



**INSTITUTO DE BIOCÊNCIAS  
PROGRAMA DE PÓS-GRADUAÇÃO EM BIOLOGIA ANIMAL**

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**Revisão do gênero *Eurystethus* Mayr, 1864 (Hemiptera: Pentatomidae: Discocephalinae)**

Porto Alegre  
2022

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**Sensilas interomatidiais e revisão do gênero *Eurystethus* Mayr, 1864 (Hemiptera:  
Pentatomidae: Discocephalinae)**

Tese apresentada ao Programa de Pós-Graduação em Biologia Animal, Instituto de Biociências da Universidade Federal do Rio Grande do Sul, como requisito à obtenção do título de Doutor em Biologia Animal. Área de concentração: Biologia comparada.

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Porto Alegre  
2022

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Pentatomidae: Discocephalinae)**

Aprovada em \_\_\_\_\_ de \_\_\_\_\_ de \_\_\_\_\_.

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**Porto Alegre, 30 de maio de 2022**

*À minha mãe, minhas avós e minhas tias, as mulheres que são, sobretudo, meu alicerce. À elas devo a luz, os meus primeiros passos e os mais fortes impulsos nas caminhadas pela vida.*

## AGRADECIMENTOS

Expressar meus agradecimentos em palavras é difícil, deixando constantemente a sensação de estar sendo injusto com alguém que eu possa, eventualmente, esquecer de mencionar; ou por usar palavras insuficientes, que não contemplem toda minha gratidão.

Sou muito grato a todos aqueles que fizeram parte desta jornada de doutorado, antes, durante, no fim e após. Não foram anos fáceis. Desde o processo de atravessar o país rumo a algo completamente novo e desconhecido, até os enfrentamentos da vida adulta, dos dilemas e problemas emocionais e psicológicos. Definitivamente, não foi fácil. Mas, se cheguei até este ponto, é porque deu certo e, de algum modo, eu já venci, e venci graças a todas as pessoas que encontrei pelo caminho.

Meus maiores sentimentos estão com a minha família, que suportou os quilômetros de distância que nos separaram sem deixar de me apoiar e me incentivar em cada passo. Minha mãe, Joelma, e minha avó, Maria das Graças, que com amor incondicional me cercaram do seu zelo e preocupação praticamente diária, bem como me faziam lembrar constantemente do propósito que ambicionei e que me fez chegar até este Doutorado.

Aos mestres – ou melhor, aos Doutores! – Luiz Alexandre Campos e José Antônio Fernandes, sobretudo pela paciência e persistência, até quando eu mesmo estava a ponto de as perder. Também não posso deixar de inserir aqui todos os outros professores do PPGBan que compartilharam seu conhecimento comigo, tanto quanto suas sabedorias e lições de vida.

Ao Erenson Romero Júnior, meu companheiro, devo toda gratidão por estar, literalmente, ao meu lado em todas as circunstâncias, sendo e fornecendo apoio em cada momento.

Pelos risos, lições, conselhos e parcerias, agradeço imensamente aos amigos e colegas. À Valéria Casique e Marcus Soares, meus primeiros amigos de morada em Porto Alegre. À Talita, Wanessa, Filipe, Ana Paula, Alana e Natália, pedacinhos do LES. À Laise e ao Breno, estes pedacinhos da UFPA e de Belém, que também vieram parar em Porto Alegre.

Ao PPGBan sou grato por todas as oportunidades e portas abertas, sem deixar de citar o memorável incentivo e apoio que me deram para visitar o American Museum of Natural History, que foi o ponto chave na minha vivência enquanto pesquisador, além de me possibilitar ver *in loco* uma outra realidade desta carreira, além dos próprios tipos de *Eurystethus*.

Enfim, não há como não ser grato à própria Natureza que se abre para que nós, Biólogos, tratemos de apreciá-la. E então também não posso deixar de expressar minha gratidão aos *Eurystethus*, que inicialmente se apresentaram para mim com a timidez de um punhado de espécies com pouquíssimos dados, para depois se revelarem um horizonte sem fim de possibilidades, ainda que eu tenha explorado só uma pequena parte delas. Que mais pessoas possam encontrar tamanha beleza para se admirar.

*“ ... I gotta have  
Roots before branches  
To know who I am  
Before I know  
Who I wanna be  
And faith  
To take chances  
To live like I see  
A place in this world  
For me... ”*

*Roots before branches – Room for two*

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## RESUMO

O gênero *Eurystethus* foi proposto como monotípico por Mayr em 1864 para alocar *E. nigropunctatus*. Ruckes, em 1958, descreveu e incluiu *E. ellipsoidalis*, e em 1966, ao revisar o gênero, incluiu mais quinze espécies e as distribuiu em dois subgêneros: *Hispidisoma*, com sete espécies com os olhos e o pronoto cerdosos, e projeções (como espinhos) na margem da cabeça e nos ápices do pronoto; e o nominal *Eurystethus*, com nove espécies sem cerdas nos olhos nem nas margens do pronoto, e com dentículos pequenos na margem da cabeça e ápice anterior do pronoto. No mesmo ano, Becker descreveu mais duas espécies para o gênero (*E. goianensis* e *E. deplanatus*), não incluídas em nenhum subgênero, totalizando dezoito espécies em *Eurystethus*. Praticamente não há ilustrações de caracteres com valor sistemático na revisão de Ruckes, o que contribui para *Eurystethus* permanecer um gênero pouco conhecido, com espécies de difícil separação, identificação e diferenciação, o que impede ou inibe a descrição de espécies novas, levando a uma provável subestimação da diversidade do gênero. O presente trabalho, organizado em três capítulos, possibilitou a revisão do gênero *Eurystethus*. Através de Microscopia Eletrônica de Varredura (MEV) as sensilas interomatidiais, caráter importante na taxonomia de *Eurystethus*, são estudadas em vinte espécies, das quais 18 Discocephalini, um Ochlerini e um Edessinae. Concluiu-se que essa característica vinha sendo abordada de forma incorreta, uma vez que, ao contrário do documentado na literatura, dezenove das vinte espécies analisadas apresentaram algum tipo de sensila entre os omatídeos, que incluem espécies do subgênero *Eurystethus*. Observou-se que as sensilas também podem ser removidas com facilidade, o que impede sua detecção através de microscopia óptica tradicional. Soma-se o fato de que muitas espécies do gênero possuem variações em sua morfologia que se encaixam em ambos os subgêneros, ou em nenhum, como as formas da unidade intercalar do lábio e a presença ou ausência das sensilas. Por essa razão, nenhuma das espécies aqui trabalhadas foram classificadas dentro dos subgêneros de *Eurystethus*. Após consulta do material tipo e outros exemplares emprestados coleções nacionais e internacionais, obteve-se um extenso número de registros de *Eurystethus*. Isto possibilitou a revisão taxonômica do gênero: com a proposição de arranjos nomenclaturais para as espécies *E. goianensis* e *E. deplanatus*, considerados sinônimos júnior de *E. ornatus* e *E. variegatus*, respectivamente; bem como a descrição de *E. jo*, *E. multipunctatus* e *E. rufodorsatus*, além de mais dezessete novas espécies (*E. sp. 22*, *E. sp. 27*, *E. sp. 5*, *E. sp. 18*, *E. sp. 3*, *E. sp. 21*, *E. sp. 16*, *E. sp. 23*, *E. sp. 52*, *E. sp. 40*, *E. sp. 45*, *E. sp. 39*, *E. sp. 26*, *E. sp. 7*, *E. sp. 34*, *E. sp. 20*, *E. sp. 36*) e uma chave dicotômica para incluir



todos os *Eurystethus*.

**Palavras-chave:** Heteroptera, Discocephalini, *Hispidisoma*, morfologia, taxonomia.

## ABSTRACT

*Eurystethus* was described by Mayr in 1864 to allocate *E. nigropunctatus*. Ruckes, in 1958, described and included *E. ellipsoidalis*. In 1966 the last author revised the genus, including more fifteen species, dividing and distributing them in two subgenera: *Hispidisoma*, with seven species with setose eyes and pronotum, thorn-like projections at margins of head and apex of pronotum; and the nominal *Eurystethus*, with nine species, not setose at eyes and pronotum, with denticles at margins of head and anterior apex of pronotum. In the same year, Becker described two new species (*E. goianensis* e *E. deplanatus*), not including them in the subgenera, totalizing eighteen species in *Eurystethus*. The revision of Ruckes is scarce of illustrations with systematic value, contributing to *Eurystethus* to remain as a barely known genus with species difficult to separate, identify and differentiate, inhibiting the description of new species and resulting in the underestimation of the genus diversity. This work, organized in three chapters, resulted in a complete revision of *Eurystethus*. With scan electron microscopy (SEM) we studied the interommatidial sensilla, important character in *Eurystethus* taxonomy, of twenty species: eighteen Discocephalini, one Ochlerini and one Edessinae. We concluded that this character was treated incorrectly by authors, because nineteen of the twenty species analyzed present some sensillum between the ommatidia, including species of the subgenus *Eurystethus* that was not supposed to have sensilla at eyes. The sensilla could be removed easily, impeding it from being observed by light stereomicroscopy. Also, many *Eurystethus* species have morphology variations that fit both subgenera, or fit none, like the presence or absence of sensilla in the eyes, and the shapes of intercalary labial units. For this reason, the species treated here were not classified into the subgenera of *Eurystethus*. After the analysis of type material and specimens borrowed from national and international collections, we obtained a large amount of material of *Eurystethus* that allowed us to revise the genus: proposing nomenclatural changes to *E. goianensis* and *E. deplanatus*, now junior synonyms of *E. ornatus* and *E. variegatus*, respectively; the description of the new *E. jo*, *E. multipunctatus* and *E. rufodorsatus*, in addition to other seventeen new species (*E. sp. 22*, *E. sp. 27*, *E. sp. 5*, *E. sp. 18*, *E. sp. 3*, *E. sp. 21*, *E. sp. 16*, *E. sp. 23*, *E. sp. 52*, *E. sp. 40*, *E. sp. 45*, *E. sp. 39*, *E. sp. 26*, *E. sp. 7*, *E. sp. 34*, *E. sp. 20*, *E. sp. 36*) with a dichotomous key to all *Eurystethus*.

**Key words:** Heteroptera, Discocephalini, *Hispidisoma*, morphology, taxonomy.

## **ADVERTÊNCIA**

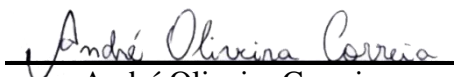
Esta tese não constitui uma publicação nos termos do artigo 8 do Código Internacional de Nomenclatura Zoológica. Os nomes novos aqui apresentados não tem validade para fins de nomenclatura.


**WARNING**

This thesis does not constitute a publication in accordance with article 8 of the International Code of Zoological Nomenclature. The new names herein presented have no validity for nomenclatural purposes.

**DECLARAÇÃO**

Declaro que o presente projeto não se enquadra nas situações previstas nos itens 2, 3 e 4 da resolução nº 40/2021 do Programa de Pós-Graduação em Biologia Animal (PPGBAN).

  
\_\_\_\_\_  
André Oliveira Correia  
Aluno

  
\_\_\_\_\_  
Luiz Alexandre Campos  
Orientador

## INTRODUÇÃO

Heteroptera é um táxon mundialmente distribuído, com grande diversidade nas zonas tropicais, sendo Pentatomidae (percevejo, fede-fede) a quarta maior família com aproximadamente 25% de sua diversidade (cerca de 230 gêneros e 1.400 espécies) na região Neotropical (Grazia *et al.* 2015).

Discocephalinae (Pentatomidae) é uma subfamília de pentatomídeos fitófagos quase totalmente restrita à região Neotropical (Garbelotto *et al.* 2018) com 79 gêneros e 317 espécies, distribuídos nas tribos Discocephalini (44 gêneros) e Ochlerini (36 gêneros) (Rolston 1981; Grazia *et al.* 2015; Roell & Campos 2018). A subfamília tem limites bem estabelecidos, pouco discutidos e com poucas alterações desde sua descrição por Fieber em 1860.

Características que unem as espécies de Discocephalinae são: a inserção do lábio na linha dos olhos com o primeiro segmento atingido o prosterno, o metasterno com uma carena mediana, tricobótrios abdominais laterais à linha que une os espiráculos e superfície dorsal do proctiger com o terço basal membranoso (Rolston & McDonald 1979, Rolston 1981, Campos & Grazia 2006).

O táxon foi descrito inicialmente como a família “Discocephalida”, depois considerada como subfamília por Stål (1868), condição que perdurou até Kirkaldy (1909) que, por sua vez, considerou-a tribo de Pentatominae. Posteriormente, Rolston & McDonald (1979) revisaram e propuseram tratar o táxon como subfamília novamente. No mesmo trabalho, os autores transferiram para o grupo 23 gêneros de Halyini (Pentatomidae, Pentatominae), levando Rolston (1981) a propor a tribo Ochlerini para incluir estes gêneros transferidos. Por isso, os 47 gêneros que originalmente formavam a família passaram então para a tribo Discocephalini, dividindo a subfamília nestas duas tribos.

As tribos de Discocephalinae podem ser distinguidas pela cor e aspecto externo geral do corpo. Os Ochlerini são sempre escuros e crípticos, com uma forma plana ou côncava na superfície dorsal do último segmento tarsal das fêmeas, enquanto nos outros pentatomídeos a forma é convexa. Discocephalini é formada por espécies pequenas ou médias e que possuem uma coloração variegada de tons claros (castanho claro, castanho amarelado) com tons mais escuros (castanho escuro, negro), mas nunca coloração intensa ou chamativa; o corpo normalmente é achatado dorsoventralmente e arredondado ou oblongo. Embora existam caracteres diagnósticos, não há uma descrição formal desta última tribo publicada até o momento (Grazia *et al.* 2015).

Rolston (1992) forneceu chave e diagnoses para os gêneros de Ochlerini, incluindo novas sinonímias, descreveu nove gêneros novos e 11 novas espécies, passando a tribo a contar com 101 espécies descritas em 28 gêneros. Após trabalhos recentes (p. ex. Campos & Grazia 2000, 2001, Campos *et al.* 2004, Garbelotto *et al.* 2011) este número foi elevado para 32 gêneros e 115 espécies (Grazia *et al.* 2015). Assim, é notável a quantidade de revisões recentes em Ochlerini, o que inclui uma análise cladística para apoiar os estudos (Campos & Grazia 2006).

Discocephalini, por sua vez, é composta atualmente por 192 espécies alocadas em 43 gêneros (Grazia *et al.* 2015). Destes, 24 foram descritos no século XIX, principalmente na segunda metade (p. ex. Dallas 1851, Distant 1887, 1889 e Stål 1860, 1864, 1868) e até o século passado foram descritos outros 21 gêneros, sendo a grande maioria de autoria de Ruckes (p. ex. 1962, 1965). Do total de gêneros, 15 já foram revisados (p. ex. Ruckes 1966a, b, c; Ruckes & Becker 1970; Becker & Grazia 1985, 1992; Rolston 1984, 1988; Fernandes & Grazia 2006, 2008), sendo o restante composto basicamente por 19 gêneros monotípicos e outros 10 que possuem aproximadamente cinco espécies conhecidas cada.

A sistemática moderna de Discocephalini data dos anos 1960 com os trabalhos de Herbert Ruckes (p.ex. Ruckes 1964, 1965, 1966a), seguidos por aqueles publicados durante quase 30 anos por Miriam Becker e Jocélia Grazia (p.ex. Becker 1966, 1977; Becker & Grazia 1985, 1992, 1995). Recentemente, diversos artigos abordando diferentes temas e incluindo Discocephalini têm sido publicados (p.ex. Bianchi *et al.* 2014, 2016; Carrenho *et al.* 2018), mas somente alguns tratam da taxonomia da tribo (Petrulevičius & Popov 2014; Rosso & Campos 2017; Garbelotto *et al.* 2018). Filogenias recentes de Discocephalinae focaram em Ochlerini, incluindo apenas uma pequena amostragem de Discocephalini (Campos & Grazia 2006; Roell & Campos 2018), ainda que os autores destes trabalhos tenham encontrado suporte, baseado em morfologia, para a relação de grupos-irmãos entre as duas tribos.

Assim, um problema em Discocephalini é a existência de subgêneros propostos com base em características diagnósticas que normalmente não são um consenso entre os especialistas, levando a necessidade de se investigar a validade dos mesmos. O gênero *Antiteuchus* Dallas, por exemplo, apresentava este problema após a revisão de Ruckes (1964), mas na revisão de Fernandes & Grazia (2006) os subgêneros foram desconsiderados. Esse trabalho ainda repercutiu no estudo de outros dois pequenos gêneros considerados próximos, *Parantiteuchus* e *Callostethus* (Fernandes & Grazia 2002, Fernandes *et al.* 2011). Casos como este reforçam que o estudo de Discocephalini seja voltado para a revisão dos gêneros

maiores e mais problemáticos. Tal desconfiança sobre o verdadeiro status recai também sobre o gênero *Eurystethus* Mayr, 1864, que mesmo após revisões (Ruckes 1966a; Becker & Grazia 1985), manteve subgêneros duvidosos quanto a sua caracterização, apesar de a análise de Discocephalini *sensu* Garbelotto (2015) ter sustentado a relação entre os dois táxons.

O gênero *Eurystethus* foi proposto como monotípico por Mayr (1864) para alocar *E. nigropunctatus*, mas Ruckes (1966a), ao revisar o gênero, incluiu mais 15 espécies, além de distribuí-las em dois subgêneros: *Hispidisoma*, com sete espécies e o nominal *Eurystethus*, com nove espécies. No mesmo ano da revisão, Becker (1966) descreveu mais duas espécies para o gênero, mas estas não foram incluídas em nenhum subgênero, totalizando 18 espécies em *Eurystethus*.

*Eurystethus* se caracteriza pela cabeça mais curta que o comprimento médio do pronoto; pronoto e escutelo com tubérculos; mesosterno hexagonal, mais largo do que longo; fêmeas com quatro placas genitais e membrana do hemiélitro reticulada (Ruckes 1966a; Garbelotto 2015). No subgênero *Hispidisoma* os olhos e o pronoto são cerdosos, e tanto a margem da cabeça quanto os ápices do pronoto apresentam projeções proeminentes, como espinhos. Espécies do subgênero *Eurystethus* não possuem cerdas ao redor dos olhos e na margem anterolateral do pronoto, e apresentam dentículos pequenos na margem da cabeça e ápice anterior do pronoto (Ruckes 1966a).

De acordo com Bergroth (1918), *Eurystethus* é um gênero próximo a *Opophylax* Bergroth. Conforme Ruckes (1966a), as características morfológicas de *Eurystethus* o colocam junto aos gêneros *Coriplatus* White, *Pelidnocoris* Stål e *Abascantus*, Stål. Esta relação foi recuperada na análise cladística de Garbelotto (2015), que sugere que *Eurystethus* seja grupo irmão de *Coriplatus* + (*Abascantus* + *Pelidnocoris*), além de sustentar a relação entre os dois subgêneros de *Eurystehtus*. Contudo, a filogenia não recuperou o relacionamento proposto por Bergroth, apontando *Opophylax* fora de Discocephalini *sensu* Garbelotto (2015), onde *Eurystethus* pertence.

Os tipos de *Eurystethus* estão concentrados nas seguintes coleções: American Museum of Natural History (AMNH), California Academy of Sciences (CAS), Carnegie Museum of Natural History (CMNH), Museu de Ciências Naturais da Fundação Zoo-Botânica do Rio Grande do Sul (MCNZ), Muséum National d'Histoire Naturelle (MNHN), Naturhistorisches Museum Wien (NMW), Rijksmuseum Van Natuurkijke Historie (RMNH). São as espécies de *Eurystethus* e seus respectivos subgêneros (Tab. 1):



**Tabela 1.** Lista de espécies de *Eurystethus* e seus respectivos subgêneros, em ordem alfabética.

Subgênero	Espécie
<i>Eurystethus</i> Mayr, 1864	<i>Eurystethus ellipsoidallis</i> Ruckes, 1958
	<i>Eurystethus macroconus</i> Ruckes, 1966
	<i>Eurystethus nigropunctatus</i> Mayr, 1864
	<i>Eurystethus ornatus</i> Ruckes, 1966
	<i>Eurystethus ovalis</i> Ruckes, 1966
	<i>Eurystethus pallescens</i> Ruckes, 1966
	<i>Eurystethus parvulus</i> Ruckes, 1966
	<i>Eurystethus sordidus</i> Ruckes, 1966
	<i>Eurystethus spurculus</i> Ruckes, 1966
<i>Hispidisoma</i> Ruckes, 1966	<i>Eurystethus fulvescens</i> Ruckes, 1966
	<i>Eurystethus microlobatus</i> Ruckes, 1966
	<i>Eurystethus nigricornis</i> Ruckes, 1966
	<i>Eurystethus nigroviridis</i> Ruckes, 1966
	<i>Eurystethus punctissimus</i> Ruckes, 1966
	<i>Eurystethus sacculatus</i> Ruckes, 1966
	<i>Eurystethus variegatus</i> Ruckes, 1966
Sem subgênero	<i>Eurystethus deplanatus</i> Becker, 1966
	<i>Eurystethus goianensis</i> Becker, 1966
	<i>Eurystethus jo</i> Correia, Fernandes & Campos
	<i>Eurystethus multipunctatus</i> Correia, Fernandes & Campos
	<i>Eurystethus rufodorsatus</i> Correia, Fernandes & Campos

Apesar de tudo, *Eurystethus* é um gênero pouco conhecido (Bergroth 1918, Ruckes 1958 e 1966a, Becker 1966) além de possuir espécies de difícil separação, pois a revisão de Ruckes (1966a) apresenta uma chave pouco clara, elaborada com base em caracteres quantitativos ou qualitativos difíceis de interpretar, como cor e tamanho genérico de estruturas (“grande” ou “pequeno”). Na revisão praticamente não há ilustrações de caracteres com valor sistemático, exceto pelas pranchas de desenho de genitálias masculinas, porém quatro espécies foram descritas com base apenas em fêmeas; não há ilustrações de genitálias

femininas, mas cinco das espécies foram descritas apenas pelos machos, e três das espécies de Ruckes não apresentam nenhuma ilustração no trabalho. Além disso, muitas espécies são parecidas entre si na morfologia geral, o que dificulta ainda mais a identificação das mesmas através das descrições.

Assim, um gênero fácil de ser reconhecido (Ruckes 1966a) possui espécies muito difíceis de serem identificadas e diferenciadas, mesmo com a literatura. Tal dificuldade impede ou inibe a descrição de espécies novas, levando a uma provável subestimação da diversidade do gênero, este que ainda possui algumas informações adicionais sobre biologia, comportamento e distribuição que devem ser agregados em um estudo (p. ex. Guerra *et al.* 2011, Castro-Huertas *et al.* 2015). Portanto, *Eurystethus* é um gênero que precisa ser revisado para que se possam elucidar os problemas de identificação das espécies, além de investigar a validade dos subgêneros *Eurystethus* e *Hispidisoma*, a relação entre as espécies do gênero e deste com os demais em Discocephalini.

O objetivo geral desta tese foi realizar a revisão taxonômica do gênero *Eurystethus*. Especificamente, objetivou-se avaliar o status dos subgêneros *Eurystethus* e *Hispidisoma* através da investigação de um caráter marcante na divisão entre ambos, as sensilas intermatidiais; redescrever espécies conhecidas, descrever novas, elaborar uma chave dicotômica de identificação e mapa de distribuição para as espécies.

Das espécies de *Eurystethus* foram analisadas, pessoalmente, o material-tipo de quinze espécies, depositados no American Museum of Natural History, New York, NY, USA, (AMNH) e na Fundação Zoobotânica do Rio Grande do Sul, Rio Grande do Sul, Brasil (MCNZ). Os demais três tipos foram analisados através de fotos cedidas pelas instituições Naturhistorisches Museum Wien, Viena, Áustria (NHMW) e Naturalis Biodiversity Center, Leiden, Países Baixos (RMNH).

Foram analisados 104 exemplares provenientes das coleções: American Museum of Natural History, New York, NY, USA, (AMNH); Coleção Entomológica do Instituto Oswaldo Cruz, Rio de Janeiro, Brasil (CEIOC); Instituto Nacional de Pesquisas da Amazônia, Amazonas, Brasil (INPA); Fundação Zoobotânica do Rio Grande do Sul, Rio Grande do Sul, Brasil (MCNZ); Museu Paraense Emílio Goeldi, Pará, Brasil (MPEG); Museu de Zoologia da USP, São Paulo, Brasil (MZUSP); National Museum of Natural History, Washington, DC, USA (NMNH); Universidade Estadual do Maranhão, Maranhão, Brasil (UEMA); Universidade Federal do Amazonas, Amazonas, Brasil (UFAM); Universidade Federal de Minas Gerais, Minas Gerais, Brasil (UFMG); Universidade Federal do Mato

Grosso, Mato Grosso, Brasil (UFMT); Universidade Federal do Pará, Pará, Brasil (UFPA) e Universidade Federal do Rio Grande do Sul, Rio Grande do Sul, Brasil (UFRGS).

O estudo dos exemplares foi feito utilizando-se estereomicroscópio para observação e descrição das estruturas. A terminologia usada para as descrições segue Ruckes (1966a) e Campos & Grazia (2006) para a morfologia geral do corpo, Dupuis (1970) e Zhou & Rédei (2020) para morfologia das genitálias externas. Medidas que expressam o tamanho dos exemplares foram realizadas com auxílio de retículo de medição acoplado à ocular do estereomicroscópio. Foram medidos: comprimento total, do ápice da cabeça à margem posterior do segmento VII; largura da cabeça, pela distância ocular sem inclusão dos olhos; comprimento da cabeça, do ápice das jugas até o ponto de inserção no tórax; largura do pronoto, do ápice de um ângulo umeral a outro; comprimento do escutelo pela linha mediana, largura da base do escutelo, e a largura do abdômen no segmento mais largo.

Uma chave dicotômica foi elaborada para a identificação das espécies de *Eurystethus*. Para esboçar a possível distribuição das espécies, um mapa com as localidades de coleta dos espécimes foi produzido usando software Quantum Gis (QGIS 2020), com coordenadas obtidas no Google Earth, indicadas em graus decimais.

Para o estudo das sensilas interomatidiais, foram analisados dezoito gêneros distintos a partir de um total de vinte espécies, das quais: dezoito são Discocephalini, sendo três espécies de *Eurystethus*, uma espécie de Ochlerini (*Ochlerus rusticus*) e uma de Edessinae (*Edessa rufomarginata*). Foram feitas observações e fotografias dos olhos de cada espécime em microscopia óptica e microscópio eletrônico de varredura (MEV) disponíveis na UFRGS.

## **ESTRUTURA DA TESE**

Esta tese está organizada em três capítulos escritos em inglês e formatados segundo as normas das revistas a que foram ou serão submetidos.

O capítulo 1 traz uma breve revisão da situação do gênero, com a descrição de três novas espécies encontradas no Brasil. Este capítulo encontra-se publicado em edição especial de Festschrift da revista Zootaxa.

No capítulo 2, as sensilas interomatidiais, caráter importante na taxonomia de *Eurystethus*, são estudadas sob microscopia eletrônica de varredura. É notado que essa característica vinha sendo abordada de forma incorreta principalmente quanto a separação de espécies deste gênero. Foi detectado que outras espécies de Discocephalinae e Edessinae

também apresentam sensilas intermatidiais numa variedade de morfologias distintas. Este capítulo encontra-se aceito para publicação na revista *Arthropod Structure & Development*.

O capítulo 3 traz a revisão taxonômica completa do gênero, com a proposição de arranjos nomenclaturais para duas espécies, *Eurystethus deplanatus* e *Eurystethus goianensis*, considerados sinônimos júnior de *Eurystethus ornatus* e *Eurystethus variegatus*. Dezesete novas espécies são descritas para o gênero, e uma chave de identificação foi elaborada incluindo as espécies conhecidas e as novas. Este capítulo encontra-se em etapa de redação, com possível submissão para a revista *Zootaxa*.

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## CAPÍTULO 1

### **Three new species of *Eurystethus* from Brazil (Hemiptera: Heteroptera: Pentatomidae)**

Normas editoriais: *Zootaxa* (Anexo 1)

Situação: publicado em 14 de abr. de 2021.

DOI: <https://doi.org/10.11646/zootaxa.4958.1.34>





## Three new species of *Eurystethus* from Brazil (Hemiptera: Heteroptera: Pentatomidae)

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### Abstract

The Heteroptera (true bugs) and its fourth-largest family Pentatomidae (stink bugs) are worldwide distributed groups with higher diversity in the tropics. The pentatomid subfamily Discocephalinae is almost restricted to the Neotropical Region, and it is divided into the tribes Discocephalini and Ochlerini. *Eurystethus* Mayr, 1864 is placed within Discocephalini and comprises 18 species, 16 out of them classified into two subgenera. Here we describe *Eurystethus jo sp. nov.*, *Eurystethus multipunctatus sp. nov.*, and *Eurystethus rufodorsatus sp. nov.*, all occurring in Brazil, compare them to other species and provide a distribution map.

**Key words:** New taxa, Discocephalini, Amazon, Cerrado

### Introduction

The worldwide distributed Heteroptera (true bugs) is a taxon greatly diversified in tropical zones, and its fourth-largest family Pentatomidae (stink bugs) has about 25% of its diversity (about 230 genera and 1,400 species) in the Neotropical region (Grazia *et al.* 2015). Discocephalinae is a subfamily of phytophagous pentatomids almost restricted to the Neotropical Region (Garbelotto *et al.* 2018), and it is divided into two tribes: Discocephalini with 43 genera and 190 species, and Ochlerini with 36 genera and 137 species (Rolston 1981; Grazia *et al.* 2015; Roell & Campos 2018). Modern systematics of Discocephalini dates back to the 1960s with the works by Herbert Ruckes (e.g., Ruckes 1964, 1965, 1966a), followed by those published for almost 30 years by Miriam Becker and Jocelia Grazia (e.g., Becker 1966, 1977; Becker & Grazia 1985, 1992, 1995). More recently, a number of papers addressing different issues and including Discocephalini have been published (e.g., Bianchi *et al.* 2014, 2016; Carrenho *et al.* 2018), but only a few approaching the discocephaline taxonomy (Petrulevičius & Popov 2014; Rosso & Campos 2017; Garbelotto *et al.* 2018). Recent phylogenetic works within Discocephalinae focused on the Ochlerini, but included a small sampling of Discocephalini (Campos & Grazia 2006; Roell & Campos 2018). The authors of these works found support, based on morphology, for the sister-group relationship between the two tribes.

*Eurystethus* Mayr, 1864 is considered a genus of Discocephalini, and it was first proposed to *Eurystethus nigropunctatus* Mayr, 1864. Ruckes (1958) described *Eurystethus ellipsoidal* Ruckes, 1958, and later (Ruckes 1966) described 14 new species along with a revision of the genus, subdividing it into two subgenera: *Eurystethus* with nine species and *Hispidisoma* with seven. Ruckes (1966) distinguished *Hispidisoma* from the nominotypical subgenus by the setigerous dorsal surface of the body and eyes, the developed antecular processes of the head, the developed anterolateral angles of pronotum, and the conspicuous intercalary unit between the labial segments I and II. Becker (1966) described two new species ignoring the subgeneric division. The genus *Eurystethus* currently comprises 18 species (Table 1) distributed in Central and South America.

In this work, we describe three new species of *Eurystethus* and compare them with other species in the genus.

**TABLE 1.** List of the species of *Eurystethus* and their respective subgenus, in alphabetical order.

Subgenus	Species	
<i>Eurystethus</i> Mayr, 1864	<i>Eurystethus ellipsoidallis</i> Ruckes, 1958	
	<i>Eurystethus macroconus</i> Ruckes, 1966	
	<i>Eurystethus nigropunctatus</i> Mayr, 1864	
	<i>Eurystethus ornatus</i> Ruckes, 1966	
	<i>Eurystethus ovalis</i> Ruckes, 1966	
	<i>Eurystethus pallescens</i> Ruckes, 1966	
	<i>Eurystethus parvulus</i> Ruckes, 1966	
	<i>Eurystethus sordidus</i> Ruckes, 1966	
	<i>Eurystethus spurculus</i> Ruckes, 1966	
	<i>Eurystethus fulvescens</i> Ruckes, 1966	
	<i>Eurystethus microlobatus</i> Ruckes, 1966	
	<i>Eurystethus nigricornis</i> Ruckes, 1966	
	<i>Eurystethus nigroviridis</i> Ruckes, 1966	
<i>Hispidisoma</i> Ruckes, 1966	<i>Eurystethus punctissimus</i> Ruckes, 1966	
	<i>Eurystethus sacculatus</i> Ruckes, 1966	
	<i>Eurystethus variegatus</i> Ruckes, 1966	
	<i>Eurystethus deplanatus</i> Becker, 1966	
	<i>Eurystethus goianensis</i> Becker, 1966	
	<i>Eurystethus jo</i> Correia, Fernandes & Campos, <b>sp. nov.</b>	
	<i>Eurystethus multipunctatus</i> Correia, Fernandes & Campos, <b>sp. nov.</b>	
	<i>Eurystethus rufodorsatus</i> Correia, Fernandes & Campos, <b>sp. nov.</b>	
	Unplaced	

## Material and methods

We examined four specimens from the following collections:

- AMNH American Museum of Natural History, New York, United States of America;  
 NMNH National Museum of Natural History, Smithsonian Institution, Washington, DC, United States of America;  
 UFAM Universidade Federal do Amazonas, Amazonas, Brazil.

The terminology used in the descriptions follows Ruckes (1966) and Campos & Grazia (2006) for the body general morphology, Dupuis (1970) and Zhou & Rédei (2020) for the external genital morphology. Measurements are in millimeters. Specimens were photographed using a Leica DFC 450 camera coupled to a Leica M205A stereomicroscope, stacked with Leica LAS suite. Geographical distribution is based on label information, and the distribution map was generated in Quantum Gis (QGIS 2020) 3.12 using coordinates retrieved from Google Earth, here indicated in decimal degrees in specimen data.

## Results and discussion

### Taxonomy

#### *Eurystethus jo* sp. nov.

(Figs. 1A, B; 2A, B; 3A–D; 4)

**Etymology.** The name honors the prominent taxonomist Jocélia Grazia, the way her friends affectionately call her; noun in apposition.

Holotype male. BRAZIL. Amazonas. ♂, Barcelos, rio Unini, Boca da Onça; 25–26/I/1990; P. Bürhnhelm, H. Remold, N.O. Aguiar e J. da Silva col. [lat. -0.973987; long. -62.925583] (UFAM).

**Differential diagnosis.** This is one of the tiniest species in *Eurystethus* together with *E. microlobatus* Ruckes. *Eurystethus jo* sp. nov. shares with *E. parvulus* Ruckes the general morphology of the body and pygophore, such as laterally projected parameres whose apices curve ventrad and partially reach each other beneath the segment X. However, in *E. jo* the lateral projection of paramere is acuminate and almost touches the posterolateral angles, and the long thorn-like projections of the process of ventral rim are unique and long (Figs 3B, D, pvr); in *E. parvulus* the projection and processes are shorter. The area behind the eyes (Fig. 2B, abe) almost entirely black, a conspicuous macula at the end of the radial vein at corium, and the lateral areas of urosternites densely spotted differs *E. jo* from *E. multipunctatus* sp. nov. and *E. rufodorsatus* sp. nov., which have the area behind the eyes mostly yellow, macula almost inconspicuous and urosternites sparsely spotted. Also, *E. jo* has anteocular angles slightly developed (Fig. 2A, aoa), different from the undeveloped anteocular angles of *E. multipunctatus*, and the head longer than wide, different from the *E. rufodorsatus* with head as long as wide. The male parameres (Fig. 3A, pa) are bilobed and oblique to each other at apex (Fig. 3B), with both lobes about the same size and only the posterior lobes reaching each other beneath the segment X (Figs 3A, X, Figs 3B–D). The shape of parameres and the subrectangular and long posterolateral angles of pygophore (Fig. 3A, pla), differs *E. jo* from *E. multipunctatus*, with posterolateral angles wider.

**Description.** Head: Mandibular plates reflexed. Anteocular angles developed, rounded and shorter than half the width of the eyes. Interommatidial sensilla (Fig. 2A, ios) long. Area behind the eyes almost entirely black, yellow on middle and narrow close to the eyes. Ventral surface of head with punctures on base of buccula and near the posterior half of it. Margins of maxillary plates with tiny black spots. Antennomeres proportions: I<II>III<IV; V not observed. Antennomere I almost entirely black, except on dorsal side and smoky ventral area. Intercalary labial unit short, enlarged (sensu Ruckes 1966).

Thorax: Pronotum with punctured spots at posterior margin of pronotum. Anterolateral angles (Fig. 2A, ala) directed laterad. Anterolateral margins of pronotum slightly arcuate. Transhumeral tubercles (Figs 2A–B, tht) slightly developed and rounded. Scutellum with dense punctured spots on the lateral face of tubercles. Anterior tubercles of scutellum (Figs 2A–B, ats) developed, acuminate, surpassing the height of transhumeral tubercles in lateral view (Fig. 2B). Posterior tubercle (Fig. 2B, pts) slightly tumid. Apex of scutellum (Fig. 2B, aps) reflexed and high, about 1/3 the anterior tubercles height and surpassing the posterior tubercles height. Lateral portions of thoracic pleura with dense punctured spots. Femora with reddish marks, sparse black spots, and incomplete annulus near apices. Tibiae yellow on apices. Tarsi yellow with few reddish marks.

Abdomen: Connexival segments with few punctured spots and reddish mark on anterior and posterior margins of each segment. Urosternites heterogeneously and densely spotted on lateral thirds; urosternite VII with spots also on middle third. Intersegmental areas, pseudosuture and trichobothrial tubercles light brown to concolor with the abdomen. Spiracles black.

Male (Figs 3A–D): Pygophore campaniform. Basal portion of parameres flat, directed laterad over the posterolateral angles of pygophore; distal portions convergent to each other, abruptly curved ventrally and then mesially (Fig. 3C); apex truncate and bilobed, with rounded angles. Process of ventral rim shield-like, ventral portion developed into a pair of black thorns (Figs 3B, D, pvr). Posterolateral angles dorsoposteriorly projected, ventrally shallowly concave, apex subrectangular with rounded angles. Ventral margin of pygophore (Figs 3A–D, vm) medially concave, with dense and black punctured spots forming a broad transversal line.

**Measurements.** Total length: 7.4 mm; abdominal width: 4.8 mm; head length: 1.8 mm; head width: 0.8 mm; antennomeres length: I, 0.6; II, 0.7; III, 0.7; IV, 1 mm; pronotum length: 1.7 mm; pronotum width: 4.5 mm; scutellum length: 3.11 mm; scutellum basal width: 2.62 mm.

**Distribution** (Fig. 4). BRAZIL. Amazonas: Barcelos.

### *Eurystethus multipunctatus* sp. nov.

(Figs. 1C, D; 2C, D; 3E–I; 4)

**Etymology.** The name refers to the densely and uniformly punctured dorsal surface. Latin: *multus*, many; *punctum*, little hole, dot; adjective.

Holotype male. BRAZIL. Distrito Federal. ♂, 32km N Brazilia, nr. Planaltina, 15° 35' S / 47° 42' W, 1000m; 17.XII.1997; T. J. Henry coll. [lat. -15.584212; long. -47.692608] (NMNH).

Paratype. ♀, same data as the holotype.

**Differential diagnosis.** Body small and ovate shared with *Eurystethus multipunctatus*, *E. jo*, *E. rufodorsatus*, *E. parvulus* and *E. microlobatus*. *E. multipunctatus* can be differentiated from these species by the conspicuous spots between the anterior margin of pronotum and the transhumeral tubercles, passing through calli (Fig. 2C), sparse in the others; anteocular angles not developed (Fig. 2C), developed in the others; third tarsomeres dark at apex; and transhumeral tubercles of pronotum and posterior tubercles of scutellum almost inconspicuous (Fig. 2D), conspicuous and high in the others. The female genital plates of *E. multipunctatus* (Fig. 3I) differ from *E. rufodorsatus* by the plates more spotted, the sutural angles of valvifers VIII (Fig. 3I, vfVIII) acuminate and divergent, laterotergites VIII (Fig. 3I, laVIII) conspicuously wider than long, and laterotergites IX (Fig. 3I, laIX) rounded and small, barely reaching the mediotergite VIII (Fig. 3I); while in *E. rufodorsatus* the plates are sparsely spotted, with valvifers VIII contiguous, laterotergites VIII as wide as long, and laterotergites VIII subelliptical. The male genitalia of *E. multipunctatus* (Figs 3E–H), compared to *E. parvulus* and *E. jo*, has ventrally arcuate parameres with apices reaching each other beneath the segment X (Figs 3G, H); posterolateral angles wide and long with convex lateral margins, the dorsal portion forming a conspicuous inner projection reaching the paramere (Fig. 3E, red arrow); and the process of ventral rim forming two small, rounded and parallel projections at middle; while in these species the parameres apices partially reach each other, the posterolateral angles are smaller and simple, without any projection, and the ventral processes have various and unique forms.

**Description.** Head: Mandibular plates slightly reflexed. Interommatidial sensilla short. Area behind the eyes with a broad black line extending ventrally to the margins of the maxillary plates (Fig. 2D). Ventral surface of head with few and sparse punctures near bucculae. Antennomeres proportions: I~II~III<IV>V. Antennomere I black laterally, apex and part of the ventral side; V yellow on basal third. Intercalary labial unit short, enlarged (sensu Ruckes 1966).

Thorax: Pronotal anterolateral angles directed laterad (Fig. 2C). Anterolateral margins slightly arcuate and weakly projected. Anterior tubercles of scutellum little surpassing the height of transhumeral tubercles in lateral view (Fig. 2D); few punctured spots on posterolateral face of tubercles. Apex of scutellum slightly swollen, reaching the height of the posterior tubercle in lateral view (Fig. 2D). Lateral portions of thoracic pleura with heterogeneously distributed punctured spots, mostly on the lateral margins of meso- and metapleura. Mesosternum dark yellow. Femora with few black spots and reddish marks near apices. Tibiae dark on apices (Fig. 1D).

Abdomen: Connexival segments with punctured spots and reddish marks heterogeneously distributed on anterior and posterior margins of each segment. Urosternites with few and sparse spots. Intersegmental areas light brown, pseudosutures concolor with the abdomen, trichobothrial tubercles and spiracles black.

Female (Fig. 3I): Valvifers VIII (Fig. 3I, vfVIII) with sparse and wide black spots, sutural margins and apices black. Posterior margins of laterotergites VIII (Fig. 3I, laVIII) arched; few black spots near base of laterotergites VIII. Laterotergites IX (Fig. 3I, laIX) less than  $\frac{1}{4}$  the length of valvifers VIII; black on middle and base, margins yellow.

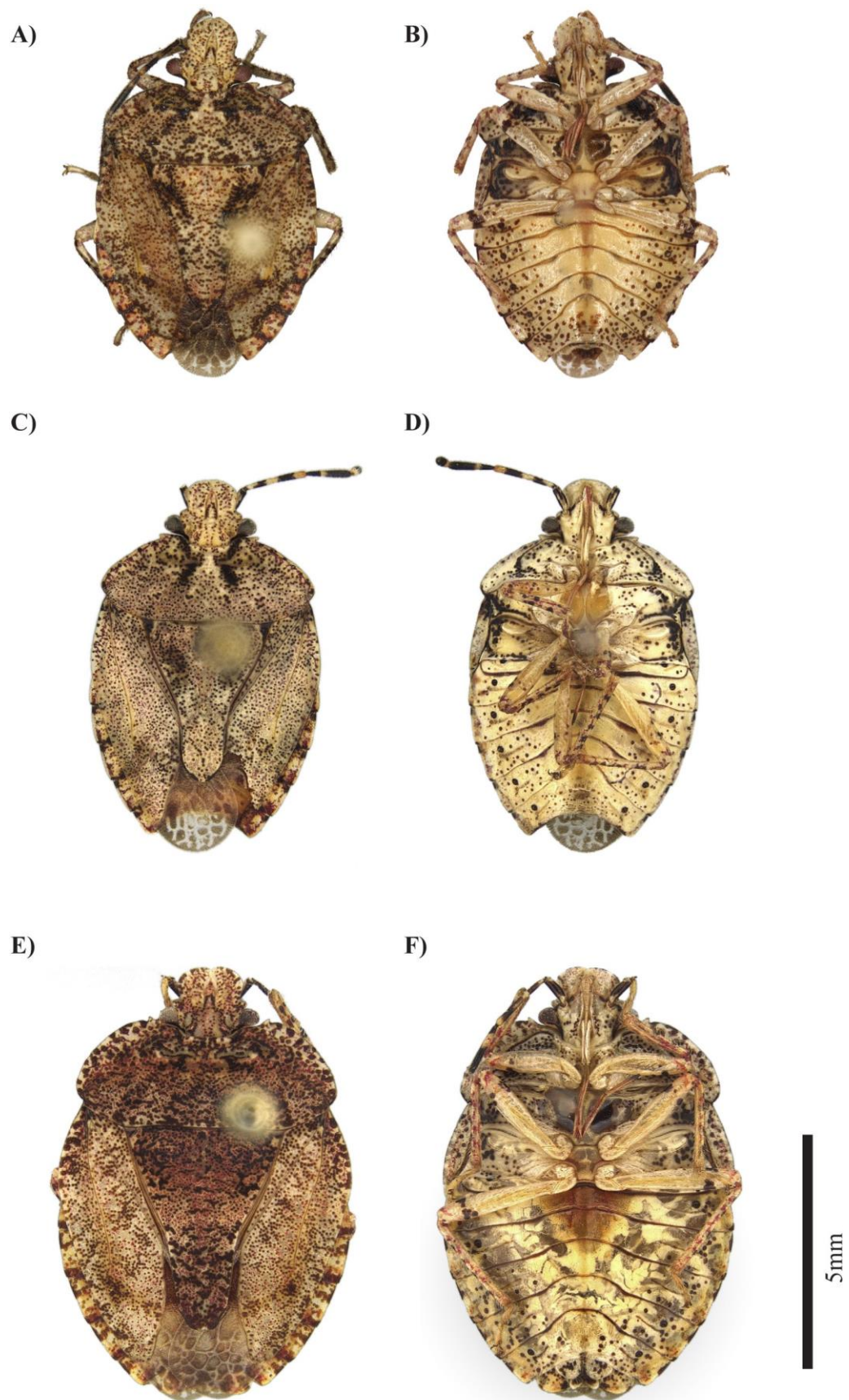
Male (Figs 3E–H): Pygophore ovate. Basal portion of parameres (Figs 3E–F) directed laterad, reaching the posterolateral angles; distal portion convergent; apex truncate with rounded angles, the posterior angles wider than the anterior ones. Process of ventral rim (Figs 3F, H) developed, shield-like and tumid; dorsal portion projected and rounded beneath parameres. Posterolateral angles (Figs 3F–H) rectangular, dorsolaterally directed; lateral margins convex, posterior margins concave, mesial angle acuminate; dorsal surface of posterolateral angles black on base, with a finger-like projection reaching the lateral margin of paramere; ventral surface with punctured spots on base. Ventral margin of pygophore black and densely punctured (Fig. 3F).

**Measurements.** Female. Total length: 9.4 mm; abdominal width: 6 mm; head length: 2 mm; head width: 1.3 mm; antennomeres length: I, 0.8; II, 0.9; III, 0.95; IV, 1.1 mm; pronotum length: 2.4 mm; pronotum width: 5.8 mm; scutellum length: 4.27 mm; scutellum basal width: 3.38 mm.

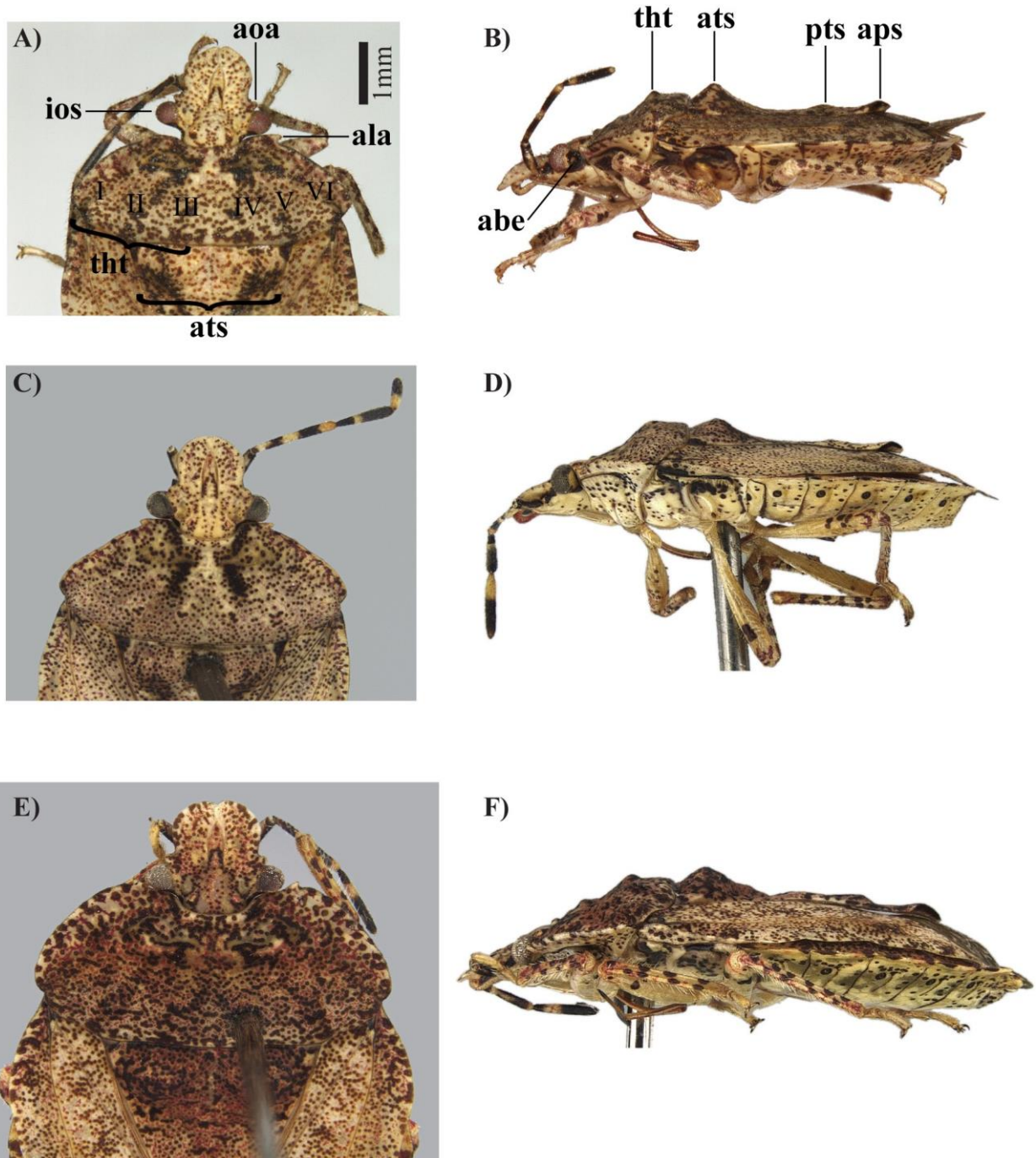
Male. Total length: 7.8 mm; abdominal width: 5 mm; head length: 1.7 mm; head width: 1.2 mm; antennomeres length: I, 0.6; II, 0.7; III, 0.8; IV, 1.1; V, 1.1 mm; pronotum length: 1.9 mm; pronotum width: 4.6 mm; scutellum length: 3.44 mm; scutellum basal width: 2.78 mm.

**Distribution** (Fig. 4). BRAZIL. Distrito Federal: Planaltina.





**FIGURE 1.** Dorsal and ventral habitus of the new species of *Eurystethus*. **A–B**, *Eurystethus jo* **sp. nov.**; **C–D**, *Eurystethus multipunctatus* **sp. nov.**; **E–F**, *Eurystethus rufodorsatus* **sp. nov.**



**FIGURE 2.** Dorsal view of head and pronotum, and lateral view of the new species of *Eurystethus*. **A–B**, *E. jo* sp. nov.; **C–D**, *E. multipunctatus* sp. nov.; **E–F**, *E. rufodorsatus* sp. nov. abe—area behind the eyes; ala—anterolateral angle of pronotum; aoa—anteocular angle; aps—apex of scutellum; ats—anterior tubercles of scutellum; ios—interommatidial sensilla; pts—posterior tubercle of scutellum; tht—transhumeral tubercles, from I to VI.

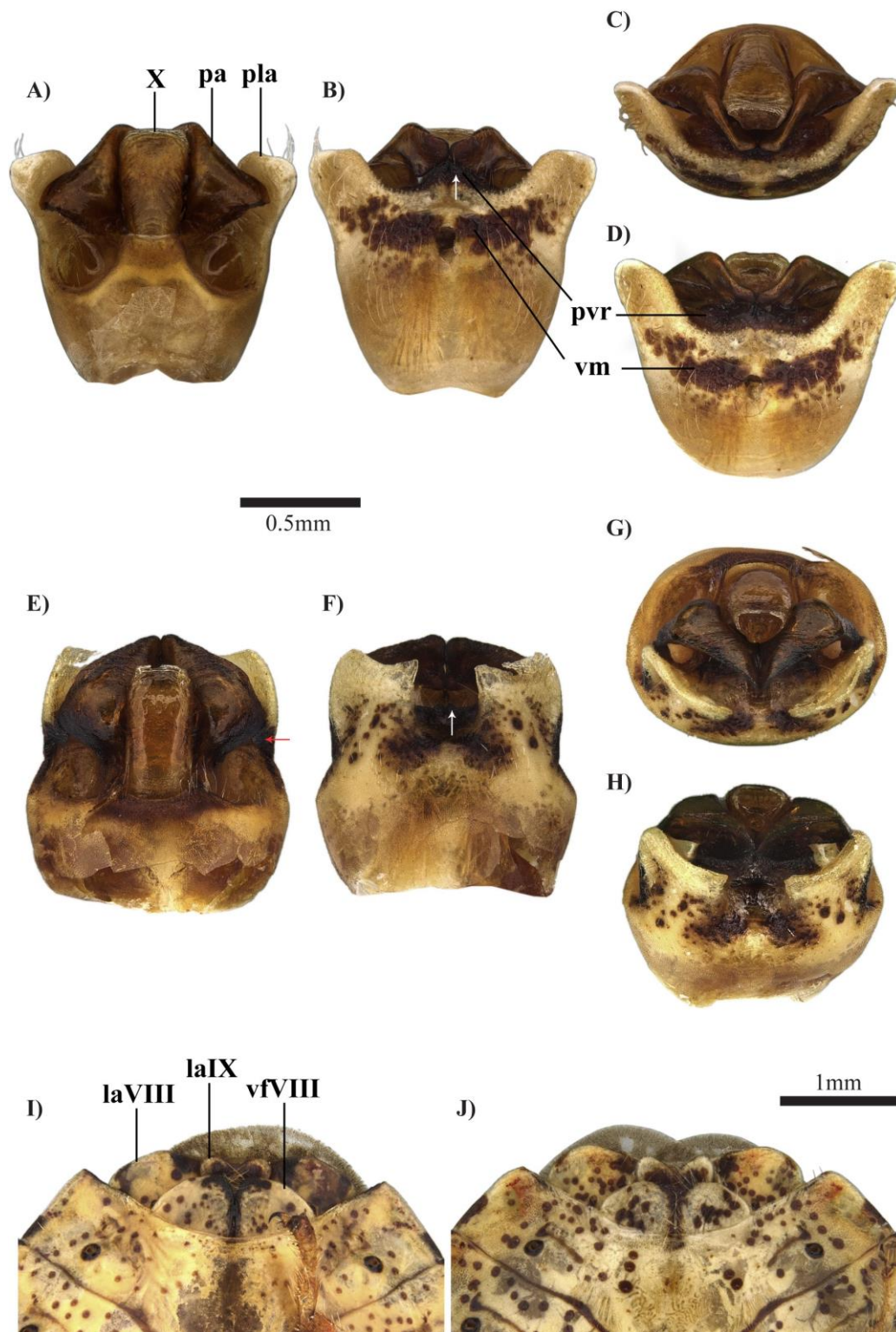
***Eurystethus rufodorsatus* sp. nov.**

(Figs. 1E, F; 2E, F; 3J; 4)

**Etymology.** The name refers to the reddish marks on the dorsal surface. Latin: *rufus*, red, reddish; *dorsum*, back, dorsal; adjective.

Holotype female. BRAZIL. **Mato Grosso.** ♀, [Vera], Vila Vera, 55° 30'' long., 12° 46'' lat., X.1973; M. Alvarenga. [lat. -12.629081; long. -55.359544] (AMNH).





**FIGURE 3.** Male pygophore and female genital plates of the new species of *Eurystethus*. **A–D**, Pygophore of *E. jo* **sp. nov.**: **A**) dorsal, **B**) ventral, **C**) posterior and **D**) posteroventral; **E–H**, Pygophore of *E. multipunctatus* **sp. nov.**: **E**) dorsal, **F**) ventral, **G**) posterior and **H**) posteroventral; **I**) Female genital plates of *E. multipunctatus* **sp. nov.**; **J**) Female genital plates of *E. rufodorsatus* **sp. nov.** laIX—laterotergites IX; laVIII—laterotergites VIII; pa—parameres; pla—posterolateral angles of pygophore; pvr—process of ventral rim; vfVIII—valvifers VIII; vm—ventral margin of pygophore; X—segment X of pygophore; white arrow—indicates the projections of process of ventral rim in ventral view; red arrow—indicates the dorsal projection at base of posterolateral angle.

**Differential diagnosis.** Dorsal surface of body with variegate and dense punctured spots, interspersed with dense reddish marks except on coria, and connexiva that look lighter than the rest of thorax are remarkable characteristics of *E. rufodorsatus*, unique among all other *Eurystethus*. Head as long as wide; pronotum with anterolateral margins arcuate and projected, and anterolateral angles anterolaterally directed (Fig. 2E) differs *E. rufodorsatus* from the other new species *E. jo* and *E. multipunctatus*, both with head longer than wide, anterolateral margins slightly arcuate, and anterolateral angles laterad. Considering the female genital plates (Fig. 3J), valvifers VIII subtrapezoidal, laterotergites VIII with a short fold at inner margins, and laterotergites IX subelliptical, surpassing the mediotergite VIII, are the differences between the females of this species and *E. multipunctatus*, with valvifers VIII acuminate, laterotergites IX rounded and barely reaching the mediotergite VIII.

**Description.** Head: Mandibular plates slightly reflexed. Antecular angles developed, rounded, punctured and shorter than half the width of the eyes (Fig. 2E). Interommatidial sensilla short. Area behind the eyes with broad black line extending ventrally till the base of head (Fig. 2F). Ventral surface of head with dense punctures heterogeneously distributed, mostly on posterior half. Maxillary plates margins black on posterior half. Antennomeres proportions: I>II<III<IV; V not observed. Antennomere I almost entirely black, except on dorsal side and ventrally at base. Labial segment I laterally black at apex. Intercalary labial unit short, enlarged (sensu Ruckes 1966).

Thorax: Pronotum with anterolateral angles unpunctured (Fig. 2E). Transhumeral tubercles developed, conical (Fig. 2E). Anterior tubercles of scutellum developed, surpassing the height of transhumeral tubercles in lateral view (Fig. 2F). Posterior tubercle slightly developed (Fig. 2F). Apex of scutellum reflexed, as high as posterior tubercle in lateral view (Fig. 2F). Coria with thin punctures heterogeneously distributed. Lateral portions of thoracic pleura with dense punctured spots, mostly on propleuron. Mesosternum dark. Legs with dense reddish marks. Femora with few black spots heterogeneously distributed near apices. Tibiae reddish on base, yellow on apices. Tarsi yellow.

Abdomen: Connexival segments with reddish and dark brown punctured spots heterogeneously distributed, mostly on anterior and posterior margins. Urosternites with sparse spots. Intersegmental areas and pseudosutures brown, trichobothrial tubercles and spiracles black.

Female (Fig. 3J): Sutural angles of valvifers VIII contiguous and black; dense dark spots heterogeneously distributed on disc; sutural margins black, contiguous. Posterior margin of laterotergites VIII rounded; black spots on basal half of disc; laterotergites VIII longer and wider than valvifers VIII; inner margins with a short fold partially covered by valvifers VIII. Laterotergites IX divergent from base, small, almost entirely black, margins yellow.

**Measurements.** Total length: 9.6 mm; abdominal width: 6.3 mm; head length: 1.8 mm; head width: 1.8 mm; antennomeres length: I, 0.8; II, 0.6; III, 0.9; IV, 0.8 mm; pronotum length: 2.5 mm; pronotum width: 5.7 mm; scutellum length: 4.31 mm; scutellum basal width: 3.41 mm.

**Distribution** (Fig. 4). BRAZIL. Mato Grosso: Vera.

**Comments.** Ruckes (1966) distinguished *Hispidisoma* from the nominotypical subgenus by the setigerous dorsal surface of the body and eyes, the developed antecular processes of head, the developed anterolateral angles of pronotum, and the conspicuous intercalary unit between the labial segments I and II. When studying specimens of several species of *Eurystethus* for this work we observed that most of them have variations that fit with both subgenera or do not fit with any, mostly the forms of the intercalary labial unit, the presence and distribution of interommatidial sensilla which could be lost by several methods including during preparation and curation of specimens. For these reasons, we chose not to classify the new species into the subgenera, and we are preparing a review of *Eurystethus* to properly address this issue.

## Acknowledgements

We are grateful to the curators of all collections mentioned. This research was partially supported by Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), Finance Code 001, granted to A.O. Correia, and by Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq), granted to L.A. Campos (310933/2018-8) and J.A.M. Fernandes (311345/2018-2).





**FIGURE 4.** Distribution map of the new species of *Eurystethus* in Brazil.

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## CAPÍTULO 2

Normas editoriais: *Arthropod Structure & Development* (Anexo 2)

Situação: aceito para publicação.

### **Morphology of interommatidial sensilla of Discocephalini (Heteroptera: Pentatomidae: Discocephalinae)**

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Declarations of interest: none

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### **Abstract**

Interommatidial sensilla have been explored for their taxonomic value and other aspects in Diptera and Lepidoptera. In Heteroptera, *Eurystethus* Mayr, 1864 is the only genus where these structures were examined in delimiting subgenera and species. This study investigates the presence, distribution, and morphology of interommatidial sensilla in Discocephalinae species and discusses the sensilla's value for cladistic and taxonomic appraisals. Twenty species of 18 genera were analyzed: 16 Discocephalini genera, one genus in Ochlerini, and one genus in Edessinae. Species' heads were observed from photographs taken with light

microscopy (LM) and scanning electron microscopy (SEM). From these images, we identified eleven types of sensilla, classified into chaetica, trichoidea and coleoconica. In LM, only chaetica sensilla with a length of 40 to 100  $\mu\text{m}$  were visible, present in six species. Under the SEM at least one type of sensillum was visible in 19 of the 20 species analyzed. No difference between the various kinds of sensilla were apparent between males and females or adults and nymphs of a given species. Both subgenera of *Eurysthetus* have the same type of sensillum (chaetica type I), which suggests this is not a delimiting feature. We conclude that chaetica sensilla can be a valuable character to delimit groups of genera within Discocephalini.

**Keywords:** sensillum; eyes; insects; Hemiptera; ultrastructure; fine morphology.

## 1. Introduction

Arthropod compound eyes are made up of structural and functional units called ommatidia, with some species evolving external sensilla or setae among their ommatidial lenses. Interommatidial sensilla are widespread structures in insects (Warrant et al., 2012) that have been documented from several orders, including: Orthoptera (Honegger et al., 1979), Coleoptera (Mishra and Meyer-Rochow, 2006), Mantodea (Zack and Bacon, 1980), Neuroptera (Yang et al., 1998), Hemiptera (Barman and Gupta, 2015), Diptera (Perry, 1968), and Lepidoptera (Warrant et al., 2012).

Amongst these insect orders, considerable research about interommatidial sensilla is known for Diptera and Lepidoptera at multiple classification levels. At the family-level of Diptera, Grimaldi (1990) used these structures as morphological characters to the cladistics and taxonomy of Drosophilidae. At the genus-level, considerable research was made on their origin, development, and function on *Drosophila* Fallén, 1823 (Perry, 1968; Cadigan et al., 2002; Hardiman et al., 2002). For Lepidoptera, their development has long been used to the

systematics of nymphalid, lycaenid, and trifine noctuid lineages (Warrant et al., 2012).

Morphologically, these sensilla structures have unbranched dendrites and long axons directed towards their ganglia, with some evidence suggesting these sensilla have mechanoreceptive sensors (Honegger, 1977). But, from the great diversity of shapes and sizes of these sensilla, they may have more than one function (Meyer-Rochow, 2015). Because of this complexity, several hypotheses have been proposed to explain the functions of these sensilla structures in insect ommatidia.

The first hypothesized function is succoring flight control. For example, Neese (1965, 1966) discovered, from experimenting on honeybees, that when interommatidial sensilla were present flight speed increased but when sensilla were removed their speed diminished. In a supporting case, Chi and Carlson (1976) analyzed the ultrastructure of interommatidial sensilla in *Musca domestica* Linnaeus, 1758. Their data showed that these mechanoreceptors monitored the degree of hair flexion, allowing the insect to perceive the draught and air-currents flowing over the head, especially during flight.

The second hypothesized function was the regulation of eye-cleaning behavior. Honegger et al. (1979) tested this hypothesis by removing interommatidial sensilla from the eyes of *Gryllus campestris* Linnaeus, 1758 and observed that their eye-cleaning behavior was significantly diminished. In a similar study, the praying mantis *Sphodromantis lineola* (Burmeister, 1838) lost its eye-cleaning behavior after the innervation of the interommatidial sensilla was destroyed (Zack and Bacon, 1981).

The third hypothesized function was sensilla influenced contact reception (Meyer-Rochow, 2015). This function was first suggested by Meyer-Rochow and Reid, (1994) for the eyes of the chironomid *Belgica antarctica* Jacobs, 1900. They suggested that these flies were encouraged to live into dark environments which led to eye reduction. In honeybees, the long interommatidial sensilla may also be essential for the maintenance of the comb by the

worker since the hives interior is almost completely dark (Tautz and Heilmann, 2007)

In true bugs (Heteroptera), studies of sensilla mainly focused on the antennae and labium (e.g., Catalá, 1996; 1997; Brozek and Zettel, 2014; Ahmad et al., 2016; Zheng et al., 2020). But their interommatidial sensilla was never explored in depth, only briefly mentioned in a few taxa: *Oncopeltus fasciatus* (Lygaeidae), *Rhodnius prolixus* (Reduviidae), and *Ovatametra* sp. (Gerridae) (Shelton and Lawrence, 1974; Settembrini, 1984; Barman and Gupta, 2015).

One caveat that emerged from the literature was investigating the utility of sensilla for Heteroptera systematics. That lone study was by Ruckes' (1966a), who determined that the morphology of sensilla was an important diagnostic character in separating two subgenera within the genus *Eurystethus*: *Eurystethus* and *Hispidisoma*.

There is no phylogeny published for Discocephalinae. However, there are groups of genera traditionally recognized by the literature (e.g.: Ruckes, 1966a; Rolston, 1990). It is known that some of them have interommatidial sensilla, but this information was never published. This study focused on two groups of genera. The first is the *Eurystethus* group of genera composed by *Coriplatus* White, 1842, *Pelidnocoris* Stål, 1867, *Abascantus* Stål, 1864 and *Psorus* Bergroth, 1914 (Ruckes, 1966a; Ruckes and Becker, 1970; Fernandes et al., 2008). The second is the “broadheaded discocephalines” genus group, composed by *Acclivilamna* Ruckes, 1966, *Allinocoris* Ruckes, 1966, *Alveostethus* Ruckes, 1966, *Colpocarena* Stål, 1868, *Discocephala* Laporte, 1832, *Discocephalessa* Kirkaldy, 1909, *Harpogaster* Kormilev, 1957, *Ischnopelta* Stål, 1868, *Lineostethus* Ruckes, 1966, *Phoeacia* Stål, 1862, *Platycarenum* Ruckes, 1965, *Tetragonotum* Ruckes, 1965 and *Uncicrus* Ruckes, 1966 (Ruckes, 1966b; Becker, 1977; Rolston, 1990).

An investigation of the fine morphology of the interommatidial sensilla in the species

under debate can bring new insights into the taxonomic characters, relationships of the taxa and their behavior. In this study, we aimed to address those applications in the following: (1) investigate the presence of interommatidial sensilla in Discocephalini; (2) analyze their external morphology, classifying them into types; (3) report differences between species and genera; (4) report differences between the two sexes and different life stages using *Eurystethus microlobatus* Ruckes, 1966 as a model; (5) provide a discussion about their possible functions; (7) compare the groups of genera related by sensilla with the groups of genera established by the literature; and (6) evaluate the utility of interommatidial sensilla characterizing group of genera, genera, subgenera, and species, as proposed by Ruckes (1965, 1966a).

## **2. Material and methods**

### ***2.1. Sampling***

This study was based on interommatidial sensilla examined from 20 species in 18 genera within Pentatomidae: 16 genera in the tribe Discocephalini, one genus in Ochlerini, *Ochlerus*, and one genus in Edessinae, *Edessa* (Table 1). In most cases, one specimen of each species was carefully analyzed under SEM. Three species of *Eurystethus* were examined to evaluate possible differences between subgenera described by Ruckes (1966a): one of *Eurystethus* subgenus and two of *Hispidisoma* subgenus.

For *Eurystethus microlobatus* we examined under SEM two adults (1 male and 1 female) for differences in sexual dimorphisms. For *Eurystethus nigroviridis* we examined under LM two nymphs (II instar and III instar) and under SEM one adult for morphological differences in life stages. We analyzed all Discocephalini genera made available from the entomological collection of the Universidade Federal do Rio Grande do Sul. *Ochlerus rusticus* and *Edessa rufomarginata*, tribe Ochlerini and subfamily Edessinae respectively, were chosen to compare the results with species outside Discocephalini. Specimens for this



study were on loan from the following institutions:

UFRGS – Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil.

UNB – Universidade de Brasília, Brasília, Brazil.

AMNH – American Museum of Natural History, New York, United States of America.

Table 01. List of species examined, ordered alphabetically by subfamily and tribe and museum institution.

<b>Subfamily, tribe</b>	<b>Species</b>	<b>Collection</b>
Discocephalinae, Discocephalini	<i>Abascantus lobatus</i> Stål, 1864	UFRGS
	<i>Acclivilamna vicina</i> Signoret, 1851	UFRGS
	<i>Alveostethus politus</i> Signoret, 1851	UFRGS
	<i>Colpocarena complanata</i> Burmeister, 1835	UFRGS
	<i>Coriplatus depressus</i> White, 1842	UFRGS
	<i>Dinocoris lineatus</i> Dallas, 1852	UNB
	<i>Discocephalessa andina</i> Breddin, 1904	UFRGS
	<i>Eurystethus microlobatus</i> Ruckes, 1966	UFRGS
	<i>Eurystethus nigroviridis</i> Ruckes, 1966	UFRGS
	<i>Eurystethus parvulus</i> Ruckes, 1966	UFRGS
	<i>Grassatorama nigroventis</i> Ruckes, 1965	UFRGS
	<i>Ischnopelta scutellata</i> Signoret, 1951	UFRGS
	<i>Lineostethus clypeatus</i> Stål, 1864	UFRGS
	<i>Oncodochilus</i> sp.	UFRGS
	<i>Pelidnocoris stalii</i> Stål, 1864	UFRGS
<i>Phoeacia lineaticeps</i> Stål, 1860	UFRGS	



	<i>Platycarenum umbraculatus</i> Fabricius, 1803	UFRGS
	<i>Psorus paraensis</i> Fernandes, Grazia & Lobo, 2008	AMNH
Discocephalinae, Ochlerini	<i>Ochlerus rusticus</i> Breddin, 1910	UFRGS
Edessinae	<i>Edessa rufomarginata</i> De Geer, 1773	UFRGS

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## ***2.2. Microscopic analyses***

Specimens were cleaned with a fine tip brush and observed by light microscopy (LM) for evaluating whether interommatidial sensilla are visible. Photographs were taken in multiple focal planes using a Leica DFC 450 camera, Leica M205A stereomicroscope, and stacked with Leica LAS suite.

For the analysis by scanning electron microscopy (SEM), heads of specimens were removed and sectioned longitudinally along the midsagittal plane. The samples were kept in contact lens cleaning solution Renu for 48 h and then placed in an ultrasonic bath with water and detergent solution for 6min (Roell et al., 2020). Afterwards, samples were dehydrated in an ethanolic series (80% and 96%, 5min each) and dried at room temperature for 30min. Samples were glued to aluminum stubs with carbon tape, coated with 20nm thick gold layer. These sections were later examined with a JEOL JSM 6060 scanning electron microscope (SEM) for detecting sensilla.

## ***2.3. Classification of sensilla***

Classification of Heteroptera antennal and labial sensilla was based on Altner and Prillinger (1980), Brozek and Chlond (2010), and Shields (2010).

## **3. Results**

Eleven types of sensilla were detected (Table 2). They were divided into two categories

according to their socket and presence of porous: nonporous sensilla with flexible socket and nonporous sensilla with inflexible socket. The first category groups nine types of chaetica sensilla and one type of trichoidea sensilla. Chaetica are sensilla that resemble long and thick setae, with mechanoreceptor function (Brozek and Chlond, 2010). Trichoidea are thin, hair-like mechanosensilla with their base sunken in flexible sockets (Brozek and Chlond, 2010). The second category have a single type of coleoconica sensilla. Coleoconica sensilla are pegs in cuticular pores related to thermoreception and hygrometry (Brozek and Chlond, 2010). No distribution patterns of the sensilla were observed. These types of sensilla are described below:

I. Nonporous sensilla with flexible socket:

Chaetica type I (CH-1) – long (40–100 $\mu$ m) and robust, inserted in a well-developed socket (Figs. 01 B; 02 A). In this study, this is the only type visible in light microscopy (Fig. 1A);

Chaetica type II (CH-2) – similar to chaetica type I, but visibly shorter (2–15 $\mu$ m), inserted in a poorly developed socket (Fig. 1B);

Chaetica type III (CH-3) – similar to chaetica type I, but visibly shorter (2–15 $\mu$ m), inserted in a slightly depressed area on the center of a well-developed socket (Fig. 1C);

Chaetica type IV (CH-4) – short (2–15 $\mu$ m) and set in a circular depressed area of the cuticle (Fig. 1D);

Chaetica type V (CH-5) – short (2–15 $\mu$ m) and set in a slightly raised socket (Fig. 1E);

Chaetica type VI (CH-6) – short (2–5 $\mu$ m) and inserted in a deep pore surrounded by a strongly depressed circular area (Fig. 1F);

Chaetica type VII (CH-7) – short (2–5 $\mu$ m) and inserted in a shallow pore surrounded by a slightly depressed circular area (Fig. 1G);

Chaetica type VIII (CH-8) – short (5–10 $\mu$ m) inserted in a flat area (Fig. 1H);

Chaetica type IX (CH-9) – similar to chaetica type III, but inserted in a well-developed socket

with no depressed area (10–15µm) (Fig. 1I);

Trichoidea type I (TR-1) – thin and elongate, set in a pore, freely movable (Fig. 1J)

II. Nonporous sensilla with inflexible socket:

Coleoconica type I (CO-1) – peg set in the margin of a cuticular pore (1µm) (Fig. 1K)

Table 2. Types of sensilla in the species analyzed. Division by colors: Yellow: “broadheaded discocephalines” genus group. Green: genera related to *Eurystethus*. Red: genus not related to the genera in the analysis. Gray: outgroup of Discocephalini.

Species	CH-1	CH-2	CH-3	CH-4	CH-5	CH-6	CH-7	CH-8	CH-9	TR-1	CO-1
<i>Abascantus lobatus</i>											
<i>Acclivilamna vicina</i>					X						
<i>Alveostethus politus</i>				X							
<i>Colpocarena complanata</i>		X									X
<i>Coriplatus depressus</i>	X		X								X
<i>Dinocoris lineatus</i>						X				X	X
<i>Discocephalessa andina</i>		X									X
<i>Eurystethus microlobatus</i>	X										X
<i>Eurystethus nigroviridis</i>	X										X
<i>Eurystethus parvulus</i>	X										
<i>Grassatorama nigroventis</i>		X									
<i>Ischnopelta scutellata</i>		X									X
<i>Lineostethus clypeatus</i>				X							
<i>Oncodochilus</i> sp.			X								
<i>Pelidnocoris stalii</i>	X										X
<i>Phoeacia lineaticeps</i>				X							
<i>Platycarenum umbraculatus</i>		X									X
<i>Psorus paraensis</i>	X	X									X
<i>Ochlerus rusticus</i>									X		
<i>Edessa rufomarginata</i>							X	X			

Among the species analyzed in our study with SEM and LM, it was possible to detect sensilla in all species, with the exception of *Abascantus lobatus* (Fig. 2A, B). For LM, sensilla were detected in *Coriplatus depressus*, *Eurystethus parvulus*, *E. microlobatus*, *E. nigroviridis*, *Pelidnocoris stalii*, and *Psorus paraensis* (Fig. 3 A-F). But it was only possible to classify them as CH-1 using SEM. In *Grassatorama nigroventis*, using SEM we detected sockets but not sensilla. However, it was impossible to ascertain whether the sensilla were too short or the specimen had lost them (Fig. 2C).

For the subgenera of *Euristethus* it was not observed differences between the analyzed species. For the species *Eurystethus microlobatus* it was not observed differences between male and female. We detected sensilla distributed in their ommatidia using LM and SEM, but it was only possible to classify them as CH-1 using SEM (Figs. 1A, 2J).

For the species *E. nigroviridis*, the sensilla observed using LM in the nymphs of II and IV instars do not differ from the sensilla observed in adult specimens (Figs. 3A–C).

Also, no correlation was apparent between the presence of the sensilla categories chaetica, trichoidea and coleoconica.

Additionally, we observed that sensilla could be separated by a minimum of two to four ommatidia varying in the same eye (Fig. 2G, H). Two sensilla were rarely found in the same interommatidial space (Fig. 2I).

Another observation is that some CH-1 sockets deformed the facets around them, wrinkling the lens surface (Fig. 2J). Although ommatidial shape was not a structure we were trying to evaluate, we noticed that it could differ between the species, and facet outlines ranged from almost flat to convexly bulging and hexagonal to roughly circular (Figs. 2D–I).

#### **4. Discussion**

This study marks the first in-depth evaluation of interommatidial sensilla in

Pentatomidae. Chaetica sensilla was the most abundant in all species examined here.

However, it was not as abundant as recorded in other insect groups like Drosophilidae and Chironomidae, where they occur in high density all over the eye (Grimaldi, 1990; Meyer-Rochow and Reid, 1994).

The lack of distribution pattern in the species examined here agrees with previous studies that examined other Hemiptera species (Settembrini, 1984; Jia and Liang, 2015).

Based on the study by Guerra et al. (2011) on *Eurystethus microlobatus*, flight control can be discarded as a function of their interommatidial sensilla because flying is not a usual activity for the species, like it is for *Musca domestica* and honeybees (Neese, 1965, 1966; Chi and Carlson, 1976). These insects live exclusively on mistletoe *Psittacanthus robustus* (Mart.) (Loranthaceae) in gregarious and subsocial communities with camouflage strategies. It is, therefore, more plausible that they have tactile or eye cleaning functions, similar to *Belgica antarctica* or *Gryllus campestris* (Honegger et al., 1979; Meyer-Rochow and Reid, 1994). Beyond that, not much can be suggested because the natural history of Discocephalinae is poorly known (Grazia et al., 2015).

In this analysis, coleoconica sensilla was not helpful to support groups of genera in the analyzed set of genera. It appears randomly in several genera not related according to literature (Tab. 2). Also, their presence does not match with the genera related by the chaetica sensilla.

Although most of the species examined in our study have interommatidial sensilla, they were not described with LM in detail by other researchers (Ruckes, 1966a). The fact that these sensilla, in most species, are not easily visible under the LM may explain the omission by the earlier investigators. Also, size or accidental loss of sensilla can influence their observation by LM and their use as taxonomic character (Figs. 2 M, N). Nevertheless, we were able to expand on Ruckes preliminary investigations of sensilla in Heteroptera (1966a)

by identifying interommatidial sensilla in several Discocephalinae genera using LM, including *Coriplatus*, *Pelidnocoris*, and *Psorus* (Figs. 3D–F).

Ruckes (1966a) in the key to the subgenera of *Eurystethus* characterized the subgenus *Eurystethus* by the glabrous or only obscurely setigerous eyes, and the subgenus *Hispidisoma* by having distinctly setigerous eyes. But, in examining the interommatidial sensilla of several species of both subgenera under LM and three species under SEM, we found no difference, and classified their sensilla as CH-1 (Figs. 2 J-L). Contrary to Ruckes (1966a), these sensilla are not helpful to distinguish the subgenera or species of *Eurystethus*.

Because there is no phylogeny of Discocephalinae, we decided to compare the groups of genera sharing different types of sensilla with the genera considered traditionally close in the literature. All genera of the *Eurystethus* group [e.g., *Coriplatus*, *Pelidnocoris*, *Abascantus* and *Psorus* (Ruckes, 1966a; Ruckes and Becker, 1970; Fernandes et al., 2008; Table 02 Green)] share CH-1, except *Abascantus*.

In the “broadheaded discocephalines” most of the genera (*Acclivilamna*, *Alveostethus*, *Colpocarena*, *Discocephalessa*, *Ischnopelta*, *Lineostethus*, *Phoeacia*, and *Platycarenum*) were analyzed under SEM. W (Ruckes, 1966b; Becker, 1977; Rolston, 1990; Table 2 Yellow). We discovered two sensilla that may have importance to group genera. The first sensilla was CH-2, which was shared between *Colpocarena*, *Discocephalessa*, *Ischnopelta*, and *Platycarenum* and two other taxa: *Grassatorama* and *Psorus* that do not belong to the “broadheaded” group. The second sensilla was CH-4, observed exclusively in *Alveostethus*, *Lineostethus*, and *Phoeacia*.

Despite our new evidence of sensilla shared between some of these genera, we could not detect a single type (i.e., synapomorphy) of sensillum shared among all the “broadheaded discocephalines.” The absence of a specific sensillum within these discocephalines maybe natural or artificial (Rolston, 1990), but that can only be verified with additional research

based on a larger selection of taxa.

Outside of various types of sensilla shared among the “broadheaded discocephalines” genera there are other genera with unique suites of sensilla. Take for example, *Dinocoris*, which is the only discocephaline genus possessing TR-1 and CH-6 sensilla and *Acclivilamna* possessing CH-5. Similarly, we observed exclusive types of *chaetica* sensilla in one genus outside the Discocephalini, namely *Ochlerus* with CH-9 (Table 02 Grey).

Outside of Discocephalinae, surprisingly we found two exclusive types of chaetica sensilla in *Edessa* (CH-7 and CH-8) (Table 02 Grey). Species of Edessinae showed no sign of the presence of sensilla under LM.

#### **4.2. Conclusion**

Our investigation into Discocephalinae and Edessinae interommatidial sensilla could offer some utility in the taxonomy of the subfamily supporting supraspecific groups. For example, some of the chaetica sensilla were shared between the groups of genera examined whereas singular types of trichoidea and coleoconica were restricted to single genera, suggesting these structures may not provide much phylogenetic signal but may be more appropriate as diagnostic characters. Only after additional research is conducted on a larger suite of sensilla from a broader taxonomic sample, we will be able to objectively determine the systematic limits of these sensilla.

#### **Acknowledgments**

We are grateful to the Universidade Federal do Pará (UFPA) for providing financial support to the trip to Porto Alegre which made this summer internship project possible. To

the Universidade Federal do Rio Grande do Sul (UFRGS) for the resources to this study. To Dr. Adam Wallner for his careful reviewing of the text and valuable comments. To the anonymous reviewers for their valuable comments. To Dr. Talita Roell, for kindly sharing her experience with SEM. To the curators of the above-mentioned collections.

### **Authors contributions**

Conceptualization: A.O.C.; Methodology: A.O.C.; Investigation: B.B.C., A.O.C.; Resources: L.A.C.; Data curation: B.B.C.; Writing — original draft: B.B.C.; Writing — review and editing: B.B.C., A.O.C., J.A.M.F, L.A.C.; Project administration: J.A.M.F., L.A.C.; Funding acquisition: B.B.C., A.O.C., J.A.M.F., L.A.C..

### **Funding**

Funding: This work was supported by the Universidade Federal do Pará [PROPESP 10/2018]; this study was financed in part by Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) [Finance Code 001]; and Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) [PIBIC; grant numbers 311345/2018-2, 310933/2018-8].

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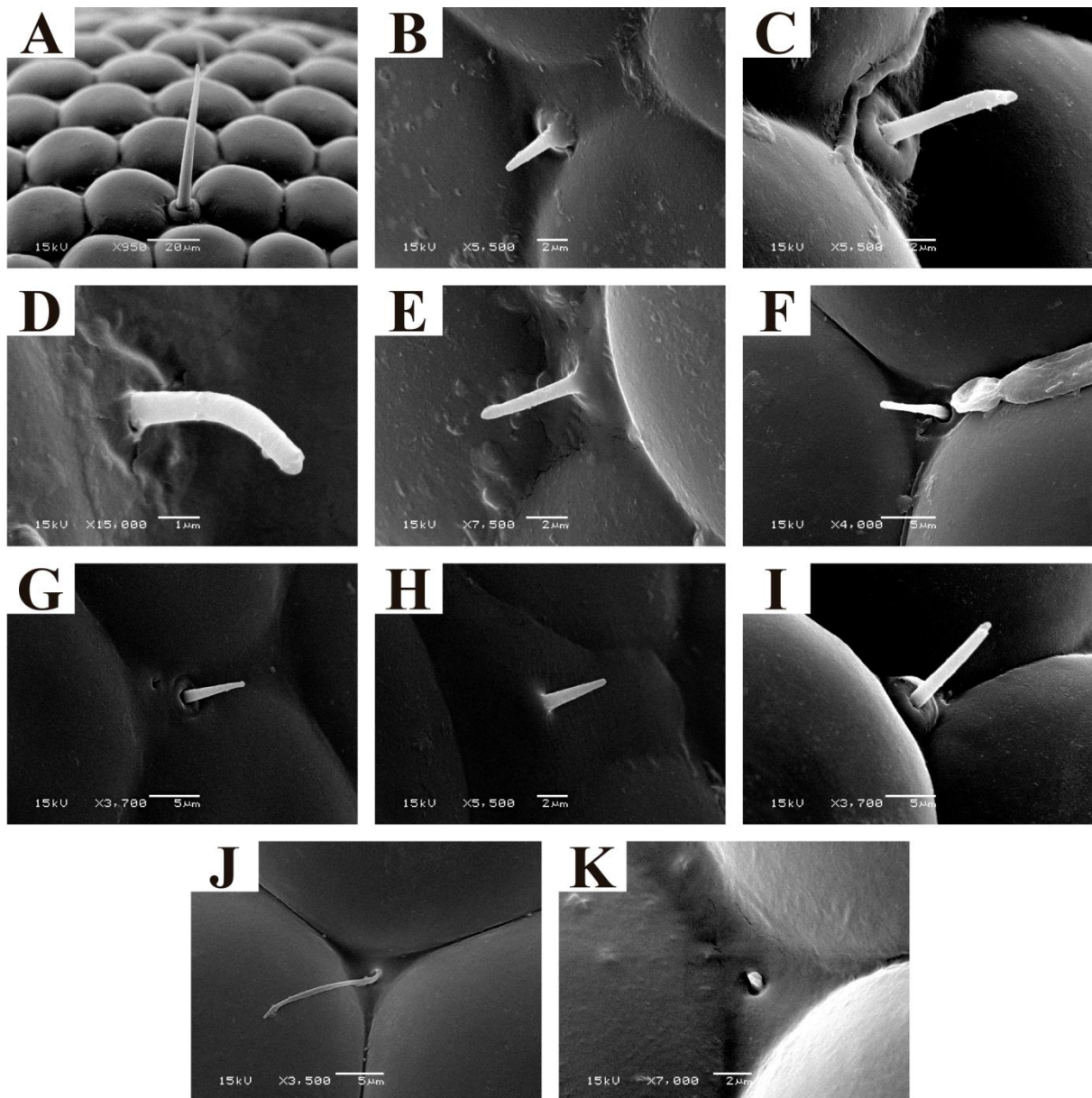
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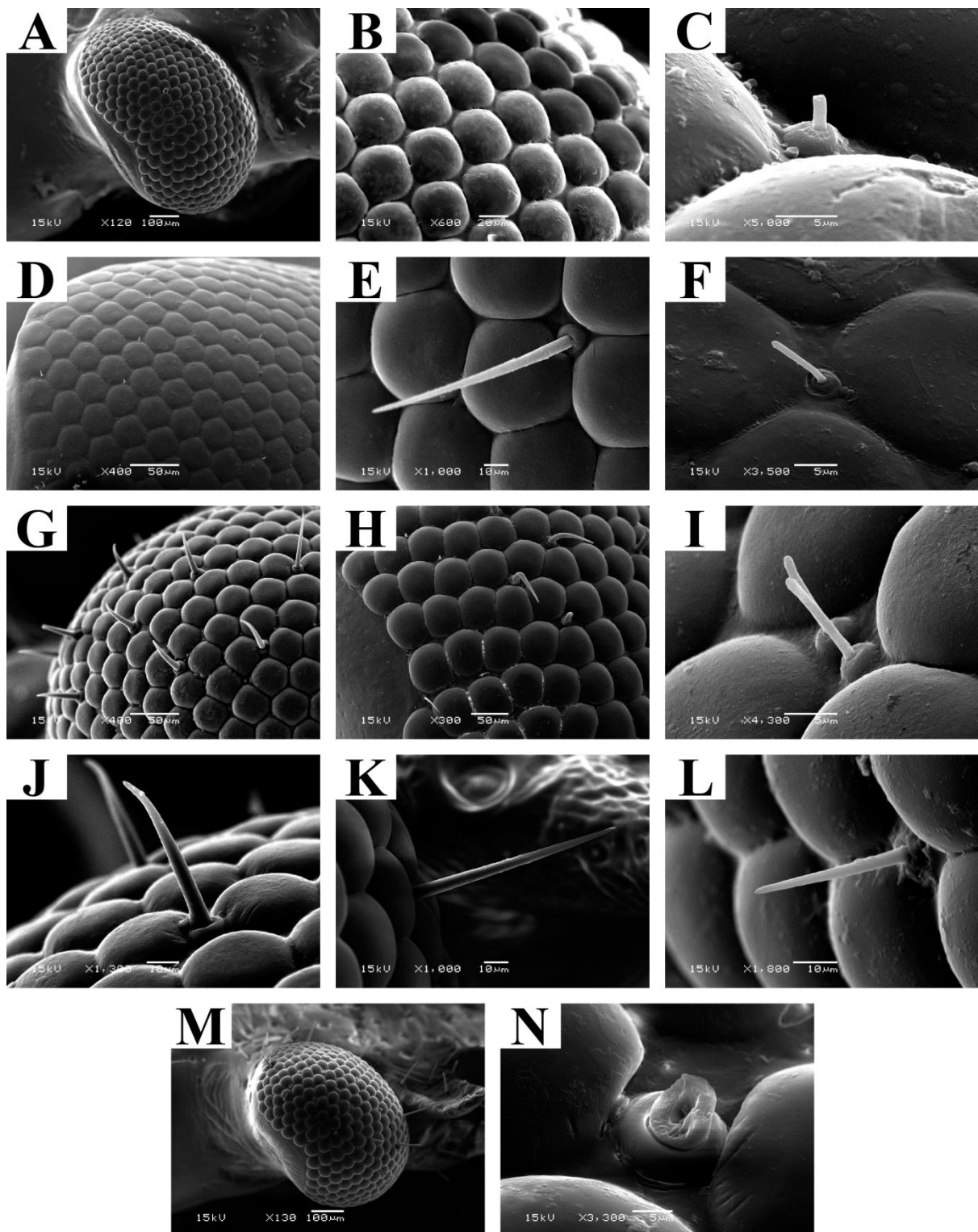
## Figure Captions



**FIGURE 1.** Types of sensilla found in Scanning Electron Microscopy. (A) CH-1 in *Eurystethus microlobatus* (female) (scale = 20 $\mu\text{m}$ ). (B) CH-2 in *Ischnopelta scutellata* (scale = 2 $\mu\text{m}$ ). (C) CH-3 in *Oncodochilus* sp. (scale = 2 $\mu\text{m}$ ). (D) CH-4 in *Alveostethus politus* (scale = 1 $\mu\text{m}$ ). (E) CH-5 in *Acclivilamna vicina* (scale = 2 $\mu\text{m}$ ). (F) CH-6 in *Dinocoris lineatus* (scale = 5 $\mu\text{m}$ ). (G) CH-7 in *Edessa rufomarginata* (scale = 5 $\mu\text{m}$ ). (H) CH-8 in *E. rufomarginata* (scale = 2 $\mu\text{m}$ ). (I) CH-9 in *Ochlerus rusticus* (scale = 5 $\mu\text{m}$ ). (J) TR-1 in

*Dinocoris lineatus* (scale = 5 $\mu$ m). (K) CO-1 in *Pelidnocoris stalii* (scale = 2 $\mu$ m).

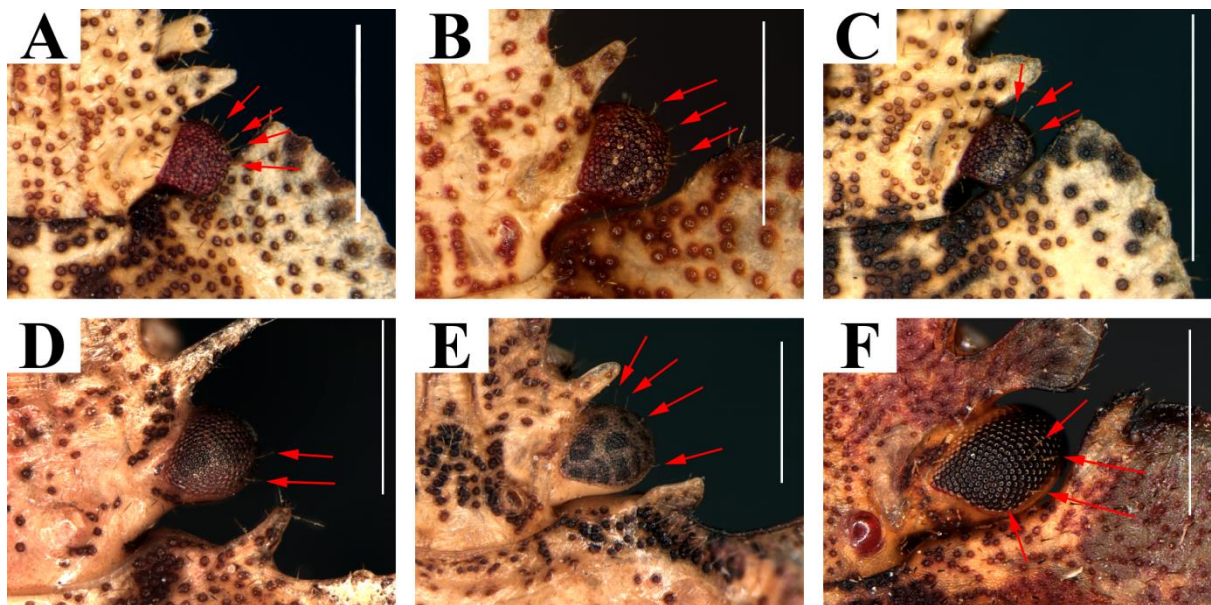
Abbreviations: CH, chaetica; TR, trichoidea; CO, coleoconica.



**FIGURE 2.** Scanning Electron Microscopy images of the analyzed species. (A) *Abascantus lobatus* (scale = 100 $\mu$ m). (B) *Abascantus lobatus* (scale = 20 $\mu$ m). (C) Short sensillum



classified as CH-2 in *Grassatorama nigroventis* (scale = 5 $\mu$ m). (D) Sparse and random distribution of sensilla in *Phoeacia lineaticeps*, which ommatidia are not elevated (scale = 50 $\mu$ m). (E) Rounded ommatidia and CH-1 in *Pelidnocoris stalii* (scale = 10 $\mu$ m). (F) Almost flat ommatidia of *Alveostethus politus* with CH-4 sensillum (scale = 5 $\mu$ m). (G) Sparse and random distribution of sensilla in *E. microlobatus* (scale = 50 $\mu$ m). (H) The margin of the eye of *Psorus paraensis* (scale = 50 $\mu$ m). (I) A couple of CH-2 in *Platycarenum umbraculatus* (scale = 5 $\mu$ m). (J) CH-1 in *E. microlobatus* (male) (scale = 10 $\mu$ m). (K) CH-1 in *E. nigroviridis* (scale = 10 $\mu$ m). (L) CH-1 in *E. parvulus* (scale = 10 $\mu$ m). (M) Eye of *E. nigroviridis* with intentionally broken sensilla in the center (scale = 100 $\mu$ m). (N) Broken sensillum and its socket in *E. nigroviridis* (scale = 5 $\mu$ m). Abbreviations: CH, *chaetica*.



**FIGURE 3.** Light Microscopy images of eyes of (A) Second instar nymph of *E. nigroviridis*. (B) Fourth instar nymph of *E. nigroviridis*. (C) Adult of *E. nigroviridis*. (D) *Coriplatus depressus*. (E) *Pelidnocoris stalii*. (F) *Psorus paraensis*. Sensilla are indicated by red arrows. Scale: 1mm.

## CAPÍTULO 3

Normas editoriais: Zootaxa

Situação: em elaboração.

### **Revision of *Eurystethus* Mayr with the description of seventeen new species (Hemiptera: Heteroptera: Pentatomidae)**

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#### **ABSTRACT**

*Eurystethus* Mayr, 1864 is revised, diagnoses for the 21 known species are provided, and seventeen new species are described: *E. sp nov.* 22, *E. sp nov.* 27, *E. sp nov.* 5, *E. sp nov.* 18, *E. sp nov.* 3, *E. sp nov.* 21, *E. sp nov.* 16, *E. sp nov.* 23, *E. sp nov.* 52, *E. sp nov.* 40, *E. sp nov.* 45, *E. sp nov.* 39, *E. sp nov.* 26, *E. sp nov.* 7, *E. sp nov.* 34, *E. sp nov.* 20, and *E. sp nov.* 36. The type specimens of each new species were photographed with a Leica DFC 450 camera coupled to a Leica M205A stereoscope, using the focus stacking function in the Leica LAS software. A dichotomous key for the species of *Eurystethus* is provided, as well as distribution maps.

**Key words:** Discocephalinae, Discocephalini, taxonomy, morphology.

#### **INTRODUCTION**

Discocephalini is a group of stink bugs with about 200 species described in 44 genera (Grazia *et al.* 2015, Rider *et al.* 2017), distributed mainly in the Neotropical Region, with a few species occurring in the Mexican Transition Zone and the southern Nearctic Region (Garbelotto *et al.* 2018). Most genera of Discocephalini were described between the second half of the 19th century and the 1960's, and several of them have been revised in the 21st

century (e.g., Fernandes & Grazia 2006, 2008, Garbelotto *et al.* 2018, Rosso & Campos, 2021). These revisionary works frequently focus on genera with large numbers of species and describe even more new species, such as, e.g., *Antiteuchus* Dallas (Fernandes & Grazia 2006) and *Ischnopelta* Stål (Rosso & Campos 2021). One large discocephaline genus lacking a taxonomic revision is *Eurystethus* Mayr.

*Eurystethus* was proposed for a single species, *E. nigropunctatus* Mayr (Mayr 1864), from a female holotype, and after the works by Ruckes (1958, 1966), Becker (1966), and Correia *et al.* (2021), the genus totals 21 included species. In the first revision of *Eurystethus* (Ruckes 1966), the species were classified into two subgenera, the nominal *Eurystethus* with nine species, and *Hispidisoma* with seven species. This subgeneric classification has been considered problematic and needs thorough evaluation (Correia *et al.* 2021).

We present a revision of *Eurystethus*, with the redescription of the genus and the description and illustration of seventeen new species. In addition, a key for the species is provided, as well as distribution maps.

## **MATERIAL AND METHODS**

The type specimens of the fifteen species of *Eurystethus* in the American Museum of Natural History (AMNH) and the Museu de Ciências Naturais do Rio Grande do Sul (MCNZ) were examined *in loco* by the first author. Digital images of the types of the remaining three species were provided by the curators of the Naturhistorisches Museum Wien (NHMW) and the Naturalis Biodiversity Center, Leiden (RMNH). Other 30 specimens from the following collections were examined: American Museum of Natural History, New York, USA, (AMNH); Coleção Entomológica do Instituto Oswaldo Cruz, Rio de Janeiro, Brasil (CEIOC); Instituto Nacional de Pesquisas da Amazônia, Amazonas, Brasil (INPA); Museu de Ciências Naturais do Rio Grande do Sul, Rio Grande do Sul, Brasil (MCNZ); Museu Paraense Emílio Goeldi, Pará, Brasil (MPEG); Museu de Zoologia da USP, São Paulo, Brasil (MZUSP); National Museum of Natural History, Washington, DC, USA (NMNH); Universidade Estadual do Maranhão, Maranhão, Brasil (UEMA); Universidade Federal do Amazonas, Amazonas, Brasil (UFAM); Universidade Federal de Minas Gerais, Minas Gerais, Brasil (UFMG); Universidade Federal do Mato Grosso, Mato Grosso, Brasil (UFMT); Universidade Federal do Pará, Pará, Brasil (UFPA) and Universidade Federal do Rio Grande do Sul, Rio Grande do Sul, Brasil (UFRGS).

The type specimens of each new species were photographed with a camera coupled to a Nikon AZ100M stereoscope, using the focus stacking function in the Nikon NIS-Elements Ar Microscope Imaging Software. Specimen observation and measurements were made under light stereomicroscopy. The following measurements were taken: total length; width and length of head and pronotum, and maximum abdominal width. In the descriptions we used the terminology from Ruckes (1966a) and Campos & Grazia (2006) for the general morphology, Dupuis (1970) and Zhou & Rédei (2020) for genital structures.

A dichotomous key for the species of *Eurystethus* is provided. We also made distribution maps with all known collection sites with Quantum Gis (QGIS 2020), after georeferencing the specimens in Google Earth. Collection site coordinates are given in decimal degrees in the material examined lists of each species.

## RESULTS

### *Eurystethus* Mayr, 1864

*Eurystethus* Mayr, 1864, p. 907; Stål, 1872, p. 10; Lethierry & Severin, 1893, p. 88; Kirkaldy, 1909, p. 219; Bergroth, 1918, p. 299; Ruckes, 1966, p. 5.

Type species. *Eurystethus nigropunctatus* Mayr, 1864.

**Diagnosis.** Body length from 6.5 mm to 13 mm. Body ovate, about 1.5x longer than wide (e.g. Figs. 3C, E), or elliptic, more than 1.5x longer than wide (Figs. 2E, 5A). Dorsal surface pale to dark yellow with yellow setae. Dense and tiny punctures on brown to black spots heterogeneously distributed, forming lines or patches. Thin reddish lines on dorsal and ventral surfaces of the body, randomly distributed (e.g. Figs. 2A, E). Clypeus with a pair of convergent punctured lines (e.g. Figs. 7E, 8A), from the base to the middle. Anteoocular processes present, varying from undeveloped and truncate (e.g. Fig. 6A) to developed and spinose or oblong in different length (e.g. Figs. 7E, 9E). Eyes globose, subpedunculate. Interommatidial sensilla, observed in light stereomicroscope, short or long, shiny, yellow to gold, randomly distributed. Area behind the eyes yellow (e.g. Fig. 8F) with black marks (e.g. Fig 8B) or totally black (e.g. Fig. 8H). Antennomeres yellow, marked with broad black stripes. Thorax with tubercles: six on transhumeral line of pronotum (e.g. Figs. 7A, B), and three on scutellum, a pair on anterior half and one tubercle on posterior half, near the apex (e.g. Fig. 7B). Tubercles can be well developed or reduced, tumid or inconspicuous; anterior pair on scutellum always bigger and higher than the remainder tubercles. Pronotal

anterolateral angles developed (e.g. Fig. 6A). Apex of scutellum laterally reflexed forming a pair of rounded tabs (e.g. Fig. 6B), from slightly swollen (e.g. Fig. 6J) to highly reflexed (e.g. Fig. 6BH). Hemelytral membrane brown, reticulated, translucent and shiny, the veins lighter than the cells, margins sulcated. Ventral surface of the body yellow or pale yellow, with punctured spots not reaching the lateral margins nor the medial line of the body. Intercalary labial unit between labial segments I and II present, of different sizes, ventrally curved. Mesosternum with a pair of broad marks. Abdominal spiracles elliptic and black, margins tumid.

**Description.** Head. Longer than wide. Dorsal surface of head with punctured spots irregularly distributed; surface irregular or flat. Punctures in arcs from the posterior margins of ocelli to the middle of cephalic disc; some punctures coalescent at the posterior margins of ocelli. Mandibular plates arcuate, laterally flattened and reflexed; apex rounded. Clypeus shorter than the mandibular plates. Area behind the eyes usually with a wide mark from the base of head to the margins of maxillary plates, covering the dorsal and lateral sides of antennal tubercles. Antennae five-segmented. Antennomeres shape and proportion: I, II and III cylindrical, usually subequal in length; IV and V claviform, subequal in length, longer than the other three. Antennomeres I usually black at apex and laterals; antennomeres II and III black at base and/or apex, and a wide black annulus at middle; antennomeres IV, yellow annulus varying in width close to the middle; antennomeres V, yellow at base, black at apex. Buccula low, bisinuous, anterior half shorter than posterior half; punctures in line at base, some dense near the posterior half. Labium yellow, emerging between the posterior third of buccula; long, reaching fifth abdominal segment; tiny black spots on lateral of segment I and at the apex of the IV. Labial segments II and III black on joint; IV almost entirely black. Segments proportion:  $I < II > III > IV$ ; segment I wider than the others, I and IV subequal in length. Intercalary labial unit between segments I and II; unit small, enlarged or sacculate (sensu Ruckes, 1966).

Thorax. Pronotum with dense punctured spots, usually coalescent around the cicatrices and between the transhumeral tubercles and pronotal posterior margin. Anterolateral angles tooth-like, directed laterad or obliquely projected. Pronotal anterolateral margins flattened and reflexed, straight (e.g. Fig. 7G) or arcuate (e.g. Fig. 7E), developed or not into a broad projection. Humeral angles undeveloped, rounded, posteriorly black. Cicatrices inconspicuous, punctured spots around and inside the area of cicatrices. Transhumeral tubercles I and VI always developed, conical and rounded, higher than the others; tubercles II

to V developed or not, acuminate, rounded or transversely elongated (forming a low crest). Scutellum triangular, longer than wide, apex rounded, reaching the abdominal segment VI; ventral surface of apex varying from solid black to yellow. Anterolateral angles of scutellum black, punctured, with conspicuous yellow and unpunctured area posterior to them. Anterior pair of tubercles conical, acuminate or rounded, at least as high as pronotum in lateral view. Posterior tubercle tumid and rounded. Distal tabs of scutellum smoky to solid black. Wings surpassing the posterior limit of abdomen. Coria reaching the seventh abdominal segment with variegate punctured spots. Radial vein conspicuous and yellow, apex with rounded unpunctured macula followed by punctured dark area; basolateral margins of coria with wide black spots. Ventral surface of prothorax: anterolateral portion with wide, black and rounded spots. Propleura densely punctured, sometimes marked; epimeral sulci brown to black. Prosternum slightly concave, receiving the labial intercalary labial unit. Meso- and metapleurae with punctured spots usually at margins. Mesosternum hexagonal. Mesocoxae closer to metacoxae than one to the other. Evaporatoria matte and translucent, coarse, reaching the metacoxae; occupying more than half of metaepisternum width; outer margin concave. Ostioles elliptic, latero-posteriorly opened, periostiole depression present. Peritremes groove-shaped (Kment & Villimova, 2010) yellow, shiny and long, reaching  $2/3$  of the evaporatorium width, anteriorly arcuate, rounded at apex. Peritremal furrow less than half of the peritreme length. Femora brown to black spotted, spots sometimes forming conspicuous annulus near the apex. Tibiae dorsally furrowed, with broad black spots; apex and base sometimes black. Tibial apparatus sickle-like. Tarsi yellow, sometimes black. Pretarsi usually black at apex. Claws black on apical half.

Abdomen. Dorsal surface yellow and unpunctured or marked. Connexival segments laterally exposed; black on anterior and posterior margins, the anterior mark usually wider than the posterior and sometimes triangular (e.g. Fig. 1A); marks continued ventrally. Posterolateral angles of segments with tiny and acute projection. Urosternite VII longer than the preceding at the middle. Trichobothrial tubercles laterally shifted, oblique to spiracle, black. Spiracles black.

**Male genitalia.** Pygophore campaniform or ovate, globose, yellow, densely setose on posterolateral angles. Dorsal rim (Fig. 10A): middle concave and slightly projected over the base of segment X, lateral concave. Segment X (Fig. 10A, X) yellow, subrectangular, longer than wide, shiny, apically furrowed and wide. Parameres (Fig. 10A, pa) sturdy, big, longer than wide, yellow or brown, glabrous, arcuate and directed to the segment X, usually

projected beneath it. Ventral rim fused with the genital cup floor, forming a shield-like process (Fig. 10B, pvr) dark brown to black, coarse, with different patterns beneath segment X and parameres. Posterolateral angles (Figs. 10A, pla) developed, spatulate, subrectangular or bilobed, somewhat divergent; apex rounded. Ventral margins (Fig. 10B, vm) yellow, usually with a transversal row of punctured marks brown to black.

**Female genitalia.** Plates with dense, long and yellow setae. Valvifers VIII (Fig. 12A, vfVIII) large, subtrapezoidal, elliptical or rounded, slightly convex, usually with punctured spots heterogeneously distributed; lateral margins concave, covering part of the base of laterotergites VIII; sutural margins brown to black. Valvifers IX almost completely covered by valvifers VIII, rounded. Laterotergites VIII (Fig. 12A, laVIII) with margins rounded, acuminate or truncate; laterals black marked; spiracle tiny, rounded, black. Inner margins of laterotergites VIII folded; fold developed or not, contiguous to laterotergites IX and valvifers VIII (e.g. Fig. 12E). When truncate, the laterotergites VIII are convex, with the mediotergite VIII forming a deep space to enclose the laterotergites IX (e.g. Fig. 12C). Laterotergites IX (Fig. 12A, laIX) subtrapezoidal, acuminate or rounded, black and yellow, size variable. Segment X (Fig. 12A, x) rounded, flattened and yellow.

**Distribution:** Bolivia, Brazil, Ecuador, French Guyana, Panama, Peru, Suriname, Venezuela.

**Key to the species of *Eurystethus***

- 1. Body ovate; anteocular angles of head not developed or short, reaching the line of the middle of the eye; pronotal anterolateral margins straight or slightly arcuate, never projected to the lateral of head.....2
- Body elliptical; anteocular angles of head not developed or developed, short or long, surpassing the middle of eye; pronotal anterolateral margins mostly arcuate and projected, sometimes directed to the lateral of head..... 16
- 2(1). Dorsal surface, punctured spots sparse, some forming conspicuous patterns on thorax..... 3
- Dorsal surface, punctured spots dense, irregular on variegate patterns..... 4
- 3(2). Dorsal surface, punctured spots coalescent on tip of transhumeral tubercles and laterals of anterior tubercles of scutellum. Anterolateral margins of pronotum straight. Area behind the eyes yellow, with black longitudinal marks. Female with large dark marks on plates,

valvifers VIII subrectangular; laterotergites VIII with proximal portion developed; laterotergites IX subrectangular..... *E. macroconus*  
 – Dorsal surface, conspicuous black spots: mostly in longitudinal lines on thorax, apex of scutellum, and margins of connexival segments. Anterolateral margins of pronotum arcuate. Area behind the eyes black. Antennomeres black, except on base and apex of antennomeres II, III and IV, and part of antennomeres I and V. Femora black, except on base and apex. Pretarsi black. Female, large black marks on plates, valvifers VIII subrectangular; laterotergites VIII proximal portion developed; laterotergites IX ovate. Male, pygophore campaniform, paramere laterally arcuate, apex bilobed; inferior process of ventral rim developed..... *E. ornatus*  
 4(2). Ventral body surface, punctured spots sparse or absent on abdomen..... 5  
 – Ventral body surface, punctured spots dense, some species with large dark marks on abdomen..... 10  
 5(4). Ventral body surface, feebly punctured spots, mostly sparse on thorax; abdomen unpunctured. Female plates acuminate with rounded angles; laterotergites VIII proximal margins developed, folded beneath valvifers VIII but not visible in ventral view..... *E. sp.* 22  
 – Ventral body surface punctured spots sparse, some coalescent on thorax. Female plates in different shapes..... 6  
 6(5). Antecular angles of head developed, short, reaching the middle of the eye line. Pronotum, transhumeral tubercles developed and rectangular ..... *E. sordidus*  
 – Antecular angles of head not developed. Pronotum, transhumeral tubercles developed, most or all of them rounded..... 7  
 7(6). Area behind the eyes yellow with few small rounded dark brown to black spots. Coria, conspicuous rounded macula at the end of radial vein. Connexival segments, black bands inconspicuous. Female, valvifers VIII and laterotergites IX subrectangular; laterotergites IX surpassing a little the mediotergites VIII in ventral view..... *E. sp.* 27  
 – Area behind the eyes with black marks. Coria, macula elongated or inconspicuous, marked with coalescent punctured spots. Connexival segments, black bands conspicuous..... 8  
 8(7). Coria, macula elongated. Male pygophore ovate, parameres medially distant from segment X, apex rectangular, not reaching each other; posterolateral angles rounded, with acuminate projection at base; inferior process of ventral rim not visible in ventral view..... *E. ovalis*



– Coria, macula inconspicuous. Male pygophore campaniform, parameres medially close to segment X; inferior process of ventral rim developed, ventrally visible..... 9

9(8). Large head. Connexival segments, black marks conspicuous, larger on anterior margins, also on ventral surface. Female, valvifers VIII subtrapezoidal, sutural margins black and contiguous; laterotergites VIII rounded; laterotergites IX subtrapezoidal, surpassing a little the mediotergite VIII. Male, parameres with a medial furrow from the base, apex rectangular but the lateral angle developed into a digitiform projection, not reaching each other beneath segment X; inferior process of ventral rim developed into a pair of flattened and rounded projections..... *E. spurculus*

– Long head. Connexival segments almost entirely dark, except for a medial yellow mark. Male, parameres laterally projected, almost reaching the laterals of pygophore, apex rectangular, overlapping each other beneath segment X; inferior process of ventral rim developed into a pair of acuminate projections..... *E. parvulus*

10(4). Ventral surface of abdomen, conspicuous black marks on laterals..... 11

– Ventral surface of abdomen, punctured spots dense and irregularly distributed, no patterns observed..... 14

11(10). Ventral surface of abdomen, laterally black, marks concomitant with marks on apical third of femora. Antennomere I black, except on base. Area behind the eyes black. Apex of scutellum reflexed and high. Female, plates densely punctured; valvifers VIII and laterotergites IX subrectangular; laterotergites VIII rounded, proximal margins developed and folded..... *E. sp. 5*

– Ventral surface of abdomen, small and conspicuous spots on laterals or anterior half of segments. Area behind the eyes yellow, with black spots on dorsal and ventral margins..... 12

12(11). Antennomere I black, except on base and small spot on proximal side. Transhumeral tubercles rectangular, except the distal tubercles (I and VI). Female plates with punctured spots; valvifers VIII subtrapezoidal; laterotergites rounded, reaching the limit of mediotergite VIII; laterotergite VIII rounded, proximal margins developed, folded..... *E. nigropunctatus*

– Antennomere I yellow, black on laterals. Transhumeral tubercles rounded..... 13

13(12). Transhumeral tubercles developed, as high as anterior tubercles of scutellum in lateral view. Anterior tubercles of scutellum rounded. Tarsomeres yellow. Male, pygophore campaniform; parameres laterally projected and arcuate, apex acuminate and sinuous,

reaching each other beneath segment X; inferior process of ventral rim ventrally developed, projected into a pair of convergent teeth..... *E. fulvescens*

– Transhumeral tubercles not developed. Anterior tubercles of scutellum acuminate, higher than pronotum in lateral view. Tarsomeres black. Male, pygophore campaniform; parameres laterally projected and bilobed, rounded lobes, apex of parameres rectangular, angles rounded, not reaching each other beneath segment X; inferior process of ventral rim ventrally developed into a pair of parallel and rounded projections..... *E. sp.* 18

14(10). Apex of scutellum oblong. Ventral thoracic surface black on laterals. Large black bands on the apical third of femora. Female, plates with punctured spots dense; valvifers VIII subtrapezoidal with rounded angles and margins; laterotergites VIII rounded, proximal margins developed and visible, folded; laterotergites IX ovate, small, not reaching the limit of mediotergites VIII in ventral view..... *E. sp.* 3

– Apex of scutellum acuminate. Ventral thoracic surface densely punctured, some punctured spots coalescent. Narrow dark bands on the apical third of femora..... 15

15(14). Antecular angles of head rounded. Anterolateral angles of pronotum laterad. Pretarsi yellow. Male, parameres laterally developed into acuminate projection, almost reaching the laterals of pygophore, apex of parameres rectangular, proximal angles rounded and reaching each other beneath segment X; inferior process of ventral rim ventrally developed into a pair of long, acuminate and convergent tooth like projections..... *E. jo*

– Antecular angles of head acuminate. Anterolateral angles of pronotum anterolaterally directed, reaching the eyes laterally. Pretarsi black on apex. Male parameres laterally rectangular and projected, apex ventrally projected, digitiform, not reaching each other beneath segment X; inferior process of ventral rim developed into a crest with a pair of small, acuminate and parallel projections..... *E. microlobatus*

16(1). Head, antecular angles not developed. Pronotum, anterolateral margins not projected..... 17

– Head antecular angles developed, short or long. Pronotum, anterolateral margins anteriorly projected reaching the laterals of the eyes..... 26

17(16). Pronotum, anterolateral margins straight ..... 18

– Pronotum, anterolateral margins arcuate ..... 21

18(17). Female laterotergites IX ovate, as long as wide, surpassing the mediotergites VIII, not reaching the laterotergites VIII limit in ventral view..... 19

- Female laterotergites IX subtrapezoidal, wider than long, surpassing the mediotergites VIII and barely reaching the laterotergites VIII limit in ventral view..... 20
- 19(18). Dorsal body surface densely punctured; punctured spots variegate. Connexival segments with conspicuous black marks. Pretarsi black on apex. Female valvifers VIII ovate, longer than wide; sutural margins contiguous from base to the middle of valvifers VIII. Pygophore campaniform; parameres laterally arcuate, apex rectangular, margins rounded; posterolateral angles rounded; ventral surface unpunctured; inferior process of ventral rim as a large plate with two pair of acute dorsal projections beneath the parameres: one pair lateral, one pair medial..... *E. sp. 21*
- Dorsal body surface sparsely punctured; punctured spots forming patterns. Connexival segments with inconspicuous black marks. Tarsomeres black, except the second; apex of femora black. Female valvifers VIII ovate, as long as wide; sutural margins contiguous. Pygophore campaniform; parameres laterally arcuate, apex rectangular and bilobed, proximal lobe wider than the lateral; posterolateral angles rectangular; ventral surface with punctured black spots on posterior margin; inferior process of ventral rim ventrally developed into one medial and acuminate tooth..... *E. sp. 16*
- 20(18). Area behind the eyes yellow with black spots. Antennomere I black, yellow on base, apex and dorsal surface. Ventral body surface densely punctured, some coalescent on thorax. Female valvifers VIII ovate, wider than long; laterotergites VIII proximal projection not visible in ventral view; laterotergites IX subtrapezoidal, wider than long. Male pygophore campaniform; parameres laterally projected into bilobed and arcuate projections, apex rectangular and sinuous, barely reaching each other beneath segment X; inferior process of ventral rim ventrally projected into a pair of large and rounded lobes..... *E. sp 23*
- Area behind the eyes black, except on margins of the eyes. Antennomere I black on base, apex, dorsal and ventral surfaces. Ventral body surface densely punctured with large black marks. Female valvifers VIII subtrapezoidal, as long as wide; laterotergites VIII proximal projection visible in ventral view; laterotergites IX subtrapezoidal, wider than long. Male pygophore campaniform; parameres laterally projected into bilobed and arcuate projections, apex rectangular, not reaching each other beneath segment X; inferior process of ventral rim ventrally projected into a pair of parallel acuminate projections; ventral surface dark; posterolateral angles rectangular and punctured..... *E. sp. 52*
- 21(17). Ventral body surface, feebly punctured spots sparse..... 22
- Ventral body surface, punctured spots dense, some coalescent..... 23

22(21). Area behind the eyes yellow with few black spots on base of head. Antennomere I yellow with black mark on lateral surface; antennomeres II and III yellow, except on the middle of dorsal surface. Dorsal surface of thorax with punctured spots dense, not forming patterns. Connexival segments black marks inconspicuous. Female plates unpunctured; valvifers VIII subtrapezoidal; laterotergites VIII truncate; mediotergite VIII forming a deep space to enclose the laterotergites IX; laterotergites IX subtrapezoidal, as long as wide, reaching the limit of laterotergites VIII in ventral view..... *E. pallescens*

– Area behind the eyes yellow with long black mark on dorsal surface. Antennomere I yellow with black mark on lateral and proximal surfaces; antennomeres II and III yellow, except on the middle. Dorsal surface of thorax with punctured spots dense and variegate. Connexival segments black marks conspicuous. Female plates with few punctured spots; valvifers VIII ovate; laterotergites VIII rounded, proximal margins developed, projections visible in ventral view; laterotergites IX ovate, divergent, longer than wide, surpassing the limit of laterotergites VIII in ventral view. Male pygophore campaniform; parameres arcuate, apex rounded with short acute projection posteriorly directed; inferior process of ventral rim developed into a pair of acute teeth beneath parameres; posterolateral angles rounded..... *E. sp. 40*

23(21). Dorsal body surface, punctured spots dense. Dorsal tubercles of thorax undeveloped; anterior tubercles of scutellum not surpassing the pronotum height in lateral view; apex of scutellum reaching the posterior tubercle height in lateral view..... 24

– Dorsal body surface, punctured spots dense with variegate pattern. Dorsal tubercles of thorax developed; anterior tubercles of scutellum surpassing the pronotum height in lateral view; apex of scutellum surpassing the posterior tubercle height in lateral view..... 25

24(23). Dorsal surface of thorax, punctured spots coalescent forming longitudinal striped pattern; longitudinal medial line with thin and sparse punctured spots. Coria, macula elongated. Ventral body surface, wide punctured spots. Female valvifers VIII ovate; laterotergites IX ovate, divergent, longer than wide, surpassing the laterotergites VIII limit in ventral view..... *E. ellipsoidalis*

– Dorsal surface of thorax, punctured spots heterogeneously distributed, without patterns. Coria, macula rounded. Ventral punctured spots thin. Female valvifers VIII ovate; laterotergites IX rounded, as long as wide, barely surpassing the mediotergites VIII in ventral view. Male pygophore ovate; parameres laterally projected into rounded keel, apex rectangular, slightly sinuous, reaching each other beneath segment X; inferior process of

ventral rim ventrally developed into one shield with medial pair of tiny teeth; posterolateral angles ventral, rectangular and sinuous, the proximal angles acuminate, the lateral rounded; base of posterolateral angles with dorsal and acute projection reaching the parameres..... *E. multipunctatus*

25(23). Female valvifers VIII ovate; laterotergites VIII truncate; laterotergites IX parallel, subtrapezoidal, wider than longer, barely reaching the laterotergites VIII in ventral view. Male pygophore ovate; parameres arcuate, not developed laterally, apex acuminate, not reaching each other beneath segment X; inferior process of ventral rim ventrally developed into a pair of short crests, apically acuminate; posterolateral angles acuminate and rounded, black on lateral and ventral surfaces, ventrally con..... *E. sp. 45*

– Male pygophore campaniform; parameres laterally arcuate, not projected, apex rounded, with a tiny teeth directed to proximal line, parameres not reaching each other, ventral surface with deep concavity near the base, where the process of ventral rim projections fit; inferior process of ventral rim developed into a crest with a pair of distal and long thorn like projections, process not developed ventrally; posterolateral angles rounded..... *E. sp. 39*

26(16). Anteocular angles short, reaching or not the half of the eye line in dorsal view..... 27

– Anteocular angles long, surpassing the half of the eye line in dorsal view..... 31

27(26). Anteocular angles reaching the half of the eye line in dorsal view. Female valvifers and laterotergites VIII punctured; valvifers VIII and laterotergites IX subtrapezoidal, the laterotergites longer than wide, reaching the limit of laterotergites VIII in ventral view..... 28

– Anteocular angles not reaching the half of the eye line in dorsal view. Female valvifers and laterotergites VIII punctured or not; laterotergites IX subtrapezoidal or ovate, not reaching the limit of laterotergites VIII in ventral view..... 29

28(27). Pronotum, anterolateral margins anteriorly projected, barely reaching the lateral of the eyes; anterolateral angles developed. Dorsal tubercles undeveloped; anterior tubercles of scutellum barely reaching the pronotum height in lateral view. Tarsomeres black on apical third. Female laterotergites VIII with proximal margins undeveloped; laterotergites IX posterior margins hardly inclined. Male pygophore campaniform; parameres laterally projected into rectangular projection, with short digitiform projection at posterior angle; apex of parameres acuminate, ventrally directed, parallel; inferior process of ventral rim ventrally

developed into a pair of convergent small teeth at middle; posterolateral angles rounded..... *E. variegatus*

– Pronotum, anterolateral margins anteriorly projected, reaching more than half of lateral of the eyes; anterolateral angles undeveloped. Dorsal tubercles undeveloped; anterior tubercles of scutellum barely reaching the pronotum height in lateral view. Tarsomeres black, except on base. Female laterotergites VIII with proximal margins undeveloped; laterotergites IX posterior margins barely inclined and sinuous..... *E. sp.* 26

29(27). Dorsal body surface with thin reddish lines densely distributed, mostly on pronotum and scutellum; punctured spots without conspicuous pattern, variegate. Area behind the eyes medially yellow, black on dorsal and ventral margins. Ventral body surface with black punctured spots dense. Femora and tibia with thin reddish lines; femora with black spots on the apical third. Female valvifers VIII subtrapezoidal; laterotergites VIII proximal margins developed, projections visible in ventral view; laterotergites IX ovate, divergent, barely surpassing the mediotergite VIII limit in ventral view..... *E. rufodorsatus*

– Dorsal body surface yellow with punctured dark spots forming patterns, without thin reddish lines. Area behind the eyes black or yellow with tiny black spots. Ventral surface of abdomen yellow and unpunctured, or with wide punctured spots on black marks. Femora and tibia without reddish lines; femora yellow with few and tiny spots on apical third, or black, except on base and apex. Female laterotergites IX subtrapezoidal and parallel..... 30

30(29). Area behind the eyes black. Antennomeres black, except on base and apex. Labial segments III and IV black. Femora and tarsomeres black, except on base and apex; tibiae black on dorsal and lateral surfaces. Ventral surface of abdomen with wide black marks. Female valvifers VIII subtrapezoidal, as long as wide; laterotergites VIII proximal margins undeveloped; laterotergites IX subtrapezoidal, not reaching the limit of laterotergites VIII in ventral view..... *E. nigricornis*

– Dorsal surface of thorax with conspicuous pattern of longitudinal dark lines. Area behind the eyes yellow with sparse and tiny black spots. Antennomeres black, except on base and apex, and the antennomere I which are black on laterals. Labium yellow. Femora yellow with few and tiny spots on apical third. Ventral surface of abdomen unpunctured, without dark wide marks. Female plates unpunctured, with short black marks only on laterals of laterotergites VIII; valvifers VIII subtrapezoidal, wider than long; laterotergites VIII proximal margins developed into short projections, barely visible in ventral view; laterotergites IX subtrapezoidal, not reaching the limit of laterotergites VIII in ventral view. Male pygophore

campaniform; parameres laterally developed into rectangular projection, apex acuminate, rounded, parallel, ventrally directed; inferior process of ventral rim ventrally developed into a crest with a pair of medial teeth parallel each other; posterolateral angles rounded..... *E. sp 7*

31(26). Antecular angles of head long, reaching the limit of the eye diameter in dorsal view. Ventral body surface yellow, punctured spots dense. Female plates with black punctured spots; laterotergites VIII rounded or barely acuminate..... 32

– Antecular angles of head very long, length about 1.5x the diameter of the eyes. Ventral body surface laterally black and densely punctured. Female plates with wide black marks or spots; valvifers VIII subtrapezoidal, wider than long; laterotergites VIII basal half black, apex acuminate; laterotergites IX subtrapezoidal, longer than wide, lateral sides about 2x the proximal side length, reaching the limit of laterotergites VIII in ventral view..... *E. sp. 34*

32(31). Pronotal anterolateral angles developed, in different sizes, usually anterolaterally directed; anterolateral margins anteriorly projected, reaching or barely reaching the middle of the eye in dorsal view. Male parameres laterally developed, but not rectangular; inferior process of ventral rim developed or not into a pair of short projections; posterolateral angles rectangular..... 33

– Pronotal anterolateral angles not developed; anterolateral margins anteriorly projected, but surpassing the middle of the eyes in dorsal view. Male pygophore campaniform; parameres laterally projected into rectangular projection, apex acuminate and rounded, posteroventrally directed, not reaching each other beneath segment X; inferior process of ventral rim ventrally developed into a pair of long and convergent thorn-like projections, medially directed; posterolateral angles rounded..... *E. nigroviridis*

33(32). Area behind the eyes yellow with black marks on dorsal and ventral surfaces. Female plates with punctured spots dense or sparse; laterotergites IX reaching the limit of laterotergites VIII in ventral view..... 34

– Area behind the eyes black. Female plates with few and sparse punctured spots, coalescent on the base of plates, or unpunctured; laterotergites IX not reaching or surpassing the limit of laterotergites VIII in ventral view..... 35

34(33). Dorsal and ventral surfaces of body densely punctured without conspicuous patterns. Antecular angles of head wide. Tarsomeres yellow; pretarsi black on apical half. Female plates punctured spots dense; valvifers VIII subtrapezoidal, wider than long; laterotergites VIII rounded, proximal margins slightly developed into short projection barely visible in

ventral view; laterotergites IX subtrapezoidal, the lateral margins about 1.5x longer than the proximal margins length..... *E. punctissimus*  
 – Dorsal body surface punctured spots dense and variegate; ventral surface with punctured spots dense on laterals. Tarsomeres totally yellow. Female plates with sparse punctured spots; valvifers VIII ovate, as long as wide; laterotergites VIII slightly acuminate; laterotergites IX subtrapezoidal, lateral margins 2x longer than the proximal margins length. Male pygophore campaniform; parameres laterally projected into acuminate medial projection, apex of parameres acuminate, parallel, posteriorly directed; inferior process of ventral rim ventrally developed into a pair of tiny and medial teeth; posterolateral angles rectangular..... *E. sacculatus*  
 35(33). Pronotal anterolateral angles are tiny. Apex of scutellum acuminate. Connexival segments with conspicuous black marks. Ventral surface of abdomen with dark marks. Tarsomeres yellow; pretarsi black on apical half. Female plates with few punctured spots on the base of valvifers and laterotergites VIII; valvifers VIII subtrapezoidal, wider than long; laterotergites VIII slightly acuminate; laterotergites IX ovate, not reaching the limit of laterotergites VIII in ventral view..... *E. sp. 20*  
 – Pronotal anterolateral angles are long, almost the same size of anteocular angles of head. Apex of scutellum oblong. Connexival segments without conspicuous marks. Intercalary labial unit black. Ventral body surface with light brown punctured spots. Tibiae black on the apex; tarsomere I black; tarsomeres II and III yellow. Female plates unpunctured; valvifers VIII subtrapezoidal, as long as wide; laterotergites VIII rounded; laterotergites IX subtrapezoidal, surpassing the limit of laterotergites VIII in ventral view..... *E. sp. 36*

***Eurystethus nigropunctatus* Mayr, 1864**

Mayr, 1864; Stål, 1872; Lethierry & Severin, 1893; Kirkaldy, 1909; Bergroth, 1918; Ruckes, 1958; Ruckes, 1966; Becker, 1966.

Type material: Holotype female. BRAZIL. f#, no data (NHMW). Examined.

**Diagnosis.** Body ovate. Head, anteocular angles not developed. Dorsal surface, punctured spots heterogeneously distributed. Pronotum, anterolateral margins slightly arcuate; tumid and transversal spot near posterior margin of cicatrice. Antennomere I black, except on basal margin and small spot near distal margin. Ventral surface, punctured spots densely distributed on large areas of the laterals, forming black patterns on thorax. Intercalary labial unit not developed. Female, valvifers VIII subtrapezoidal, wider than longer, about the



same length as laterotergites VIII, sutural margins black and contiguous; laterotergites VIII, posterior margins rounded, proximal margins developed and projected as a fold under the valvifers VIII. Laterotergites IX elliptical, basal third black, tip yellow, divergent, longer than wider, reaching the mediotergites VIII line in ventral view. Male unknown.

**Distribution.** BRAZIL.

**Comments:** Mayr (1864), in the original description, did not mention the sex of the type specimen neither described the genital morphology. In *Eurystethus* revision, in 1966, Ruckes described it as a male, with notes about a pygophore. However, the type specimen deposited in Naturhistorisches Museum Wien (NHMW) is a female, examined and photographed during our revision.

***Eurystethus ellipsoidalis* Ruckes, 1958**

Ruckes, 1958; Ruckes, 1966; Becker, 1966.

Type material: Holotype female. PANAMA. **Canal Zone.** f#, Barro Colorado Island; 2-VI-1957; F. Schrader collector, (AMNH). Examined.

**Diagnosis.** Body elliptical. Head, antecular angles not developed. Dorsal surface of pronotum and scutellum medially with a conspicuous area with sparse and tiny punctured spots, lighter than the surface. Pronotum, anterolateral margins arcuated, slightly projected. Corium, narrow and elliptical macula on the end of the radial vein. Ventral surface, punctured spots densely distributed on laterals. Intercalary labial unit not developed. Female, valvifers VIII subelliptical, longer than the laterotergites VIII; sutural margins black, reaching each other at middle; laterotergites VIII, margins rounded; laterotergites IX elliptical, basal half black, tip yellow, divergent, as long as wide, surpassing the line of laterotergites VIII in ventral view. Male unknown.

**Distribution.** PANAMA: Canal Zone.

***Eurystethus macroconus* Ruckes, 1966**

Ruckes, 1966

Type material: Holotype female. BRAZIL. **Amazonas.** f#, Hyutanahan, Rio Purus; IV-1922; S. M. Klages collector; Carnegie Museum. Paratype female. f#, same data as for holotype, (AMNH) Examined.

**Diagnosis.** Body ovate. Head, antecular angles not developed. Dorsal body surface, punctured spots heterogeneously distributed, but sparse on scutellum with a medial area

fewer punctured than the laterals. Pronotum, anterolateral angles laterad; anterolateral margins straight, not projected. Corium, macula absent. Ventral body surface punctured spots sparsely distributed on laterals. Intercalary labial unit slightly developed. Female, valvifers VIII subtrapezoidal, as long as wide, but longer than the laterotergites VIII, sutural margins dark and contiguous; laterotergites VIII rounded; laterotergites IX subtrapezoidal, subparallel, wider than longer, not reaching the limit of laterotergites VIII, but surpassing the mediotergite VIII in ventral view. Male unknown.

**Distribution.** BRAZIL: Amazonas and Pará.

***Eurystethus ornatus* Ruckes, 1966**

*Eurystethus ornatus* Ruckes, 1966.

*Eurystethus goianensis* Becker, 1966. **New synonym.**

Type material of *Eurystethus ornatus*: Holotype male. BRAZIL. **Minas Gerais.** m#, Uberaba; 12-I-1932; ex collection H. Ruckes, (AMNH). Examined. Paratype female. **São Paulo.** f#, Rebouças; 10-X-1945; M. Alm collector, (AMNH). Examined.

Type material of *Eurystethus goianensis*: two f# Rebouças, 18-X-1945, Ivo M. Alm. col. (MCNZ). **Goiás.** Seven m#, one f# Rio Verde, 1945, Carvalho col. (MCNZ). All examined.

**Diagnosis.** Body ovate. Dorsal body surface punctures irregular, sparse on pronotum and scutellum; black spots forming conspicuous patterns, contrasting with the pale yellow surface. Head, anteocular angles not developed; area behind the eyes totally black; antennomeres I black, except for the yellow spot on proximal face, antennomeres II and III black, except for the base and tip. Pronotum, black spots posterior to the cicatrices, a pair of black longitudinal marks directed to the ocelli, and three pairs of longitudinal marks on the transhumeral tubercles; anterolateral margins arcuate, slightly projected. Scutellum, black marks on the base, parafrenal tubercles, laterals of postfrenal tubercle and apex of scutellum. Corium, macula present, marked with a black punctured spot. Ventral body surface punctured spots densely distributed, some coalescent on thorax. Intercalary labial unit slightly developed. Legs, femora black, except on base and tip; distal tarsomere black. Female, valvifers VIII elliptical, wider than long, black except on margins and irregular spots, tips convergent, sutural margins contiguous; laterotergites VIII rounded, basal half black, distal yellow, proximal margin developed and folded under the valvifers VIII; laterotergites IX, elliptical, basal half black, divergent, longer than wide, surpassing the mediotergites VIII, reaching the limit of laterotergites VIII in ventral view. Male, pygophore campaniform;

parameres projected beneath segment X, laterally arcuate, apex bilobed and rounded, both lobes parallel but the proximal lobe dorsoventrally flattened; posterolateral margins rectangular; ventral rim developed in a pair of long teeth, apex rounded, convergent.

**Distribution.** BRAZIL: Minas Gerais, São Paulo and Goiás.

***Eurystethus parvulus* Ruckes, 1966**

Ruckes, 1966

Type material: Holotype male. BRAZIL. **Amazonas**. m#, 21-30.VI.1927; Zerny collector, (NMHW) Examined.

**Diagnosis.** Body ovate. Dorsal surface of thorax, punctured spots heterogeneously distributed, not forming patterns. Head, anteocular not developed. Pronotum, anterolateral angles laterad, anterolateral margins straight. Ventral surface of thorax, punctured spots coalescent on laterals. Intercalary labial unit slightly developed. Male, pygophore campaniform; parameres projected beneath segment X, laterally projected and acuminate, apex rectangular, reaching each other; posterolateral angles rectangular. Female unknown.

**Distribution.** BRAZIL: Amazonas.

***Eurystethus spurculus* Ruckes, 1966**

Ruckes, 1966

Type material: Holotype male. FRENCH GUIANA. m#, 1899; R. Oberthuir collector; Museum National d'Histoire Naturelle. Paratypes male and female. f# m#, same data as holotype, (AMNH) Examined.

**Diagnosis.** Body ovate. Dorsal surface of thorax, punctured spots dense. Head, large anteocular angles not developed. Pronotum, anterolateral angles laterad, anterolateral margins arcuate. Connexival segments, black marks conspicuous. Ventral body surface punctured spots sparse. Intercalary labial unit slightly developed. Female, valvifers VIII subtrapezoidal, sutural margins black and contiguous; laterotergites VIII rounded; laterotergites IX subtrapezoidal, surpassing a little the mediotergite VIII. Male, pygophore campaniform; parameres projected beneath segment X but not reaching each other, medial wide furrow from the base to the middle of the paramere, forming a lateral arcuate projection, apex rectangular with a tiny and rounded projection ventrally directed; posterolateral angles rectangular; ventral rim, pair of flattened, long and dark projections, rounded, subparallel.

**Distribution.** FRENCH GUIANA.

***Eurystethus ovalis* Ruckes, 1966**

Ruckes, 1966

Type material: Holotype male. BOLIVIA. **Chapare**. m#, Rio Cristalmayo; 8-IV-1950; L. Pefia collector, (AMNH) Examined.

**Diagnosis.** Body ovate. Head, anteoocular angles not developed. Pronotum, anterolateral margins arcuate. Ventral body surface punctured spots sparse. Intercalary labial unit slightly developed. Male, pygophore ovate; parameres projected beneath segment X, base thinner than the rest, medially distant from segment X, laterally projected and arcuate, reaching the posterolateral angles of pygophore; apex acuminate and rounded, ventrally directed, not reaching each other, ventral surface of paramere with longitudinal keel; posterolateral angle rounded, with basal, acuminate and convergent projections. Female unknown.

**Distribution.** BOLIVIA: Chapare. PERU: Tingo Maria.

***Eurystethus pallescens* Ruckes, 1966**

Ruckes, 1966

Type material: Holotype male. SURINAME. **Paramaribo**. m#, 12-II-1958; P. H. van Doesburg collector, (RMNH) Examined. Paratype female. f#, same data as for holotype, (AMNH) Examined.

**Diagnosis.** Body elliptical. Head, anteoocular angles not developed. Dorsal surface of thorax, tiny punctured spots dense, some coalescent after macula on corium. Pronotum, anterolateral angles laterad, anterolateral margins slightly arcuate. Ventral body surface tiny punctured spots sparse. Intercalary labial unit slightly developed. Female, valvifers VIII ovate, rounded, convergent, wider than longer, longer than laterotergites VIII, sutural margins black and contiguous; laterotergites VIII truncate, convex, with the mediotergite VIII forming a deep space to enclose the laterotergites IX; laterotergites IX subrectangular with rounded angles and arcuate margins, parallel each other, contiguous, as long as wide, surpassing a little the mediotergite VIII, reaching the laterotergites VIII in ventral view. Male, pygophore campaniform; parameres laterally projected, base thinner than the rest, distal half large and flattened, almost reaching the posterolateral angles, apex square, projected beneath segment X, not reaching each other, ventrally directed; ventral rim developed as a dark keel; posterolateral angles rectangular and slightly sinuous, medially concave.

**Distribution.** SURINAME: Paramaribo.

***Eurystethus sordidus* Ruckes, 1966**

Ruckes, 1966

Type material: Holotype female. FRENCH GUIANA. **Sinnamary.** f#, II-1951; ex collection H. Ruckes, (AMNH) Examined.

**Diagnosis.** Body ovate. Head large, antecular angles developed, short, rounded. Dorsal surface of thorax, punctured spots irregularly coalescent, some on transhumeral tubercles. Pronotum, anterolateral margins arcuate, slightly projected; transhumeral tubercles rectangular. Connexival segments without conspicuous black marks. Ventral body surface punctured spots sparse. Intercalary labial unit sacculate. Female, valvifers VIII ovate, as long as wide, as long as laterotergites VIII, sutural margins yellow, contiguous at tip; laterotergites VIII acuminate, rounded, proximal margin developed as a short fold under laterotergites IX; laterotergites IX subtrapezoidal with rounded angles, parallel, black except for the lateral margins, as long as wide, surpassing the mediotergites VIII but not reaching the limit of laterotergites VIII in ventral view. Male unknown.

**Distribution.** FRENCH GUIANA: Sinnamary.

***Eurystethus punctissimus* Ruckes, 1966**

Ruckes, 1966

Type material: Holotype female. BRAZIL. f#, Chapada; VIII, (AMNH) Examined.

**Diagnosis.** Body elliptical. Dorsal surface, punctured spots dense. Head, antecular angles developed, acuminate, reaching the limit of eyes in dorsal view. Pronotum, anterolateral margins arcuate, projected to the lateral of head. Tubercles slightly developed on pronotum and scutellum. Ventral body surface punctured spots dense, also on the head. Intercalary labial unit sacculate. Female, plates densely punctured; valvifers VIII subtrapezoidal, as long as wide, same length of laterotergites VIII, sutural margins dark and contiguous; laterotergites VIII posterior margins rounded, proximal margin slightly reflected into a small fold; laterotergites IX subtrapezoidal, parallel, wider than long, surpassing the mediotergite VIII but not reaching the laterotergites VIII in ventral view, posterior margin in diagonal, lateral margin arcuate, proximal margins dark and contiguous. Male unknown.

**Distribution.** BRAZIL.

***Eurystethus nigricornis* Ruckes, 1966**

Ruckes, 1966

Type material: Holotype male. ECUADOR. **Santo Domingo de los Tsáchilas**. m#, Santo Domingo; 10-XI-1956; R. W. Portman collector, (CAS) Examined. Paratype female. f#, same data as for holotype, (AMNH) Examined.

**Diagnosis.** Body elliptical. Dorsal body surface, punctured spots irregular, some coalescent on variegate pattern. Head, anteocular angles slightly developed, rounded; area behind the eyes totally black. Pronotum, anterolateral margins arcuate, slightly projected to the lateral of head. Tubercles slightly developed on pronotum and scutellum. Ventral body surface punctured spots dense; abdomen black, except on margins and middle. Antenna black, except on joints. Intercalary labial unit sacculate, labial segments III and IV black. Legs black, except on joints and irregular spots on tibiae. Female, plates with few punctured spots; valvifers VIII ovate, as long as wide, longer than the laterotergites VIII, sutural margins yellow and contiguous; laterotergites VIII, posterior margins rounded; laterotergites IX subtrapezoidal, margins arcuate, parallel, basal half black, wider than long, surpassing the mediotergite VIII but not reaching the limit of laterotergites VIII in ventral view; mediotergites VIII black. Male, pygophore campaniform; parameres laterally developed and sinuous, forming digitiform and laterad projections, almost reaching the laterals of pygophore; apex rounded, ventrally projected beneath segment X, not reaching each other; posterolateral angles rectangular.

**Distribution.** ECUADOR: Santo Domingo de los Tsáchilas.

***Eurystethus nigroviridis* Ruckes, 1966**

Ruckes, 1966

Type material: Holotype male. BRAZIL. **Pará**. m# Belém; 10-22.XI.1963; Oliveira and Wygodzinsky collectors, (AMNH) Examined.

**Diagnosis.** Body elliptical. Dorsal body surface, punctured spots irregular, some coalescent on variegate pattern. Head large, anteocular angles developed, acuminate, not reaching the tangent line of eyes. Dorsal tubercles of pronotum and scutellum, and apex of scutellum not developed, except parafrenal tubercles. Pronotum, anterolateral margins straight, but developed and anteriorly projected to the lateral of head; anterolateral angles not developed. Corium, macula absent, with punctured spots at end of vein radius. Ventral body surface punctured spots sparse. Intercalary labial unit slightly developed. Male, pygophore

campaniform; parameres laterally arcuate and projected, almost reaching the lateral of paramere; apex rounded, ventrally directed, not reaching each other beneath segment X; posterolateral angles rounded; ventral rim punctured, projected into a pair of acute teeth, convergent, black at tip. Female unknown.

**Distribution.** BRAZIL: Pará.

***Eurystethus sacculatus* Ruckes, 1966**

Ruckes, 1966

Type material: Holotype male. BRAZIL. m# upper Rio Mapuera; 2-II-1938; W. G. Hassler collector, (AMNH) Examined. Paratype female. f#, same data as for holotype, (AMNH) Examined.

**Diagnosis.** Body elliptical. Dorsal body surface, punctured spots irregular, some coalescent on variegate pattern. Head large, antecular angles developed, acuminate, reaching the tangent line of eyes. Dorsal tubercles of thorax and apex of scutellum not developed. Pronotum, anterolateral margins straight, developed, projected to the lateral of head. Connexival marks inconspicuous. Ventral body surface punctured spots dense, coalescent on thorax. Intercalary labial unit sacculate. Tarsomeres yellow. Female, plates sparsely punctured; valvifers VIII subtrapezoidal, wider than long, same length as laterotergites VIII, sutural margins black and contiguous; laterotergites VIII acuminate; laterotergites IX subtrapezoidal, parallel, posteriorly diagonal, lateral margins arcuate, proximal third black, longer than wide, surpassing the mediotergites VIII and reaching the laterotergites VIII line in ventral view. Male, pygophore campaniform; parameres laterally developed into a rectangular projection, medial digitiform projection laterad, medially distant from the segment X, apex ventroposteriorly directed, acuminate and rounded, not reaching each other beneath segment X; posterolateral angles rectangular; ventral rim dark, flattened, with a pair of small and rounded projections at middle.

**Distribution.** BRAZIL.

***Eurystethus variegatus* Ruckes, 1966**

*Eurystethus variegatus* Ruckes, 1966; Becker, 1966.

*Eurystethus deplanatus* Becker, 1966. **New synonym.**

Type material of *Eurystethus variegatus*: Holotype male. BRAZIL. **Rio de Janeiro.** m# I-1920, (AMNH) Examined. Paratype. f# same data as for holotype, (AMNH). **São Paulo.**

Type material of *Eurystethus deplanatus*: Seven m#, eight f# Rebouças, 18-X-45, Ivo M. Alm. col. (MCNZ). **Minas Gerais.** f# Belo Horizonte, X-32, A. Costa Jr. col. (MCNZ). Examined.

**Diagnosis.** Body elliptical. Dorsal body surface punctured spots irregular, some coalescent on variegate pattern. Head, antecular angles developed, acuminate, not reaching the tangent line of eyes. Dorsal tubercles of thorax and apex of scutellum not developed. Pronotum, anterolateral margins straight, developed, projected. Connexival marks inconspicuous. Ventral body surface punctured spots dense. Coxae, conspicuous black marks close to the tip. Intercalary labial unit sacculate. Female, plates punctured; valvifers VIII subtrapezoidal, wider than long, same length as laterotergites VIII, sutural margins black and contiguous; laterotergites VIII rounded; laterotergites IX ovate, longer than wide, divergent, black on basal third, surpassing the mediotergite VIII but not reaching the laterotergites VIII line in ventral view. Male, pygophore campaniform; parameres laterally developed, rectangular, apex acuminate and rounded, ventrally projected until reach the line of ventral rim, not reaching each other beneath segment X; posterolateral angles rounded; ventral rim flattened, black, developed into a pair of convergent, acuminate teeth.

**Distribution.** BOLIVIA: Provincia del Sara and Santa Cruz de la Sierra. BRAZIL: São Paulo, Rio de Janeiro and Minas Gerais.

### ***Eurystethus fulvescens* Ruckes, 1966**

Ruckes, 1966

Type material: Holotype male. BRAZIL. **Rio de Janeiro.** m#, 1929, (AMNH) Examined.

**Diagnosis.** Body ovate. Dorsal body surface punctured, some coalescent on light brown irregular spots. Head large, antecular angles not developed, area behind the eyes black except on the medial transversal line. Pronotum, anterolateral angles developed and long; anterolateral margins arcuate; transhumeral tubercles rounded. Ventral body surface punctured spots dense; pleura dark on laterals. Intercalary labial unit slightly developed. Male, pygophore campaniform; parameres laterally projected and rounded, apex rectangular and sinuous, proximal angle longer than the lateral, convergent, overlapping each other beneath segment X; posterolateral angles rounded; ventral rim developed into a pair of convergent and acute teeth at middle. Female unknown.

**Distribution.** BRAZIL: Rio de Janeiro.



***Eurystethus microlobatus* Ruckes, 1966**

Ruckes, 1966

Type material: Holotype male. SURINAME. **Paramaribo**. m#, 28-I-1958; P. H. van Doesburg, Jr. collector, (RMNH) Examined.

**Diagnosis.** Body ovate. Dorsal body surface punctured spots irregular, some coalescent on variegate pattern. Head, antecular angles developed, acuminate, not reaching the limit of eye. Pronotum, anterolateral angles developed and long, projected to the lateral of head; anterolateral margins arcuate. Ventral body surface punctured spots dense. Intercalary labial unit slightly developed. Male, pygophore campaniform; parameres laterally projected, acuminate, apex acuminate and rounded, ventrally projected, not reaching each other beneath segment X; posterolateral angles rectangular, sinuous, concave, proximal margin tumid; ventral rim black, developed into a pair of small and parallel angles at middle. Female unknown.

**Distribution.** SURINAME: Paramaribo.

***Eurystethus jo* Correia, Fernandes & Campos, 2020**

Correia, Fernandes & Campos, 2020

Type material: Holotype male. BRAZIL. **Amazonas**. m#, Barcelos, rio Unini, Boca da Onça; 25–26/I/1990; P. Bührenheim, H. Remold, N.O. Aguiar e J. da Silva col. [lat. -0.973987; long. -62.925583] (UFAM), Examined.

**Diagnosis.** Body ovate. Dorsal body surface punctured spots irregular, some coalescent on variegate pattern. Head, antecular angles developed, rounded, not reaching the limit of eyes; area behind the eyes black, except on small spot at middle. Pronotum, anterolateral margins slightly arcuate; anterolateral angles laterad. Ventral body surface punctured spots dense, coalescent on thorax. Intercalary labial unit short, enlarged. Male, pygophore campaniform; parameres, laterally developed into acuminate projection laterad, apex rectangular with rounded angles, proximal angles reaching each other beneath segment X, with a medial transversal keel on ventral surface of parameres; posterolateral angles rectangular; ventral rim developed into a pair of long teeth, convergent, that reaches the apex of parameres. Female unknown.

**Distribution.** BRAZIL: Amazonas.

***Eurystethus multipunctatus* Correia, Fernandes & Campos, 2020**

Correia, Fernandes & Campos, 2020

Type material: Holotype male. BRAZIL. **Distrito Federal**. m#, 32km N Brazilia, nr. Planaltina, 15° 35' S / 47° 42' W, 1000m; 17.XII.1997; T. J. Henry coll. [lat. -15.584212; long. -47.692608] (NMHN), Examined. Paratype. f#, same data as the holotype (NMHN) Examined.

**Diagnosis.** Body elliptical. Dorsal body surface punctured spots dense. Head large, antecular angles not developed. Pronotum, anterolateral margins slightly arcuate; anterolateral angles laterad; transhumeral tubercles slightly developed. Ventral body surface punctured spots sparse. Intercalary labial unit short, enlarged. Female, valvifers VIII ovate, wider than long, longer than laterotergites VIII, sutural margins black, contiguous; laterotergites VIII rounded; laterotergites IX medially black, rounded, wider than long, reaching the mediotergites VIII, but not the laterotergites VIII limit in ventral view. Male, pygophore ovate; parameres laterally developed and projected, reaching the base of posterolateral angles, apex rectangular with rounded margins, reaching each other beneath segment X; ventral rim developed into a keel, with a pair of small and parallel teeth at middle; posterolateral angles rectangular, sinuous, medially concave, with small digitiform projection at dorsal surface, reaching the parameres.

**Distribution.** BRAZIL: Distrito Federal.

### ***Eurystethus rufodorsatus* Correia, Fernandes & Campos, 2020**

Correia, Fernandes & Campos, 2020

Type material: Holotype female. BRAZIL. **Mato Grosso**. f#, [Vera], Vila Vera, 55° 30' long., 12° 46' lat., X.1973; M. Alvarenga. [lat. -12.629081; long. -55.359544] (AMNH), Examined.

**Diagnosis.** Body elliptical. Dorsal body surface punctured spots dense, some coalescent on variegate pattern; reddish lines dense, mostly on pronotum and scutellum. Head large, antecular angles developed, rounded, short, not reaching the limit of eye. Pronotum, margins arcuate, projected. Ventral body surface punctured spots dense on thorax, sparse on abdomen. Intercalary labial unit short, enlarged. Reddish lines on tip of femora and tibiae. Female, plates with punctured spots dense; valvifers VIII subtrapezoidal, wider than long, sutural margins black and contiguous; laterotergites VIII rounded, longer than valvifers VIII, proximal margin slightly developed into a small fold; laterotergites IX medially black,

elliptical, longer than wide, divergent, surpassing a little the mediotergites VIII, but not reaching the laterotergites VIII limit in ventral view. Male unknown.

**Distribution.** BRAZIL: Mato Grosso.

***Eurystethus* sp. nov. 22**

(Figs. 2A, B; 6I, J; 12D; 15)

Holotype female. BRAZIL. **Pará.** f#, Tucuruí; I.1979; M. Alvarenga. (UFPA). Male unknown.

**Differential diagnosis.** Despite the similarities between female plates and general body morphology of this species and *E. sp. nov. 40*, some differences are remarkable between them. *Eurystethus* sp. nov. 22 have the dorsal surface with dense punctured spots, without any conspicuous patterns, while is variegate in *E. sp. nov. 40*; the connexival segments are marked at posterior rim and small spot at anterolateral margins in *E. sp. nov. 22*, but in *E. sp. nov. 40* the anterior rim of connexival segments have conspicuous dark mark; ventral body surface punctured only at propleurae in *E. sp. nov. 22*, and ventral body surface with sparse punctures in *E. sp. nov. 40*. The valvifers VIII of both species have a small projection at anterolateral margins, contiguous to the laterotergites VIII. However, in *E. sp. nov. 22* the valvifers VIII are wider than longer (as long as wide in *E. sp. nov. 40*) and have the apex slightly truncate (rounded in *E. sp. nov. 40*); the laterotergites VIII are slightly angular and have about the same length of valvifers VIII in *E. sp. nov. 22*, but rounded and short in *E. sp. nov. 40*; and the laterotergites IX of *E. sp. nov. 22* are ovate and acuminate, while in the other species the laterotergites IX are ovate and rounded.

**Description.** Head: Mandibular plates slightly reflexed. Antecular angles undeveloped, truncate. Interommatidial sensilla observed. Area behind the eyes with a dark brown spot near eyes and a narrow mark at the base of head. Ventral surface of head unpunctured. Antennomeres proportion: I<II≈III<IV; V not observed. Antennomere I black on laterals and part of ventral side. Intercalary labial unit enlarged.

Thorax: Pronotum with punctures heterogeneously distributed without conspicuous patterns. Anterolateral angles directed laterad. Anterolateral margins slightly straight, not projected. Transhumeral tubercles almost inconspicuous, except I and VI; tubercles II and IV elongated. Scutellum with few punctured spots near posterior tubercle. Anterior tubercles of scutellum surpassing a little the pronotum in lateral view. Posterior tubercle developed, convex. Apex of scutellum reflexed, almost reaching the height of posterior tubercle in lateral

view. Coria with punctures uniformly distributed; macula present. Ventral surface of thorax barely punctured. Femora with few and small black spots and reddish marks heterogeneously distributed near apex. Tibiae with base and apex reddish brown. Tarsi yellow.

Abdomen: Connexival segments feebly punctured near proximal margin, the remaining unpunctured. Urosternites unpunctured or marked, so intersegmental area, pseudosuture and trichobothrial tubercles concolor.

Female (Fig. 12D): Valvifers VIII subtrapezoidal with rounded angles and arcuate margins, except the sutural straight; few brown spots heterogeneously distributed; sutural margins black and divergent from base. Laterotergites VIII angular, posteriorly projected, with a small spot on base; inner margins folded, contiguous to laterotergites IX and valvifers VIII. Laterotergites IX subelliptic, divergent from base, slightly acuminate and posteriorly directed; small, about  $\frac{1}{4}$  the size of laterotergites VIII, surpassing the mediotergites VIII but not reaching the imaginary line tangent to it apex; basal half dark, apical half yellow.

**Measurements.** Total length: 9.6 mm; abdominal width: 6.2 mm; head length: 1.6 mm; head width: 1.4 mm; antennomeres length: I, 0.5; II, 0.9; III, 1; IV, 1.5 mm; pronotum length: 2 mm; pronotum width: 6 mm.

**Distribution** (Fig. 15). BRAZIL. Pará: Tucuruí.

### ***Eurystethus* sp. nov. 27**

(Figs. 4C, D; 8E, F; 13E; 15)

Holotype female. BRAZIL. Pará. f#, Altamira, Rio Xingu, Camp. 52°22'W / 3°39'S, 60km S.; 8-12.X.1986; P. Spangler & O. Flint. (USNM/MNH). Male unknown.

**Differential diagnosis.** This species shares with *E. microlobatus* and *E. sp. nov. 5* the body ovate, smaller size compared with other *Eurystethus*, dorsal tubercles developed but short when compared with species as *E. macroconus*, and the conspicuous macula on coria. *Eurystethus* sp. nov. 27 have the apex of scutellum oblong, laterally not reflexed but tumid, not so high as in *E. microlobatus* and *E. sp. nov. 5*; area behind the eyes are almost entirely yellow, with just few and small rounded dark brown to black spots close to the posterior margins of eyes. Known of a single female, the genital plates differ due to the subtrapezoidal valvifers VIII, acuminate in *E. microlobatus*, and the elliptic laterotergites IX, acuminate in *E. sp. nov. 5*.

**Description.** Head: Mandibular plates slightly reflexed. Antecular angles slightly developed, truncate, punctured. Interommatidial sensilla observed, dense and long. Area

behind the eyes, broad black spots near the posterior margins of eyes and base of head. Ventral surface densely punctured, some aligned with buccula. Anterior margin of maxillary plates concolor to the plates. Antennomeres proportion: I<II≈III<IV≈V. Antennomere I, oblique black mark on ventral side; V, yellow on basal third. Intercalary labial unit sacculate.

Thorax: Pronotum with wide punctured spots from medial transhumeral tubercles to pronotal anterior margin. Dense thin reddish lines. Anterolateral angles oblique. Pronotal anterolateral margins arcuate, slightly projected. Transhumeral tubercles developed, conical. Scutellum, longitudinal medial line tumid, with thin and light brown punctures and reddish lines; the remaining with punctured spots. Apex of scutellum slightly reflexed, almost reaching the height of posterior tubercle in lateral view. Anterior tubercles of scutellum conical, higher than the transhumeral tubercles in lateral view. Posterior tubercle of scutellum tumid. Coria, punctured spots coalescent after the conspicuous macula. Ventral surface, wide black punctured spot on propleurae; meso- and metapleurae with punctured spots at margins. Coxae, sparse punctures. Femora, spotted near apex. Tarsi yellow.

Abdomen: Connexival segments dense and heterogeneously punctured. Urosternites sparsely spotted. Intersegmental area brown. Pseudosutures and trichobothrial tubercles concolor to the plate.

Female (Fig. 13E): Valvifers VIII subtrapezoidal, angles and margins rounded; spots heterogeneously distributed; sutural margins black, contiguous, apex divergent. Laterotergites VIII rounded; spotted on base; shorter than valvifers VIII; inner margins folded, arcuate, higher than valvifers VIII. Laterotergites IX rounded, small, barely surpassing the mediotergite VIII; black, except on lateral margins.

**Measurements.** Total length: 8.12 mm; abdominal width: 5.25 mm; head length: 1.45 mm; head width: 1.17 mm; antennomeres length: I, 0.5; II, 0.8; III, 0.6; IV, 1.1 mm; pronotum length: 1.65 mm; pronotum width: 4.86 mm.

**Distribution** (Fig. 15). BRAZIL. Pará: Altamira.

### ***Eurystethus* sp. nov. 5**

(Figs. 3E, F; 7C, D; 13B; 15)

Holotype female. BRAZIL. **Goiás**. f#, Aragarças, XI.1965; Alvarenga col. (UFRGS). Male unknown.

**Differential diagnosis.** Shares with *E. microlobatus* and *E. sp. nov. 27* the smallest body size between all *Eurystethus*, the body ovate, dorsal tubercles and apex of scutellum developed,

but not so high as in other species like *E. macroconus*. With *E. sp. nov. 27*, shares the conspicuous, unpunctured and light macula at the apex of the radial vein on coria, and the anteocular angles slightly developed, short and rounded (developed and acuminate on *E. microlobatus*). Parameres are convergent and touch each other at apex beneath segment X, different from the subparallel apex on *E. microlobatus*. The valvifers VIII are considerably rounded at apex on *E. sp. nov. 5*, and the laterotergites IX are apically acuminate and divergent, different from the other species mentioned above. Also, the apex of scutellum laterally reflexed and high, the area behind the eyes almost entirely black, and the ventral longitudinal dark brown to black marks are singular features that differs *E. sp. nov. 5* from *E. sp. nov. 27*.

**Description.** Head: Anteocular angles undeveloped, truncate. Interommatidial sensilla observed, short. Area behind the eyes almost entirely black, margins of eyes yellow. Buccula with few punctures at base. Antennomere I almost entirely black, yellow on dorsal surface and on ventral longitudinal line. Labial segments II and III black on joint. Intercalary labial unit sacculate.

Thorax: Dorsal surface with thin reddish lines. Pronotal transhumeral tubercles developed, conical. Anterolateral angles directed laterad. Anterolateral margins slightly arcuate. Scutellum, punctured spots on laterals; apex highly reflexed. Anterior tubercles of scutellum conical, as high as transhumeral tubercles in lateral view. Ventral surface with dense and black punctured spots. Meso- and metafemora, wide black annulus and spots near apex. Tarsi yellow.

Abdomen: Connexival segments with dense reddish lines, except on middle and lateral margins; dense punctured spots, heterogeneously distributed. Urosternites sparsely spotted; conspicuous black mark, not reaching lateral and middle of plates; intersegmental areas, pseudosutures and trichobothrial tubercles black.

Female (Fig. 13B): Valvifers VIII rounded, apex convergent; sutural margins black, base divergent; densely spotted, heterogeneously distributed. Laterotergites VIII rounded; dense black spots, except on middle; fold at inner margin observed, beneath valvifers VIII. Laterotergites IX subtrapezoidal, laterally arcuate; long, surpassing the mediotergite VIII; inner half black, lateral yellow.

**Measurements.** Total length: 9.3 mm; abdominal width: 5.7 mm; head length: 2 mm; head width: 1 mm; antennomeres average length: I, 0.6; II, 1; III, 1.3 mm; pronotum length: 1.7 mm; pronotum width: 5.3 mm.

**Distribution** (Fig. 15). BRAZIL, Goiás: Aragarças.

***Eurystethus* sp. nov. 18**

(Figs. 1C, D; 8A, B; 11I–L; 15)

Holotype male. BRAZIL. Maranhão. m#, Caxias, Res. Ecol. Inhamum; 20-22.XI.2006; armadilha luminosa; R. O. Sousa et al. (UEMA). Female unknown.

**Differential diagnosis.** Known for a single male, shares the same color and puncture patterns of dorsal and ventral surfaces with *E. sp. nov. 52*, *E. sp. nov. 23* and *E. sp. nov. 16*. The posterolateral angles of parameres are rectangular, similar to *E. sp. nov. 16* and *E. sp. nov. 23*; however, the posterior margins of the angles are truncate, not oblique as in *E. sp. nov. 16*. *Eurystethus sp. nov. 18* differs from *E. sp. nov. 23* by the parameres with shallow sutures marking the middle of the basal lateral sinuosities, and the projections of the inferior process of ventral rim much more separate than the apex of parameres in ventral view.

**Description.** Head: Sparse punctures near the posterior margins of ocelli and eyes. Anteocular angles undeveloped, truncate, punctured. Interommatidial sensilla present. Ventral surface of head with punctures aligned at base of buccula, some coalescent near posterior half of buccula and base of head. Base of buccula black. Antennomeres proportions:  $I \approx II < III < IV > V$ . Antennomere I almost entirely black, yellow dorsally on basal and apical thirds; V yellow on basal third. Labial segments II and III black on joint and apical half of IV.

Thorax: Pronotal anterolateral angles oblique, unpunctured. Anterolateral margins straight. Transhumeral tubercles slightly developed; II and V elongated. Scutellum: wide punctured spots on opaque areas at laterals of anterior tubercles, the remaining sparsely punctured, absent on apex. Anterior tubercles much higher than the pronotum in lateral view. Posterior tubercle inconspicuous. Apex of scutellum reflexed. Coria: cluster of punctured spots and macula present. Propleura almost entirely black and densely punctured. Meso- and metapleurae with dense and wide punctured spots. Mesosternum yellow. Coxae punctured. Femora: sparse, rounded and black spots; meso- and metafemora with incomplete annulus near apex. Tibiae black on apex. Tarsi black; mesotarsi with yellow apex.

Abdomen: Connexival segments with punctures heterogeneously distributed on middle. Urosternites densely punctured. Intersegmental areas and pseudosutures brown. Trichobothrial tubercles black.

Male (Fig. 11I–L): Pygophore campaniform. Parameres with a shallow sulcus, oblique from the base to the middle; laterally projected and bilobed, with arcuate lobes, the basal longer than the distal. Parameres posteriorly projected, convergent beneath segment X but not reaching each other; apices oblique to each other, bilobed, lobes with the same size

and rounded. Process of ventral rim with a shallow and longitudinal constriction at the middle, forming a pair of small tooth-like posteriorly projected, far from each other, aligned with the apex of parameres. Posterolateral angles spatulate, dorsolaterally directed; ventral surface with wide dark brown to black spots distributed towards the ventral margins.

**Measurements.** Total length: 9.4 mm; abdominal width: 5.1 mm; head length: 1.9 mm; head width: 1.8 mm; antennomeres length: I, 0.7; II, 0.8; III, 0.8; IV, 1.3; V, 1.2 mm; pronotum length: 2 mm; pronotum width: 5.7 mm.

**Distribution** (Fig. 15). BRAZIL. Maranhão: Caxias.

### ***Eurystethus* sp. nov. 3**

(Figs. 3C, D; 7A, B; 13A; 15)

Holotype female. BRAZIL. **Santa Catarina.** f#, Joinville, III.58, Dirings (MZSP). Male unknown.

**Differential diagnosis.** Body ovate and tubercles developed and short, similar to *E. microlobatus*, *E. sp. nov. 5* and *E. sp. nov. 27*. However, *E. sp. nov. 3* is considerably bigger than the others mentioned. Proximal portion of female laterotergites VIII developed as a fold under the laterotergites IX, not developed in *E. microlobatus*; valvifers VIII oblong and laterotergites IX acuminate, similar to *E. sp. nov. 5*, but small and barely reaching the limit of the mediotergites VIII in ventral view.

**Description.** Head: Dorsal surface with transversal furrows. Punctures smaller than in the remaining of the body, forming arcs close to the base of head, coalescent at the posterior margin of ocelli, and sparse on the center of the disc. Mandibular plates spaced at apex, margins slightly arcuate. Interommatidial sensilla present, short. Ocelli yellow. Antecular angles developed, rounded, almost reaching the line tangent to the eyes. Area behind the eyes almost entirely black, with a tiny yellow mark at the middle. Ventral surface with punctures distributed between the eyes and buccula, in a line at the base of buccula, and absent on the remaining of the head; with conspicuous stripe between base of the head and eyes, eyes and antennifer tubercles, and a narrow line at the anterior ventral margin of the head; rectangular and oblique black marks from the base of the head to the basal half of the buccula, but not reaching it. Antennomere I, dorsal surface yellow on the middle, basal and apical margins; antennomeres II and III yellow at basal and apical margins, the II also with a yellow dorsolateral mark, and the III with the yellow apical portion broader than the basal portion; antennomere IV, yellow and broad annulus close to the base; antennomere V yellow at the



basal third, the remaining black. Labial segment I with a lateral, tiny, tooth-like black projection; intercalary labial unit sacculate; segment II brown at apex; segment III brown to black at base and apex.

Thorax: Pronotum with punctured spots coalescent on the anterior half, close to the medial line, on the posterior and medial margins of cicatrices, and posteriorly on each transhumeral tubercles. Punctures absent on the middle line of anterior half. Anterolateral angles developed as a thorn, obliquely projected. Anterolateral margins straight. Transhumeral tubercles developed, slightly conical, except the lateral rounded, marked with large and coalescent punctures on top. Scutellum with tiny punctured spots on the middle, tubercles developed and marked with large spots. Parafrenal tubercle almost twice higher than the pronotum. Postfrenal tubercle developed, conic. Distal tabs as high as the postfrenal tubercle in lateral view. Coria heterogeneously punctured, with variegated matte spots. Propleurae with wide black and punctured mark on the anterolateral margins; broad and punctured black spots covering the pleural sulci, reaching the margins of the plates; some black punctured spots heterogeneously distributed on the remaining, including coxae. Meso- and metapleurae with black marks at the lateral fourth of the plates, not reaching the posterior margins. Mesopleurae with a row of punctures, from the anterior margin to the posterior one, close to the coxae, the remaining unpunctured. Metapleurae with punctures coalescent at the posterior margin, sparse near the peritreme and coxae. Femora with a broad and black incomplete annulus close to apex; small and rounded spots close to the annulus; black annulus conspicuous on meso- and metafemora. Thoracic pleurae with wide black lines coincident with the broad black marks at apex of femora in rest position. Tarsi yellow.

Abdomen: Connexival segments arcuate with dense and brown punctured spots, absent on lateral margins; posterolateral angles rounded. Urosternites densely punctured. Intersegmental areas and pseudosuture black, but the intersegmental concolor at the medial line of the body. Trichobothrial tubercles black.

Female (Fig. 13A): Valvifers VIII rounded, the base wider than the apex; punctures coalescent on the middle and base. Sutural margins dark; plates not contiguous, except close to the apex. Lateral margins slightly reflexed. Laterotergites VIII rounded with sparse punctures; with a pair of black marks at laterals, half-moon shaped; apex not marked. Fold of laterotergites VIII with the proximal portion short, straight and longitudinal, contiguous to the respective laterotergite IX; the basal portion arcuate, anteriorly directed and contiguous to valvifers VIII. Laterotergites IX elliptic and short, almost reaching the mediotergite VIII in

ventral view, divergent from the base, black, but yellow in a narrow area on the lateral margins.

**Measurements.** Total length: 11.5 mm; abdominal width: 7.7 mm; head length: 2.2 mm; head width: 1.5 mm; antennomeres average length: I, 0.8; II, 0.8; III, 1; IV, 1.6; V, 1.5 mm; pronotum length: 2.7 mm; pronotum width: 7 mm.

**Distribution** (Fig. 15). BRAZIL. Santa Catarina: Joinville.

***Eurystethus* sp. nov. 21**

(Figs. 1E, F; 6G, H; 10A–D; 12C; 15)

Holotype male. VENEZUELA. m#, No data. (USNM).

Paratype. BRAZIL. Amazonas. f#, Parque Nacional do Jaú; 11-12.IV.1994; C. Motta *et al.* (UFPA). f#, Parque Nacional do Jaú; 06-07.IV.1994; C. Motta *et al.* (UFPA).

**Differential diagnosis.** Shares with *E. sp. nov. 45* almost the same patterns of dark and wide punctured spots on thorax and coria, and the ventral body surface densely punctured with narrow punctured spots. Comparing with *E. sp. nov. 45*, *E. sp. nov. 21* has the ventral surface considerably less punctured, and the apex of scutellum is less reflexed, barely reaching the height of posterior tubercle of scutellum (but higher than in *E. sp. nov. 45*) in lateral view. Also, the genital features have differences between them. Despite the same acuminate valvifers VIII, in *E. sp. nov. 21* these plates are apically divergent and with a lateral projection on the inner side, under the plate, different from those of *E. sp. nov. 45* with plates subparallel; the space between laterotergites VIII is deep in *E. sp. nov. 21*, but almost not visible in *E. sp. nov. 45*; and the laterotergites IX of *E. sp. nov. 21* are subelliptic, subtrapezoidal in *E. sp. nov. 45*.

**Description.** Head: Mandibular plates reflexed. Anteocular angles undeveloped, truncate, punctured. Interommatidial sensilla observed. Area behind eyes with wide dark mark on posterior margins of eyes, extending to base of head. Ventral surface of head with punctures near posterior half of buccula. Antennomeres proportion: I<II>III<IV>V. Antennomere I almost entirely black, except for dorsal and part of ventral sides; V black on apical half. Intercalary labial unit enlarged.

Thorax: Pronotum with wide punctured marks between cicatrices and transhumeral tubercles, except I and VI, and between tubercles and pronotal posterior margin; area between cicatrices and marks few punctured. Pronotal anterolateral angles unpunctured, directed laterad. Anterolateral margins straight. Transhumeral tubercles almost inconspicuous, except

I and VI; II and V elongated. Scutellum with wide punctured spots on laterals. Reddish marks distributed on anterior surface of anterior tubercles of scutellum and on medial line, reaching the apex. Anterior tubercles developed much higher than pronotum in lateral view. Posterior tubercle slightly developed. Apex of scutellum reflexed, as high as posterior tubercle in lateral view. Coria with wide punctured spots on oblique mark at the apex of radial vein; macula absent. Ventral surface with dense punctured spots. Mesosternum yellow. Coxae punctured. Femora with black spots and reddish marks near apex, mostly on profemora. Tibiae smoky black on base and apex; reddish marks heterogeneously distributed. Pretarsi black on apex.

Abdomen: Connexival segments with few punctures and sparse reddish marks heterogeneously distributed. Urosternites with sparse spots. Intersegmental area and pseudosuture light brown, trichobothrial tubercles black.

Male (Fig. 10A–D): Pygophore campaniform. Paramere lateral margin arcuate and slightly sinuous, convergent and oblique, not reaching each other beneath segment X; apex truncate with rounded angles, the lateral angle of paramere tumid, posteriorly directed. Process of ventral rim dorsally projected into a high shield with two pairs of conspicuous thorn-like projections: one pair at laterals, beneath paramere, other pair paired at middle, beneath segment X. Posterolateral angles ventrally placed, spatulate, slightly concave, dorsolaterally directed, unpunctured.

Female (Fig. 12C): Valvifers VIII subelliptic, longer than laterotergites VIII; margins dark brown to black; few and wide punctured spots on base; sutural margins divergent from base. Laterotergites VIII subelliptic, with wide dark brown spots on base; inner margins folded and contiguous to valvifers VIII; laterotergites high, forming a deep area to enclose laterotergites IX. Laterotergites IX subelliptic and divergent from base; yellow on posterolateral margin, dark brown on remaining; short, about  $\frac{1}{3}$  the size of laterotergites VIII, surpassing the mediotergites VIII but not reaching the imaginary line tangent to its apex.

**Measurements.** Total length: 10–10.7 mm; abdominal width: 5.5–6.1 mm; head length: 1.9–2 mm; head width: 1.3–1.4 mm; antennomeres length: I, 0.4; II, 1; III, 0.9; IV, 1.4; V, 1.2 mm; pronotum length: 2–2.1 mm; pronotum width: 5.3–5.8 mm.

**Distribution** (Fig. 15). BRAZIL. Amazonas. VENEZUELA.

### ***Eurystethus* sp. nov. 16**

(Figs. 1G, H; 7G, H; 11E–H; 13C; 15)

Holotype male. BRAZIL. **Amazonas**. m#, Coari, rio Urucu, LOC-09; 4°51'56" S / 65°04'56" W; 25.I - 10.II.1995; P. F. Bührnheim et al col.; à luz mista de mercúrio; Fund. Univ. AM, I.1997 (FUAM).

Paratypes. BRAZIL. **Amazonas**. f#, Coari, rio Urucu, Ig. Marta-3; 4°50'73" S / 65°02'37" W; 14-25.VIII.1993; P. F. Bührnheim et al col.; à luz mista de mercúrio; Fund. Univ. AM, I.1997 (FUAM). f#, m#, Coari, rio Urucu; 4°51'56.5" S / 65°04'56.6" W; 11-18.V.1991; P. Bührnheim, N. O. Aguiar & F. A. Fé col.; à luz mista de mercúrio; Fund. Univ. AM, I.1997 (FUAM). f#, Coari, rio Urucu, Petrobrás, Aloj. Vitória Régia; S 04°52'36.6" / W 65°19'20.5"; 6-III-2010; J. A. M. Fernandes e equipe; coleta manual (UFPA). f#, Manaus, ZF2 [Zona Franca 2] km-14, Torre, 023521S / 600655W, 40 mts altura; 16-19.VII.2004; J. A. Rafael, C. S. Motta, F. F. Xavier Fº, J. M. F. Ribeiro & S. Trovisco; lençol, luz mista e BLB (UFPA). m#, Tonantins; 025015S / 674630W; 16-20.IX.2005; J. A. Rafael & F. F. Xavier Fº; arm. luz (UFPA).

**Differential diagnosis.** Ventral body surface less punctured and marked, and basitarsi mostly yellow with smoky black annulus on base and apex, different from *E. sp. nov. 52*, *E. sp. nov. 23* and *E. sp. nov. 18* whose ventral body surface is densely punctured and marked, and basitarsi black. On males, the basal lobe of parameres is slightly developed, narrower than the lobes in *E. sp. nov. 52*, *E. sp. nov. 23* and *E. sp. nov. 18*, and the apex of parameres are proportionally truncate with a short apical sinuosity on anterolateral portion; posterolateral angles subrectangular, divergent, with the posterior margins truncate similar to *E. sp. nov. 23*, but different from this species in the general morphology of parameres. *Eurystethus sp. nov. 16* is the only whose ventral margin of the process of ventral rim is medially projected posteriorly forming one or two small spines, different from the others whose ventral margin is tumid and medially interrupted. Also, in *E. sp. nov. 16*, the lateral angles of the dorsal margin of this process (caudal view) are more developed than in the other species. On females, valvifers VIII of *E. sp. nov. 16* are apically more rounded and narrow than in *E. sp. nov. 23*.

**Description.** Head: Mandibular plates reflexed. Antecular angles not developed, truncate, punctured. Interommatidial sensilla short. Area behind the eyes with a broad black line extending ventrally to the buccula. Ventral surface of head with punctures on base and around the posterior half of buccula. Antennomeres proportions: I≈II<III<IV>V; antennomere V yellow on basal third, black on remaining. Intercalary labial unit sacculate.

Thorax: Pronotal anterolateral angles directed laterad, unpunctured. Anterolateral margins straight and weakly projected. Transhumeral tubercles slightly developed and rounded, but II and V elongated and almost inconspicuous. Anterior tubercles of scutellum developed, acuminate, surpassing the height of transhumeral tubercles in lateral view. Posterior tubercle slightly tumid. Apex of scutellum solid black, reflexed and high, about  $\frac{1}{3}$  the anterior tubercles height in lateral view. Coria with cluster of punctured spots and macula present at apex of radial vein. Lateral portions of thoracic pleura with dense punctured spots. Mesosternum dark yellow. Meso- and metafemora with incomplete and narrow black annulus. Tarsi black; mesotarsi yellow.

Abdomen: Connexival segments with punctured spots on both outer corners of each segment. Urosternites with heterogeneously distributed spots. Intersegmental areas and pseudosutures light to dark brown.

Male (Fig. 11E–H): Pygophore campaniform. Basal portion of parameres bisinuous with rounded projections, one basal and one medial; distal portion convergent but not reaching each other; apex bisinuous with anterior lobe wide and rounded, posterior lobe small and acuminate. Process of ventral rim developed, shield-like; dorsal portion sinuous, projected and rounded beneath the parameres; ventral portion developed into a truncate projection. Posterolateral angles subrectangular with rounded angles, densely punctured.

Female (Fig. 13C): Valvifers VIII subelliptic, wider than long, with few rounded spots, sutural margins black and contiguous. Laterotergites VIII as wide as the valvifers VIII, with posterior margins arched; proximal folds covered by valvifers VIII. Laterotergites IX subtrapezoidal with rounded angles, laterally arched, almost entirely black, but laterally yellow.

**Measurements.** Total length: 9.5–10.9 mm; abdominal width: 5.1–6.6 mm; head length: 1.9–2.3 mm; head width: 1.3–1.9 mm; antennomeres length: I, 0.4–0.8; II, 0.9–1; III, 0.8–1; IV, 1.1–1.5; V, 0.5–1.4 mm; pronotum length: 1.8–2.4 mm; pronotum width: 5.5–6.5 mm.

**Distribution** (Fig. 15). BRAZIL. Amazonas: Coari, Manaus, Tonantins.

### ***Eurystethus* sp. nov. 23**

(Figs. 4A, B; 8C, D; 11M–P; 13D; 15)

Holotype male. BRAZIL. **Espírito Santo**. m#, [Sooretama], Parque Soóretama (Cupido); II-III.1948; L. Trav., Freitas & H. Trav.; CEIOC 80528 (CEIOC/Fiocruz).

Paratype. **Espírito Santo**. f#, [Pedro Canário], Vale do Itauna, Rib. do Engano; 9.X.1942; Trav. & Santos; col. MRCN 001970 (MRCN/FZB).

**Differential diagnosis.** This species shares the dorsal and ventral patterns of punctures and spots with *E. sp. nov.* 16, *E. sp. nov.* 18 and *E. sp. nov.* 52. The male parameres have one single suture, unlike the two sutures observed on *E. sp. nov.* 18, and do not reach the posterolateral angles level as in *E. sp. nov.* 52; also, the apex are roundly acuminate, not subrectangular as in *E. sp. nov.* 16. The female valvifers VIII are apically wider than in *E. sp. nov.* 52 and *E. sp. nov.* 16, and the laterotergites IX are bigger compared with the other species, about 1/3 of the size of valvifers VIII.

**Description.** Head: Mandibular plates reflexed. Anteocular angles undeveloped, truncate. Interommatidial sensilla not observed. Area behind the eyes almost entirely black, extending to the buccula, and with a long yellow line in the middle. Antennomeres proportion: I $\approx$ II $\approx$ III<IV $\approx$ V. Antennomere I, lateral and ventrally black; V yellow on basal third. Intercalary labial unit sacculate.

Thorax: Pronotal anterolateral angles oblique. Anterolateral margins straight. Transhumeral tubercles developed, II and V elongated. Scutellum, punctured spots on laterals. Anterior tubercle developed, about three times higher than the transhumeral tubercles in lateral view. Posterior tubercle developed. Apex of scutellum solid black, highly reflexed, about  $\frac{1}{3}$  the height of anterior tubercle in lateral view. Ventral thoracic surface with dense punctured spots. Mesosternum light yellow. Coxae punctured. Femora, broad dark brown to black annulus near apex; apex light yellow. Tibiae, reddish and thin marks heterogeneously distributed; apex black. Tarsi black; mesotarsi yellow.

Abdomen: Connexival segments with few and sparse light brown punctures. Ventral surface densely spotted. Intersegmental area, pseudosutures, and trichobothrial tubercles black.

Male (Fig. 11M–P): Pygophore campaniform. Segment X, apex wide. Parameres with a deep and oblique suture from base to middle; laterally projected, bilobed, with rounded lobes about the same size; distal portion posteriorly projected, convergent beneath segment X, not reaching each other; apex truncate, ventrally convex, bilobed, lobes rounded, the proximal more projected and close to each other. Process of ventral rim, pair of acuminate projections on posterior margin, aligned with apex of parameres. Posterolateral angles roundly subrectangular; lateral margin longer and dorsally directed; ventral surface with few punctured spots near apex.

Female (Fig. 13D): Valvifers VIII subelliptic, about 1.5x the size of laterotergites VIII; dense spots heterogeneously distributed; sutural margins black, apex convergent, base parallel. Laterotergites VIII rounded, spiracle almost entirely covered by urosternite VII and valvifers VIII; fold on inner margins observed. Laterotergites IX subrectangular, angles and lateral margins rounded, posterior margin sinuous; wider than long, not reaching the imaginary line tangent to the apex of laterotergites VIII; divergent from base; almost entirely black, lateral margin yellow.

**Measurements.** Total length: 10.52 mm; abdominal width: 6.07 mm; head length: 1.77 mm; head width: 1.36 mm; antennomeres length: I, 0.5; II, 0.6; III, 0.6; IV, 1 mm; pronotum length: 2.18 mm; pronotum width: 5.97 mm.

**Distribution** (Fig. 15). BRAZIL. Espírito Santo: Pedro Canário and Sooretama.

***Eurystethus* sp. nov. 52**

(Figs. 4E, F; 8G, H; 11Q–T; 13F; 15)

Holotype male. FRENCH GUIANA. **Roura**. m#, Montagne des Chevaux, RN2, pk22; 28.XII.2013; polyvie LED blue; SEAG89 (UFPA).

Paratypes. **Inselberg**. f# m#, Mont Saint-Marcel, 635m, Camopi; 17.IX.2014; piège lumineux; SEAG107 (UFPA). f#, same data as paratypes but the date: 25.IX.014; SEAG108 (UFPA).

**Differential diagnosis.** This species shares with *E. sp. nov. 23*, *E. sp. nov. 18* and *E. sp. nov. 16* the dorsal surface with transhumeral tubercles marked with wide black punctured spots on the posterior part of each tubercle, contrasting with the remaining densely punctured with black, unspotted punctures on light yellow surface. Transhumeral tubercles more developed and with more numerous and concentrated black punctured spots than the species *E. sp. nov. 23*, *E. sp. nov. 18* and *E. sp. nov. 16*. Parafrenal tubercles and apical tabs of scutellum very high compared to the others mentioned here; these patterns can also be observed in *E. macroconus*, but with considerably differences in the female genitalia. *E. sp. nov. 52* have bilobed parameres with narrow sutures, and almost touching the posterolateral angles, which are spatulate and ventrally concave, different from the others that show less broad parameres and subrectangular posterolateral angles. Females have the valvifers VIII elliptic and the laterotergites IX subtrapezoidal, the latter rounded on laterals and angles, about two times wider than long and almost entirely black. The abdominal ventral surface is marked with dark brown to black spots, also in the sutural margins of valvifers VIII and base

of laterotergites VIII; the valvifers VIII are as long as wide, different from the others with wider than long valvifers (*E. sp. nov.* 23, *E. sp. nov.* 18 and *E. sp. nov.* 16).

**Description.** Head: Punctured spots in arc from posterior margins of ocelli to the middle of cephalic disc; some punctures coalescent at posterior margins of ocelli; punctured black lines on clypeus, reaching each other at the middle of clypeus. Clypeus length about  $\frac{3}{4}$  of mandibular plates length. Mandibular plates arcuate, lateral not reflexed, apex rounded. Anteocular angles undeveloped, truncate. Interommatidial sensilla short. Area behind the eyes black, with a smooth yellow mark at the base of the peduncle. Punctured spots along buccula, some at posterior half of it. Black mark behind the eyes extending to a big black area reaching the posterior half of buccula, sometimes covering completely the buccula. Antennomeres proportion: I $\approx$ II $\approx$ III<IV $\approx$ V. Antennomere I black, with a yellow dorsal spot; II black at base and wide annulus at middle; III, wide black annulus at middle, closer to the base; IV, wide yellow annulus at basal half, close to the middle, not reaching the base; V, yellow at basal third, the remaining black. Labial segments I and IV black at apex; II and III black at joint. Intercalary labial unit sacculate.

Thorax: Pronotum with dark punctures coalescent from transhumeral tubercles to the pronotal posterior margin; two spots at anterior margin directed laterad to the base of head. Anterolateral angles tooth-like, yellow, unpunctured, laterally directed. Anterolateral margins straight, slightly projected. Cicatrices inconspicuous, marked by an unpunctured area. Transhumeral tubercles developed, tumid; I, III, IV and VI conical, the others elongated, III and IV slightly higher than II and V. Scutellum, laterally with spotted punctures, medially with black unspotted punctures; broad punctured spots at laterals, from the base to the postfrenal tubercle; spotted punctures also covering lateral sides of anterior tubercles; central line and apex of scutellum barely and sparsely punctured. Anterior part of scutellum conspicuously tumid; tubercles developed, acuminate, much higher than the pronotum in lateral view. Posterior tubercle almost inconspicuous. Apex of scutellum ventrally solid black; tabs strongly reflexed, solid black, reaching about half the height of anterior tubercles. Coria, punctured spots heterogeneously distributed, some coalescent at the apex of radial vein; macula absent. Propleurae, mostly black with few yellow spots; lateral part yellow with black punctured spots. Meso- and metapleurae yellow to dark yellow and densely punctured. Mesosternum yellow. Coxae yellow. Femora yellow and densely spotted to smoky black. Tibiae black reddish with black marks on dorsal and lateral sides at the base; apex widely black. Tarsi black; mesotarsi yellow.



Abdomen: Connexival segments with dense punctured spots, not reaching the lateral margins; wide spots at anterior and anterolateral margins of segments; posterior margins black. Urosternites mostly dark brown to black laterally; conspicuous half-moon shaped lateral areas, unpunctured and contrastingly yellow. Intersergmental area, pseudosutures, and trichobothrial tubercles black.

Male (Fig. 11Q–T): Pygophore campaniform. Segment X trapezoidal. Lateral margin of pygophore with a deep sulcus on inner side. Parameres swollen, looking like composed by more than one piece due to a deep suture from base to middle; the lateral portion anterolaterally projected and bilobed, with rounded, broad, flat laterally directed lobes; distal portion posteriorly projected, convergent but not contiguous; apex truncate. Ventral rim shield, with ventral and dorsal margins tumid, medially interrupted. Posterolateral angles spatulate, dorsolaterally projected, with wide black punctured spots. Ventral surface of pygophore brown with concolor punctures.

Female (Fig. 13F): Valvifers VIII subtrapezoidal, with rounded angles and arcuate margins, except the sutural; dense black spots heterogeneously distributed; sutural margins black, parallel but not contiguous. Laterotergites VIII large, about the same size of valvifers VIII; distal margin rounded; inner lateral fold slightly developed, and partially covered by valvifers VIII. Laterotergites IX subtrapezoidal, wider than long, angles rounded; not reaching the imaginary line tangent to the laterotergites VIII apex; mostly black, lateral margins yellow.

**Measurements.** Total length: 10.61 mm; abdominal width: 6.21 mm; head length: 1.85 mm; head width: 1.37 mm; antennomeres length: I, 0.6; II, 0.9; III, 0.9; IV, 1.4; V: 1.2 mm; pronotum length: 2.11 mm; pronotum width: 6.2 mm.

**Distribution** (Fig. 15). FRENCH GUIANA: Inselberg and Roura.

### ***Eurystethus* sp. nov. 40**

(Figs. 2E, F; 6C, D; 10I–L; 12E; 15)

Holotype male. BRAZIL. **Amazonas**. m#, Manaus, 9.VIII.1979; J. Adis e outros. (INPA).

Paratype. BRAZIL. f#, No data. (CEIOC).

**Differential diagnosis.** This species have unique pygophore with small parameres (smallest between all *Eurystethus*), about the same length of segment X, but narrower than it, and the posterolateral angles simple, dorsally directed. Shares with *E. sp. nov. 21* almost the same patterns of dark and wide punctured spots on thorax and coria, and the ventral surface

densely punctured with narrow punctured spots. Different from *E. sp. nov. 21*, have the ventral surface considerably more punctured. The female genital plates of *E. sp. nov. 40* have valvifers VIII acuminate, divergent at apex which reaches the base of laterotergites IX due the shallow space between valvifers VIII and laterotergites VIII; despite the laterotergites IX subelliptic, as in *E. sp. nov. 21*, they are divergent from the base.

**Description.** Head: Mandibular plates slightly reflexed. Antecular angles undeveloped, truncate, punctured. Interommatidial sensilla observed, dense and short. Area behind eyes with broad dark line on posterior margins of eyes, extending to base of head. Ventral surface of head with few punctured spots near posterior half of buccula. Antennomeres proportion:  $I \approx II \approx III < IV$ , V not observed. Antennomere I black on apex and laterals; II ventrally smoky brown. Intercalary labial unit developed, enlarged.

Thorax: Pronotum with punctured spots between cicatrices and transhumeral tubercles, and between tubercles and pronotal posterior margin, the remaining with reddish brown punctures heterogeneously distributed; sparse punctures between cicatrices. Pronotal anterolateral angles unpunctured, directed laterad. Anterolateral margins slightly arcuate and projected. Transhumeral tubercles undeveloped, II and V almost inconspicuous. Scutellum with punctured spots on laterals; opaque area between tubercles of scutellum; reddish marks on longitudinal line at middle. Anterior tubercles of scutellum slightly developed, surpassing the height of the pronotum in lateral view. Posterior tubercle inconspicuous. Apex of the scutellum reflexed, reaching almost half of anterior tubercles height. Coria with punctured spots variegate, some on oblique and irregular areas after macula. Ventral surface of thorax with few dark brown to reddish punctured spots heterogeneously distributed. Mesosternum yellow. Legs with few reddish marks heterogeneously distributed. Femora with few broad marks near apex; tiny brown spots laterally on apex. Tibiae dark on apex. Basitarsi dark on base, pretarsi dark on apex.

Abdomen: Connexival segments with dense punctured spots, not reaching lateral margins, with dense reddish marks heterogeneously distributed. Urosternites unspotted. Intersegmental area, pseudosuture and trichobothrial tubercles concolor to plate.

Male (Fig. 10I–L): Pygophore campaniform. Paramere short, about the same size of segment X, laterally arcuate, convergent but oblique beneath segment X; apex oblong, with short keel at posteroalteral margins. Inferior process of ventral rim reduced, narrow, divided into two developed and subrectangular shields, with a short tooth-like projection on lateral

margins, beneath the parameres and far apart each other. Posterolateral angles spatulate, shorter than the parameres, ventrally placed, dorsally directed, with small dark spots on base.

Female (Fig. 12E): Valvifers VIII subelliptic, as long as wide; few brown spots heterogeneously distributed; sutural margins dark brown, divergent from base. Laterotergites VIII rounded, shorter than valvifers VIII; few brown spots on base; inner margins with a very developed fold, as a keel, directed laterad, reaching the lateral margins of valvifers VIII. Laterotergites IX rounded, divergent from base; small, less than  $\frac{1}{5}$  of valvifers VIII size, not reaching the imaginary line tangent to the laterotergites VIII apex; proximal margins dark brown, the remaining yellow.

**Measurements.** Total length: 10.44 mm; abdominal width: 6 mm; head length: 1.62 mm; head width: 1.22 mm; antennomeres length: I, 0.6; II, 1; III, 0.9; IV, 1.5 mm; pronotum length: 2.25 mm; pronotum width: 5.98 mm.

**Distribution** (Fig. 15). BRAZIL. Amazonas: Manaus.

#### ***Eurystethus* sp. nov. 45**

(Figs. 3A, B; 6E, F; 10M–P; 12B; 15)

Holotype male. m#, FRENCH GUIANA. No data (UFPA).

Paratype. f#, FRENCH GUIANA. No data (UFPA).

**Differential diagnosis.** Dorsal patterns of body and male parameres small as in *E. sp. nov. 40*, but *E. sp. nov. 45* parameres seem to be short because they are very contiguous to segment X, including beneath it. *E. sp. nov. 45* has the ventral surface of the body with dense and wide punctured spots, including the femora. The male pygophore have a very narrow and small parameres, completely contiguous to the segment X, with apex hidden beneath it; the paramere have a conspicuous keel from the base to the middle on dorsal side, and from the middle to the apex on ventral side; the posterolateral angles are acuminate, narrower than the segment X, dorsolaterally directed, ventrally black and concave, as observed in *E. pallescens*, however this angle is simple and single in *E. sp. nov. 45*, but rectangular and bilobed in *E. pallescens*; and finally, the inferior process of ventral rim is very reduced and narrow as in *E. sp. nov. 40*, but in *E. sp. nov. 45* the process is simple, without projections except the rounded ones extending at the ventral rim. The female has a pattern similar to that of *E. pallescens*. However, plus the other characters forementioned, the projections of valvifers VIII on *E. sp. nov. 45* are developed, longer and wider, and the laterotergites IX rounded and smaller, barely reaching the mediotergites VIII.

**Description.** Head: Mandibular plates slightly reflexed, posterolateral margins dark. Anteocular angles undeveloped, truncate, brown and punctured. Interommatidial sensilla observed, short, dense. Area behind the eyes with wide black mark on margins of eyes, extending to base of head. Ventral surface of head with few punctured spots near posterior half of buccula. Antennomeres proportion: I<II≈III≈IV>V. Antennomere I almost entirely black except for part of dorsal and ventral sides; V black on apical half. Labial segments II and III black on joint. Intercalary labial unit sacculate.

Thorax: Pronotum with punctured spots between cicatrices and transhumeral tubercles, and between tubercles to pronotal posterior margin. Anterolateral angles unpunctured, directed laterad. Anterolateral margins slightly arcuate and projected. Transhumeral tubercles slightly developed; tubercles II and V elongated. Scutellum with punctured spots on laterals. Anterior tubercles of scutellum conical, higher than pronotum in lateral view. Posterior tubercle almost inconspicuous. Apex of scutellum slightly swollen, reaching the height posterior tubercle in lateral view. Coria with punctured spots heterogeneously distributed, some coalescent at the apex of radial vein; macula absent. Ventral surface of thorax with sparse punctured spots, mostly on margins. Mesosternum yellow. Femora dense and heterogeneously spotted with reddish marks near apex. Tibiae black on base and apex. Pretarsi yellow on basal third.

Abdomen: Connexival segments with few and sparse punctured spots on proximal half, not reaching lateral margins. Urosternites densely spotted. Intersegmental area, pseudosuture and trichobothrial tubercles dark brown to black; intersegmental area concolor to the plate on middle.

Male (Fig. 10M–P): Pygophore ovate. Paramere twisted from base, exposing dorsally part of lateral and ventral surfaces; margin arcuate; apex acuminate, with a median keel at ventral surface; convergent but not reaching each other beneath segment X. Process of ventral rim short and tumid, margins sinuous. Posterolateral angle long and acuminate, directed laterad, apex curved; ventral surface very concave with a wide black mark, except on apex. Ventral margin with a pair of lateral tumescences and transversal punctured black mark on middle.

Female (Fig. 12B): Valvifers VIII subtrapezoidal, wider than long, angles rounded, margins arcuate; wide dark brown spots on apex and heterogeneously distributed; sutural margins black, divergent at apex. Laterotergites VIII rounded, smaller than valvifers VIII; few rounded spots near spiracle; plates high, forming a deep area to enclose laterotergites IX.

Laterotergites IX rounded, parallel, small, less than  $\frac{1}{5}$  of valvifers VIII size, not reaching the line tangent to apex laterotergites VIII; almost entirely dark.

**Measurements.** Total length: 10–10.5 mm; abdominal width: 5.7–6 mm; head length: 1.8–2.2 mm; head width: 1.2–1.5 mm; antennomeres length: I, 0.6–0.7; II, 1–1.2; III, 0.7–1; IV, 1.4–1.5; V: 1.1 mm; pronotum length: 2.2–2.6 mm; pronotum width: 5.5–5.7 mm.

**Distribution** (Fig. 15). FRENCH GUIANA.

### ***Eurystethus* sp. nov. 39**

(Figs. 2C, D; 6A, B; 10E–H; 15)

Holotype male. BRAZIL. **Minas Gerais.** m#, São Gonçalo do Rio Abaixo; 12.XI.1987 (UFMG). Female unknown.

**Differential diagnosis.** Males of *E. sp. nov. 39* and *E. sp. nov. 40* have a similar pattern of pygophore, with parameres broad at apex, proximally projected, ventrally directed beneath segment X; posterolateral angles singular, oblong and dorsally directed; inferior process of ventral rim developed. However, *E. sp. nov. 39* is a species with conspicuous clusters of coalescent wide punctured spots on dorsal surface, mainly at pronotum and scutellum; *E. sp. nov. 40* has variegate pattern. Ventral body surface with dense punctured spots in *E. sp. nov. 39*, but ventral surface feebly punctured in *E. sp. nov. 40*. While *E. sp. nov. 39* basitarsi are black at base, and the pretarsi are almost totally black, except at base, in *E. sp. nov. 40* just the apical half of pretarsi are black. The male pygophore of *E. sp. nov. 39* has parameres very broad and rounded at apex, with a single tooth-like projection (projections absent in *E. sp. nov. 40*), ventrally directed; the inferior process of ventral rim is developed on long thorns at the lateral edges, reaching the middle portion of the parameres, while *E. sp. nov. 40* has a pair of short crests with tiny apical teeth on the middle.

**Description.** Head: Mandibular plates slightly reflexed. Antecular angles undeveloped, truncate, black. Interommatidial sensilla observed, short. Area behind the eyes with wide black mark on margins of eyes, extending to base of head. Ventral surface of head with few punctured spots near posterior half of buccula. Antennomeres proportion: I<II>III<IV, V not observed. Antennomere I almost entirely black, except on dorsal and part of ventral sides. Labial segment II and III dark brown on joint.

Thorax: Pronotum with wide punctured spots near cicatrices, and between transhumeral tubercles and pronotal posterior margin; area between cicatrices with sparse or absent punctures. Pronotal anterolateral angles black, anterolaterally directed. Anterolateral

margins arcuate, slightly projected. Transhumeral tubercles slightly developed, top black. Scutellum with broad punctured mark on laterals. Anterior tubercles of scutellum developed, much higher than pronotum in lateral view, emerging from tumid area. Posterior tubercle slightly developed, tumid. Apex of scutellum harshly reflexed, much higher than posterior tubercle. Coria with punctured spots on oblique mark at the apex of radial vein; macula absent. Ventral surface of thorax with sparse punctured spots. Mesosternum light yellow. Legs with reddish marks. Femora with wide black spots.

Abdomen: Connexival segments with few sparse punctures. Urosternites with sparse spots. Intersegmental area dark brown, except on middle; pseudosuture concolor; trichobothrial tubercles black.

Male (Fig. 10E–H): Pygophore ovate. Paramere laterally arcuate, convergent and parallel, not reaching each other beneath segment X; apex spatulate, wider than the remaining of paramere, with a short acuminate projection, ventrally directed. Process of ventral rim developed, shallow, projected into a pair of lateral and long thorn-like projections reaching ventral surface of paramere. Posterolateral angle ventrally placed, dorsally directed, spatulate, slightly concave, unpunctured. Ventral margin with dense and dark punctured spots.

**Measurements.** Total length: 9.23 mm; abdominal width: 5.65 mm; head length: 1.65 mm; head width: 1.13 mm; antennomeres length: I, 0.5; II, 0.8; III, 0.8; IV, 1.3 mm; pronotum length: 1.93 mm; pronotum width: 5.28 mm.

**Distribution** (Fig. 15). BRAZIL. Minas Gerais: São Gonçalo do Rio Abaixo.

### ***Eurystethus* sp. nov. 26**

(Figs. 5C, D; 9C, D; 14B; 15)

Holotype female. PERU. **Madre de Dios.** f#, Rio Tambopata Res.; 30 air km.SW, Pto. Naldonado, 290m; 11-15.XI.1979; subtropical moist forest; J. B. Heppner. (MNHN). Male unknown.

**Differential diagnosis.** Shares with *E. nigroviridis* the morphology of body with antecular angles developed, pronotal anterolateral margins arcuate and projected; pronotal anterolateral angles absent, intercalary labial unit sacculate and female valvifers VIII subtrapezoidal, apically truncate. Different from *E. nigroviridis*, *E. sp. nov. 26* have the antecular angles short, barely reaching the imaginary line that cross the middle of eyes (long, reaching the limit of the eye in *E. nigroviridis*); the punctured spots are narrow, coalescent on small clusters, specially posterior to the transhumeral tubercles, between the

parafrenal and postfrenal tubercles, and small area after the macula on coria (dense and coalescent punctured spots in *E. nigroviridis*); the basitarsi are black at apex (totally yellow in *E. nigroviridis*); on female genital plates, the valvifers VIII are divergent on the middle of sutural margins, and the laterotergites IX are subtrapezoidal, longer than wider.

**Description.** Head: Mandibular plates very reflexed. Antecular angles developed, rounded, oblique, punctured, setose. Interommatidial sensilla observed, dense, short. Ventral surface with few sparse punctures, some at posterior half of buccula. Antennomeres proportion: I>II<III<IV≈V. Antennomere I yellow on dorsal and part of ventral surface; antennomere V yellow on basal third. Labial segments II and III black on joint. Intercalary labial unit sacculate.

Thorax: Pronotum with broad punctured spots on transhumeral tubercles. Anterolateral margins very developed, arcuate, anteriorly projected reaching the middle of the eye. Anterolateral angles absent. Cicatrices inconspicuous, proximal margins tumid. Transhumeral tubercles slightly developed, elongated. Scutellum, punctured spots on laterals between anterior and posterior tubercles. Anterior tubercles of scutellum slightly developed, barely surpassing the height of pronotum in lateral view. Posterior tubercle of scutellum developed, convex. Apex of scutellum slightly reflexed, almost reaching the height of posterior tubercle in lateral view. Coria, punctured spots heterogeneously distributed. Ventral surface with dense punctured spots heterogeneously distributed. Mesosternum dark. Femora, incomplete black annulus and spots near apex. Tibiae black on apex. Basi- and pretarsi black on apex.

Abdomen: Connexival segments, few punctured spots not reaching the lateral margins. Urosternites with dense spots heterogeneously distributed. Intersegmental area, pseudosutures and trichobothrial tubercles dark brown.

Female (Fig. 14B): Valvifers VIII subtrapezoidal, angles rounded; dark brown spots heterogeneously distribute; sutural margins black, divergent on middle, convergent on apex. Laterotergites VIII angular, about same size of valvifers VIII; wide dark brown spots on base; inner margins high, forming a deep space between the laterotergites VIII where are the laterotergites IX. Laterotergites IX elliptical, divergent on apex; big, about half of valvifers VIII size, but not reaching the imaginary line tangent to the laterotergites VIII apex; inner margins black, lateral yellow.

**Measurements.** Total length: 11.33 mm; abdominal width: 6.7 mm; head length: 1.9 mm; head width: 1.6 mm; antennomeres length: I, 0.7; II, 0.8; III, 1 ; IV, 1.4; V: 1.3 mm; pronotum length: 2.43 mm; pronotum width: 6.62 mm.

**Distribution** (Fig. 15). PERU. Madre de Dios.

***Eurystethus* sp. nov. 7**

(Figs. 1A, B; 7E, F; 11A–D; 12A; 15)

Holotype male. BRAZIL. **Mato Grosso.** m#, Aripuana, E. E. Iquê; 06.IX – 1981; Mirian Serrano; (UFMT).

Paratype. f#, no data, probably the same as the male (UFMT).

**Differential diagnosis.** Species similar to *E. ornatus* in the conspicuous wide black spots on the dorsal surface contrasting with the concolor punctures on light yellow surface – which make the two species easily recognizable among *Eurystethus* –, and the ventral surface feebly punctured. *E. sp. nov. 7* differs from *E. ornatus* for the few black rounded spots at the apex of mandibular plates; the anteocular angles slightly developed and rounded, barely reaching the imaginary line tangent to the middle of eyes; pronotal anterolateral margins arcuate and projected; cicatrices marked with wide black spots; coria with variegate light brown spots. The female plates are similar to those of others species with pronotum projected like *E. variegatus*, with subtrapezoidal, wider than long valvifers VIII, however in *E. sp. nov. 7* the laterotergites IX are wider than long and considerable small, about  $\frac{1}{4}$  the size of valvifers VIII. Compared to the male of *E. ornatus*, the parameres in *E. sp. nov. 7* are much longer, with the basal lobe smaller, apex acuminate, rounded, and ventrally projected.

**Description.** Head: Area behind the eyes with small black marks dorsally at margin of eyes and base of head. Anteocular angles slightly developed, rounded, short, not reaching the imaginary line tangent to the eyes. Interommatidial sensilla present, long. Ventral surface unpunctured. Antennae almost entirely black, except on base of antennomere I, apex of II and III, and basal quarter of IV. Labial segments II and III black on joint. Intercalary labial unit sacculate.

Thorax: Dorsal surface pale yellow, with four punctured, longitudinal and black spots between transhumeral tubercles and cicatrices. Pronotal anterolateral angles directed laterad. Anterolateral margins arcuate, anterolaterally projected, almost reaching half of eyes. Transhumeral tubercles slightly developed, tumid, conical. Scutellum, punctured spots on laterals. Anterior tubercles of scutellum slightly developed, barely surpassing the height of



pronotum in lateral view. Apex of scutellum slightly swollen. Ventral surface with light brown punctured spots heterogeneously distributed. Femora with tiny black spot near apex. Tibiae black on apex.

Abdomen: Connexival segments with broad black marks on anterior and posterior margins; sparse concolor punctures. Urosternites unspotted. Intersegmental areas medially brown. Pseudosutures concolor. Femora with few black spots or none. Tibiae, wide black spots on base, apex black. Basitarsi brown to black on base; pretarsi black on apex.

Male (Fig. 11A–D): Parameres, basal half directed laterad, flattened and sinuous. Distal half convergent, slightly arcuate beneath segment X; apex acuminate, rounded, ventroposteriorly directed, parallel to each other. Process of ventral rim, ventral margin projected and flattened as a crest, medially projected into two parallel, tiny, black, tooth-like projections. Posterolateral angles rounded, dorsally directed, divergent. Ventral margin with a medial concavity.

Female (Fig. 12A): Plates yellow. Valvifers VIII subtrapezoidal and obliquely furrowed; sutural margins brown, slightly divergent on base. Laterotergites VIII angular. Laterotergites IX subtrapezoidal, parallel, not reaching the imaginary line tangent to the laterotergites VIII apex.

**Measurements.** Total length: 9.2–11.5 mm; abdominal width: 5.8–7.1 mm; head length: 2.2–2.3 mm; head width: 1.3–1.7 mm; antennomeres average length: I, 0.9; II, 1; III, 1; IV, 1.3; V, 1.2 mm; pronotum length: 2.4–3 mm; pronotum width: 5.4–3 mm.

**Distribution** (Fig. 15). BRAZIL. Mato Grosso: Aripuanã.

### ***Eurystethus* sp. nov. 34**

(Figs. 5E, F; 9E, F; 14C; 15)

Holotype female. BRAZIL. **Mato Grosso.** f#, Sinop; X.1976; M. Alvarenga; AMNH\_IZC 00146650. (AMNH). Male unknown.

**Differential diagnosis.** Despite the similarities of body and female plates shape with *E. sp. nov. 20*, *E. sp. nov. 26* and *E. variegatus*, only *E. sp. nov. 34* has anteocular angles surpassing the limit of the eyes, while *E. sp. nov. 20* has angles just reaching the limit of eyes, and not reaches in *E. sp. nov. 26* and *E. variegatus* with short angles. Also, the ventral body surface of *E. sp. nov. 34* is wide black marks, while in the other three species it is yellow with dense and dark punctured spots; the tarsomeres are yellow, except the third which are black at tip, different of *E. sp. nov. 20* which has the apical third black of pretarsi, and *E.*

*variegatus* and *E. sp. nov. 26* with basi- and pretarsi black on apical half. Considering the female plates, the laterotergites VIII of *E. sp. nov. 34* have wide black marks on the base, while in the other three species the laterotergites VIII are just punctured; the laterotergites VIII are also acuminate on tip, slightly angulose on the others; and the subtrapezoidal laterotergites IX are longer than wide, reaching the limit of laterotergites VIII in ventral view, while in the others the laterotergites IX not reaches this limit, and in *E. sp. nov. 20* those plates are ovate.

**Description.** Head: Dorsal surface, dense and concolor punctures. Mandibular plates slightly reflexed. Antecular angles developed, oblong, long, surpassing the imaginary line tangent to the eyes, punctured and setose. Interommatidial sensilla observed, short. Ventral surface of head densely punctured, some on base of buccula. Antennomeres proportion: I>II<III>IV≈V; antennomere II shorter, less than half of the III. Antennomeres II and III reddish; V, yellow on basal third. Labial segment I black on apex; II and III dark brown on joint. Intercalary labial unit sacculate.

Thorax: Pronotum with punctured spots forming longitudinal marks from transhumeral tubercles to cicatrices and posterior margin. Anterolateral angles anteriorly directed. Anterolateral margins slightly arcuate, anterolaterally projected, surpassing the middle of eyes. Humeral angles black. Transhumeral tubercles slightly developed, II and V inconspicuous. Scutellum, punctured spots on laterals. Anterior tubercles of scutellum slightly developed, barely surpassing height of pronotum in lateral view. Posterior tubercle slightly developed. Apex of scutellum slightly swollen, almost reaching height of posterior tubercle in lateral view. Coria, punctured spots after macula. Ventral surface of thorax with black punctured marks; densely punctured. Femora with incomplete wide annulus and spots randomly distributed near it. Tibiae black on apex; reddish on dorsal surface. Pretarsi black on apex.

Abdomen: Connexival segments, dense punctured spots. Urosternites with broad black marks concomitant with punctured spots. Intersegmental area, pseudosuture and trichobothrial tubercles black.

Female (Fig. 14C): Valvifers VIII subtrapezoidal with rounded angles and arcuate margins; spots heterogeneously distributed; sutural margins dark brown, divergent on middle. Laterotergites VIII angular, acuminate, longer than valvifers VIII; wide black mark and spots on base; high, with mediotergites forming a deep area to laterotergites IX; inner margins not

folded. Laterotergites IX subtrapezoidal, angles rounded and margins arcuate, parallel, longer than wide, reaching the imaginary line tangent to the laterotergites VIII apex.

**Measurements.** Total length: 11.76 mm; abdominal width: 7.14 mm; head length: 2.02 mm; head width: 1.71 mm; antennomeres length: I, 0.6; II, 0.7; III, 1.1; IV, 1.3; V: 1.2 mm; pronotum length: 2.34 mm; pronotum width: 6.53 mm.

**Distribution** (Fig. 15). BRAZIL. Mato Grosso: Sinop.

### ***Eurystethus* sp. nov. 20**

(Figs. 5A, B; 9A, B; 14A; 15)

Holotype female. BRAZIL. **Maranhão**. f#, Bom Jardim, REBIO - Res. Biol. Gurupi; 17-27.I.2010; armadilha malaise; F. Limeira-de-Oliveira, J. T. Câmara & A. A. T. Sousa, cols. (UEMA). Male unknown.

**Differential diagnosis.** Body elliptic with pronotum laterally projected and flattened, similar to *E. variegatus*, *E. sp. nov. 26* and *E. sp. nov. 34*. *E. sp. nov. 20* has the anteocular angles of head long, reaching the limit of the eyes in dorsal view, while in *E. variegatus* and *E. sp. nov. 34* the angles are short, barely reaching the middle of eye limit in dorsal view, and *E. sp. nov. 20* has anteocular angles much longer than the others mentioned, surpassing the limit of the eyes. Ventral body surface has similar patterns of dense punctured spots in *E. sp. nov. 20*, *E. sp. nov. 26* and *E. variegatus*; on *E. sp. nov. 34* the ventral surface is widely black. *E. sp. nov. 20* and *E. sp. nov. 26* has incomplete dark annulus near apex of femora, different in *E. variegatus* with complete dark annulus; on tarsomeres, only the apical half of pretarsi are black in *E. sp. nov. 20*, while in *E. sp. nov. 26* also the apex of basitarsi are black. Despite those, the female plates shares the subtrapezoidal, wider than long, shape of valvifers VIII, except in *E. sp. nov. 26* which are as long as wide. Also shares the laterotergites VIII slightly angulose, except in *E. sp. nov. 34* with the plate conspicuously acuminate. However, only *E. sp. nov. 20* has the laterotergites IX ovate, while it is subtrapezoidal in the other three.

**Description.** Head: Mandibular plates reflexed. Anteocular angles developed, surpassing a little the imaginary line tangent to the eyes, oblong, setose, punctured. Interommatidial sensilla observed, dense. Ventral surface of head with longitudinal black marks from base of head; punctures heterogeneously distributed, some at base of buccula. Antennomere I $\approx$ II>III<IV $\approx$ V. Antennomere I laterally black; V yellow on basal third. Labial segment I laterally black on apex; II and III black on joint; IV black on apical half. Intercalary labial unit sacculate.

Thorax: Pronotal area between cicatrices with few punctures. Anterolateral margins arcuate, developed, anterolaterally projected. Anterolateral angles anterolaterally directed. Transhumeral tubercles almost inconspicuous, elongated, except I and VI. Scutellum, punctured spots on laterals. Apex of scutellum slightly swollen. Anterior tubercles of scutellum slightly developed, surpassing a little the pronotum in lateral view. Posterior tubercle almost inconspicuous. Coria heterogeneously punctured; macula present. Ventral surface of thorax with dense punctured spots heterogeneously distributed. Femora, tiny black spots at laterals and dorsally at apex. Femora, spots heterogeneously distributed; mesofemora with narrow and incomplete black annulus near apex. Tibiae black on base and apex. Praetarsi black on distal half.

Abdomen: Connexival segments, sparse punctures. Urosternites with sparse spots. Intersegmental areas and pseudosuture wide brown; trichobothrial tubercles black.

Female (Fig. 14A): Valvifers VIII subtrapezoidal with rounded angles; rounded brown spots on base; sutural margins brown, contiguous. Laterotergites VIII rounded, with brown spots on base. Laterotergites IX elliptical, posteriorly directed; longer than wide, about half of laterotergites VIII length, not reaching the imaginary line tangent to the apex of laterotergites VIII; inner half dark brown.

**Measurements.** Total length: 9.2 mm; abdominal width: 5.5 mm; head length: 2.2 mm; head width: 1.4 mm; antennomeres length: I, 0.5; II, 0.6; III, 0.7; IV, 1 mm; pronotum length: 1.7 mm; pronotum width: 5.2 mm.

**Distribution** (Fig. 15). BRAZIL. Maranhão: Bom Jardim.

### ***Eurystethus* sp. nov. 36**

(Figs. 5G, H; 9G, H; 14D; 15)

Holotype female. BRAZIL. **Mato Grosso**. f#, Sinop, lat. 12°31' / long. 55°37'; X.1974; M. Alvarenga; AMNH\_IJC 00146651. (AMNH). Male unknown.

**Differential diagnosis.** Shares with *E. sp. nov. 20* and *E. sp. nov. 34* the body shape elliptic, with anteocular angles developed and long, pronotum anterolaterally projected, and female valvifers VIII subtrapezoidal. However, *E. sp. nov. 36* and *E. sp. nov. 20* have the anteocular angles reaching the limit of the eyes and the ventral body surface with punctured spots, while in *E. sp. nov. 34* the angles surpasses the limit of the eyes and the ventral body surface has wide black marks at laterals. The pronotum projected barely reaching the lateral of eyes in *E. sp. nov. 36*, different from *E. sp. nov. 20* and *E. sp. nov. 34* with pronotum

reaching the middle of eyes. Despite the similarity of valvifers VIII, in *E. sp. nov. 36* they are as long as wide (wider than long in the other two species); the laterotergites VIII are rounded (angular in the others) and the subtrapezoidal laterotergites IX (ovate in *E. sp. nov. 20*) surpasses the limit of laterotergites VIII in ventral view, reaching it or not in *E. sp. nov. 34* and *E. sp. nov. 20*, respectively.

**Description.** Head: Mandibular plates slightly reflexed, margins brown. Anteocular angles developed, oblong, long, reaching the imaginary line tangent to the eyes, medially concave, dorsally reflexed. Interommatidial sensilla observed, dense, longer than head setae. Area behind the eyes almost entirely dark brown to black, except for a smoky yellow area on middle. Ventral surface of head densely punctured. Antennomeres proportion:  $I > II < III < IV \approx V$ . Antennomere V with apical half black. Labrum black. Labial segment I black on apex. Intercalary labial unit black, sacculate.

Thorax: Pronotum with punctured spots between cicatrices and transhumeral tubercles II and V. Anterolateral angles anterolaterally directed, apex black. Anterolateral margins arcuate, developed. Transhumeral tubercles almost inconspicuous, except I and VI. Scutellum, punctured spots on anterior and lateral margins. Anterior tubercles of scutellum slightly developed, barely surpassing height of pronotum in lateral view. Posterior tubercle developed. Apex of scutellum slightly reflexed. Coria, punctured spots after macula. Ventral surface of thorax densely punctured. Mesosternum yellow. Femora with broad black spots heterogeneously distributed. Tibiae black on apex, with thin reddish lines heterogeneously distributed. Basitarsi black; pretarsi black on apex.

Abdomen: Connexival segments with punctures heterogeneously distributed. Urosternites with sparse spots. Intersegmental area brown; pseudosuture and trichobothrial tubercles concolor to the plate.

Female (Fig. 14D): Valvifers VIII subtrapezoidal with rounded angles; sutural margins light brown and contiguous. Laterotergites VIII subelliptical, smaller than valvifers VIII; inner margins not folded. Laterotergites IX subtrapezoidal, yellow, as long as wide, angles rounded, lateral margins arcuate, posterior and inner margins straight; big, surpassing a little the imaginary line tangent to the laterotergites VIII apex.

**Measurements.** Total length: 11.4 mm; abdominal width: 6.82 mm; head length: 2.25 mm; head width: 1.53 mm; antennomeres length: I, 0.7; II, 0.8; III, 1 ; IV, 1.4; V: 1.3 mm; pronotum length: 2.3 mm; pronotum width: 6.36 mm.

**Distribution** (Fig. 15). BRAZIL. Mato Grosso: Sinop.

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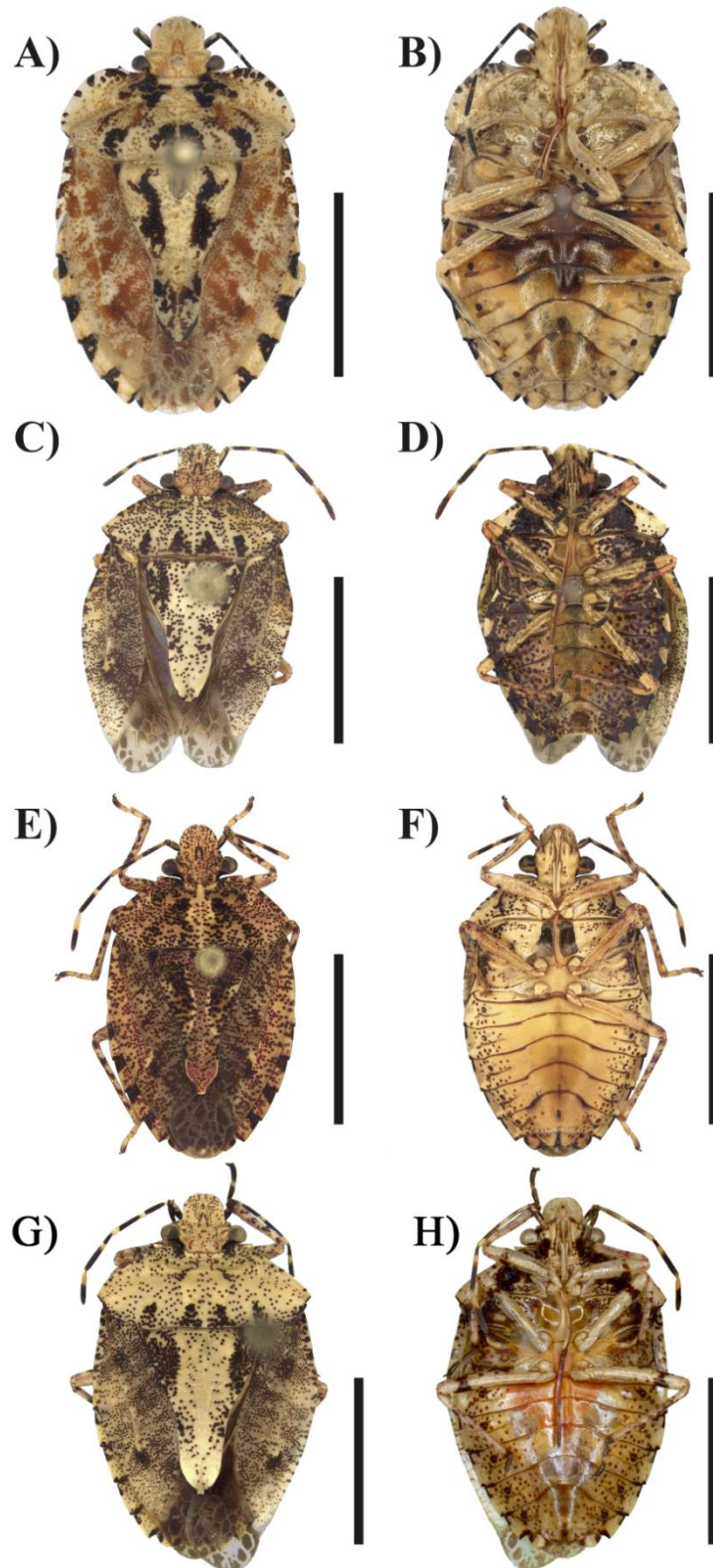
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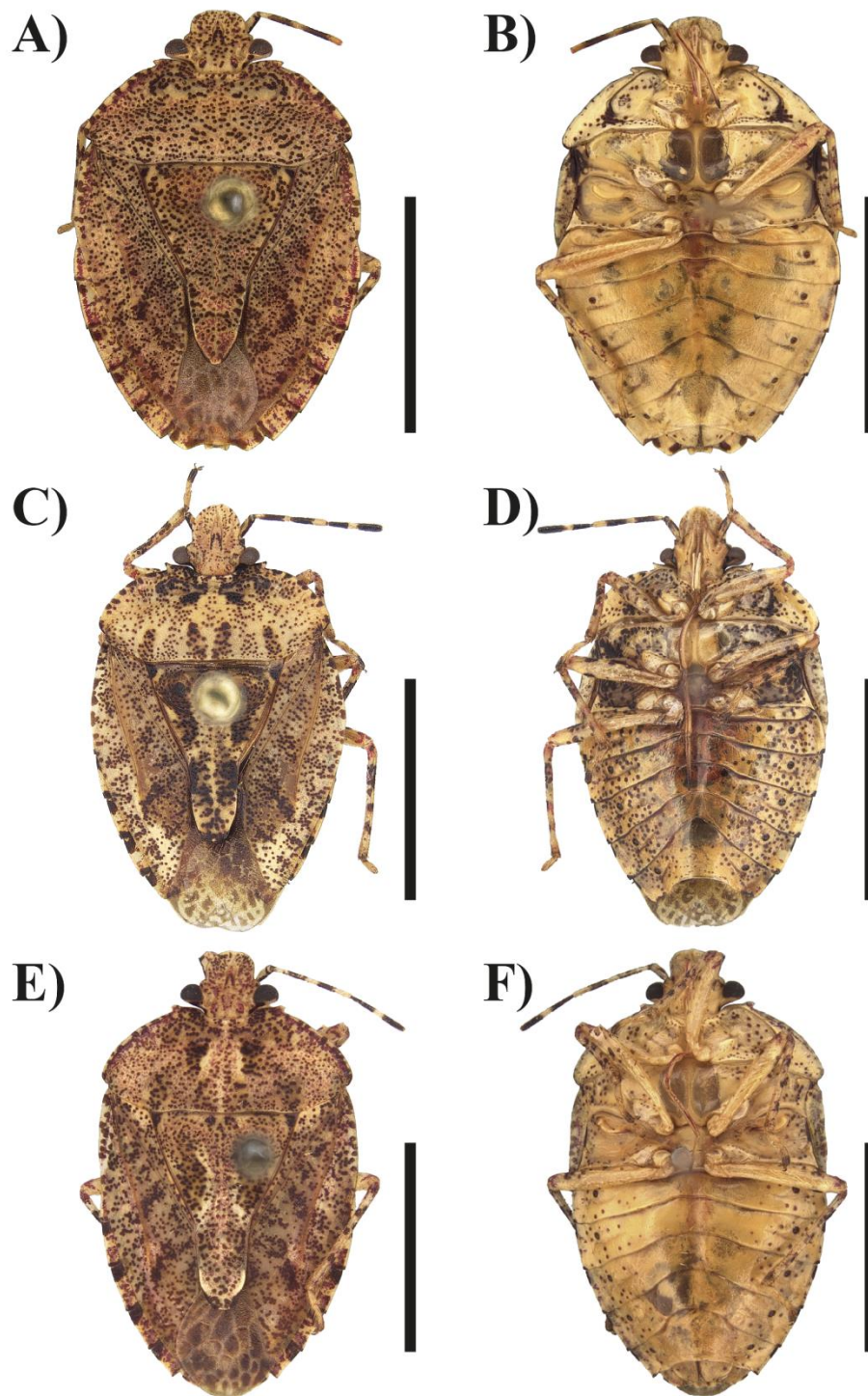
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## LEGENDS AND ILLUSTRATIONS

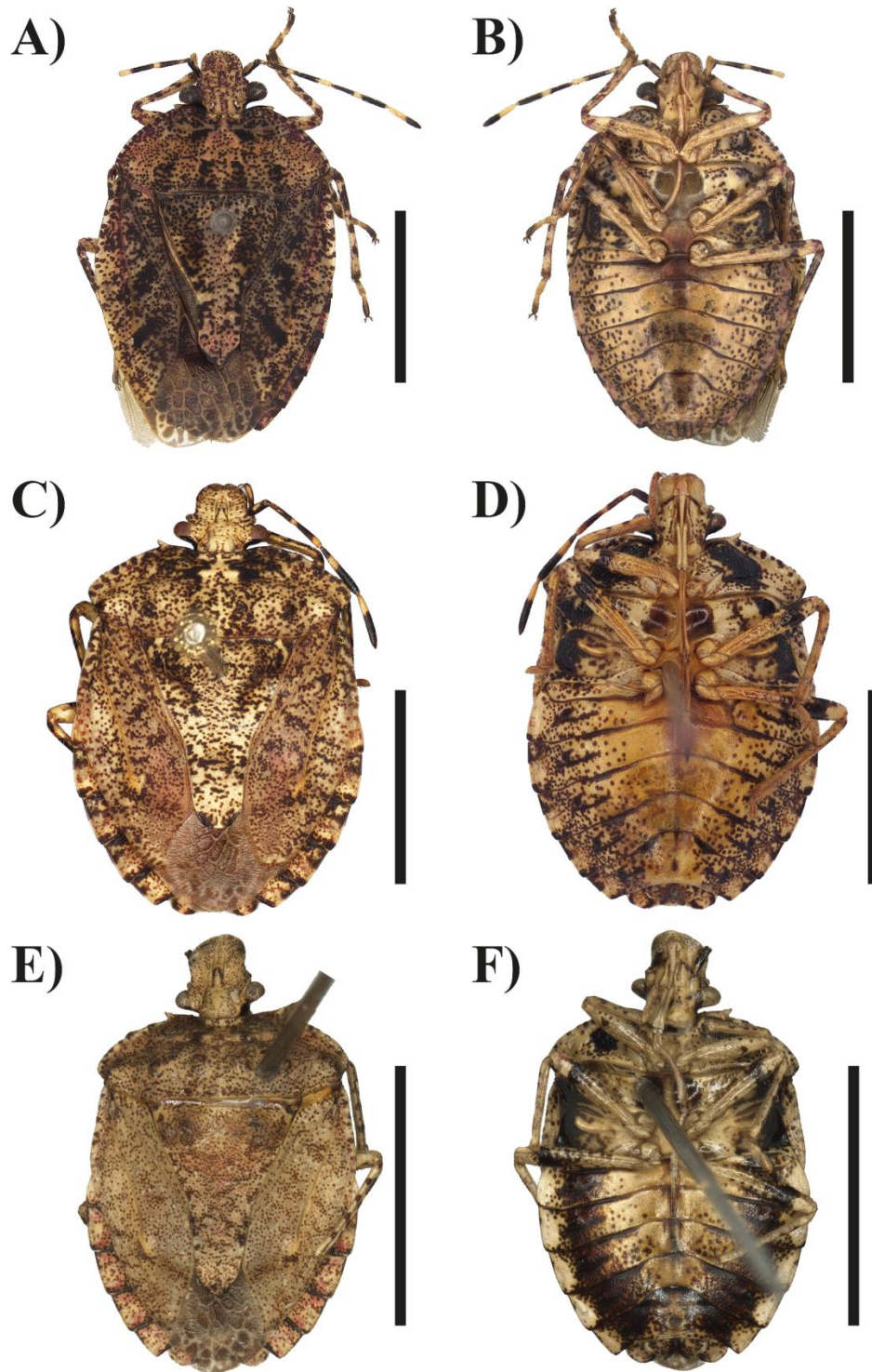


**Figure 1.** Dorsal and ventral habitus of the new species of *Eurystethus*. **A–B**, *Eurystethus* sp. nov. 7; **C–D**, *Eurystethus* sp. nov. 18; **E–F**, *Eurystethus* sp. nov. 21; **G–H**, *Eurystethus* sp. nov. 16. Scale: 5mm.

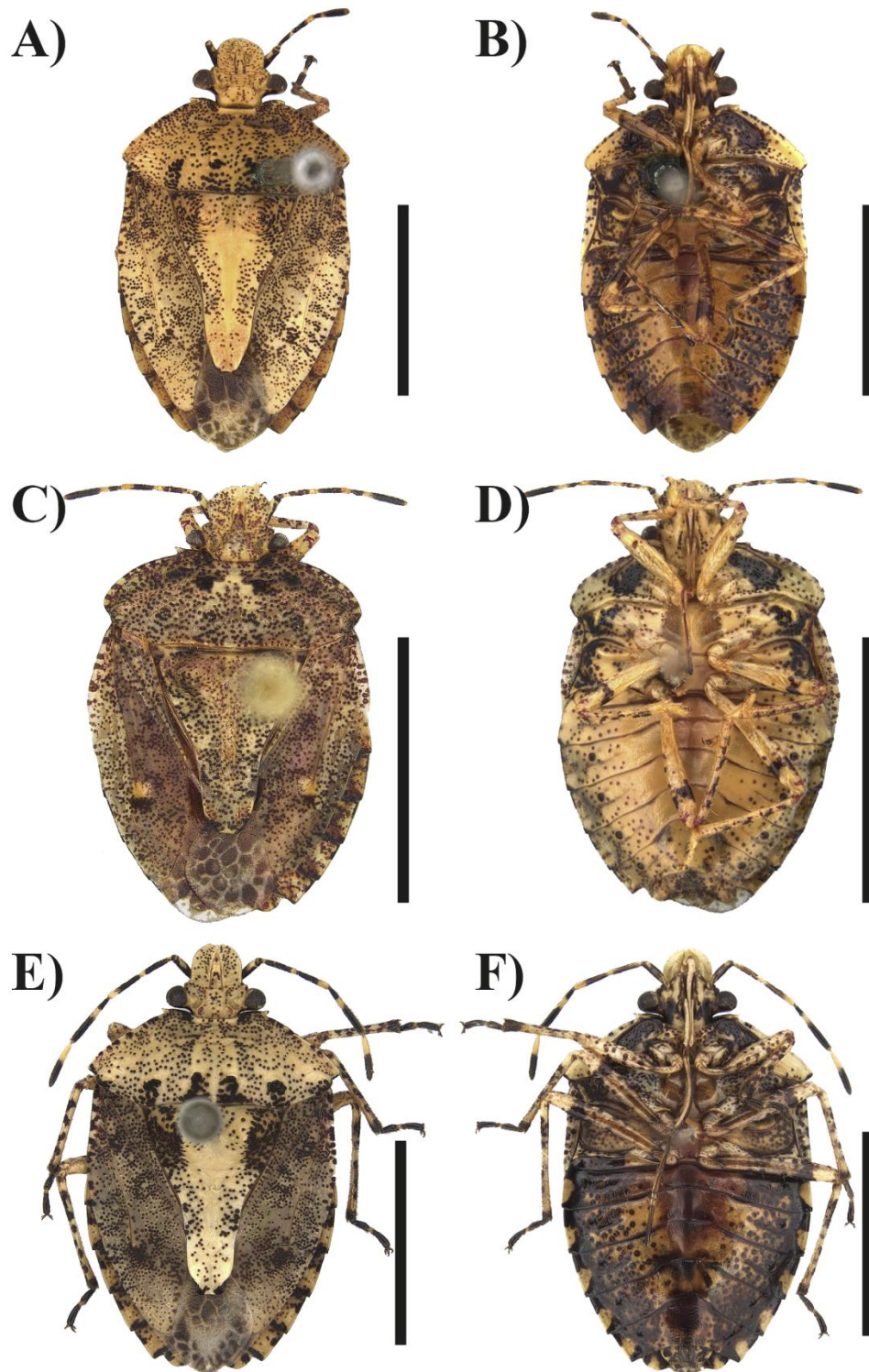


**Figure 2.** Dorsal and ventral habitus of the new species of *Eurystethus*. **A–B**, *Eurystethus* sp. nov. 22; **C–D**, *Eurystethus* sp. nov. 39; **E–F**, *Eurystethus* sp. nov. 40. Scale: 5mm.



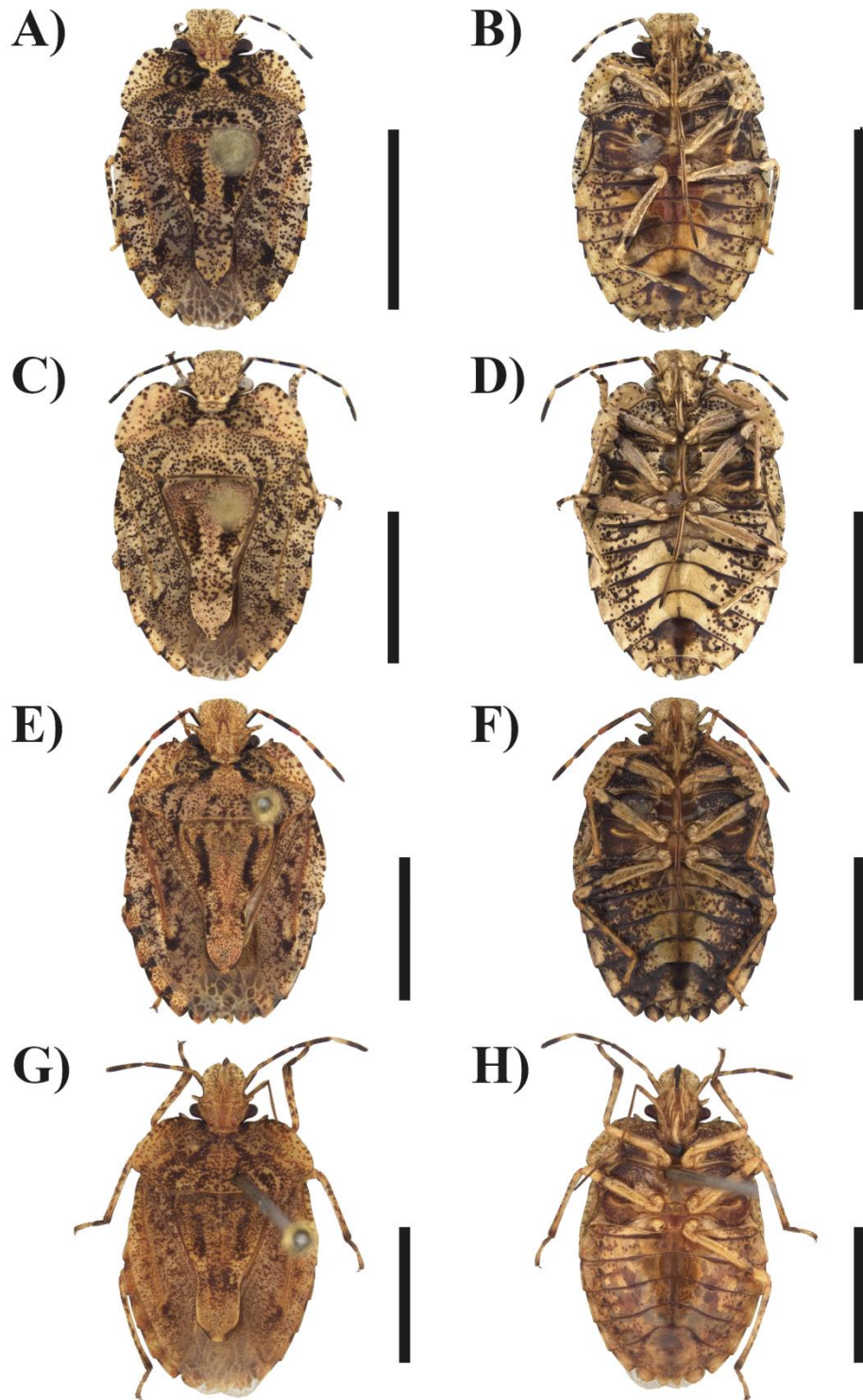


**Figure 3.** Dorsal and ventral habitus of the new species of *Eurystethus*. **A–B**, *Eurystethus* sp. nov. 45; **C–D**, *Eurystethus* sp. nov. 3; **E–F**, *Eurystethus* sp. nov. 5. Scale: 5mm.

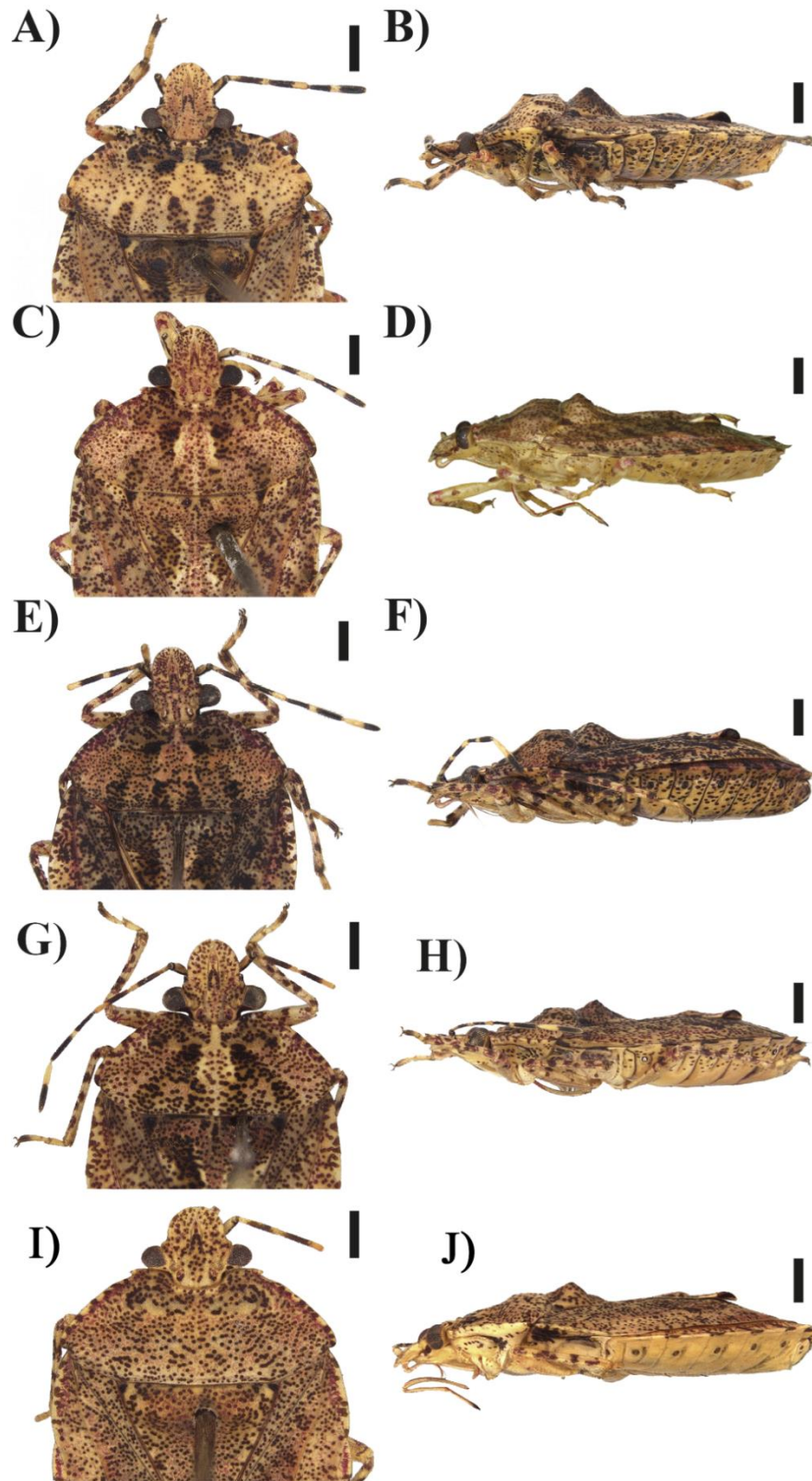


**Figure 4.** Dorsal and ventral habitus of the new species of *Eurystethus*. **A–B**, *Eurystethus* sp. nov. 23; **C–D**, *Eurystethus* sp. nov. 27; **E–F**, *Eurystethus* sp. nov. 52. Scale: 5mm.



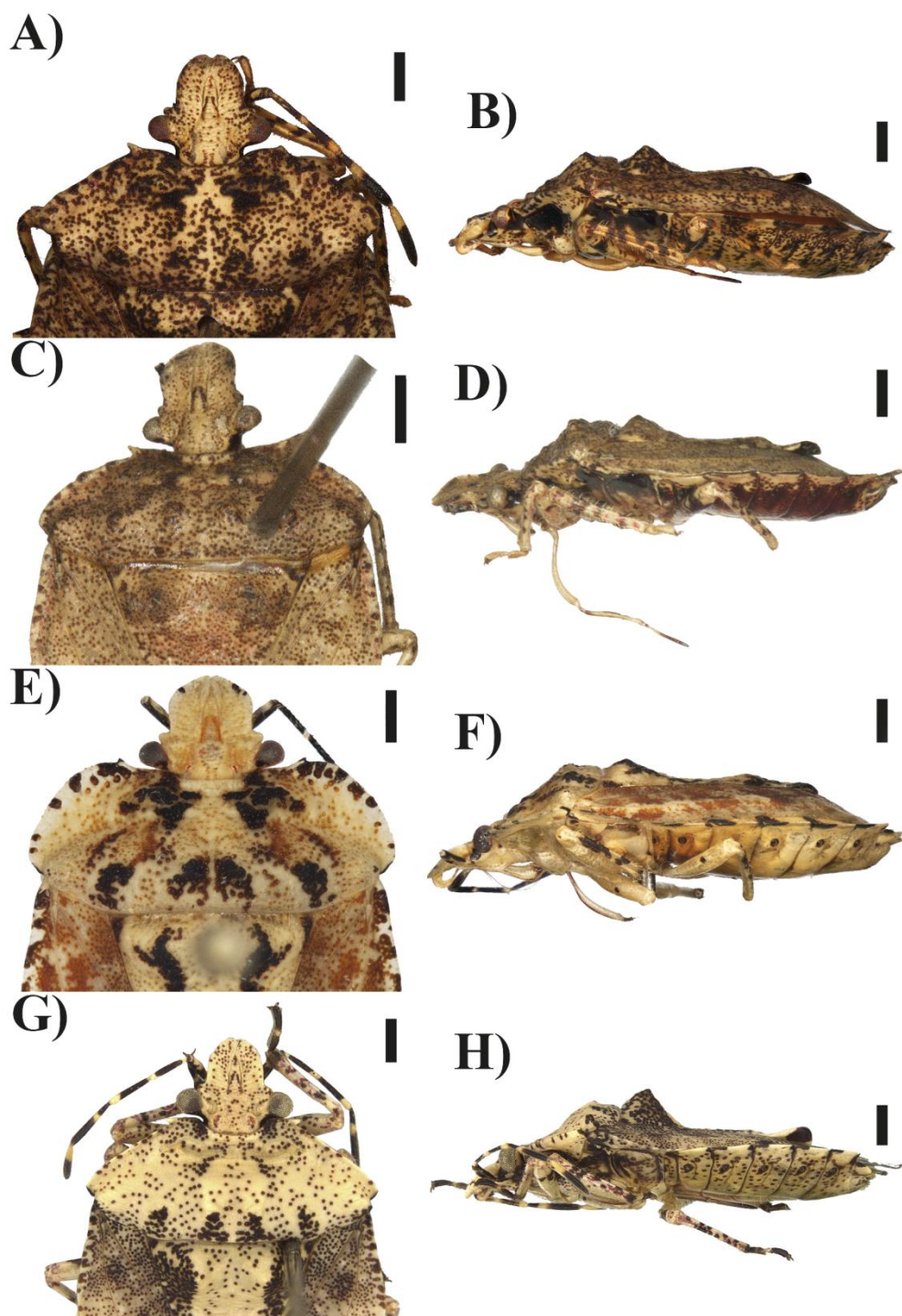


**Figure 5.** Dorsal and ventral habitus of the new species of *Eurystethus*. **A–B**, *Eurystethus* sp. nov. 20; **C–D**, *Eurystethus* sp. nov. 26; **E–F**, *Eurystethus* sp. nov. 34; **G–H**, *Eurystethus* sp. nov. 36. Scale: 5mm.

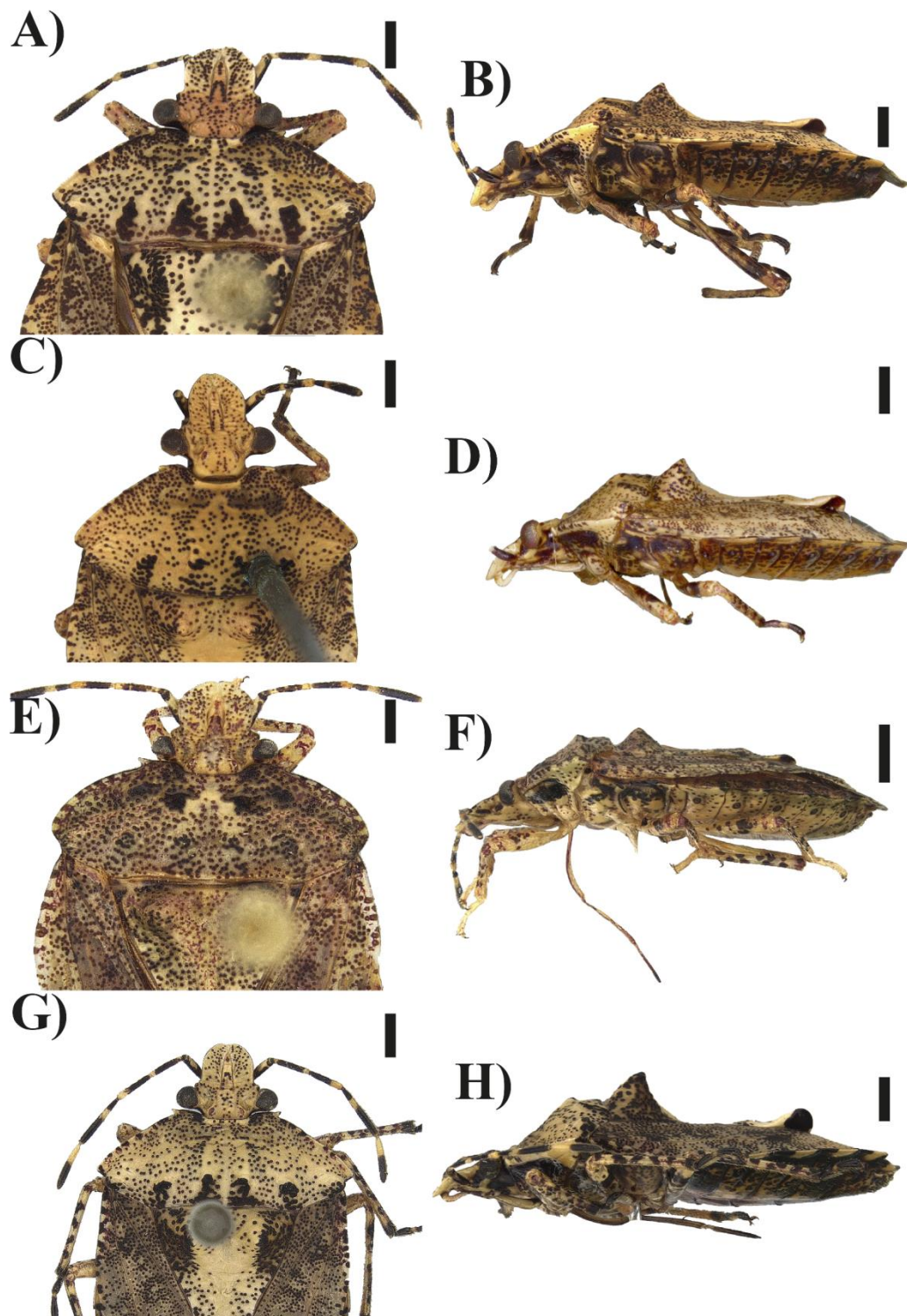


**Figure 6.** Dorsal view of head and pronotum, and lateral view of the new species of *Eurystethus*. **A–B**, *E. sp. nov.* 39; **C–D**, *E. sp. nov.* 40; **E–F**, *E. sp. nov.* 45; **G–H**, *E. sp. nov.* 21; **I–J**, *E. sp. nov.* 22. Scale: 1mm.



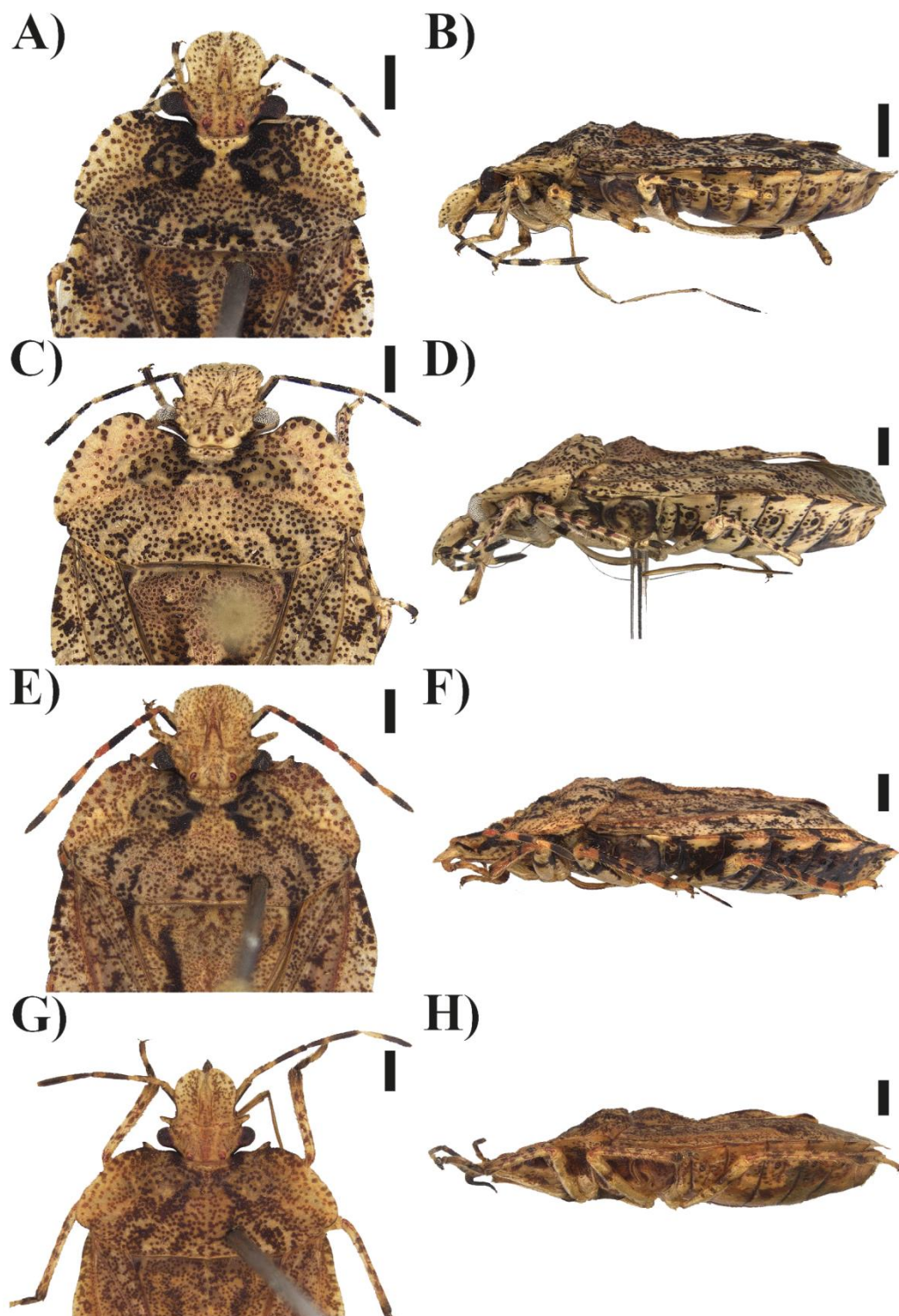


**Figure 7.** Dorsal view of head and pronotum, and lateral view of the new species of *Eurystethus*. **A–B**, *E. sp. nov. 3*; **C–D**, *E. sp. nov. 5*; **E–F**, *E. sp. nov. 7*; **G–H**, *E. sp. nov. 16*. Scale: 1mm.

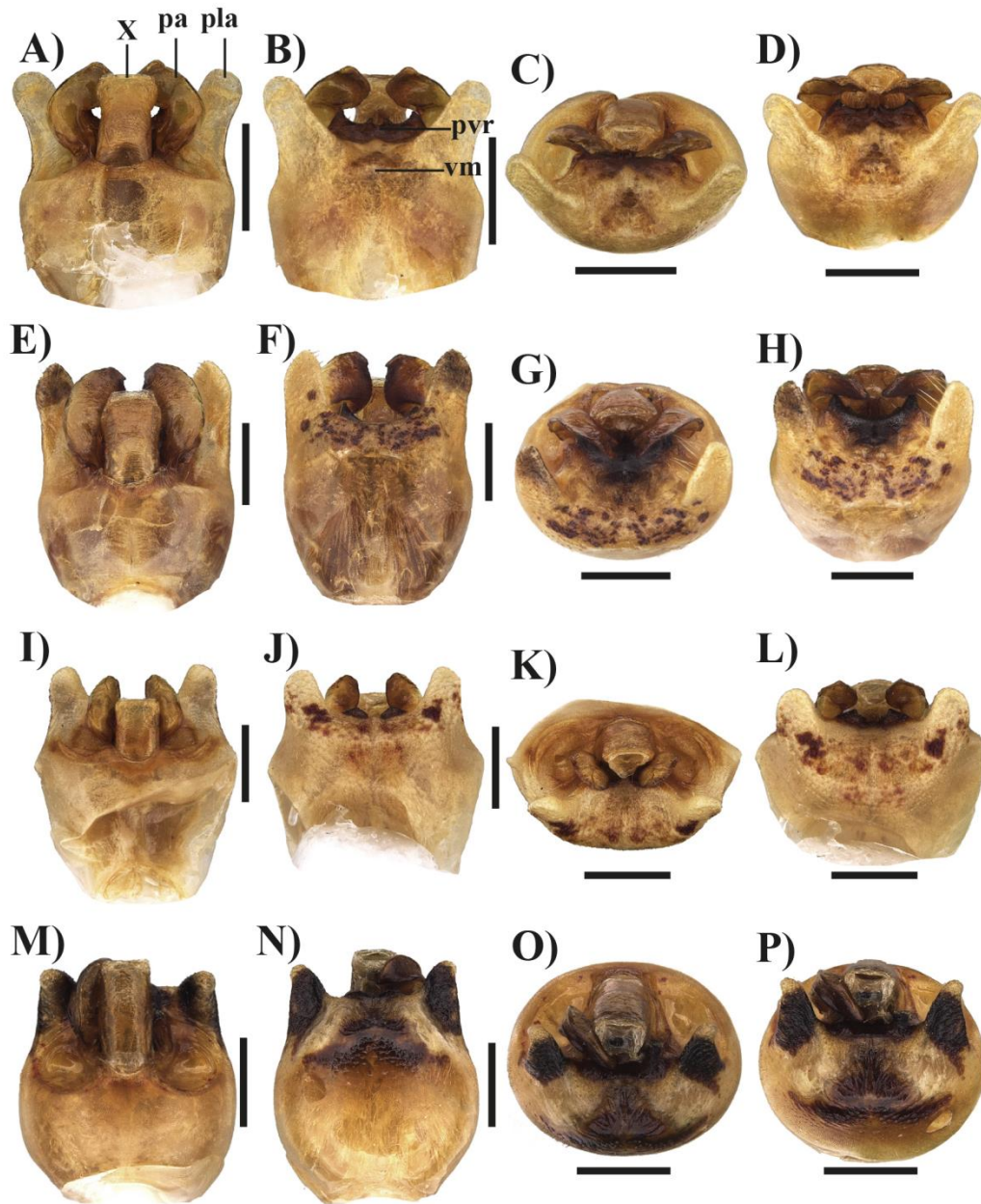


**Figure 8.** Dorsal view of head and pronotum, and lateral view of the new species of *Eurystethus*. A–B, *E. sp. nov.* 18; C–D, *E. sp. nov.* 23; E–F, *E. sp. nov.* 27; G–H, *E. sp. nov.* 52. Scale: 1mm.



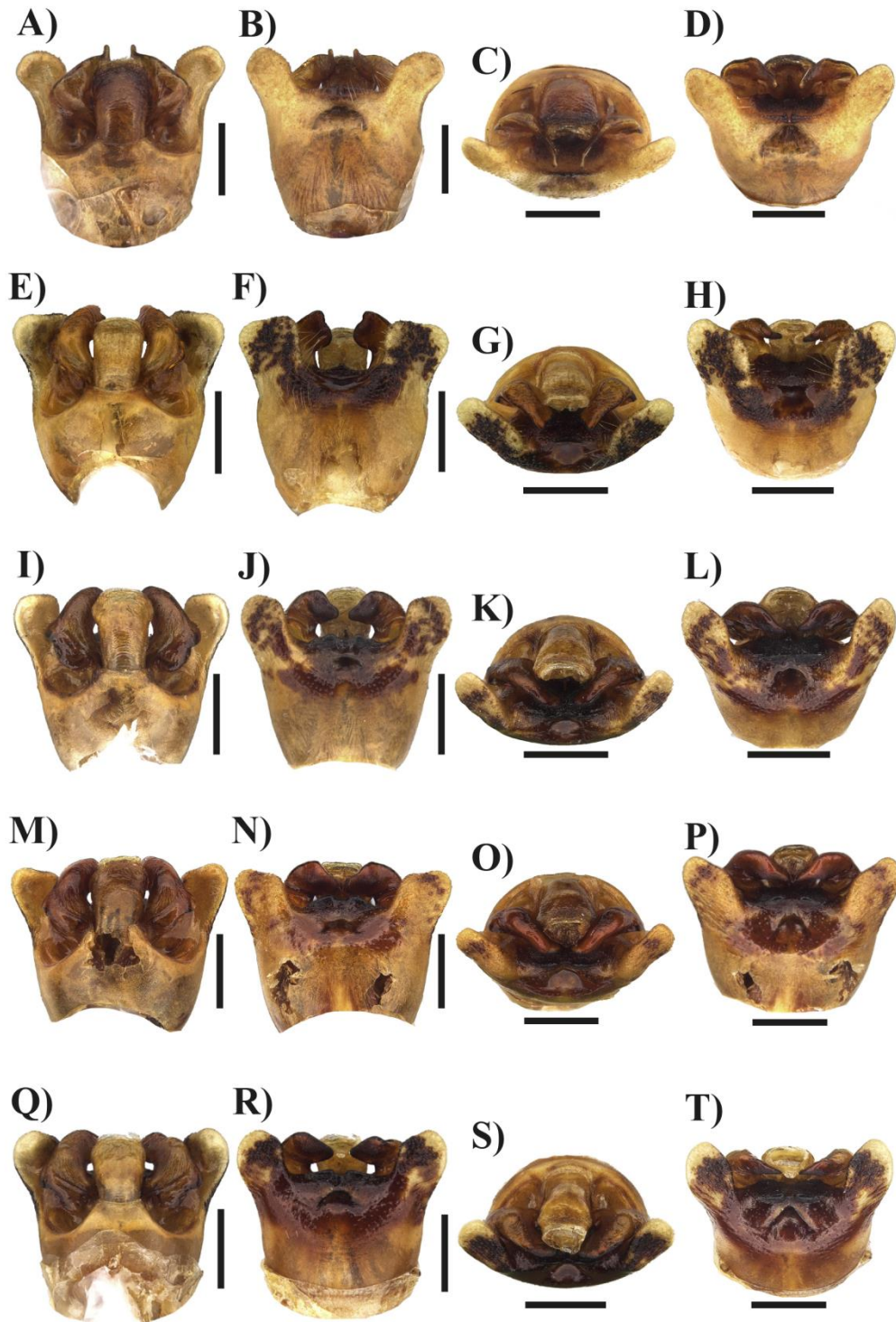


**Figure 9.** Dorsal view of head and pronotum, and lateral view of the new species of *Eurystethus*. **A–B**, *E. sp. nov.* 20; **C–D**, *E. sp. nov.* 26; **E–F**, *E. sp. nov.* 34; **G–H**, *E. sp. nov.* 36. Scale: 1mm.



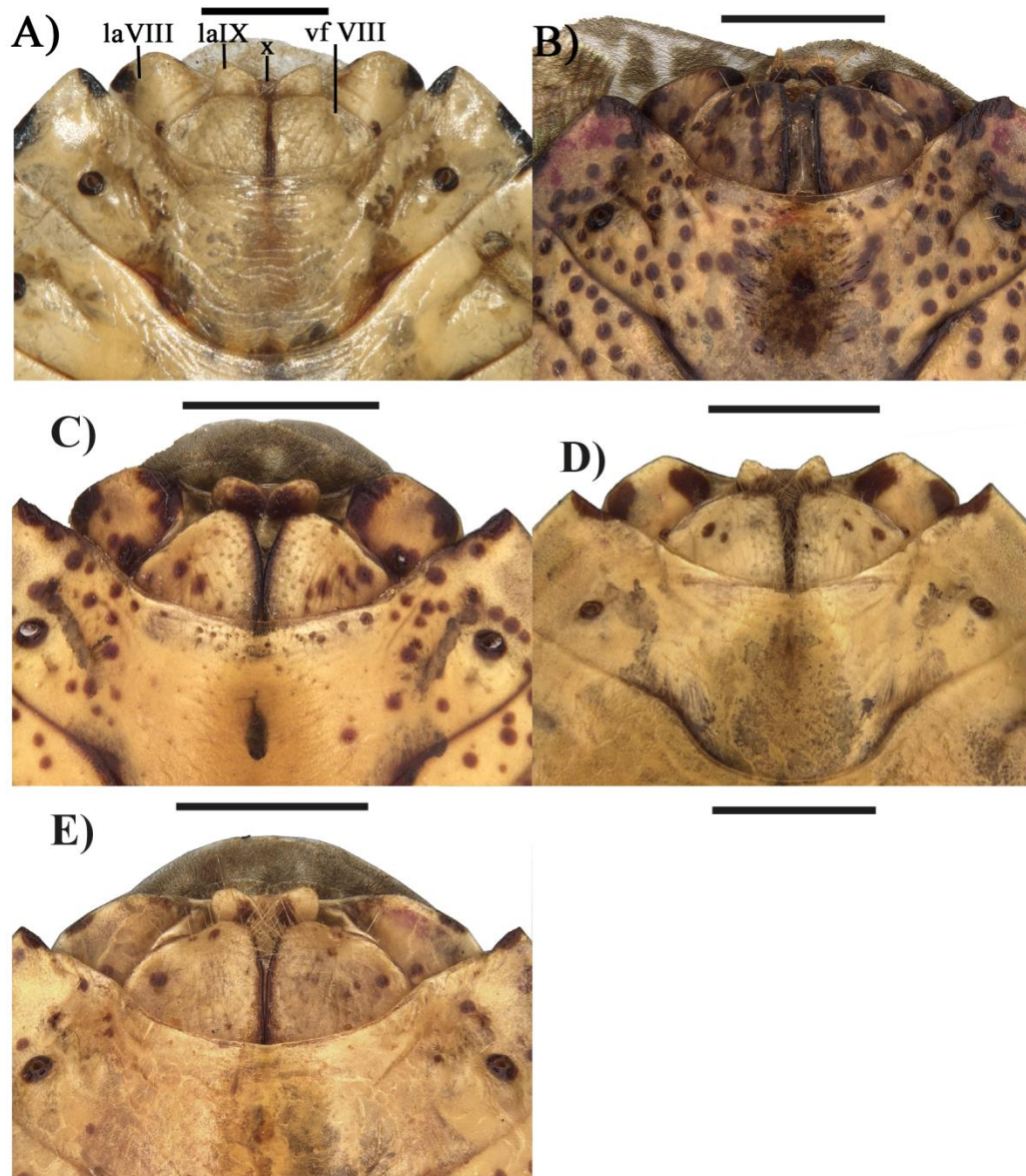
**Figure 10.** Male pygophore of the new species of *Eurystethus*. **A–D**, Pygophore of *E. sp. nov. 21*: **A**) dorsal, **B**) ventral, **C**) posterior and **D**) posteroventral; **E–H**, Pygophore of *E. sp. nov. 39*: **E**) dorsal, **F**) ventral, **G**) posterior and **H**) posteroventral; **I–L**, Pygophore of *E. sp. nov. 40*: **I**) dorsal, **J**) ventral, **K**) posterior and **L**) posteroventral; **M–P**, Pygophore of *E. sp. nov. 45*: **M**) dorsal, **N**) ventral, **O**) posterior and **P**) posteroventral; pa – parameres; pla – posterolateral angles of pygophore; pvr – process of ventral rim; vm – ventral margin of pygophore; X – segment X of pygophore. Scale: 1mm.





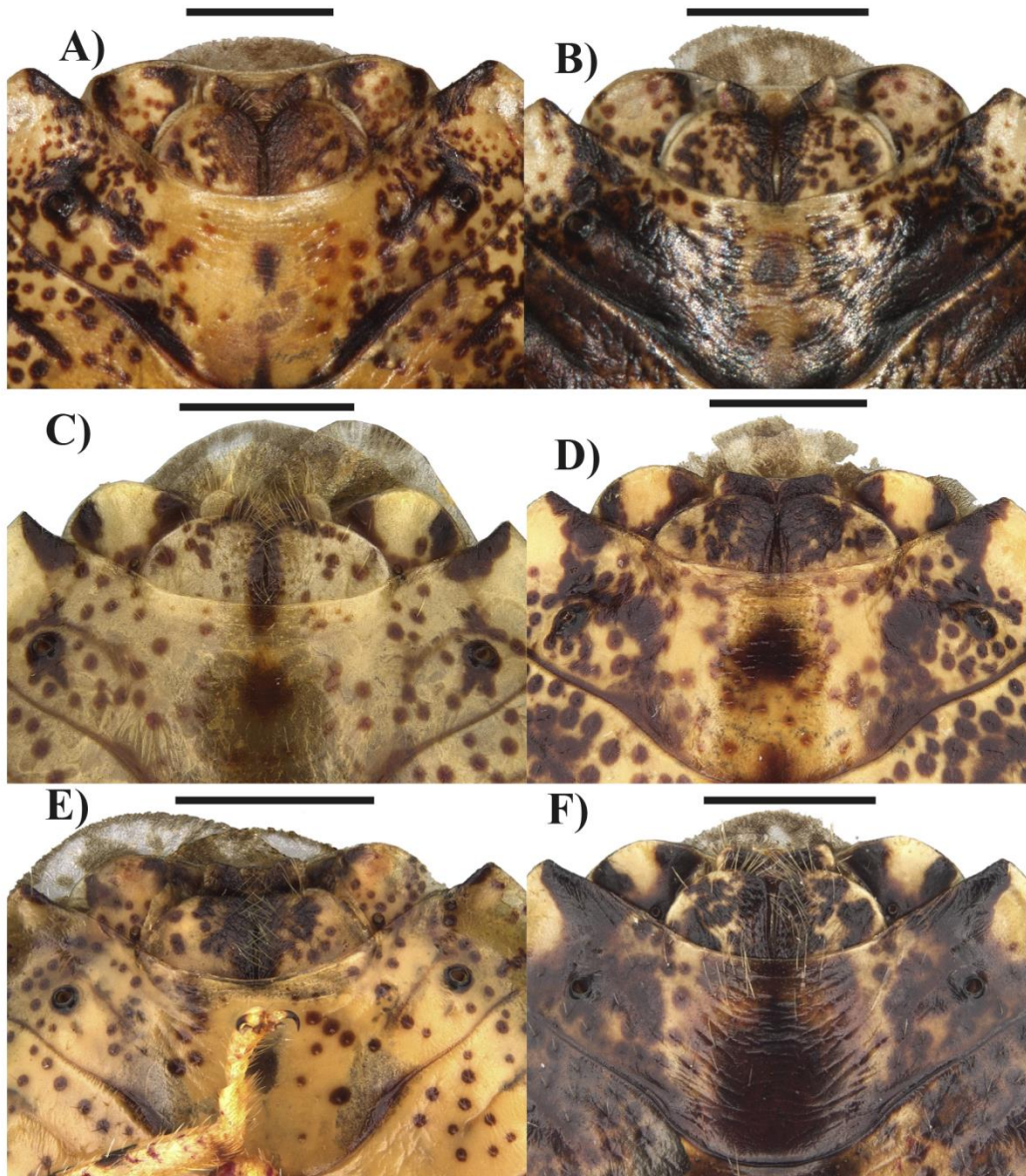
**Figure 11.** Male pygophore of the new species of *Eurystethus*. **A–D**, Pygophore of *E. sp. nov. 7*: **A**) dorsal, **B**) ventral, **C**) posterior and **D**) posteroventral; **E–H**, Pygophore of *E. sp. nov. 16*: **E**) dorsal, **F**) ventral, **G**) posterior and **H**) posteroventral; **I–L**, Pygophore of *E. sp. nov. 18*: **I**) dorsal, **J**) ventral, **K**) posterior and **L**) posteroventral; **M–P**, Pygophore of *E. sp.*

nov. 23: **M)** dorsal, **N)** ventral, **O)** posterior and **P)** posteroventral; **Q–T)** Pygophore of *E.* sp. nov. 52: **Q)** dorsal, **R)** ventral, **S)** posterior and **T)** posteroventral. Scale: 1mm.

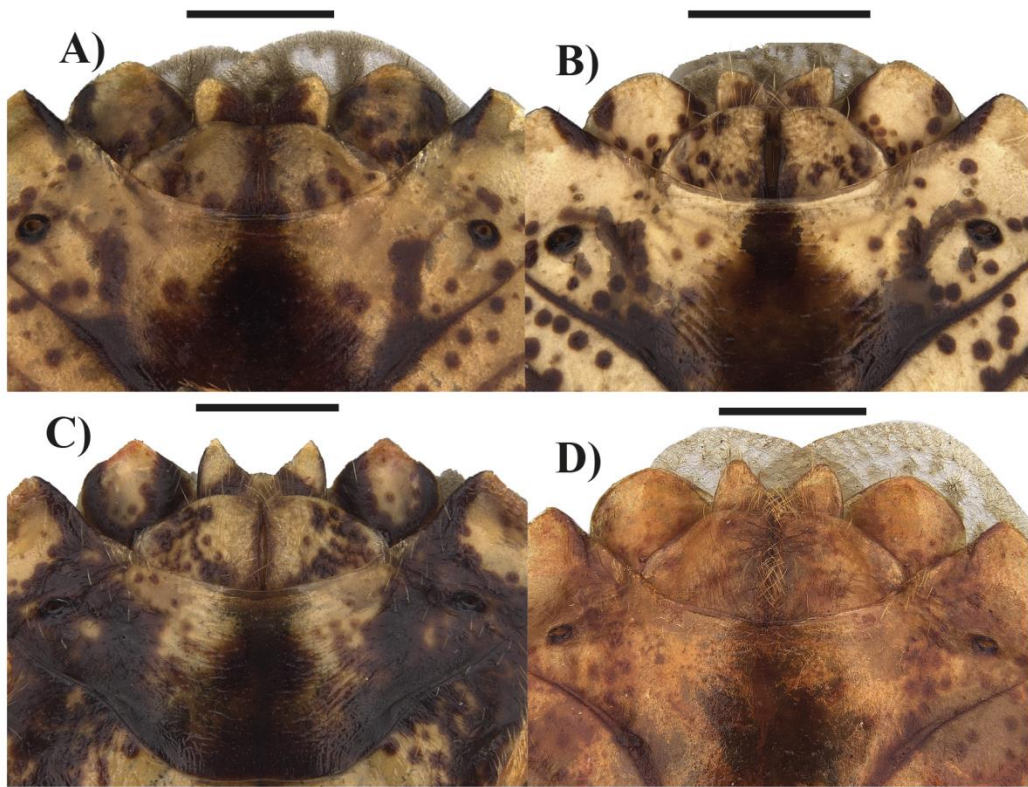


**Figure 12.** Female genital plates of the new species of *Eurystethus*. **A)** Female genital plates of *E.* sp. nov. 7; **B)** Female genital plates of *E.* sp. nov. 45; **C)** Female genital plates of *E.* sp. nov. 21; **D)** Female genital plates of *E.* sp. nov. 22; **E)** Female genital plates of *E.* sp. nov. 40; laIX – laterotergites IX; laVIII – laterotergites VIII; vfVIII – valvifers VIII; x – segment X of female. Scale: 1mm.

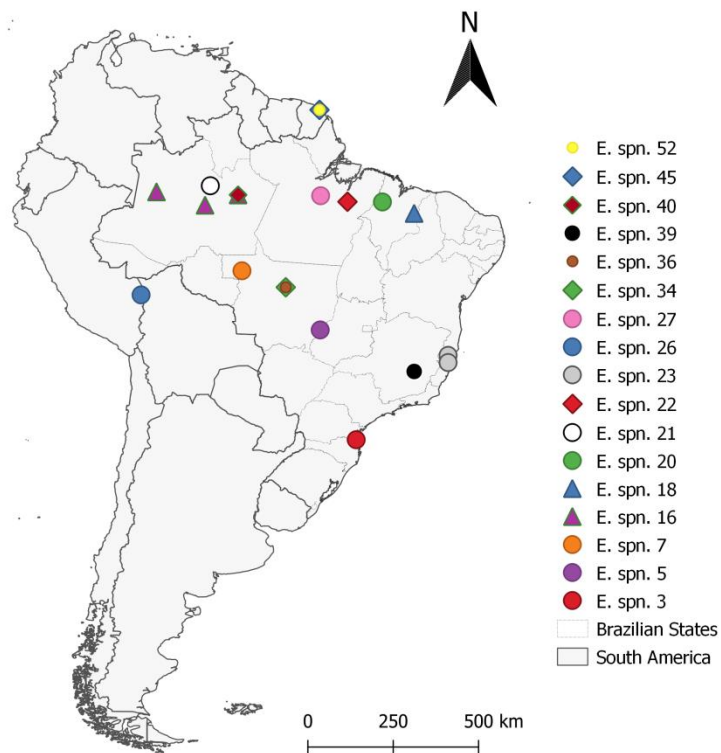




**Figure 13.** Female genital plates of the new species of *Eurystethus*. **A)** Female genital plates of *E. sp. nov. 3*; **B)** Female genital plates of *E. sp. nov. 5*; **C)** Female genital plates of *E. sp. nov. 16*; **D)** Female genital plates of *E. sp. nov. 23*; **E)** Female genital plates of *E. sp. nov. 27*; **F)** Female genital plates of *E. sp. nov. 52*. Scale: 1mm.



**Figure 14.** Female genital plates of the new species of *Eurystethus*. **A)** Female genital plates of *E. sp. nov. 20*; **B)** Female genital plates of *E. sp. nov. 26*; **C)** Female genital plates of *E. sp. nov. 34*; **D)** Female genital plates of *E. sp. nov. 36*. Scale: 1mm.



**Figure 15.** Distribution map of the new species of *Eurystethus* in South America.



## CONCLUSÕES GERAIS

O estudo dos espécimes disponíveis para a realização deste trabalho viabilizou a revisão do gênero *Eurystethus*, através de análises morfológicas, com a avaliação da validade de seus subgêneros, a diagnose das 18 espécies previamente conhecidas, a correção na descrição do espécime tipo de *E. nigropunctatus* – redescrito erroneamente por Ruckes (1966) como um macho – os arranjos nomenclaturais para *E. deplanatus* e *E. goianensis*, e a descrição de 20 espécies novas de *Eurystethus*.

As observações iniciais das sensilas interomatidiais abrem novas possibilidades de estudos, não apenas em *Eurystethus*, os primeiros discocefalíneos onde essas estruturas foram mencionadas e usadas na taxonomia, mas também nos outros táxons. Foi, principalmente, a observação das variações de sensilas e a conclusão de que podem estar ou ter estado presentes, mesmo que não as observemos em microscopia óptica, o que nos levou a questionar a validade dos subgêneros anteriormente estabelecidos dentro de *Eurystethus*.

Ademais, nota-se uma real subestimação da diversidade do gênero, ocasionada, sobretudo, pela dificuldade de definir as espécies, devido aos grandes padrões de semelhanças entre algumas delas e a própria carência de grandes conjuntos de espécimes que possibilitem observar as possíveis variações dentro de uma espécie nova em potencial. Ainda assim, é possível encontrar as delimitações para algumas, havendo um bom número de espécies novas para serem descritas. Até mesmo é possível vislumbrar a formação de grupos taxonômicos menores ou novos gêneros a partir de *Eurystethus*.

## **Anexo 1**

### **Capítulos 1 e 3: Zootaxa**

ISSN 1175-5326 (Print Edition) & ISSN 1175-5334 (Online Edition)

Editor na área de Hemiptera: Heteroptera: Pentatomoidea, Dipsocoromorpha, General (Faunal studies, List of Types, etc.): **David Rider** (david.rider@ndsu.edu), Department of Entomology, 1300 Albrecht Blvd., 202 Hultz Hall, Fargo, ND 58102, USA.

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## **Anexo 2**

### **Capítulo 2: Arthropod Structure and Development**

ISSN: 1467-8039

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