico (Porter 1950; Drake & Chapman 1953), Panama (Champion 1898), Puerto Rico (Porter 1950), United States (Barber 1914), Trinidad & Tobago (Drake & Chapman 1953).

The record from Kansas (Hungerford & Beamer 1925) refers to *H. burmeisteri* (Drake & Harris 1943). The only record from Texas (Clark 1973) needs verification.

Distribution in Mexico. Morelos (Porter 1950), Oaxaca, Veracruz (Drake & Chapman 1953) (Fig. 23).

***Hebrus hirsutus* Champion, 1898**

Hebrus hirsutus Champion, 1898: 119 (original description).

Naeogeus hirsutus: Kirkaldy (1900): 241 (new combination).

Hebrus hirsutus: Harris (1942): 124 (original combination).

Figs. 8, 9, 10, 23

Type material examined. Holotype. MEXICO – Sinaloa • La Noria; [23.51, –106.31]; 1 macropterous ♀; Höge leg.; NHMUK 016033305.

Additional material examined. MEXICO – Guerrero • 40 miles North of Acapulco; [17.32, –99.48]; 26.IV.1964; J.T. Polhemus & M.S. Polhemus; 2 macropterous ♂, 2 macropterous ♀, NMNH.

Redescription

Macropterous females (Fig. 8). **Holotype (non-types).** BL 2.14 (2.02–2.05); HL 0.45 (0.33–0.35); HW 0.50 (0.45–0.46); EYE 0.12 (0.11); IOW 0.29 (0.25); ANT I 0.21 (0.25); ANT II 0.17 (0.15); ANT III lost (0.27); ANT IV lost (0.35–37); AWP 0.57 (0.55–0.60); HWP 0.87 (0.87–0.90); PL 0.42 (0.43); MESW 0.32 (0.35); MESL 0.07 (0.05–0.06); METW 0.36 (0.35); METL 0.16 (0.17–0.18); FORELEG glued, FEM (0.45), TIB (0.45), TAR I (0.02), TAR II

(0.12); MIDLEG glued, FEM (0.50), TIB (0.45–0.47), TAR I (0.02), TAR II (0.13); HINDLEG, FEM 0.45 (0.62), TIB 0.72 (0.65), TAR I 0.03 (0.02), TAR II 0.14 (0.13–0.15).

General color light brown, except base of ocellus, eyes, margins of metanotal elevation, and forewing veins dark brown. Forewings: light brown; veins darker at base; corium with large white macula for about half of length; clavus with a large white macula slightly surpassing apex of metanotal elevation; membrane with several maculae — one with approximate inverted V-shape at base, a lateral oblique adjacent to apex of veins, one rounded on center, a submedian irregular pair, and one elongated closer to apex (Figs. 8A, 10A); some membrane maculae more evident than others. Legs light yellow.

Dorsal integument with very long, erect dark setae, thinner and longer on forewing veins and abdomen (Figs. 8A, 10A). Legs with dense, decumbent, light brown setae of moderate length interspersed with many erect setae, especially on tibiae.

Head wider than long; width across eyes approximately 1.3 times length; interocular width 2.2 times eye width. Buccula elongated, slightly curved (Figs. 8C, 10C). Antennomere I cylindrical, slightly curved; antennomere II cylindrical; antennomeres III–IV nearly half as wide as antennomere I. Pronotum with a transverse row of small, moderately deep punctations on collar and a transverse row of eight deep punctations between lobes; two most central punctations in row between lobes placed close together, but distinguishable; posterior lobe with a pair of submedian rows of deep, dark punctations; a row of small punctations adjacent to posterior margin, continuing laterally near humeri, and smaller, more irregular punctations on disc; humeri elevated (Figs. 8A, 10A). Mesoscutellum 5.8 times wider than long. Metanotal elevation trapezoidal, 1.9 times wider than long; disc with raised margins and two submedian depressions separated by a median carina; apex rounded, with a subquadrate median notch (Figs. 8A, 10A). Forewings exposing narrow lateral margins of abdominal laterotergites, almost reaching or reaching posterior margin of the abdomen.

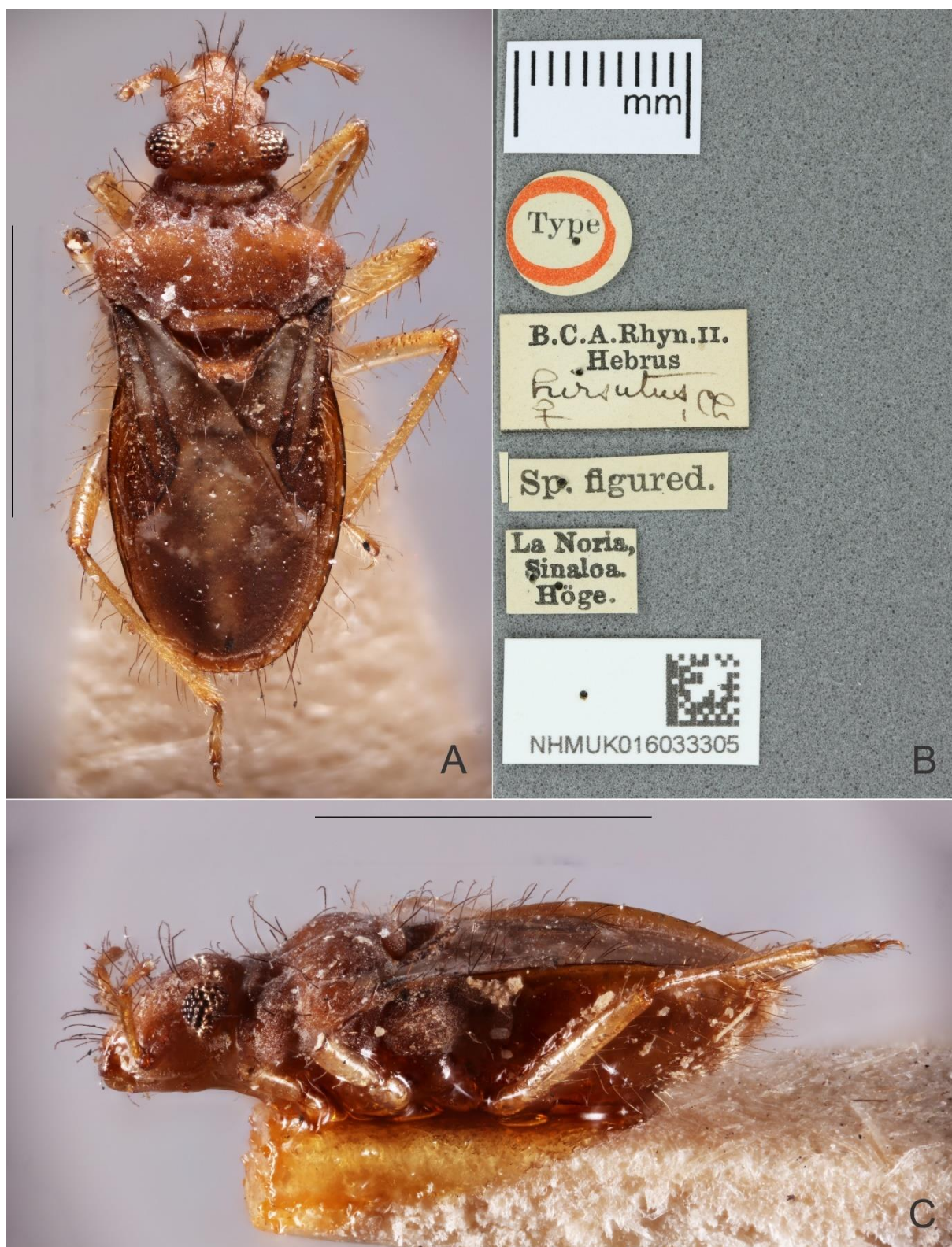


Figure 85. *Hebrus hirsutus*, macropterous female, holotype (NHMUK 016033305), habitus. **A.** Dorsal view. **B.** Labels. **C.** Lateral view. Scale bars: 1.0 mm.



Figure 86. *Hebrus hirsutus*, Macropterous female, habitus. **A.** Dorsal view. **B.** Ventral view. **C.** Lateral view. **D.** labels. Scale bars: 1.0 mm.

Macropterous male (Fig. 10). BL 1.82–1.85; HL 0.30–0.31; HW 0.45; EYE 0.10; IOW 0.22; ANT I 0.25; ANT II 0.15; ANT III 0.27–0.30; ANT IV 0.35; AWP 0.52–0.55; HWP 0.80; PL 0.38–0.40; MESW 0.35–0.37; MESL 0.05–0.06; METW 0.35–0.37; METL 0.15–0.16; FORELEG, FEM 0.40–0.42, TIB 0.40–0.43, TAR I 0.02, TAR II 0.12; HINDLEG, FEM 0.47, TIB 0.45, TAR I 0.02, TAR II 0.12–0.13; HINDLEG, FEM 0.60, TIB 0.60, TAR I 0.02, TAR II 0.13.

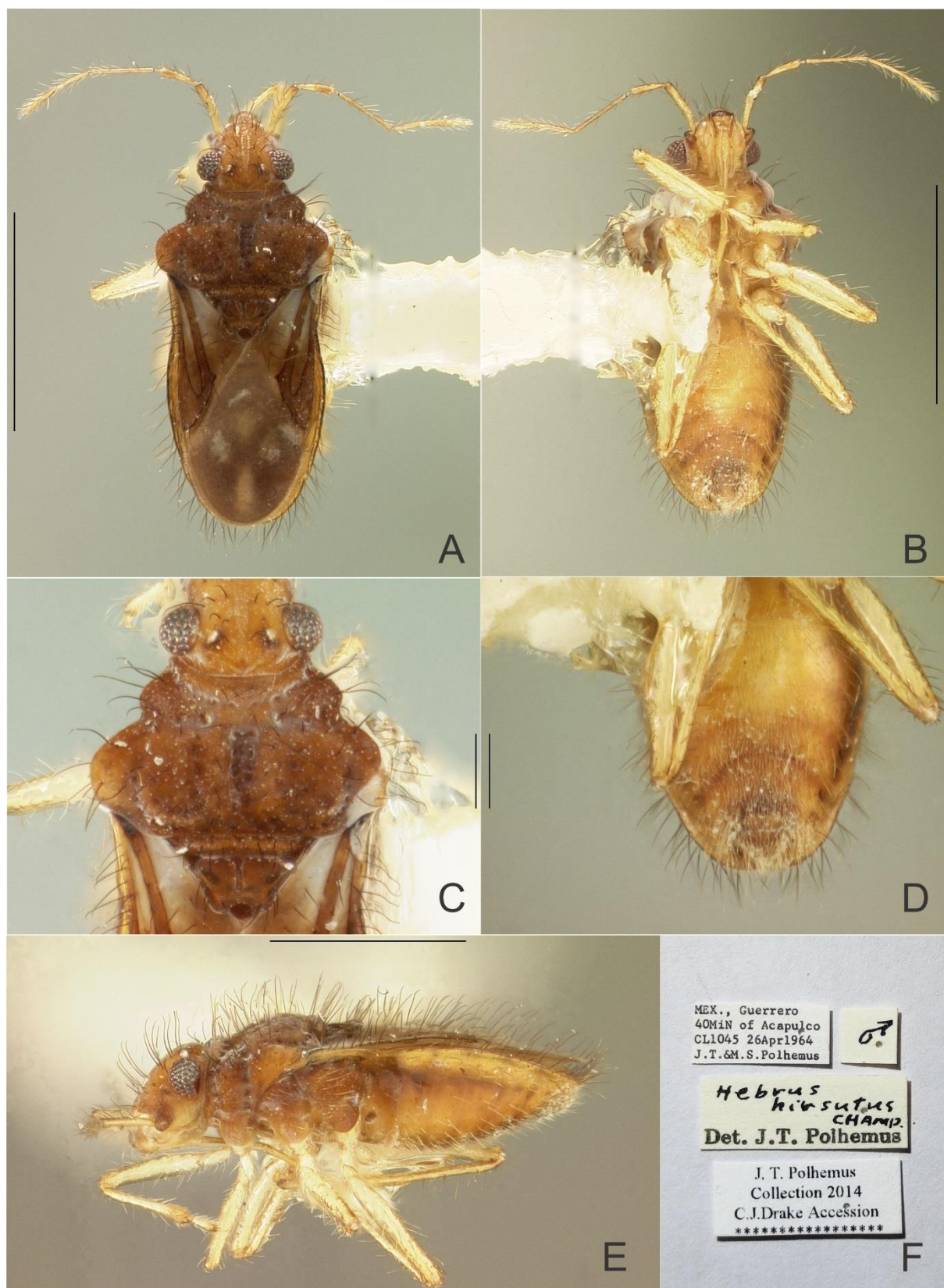


Figure 87. *Hebrus hirsutus*, macropterous male. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Head, thorax, and part of abdomen, dorsal view. **D.** Apex of abdomen, ventral view. **E.** Habitus, lateral view. **F.** labels. Scale bars: 1.0 mm (A–B, E), 0.2 mm. (C, D).

Similar to macropterous female but darker and smaller.

Diagnosis. BL ~1.8–2.2; general color light brown, dorsum with very long, erect dark setae (Figs. 8A, 9A, 10A); corium and clavus each with a large white macula, membrane with several maculae, some more evident than others (Figs. 8A, 9A, 10A); metanotal elevation with median carina, apex with subquadrate median notch (Figs. 8A, 9A, 10A, 10C); male and female abdomen without distinct modifications.

Discussion.

Hebrus hirsutus and *H. sobrinus* share the general morphology typical of *Hebrus*, including macropterous males and females, pronotum with a transverse row of eight deep punctations between lobes, elevated humeri, trapezoidal metanotal elevation with a median carina and two submedian depressions, and forewings exposing narrow lateral margins of the abdominal laterotergites (Figs. 8A, 10A; 16A, 17A, 18A). Both species also present whitish maculae on the forewings and a medially notched apex of the metanotal elevation (Figs. 8A, 10A; 16C, 17C, 18E). *Hebrus hirsutus* differs from *H. sobrinus* by its lighter general coloration and by the dorsum densely covered with very long, erect, dark setae, especially on forewing veins and abdomen (Figs. 8A, 10A), whereas *H. sobrinus* has short, golden, decumbent setae dorsally (Figs. 16A, 17A, 18A). In addition, *H. hirsutus* presents large whitish maculae on both corium and clavus, and several conspicuous maculae on the membrane, including an inverted V-shaped basal macula (Figs. 8A, 10A), while *H. sobrinus* has a basal whitish macula on the clavus reaching about half of the metanotal elevation and only three small, faint whitish maculae on the membrane (Figs. 16A, 17A, 18A, 18B). The apex of the metanotal elevation is subquadrately notched in *H. hirsutus* (Figs. 8A, 10A) and rounded and moderately deep in *H. sobrinus* (Figs. 16C, 17C, 18E). Furthermore, males of *H. sobrinus* have large terminalia with lateral tufts of long setae and a robust paramere with rounded apex (Figs. 16B, 17B, 18C, 22D), whereas males and females of *H. hirsutus* lack conspicuous abdominal or genital modifications (Figs. 8A, 9A, 10A).

Distribution. Mexico (Champion 1898).

Distribution in Mexico. Guerrero (present study), Sinaloa (Champion 1898; present study) (Fig. 23).

***Hebrus lacunatus* Drake & Chapman, 1958**

Hebrus lacunatus Drake & Chapman, 1958: 322 (original description).

Figs. 11, 22B, 23

Type material examined. Holotype. MEXICO – **San Luis Potosí** • Ciudad Valles, [small, deep, stagnant pool near a river]; [22.0, –99.0]; 08.VIII.1950; C.J. Drake leg.; 1 macropterous ♂ and 1 slide, NMNH. **Paratype.** MEXICO – **Tamaulipas** • Tampico, [small drainage ditch]; [22.3, –97.9]; 16.VII.1950; C.J. Drake leg.; 1 ♂ [wings broken off], NMNH.

Redescription

Macropterous male. Holotype (Paratype). BL 1.90 (1.72); HL 0.27 (0.27); HW 0.41 (0.40); EYE 0.10 (0.10); IOW 0.21 (0.20); OL 0.12 (0.12); ANT I 0.16 (0.17); ANT II 0.12 (0.13); ANT III 0.20 (0.18); ANT IV 0.30 (0.27); AWP 0.50 (0.50); HWP 0.80 (0.72); PL 0.40 (0.35); MESW 0.35 (0.35); MESL 0.05 (0.05); METW 0.37 (0.40); METL 0.15 (0.16); FORELEG, FEM 0.40 (0.41), TIB 0.37 (lost), TAR I 0.02 (lost), TAR II 0.10 (lost); MIDLEG, FEM 0.40 (0.42), TIB 0.37 (lost), TAR I 0.02 (lost), TAR II 0.10 (lost); HINDLEG, FEM 0.52 (0.52), TIB 0.55 (0.52), TAR I 0.02 (0.02), TAR II 0.12 (0.12).

General color brown, except apical region of head, sides of pronotum and median longitudinal furrow, metanotal elevation and veins of forewings dark brown; ventrites and abdomen dark brown to black; venter of head (bucculae and rostrum), antennomere I, prosternum and legs light brown to yellow; proximal fourth of clavus with a white small maculae; membrane of forewings with three faint whitish to yellow maculae on the apical half: two parallel transversal strips on the middle sides and a longitudinal central one at the apex (Fig. 11A).

Vertex of head, posterior lobe of pronotum; mesonotum, metanotal elevation, corium and clavus of forewings with very short golden setae. Legs and abdomen with dense and moderately long yellowish setae. Tegument with whitish pruinosity bordering the eyes and the lateral of thorax.

Head wider than long; width through eyes approximately 1.5 times its length; interocular width about 2 times eye width; with a well-marked median furrow. Bucculae elongated, straight, with apex slightly pointed inwards (Fig. 11C). Antennomere I cylindrical, slightly curved; antennomere II cylindrical; width of antennomeres III–IV approximately half of antennomere I. Antennal formula: $IV > III > I > II$. Pronotum with a transverse row of small and moderately deep punctations on collar; a deep median furrow extending longitudinally from collar to the posterior margin, emarginated by two parallel elevated carinae; anterior lobe with two large and deep punctations in the median region, and a central, bigger and deep punctation between lobes, lateral regions with minute black denticles; posterior lobe with a row of small punctations adjacent to posterior margin, continuing laterally close to humeri, and many shallow punctations on disc; humeri elevated (Fig. 11A, 11D). Mesoscutellum seven times wider than long. Metanotal elevation trapezoidal, about 2.5 times wider than long; disc with raised margins and two submedian depressions divided by a straight median carina; apex rounded, with a small median notch (Fig. 11A, 11D) [apex broken in the holotype]. Forewings reaches the posterior margin of abdomen.

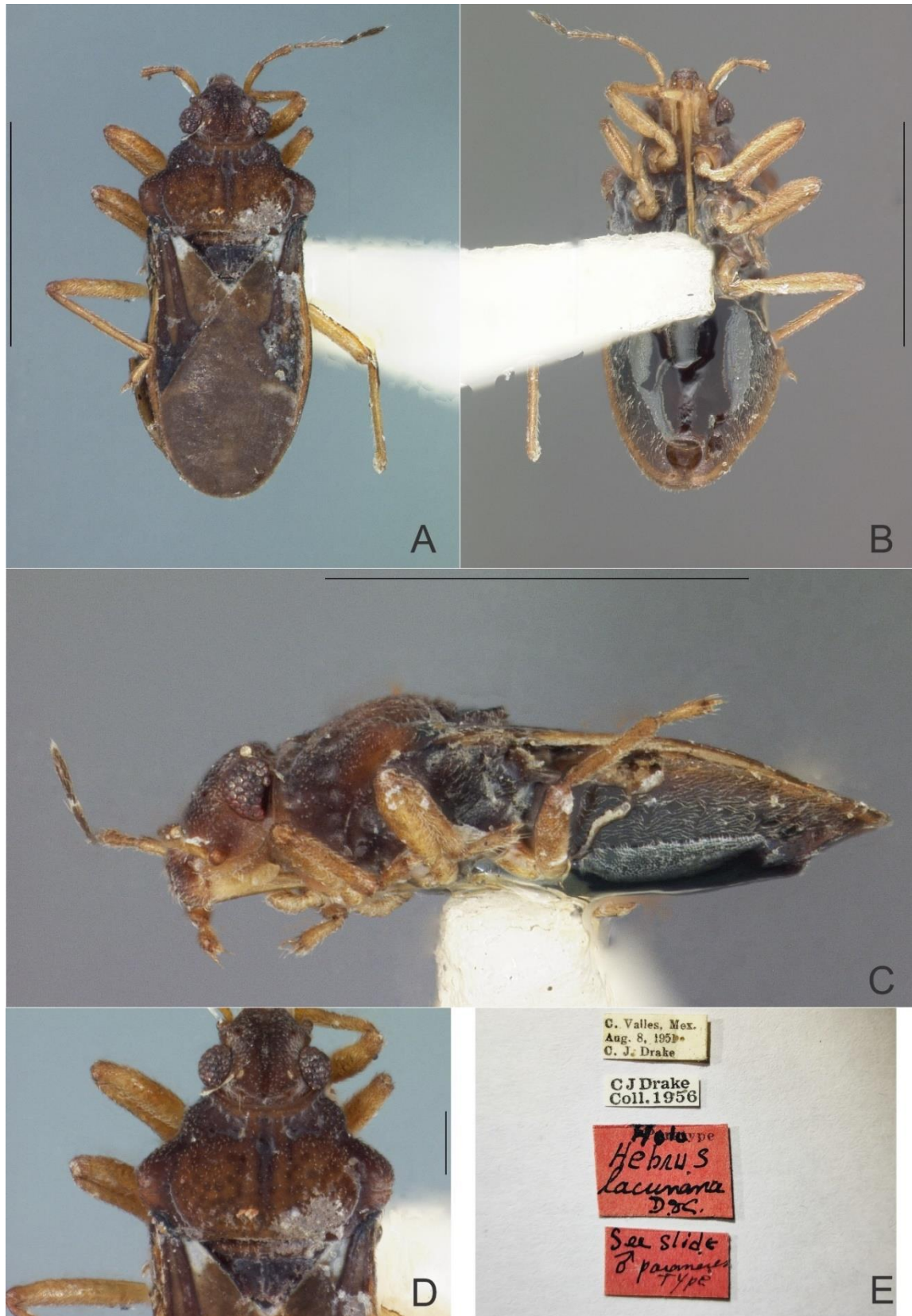


Figure 88. *Hebrus lacunatus*, macropterous male, holotype. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Habitus, lateral view. **D.** Head, thorax, and part of abdomen, dorsal view. **E.** label. Scale bars: 1.0 mm (**A, B, C**). 0.2 mm (**D**)

Diagnosis. BL ~1.7–1.90; general color brown to dark-brown (Fig. 11A); corium and clavus each with a short white macula, membrane with three whitish maculae (Fig. 11A); metanotal elevation with median carina, apex rounded, with a small median notch (Fig. 11A, 11C); male abdomen without distinct modifications; paramere curved (Fig. 22B).

Discussion.

Hebrus lacunatus, *H. nubilus*, and *H. usingeri* share the general morphology typical of the genus, including macropterous body, predominantly brown to dark-brown coloration, pronotum with a well-developed median longitudinal furrow, metanotal elevation trapezoidal with a median carina and apical notch, and male abdomen without evident modifications (Figs. 11A, 12A, 20A). *H. lacunatus* can be readily distinguished by its smaller size (BL ~1.7–1.9), the presence of three distinct whitish maculae on the apical half of the forewing membrane—two transverse and one longitudinal—and by the clavus bearing a small white macula restricted to the proximal fourth (Fig. 11A); additionally, the apical notch of the metanotal elevation is small and shallow (Figs. 11A, 11D). *H. nubilus* differs from the other two species by its larger body size (BL ~2.2–2.4), darker and more uniform dorsal coloration, reduced wing pattern with only a very small and faint basal macula on the clavus and a pair of weak maculae adjacent to the apex of the veins on the membrane, and by the relatively larger median apical notch of the metanotal elevation (Figs. 12A, 12D, 13A). *H. usingeri* is easily recognized by the presence of a tubercle on the hind femur of the male (Fig. 20B), a character absent in *H. lacunatus* and *H. nubilus*, as well as by the more contrasting wing pattern, with the basal white macula of the clavus almost reaching the apex of the metanotal elevation and three small white maculae on the membrane (Figs. 20A, 20D); in this species, the apical notch of the metanotal elevation is moderately deep and rounded, and the paramere is robust and slightly curved (Fig. 20E).

Distribution. MEXICO (Drake & Chapman 1958) (Fig. 23)

Distribution in Mexico. Tamaulipas, San Luis Potosí (Drake & Chapman 1958; present study)

***Hebrus major* Champion, 1898**

Hebrus sobrinus: Uhler (1894b): 288 (misidentification).

Hebrus major Champion, 1898: 118 (original description).

Naeogeus hirsutus: Kirkaldy (1900): 241 (new combination).

Hebrus hirsutus: Harris (1942): 124 (original combination).

Hebrus acapulcana Drake & Chapman, 1954: 152 (synonym by Drake & Chapman 1958: 322).

Fig. 24

Diagnosis. BL ~2.7–3.0; general color reddish-brown with dark-brown areas, dorsum with short golden setae; clavus with a white macula reaching about half of metanotal elevation, membrane with a pair of transversal maculae adjacent to apex of veins; metanotal elevation with median carina, apex with wide notch; male and female abdomen without distinct modifications (Franco et al. (in prep.)).

For a detailed treatment of this species, see Franco et al. (in prep.) review of the *Hebrus* of Central America and part of South America.

Note. *Hebrus major* probably represents a complex of species that waits for description (Stevens & Polhemus 2008).

Distribution. Colombia (Alvarez & Roldán-Pérez 1983), Costa Rica (Drake & Harris 1943), Mexico (Uhler 1894b), United States (Drake & Harris 1943).

The presence in California (Drake & Chapman 1958) needs verification (Menke 1979). Some of the material from Arizona (Drake & Harris 1943; Porter 1950) may be misidentified *H. longivillus* Polhemus & McKinnon, 1983 (Henry & Froeschner 1988).

Distribution in Mexico. Baja California Sur (Uhler 1894b; Porter 1950), Guerrero (Drake & Chapman 1954), Mexico (Drake & Harris 1943; Porter 1950), Mexico D.F. (Drake & Harris 1943; Porter 1950), Nuevo León (Cantú-A. et al. 2013), Sonora (Stevens & Polhemus 2008), Veracruz (Champion 1898; Zettel et al. 2023; Franco et al. in prep.) (Fig. 24).

***Hebrus nubilus* Drake & Harris, 1943**

Hebrus nubilus Drake & Harris, 1943: 56 (original description).

Hebrus nubilis: Drake & Chapman (1958): 325 (incorrect subsequent spelling).

Figs. 12, 13, 22C, 24

Type material examined. Holotype. MEXICO – **Mexico** • Temascaltepec, Real de Arriba; [19.04, –100.00]; 22.V.1933; H.E. Hinton & R.L. Usinger leg.; 1 macropterous ♂, CAS 7099.

Allotype (= paratype) and paratypes. MEXICO – **Mexico** • Same data as holotype; 1 macropterous specimen [undetermined sex], 2 macropterous ♀; CAS 8604784–8604786.

Redescription

Macropterous male (Fig. 12). **Holotype.** BL 2.28; HL 0.52; HW 0.45; EYE 0.11; IOW 0.22; ANT I lost; ANT II lost; ANT III lost; ANT IV lost; AWP 0.60; HWP 0.91; PL 0.50; MESW 0.36; MESL 0.06; METW 0.43; METL 0.16; FORELEG, FEM 0.55, TIB 0.50, TAR I 0.03, TAR II 0.13; MIDLEG, FEM 0.55, TIB 0.50, TAR I 0.02, TAR II 0.15; HINDLEG, FEM 0.68, TIB 0.70, TAR I 0.02, TAR II 0.23.

General color dark brown. Head apically and ventrally light brown to yellow. Labium yellow. Pronotum brown, with lateral areas and punctuations darker; collar yellowish-brown. Mesoscutellum brown. Metanotal elevation dark brown; apex lighter. Abdominal sterna dark brown to black; acetabula and legs light brown to yellow. Forewings: corium and clavus light brown; veins brown, darker at base and apex; clavus with a very small, faint white macula at base; membrane matte brown, with a pair of small, faint, transversal yellowish macula adjacent to apex of veins (Fig. 12A).

Vertex of head, pronotum, mesoscutellum, and metanotal elevation with short golden setae. Antenna densely covered with short, decumbent brown setae and many erected yellowish setae, mostly on antennomeres III and IV. Corium and clavus with moderately long, brownish to golden setae (Fig. 12A). Legs densely covered by moderately long yellowish setae. Abdomen with dense, long whitish to yellow setae. Tegument with whitish pruinosity on head vertex, anterior lobe of pronotum near collar, disc of metanotal elevation, and abdominal laterosternites (Fig. 12A, 12D).

Head longer than wide; length approximately 1.15 times width through eyes; interocular width two times eye width. Buccula elongated, straight, enlarged at rounded apex. Antennomere I cylindrical, slightly curved; antennomere II cylindrical; width of antennomeres III–IV approximately half of antennomere I. Antennal formula: IV > III > I > II. Pronotum with a transverse row of small, moderately deep punctations on collar; anterior lobe with an irregular

row of four large, deep punctations medially; a central, deep punctation between lobes merged with a deep longitudinal groove that extends to the middle of posterior lobe; posterior lobe with several moderately large punctations on apical half of disc, not extending to the humeri, and a row of punctations adjacent to posterior margin, continuing laterally close to humeri; humeri elevated (Fig. 12A, 12D). Mesoscutellum 6 times wider than long. Metanotal elevation trapezoidal, about 2.7 times wider than long; disc with raised margins and two submedian depressions divided by a median carina; apex with a moderately large median notch (Fig. 12A, 12D). Forewings exposing narrow lateral margins of abdominal laterotergites, reaching posterior margin of abdomen. Paramere curved, shaped approximately like a closed fist in lateral view (Fig. 22C).

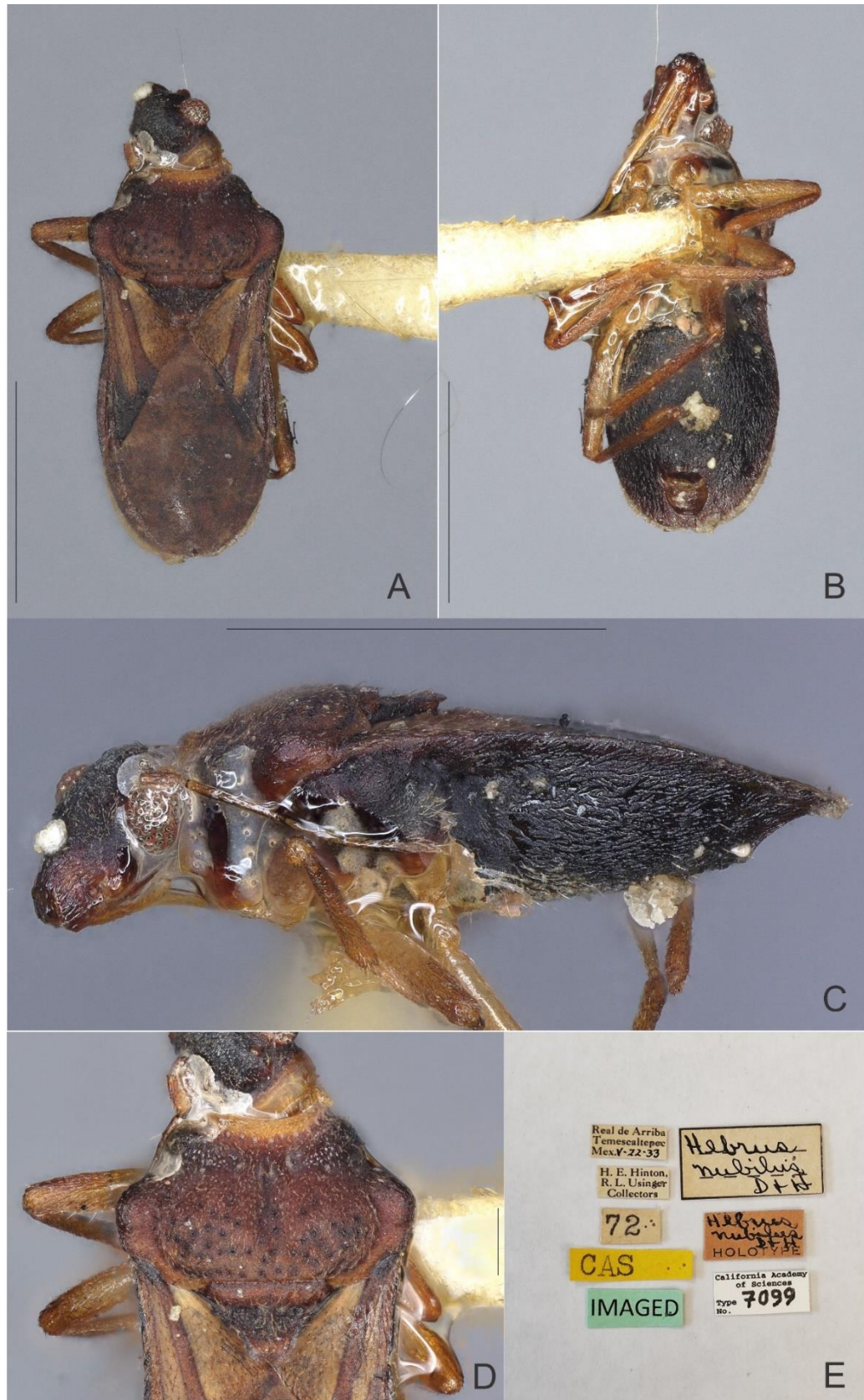


Figure 89. *Hebrus nubilus*. macropterous male, holotype. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Habitus, lateral view. **D.** Head, thorax, and part of abdomen, dorsal view. **E.** labels. Scale bars: 1.0 mm (**A**, **B**, **C**). 0.2 mm (**D**).

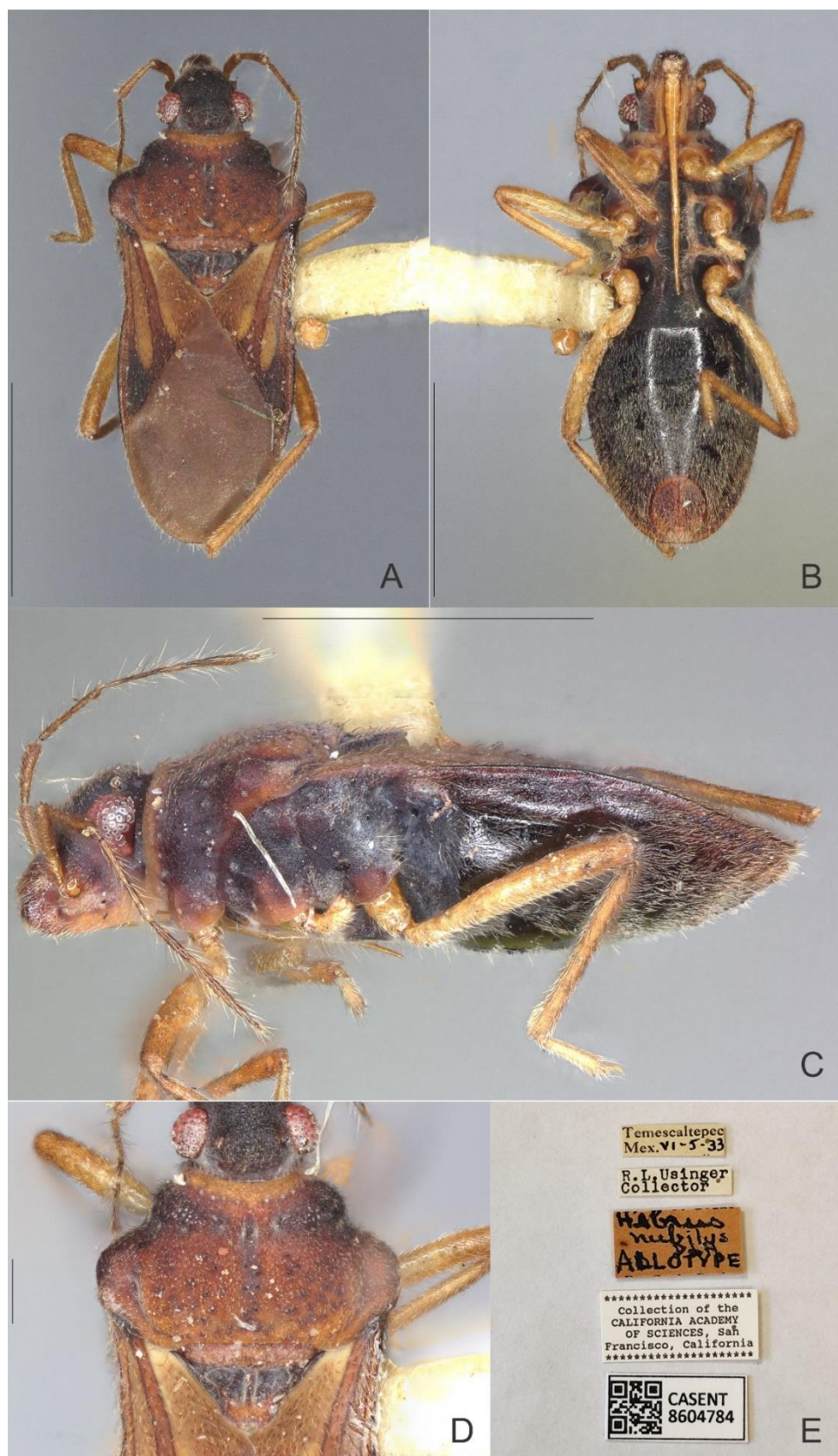


Figure 90. *Hebrus nubilus*. macropterous female, allotype. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Habitus, lateral view. **D.** Head, thorax, and part of abdomen, dorsal view. **E.** labels. Scale bars: 1.0 mm (**A, B, C**). 0.2 mm (**D**).

Macropterous female (Fig. 13). **Paratypes.** BL 2.30–2.37; HL 0.48–0.50; HW 0.45–0.47; EYE 0.10–0.11; IOW 0.22; OL 0.15–0.17; ANT I 0.25; ANT II 0.17; ANT III 0.25–0.27; ANT IV 0.42–0.45; AWP 0.57–0.60; HWP 0.91–0.95; PL 0.50; MESW 0.41–0.42; MESL 0.06–0.07; METW 0.46–0.47; METL 0.17–0.18; FORELEG, FEM 0.52–0.53, TIB 0.50, TAR I 0.02, TAR II 0.12–0.15; MIDLEG, FEM 0.51–0.52, TIB 0.50, TAR I 0.02, TAR II 0.13–0.15; HINDLEG, FEM 0.70, TIB 0.70–0.72, TAR I 0.02–0.03, TAR II 0.20–0.22.

Similar to macropterous male but slightly larger.

Diagnosis. BL ~2.2–2.4; general color dark brown, contrasting with lighter collar, dorsum with short golden setae (Figs. 12A, 13A); clavus with a very small faint basal white macula, membrane with a pair or faint macular adjacent to apex of veins (Figs. 12A, 13A); metanotal elevation with median carina, apex with moderately large median notch (Figs. 12A, 12D, 13A); male and female abdomen without distinct modifications.

Discussion.

Comparative characters of *H. nubilus*, *H. lacunatus*, and *H. usingeri* are discussed under *H. lacunatus*.

Distribution. Mexico (Drake & Harris 1943).

Distribution in Mexico. Mexico (Drake & Harris 1943; Porter 1950; present study) (Fig. 24).

***Hebrus pudoris* Drake & Harris, 1943**

Hebrus pudoris Drake & Harris, 1943: 56 (original description).

Figs. 14, 15, 24

Material examined. MEXICO – **Michoacán** • Morelia, Km 26; [19.7, –101.2]; 2100 m a.s.l.; 25.V.1972; J. Ribes leg.; 1 macropterous ♂, 1 macropterous ♀, CEIOC 82123 – **Puebla** • Popocatepetl; [19.02, –98.63]; 4100 m a.s.l.; 20.V.1972; J. Ribes leg.; 1 macropterous ♂, 3 macropterous ♀, CEIOC 82124.



Figure 91. *Hebrus pudoris*. macropterous male. **A.** Habitus, dorsal view. **B.** Habitus, latero-ventral view. **C.** Habitus, lateral view. Scale bars: 1.0 mm.

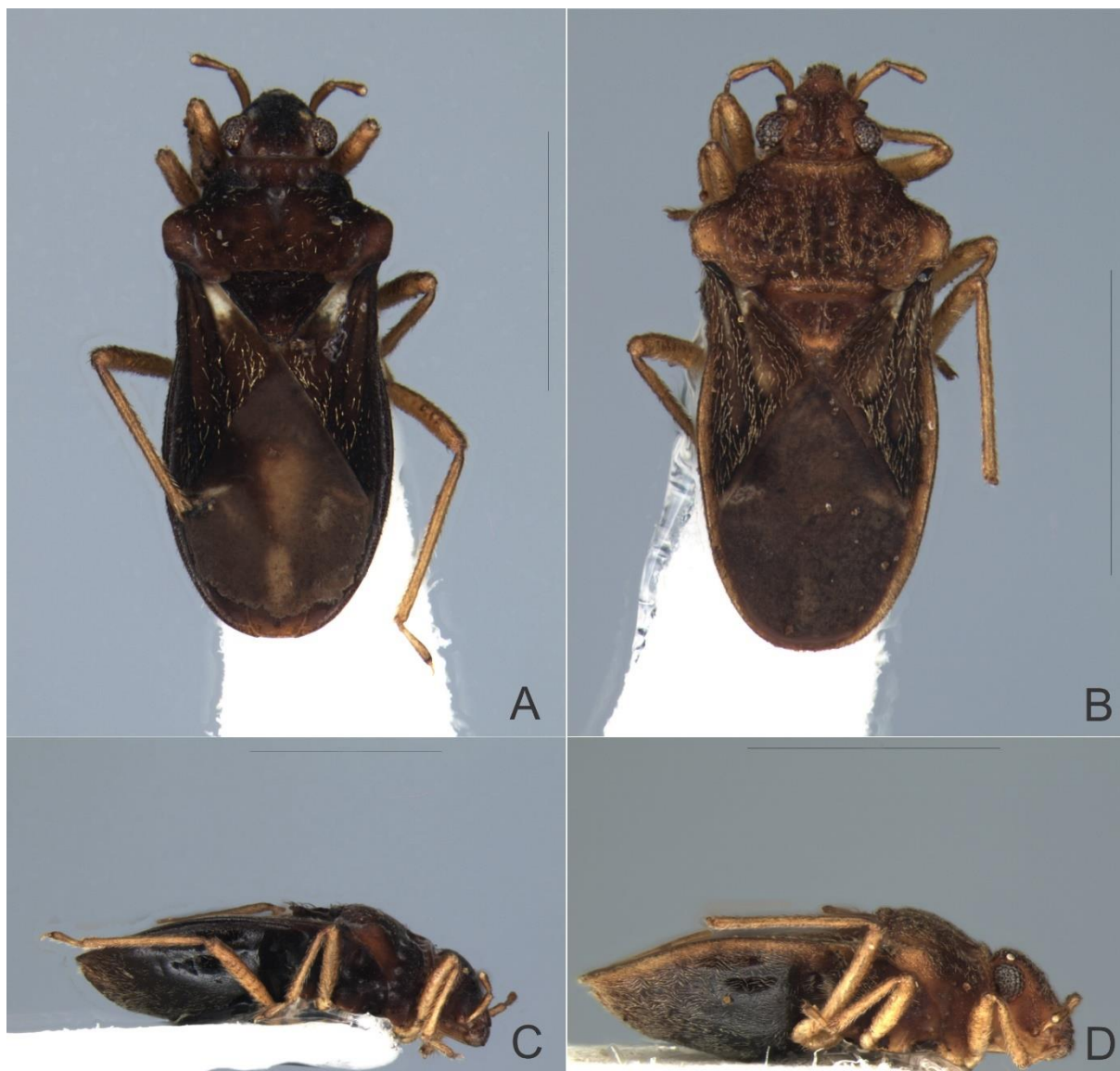


Figure 92. *Hebrus pudoris*. macropterous female, **A, B.** Habitus, dorsal view. **C, D.** Habitus, lateral view. Scale bars: 1.0 mm.

Diagnosis. BL ~1.8–2.0; general color light brown, dorsum with golden setae (Figs. 14A, 15A, 15B); clavus with small white macula at base, membrane with three yellowish maculae; metanotal elevation with median carina (Figs. 14A, 15A, 15B), apex with rounded median notch; male and female abdomen without distinct modifications (14B). The structure of the head and pronotum are also characteristic in this species (Franco *et al.* (in prep.)).

For a detailed treatment of this species, see Franco *et al.* (in prep.) review of the *Hebrus* of Central America and part of South America.

Distribution. Costa Rica (Porter 1950), Mexico (Drake & Harris 1943).

Distribution in Mexico. Mexico (Drake & Harris 1943; Porter 1950; Franco et al. in prep.), Michoacán, Puebla (present study) (Fig. 24).

***Hebrus sobrinus* Uhler, 1877**

Hebrus sobrinus Uhler, 1877a: 452 (original description).

Hebrus sobrinus Uhler, 1877b: 1330 (partim; primary homonym).

Hebrus pucellus [sic]: Riley (1893): 250 (new synonymy).

Naeogeus sobrinus: Kirkaldy (1900): 241 (new combination).

Hebrus sobrinus: Harris (1942): 124 (original combination).

Figs. 16, 17, 18, 19, 22D, 24

Material examined. UNITED STATES – **Colorado** • Denver; [39.7, –105.0]; 17.IV.1961; J.T. Polhemus leg.; 2 macropterous ♂, NMNH • Same, except 13.IV.1961; 1 macropterous ♂, 2 macropterous ♀, NMNH. MEXICO – **Jalisco** • Est. Biol. [Estación de Biología] Chamela; [19.49, –105.00]; 28.X.1988; E. Ramirez col.; 2 macropterous ♂, 2 macropterous ♀, UNAM • Same, except 07.XI.1989; A. Cadera & G. Ortega leg.; 1 macropterous ♀, UNAM • Carr. [Carretera] Barra de Navidad Pto. [Puerto] Vallarta, Rio Cuitzmala, Km 43; [19.407, –104.962]; 02.XII.1988, 24.XI.1989, and 26.I.1990; E. Ramirez leg.; 5 macropterous ♂, 4 macropterous ♀, UNAM • Same, except 07.XII.1990; E. Ramirez & J. Villa leg.; 1 macropterous ♂, UNAM • [Carretera Barra de Navidad Puerto Vallarta, Km 84], Rio San Nicolas; [19.598, –105.104]; 26.XI.1990; G. Ortega, C. Mayorga & S. Rodriguez leg.; 1 macropterous ♀, UNAM.

Redescription

Macropterous male (Fig. 16). **Non-types.** BL 2.17–2.27; HL 0.30–0.35; HW 0.45; EYE 0.10; IOW 0.22; ANT I 0.25; ANT II 0.20; ANT III 0.22; ANT IV 0.32–0.37; AWP 0.62–0.65; HWP 0.90–0.92; PL 0.50–0.52; MESW 0.37–0.40; MESL 0.05–0.07; METW 0.42; METL 0.17–0.21; FORELEG, FEM 0.45–0.51, TIB 0.45–0.47, TAR I 0.02, TAR II 0.12–0.13; MIDLEG, FEM 0.50–0.52, TIB 0.47–0.48, TAR I 0.02, TAR II 0.12–0.13; HINDLEG, FEM 0.65–0.67, TIB 0.65–0.67, TAR I 0.02–0.03, TAR II 0.15–0.17.

General color dark brown. Head with vertex dark brown to black; antenna and venter, including buccula and labium, light brown (Figs. 16A, 17A, 18A, 18B). Pronotum, mesoscutellum, and metanotal elevation dark brown. Thoracic sterna dark brown, except for prosternum light brown. Distal half of acetabula and legs brown to yellow; distal half of femora and tibiae dorsally yellow. Forewings: brown; veins darker at base and apex; clavus with a basal white macula reaching about half of metanotal elevation; membrane dull brown, with three small whitish maculae — a transversal pair near apex of veins and one rounded medially closer to apex (Figs. 16A, 17A, 18A, 18B). Abdomen dark brown to black.

Vertex of head covered by very short golden setae. Antenna densely covered by light brown to golden setae. Pronotum, mesoscutellum, metanotal elevation, corium, and clavus with short golden setae (Figs. 16A, 16C, 17A, 17C, 18A, 18B, 18E). Legs and abdomen densely covered with moderately long yellow setae (Figs. 16B, 17B, 18C). Integument with whitish pruinosity around eyes, on apex of head dorsally, sides of head, anterior lobe of pronotum, and sides and venter of thorax (Figs. 16A, 16C, 17A, 17C, 18A, 18B, 18E).

Head wider than long; width between the eyes approximately 1.2 times eye width. Buccula elongated, straight, with rounded apex slightly turned mesally (Figs. 16D, 17D, 18D). Antennal formula $IV > I > III > II$. Pronotum with a transverse row of moderately large, deep punctations on collar; a row of eight large punctations between lobes, the four most central ones deeper, the two most central ones placed very close together within a moderately deep longitudinal groove; posterior lobe with a row of small punctations adjacent to posterior margin, continuing laterally near humeri, two longitudinal rows submedially, and some sparse small punctations on disc; humeri elevated (Figs. 16A, 16C, 17A, 17C, 18A, 18B, 18E). Mesoscutellum .7 times wider than long. Metanotal elevation trapezoidal, twice as wide as long; disc with raised margins and two submedian depressions divided by a median carina; apex with a moderately deep, rounded median notch. Forewings exposing narrow lateral margins of abdominal laterotergites, almost reaching to surpassing posterior margin of abdomen. Terminalia large, with tufts of long setae emerging laterally (Figs. 16B, 17B, 18C). Paramere robust; apex rounded (Fig. 22D).

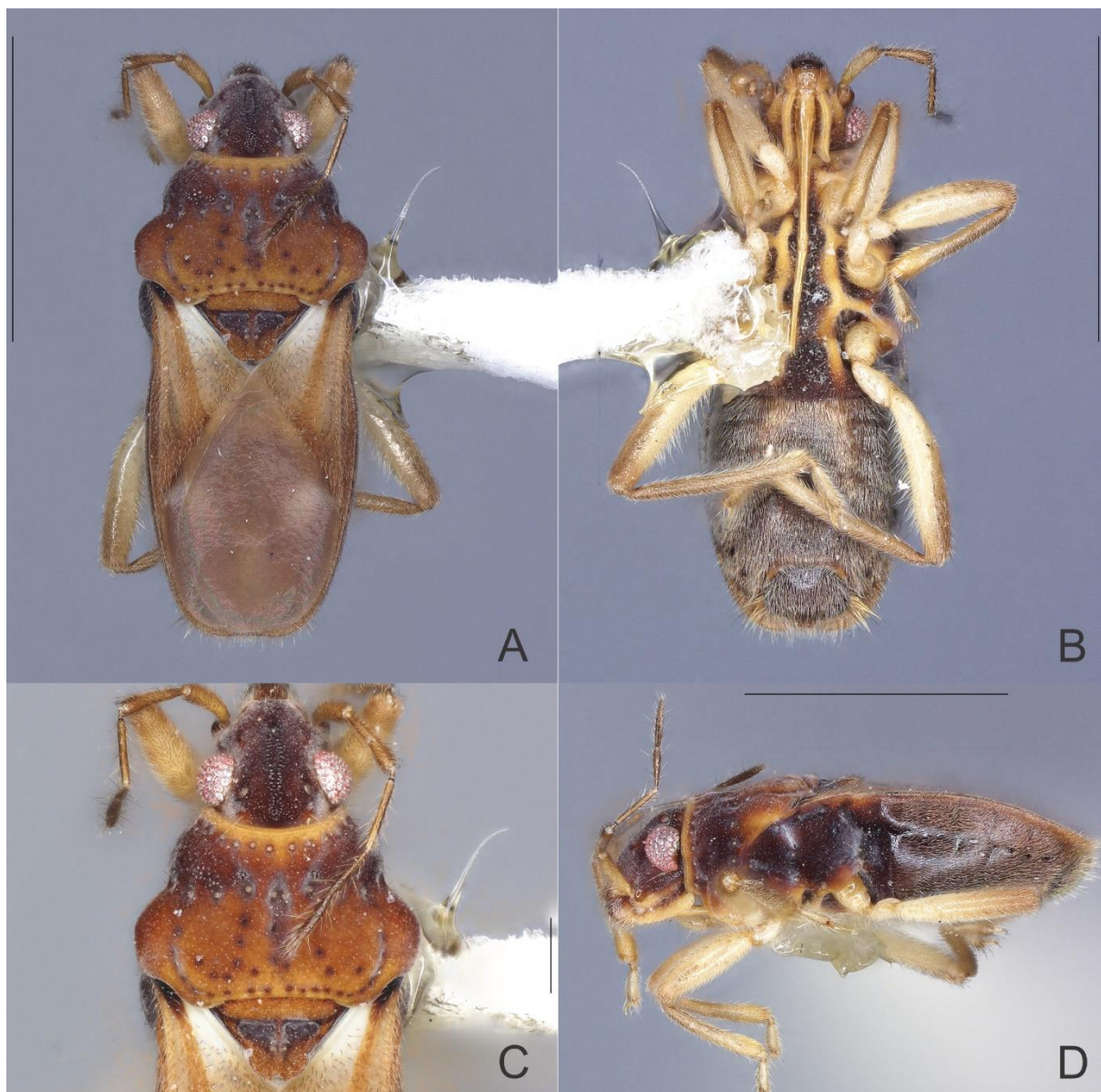


Figure 93. *Hebrus sobrinus* from California, macropterous male. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Head, thorax, and part of abdomen, dorsal view. **D.** Habitus, lateral view. Scale bars: 1.0 mm (**A, B, D**), 0.2 mm. (**C**).

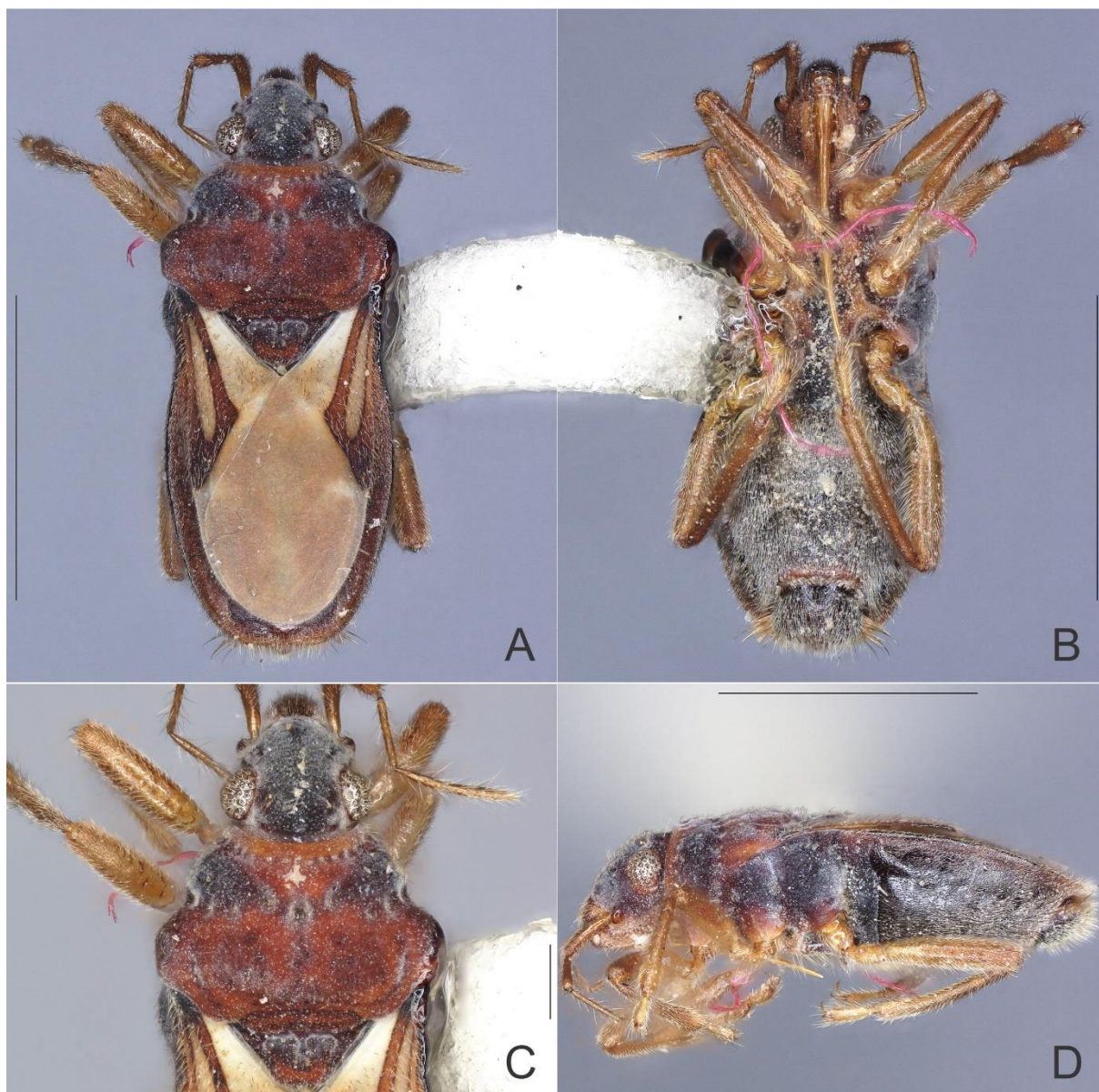


Figure 94. *Hebrus sobrinus* from California, macropterous male. **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Head, thorax, and part of abdomen, dorsal view. **D.** Habitus, lateral view. Scale bars: 1.0 mm (**A, B, D**), 0.2 mm (**C**).

Macropterous female (Fig. 19). **Non-types.** BL 2.23–2.31; HL 0.32–0.35; HW 0.46–0.47; EYE 0.10; IOW 0.25; ANT I 0.25; ANT II 0.17–0.20; ANT II.I 0.20–0.22; ANT IV 0.35–0.37; AWP 0.65–0.67; HWP 0.93–0.95; PL 0.50; MESW 0.40–0.42; MESL 0.07; METW 0.43–0.47; METL 0.20–0.21; FORELEG, FEM 0.47–0.50, TIB 0.45, TAR I 0.02, TAR II 0.12; MIDLEG, FEM 0.47–0.50, TIB 0.41–0.45, TAR I 0.02, TAR II 0.12; HINDLEG, FEM 0.67, TIB 0.66–0.67, TAR I 0.02, TAR II 0.15.

Similar to macropterous male but slightly larger.

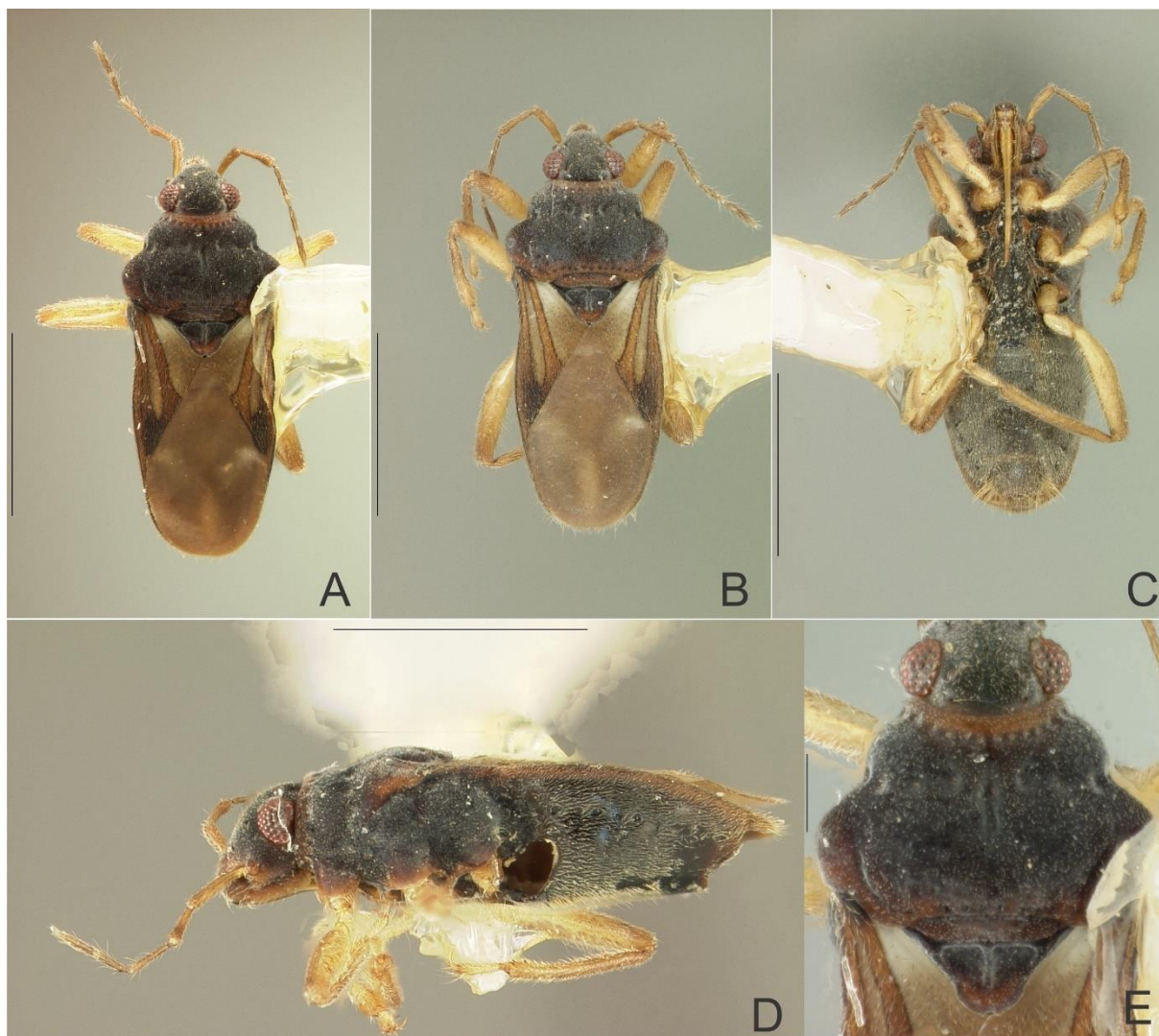


Figure 95. *Hebrus sobrinus* from Colorado. Macropterous male, habitus. **A, B.** Dorsal view. **C.** Ventral view. **D, F.** Lateral view. **E.** Head, thorax, and part of abdomen, dorsal view. Scale bars: 1.0 mm. (**A–D**). 0.2 mm (**E**).

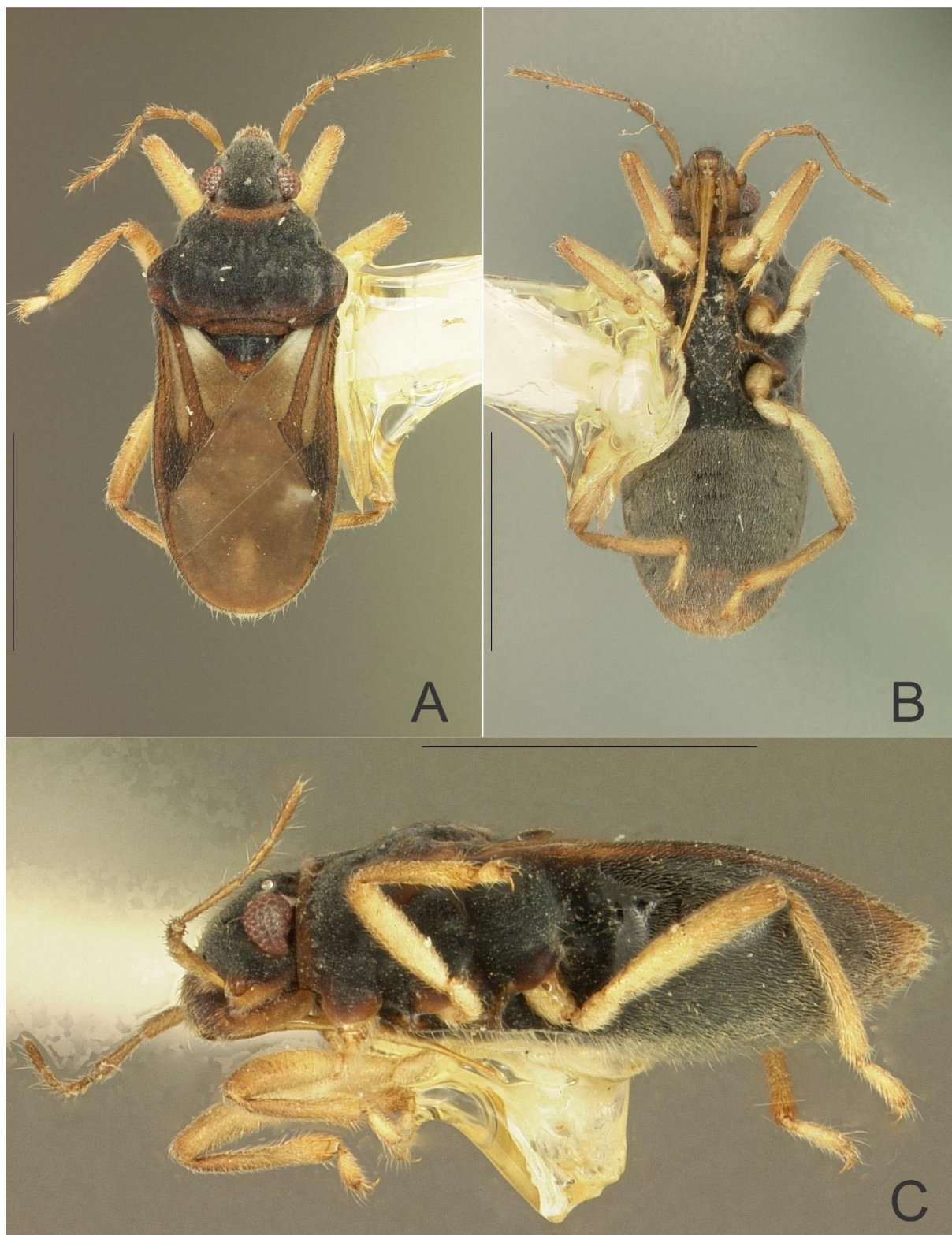


Figure 96. *Hebrus sobrinus* from Colorado. Macropterous female, habitus. **A.** Dorsal view. **B.** Ventral view. **C.** Lateral view. Scale bars: 1.0 mm.

Diagnosis. BL ~2.1–2.4; general color dark brown, with short golden setae dorsally (Figs. 16A, 17A, 18A, 18B, 19A); clavus with a basal white macula reaching about half of metanotal

elevation, membrane three less evident whitish maculae (Figs. 16A, 16C, 17A, 17C, 18A, 18B, 18E, 19A); metanotal elevation with median carina, apex with moderately deep, rounded median notch (Figs. 16C, 17C, 18E); male terminalia large, with tufts of long setae emerging laterally (Figs. 16B, 17B, 18C); paramere robust, with rounded apex (Fig. 22D).

Discussion.

Comparative characters of *H. sobrinus* are discussed under *H. hirsutus*.

Notes. Polhemus (1977) designated a neotype collected by himself in Denver in 17.IV.1961 for the species firstly described as *H. sobrinus* by Uhler (1877a). There are two specimens with this same collection information, each with a pink label, in the NMNH. We could not distinguish which one would be the neotype, so we listed both together with all non-type material that we examined.

Distribution. Mexico (Porter 1950; Bond et al. 2014; present study), United States (Uhler 1877a).

Part of the material mentioned by Uhler (1877b) is apparently misidentified *H. hubbardi* Porter, 1952 (Polhemus 1975). The specimen recorded from Baja California Sur by Uhler (1894b) was later identified as *H. major* by Porter (1950). The record from Peru based on a single female (Porter 1950) is highly questionable.

Distribution in Mexico. Chiapas (Bond et al. 2014), Jalisco (present study), Mexico (Porter 1950) (Fig. 24).

***Hebrus usingeri* Drake & Harris, 1943**

Hebrus usingeri Drake & Harris, 1943: 54 (original description).

Figs. 20, 21, 24

Type material examined. Holotype. MEXICO – Mexico • Temascaltepec, Real de Arriba; [19.04, –100.00]; 25.VI.1933; H.E. Hinton & R.L. Usinger leg.; 1 macropterous ♂, CAS 7101.

Allotype (= paratype). Same data as holotype; 1 macropterous ♀, CAS 8604798.

Additional material examined. MEXICO – **Oaxaca** • Valle Nacional, San Mateo Yetla; 13.X.1990; [17.76, –96.31]; E. Barrera, A. Cadena & E. Ramirez leg.; 1 macropterous ♂, 3 macropterous ♀, UNAM.

Redescription

Macropterous male (Fig. 20). **Holotype.** BL 2.25; HL 0.37; HW 0.45; EYE 0.13; IOW 0.20; ANT I 0.25; ANT II 0.20; ANT III 0.30; ANT IV 0.43; AWP 0.56; HWP 0.90; PL 0.48; MESW 0.41; MESL 0.06; METW 0.44; METL 0.20; FORELEG, FEM 0.55, TIB 0.51, TAR I 0.02, TAR II 0.16; MIDLEG, FEM 0.56, TIB 0.53, TAR I 0.02, TAR II 0.16; HINDLEG, FEM 0.71, TIB 0.71, TAR I 0.03, TAR II 0.23.

General color dark brown. Head vertex dark brown to black; antenna and venter, including buccula and labium, light brown. Pronotum, mesoscutellum, and metanotal elevation dark brown. Thoracic sterna dark brown, except prosternum light brown. Distal half of acetabula and legs light brown; distal half of femora and tibiae dorsally darker. Forewings: corium and veins dark brown; veins darker at base and apex; clavus brown, with a basal white macula almost reaching apex of metanotal elevation; membrane brown matte, with three small white macula — a transversal pair near apex of veins and one rounded medially closer to apex (Fig. 20A). Abdomen dark brown to black.

Vertex of head with very short golden setae; apex with longer setae; antenna densely covered by light brown to golden setae. Pronotum, mesoscutellum, metanotal elevation, corium and clavus with moderately long golden setae. Legs and abdomen with dense, moderately long yellowish setae. Tegument with whitish pruinosity bordering eyes, on apex of head dorsally, sides of head, anterior lobe of pronotum, and sides and venter of thorax.

Head wider than long; width through eyes about 1.2 times length; interocular width 1.5 times eye width. Buccula elongated, straight, apex rounded, slightly turned mesally (Fig. 20D). Antennal formula: IV > III > I > II. Pronotum with a transverse row of moderately large, deep punctations on collar; a row of eight large punctations between lobes, four most central ones deeper, two most central ones placed very close on a longitudinal, moderately deep groove that almost reaches apical third of posterior lobe; posterior lobe with a row of small punctations adjacent to posterior margin, continuing laterally close to humeri, two longitudinal rows

submedially, and a few sparse small punctations on disc; humeri elevated (Fig. 20A, 20C). Mesoscutellum 6.8 times wider than long. Metanotal elevation trapezoidal, 2.2 times wider than long; disc with raised margins and two submedian depressions divided by a median carina; apex with a moderately deep rounded median notch (Fig. 20A, 20C). Hind femur with a tubercle near base (Fig. 20B). Forewings leaving narrow lateral margins of anterior abdominal laterotergites exposed, surpassing posterior margin of abdomen.

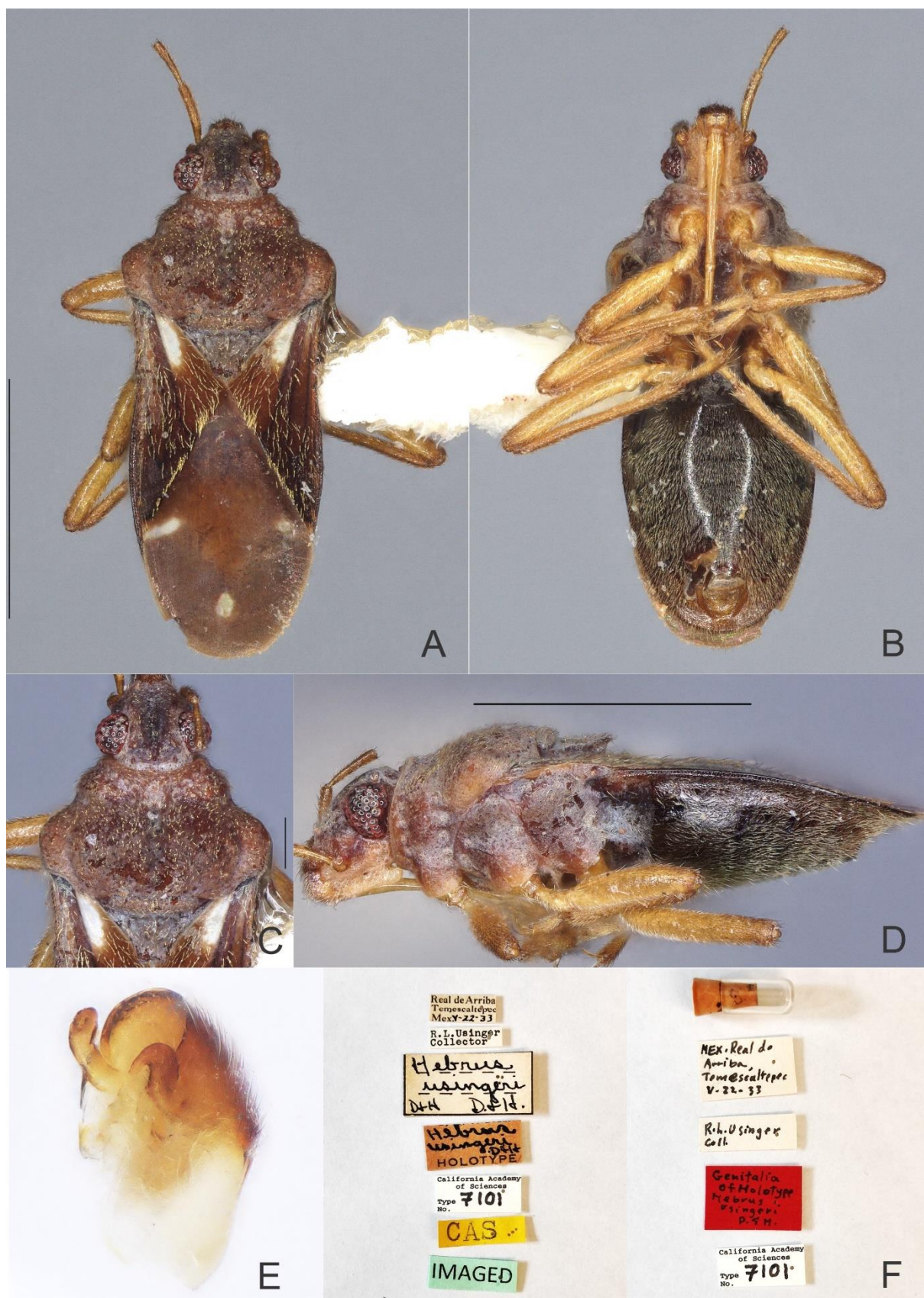


Figure 97. *Hebrus usingeri*. macropterous male, holotype (CAS 7101). **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Head, thorax, and part of abdomen, dorsal view. **D.** Habitus, lateral view. **E.** Capsule genital and paramere. **F.** labels. Scale bars: 1.0 mm (A, B, D), 0.2 mm (C).

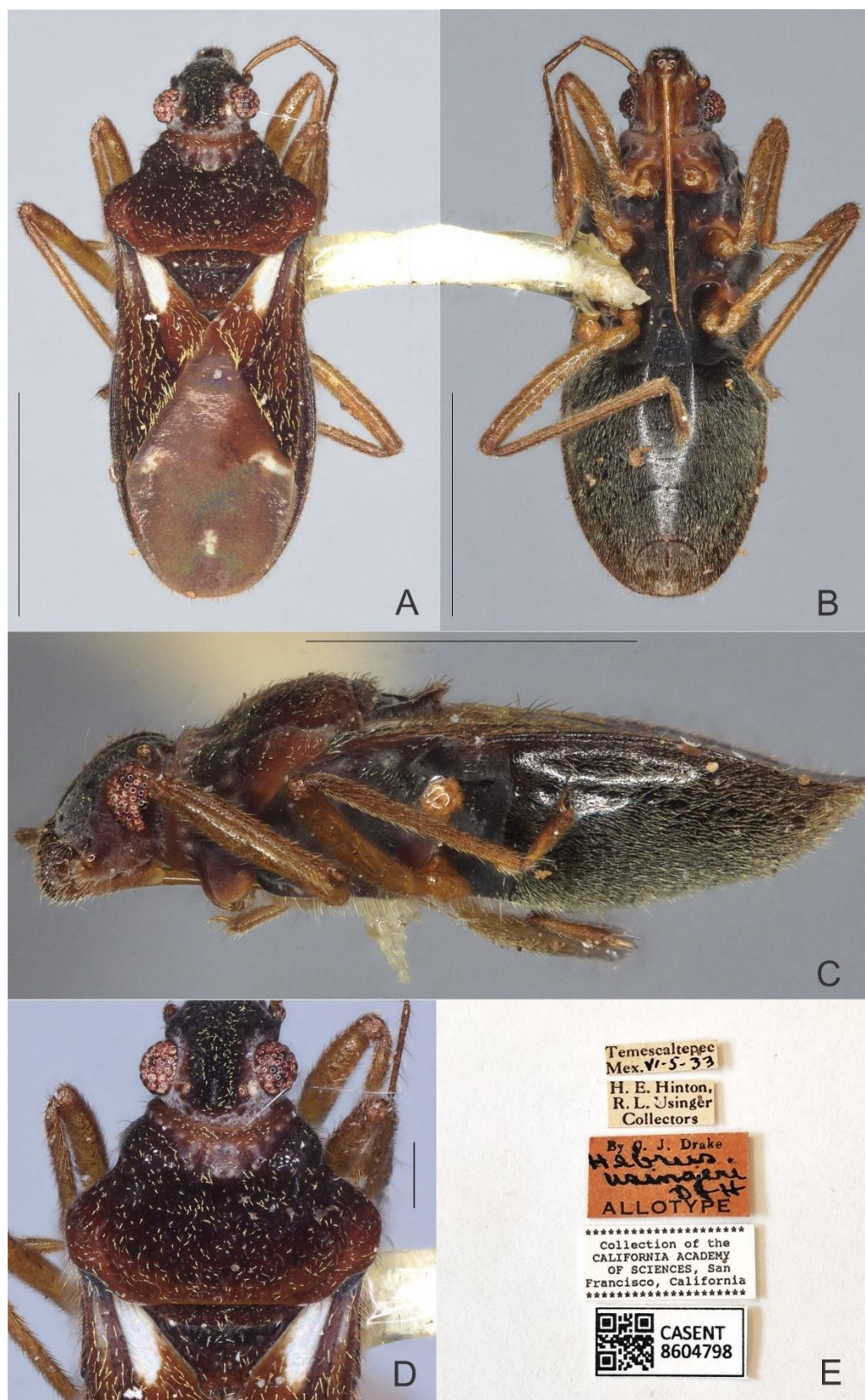


Figure 98. *Hebrus usinger*. macropterous female, allotype (CAS 8604798). **A.** Habitus, dorsal view. **B.** Habitus, ventral view. **C.** Habitus, lateral view. **D.** Head, thorax, and part of abdomen, dorsal view. **E.** F. labels. Scale bars: 1.0 mm (A–C), 0.2 mm (D).

Macropterous female (Fig. 21). **Paratype.** BL 2.47; HL 0.46; HW 0.48; EYE 0.12; IOW 0.23; OL 0.16; ANT I 0.28; ANT II 0.20; ANT III 0.31; ANT IV 0.43; AWP 0.60; HWP 0.96; PL 0.56; MESW 0.48; MESL 0.06; METW 0.50; METL 0.21; FORELEG, FEM 0.53, TIB 0.53, TAR I 0.02, TAR II 0.15; MIDLEG, FEM 0.58, TIB 0.56, TAR I 0.02, TAR II 0.15; HINDLEG, FEM 0.80, TIB 0.83, TAR I 0.02, TAR II 0.21.

Similar to macropterous male but slightly larger and without tubercle on hind femur.

Diagnosis. BL ~2.2–2.5; general color dark brown, with short golden setae dorsally (Figs. 19A, 20A); clavus with a basal white macula almost reaching apex of metanotal elevation, membrane with three small white maculae (Figs. 19A, 19D, 20A, 20D); metanotal elevation with median carina, apex with moderately deep rounded median notch (Figs. 19A, 19D, 20A, 20D); male hind femur with a tubercle near base (Figs. 19B). Paramere robust and slightly curved (Fig. 20E).

Discussion.

Comparative characters of *H. usingeri*, *H. lacunatus*, and *H. nubilus* are discussed under *H. lacunatus*.

Distribution. Mexico (Drake & Harris 1943) (Fig. 24).

Distribution in Mexico. Mexico (Drake & Harris 1943; present study), Oaxaca (present study), Puebla, San Luís Potosí (Drake & Chapman 1953).

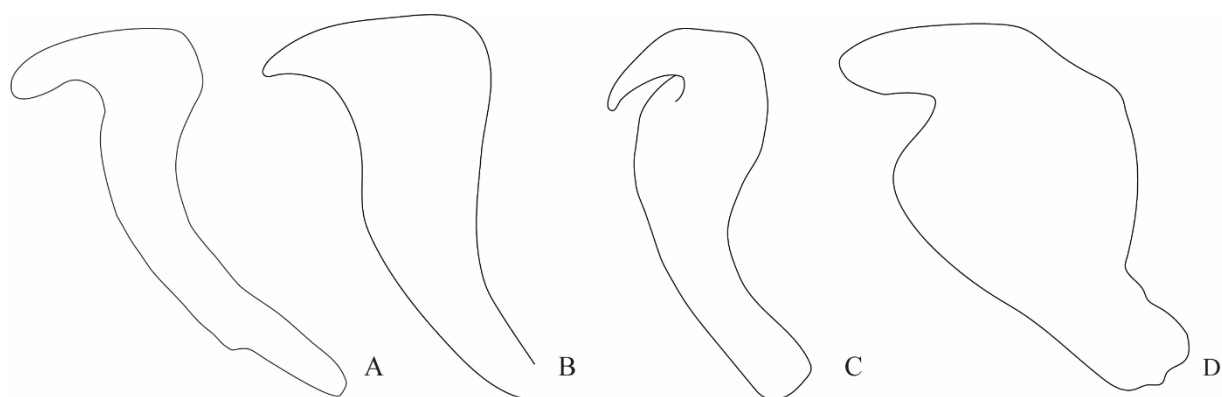


Figure 99. Parameres, schematic drawings. **A.** *Hebrus burmeisteri* Drake & Chapman, 1958. **B.** *H. lacunatus* Drake & Chapman, 1958. **C.** *H. nubilus* Drake & Chapman, 1958. **D.** *H. sobrinus* Drake & Chapman, 1958.

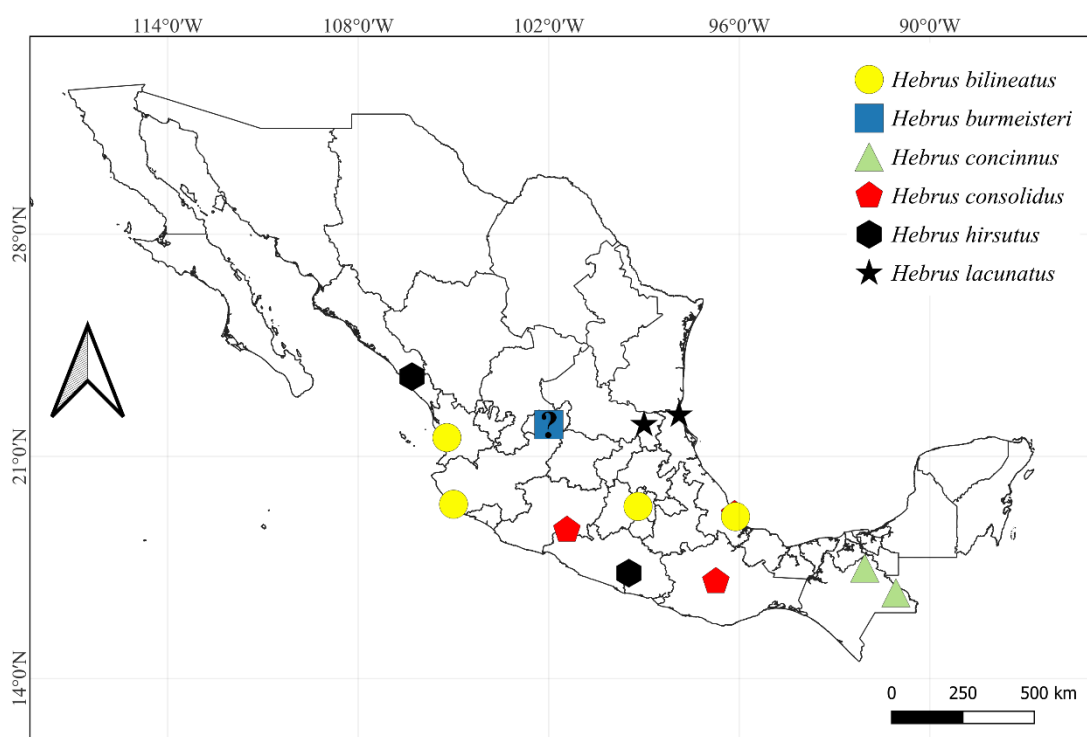


Figure 100. Geographic distribution of *Hebrus* recorded from Mexico: *H. bilineatus* (yellow circles), *H. burmeisteri* (blue squares), *H. concinnus* (green triangles), *H. consolidus* (red pentagons), *H. hirsutus* (black hexagon), and *H. lacunatus* (black star). Question mark indicates unspecified locality.

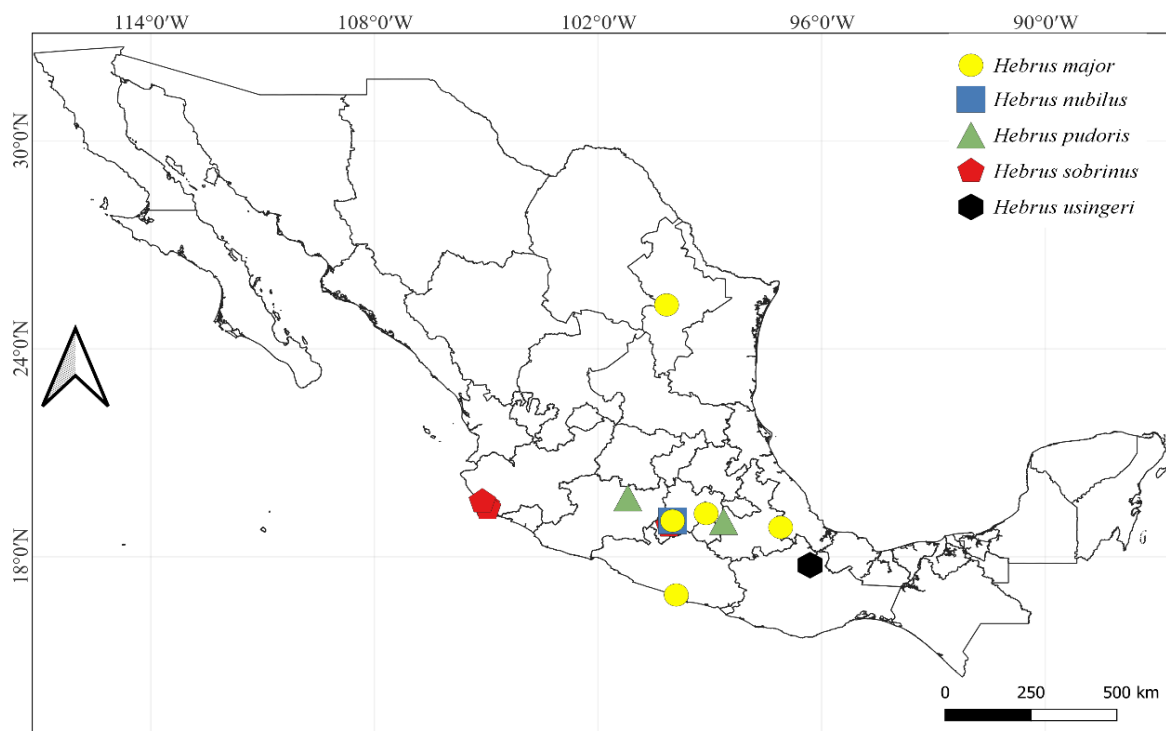


Figure 101. Geographic distribution of *Hebrus* recorded from Mexico: *H. major* (yellow circles), *H. nubilus* (blue square), *H. pudoris* (green triangles), *H. sobrinus* (red pentagon), and *H. usingeri* (black hexagon).

Discussion

The present study represents the most comprehensive taxonomic treatment of *Hebrus* in Mexico to date, significantly improving the understanding of species diversity and distribution of Hebridae in the country. Previous knowledge of Mexican *Hebrus* was largely based on isolated records and original descriptions produced in the late 19th and mid-20th centuries (Uhler 1877, 1894; Champion 1898; Drake & Harris 1943; Drake & Chapman 1958), many of which lacked detailed morphological information and illustrations.

The analysis confirms the occurrence of 11 species of *Hebrus* in Mexico, corroborating previous records: *Hebrus bilineatus*; *H. burmeisteri*; *H. concinnus*; *H. consolidus*; *H. hirsutus*; *H. lacunatus*; *H. major*; *H. nubilus*; *H. pudoris*; *H. sobrinus*; *H. usingeri* (Uhler 1877, 1894; Champion 1898; Drake & Harris 1943; Drake & Chapman 1958; Polhemus & Polhemus 2008), expands the known distribution of several taxa within the country. Redescriptions provide detailed morphometric data, refined diagnoses, and updated illustrations, improving upon the original descriptions, which were often brief or incomplete.

As highlighted by Moreira (2015), the taxonomy of Neotropical Hebridae has long been hindered by the rarity of specimens in collections, the cryptic habits of these insects, and

the frequent absence of male material. Our redescriptions address these limitations by providing standardized measurements, high-quality images, and updated diagnoses, facilitating more reliable species identification and comparison.

Morphological characters traditionally used in *Hebrus* taxonomy—such as body size, dorsal coloration, forewing maculation patterns, and the shape of the metanotal elevation—remain useful for species delimitation, as previously noted by Drake & Harris (1943) and Polhemus & Polhemus (2008). However, our results reinforce the importance of combining these external traits with male genital morphology, which offers more consistent diagnostic value, particularly among closely related species with overlapping coloration patterns.

The updated distribution maps reveal that several species previously thought to have restricted ranges are more widely distributed in Mexico than formerly recognized. This pattern mirrors trends observed in other Neotropical Gerromorpha, where increased sampling and revisionary work have frequently led to substantial range extensions (Polhemus & Polhemus 2008; Kment et al. 2016). The presence of both widespread and apparently endemic *Hebrus* species suggests that Mexico plays an important role as a biogeographic transition zone for Hebridae, linking Nearctic and Neotropical faunal elements.

Despite the advances presented here, significant gaps remain. Many Mexican regions are still poorly sampled, and several species are known from few specimens. Continued fieldwork, particularly in understudied freshwater microhabitats, as well as integrative approaches combining morphology and molecular data, will be essential further to resolve species limits and evolutionary relationships within *Hebrus*, as advocated by recent studies on Gerromorpha systematics (Stella & Pall 2018; Zhang et al. 2024).

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Capítulo 4. A review of *Hebrus* Curtis, 1833 (Hemiptera: Heteroptera: Hebridae) from Argentina, with the description of a new species

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Abstract.

Hebridae (Hemiptera: Heteroptera: Gerromorpha) includes about three genera and 220 species, with *Hebrus* Curtis, 1833. These small semiaquatic insects have body size varying from 1.53 to 3.4 mm and are often found in damp environments such as stream edges, lagoons, and floating plants, with some species attracted to light traps. Two species of *Hebrus* are currently known in Argentina: *H. alvearensis* and *H. engaeus*. Here, we present a review of the *Hebrus* recorded from Argentina, including the description of a new species, the redescription of *H. engaeus*, and first records of *H. gloriosus* Drake & Harris, 1943, *H. nordestinus* Franco, Rodrigues, Floriano & Moreira and *H. plaumanni* Porter, 1952.

Key words. Aquatic environments, semiaquatic bugs, taxonomy, velvet water bugs

Introduction

Hebridae (Hemiptera: Heteroptera: Gerromorpha) includes nine genera and about 220 species of small semiaquatic bugs, with body length varying from 1.5 to 3.4 mm (Polhemus and Chapman 1979; Polhemus and Polhemus 2008; Mazzucconi et al. 2009; Kment and Kanyukova 2010; Damgaard 2012). Neotropical representatives of the family are rarely collected and poorly studied (Moreira 2015).

Hebrus Curtis, 1833 is the most speciose and widely distributed genus in the family, including more than 180 species (GBIF 2025; ITIS 2025; Moreira 2025). It can be distinguished from other hebrid genera by the long antenna, with antennomere IV superficially divided by a constriction (Andersen 1982). The habits of most species are unknown (Moreira 2015), but there are records of individuals collected on hydrophytes, leaf banks, marginal vegetation of lagoons, streams, mangroves, pools, exposed roots in streams, and on the floating vegetation of rivers (Andersen 1982; Polhemus and Polhemus 1989; Schuh and Slater 1995; Pérez-Sena et al. 1996; Nieser and Melo 1997; Zettel 2004; Chen et al. 2005; Pereira and Melo 2007; Moreira 2015; Zettel and Tran 2016), as well as using light traps close to these places (Rodrigues et al. 2021).

Hebrus is currently represented in Argentina by two species: *H. alvearensis* Stella & Pall, 2018, recorded from Tucumán to Buenos Aires, and *H. engaeus* Drake & Chapman, 1958, from La Pampa (Drake and Chapman 1958; Stella and Pall 2018; Mazzucconi 2023). Here, we present a review of the *Hebrus* recorded from Argentina, including the description of a new species, the redescription of *H. engaeus*, and the first records of *H. gloriosus* Drake & Harris, 1943, *H. nordestinus* Franco, Rodrigues, Floriano & Moreira, in prep., and *H. plaumanni* Porter, 1952.

Material and Methods

The material examined is deposited in the following collections: National Museum of Natural History, Smithsonian Institution, Washington D.C., United States (NMNH); and Laboratorio de Entomología, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires (UBA).

We obtained photographs of the specimens using a Canon EOS 5D digital camera and the images were stacked into single figures using Visionary Digital software, and a Leica

M205 C stereomicroscope coupled with a digital camera and the Leica LAS version 4.7.1 imaging system.

Collecting information is written as follows: country in all-capitals; states in bold; a bullet point (•) indicates the beginning of a record; a n-dash indicates a new state record; within each record, the different fields are delimited by a semicolon; a single field can be composed of several elements, which are separated by commas. We produced distribution maps using QGIS 2.6.1 (QGIS Development Team 2020).

Abbreviations used for measurements are as follows: body length (BL), head length (HL), head width through eyes (HW), eye width (EYE), minimum interocular width (IOW), length of antennomeres I–IV [without intersegmental pieces] (ANT I, ANT II, ANT III, ANT IV), anterior width of pronotum (AWP), humeral width of pronotum (HWP), pronotum length on midline (PL), mesoscutellum width (MESW), mesoscutellum length (MESL), metanotum width (METW), metanotum length (METL), length of foreleg segments (FORELEG), length of midleg segments (MIDLEG), length of hindleg segments (HINDLEG), femoral length (FEM), tibial length (TIB), length of tarsomeres I–II (TAR I, TAR II). All measurements are given in millimeters and were always taken in their maximum dimensions, except for the minimum interocular width.

Results

Hebrus barrosae new species

Figs. 1–8, 47 table 1

Material examined. Holotype (Fig. 1). ARGENTINA – **Corrientes** • Mburucuyá Department, Mburucuyá National Park, Cañada Fragosa, stream; –27.95, –58.01; 07.XI.1997, S. Mazzucconi leg.; 1♂ macropterous, XXXX. **Paratypes**. Same data as the holotype, 1 macropterous, XXXX – **Buenos Aires** • Delta, Sarmiento; [–34.61, –58.40]; 1-3.XI.1983, S. Mazzucconi col., 2♂ macropterous, 2♀ macropterous, 3♂ brachypterous, 4♀ brachypterous; XXXX.

Description

Macropterous male (Fig. 1; table 1). General color brown to dark, except the base of ocelli, antennomeres I–IV yellow. Dark eyes. Pale yellow legs. Forewing dark brown to black,

except endocorium with a large white macula finding on the eaching the apex of the metanotum elevation and membrane with four white oval maculae: one proximal, two parallel on the median region, and an elongated distal one (Fig. 1). Body covered with white long, dense and decumbent setae.

Head wider than long, length 0.57 times the width of the head through eyes. Bucculae long slightly curved. Antennomere I–II cylindrical, slightly curved; width of antennomeres II–IV approximately half of antennomere I. Antennal formula: IV>III>II>I. Anterior lobe of pronotum with a transverse row of moderately deep punctations on the collar, and eight deep punctations in the distal region, between the lobes; two of these punctations, the most central ones (Fig. 1). Posterior lobe with a row of smaller with six punctations on the lateral margin, close to the humerus (Fig. 1, 3). Elevated humeri. Mesoscutellum 4.8 times wider than long. Metanotal elevation subtrapezoidal, 2.0 times wider than long, with the apex slightly excavated in the middle; disc with raised margins and two submedian depressions divided by a straight median carina (Fig. 1, 3). Tarsomere II of the foreleg is equal times the length of tarsomere II of the midleg. Hind tibia 1.3 times the length of the middle tibia.

Posterior region of propleurite and dorsoposterior region of metapleurite with punctations. Forewings reaching the posterior margin of abdomen. Paramere concave and narrowing apically, with the apex projecting beyond the concave region. (Figs. 17, 18).

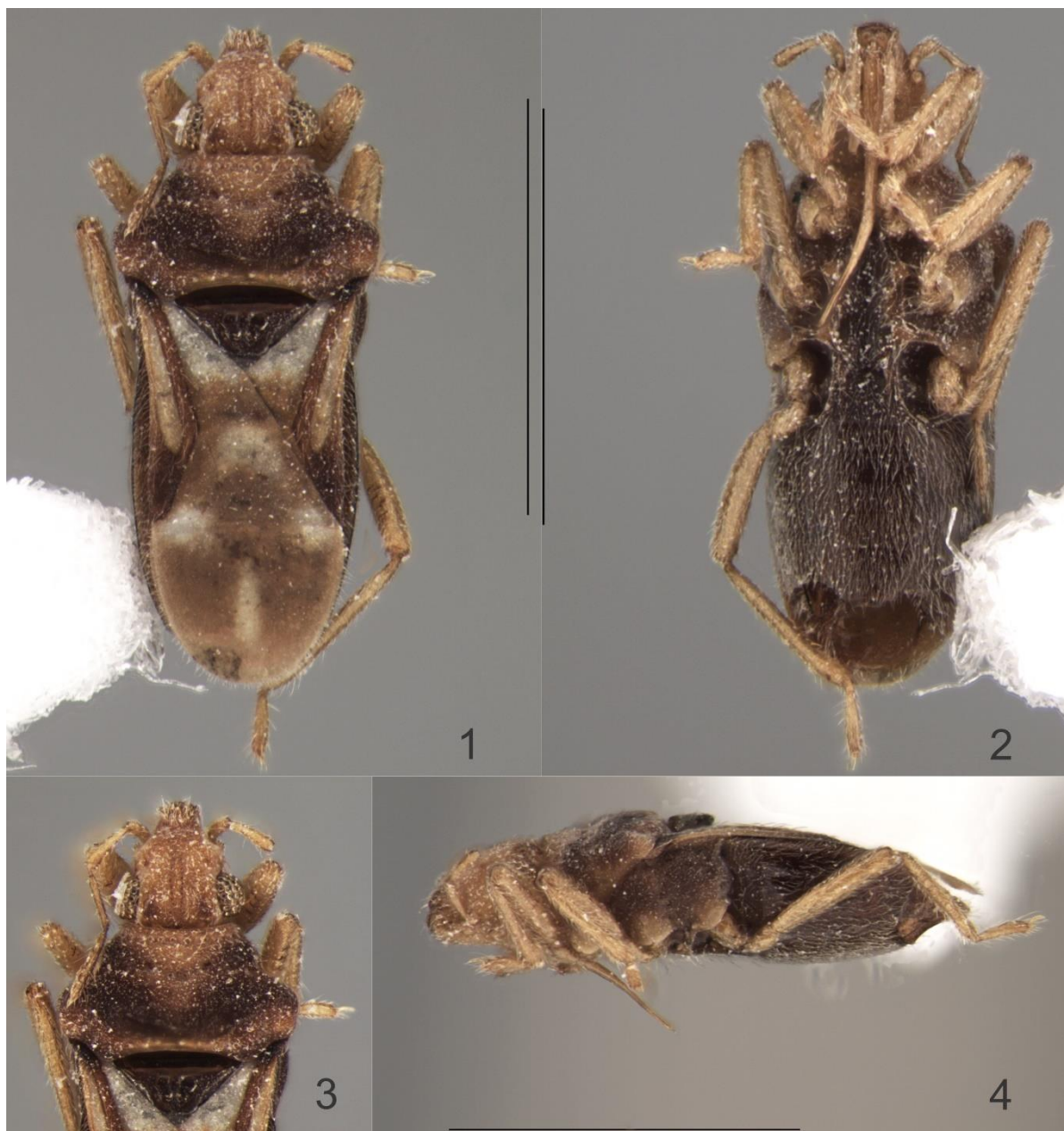


Figure 102. *Hebrus barrosae* **new species** macropterous male, holotype. habitus. 1. Dorsal view. 2. Ventral view. 3. Head, Antennomeres, and thorax, dorsal view. 4. Lateral view. Scale bars: 1.0 mm.

Brachypterous male (Figs. 5–8, table 1). General color light brown, except the base of ocelli, longitudinal areas on both lobes of the pronotum, mesoscutellum, abdominal sternites dark brown. Brown eyes. Yellow legs. Forewings light brown, except endocorium with a large white macula on the proximal half, surpassing the apex of the metanotum elevation, and membrane with four white oval maculae: one proximal, two parallel on the

median region, and an elongated distal one (Fig. 5). Body covered with white long, dense and decumbent setae.

Table 1. Measurements from six males and six females of *Hebrus barrosae* **new species**. All measurements are in mm. [M, macropterous; B, brachypterous]

	Holotype		Males				Females					
	M	M	M	B	B	B	M	M	B	B	B	B
BL	1.51	1.12	1.19	1.12	1.20	1.17	1.26	1.31	1.18	1.12	1.11	1.22
HL	0.25	0.13	0.22	0.21	0.10	0.21	0.23	0.26	0.24	0.20	0.23	0.30
HW	0.35	0.28	0.30	0.28	0.30	0.30	0.31	0.33	0.30	0.28	0.28	0.35
EYE	0.20	0.17	0.18	0.17	0.17	0.18	0.18	0.19	0.17	0.17	0.16	0.21
IOW	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.08	0.06	0.07	0.06	0.08
ANT I	0.10	0.10	0.12	0.10	0.12	0.10	0.12	0.10	0.09	0.10	0.10	0.12
ANT II	0.13	0.12	0.13	0.12	0.13	0.12	0.10	0.13	0.12	0.10	0.13	0.15
ANT III	0.16	0.12	0.13	0.13	0.13	0.14	0.14	0.14	0.15	0.14	0.14	0.14
ANT IV	0.22	0.19	0.23	0.22	0.21	0.19	0.21	0.20	0.21	0.21	0.20	0.20
PL	0.32	0.22	0.26	0.24	0.27	0.25	0.27	0.29	0.25	0.24	0.24	0.29
AWP	0.39	0.32	0.34	0.31	0.38	0.33	0.33	0.34	0.32	0.31	0.33	0.35
HWP	0.60	0.51	0.48	0.44	0.48	0.44	0.50	0.50	0.46	0.45	0.43	0.50
MESL	0.05	0.03	0.02	0.03	0.02	0.02	0.03	0.04	0.04	0.03	0.03	0.03
MESW	0.28	0.23	0.20	0.17	0.21	0.17	0.21	0.25	0.22	0.20	0.21	0.22
METL	0.10	0.11	0.11	0.08	0.10	0.10	0.10	0.10	0.10	0.09	0.09	0.10
METW	0.26	0.20	0.21	0.17	0.20	0.19	0.21	0.22	0.20	0.22	0.20	0.22
						Foreleg						
FEM	0.27	0.27	0.26	0.27	0.27	0.25	0.22	0.20	0.22	0.23	0.20	0.20
TIB	0.30	0.28	0.28	0.30	0.30	0.26	0.23	0.23	0.24	0.24	0.23	0.24
TAR I	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
TAR II	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.09	0.09	0.09	0.10
						Midleg						
FEM	0.25	0.29	0.26	0.25	0.25	0.27	0.23	0.22	0.23	0.22	0.20	0.23
TIB	0.32	0.32	0.34	0.30	0.35	0.21	0.27	0.26	0.27	0.24	0.23	0.23
TAR I	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02
TAR II	0.08	0.08	0.09	0.09	0.09	0.08	0.10	0.10	0.09	0.09	0.13	0.10
						Hindleg						
FEM	0.35	0.32	0.34	0.31	0.32	0.35	0.34	0.34	0.30	0.34	0.25	0.30
TIB	0.40	0.35	0.39	0.33	0.35	0.39	0.39	0.40	0.38	0.35	0.35	0.40
TAR I	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
TAR II	0.13	0.12	0.13	0.13	0.12	0.12	0.12	0.10	0.10	0.09	0.10	0.10

Head wider than long, length 0.71 times the width of the head through eyes. Bucculae elongated and slightly curved (Fig. 8). Antennomere I cylindrical, slightly curved; antennomere II fusiform; width of antennomeres III–IV approximately half of antennomere I. Antennal formula: IV>III>II>I. Anterior lobe of pronotum with a slightly depressed median region, a transverse row of moderately deep punctations on the collar, two of these punctations, the most central ones, are closely placed and clearly distinguished in dry way, and eight moderately deep punctations located in the distal region, between the lobes (Figs. 5, 7). Posterior lobe depressed in the anterior half, with a row of smaller punctations on the distal margin, which continues laterally, close to the humerus, and two pairs of deep punctations in

the proximal central region, following the central punctations of the anterior lobe (Figs. 5, 7). Elevated humeri. Mesoscutellum 5.6 times wider than long. Metanotal elevation trapezoidal, about 2.6 times wider than long; disc with raised margins, forming a uniform central depression, slight any carina; apical margin truncated (Figs. 5, 7). Tarsomere II of the foreleg 1.25 times the length of tarsomere II of the midleg. Hind tibia 1.25 times the length of the middle tibia.



Figure 103. *Hebrus barrosae* **new species** brachypterous male, paratype. habitus. 5 Dorsal view. 6. Ventral view. 7. Head, Antennomeres, and thorax, dorsal view. 8. Lateral view. Scale bars: 1.0 mm. (5, 6, 8) 0.2 mm (7).

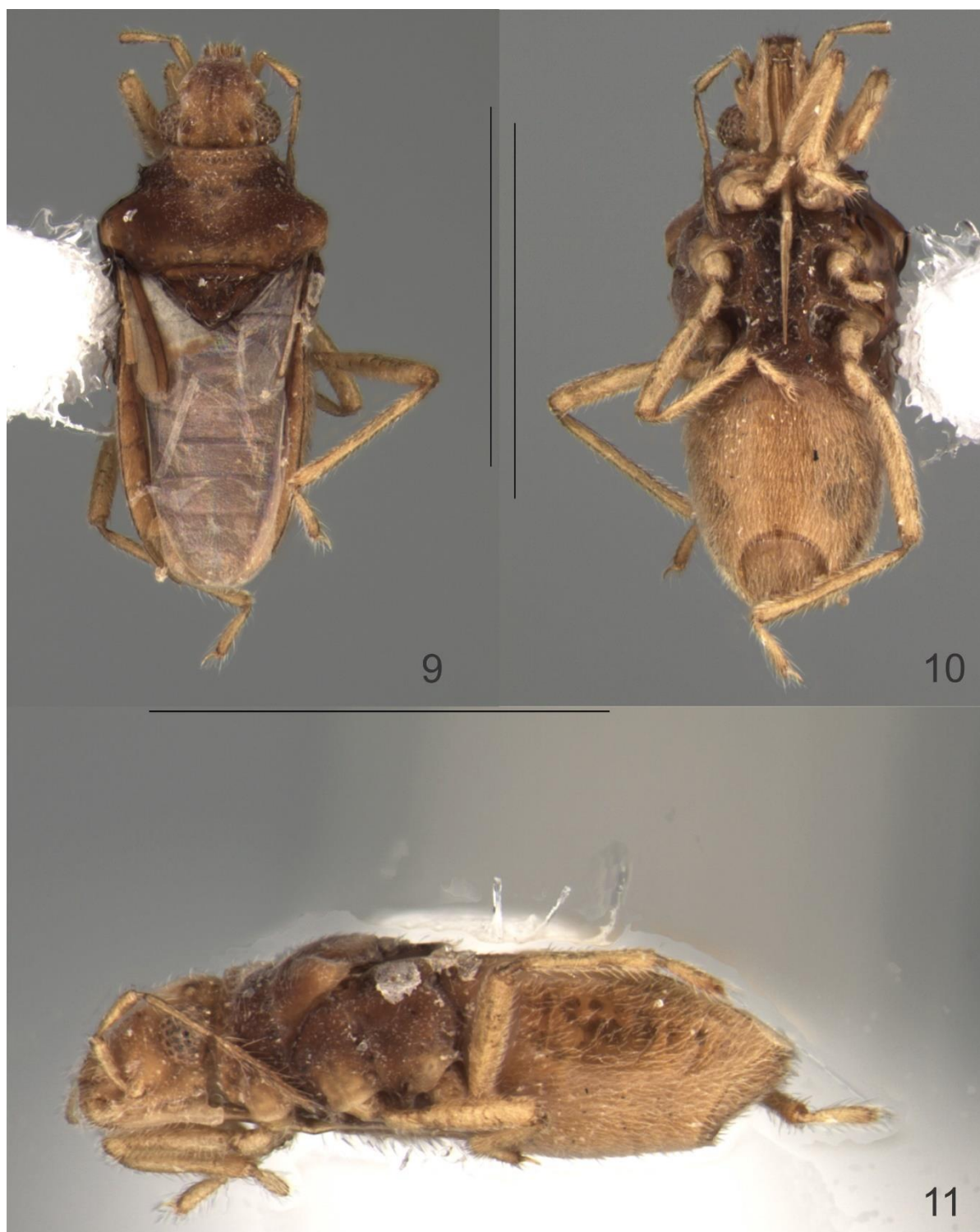


Figure 104. *Hebrus barrosae* **new species**, paratypes. macropterous female habitus. 9. Dorsal view. 10. Ventral view. 11. Lateral view. Scale bars: 1.0 mm.



Figure 105. *Hebrus barrosae* **new species** paratypes, brachypterous female habitus. 40. Dorsal view. 41. Ventral view. 42 Lateral view. Scale bars: 1.0 mm.

Posterior region of the propleurite and dorsoposterior region of the metapleurite with punctations. Forewings almost reaching the posterior margin of abdomen (Fig. 11).

Macropterous females, paratypes (Figs. 9–11; table 1). Similar to macropterous male but larger. Abdominal laterotergites elevated but not reflected over mediotergites (Fig. 9).

Brachypterous females (Figs. 13–14; table 1). Similar to brachypterous male but larger. Abdominal laterotergites elevated but not reflected over mediotergites (Fig. 12, 13).

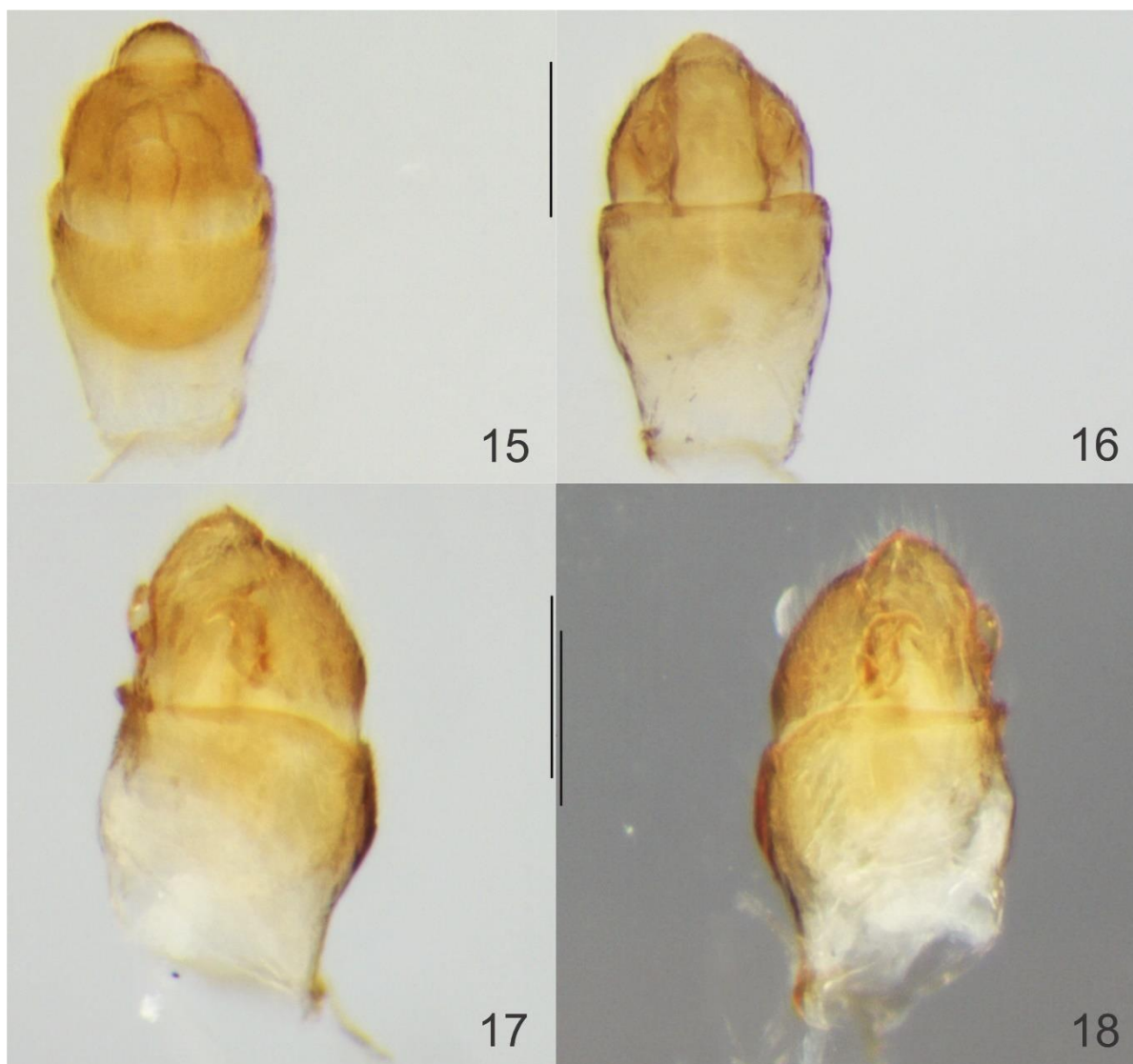


Figure 106. *Hebrus barrosae* **new species**, paratypes, macropterous male habitus. genital capsule 43. Dorsal view. 44. Ventral view. 45. Right lateral view. 46. Left lateral view. Scale bars: 0.1 mm.

Diagnosis.

Hebrus barrosae **new species** can be distinguished from congeners by the following combination of characters: body small (BL 1.11–1.51 mm), densely covered with long, white,

decumbent setae (Figs. 1, 5, 12); general coloration brown to dark brown, with antennomeres I–IV entirely yellow and legs pale yellow (Figs. 1, 5, 12). Forewings with a distinctive color pattern, bearing a large white macula on the endocorium extending beyond the apex of the metanotal elevation, and membrane with four white oval maculae (one proximal, two parallel in the median region, and one elongate distal macula) (Figs. 1, 5, 12). Metanotal elevation subtrapezoidal to trapezoidal, distinctly wider than long; in macropterous males with raised margins, two submedian depressions separated by a straight median carina and apex slightly excavated medially (Figs. 1, 3, 5, 7, 12), whereas in brachypterous males the disc forms a uniform central depression, lacking a distinct carina, with apical margin truncated (Figs. 1, 3, 5, 7). Pronotum with anterior lobe bearing a transverse row of moderately deep punctations on the collar and eight punctations on the distal region, the two central punctations closely placed and conspicuous; posterior lobe with smaller punctations along the distal margin and laterally near the humeri (Figs. 1, 3, 5, 7, 12). Male genitalia distinctive, with paramere concave and narrowing apically, the apex projecting beyond the concave region (Figs. 17, 18). This species further differs from related *Hebrus* species by the proportional lengths of the legs, with tarsomere II of the foreleg equal to or longer than that of the midleg, and hind tibia approximately 1.25–1.30 times the length of the mid tibia (tables 1).

Discussion.

Hebrus barrosae **new species**, is morphologically similar to *Hebrus gloriosus* (Fig. 35) due to the conspicuous white maculae on the forewings and the dense, long, decumbent dorsal setation. Nevertheless, the new species can be readily distinguished by the forewing color pattern, with a single large white macula on the endocorium extending beyond the apex of the metanotal elevation and four white maculae on the membrane (one proximal, two parallel in the median region, and one elongate distal) (Figs. 1, 5, 12). Additional differences include the entirely yellow antennomeres I–IV in *Hebrus barrosae* **new species**, contrasting with the partially darkened antennomeres of *H. gloriosus*, and the structure of the metanotal elevation, which in the new species is distinctly wider than long and sexually dimorphic: subtrapezoidal with raised margins, two submedian depressions separated by a straight median carina and a slightly excavated apex in macropterous males (Figs. 1, 3, 5, 7), but trapezoidal with a uniform central depression, lacking a distinct carina and with a truncated apical margin in brachypterous males (Figs. 5, 7). In *H. gloriosus*, the metanotal elevation is more uniformly shaped and lacks such marked dimorphism. Male genitalia further support the separation of

the two species, as the paramere of *Hebrus barrosae* **new species**, is concave and gradually narrowing apically, with the apex projecting beyond the concave region (Figs. 17, 18). In addition, *Hebrus barrosae* **new species**, is smaller in overall size (BL 1.11–1.51 mm; (table 1) and differs in leg proportions, with tarsomere II of the foreleg equal to or longer than that of the midleg and the hind tibia about 1.25–1.30 times the length of the mid tibia, proportions not observed in *H. gloriosus*.

Etymology

This species is dedicated to Prof. Dr. Maria Claudene Barros (Universidade Estadual do Maranhão), in recognition of her contributions to the study of Neotropical biodiversity.

Distribution in Argentina. Buenos Aires, Corrientes (Fig. 47).

Hebrus engaeus Drake & Chapman, 1958

Hebrus engaeus Drake & Chapman, 1958: 322 (original description).

Figs. 19–34, 47, table 2

Material examined (Figs. 19–21). **Holotype.** ARGENTINA – **Tucumán** • Taí del Valle; [–26.9, –65.7]; 2000 m a.s.l.; 08.X.1948; P. Wygodzinsky leg.; 1 macropterous ♂, NMNH. **Allotype (= paratype).** Same data as holotype; 1 macropterous ♀, NMNH.

Additional material examined. ARGENTINA – **Jujuy** • between Laguna de Yala and Rt [Route] 9 just NW [Northwest] of Jujuy; [–24.12, –65.44]; 1835 m a.s.l.; 10.II.1993; R.T. Schuh & J.T. Polhemus leg.; 1 macropterous ♂, 1 macropterous ♀, NMNH – **Tucumán** • Chicligasta Department; El Cochuna Provincial Park, Cochuna River; 1.092 m a.s.l.; –27.32, –65.91; 06.XII.2007; S. Mazzucconi leg.; 6 macropterous ♂, 4 macropterous ♀, UBA.

Redescription

Macropterous males (Figs. 19–21). **Holotype (non-type).** BL 2.65 (2.90); HL 0.47 (0.52); HW 0.52 (0.50); EYE 0.12 (0.12); IOW 0.27 (0.25); OL 0.17 (0.15); ANT I 0.35 (0.32); ANT II 0.30 (0.27); ANT III lost (0.30); ANT IV lost (0.42); AWP 0.67 (0.70); HWP 1.02 (1.11); PL 0.62 (0.62); MESW 0.50 (0.50); MESL 0.07 (0.07); METW 0.52 (0.50); METL 0.23 (0.26); FORELEG, FEM 0.65 (0.57), TIB 0.65 (0.57), TAR I 0.05 (0.05), TAR II 0.18 (0.18); MIDLEG, FEM 0.70 (0.70), TIB 0.70 (0.65), TAR I 0.05 (0.03), TAR II 0.17

(0.17); HINDLEG, FEM 0.87 (0.92), TIB 1.07 (1.10), TAR I lost (0.03), TAR II lost (0.20). Additional measurements for non-type material deposited in the UBA are given in Table 1.

General color dark brown, except collar and medially on anterior lobe of pronotum slightly lighter. Labium and legs light brown. Forewings: corium light brown between darker veins; clavus light brown, with a small surpassing apex of mesoscutellum; membrane matte brown, with a small narrow whitish macula near apex of veins (Fig. 19). Sometimes, a very faint macula on the opposite side of the membrane (Fig. 19).

Vertex of head, pronotum, mesoscutellum, and metanotal elevation with very short golden setae. Clypeus and maxillary plate densely covered by yellowish to brown setae. Buccula with long yellowish setae. Antenna densely covered by brown setae. Corium and clavus with moderately long golden setae. Ornamentation of thoracic sterna with long yellowish setae. Legs and abdomen with dense, moderately long yellowish setae. Tegument with whitish pruinosity bordering eyes, on sides of head, anterior lobe of pronotum, and sides and venter of thorax (Fig. 19).

Head slightly wider than long; width through eyes approximately 1.1 times length; interocular width about 2.2 times eye width; a deep small punctation medially near pronotum (Fig. 19). Buccula elongated, slightly curved ventrally (Fig. 21). Antennomere I cylindrical, slightly curved; antennomere II cylindrical; antennomeres III–IV thinner than I–II. Pronotum with a transverse row of very small, moderately deep punctations on collar; anterior lobe with a pair of submedian carinae, depressed between them, swollen and with some punctations laterally; a transverse row of eight deep punctations between lobes; most central two punctations in row between lobes very closely placed, giving impression of a single deep punctation; posterior lobe depressed at midline, with two parallel rows of punctations submedially, a row of small punctations adjacent to posterior margin, continuing laterally close to humeri, and more irregular small punctations on disc; humeri elevated (Fig. 19). Mesoscutellum about 7 times wider than long. Metanotal elevation trapezoidal, 1.9–2.3 times wider than long; disc with raised margins and two submedian depressions divided by a median carina; obliquely narrowed on apical two-fifths; apex bluntly rounded, without median notch (Fig. 19). Abdomen without distinct modifications. Forewings exposing lateral margins of abdominal laterotergites, surpassing posterior margin of abdomen.

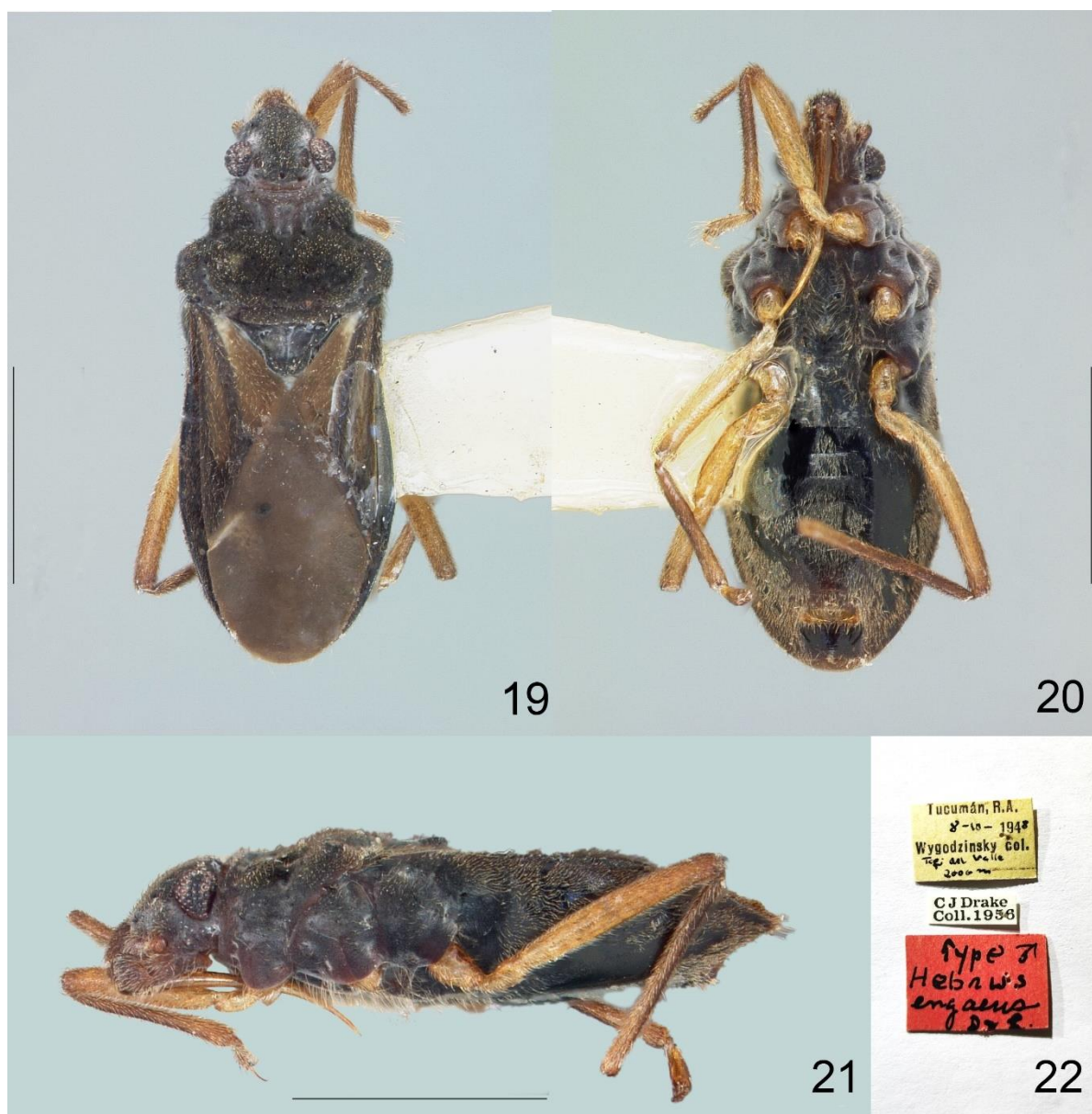


Figure 107. *Hebrus engaeus*, macropterous male, holotype (NMNH), habitus. 19. Dorsal view. 20. Ventral view. 21. Lateral view. 22. labels. Scale bars: 1.0 mm.

Macropterous female (Figs. 23–25). **Paratype.** BL 2.95; HL 0.50; HW 0.52; EYE 0.12; IOW 0.28; OL 0.17; ANT I 0.35; ANT II 0.32; ANT III lost; ANT IV lost; AWP 0.72; HWP 1.10; PL 0.62; MESW 0.52; MESL 0.07; METW 0.57; METL 0.25; FORELEG, FEM 0.67, TIB 0.70, TAR I lost, TAR II lost; MIDLEG, FEM 0.75, TIB, TAR I, TAR II lost; HINDLEG lost. Additional measurements for non-type material deposited in the UBA are given in Table 2.



Figure 108. *Hebrus engaeus*, macropterous female, paratype (NMNH), habitus. 23. Dorsal view. 24. Ventral view. 25. Lateral view. 26. labels. Scale bars: 1.0 mm.

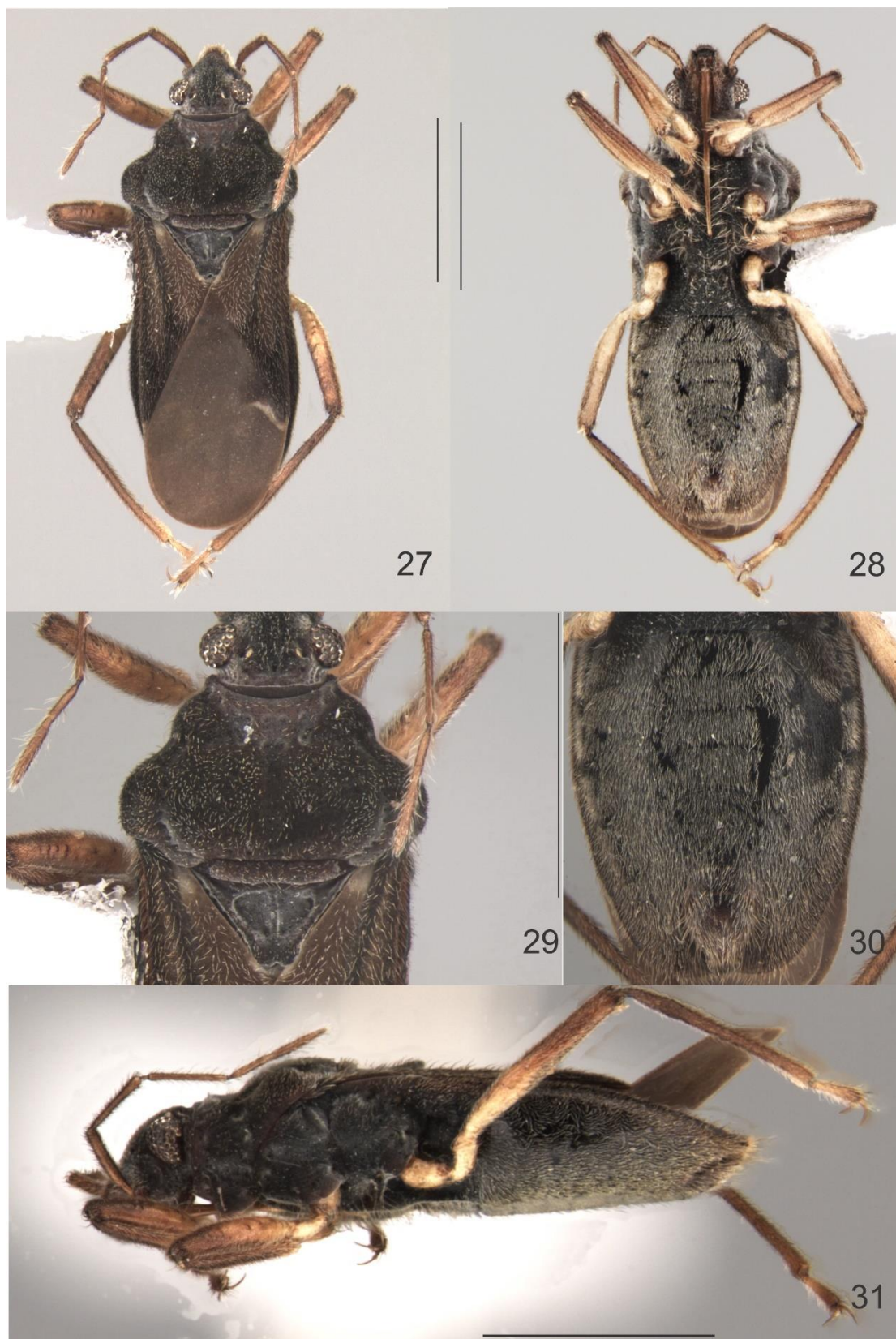


Figure 109. *Hebrus engaeus* macropterus male from Tucuman 27. Dorsal view. 28. Ventral view. 29. Part of head and thorax, dorsal view. 30. Part of abdomen, ventral view. 31. Lateral view, Scale bars: 1.0 mm (27, 28, 29, 31), 0.5 mm (30).

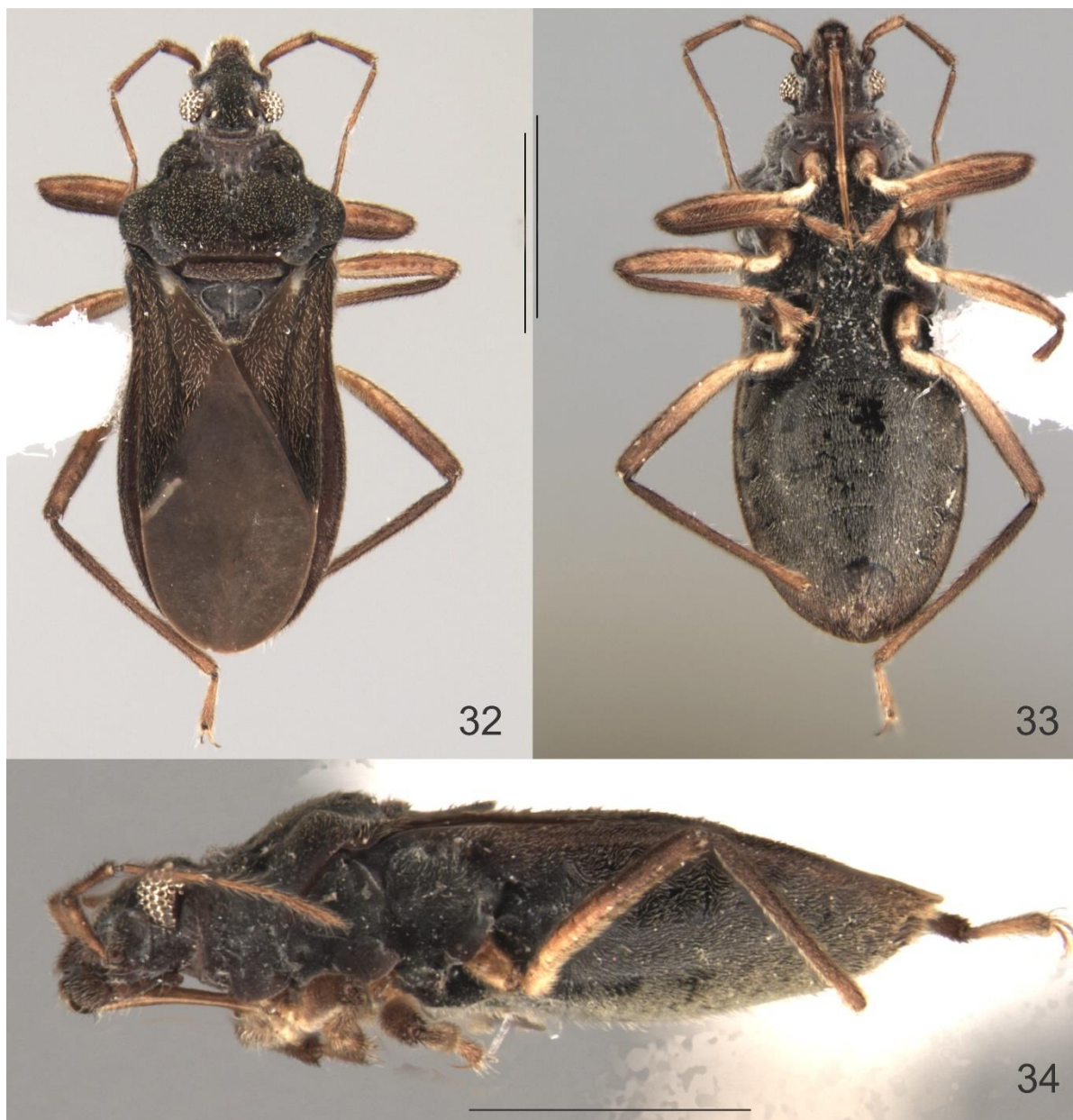


Figure 110. *Hebrus engaeus* macropterous female from Tucuman, 32. Dorsal view. 33. Ventral view. 34. Lateral view, Scale bars: 1.0 mm.

Similar to macropterous male but larger. Abdominal laterotergites elevated but not reflected over mediotergites (Figs. 23, 24, 32, 33).

Comment. The citation and record of *H. engaeus* from Buenos Aires is certainly erroneous, given the species' known distribution. It is clear that the citation by Bachmann & Mazzucconi (1995) was based on material belonging to another species, as neither author was familiar with species of *Hebrus* at that time (S.A. Mazzucconi pers. comm.). Dr. Bachmann

most likely associated the Buenos Aires specimens with the only species known from Argentina at the time (*H. engaeus*). The subsequent citations by Bachmann (1998) ("from the North to Buenos Aires") and Mazzucconi (2023) simply repeated the original citation from Bachmann and Mazzucconi (1995).

Table 2. Measurements from five males and five females of *Hebrus engaeus* deposited in the Universidad de Buenos Aires.

Structure	Male	Male	Male	Male	Male	Female	Female	Female	Female	Female
BL	2.88	2.71	2.85	2.84	2.80	3.03	2.94	3.06	3.03	2.88
HL	0.28	0.27	0.28	0.28	0.27	0.34	0.35	0.37	0.39	0.31
HW	0.54	0.53	0.53	0.51	0.51	0.54	0.52	0.55	0.52	0.55
EYE	0.15	0.14	0.13	0.12	0.12	0.12	0.11	0.13	0.10	0.13
IOW	0.31	0.29	0.3	0.27	0.29	0.32	0.31	0.30	0.31	0.28
ANT I	0.36	0.33	0.32	0.33	0.34	0.34	0.34	0.38	0.35	0.34
ANT II	0.34	0.31	0.30	0.31	0.30	0.32	0.30	0.34	0.29	0.31
ANT III	0.41	0.38	0.41	0.39	0.36	0.36	0.34	0.38	0.37	0.33
ANT IV	0.49	0.46	0.51	0.48	0.51	0.49	0.51	0.55	0.49	0.47
PL	0.56	0.48	0.56	0.55	0.55	0.60	0.66	0.62	0.48	0.59
AWP	0.71	0.67	0.71	0.67	0.69	0.72	0.68	0.74	0.74	0.71
HWP	1.14	1.07	1.07	1.96	1.06	1.19	1.11	1.22	1.16	1.18
MESL	0.09	0.08	0.12	0.10	0.09	0.11	0.12	0.10	0.10	0.11
MESW	0.55	0.52	0.57	0.53	0.45	0.51	0.54	0.52	0.55	0.55
METL	0.25	0.27	0.29	0.27	0.26	0.29	0.27	0.29	0.27	0.30
METW	0.47	0.5	0.51	0.47	0.38	0.50	0.51	0.47	0.44	0.44
Foreleg										
FEM	0.52	0.57	0.61	0.59	0.59	0.63	0.62	0.63	0.66	0.62
TIB	0.63	0.66	0.63	0.64	0.65	0.71	0.65	0.66	0.68	0.64
TAR I	0.03	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.05
TAR II	0.12	0.21	0.20	0.19	0.19	0.20	0.19	0.19	0.21	0.20
Midleg										
FEM	0.61	0.58	0.66	0.67	0.69	0.63	0.59	0.65	0.65	0.63
TIB	0.67	0.65	0.74	0.72	0.71	0.68	0.66	0.73	0.75	0.71
TAR I	0.04	0.05	0.05	0.04	0.05	0.06	0.07	0.06	0.06	0.05
TAR II	0.14	0.20	0.19	0.18	0.20	0.22	0.18	0.20	0.23	0.22
Hindleg										
FEM	0.61	0.58	0.66	0.67	0.69	0.97	0.80	0.96	0.85	0.80
TIB	0.67	0.65	0.74	0.72	0.71	1.13	0.97	1.15	1.21	1.13
TAR I	0.04	0.05	0.05	0.04	0.05	0.06	0.06	0.06	0.06	0.06
TAR II	0.14	0.20	0.19	0.18	0.20	0.24	0.26	0.27	0.29	0.26

Diagnosis. Body length ~2.6–3.1; general dark brown, with golden setae dorsally (Figs. 19, 23, 27, 32); head with a median punctation posteriorly (Figs. 19, 23, 27, 32); pronotum with a pair of submedian carinae (Figs. 19, 23, 27, 32); clavus with a small basal white macula surpassing apex of mesoscutellum, membrane with a small narrow whitish macula near apex of veins (Figs. 19, 23, 27, 29, 32) (sometimes, a very faint macula on the opposite side of the membrane; (Figs. 19, 23, 27, 32); metanotal elevation with median carina, apex bluntly rounded, without median notch (Figs. 19, 23, 27, 29, 32); male and female abdomen without distinct modifications; paramere long, blade-like, serrated.

Discussion.

Hebrus engaeus Drake & Chapman, 1958 is similar to *Hebrus plaumanni* Porter, 1952 in general coloration, pronotal punctation pattern, elevated humeri, forewings with whitish maculae, and metanotal elevation with a median carina. In both species, the male abdomen lacks distinct notches or projections. *Hebrus engaeus* can be distinguished by its larger body size (BL ~2.6–3.1), pronotum with a pair of distinct submedian carinae on the anterior lobe, and metanotal elevation with apex bluntly rounded and without a median notch. In contrast, *H. plaumanni* is smaller (BL ~1.9–2.2), lacks submedian carinae on the anterior pronotal lobe, and has the apex of the metanotal elevation with a moderately deep, rounded median notch. Forewing coloration also differs: in *H. engaeus*, the clavus bears a small basal whitish macula surpassing the apex of the mesoscutellum and the membrane shows a single small, narrow whitish macula near the apex of the veins, whereas *H. plaumanni* presents a pair of basal whitish maculae extending from below the pronotum to about half of the metanotal elevation and a pair of small transversal whitish maculae near the apex of the veins. Additionally, *H. engaeus* has very short golden setae on the dorsum and a median punctation on the posterior region of the head, while *H. plaumanni* exhibits moderately short brownish setae dorsally and lacks a distinct posterior median head punctation. The paramere of *H. engaeus* is long, blade-like, and serrated, whereas in *H. plaumanni* it is curved, with pointed apex.

Distribution. Argentina (Drake and Chapman 1958; Mazzucconi 2023; present study).

Distribution in Argentina. Jujuy (present study), Tucumán (Drake and Chapman 1958; present study) (Fig. 47).

Hebrus gloriosus Drake & Harris, 1943

Hebrus gloriosus Drake & Harris, 1943: 47 (original description).

Figs. 35–38, 47

Material examined (Figs. 35–38). ARGENTINA – **Misiones** • San Pedro Department, Moconá Provincial Park, Yabotí Stream; 152 m a.s.l.; –27.14, –53.90; 13.IV.2000; S. Mazzucconi leg.; 1 macropterous ♀, UBA.

Diagnosis.

For a detailed treatment of this species, see Franco *et al.* (in prep.).

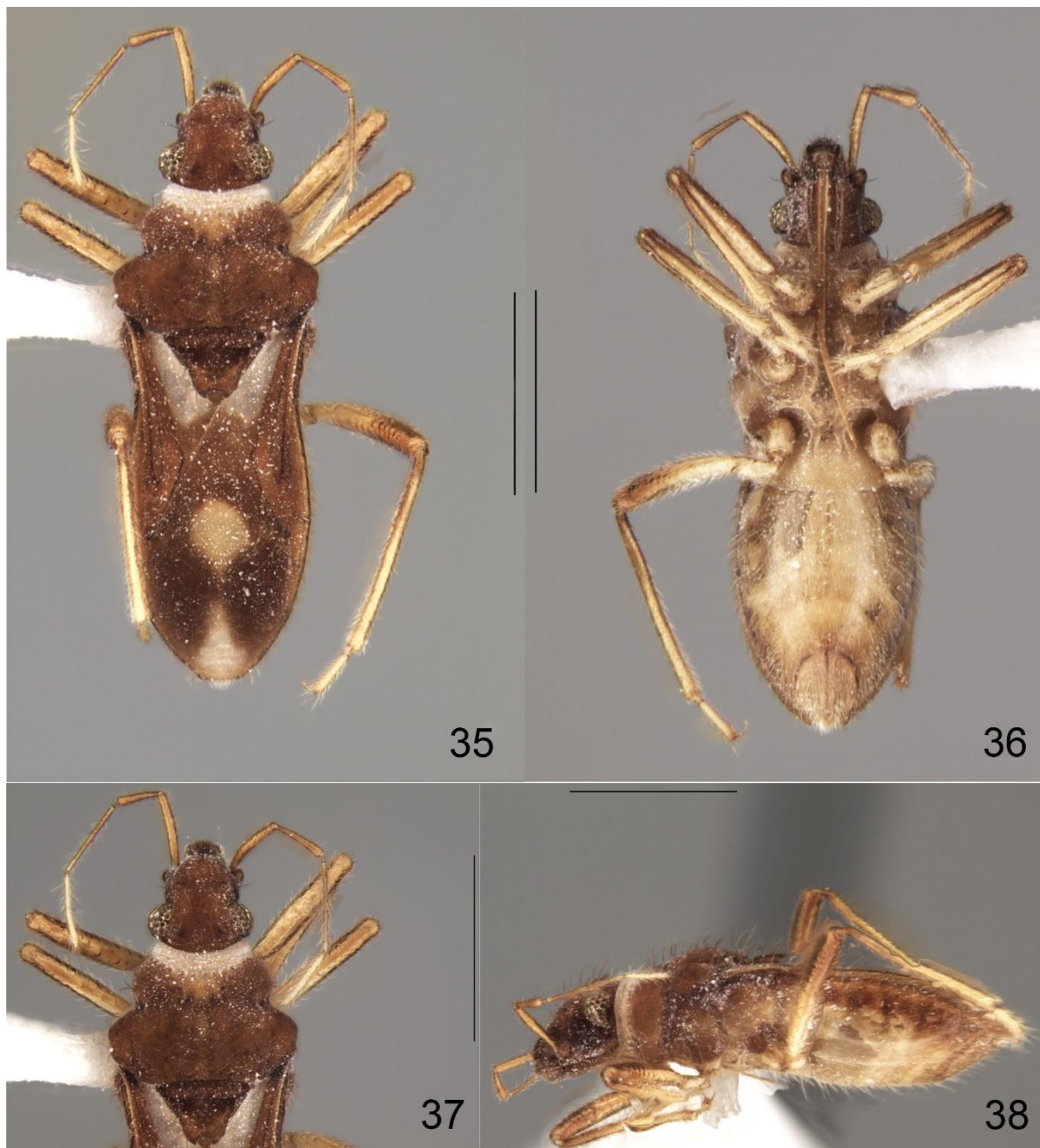


Figure 111. *Hebrus gloriosus*, macropterous female, habitus. 35. Dorsal view. 36. Ventral view. 37. Head, Antennomeres, and thorax, dorsal view. 38. Lateral view. Scale bars: 1.0 mm.

Distribution. Argentina (present study), Brazil (Drake and Harris 1943; Porter 1950; Franco et al. in prep.).

Distribution in Argentina. Misiones (new record; Fig. 47).

***Hebrus nordestinus* Franco, Rodrigues, Floriano & Moreira, in prep.**

Hebrus nordestinus Franco, Rodrigues, Floriano & Moreira, in prep. (original description).

Material examined. ARGENTINA – **Corrientes** • Ituzaingó Department, Iberá National Park, San Ignacio Ranger Station, Camping Monterrey, Aguará pedestrian path, marshland, muestra 7; –27.87, –56.88; 18.XI.2018; S. Mazzucconi leg.; 1 macropterous ♂, 1 macropterous ♀, UBA • Same, except Mburucuyá Department, Mburucuyá National Park, Cañada Fragosa, stream, 68 m. a.s.l.; muestra 7, lote 4; –27.95, –58.01; 11.VII.1997; S. Mazzucconi leg.; 1 macropterous ♂, 1 macropterous ♀, UBA.

Diagnosis.

For a detailed treatment of this species, see Franco et al. (in prep.). The micropterous form is herein reported for the first time. The wings do not surpass the apex of the metanotal elevation and are brown basally, white apically.

Distribution. Argentina (present study), Brazil (Franco et al. in prep.).

Distribution in Argentina. New record from Argentina, Corrientes (Fig. 47).

***Hebrus plaumanni* Porter, 1952**

Hebrus plaumanni Porter, 1952: 12 (original description).

Figs. 39–46, 47

Diagnosis.

For a detailed treatment of this species, see Franco et al. (in prep.).

Material examined (Figs. 39–46). ARGENTINA – **Salta** • Metán Department, Provincial Route 5 between National Route 9 and Provincial Route 20; muestra 7; [–24.79, –65.36]; 17.IX.2005; S. Mazzucconi leg.; 1 macropterous ♀, UBA – **Misiones** • Cainguas Department, Balneario Municipal del Valle del Cuñá-Pirú, Arroyo Cuñá-Pirú, 202 m a.s.l.; muestra 7; –27.08, –54.95; 02.IV.2006; S. Mazzucconi leg.; 1 macropterous ♂, UBA.

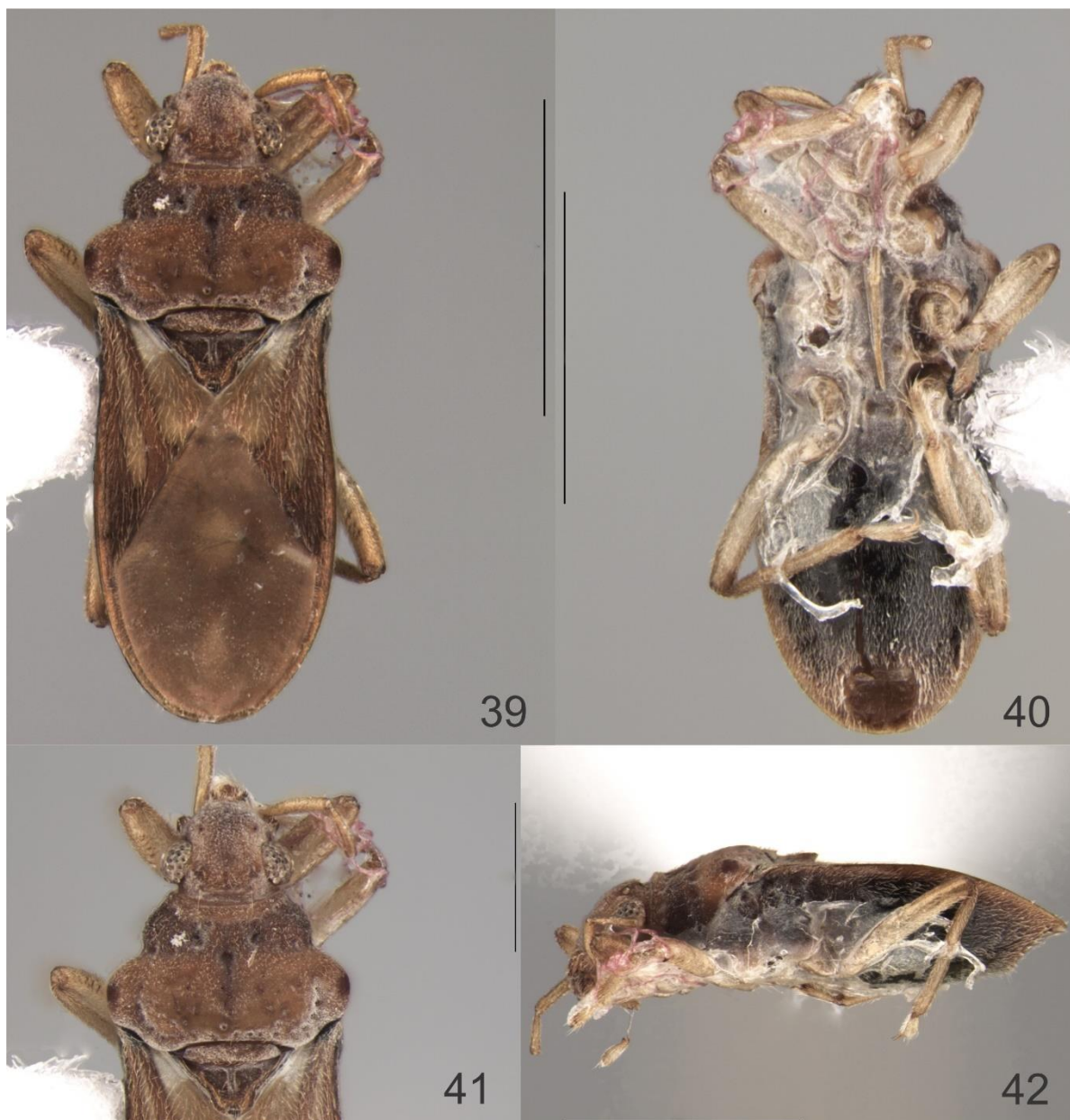


Figure 112. *Hebrus plaumanni*, macropterous male. 39. Dorsal view. 40. Ventral view. 41. Head, Antennomeres, and thorax, dorsal view. 42. Lateral view. Scale bars: 1.0 mm (39, 40, 42) 0.5mm (41).



Figure 113. *Hebrus plaumanni*, macropterous female. 43. Dorsal view. 44. Ventral view. 45. Head, Antennomeres, and thorax, dorsal view. 46. Lateral view. Scale bars: 1.0 mm (43, 44, 46) 0.5mm (45).

Distribution. Argentina (present study), Brazil (Porter 1952). The record from Colombia (Padilla-Gil 2013) is highly questionable.

Distribution in Argentina. Misiones and Salta (present study; Fig. 47).

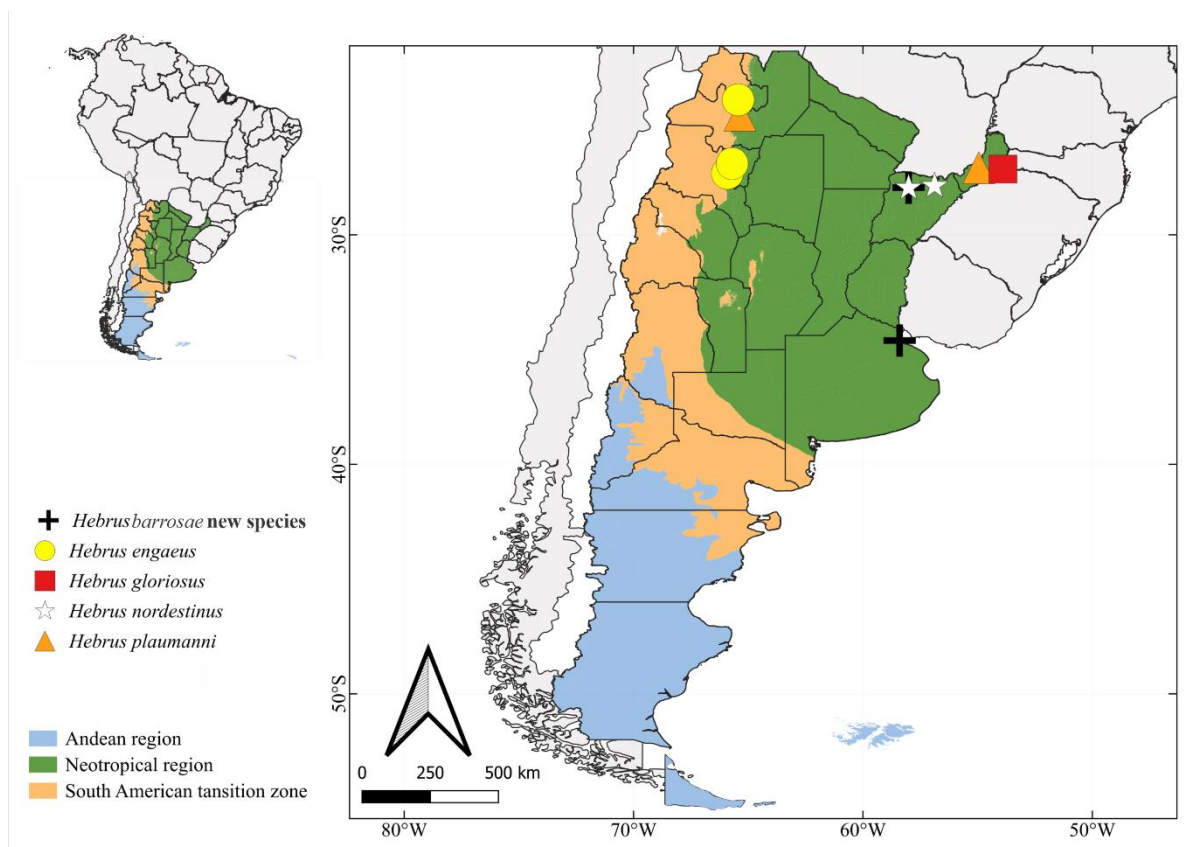


Figure 114. Geographic distribution of *Hebrus* recorded from Argentina. *Hebrus barrosae* new species, is represented by (dark crosses), *H. engaeus* (yellow circles; *H. gloriosus* by a red square; *H. nordestinus* by white stars), and *H. plaumanni* (orange triangles).

Discussion

The present study considerably expands the knowledge of *Hebrus* in Argentina, increasing the number of recorded species from two to six and documenting a broader geographic and morphological diversity than previously recognized. Until recently, the Argentine fauna of Hebridae was regarded as poorly diverse and restricted mainly to central and southern provinces (Drake and Chapman 1958; Stella and Pall 2018; Mazzucconi 2023). The new records and the description of a new species presented here demonstrate that this low diversity was largely an artifact of limited sampling and taxonomic attention.

The redescription of *Hebrus engaeus* was necessary due to the scarcity of detailed morphological information in the original description by Drake and Chapman (1958). Examination of additional material revealed intraspecific variation in body size, coloration, and wing maculation, reinforcing the importance of redescriptions based on series rather than

single specimens. Such variation has been reported for other species of *Hebrus* and appears to be common within the genus (Andersen 1982; Moreira 2015).

The first Argentine records of *H. gloriosus* and *H. plaumanni* significantly extend the known southern distribution limits of these species, which were previously known mainly from Brazil and adjacent regions (Drake and Harris 1943; Porter 1952; Polhemus and Polhemus 2008). These findings suggest a stronger biogeographic connection between the Argentine fauna and the subtropical and temperate regions of southeastern South America than previously assumed. Similarly, the record of *H. nordestinus*, originally described from northeastern Brazil, indicates a wider latitudinal distribution and ecological tolerance within the species.

The new species described herein further highlights the underestimated diversity of *Hebrus* in southern South America. Diagnostic characters, particularly those related to male genitalia, wing maculation patterns, and the shape of the metanotal elevation, proved to be reliable for species delimitation, corroborating previous studies emphasizing the taxonomic value of these characters within Hebridae (Andersen 1982; Polhemus and Polhemus 1989; Moreira 2015).

From an ecological perspective, most examined specimens were collected in marginal aquatic habitats, including stream edges, lagoons, and associated vegetation, consistent with habitat preferences reported for the genus elsewhere (Nieser and Melo 1997; Pereira and Melo 2007; Rodrigues et al. 2021). The frequent use of light traps, as evidenced by several records, reinforces the notion that passive nocturnal sampling methods are particularly effective for detecting *Hebrus* species and should be more widely employed in future surveys.

Overall, the results presented here underscore the need for continued taxonomic revisions and targeted collecting efforts focusing on semiaquatic Heteroptera in Argentina and neighboring regions. Given the cryptic habits, small body size, and limited historical sampling of Hebridae, it is likely that additional species of *Hebrus* remain undiscovered in southern South America. Future studies integrating morphological and molecular data will be essential for refining species boundaries, clarifying phylogenetic relationships, and improving our understanding of the biogeography of this understudied group.

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Resultado e Discussão Geral

Das 28 espécies de *Hebrus* previamente registradas para a região Neotropical (Polhemus & Polhemus, 2008; Moreira, 2015), verificou-se que *Hebrus buenoi furvus* Polhemus & Chapman, 1970 não ocorre na região, reduzindo o número de espécies válidas neotropicais a 27. Adicionalmente, foram propostas duas novas sinonímias com base no exame do material-tipo e de espécimes adicionais: *Hebrus catus* Drake & Chapman, 1958 (= *Hebrus elimatus* Drake & Cobben, 1960, **syn. nov.**) e *Hebrus plaumanni* Porter, 1952 (= *Hebrus limnaeus* Drake & Chapman, 1958, **syn. nov.**), resultando em 25 espécies válidas para a região.

Todas as 25 espécies válidas foram redescritas, ilustradas e tiveram seus dados de distribuição geográfica atualizados com base em material examinado de coleções entomológicas nacionais e internacionais, bem como em dados inéditos de campo. As espécies tratadas são as seguintes: *Hebrus bilineatus* Champion, 1898; *H. burmeisteri* Lethierry & Severin, 1896; *H. camposi* Drake & Chapman, 1954; *H. catus* Drake & Chapman, 1958; *H. concinnus* Uhler, 1894; *H. consolidus* Uhler, 1894; *H. ecuadoris* Drake & Harris, 1943; *H. engaeus* Drake & Chapman, 1958; *H. gloriosus* Drake & Harris, 1943; *H. hirsutus* Champion, 1898; *H. hungerfordi* Drake & Harris, 1943; *H. lacunatus* Drake & Chapman, 1958; *H. laeviventris* Champion, 1898; *H. major* Champion, 1898; *H. nubilus* Drake & Harris, 1943; *H. parvulus* Stål, 1860; *H. paulus* Drake & Harris, 1943; *H. pilosidorsus* Polhemus & Chapman, 1970; *H. plaumanni* Porter, 1952; *H. priscus* Drake & Harris, 1943; *H. pudoris* Drake & Harris, 1943; *H. sobrinus* Uhler, 1877; *H. spiculus* Polhemus & McKinnon, 1983; *H. sulcatus* Champion, 1898; e *H. usingeri* Drake & Harris, 1943.

Além das espécies já conhecidas, foram descritas 10 espécies novas para a ciência, totalizando 35 espécies de *Hebrus* para a região Neotropical: *Hebrus alagoensis* **sp. nov.**, *H. azevedus* **sp. nov.**, *H. barrosae* **sp. nov.**, *H. canejoi* **sp. nov.**, *H. cunhai* **sp. nov.**, *H. franciscanus* **sp. nov.**, *H. giehli* **sp. nov.**, *H. inpa* **sp. nov.**, *H. limai* **sp. nov.** e *H. nordestinus* **sp. nov.**

Esse resultado demonstra que a diversidade do gênero na região Neotropical foi historicamente subestimada, o que pode ser atribuído aos hábitos crípticos das espécies, ao seu pequeno tamanho corporal e à escassez de esforço amostral direcionado ao grupo (Moreira, 2015; Zettel & Tran, 2016). Polhemus & Polhemus (2008), em sua revisão global dos percevejos aquáticos, estimaram que ao menos 20 espécies de *Hebrus* aguardavam descrição formal para a região Neotropical. O presente trabalho descreveu 10 dessas espécies,

representando a metade do total estimado por aqueles autores, e há fortes indícios de que esse número será ultrapassado à medida que novas expedições de coleta sejam realizadas, especialmente em áreas ainda pouco amostradas do Brasil e de outros países da América do Sul.

A compilação e atualização dos dados de distribuição geográfica revelaram lacunas expressivas no conhecimento da ocorrência de *Hebrus* no continente americano, particularmente em países como Bolívia, Paraguai e nas regiões Centro-Oeste do Brasil. As novas ocorrências registradas neste trabalho ampliam consideravelmente a distribuição conhecida de diversas espécies e sugerem que a diversidade biogeográfica do grupo é maior do que se supunha. Os mapas de distribuição aqui apresentados constituem, portanto, uma ferramenta de referência para estudos futuros sobre biogeografia, ecologia e conservação dos Hebridae na região Neotropical.

Em conjunto, os resultados obtidos contribuem para a redução de duas das sete lacunas de conhecimento sobre a biodiversidade apontadas por Hortal et al. (2015): a *lacuna linneana*, ao delimitar e formalizar o reconhecimento de táxons válidos, e a *lacuna wallaceana*, ao ampliar o registro de distribuição geográfica das espécies. Espera-se que este trabalho sirva de base para que novos pesquisadores possam avançar no conhecimento taxonômico, filogenético e ecológico dos Hebridae neotropicais.

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