

THE TINGIDAE (HEMIPTERA: HETEROPTERA) OF SOUTHERN CENTRAL AMERICA
(WITH AN EMPHASIS ON COSTA RICA)

A Thesis
Submitted to the Graduate Faculty
of the
North Dakota State University
of Agriculture and Applied Science

By

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In Partial Fulfillment of the Requirements
for the Degree of
MASTER OF SCIENCE

Major Department:
Entomology

April 2018

Fargo, North Dakota

North Dakota State University
Graduate School

Title

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State University's regulations and meets the accepted standards for the degree of

MASTER OF SCIENCE

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ABSTRACT

The genera of Tingidae of the neotropics are herein diagnosed and a key for their identification is also provided. Five new genera are described from Central America, two from Panama, two from Costa Rica, and one new genus is described from Mexico. This brings the total of neotropical genera to 74. One new species, *Mexibyrsa woolleyi* is described from Mexico.

The Tingidae of southern Central America (Nicaragua, Costa Rica, and Panama) are reviewed in detail. There are now 153 described species spread among 43 genera. Thirty-two new species from southern Central America are described. Identification keys are provided for all species found in the study region.

ACKNOWLEDGMENTS

Over the course of my Master's degree I have made many contacts and friends in and outside of the field of entomology. There are literally countless people that have made this work possible and I wish to thank all who have participated, assisted, and provided for this project. Whenever possible, I have tried to record all individuals with their contributions, and to the best of my knowledge, they are listed below.

First of all I would like to express sincere gratitude towards my advisors Dr. David A. Rider and Dr. Janet J. Knodel; without their support, knowledge, and sage advice, I would not have had this wonderful opportunity to work on this group of fascinating insects. I would also like to thank my committee members Dr. Rebecca Simmons and Dr. Mark A. Boetel for their encouragement and advice. Additionally, I thank David A. Rider, for his patience and support of my endeavors and for continuously pushing me to be my best.

For additional support and career advice I thank Dr. Thomas J. Henry: United States Department of Agriculture, Systematic Entomology Laboratory, Dr. Theodore "Jim" Lewis: Instituto Nacional de Biología (INBio); Dr. Dennis D. Kopp: United States National Museum of Natural History (USNM); Dr. Joseph Schaffner: Texas A&M University (TAMU), and Dr. Alfred G. Wheeler Jr.: Clemson University. I also thank Laura Torres Miller: West Virginia Department of Agriculture, for her willingness to help and her enthusiastic support.

I am indebted to all individuals who provided specimens for this large project and acknowledge them in the following orations. Despite contacting numerous museums and receiving many specimens on loan from multiple collections, I owe the greatest thanks to Max Barclay and Mick Webb: Natural History Museum of London (BMNH); Thomas J. Henry:

USNM; Jim Lewis: INBio; Edward G. Riley, John D. Oswald, and Joseph Schaffner: TAMU for providing the majority of specimens used in this study. Irrespective of the holdings of each collection, all specimens provided were of utmost importance; Craig Brabant: University of Wisconsin Madison; Christopher Dietrich: Illinois Natural History Survey, Champaign, IL; Gerald Fauske: North Dakota State University, Fargo; Susan Halbert: Florida State Collection of Arthropods, Gainesville; Paul Hanson: University of Costa Rica, San José; Steve Heydon: Bohart Museum of Entomology University of California Davis; E. Richard Hoebeke and Joseph V. McHugh: University of Georgia, Athens; John M. Leavengood Jr.: United States Department of Agriculture, Animal Plant Health Inspection Service, Miami, FL; Jean Michel Maes: Entomological Museo de León, Nicaragua; Crystal Maier: Field Museum of Natural History, Chicago, IL; José Montero Ramírez: University of Georgia, Athens, Costa Rica Campus; late Norm Penny: California Academy of Sciences, San Francisco; John Rawlins: Carnegie Museum of Natural History, Pittsburgh, PA; David A. Rider: Personal Collection, Fargo, ND; Ruth Salas: American Museum of Natural History, New York, NY; Barb Sharanowski: University of Manitoba, Winnipeg, Canada; Robert Sites: University of Missouri, Columbia; and Jefferson Vaughn: University of North Dakota, Grand Forks.

A project this massive would be incomplete without photographs, as such technical assistance with taking photographs was generously provided by Patrick Beauzay and Gerald Fauske: North Dakota State University, as well as Juan Mata Lorenzen and Jim Lewis: INBio. I also graciously appreciate receiving photographs of type specimens from Bo Delling: Swedish Museum of Natural History, Stockholm; Thomas Henry: USNM; Gabriel Mejdalani:

Universidade Federal do Rio de Janeiro, Brazil; Amoret Spooner: Oxford University, Oxford, England; Vanessa Verdecia: Carnegie Museum of Natural History; and Mic Webb: BMNH.

Assistance acquiring collecting permits was generously provided by Barbara Lewis and Francisco Campos Rivera: Organization of Tropical Studies. Ground transportation was provided by Luis F. Delgado M. and Luis of Natural Car Rental.

Partial funding for this project was generously provided by the NDSU Entomology Scholarship committee in the form of two Knippling thesis enhancement grants, one of which was used to visit Costa Rica. Additional funding was provided by Dr. John D. Oswald of TAMU.

DEDICATION

I wish to dedicate this work to my best friend and amor, my wife Veronica. Thank you for your compassionate support and tender care through this arduous journey we call life. Without your continual devotion, this project would have never come to fruition. ¡Besitos y abrazos del tu osito polar del norte!

DISCLAIMER

This manuscript in its entirety should not be recognized as a valid publication. Any species names proposed herein are only manuscript names and should not be regarded as published until they appear elsewhere in a refereed taxonomic journal.

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CHAPTER ONE: A KEY TO THE GENERA OF TINGIDAE (HEMIPTERA: HETEROPTERA) OF THE NEOTROPICS

Abstract

A key to the genera of Tingidae (excepting the Vianaididae [= Vianaidinae]) of the Neotropics is provided. The fauna are represented by 76 genera found from coastal Mexico to Chile and Argentina. One new genus, new species, *Mexibyrsa woolleyi*, is described. Diagnoses, distribution information, and life histories are also summarized for each genus.

Introduction

The Neotropics span from northern coastal Mexico, throughout Central America, and cover all of South America as well as southern Florida and the Caribbean Islands (Udvardy 1975). There is no universal taxonomic key to the neotropical genera of Tingidae, however several keys have been published for different regions or groups of the Tingidae. For example, Hurd (1946) published the first, most extensive key to tingid genera and included diagnosis; however, this key is only restricted to North America west of the Panama Canal. Guidoti *et al.* (2016) developed an exceptionally useful key which included all agriculturally important genera of neotropical Tingidae.

The higher classification of the Tingidae has been under contention during the past century as different tribes or subfamilies have been erected to family status (Kormilev 1955; Drake and Davis 1958, 1960; Štys and Kerzhner 1975; Froeschner 1996; Lis 1999; Golub and

Popov 2016). For sake of simplicity and consistency of current literature, the classification used in this work will follow that of Štys and Kerzhner (1975), as used by Froeschner (1996, 2001).

The Tingidae is a group of herbivorous Hemiptera, some of which have been reported as stem feeders, while others are known to feed on parts of the developing flowers. This family is often overlooked because of members' small sizes and delicate morphologies. Furthermore, the majority of species are of little agricultural importance in the United States and Europe, but many agricultural crops grown in the Neotropics have important tingid pests that can cause significant damage including necrosis, tissue syscenece, and premature sheading of leafs (Hall 1991).

It should be noted that the key included herein is not all inclusive and may not work for all described or undescribed taxa. However, this key, along with the provided diagnoses and photographs, is designed to be robust and helpful for the identification of the most commonly encountered taxa within the Tingidae. Several genera are variable in form and may contain several species groups (i.e., *Acysta* Champion, *Corycera* Drake, *Leptopharsa* Stål, *Phymacysta* Monte, *Teleonemia* Costa, and *Tigava* Stål), which may require certain genera to key out in multiple places within this key. Conversely, several genera are in need of revision and reclassification in order to better establish generic boundaries; thus a few species may not key to their correct, currently assigned genus.

Materials and Methods

Specimens from the following collections were examined:

BMNH - Natural History Museum, London, England, Mick Webb

CASC - California Academy of Sciences, San Francisco, CA, Norm Penny

CMNH - Carnegie Museum of Natural History, Pittsburgh, PA, John Rawlins

DARC - David A. Rider personal collection, Fargo, ND

FMNH - Field Museum of Natural History, Chicago, IL, Crystal Maier

FSCA - Florida State Collection of Arthropods, Gainesville, FL, Susan E. Halbert

INBio - Instituto Nacional de Biodiversidad, Santo Domingo, Costa Rica, Theodore J. Lewis

TAMU - Texas A&M University, College Station, TX, E. G. Riley

UCDC - Bohart Museum of Entomology, University of California, Davis, CA, Steve Heydon

UGCA - University of Georgia Collection of Arthropods Athens, GA, Joseph V. McHugh

UMRM - University of Missouri Insect Collection, Columbia, MO, Robert Sites

USNM - United States National Museum of Natural History, Washington, DC, Thomas Henry



Figure 1.1: Map of the Neotropical realm.

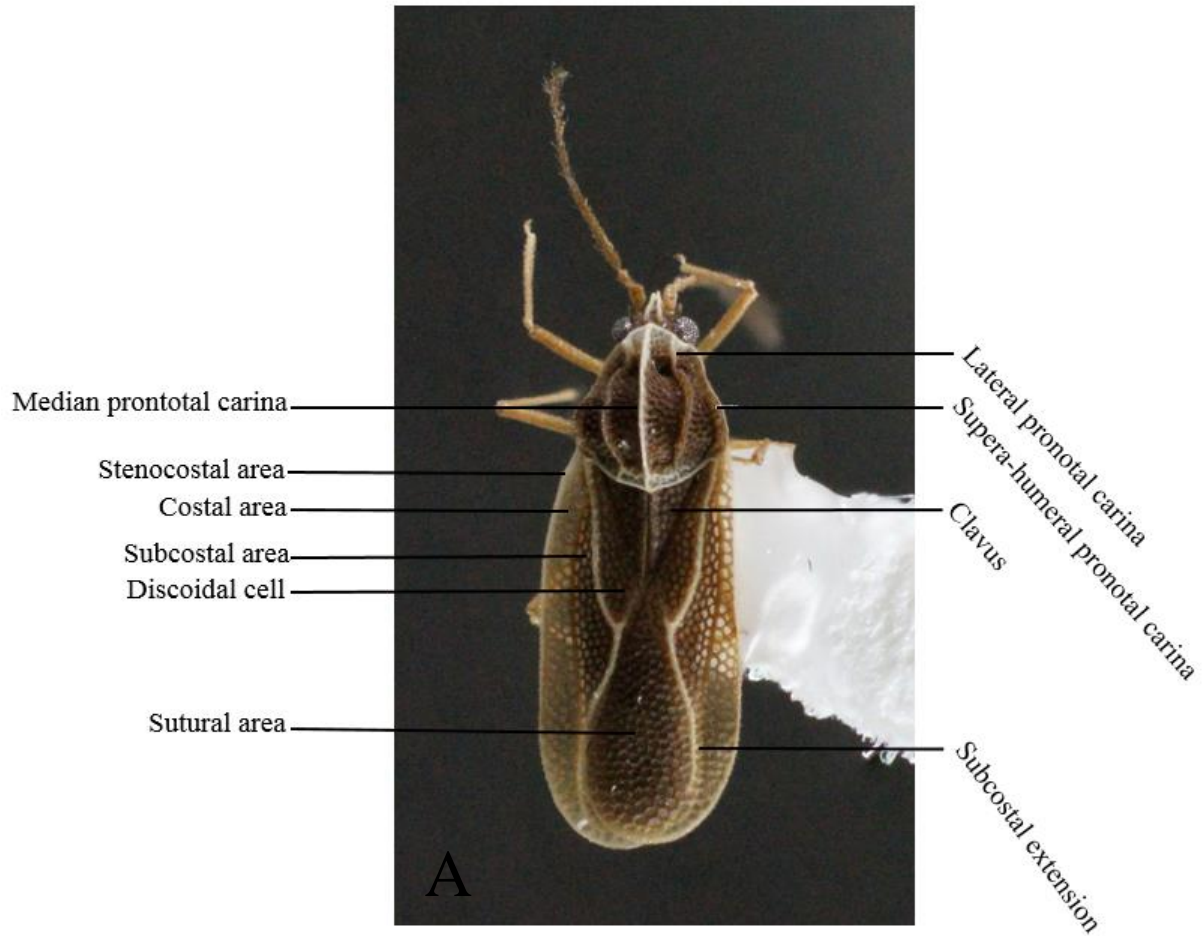


Figure 1.2: General tingid anatomy, dorsal aspect. **A.** *Carinacader adelphi* new species.

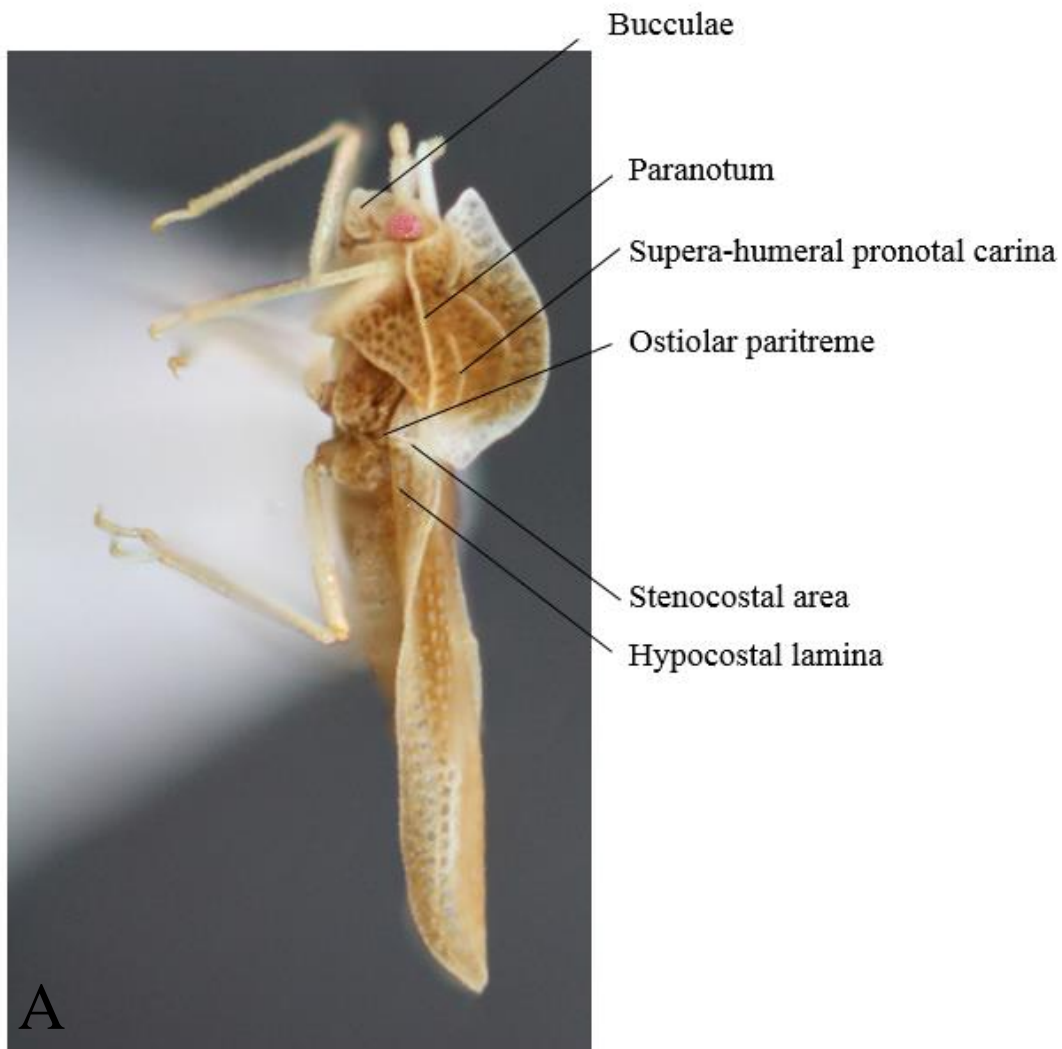


Figure 1.3: General tingid anatomy, lateral aspect. **A.** *Carinacader minuta* new species.

Results

Key to the genera of Neotropical Tingidae

- 1 Stenocostal area of wing present at least basally (Fig. 1.2).....2
- Stenocostal area not present5
- 2(1) Costal area extremely broad, broader than width of subcostal or discoidal area
.....*Nectocader* Drake
- Costal area not extremely broad, subequal to or narrower than width of discoidal area3
- 3(2) Wing margin serrate, found in Chile and Argentina *Stenocader* Drake and Hambleton
- Wing margin smooth, not serrate4
- 4(3) Pronotum pentacarinata*Carinacader*, new genus
- Pronotum tricarinate *Taurcader*, new genus
- 5(1) Clavus of hemelytron similarly developed as mesocorium6
- Clavus weakly developed..... 10
- 6(5) Interocular area of head depressed, eyes appearing obliquely elevated
.....*Eocader* Drake and Hambleton
- Interocular area of head not depressed7
- 7(6) Paranota broad, each projecting as a distinct angle, apically forming two spiniform
processes..... *Phatnoma* Fieber
- Paranota usually narrow, never projecting apically as spiniform processes8
- 8(7) Paranota with small, short, acute angulations *Minitingis* Barber
- Paranotal margin rounded without acute angulations9
- 9(8) Occipital spines as long, or longer than width of eye, hook-like

.....	<i>Pampacader</i> Carpintero and Montemayor	
- Occipital spines shorter than width of eye, not hook-like	<i>Zetekella</i> Drake	
10(5) Second tarsal segment swollen, much larger than first tarsal segment.....		11
- Second tarsal segment not greatly swollen		13
11(10) Each paranotum reduced to a ridge-like carina	<i>Psilobyrsa</i> Drake and Hambleton	
- Each paranotum with multiple rows of areolae		12
12(11) Discoidal cell tumidly elevated	<i>Aristobyrsa</i> Drake and Poor	
- Discoidal cell not tumidly elevated	<i>Stragulatingis</i> Froeschner	
13(10) Lateral margins of paranota each armed with three or more large, stout spines.....		14
- Lateral margins of paranota either bare or with small spinules, but never with a series of large spines		16
14(13) Lateral margins of paranota each with three stout spines, head with five long, stout spines.	<i>Acanthotingis</i> Monte	
- Lateral margins of paranota each with more than three stout spines; head with three or fewer spines.....		15
15(14) Head with occipital spines, bucculae partially contiguous anteriorly	<i>Acanthocheila</i> Stål	
- Head without occipital spines, bucculae not contiguous anteriorly	<i>Carvalhotingis</i> Froeschner	
16(13) Paranota greatly reflexed dorsally, at times covering part of pronotum or at least completely obscuring pronotal disc in lateral view; may vary from flat to shell-shaped		17

- Paranota not greatly reflexed; explanate, carinate, deflexed, or reflexed onto lateral margins of pronotum, but reflexation never covering dorsum of pronotum or strongly reflexed dorsally into shell-shaped lobes	29
17(16) Paranota bulbous, inflated	18
- Paranota not bulbous or inflated, but may be shell-shaped or triangular.....	19
18(17) Paranota not covering pronotal carinae; pronotum with bulbous hood; costal area of wing broad	<i>Oedotingis</i> Drake
- Paranota covering lateral carinae apically; pronotum without bulbous hood; costal area of wing narrow	<i>Dichocysta</i> Champion
19(17) Dorsum with two cysts in line; pronotum with hood and median carina on posterior projection of pronotum laterally inflated	20
- Dorsum without two cysts; pronotal hood present, median carina not inflated	21
20(19) Costal area of wing uniseriate	<i>Aepycysta</i> Drake and Bondar
- Costal area of wing with at least two rows of areolae	<i>Dicysta</i> Champion
21(19) Ostiolar peritremes absent.....	22
- Ostiolar peritremes present.....	23
22(21) Paranota nearly flat against pronotum without spines or carinaform processes	<i>Dictyla</i> Stål
- Paranota not lying flat against pronotum, produced into two carinaform processes, some spines may be present.....	<i>Ambothingis</i> Drake and Ruhoff
23(21) Paranota folded over itself forming a carnula along lateral margin	<i>Leptodictya</i> Stål

- Paranota triangular, linear, or hemispherical, shell-shaped, foliaceous, never folded over itself24
- 24(23) Hood covering head basally, but leaving apical portion exposed dorsally; bucculae closed anteriorly *Teleonemia* Costa (in part)
- Hood either completely covering head from above, or if not completely covering head, then bucculae open anteriorly25
- 25(24) First antennal segment at least five times longer than second; cephalic spines not adpressed to head; sutural area of wing only overlapping in apical third
.....*Phymacysta* Monte (in part)
- First antennal segment less than five times longer than second; cephalic spines, if present, adpressed to head; sutural area of wing only overlapping beyond apical third26
- 26(25) Lateral carinae constricted inwards toward median carina; paranota broad, each with more than two rows of areolae, triangular; areolae of hemelytra, paranota, hood, surrounded by hairs *Pachycysta* Champion
- Lateral carinae subparallel with median carina, if constricted, then paranota either shell-shaped or narrow, each with two rows of areolae; areolae may or may not be surrounded with hairs.....
.....27
- 27(26) Hairy species, vein margins surrounding areolae covered with small fine hairs; paranota not reflexed into shell-shaped lobes28
- Few scattered hairs, if any present; paranota reflexed into shell-shaped lobes
..... *Calotingis* Drake

28(27) Fourth antennal segment anteapical, less than half the length of third segment; lateral carinae subparallel	<i>Stenocysta</i> Champion
- Fourth antennal segment apical, more than half as long as third segment; lateral carinae constricted slightly	<i>Zelotingis</i> Drake and Hambleton
29(16) Paranota deflexed anteriorly, pronotal disk extremely high with a transverse sulcus on posterior margin (Caribbean Islands)	<i>Hybopharsa</i> Hurd
- Paranota not usually deflexed, or if slightly deflexed, then pronotal disk without a transverse sulcus	30
30(29) Paranota not foliaceous, without a complete row of conspicuous areolae, usually carinate at least posteriorly	31
- Paranota foliaceous, with one or more rows of conspicuous areolae, or at least an areolate flap at humeral angles	40
31(30) First antennal segment more than five times longer than second; species extremely long (4.0-5.0) and narrow (1.0-1.2)	<i>Tigava</i> Stål (in part)
- First antennal segment less than five times longer than second segment; species shorter, but if long, then extremely wide (2.0-4.2)	32
32(31) Hemelytra coleopteroid in form; species less than 2mm	<i>Coleopterodes</i> Philippi
- Hemelytra not coleopteroid; species varying in shapes and forms	33
33(32) Color mostly black; costal area of wing broad, with four or more rows of areolae at widest	<i>Nyctotingis</i> Drake
- Costal area narrow, with less than three complete rows of areolae	34

- 34(33) First antennal segment stout; very narrow species (0.6mm)
..... *Campylotingis* Drake and Bondar
- First antennal segment sometimes stout; species wider than one millimeter 35
- 35(34) Paranota reduced to very narrow carinae, but areolate apically near pronotal collar,
margins not serrate, pronotum unicarinate *Dyspharsa* Drake and Hambleton
- Paranota may be narrow, but if narrow, then serrate along margins 36
- 36(35) Hemelytra and pronotum covered with long, fine hairs, lacking wax
..... *Phaeochila* Drake and Hambleton
- Hemelytra and pronotum may have short hairs, but never long, wax may be present 37
- 37(36) Frontal and median cephalic spines present, fused to form a single, thick projection;
pronotum tricarinate; hemelytra slightly constricted *Corycera* Drake (in part)
- Frontal and median cephalic spines if present, not fused; pronotum may be tricarinate or
unicarinate; hemelytra may or may not be constricted 38
- 38(37) Pronotum densely covered with wax, some small, short hairs present; hemelytra each
with two prominent tubercles along lateral and posterior margins of each discoidal cell.....
..... *Ulotingis* Drake and Hambleton
- Pronotum may have wax present, but if so, then with short hairs lacking; veins of discoidal
cells flat, glabrous 39
- 39(38) Occipital spines long; lateral margins of paranota smooth; discoidal cells usually
surpassing middle of wing *Leptoypha* Stål
- Occipital spines may be present, but not usually long; lateral margins of paranota minutely
serrate; discoidal cells not surpassing middle of wing *Amblystira* Stål

40(30) Paranota each reduced to areolate flap at humeral angles	<i>Pseudacysta</i> Blatchley
- Paranota may or may not be interrupted, but if interrupted, then always present along anterior and usually posterior portions of pronotum	41
41(40) Paranota interrupted, but present on anterior and posterior portions of pronotum.....	
.....	<i>Acysta</i> Champion (in part)
- Paranota complete along lateral margins of pronotum	42
42(41) Paranota with only one complete row of areolae	43a
- Paranota with two or more rows of areolae.....	48
43a(42) First antennal segment more than six times longer than second; discoidal cell uniformly triangular.....	43
- First antennal segment less than six times as long as second; discoidal cell not uniformly triangular	44
43(43a) First antennal segment spindle shaped	
.....	<i>Mexicotigis</i> Henry, Montemayor, and Knudson
- First antennal segment uniform, not spindle shaped.....	<i>Tigava</i> Stål (in part)
44(43) Pronotum with distinct, spherical hood.....	<i>Sphaerocysta</i> Stål
- Pronotum without distinct spherical hood.....	45
45(44) Paranota reflexed dorsally against lateral margins of pronotum... ..	<i>Teleonemia</i> Stål (in part)
- Paranota not reflexed dorsally, or if reflexed dorsally, then not against lateral margins of pronotum.....	46
46(45) Head without spines, except antenniferous tubercles present, well-developed	
.....	<i>Atheas</i> Champion

- Head with at least some spines, in addition to antenniferous tubercles.....	47
47(46) Elongate, narrow species; with wing apices angulate.....	<i>Birabena</i> Drake and Hurd
- Broad, not so narrow species; wing apices rounded.....	<i>Acysta</i> Champion (in part).
48(40) Pronotum with distinct hood which may be greatly inflated or laterally flattened, sometimes produced anteriorly	49
- Pronotum without distinct hood, pronotal collar may be partially inflated, projected over basal part of head.....	65
49(48) Pronotal hood extremely large, long, inflated, expanded laterally and dorsally, sometimes narrowed basally, completely obscuring pronotum in dorsal view	50
- Pronotal hood of various forms, but never completely covering pronotum	51
50(49) Larger species (4.5); in dorsal view, median nerve of pronotal hood not inline with median carina on posterior process of pronotum, sinuous; costal margins of hemelytra slightly reflexed, wing apices not widely diverging in repose.....	
<i>Megalocysta</i> Champion	
- Smaller species (3.2); in dorsal view, median nerve of pronotal hood inline with median carina on posterior process of pronotum, costal margins usually flat, wing apices widely diverging in repose	
.....	<i>Ulocysta</i> Drake and Hambleton
51(49) Pronotal hood extremely narrow, high, not expanded laterally.....	<i>Leptocysta</i> Stål
- Pronotal hood variable, but if narrow, then expanded laterally	52
52(51) Costal area extremely broad, with more than seven rows of areolae	<i>Eurypharsa</i> Stål
- Costal area with less than seven rows of areolae	53

53(52) Paranota explanate, each with basal fold; costal margins of hemelytra upturned; pronotal hood elongate, curving down over head, with crest, and extending beyond antennal insertions	<i>Corythaica</i> Stål
- Paranota sometimes explanate, but each without basal fold	54
54(53) Width across paranota similar to or slightly less than width across hemelytra	55
- Width across paranota much less than width across hemelytra	66
55(54) Height of lateral pronotal carinae equal to or greater than height of hood in lateral view	<i>Leptobyrsa</i> Stål
- Height of lateral pronotal carinae, if present, distinctly less than height of pronotal hood in lateral view	56
56(55) Paranota produced apically, forming spine-like projections anteriorly, wing apices sharply angled	<i>Zeiratingis</i> Drake and Hambleton
- Paranota rounded apically, spinules may be present, wing apices rounded.....	57
57(56) Long, narrow species; first antennal segment five or more times longer than second antennal segment	58a
- Short, broad species; first antennal segment less than five times the length of segment two... ..	59a
58a(57) Head with occipital spines	58
- Head lacking occipital spines	<i>Macrotisingis</i> Champion
58(58a) Occipital spines straight or diverging, erect	<i>Ceratotingis</i> Montemayor
- Occipital spines long, downcurving, and converging towards middle of head.....	<i>Paraceratotingis</i> Henry, Montemayor, and Knudson

59a(57) Cephalic spines long, nearly as long as first antennal segment	59
- Cephalic spines short	60
59(57) Wing apices strongly pointed	<i>Baeotingis</i> Drake and Poor
- Wing apices rounded.....	<i>Acanthopharsa</i> , new genus
60(59) Pronotal hood rounded anteriorly	61
- Pronotal hood pointed anteriorly	63
61(60) Pronotal hood ovate, lateral pronotal carinae slightly constricted; paranota not produced apically	<i>Ambycysta</i> Drake and Hurd
- Pronotal hood of various forms, lateral pronotal carinae subparallel	62
62(61) Rostral laminae open behind	<i>Leptopharsa</i> Stål (in part).
- Rostral laminae closed by transverse carina across meso-meta sternal suture .....	.....<i>Gargaphia</i> Stål
63(60) Paranota each with a basal undulation; head without spines	<i>Corythucha</i> Stål
- Paranota flat, each without a basal undulation; head with or without spines	64
64(63) Head with long, porrect spines; margins of hemelytra and paranota with substantial, distinct spinules; discoidal cell of forewing surrounding a tumid inflation, tumidity not upturning subcostal area	<i>Caloloma</i> Drake and Bruner*
- Head usually with short spines; margins of hemelytra and paranota without substantial, distinct spinules; discoidal cell of forewing not surrounding a tumid inflation	65
65(64) Paranota explanate, protruding anteriorly beyond pronotal hood	<i>Neobyrsa</i> , new genus
- Paranota explanate, sometimes reflexed dorsally along posterior margin, protruding apically, but never beyond pronotal hood	<i>Stephanitis</i> Stål

66(54) Pronotal hood completely covering head dorsally.....	<i>Mexibyrsa</i> , new genus	
- Hood covering only basal portion of head, leaving apical portion exposed dorsally		
.....	<i>Pliobyrsa</i> Drake and Hambleton	
67(43) Rostral laminae strongly constricted on mesosternum	<i>Vatiga</i> Drake and Hambleton	
- Rostral laminae subparallel to diverging		68
68(67) Dorsal surface very flat, with costal area of hemelytra broad (0.8-1.0)		69
- Dorsal surface variable, but if flat, then costal area of hemelytra not extremely broad (0.1-0.5)...		
.....		70
69(68) Median carina of pronotum low, without cells; discoidal cells and cells next to discoidal area similar in size to those of costal area of wing	<i>Planibyrsa</i> Drake and Poor	
- Median carina of pronotum may be low, but always with distinct areolae; discoidal cells and cells next to discoidal area smaller than those of costal area		
.....	<i>Pleseobyrsa</i> Drake and Poor	
70(68) First antennal segment more than five times the length of second antennal segment; paranota with an elongate cell near base	<i>Tingicesa</i> Koçak and Kemal	
- First antennal segment usually less than five times the length of second; paranota without an elongate cell near base		71
71(70) Antennae with setigerous tubercles	<i>Acalypta</i> Westwood	
- Antennae without setigerous tubercles, but small setae may be present		72
72(71) Species restricted to the Caribbean Islands		73
- Species not restricted to the Caribbean islands		74

- 73(72) Male with paired digital processes on penultimate abdominal segment: bucculae not projected anteriorly from head *Dicrotingis* Drake and Ruhoff
- Male without paired digital processes on penultimate abdomen segment; bucculae projected anteriorly from head..... *Allotingis* Drake
- 74(72) Species usually stoutly ovate, not elongate75
- Species usually elongate or weakly ovate76
- 75(74) Paranota produced forward and angulate*Neotingis* Drake
- Paranota not produced forward or angulate*Tingis* Fabricius
- 76(74) Paranota each produced forward into spiniform process, antenniferous tubercles short, stout*Zatingis* Drake
- Paranota rounded, each not produced into spiniform process, antenniferous tubercles long, distinct*Liotingis* Drake

* The genus *Caloloma* was accidently introduced into the New World from Australia and has now become established on several Caribbean Islands (Drake and Ruhoff 1965a).

Subfamily CANTACADERINAE Stål, 1873

Tribe Cantacaderini Stål, 1873

Carinacader, new genus

Type species: *Carinacader lewisi* new species, by present designation.

Diagnosis: Among the genera of Cantacaderini whose scutellum is covered by the pronotum, *Carinacader* can be distinguished by the extremely tumid pronotum that has five dorsal carinae, and by the pronotal collar which extends over the posterior portion of the head.

Geographic distribution: Costa Rica and Ecuador.

Comments: This genus will be described in a future publication. The majority of the type specimens of the type species were collected by the use of a malaise trap over an extended period of time. The other specimens were collected by insecticidal fogging of trees (Knudson *et al.* 2018c).

Nectocader Drake, 1928

Nectocader Drake, 1928: 41.

Type species: *Cantacader gounellei* Drake, 1923, by original designation.

Diagnosis: This genus can be distinguished from all other neotropical members of the Cantacaderini by the extremely broad costal area of the hemelytra.

Geographic distribution: Brazil (Drake and Ruhoff 1965a) Vietnam (Guilbert *et al.* 2018).

Comments: This genus contains two species, *N. gounellei* (Drake) and *N. vietnamensis* (Guilbert, Pham, Soulier-Perkins). Monte (1937, 1939) recorded *N. gounellei* from *Vernonia* sp. [Asteraceae].

Stenocader Drake and Hambleton, 1944

Stenocader Drake and Hambleton, 1944: 120.

Type species: *Piesma tingidoides* Spinola, 1852, by original designation.

Diagnosis: This genus can be separated from all other members of the Cantacaderini by the serrate margins of the costal area of the hemelytra.

Geographic distribution: Argentina and Chile (Drake and Ruhoff 1965a).

Comments: This genus currently contains two species: *S. mapu* Carpintero and Montemayor and *S. tingidoides* (Spinola). The latter has been found on blueberries (Eduardo Faúndez, personal communication).

Taurcader, new genus

Type species: *Taurcader hexabison* new speices, by present designation.

Diagnosis: *Taurcader* can be separated from other cantacaderine genera by the long, sharp occipital spines and by the lack of lateral carinae on the pronotum.

Geographic distribution: Costa Rica.

Comments: This genus will be described in a future publication. It is only known from one single specimen that was collected by insecticidal fogging at La Selva biological station.

Tribe Phatnomatini Drake and Davis, 1960

Eocader Drake and Hambleton, 1934

Eocader Drake and Hambleton, 1934: 436.

Montea Bruner, 1940: 246. (syn. by Monte, 1942)

Type species: *Eocader* Drake and Hambleton, 1934: *Eocader vegrandis* Drake and Hambleton, 1934, by original designation. *Montea* Bruner, 1940: *Montea bouclei* Bruner, 1940, by original designation.

Diagnosis: This genus can be separated from all other phatnomatine genera by the cephalic declivity between the eyes (Froeschner, 1996).

Geographic distribution: Cuba, Costa Rica, Brazil (Drake and Ruhoff, 1965) and Argentina (Carpintero and Montemayor 2008).

Comments: This genus currently contains only the two species listed above. *Eocader vegrandis* was originally cited from *Bombax monguba* (= *Pseudobombax munguba*) [Malvaceae] (Drake and Hambleton 1934); Drake and Ruhoff (1965) also listed this species from the fruits of *Pseudobombax* sp., and from the bark of *Casuarina equisetifolia* [Casuarinaceae].

Minitingis Barber, 1954

Minitingis Barber, 1954: 7.

Type species: *Minitingis minuscula* Barber, 1954, by monotypy.

Diagnosis: *Minitingis* can be separated from all other phatnomatine genera by the lack of a cephalic dorsomedial spine or tubercle, by the eight short spines on the head, and by the short, acute angulations on the paranota (Froeschner 1996).

Geographic distribution: Bahamas (Drake and Ruhoff 1965a), Jamaica (Froeschner 1968) and United States (FL) (Personal communication S. L. Snyder).

Comments: This genus currently contains two species, the species listed above and *M. elsae* Froeschner. No life history information or host plant records have been recorded in the literature. However, a Florida specimen was recently collected by sifting pine duff of *Pinus elliottii* var. *densa*, (Personal communication S. L. Snyder). I visited the collecting locality to search for *Minitingis* in this manor, but was unsuccessful in obtaining any specimens.

Pampacader Carpintero and Montemayor, 2005

Pampacader Carpintero and Montemayor, 2005: 58-59.

Type species: *Pampacader cicchinoi* Carpintero and Montemayor, 2005, by original designation.

Diagnosis: *Pampacader* can be separated from all other phatnomatine genera by the hook-like occipital spines which are as long as the eyes (Carpintero and Montemayor, 2005). The aforementioned character is the only unique trait that this genus possesses, thus indicating that this genus is extremely similar to members of the genus *Zetekella* Drake.

Geographic distribution: Argentina (Carpintero and Montemayor, 2005).

Comments: Lis and Lis (2006) found *P. cicchinoi* to be congeneric with *Gonycentrum* Bergroth and as such proposed *Pampacader* as a junior synonym. Several publications since Lis

and Lis (2006) have not recognized this synonymy. Froeschner (1996) uses the ear like peritreme that overlaps the bases of the hypocostal areas of the hemelytra to diagnose and key out the genus *Zetekella*. Since both *Pampacder* and the description of *Gonycentrum hessi* Lis (2006) have similarly shaped ostioles, *Zetekella* is likely another junior synonym of *Gonycentrum*. I am unable to recognize this synonymy presently, because the condition of the ostiol peritremes of *Gonycentrum coronation*, the type of the genus, is not described. The majority of the type specimens for the only included species were collected in pitfall traps (Carpintero and Montemayor, 2005). Virtually no biological information is known for this species. However, because members of the related genus, *Zetekella*, have been collected in association with ants, perhaps *P. cicchinoi* may also have a similar ecological association with ants.

Phatnoma Fieber, 1844

Phatnoma Fieber, 1844: 30, 57.

Type species: *Phatnoma laciniata* Fieber, 1844, by monotypy.

Diagnosis: *Phatnoma* can be separated from all other genera in the Phatnomatini by the seven cephalic spines, the lack of a dorsomedial spine, and the paranota which project forward as either angulate or spiniform processes (Froeschner 1996).

Geographic distribution: Circumtropical.

Comments: *Phatnoma* is a circumtropical genus with species (at present, more than 25 species are known) that can be found in the Neotropics, Palearctica, Australia, and some Pacific Islands. Members of this genus have been collected on a variety of plant species in several families, with several *Phatnoma* species in the Neotropics being reported to feed on pineapple

(Drake and Ruhoff 1965a). Other host plant records include members of the families Orchidaceae, Asteraceae, and Malvaceae (Drake and Ruhoff 1965a). Although now outdated, Gibson (1919a) attempted to monograph this genus and provided a key for the known species.

***Zetekella* Drake, 1944**

Zetekella Drake, 1944: 139, 142.

Type species: *Zetekella zeteki* Drake, 1944, by original designation.

Diagnosis: This genus can be separated from *Pampacader* only by the reduced occipital spines which are shorter than an eye. Both *Pampacader* and *Zetekella* can be separated from all other Phatnomatini genera by the ostiolar peritremes, which are elongate and overlap the base of the hypocosta.

Geographic distribution: Panama, Brazil (Drake and Ruhoff 1965a) and Suriname (Van Doesburg 2008).

Comments: Little is known regarding the life history and biology of this genus

Subfamily TINGINAE Laporte, 1832

Tribe Litadeini Drake and Ruhoff, 1965

***Aristobyrsa* Drake and Poor, 1937**

Aristobyrsa Drake and Poor, 1937: 164.

Type species: *Leptobyrsa latipennis* Champion, 1897, by original designation (Drake and Poor 1937).

Diagnosis: This genus can be separated from all other genera by the inflated second tarsal segment, by the broadly expanded costal area of the wing, and by the discoidal cell which is tumidly elevated (Froeschner, 2001).

Geographic distribution: Panama, Peru, Brazil (Drake and Ruhoff).

Comments: This genus was originally included within the Tingini, but was subsequently transferred to the Litadeini by Froeschner (2001). Only two species of *Aristobyrsa* are known; *A. lattipennis* and *A. uaupesensis* Carvalho and Costa (1991). The type species has been taken from *Lucuma* sp. (Monte 1947).

Psilobyrsa Drake and Hambleton, 1935

Psilobyrsa Drake and Hambleton, 1935: 148-149.

Type species: *Psilobyrsa aechemeae* Drake and Hambleton, 1935, by original designation.

Diagnosis: *Psilobyrsa* can be separated from all other genera of the Litadeini by the carinate paranota, by the presence of three to five cephalic spines, and by the broad costal area (Froeschner 2001).

Geographic distribution: Brazil (Drake and Ruhoff 1965a).

Comments: This genus currently contains two species, both of which have been reported from members of the family Bromeliaceae (Drake and Hambleton 1935).

***Stragulotingis* Froeschner, 1969**

Stragulotingis Froeschner, 1969: 130-132.

Type species: *Leptobyrsa plicata* Champion, 1897, by original designation (Froeschner 1969).

Diagnosis: *Stragulotingis* can be easily separated from other genera of the Litadeini by the broadly expanded costal margins of the hemelytra, by the broad, flat paranota, and by the flattened discoidal cell (Froeschner 2001).

Geographic distribution: Costa Rica, Panama, Venezuela, Peru, Brazil (Froeschner 2001).

Comments: This genus currently contains five species and the only known host association is *Cattleya dowiana aurea* [Orchidaceae] (Swezey 1945). *Stragulotingis bicincta* (Monte) feeds on the pinnae of African oil palm (Howard 2001).

Tribe Tingini Laporte, 1832

***Acalypta* Westwood, 1840**

Acalypta Westwood, 1840: 121.

Orthosteira Fieber, 1844: 46. (syn. by Stål, 1873)

Orthostira Fieber, 1861: 130. (unjustified emendation)

Fenestrella Osborn and Drake, 1916:219, 220. (junior homonym of *Fenestrella* Gray, 1847,

Mollusca; syn. by Drake and Ruhoff, 1960)

Drakella Bergroth, 1922: 152. (unnecessary new name for *Fenestrella* Osborn and Drake, 1916)

Type species: *Acalypta* Westwood, 1840: *Tingis carinata* Panzer, 1806, by original designation. ***Orthosteira* Fieber, 1844:** *Tingis cassidea* Fallén, 1807 (= *Tingis carinata* Panzer, 1806), by subsequent designation (China, 1941). ***Fenestrella* Osborn and Drake, 1916:** *Fenestrella ovata* Osborn and Drake, 1916 (= *Acalypta druryi* Drake, 1930), by original designation.

Diagnosis: *Acalypta* can be separated from all other genera in the neotropics by the parallel buculae that are open anteriorly, by the presence of setigerous tubercles on the antennae, by the unicarinate pronotum, and by the generally circular form in dorsal view. It should be noted that many Old-World species of *Acalypta* have three carinae on the pronotum, however nearly all species that occur in the Neotropics have only a single carina on the pronotum.

Geographic distribution: England, Ireland, Scotland, Portugal, Spain, Andorra, France, Belgium, Netherlands, Germany, Denmark, Switzerland, Italy, Austria, [former] Yugoslavia, [former] Czechoslovakia, Romania, Greece, Bulgaria, Turkey, Armenia, Caucasus, Syria, Poland, Latvia, Estonia, Sweden, Norway, Finland, Russia, Tunisia, Algeria, Japan, Canada, United States, and Mexico (Drake and Ruhoff 1965a) Guatemala (Froeschner 1996).

Comments: This is a relatively large genus with over 50 species. Members of this genus are found throughout the northern hemisphere with only one species definitively found in the neotropics. Three species are reported from Mexico, but their distributions are not well known. Another species, *A. emicata* Froeschner, was described from Guatemala, thus representing the most southern record of this genus in the new world (Froeschner 1996). Most species are moss feeders, although several species have been recorded from *Tilliandsia* species (Drake and Ruhoff 1965a).

Acanthocheila Stål, 1860

Monanthia (*Acanthocheila*) Stål, 1860: 61.

Acanthochila [sic] Stål, 1873: 119, 127.

Type species: *Monanthia armigera* Stål, 1860, by subsequent designation (Van Duzee 1916).

Diagnosis: This genus can be separated from all other tingid genera by the large spines along the lateral margins of the uniseriate paranota, by the presence of occipital spines, and by the bucculae that are strongly curved medially beyond the apex of the clypeus (Froeschner, 1995).

Geographic distribution: Most Caribbean Islands and from the southern United States (Texas) to Argentina (Froeschner, 1995).

Comments: This genus has some of the most striking and intimidating looking tingids, as they are armed with large spines along the paranota. Froeschner (1995) revised this genus, provided keys, and new synonymies as well as erected a new genus, *Carvalhotingis*, for some of the former species of *Acanthocheila*. Members of *Acanthocheila* are known to feed on plants of the families Nyctaginaceae and Sapotaceae; host records include *Pisonia* sp., *Ouratea* sp., *Guapira fragrans*, and a sapotaceous tree (Drake and Ruhoff 1965a).

Acanthopharsa, new genus

Type species: *Acanthopharsa deltooides* new species, by present designation

Diagnosis: *Acanthopharsa* can be separated from other similar genera by the extremely minute size and by the irregularly arranged, stout spines along the lateral margins of the biseriate paranota.

Geographic distribution: Panama.

Comments: This genus will be described in a future publication. Nothing is known regarding host information or life history of this species.

Acanthotingis Monte, 1940

Acanthotingis Monte, 1940: 13-15.

Type species: *Acanthotingis apicicornis* Monte, 1940, by original designation.

Diagnosis: *Acanthotingis* can be separated from all other tingid genera by the extremely long cephalic spines and the presence of three stout spines along the lateral margins of the paranota.

Geographic distribution: Brazil (Monte 1940).

Comments: At present, this genus contains only the **Type species:** listed above. Monte (1940) reported collecting this species in São Paulo on a rubiaceous plant along with *Gargaphia patria* (Drake and Hambleton).

Acysta Champion, 1898a

Acysta Champion, 1898a: 46.

Type species: *Acysta integra* Champion, 1898a by subsequent designation (Hurd 1946).

Diagnosis: Members of the genus *Acysta* can be separated from other tingid genera by the minute cephalic spines, by the paranota which may be carinate near the pronotal calli, but are usually foliaceous anteriorly and at the humeral angles, and by the discoidal cell which is generally small, not reaching the middle of the wing.

Geographic distribution: Southern Mexico, Guatemala, Honduras, Brazil, Australia (Drake and Ruhoff 1965a).

Comments: At present, there are nine described species in this genus, but one of these, *A. australica* Drake, occurs in Australia. Reported host plant records come from several plant families: Boraginaceae, Fabaceae, Lauraceae, and Musaceae (Drake and Ruhoff 1965a). *Acysta interrupta* Champion is a common species in oil palm plantations in Costa Rica (Howard, 2001).

Aepycysta Drake and Bondar, 1932

Aepycysta Drake and Bondar, 1932: 93-95.

Type species: *Aepycysta undosa* Drake and Bondar, 1932 by original designation.

Diagnosis: *Aepycysta* can be separated from all other tingid genera by having a large pronotal hood which is narrowed basally, by the uniseriate paranota with large cells, and by the uniseriate costal area of the hemelytra which have large rectangular cells.

Geographic distribution: Mexico, Guatemala, Costa Rica, Panama, Brazil, Paraguay (Knudson and Torres Miller 2018).

Comments: Knudson and Torres Miller (2018) Are describing two new species, one from Mexico and another Guatemala. Little is known about this genus except that one species *Aepycysta undosa* Drake and Bondar, has been reported to feed on leaves of *Ichmanthus leiocarpus* ([Poaceae] (Drake and Bondar 1932).

Allotingis Drake, 1930

Allotingis Drake, 1930: 269-270.

Type species: *Leptobyrssa binotata* Drake and Bruner, 1924, by original designation (Drake 1930).

Diagnosis: This genus is most closely related to the genus *Liotingis*, but can be easily separated from that genus by the bucculae which project anteriorly beyond the apex of the head.

Geographic distribution: Cuba, Haiti (Drake and Ruhoff 1965a).

Comments: At present, this genus has two described species, the genotype and *Allotingis insulicola* Drake and Poor. A host plant has been recorded for the type species of the genus, *L. binotata*: *Thrinax wendlandiana* (= *Thrinax radiata*) [Arecaceae] (Drake and Bruner, 1924). Despite the only known host being related to oil palm, there is no indication that this species is economically important (Howard, 2001).

Amblystira Stål, 1873

Amblystira Stål 1873:119-120, 129.

Type species: *Monanthia pallipes* Stål, 1858, by monotypy (Stål 1873).

Diagnosis: Members of this genus are generally black and white, or brown, but can be separated from other similar-looking genera by the carinate paranota that are minutely serrate along the outer margin, by the discoidal cell that does not usually reach the middle of the hemelytra, and by the usual faint or distinct constriction of the hemelytra.

Geographic distribution: Southern Mexico to Northern Argentina (Drake and Ruhoff 1965a)

Comments: This genus presently contains 21 species, including a recently described species from Argentina (Montemayor 2010); that author also provided a key to the South American species. Several species of *Amblystira* have been reported to feed on species of Fabaceae including *Derris elliptica*, *Hymenaea stigonocarpa*, *Lonchocarpus sericeus*, *Lonchocarpus sericeus*, and *Peltogyne* sp. Other host records include *Bredemeyera* sp. [Polygalaceae], *Serjania* sp. [Sapindaceae], and *Roupala* sp. [Proteaceae] (Drake and Ruhoff, 1965).

Ambothingis Drake and Ruhoff, 1960

Ambothingis Drake and Ruhoff, 1960: 29-31.

Type species: *Monanthia senta* Drake and Hambleton, 1942, by original designation (Drake and Ruhoff 1960).

Diagnosis: This genus can be separated from all other genera by the presence of the greatly reflexed paranota, each of which exhibit two carinaform processes.

Geographic distribution: Guatemala, Costa Rica, Ecuador, and Peru. (Knudson *et al.* 2017), and recently recorded from Nicaragua (Maes and Knudson 2016).

Comments: At present, there are only two described species within this genus. Little biological information has been reported, however the type species was collected on an unidentified shrub (Drake and Hambleton 1942).

Ambycysta Drake and Hurd, 1945

Ambycysta Drake and Hurd, 1945:129-130.

Type species: *Megalocysta championi* Drake, 1922, by original designation (Drake and Hurd 1945).

Diagnosis: Species of *Ambycysta* have parallel bucculae, a small to medium sized inflated pronotal hood which does not extend onto the posterior triangular process of the pronotum, and a tricarinate pronotum. *Megalocysta* Champion is a similar genus, but can be recognized by the unicarinate pronotum and the massive pronotal hood which covers the entire pronotum.

Geographic distribution: Costa Rica, Peru, and Brazil (Drake and Ruhoff 1965a).

Comments: At present, there are four described species in this genus. A possible host plant has been published for only one species; *Ambycysta gibbifera* (Picado) was recorded from the bromeliad, *Aechmea* sp. (Picado 1913).

Atheas Champion, 1898a

Atheas Champion, 1898a: 44.

Type species: *Atheas nigricornis* Champion by subsequent designation (Van Duzee 1916).

Diagnosis: The genus *Atheas* can be separated from all other genera by the lack of cephalic spines, with the presence of well-developed antenniferous tubercles, and the tricarinate pronotum. Most species are black and brown, but *A. flavipes* Champion, has more hyaline hemelytra.

Geographic distribution: Species of this genus are known from the United States south to Paraguay (Drake and Ruhoff 1965a), with a recent record from Canada (Manitoba) (Knudson and Rider 2017).

Comments: This genus at present contains 14 described species. Miller (2001) revised this genus and provided a key for the identification of all known species. Knudson and Rider (2017) first reported *Atheas mimeticus* Heidemann, from Canada and summarized all host plant records for the genus.

Baeotingis Drake and Poor, 1939

Baeotingis Drake and Poor, 1939: 96.

Type species: *Baeotingis oglobini* Drake and Poor by original designation (Drake and Poor 1939).

Diagnosis: *Baeotingis* can be separated from other tingid genera by the extremely long occipital and median spines, which extend beyond the apex of antennal segment one; by the

broadly rounded paranota and costal margins of the hemelytra which are armed with stout spinules, and by the wing apices which are extremely narrowed.

Geographic distribution: This genus had been thought to be endemic to Argentina (Drake and Ruhoff 1965a) until Guidoti *et al.* (2014) recently recorded *B. oglobini* from Brazil (Rio Grande do Sul).

Comments: This genus currently contains three described species, none of which have any reported host plant information

***Birabena* Drake and Hurd, 1945**

Birabena Drake and Hurd, 1945: 127-128.

Type species: *Birabena birabeni* Drake and Hurd by original designation.

Diagnosis: Allied to the genus *Atheas*, *Birabena* can be separated from that genus by its longer head, by the small hood on the pronotum, by the long hemelytra which are angulate at the apices, and by the four cephalic spines (Drake and Hurd 1945).

Geographic distribution: Brazil and Argentina (Drake and Ruhoff 1965a).

Comments: This genus presently contains four described species. No biological information has been published for any of the species.

***Calotingis* Drake, 1918**

Calotingis Drake, 1918: 86.

Neopachycysta Hacker, 1928: 183 (Synonymized by Hacker 1929).

Type species: *Calotingis* Drake, 1918: *Calotingis knighti* Drake by original designation.

Neopachycysta Hacker, 1928: *Neopachycysta subopaca* Hacker by original designation.

Diagnosis: *Calotingis* can be separated from other similar genera by the large round hood which covers the head basally, the paranota which are greatly reflexed and shell-shaped, and by the sutural areas of the hemelytra which overlap completely.

Geographic distribution: USA (Texas), Mexico, and Australia (Queensland) (Drake and Ruhoff 1965a).

Comments: The genus *Calotingis* is represented by two species, but only one is found in the New World. *Calotingis knighti* Drake is found in southern Texas and northern Mexico. The reported host plant association for this species, *Malvaviscus arboreus* var. *drummondii* [Malvaceae], is found throughout the southeastern United States along the Gulf of Mexico and *M. a.* var. *arboreus* extends throughout Central America (Turner and Mendenhall 1993).

Campylotingis Drake and Bondar, 1932

Campylotingis Drake and Bondar, 1932: 89-90.

Type species: *Tigava mollicula* Drake, 1922 by original designation.

Diagnosis: This genus can be separated from other similar genera by the short, yet extremely stout first antennal segment, the long cephalic spines, the narrow paranota, and by the elongate body.

Geographic distribution: Brazil, Paraguay, and Argentina (Drake and Ruhoff 1965a).

Comments: There are at present 14 species described in this genus. *Campylotingis* is one of many genera included in the *Tigava* generic complex (Henry *et al.* 2017). Several species in this genus have been reported to feed on *Machaerium* sp. [Fabaceae] and other fabacious plants (Drake and Ruhoff 1965a).

Carvalhotingis Froeschner, 1995

Carvalhotingis Froeschner, 1995: 331-333, 337-338.

Type species: *Acanthocheila tumida* Drake, 1924, by original designation.

Diagnosis: This genus can be separated from all other tingid genera by the large spines along the lateral margins of the uniseriate paranota, by the absence of occipital spines, and by the parallel bucculae which are completely separated near the apex of the clypeus (Froeschner, 1995).

Geographic distribution: Mexico and Argentina (Froeschner 1995).

Comments: The five species currently placed in this genus were formerly placed in the genus *Acanthocheila*, and are quite similar in appearance to species still in that genus. Species of *Carvalhotingis* tend to be smaller than *Acanthocheila* species, but this should not be considered an important character for identification. All host records for this genus are from the Bignoniaceae; host records include *Bignonia exoleta* = *Dolichandra unguis-cati* and *Anemopaegma prostratum* (Monte 1937, Drake and Hambleton 1938).

***Ceratotingis* Montemayor, 2008**

Ceratotingis Montemayor, 2008: 444, 449.

Type species: *Ceratotingis rafaeli* Montemayor, 2008, by original designation.

Diagnosis: This genus is closely allied with *Macrotingis* Champion. Species of *Ceratotingis* can easily be recognized by having three cephalic spines present whereas species of *Macrotingis* only have one cephalic spine.

Geographic distribution: The species included in *Ceratotingis* by Montemayor (2008) were known from Costa Rica, Panama, and Brazil (Montemayor and Costa 2009). Two of the known species have recently been recorded from Nicaragua (Maes and Knudson 2016).

Comments: This genus currently contains four described species, of which only one, *C. costarriquense* Montemayor, has a recorded plant association: *Phaseolus vulgaris* [Fabaceae] (Montemayor 2008).

***Coleopterodes* Philippi, 1864**

Solenostoma Signoret 1863: 575. (junior homonym of *Solenostomas* Lacépède, 1803 Solenostomatidae; syn. Kirkaldy, 1900).

Coleopteroidies Philippi 1864: 308.

Type species: *Solenostoma* Singoret, 1863: *Solenostoma liliputiana* Singoret by monotypy. ***Coleopteroidies* Philippi 1864:** *Coleopteroidies fuscescens* Philippi (= *Solenostoma liliputiana* Singoret, 1863), by monotypy.

Diagnosis: Members of this genus are extremely minute, with very punctate, coleopteroid hemelytra. Both species currently included in this genus also have a depression on the hemelytra which contains several sensory pegs.

Geographic distribution: Brazil, Argentina, and Chile (Guidoti *et. al* 2014).

Comments: Faúndez and Carvajal (2014) reported that *C. liliputianum* (Signoret) seems to be a generalist feeder due to the diversity of host records.

Corycera Drake, 1922

Corycera Drake 1922: 368.

Type species: *Corycera comptula* Drake, 1922, by original designation.

Diagnosis: Species in this genus are easily confused with members of the genera *Atheas*, *Amblystira*, *Leptopharsa* and *Leptoypa*. *Corycera* can be separated from these genera by the presence of the median and frontal cephalic spines being joined together as to form a cephalic horn. It should be noted, however, that there are several species in other genera which may also have this character, but they are usually lacier, or very brown. Examples include *Leptopharsa elongulata* Stål and several species of *Teleonemia*.

Geographic distribution: Panama, Guyana, Brazil, and Paraguay (Drake and Ruhoff 1965a).

Comments: This genus currently contains 16 described species, six of which have host plant associations recorded for them. These host records come from several different plant families: Erythroxylaceae, Euphorbiaceae, Fabaceae, and Proteaceae.

***Corythaica* Stål, 1873**

Corythaica Stål, 1873: 120.

Typonotus Uhler, 1893: 716. (syn. by Champion 1897).

Dolichocysta Champion, 1898b: 56. (syn. by Hurd 1946).

Leptotingis Monte, 1938: 128. (syn. by Monte 1942).

Type species: *Corythaica* Stål, 1873: *Tingis monacha* Stål, 1858, by monotypy.

***Typonotus* Uhler, 1893:** *Typonotus planaris* Uhler, 1893 (= *Leptobyrsa passiflorae* Berg, 1884) by monotypy. ***Dolichocysta* Champion, 1898b:** *Dolichocysta venusta* Champion, 1898b by monotypy. ***Leptotingis* Monte, 1938:** *Leptotingis umbrosa* Monte, 1938 by monotypy and original designation.

Diagnosis: Members of this genus are similar to species of *Corythucha*, but can be separated from that genus by the basal folds of the paranota and by the hood, which is generally compressed or flattened dorsally.

Geographic distribution: The Americas and the Caribbean Islands (Drake and Ruhoff 1965a).

Comments: Several species in this genus have been referred to as eggplant tingids (Heidemann 1909), because they are known to feed on solanaceous plants, especially those in the genus *Solanum*. Several other species have been recorded from species in other plant families; several *Corythaica* species have been reported as pests of tomatoes, cotton, and other important plants (Monte, 1945, 1937).

Kogan (1964) described the life history, morphology, and agricultural impact of one of the more common neotropical species, however the name reported in this paper has been changed (Montemayor 2012). Gibson (1919c) provided a key for this genus and later Hurd (1946) monographed this genus.

Corythucha Stål, 1873

Corythucha, Stål 1873: 119.

Corythuca: Uhler, 1886: 22. (misspelling or unjustified emendation)

Type species: *Tingis fuscigera* Stål, 1862, by subsequent designation (VanDuzee 1916).

Diagnosis: *Corythucha* can be distinguished from other genera by the following characters: a bulbous hood which extends over the head, and is pointed anteriorly; paranota each lacking a basal fold; and the paranota and usually the hemelytra with at least some spinules (some species have only a few spinules on the anterior portion of the paranota), but are not generally neotropical species.

Geographic distribution: The Americas and the Caribbean Islands (Drake and Ruhoff 1965a).

Comments: This is a large genus, currently containing nearly 75 described species. Several species have been accidentally introduced into different parts of the Old World. Additionally, *Corythucha marmorata* (Uhler) has been introduced into Japan with one of its recorded hosts *Solidago altissima* L. [Asteraceae] (Tomokuni 2002) and a few species have also been accidentally introduced to the state of Hawaii, which has no native species of Tingidae (Miller and Nagamine 2005).

With this many species, many host plant associations from many plant families have been recorded. Several species have been reported to feed on agricultural crops, but at least one species is known to have a wide host range including many different crops. *C. gossypii* (Fabricius) is known to feed on cotton, citrus, and lima beans (Drake and Ruhoff 1965a).

This genus is badly in need of revision and will be treated in a later work. Gibson (1918) provided a key to the known species, but this work is outdated.

***Dichocysta* Champion, 1898a**

Dichocysta Champion, 1898a: 33-34.

Type species: *Dichocysta pictipes* Champion, 1898a by monotypy.

Diagnosis: *Dichocysta* can be separated from all other genera of Tingidae in the New World by its reflexed paranota which are greatly inflated and nearly meet the median carina and by the narrow costal area of the hemelytra. Champion (1898) shows two forms, one of which has narrower and less bulbous paranota, but he states that intermediate forms are present.

Geographic distribution: USA (Arizona, Texas, and Florida) Mexico, Guatemala, Honduras, Costa Rica, and Panama (Drake and Ruhoff 1965a).

Comments: At present, this genus contains a single species, *Dichocysta pictipes* Champion, which has been reported to feed on seed pods of cacao (Drake 1928a). Despite its only reported host being an agricultural crop for Central and South America, it is not considered to be a major pest (Drake, 1928a).

***Dicrotingis* Drake and Ruhoff, 1960**

Dicrotingis Drake and Ruhoff, 1960: 34-36.

Type species: *Leptopharsa digitalis* Drake, 1928b, by original designation.

Diagnosis: *Dicrotingis* can be separated from other genera by the three cephalic tubercles, the long lacy hemelytra, and the presence of paired digital processes adjacent to the pygophore.

Geographic distribution: Haiti (Drake and Ruhoff 1965a).

Comments: At present, this genus contains a single species, *Dicrotingis digitalis*, which is only known from the West Indian island of Haiti. This species has been reported to feed on *Phyllostylon rhamnoides* [Ulmaceae], but little else is known about its life history. Only the adult male forms are known (Drake and Ruhoff 1960).

***Dictyla* Stål, 1874**

Dictyla Stål, 1874: 57.

Monanthia: (of authors, but not LePeletier and Serville, 1828)

Horvathula Schouteden, 1957: 317-318. (syn. by Duarte Rodrigues, 1979)

Octacysta Drake and Ruhoff, 1960: 71. (syn. by Péricart, 1982)

Type Species: *Dictyla* **Stål, 1874:** *Monanthia platyoma* Fieber, 1861, by monotypy.

Horvathula* Schouteden, 1957:** *Sankisia uniseriata* Horváth, 1929, by monotypy. ***Octacysta

Drake and Ruhoff, 1960: *Tingis rotundata* Herrich-Schäffer, 1835, by original

designation. **Diagnosis:** *Dictyla* can be separated from other tingid genera by the combination of

the greatly reflexed paranota which are adpressed dorso-laterally to the pronotum and are usually flattened or at most medially depressed, and by the absence of ostiolar peritremes.

Geographic distribution: This genus is found worldwide with species found on all continents except Antarctica (Drake and Ruhoff 1965a).

Comments: This is a large genus with over 75 described species, of which about 15 species are known from the New World. Many host plant associations from a number of different plant families have been reported, but there seems to be a preference of several species of *Dictyla* to occur on members of the plant genus *Cordia* [Boraginaceae] (Drake and Ruhoff 1965a)

Dicysta Champion, 1897

Dicysta Champion, 1897: 5.

Type species: *Dicysta vitrea* Champion, 1897, by monotypy.

Diagnosis: Members of *Dicysta* can be separated from other similar genera by the presence of a large pronotal hood which is not narrowed at the base (posteriorly), a second cyst that arises on the posterior pronotal projection, the bi- to triseriate paranota, and the costal areas of the hemelytra are usually bi- to triseriate.

Geographic distribution: Panama, Peru, Brazil, Paraguay, Australia (Queensland), (Drake and Ruhoff 1965a), New Caladenia (Guilbert 2008). Drake and Ruhoff 1965a

Comments: Drake and Ruhoff (1965) included 12 species in this genus in their catalog. Three additional species has been recently described (Guilbert 1997, 2008). Ten of these species are known from the New World, two from Australia, and three from New Caledonia. Only about

4-5 of the known species have host plant associations reported for them, and all of the known records come from the plant family Bignoniaceae. One New Caledonian species: *D. tristanopsidis* Guilbert, has been collected from an unidentified species of *Tristanopsis* [Myrtaceae] (Guilbert 2008).

Dyspharsa Drake and Hambleton, 1944

Dyspharsa Drake and Hambleton, 1944:127-128.

Type species: *Leptopharsa myersi* Drake, 1926, by original designation.

Diagnosis: This genus is most similar to *Acysta*, but can be separated by the carinate paranota which are only minutely areolate anteriorly, by the single median carina, and by the short discoidal cells of the hemelytra.

Geographic distribution: The sole member of this genus, *D. myersi*, is only known from the Trinidad Mountains on the Island of Cuba (Drake 1926).

Comments: Drake and Ruhoff (1965) erroneously reported the holotype of this species as being from the island of Trinidad. No biological information has been reported for this species.

Eurypharsa Stål, 1873

Eurypharsa Stål, 1873: 122, 133.

Type species: *Tingis nobilis* Guérin-Méneville 1844, by monotypy.

Diagnosis: *Eurypharsa* can be separated from all other similar tingid genera by the tectiform pronotal collar which is raised into a slight hood, by the paranota which are reflexed upward, but not folded over themselves, and by the costal margins of the hemelytra which are seven or more rows of areolae wide.

Geographic distribution: Panama, Colombia, Peru, Bolivia, Brazil.

Comments: Members of this genus are strikingly large in comparison with species of many other neotropical genera. This genus presently contains six described species. Little is known regarding the biology of these species, except that one species, *E. farouki* Silva, has been taken on a vine of a plant species in the family Malpighiaceae (Silva 1956).

***Gargaphia* Stål, 1862**

Monanthia (*Gargaphia*) Stål, 1862: 324-325.

Gargaphia Stål, 1873: 119.

Type species: *Monanthia patricia* Stål, 1862, subsequent designation (Van Duzee 1916).

Diagnosis: Members of this genus are varied in form and in some cases, they are very similar in appearance as species of the genus *Leptopharsa*. They can be reliably separated from that genus, however, by the presence of a transverse lamina that crosses the rostral groove near the posterior margin of the mesosternum.

Geographic distribution: Southern Canada to Argentina (Drake and Ruhoff 1965a)

Comments: This is a relatively large genus, currently containing nearly 70 described species. Several species of *Gargaphia* are considered to have some economic importance as they tend to feed on solanaceous plants, including several that are grown commercially. Fink (1915)

first documented *G. solani* Heidemann as being injurious to commercial eggplant production reporting as much as 15 percent injury across fields. *Gargaphia lunulata* (Mayr) is a common South American species which has a broad host range, including many solanaceous plants. Drake and Hambleton (1934) recorded this species feeding on numerous hosts including soybeans, cotton, and yucca. Bosq (1937) reported *G. subpilosa* from species of *Prunus* [Rosaceae] and *Gossypium* [Malvaceae]. Silva (1956) reported *G. torresi* Costa Lima from cotton.

Smith (1996), as a graduate student research project, revised *Gargaphia*, but her work remains unpublished. As such, the most recent published key to known species is by Gibson (1919b).

***Hybopharsa* Hurd, 1946**

Hybopharsa Hurd, 1946: 441, 467-468.

Type species: *Leptostyla colubra* Van Duzee, 1907 by original designation.

Diagnosis: This genus can be separated from all other genera occurring in the Neotropics by the deflexed paranota and by the extremely tumid pronotum which has a transverse suture along the posterior margin of the tumidity (Hurd 1946).

Geographic distribution: This genus is only known to occur on the Caribbean islands of Cuba and Jamaica and is represented by one species.

Comments: The only described species, *H. colubra*, has been recorded as being collected on a couple different host plants, both in the plant family Myrtaceae.

***Leptobyrssa* Stål, 1873**

Leptobyrssa Stål, 1873: 119, 123.

Type species: *Tingis steini* Stål, 1860 by monotypy.

Diagnosis: This genus at one time had broad generic boundaries, but was fixed by Drake and Poor (1937). *Leptobrysa* can be separated from other genera in the neotropics by the tall pronotal carinae which are as tall, or taller than the pronotal hood.

Geographic distribution: Colombia, Ecuador, Brazil and Argentina (Drake and Ruhoff 1965a).

Comments: This genus currently contains eight described species. About half of the described species have been recorded from plant species in the family Asteraceae, but *L. decora* Drake has been reported to feed on the leaves of *Citrus aurantium* [Rutaceae] and can cause chlorotic spotting on the leaves (Monte 1938). It has also been introduced into Australia and Guam to combat the invasive weed *Lantana camara* (Harley and Kassulke 1971). Misra (1985) tested its effectiveness against *Lantana camara* in India, and later Misra and Sen Sarma (1986) recommended that this species not be released for bio-control into India, because it also feeds on *Tectona grandis* [Lamiaceae].

***Leptocysta* Stål, 1873**

Leptocysta Stål, 1873: 121-122, 127.

Type species: *Tingis sex-nebulosa* Stal, 1860 by monotypy.

Diagnosis: *Leptocysta* is most similar to the genus *Corythucha*, but can be easily separated from that genus by its larger size, its narrow pronotal hood, and by the lack of paranotal basal folds.

Geographic distribution: Colombia, Venezuela, Peru, Brazil, Paraguay, and Argentina.

Comments: Drake and Ruhoff (1965) included four described species of *Leptocysta* in their catalog; more recently, two additional species have been described from South America (Montemayor 2010). I have discovered a new species from Mexico which belongs to this genus and will be described in a later work. Host plant associations have been recorded for only one species, *L. Sexnebulosa*, which has been recorded from several species in the family Asteraceae and also from sweet potato [Convolvulaceae] Drake and Hambleton 1938, Drake and Ruhoff 1965a).

Leptodictya Stål, 1873

(Figs. 2.16-21)

Leptodictya Stål, 1873:121, 127.

Type species: *Monanthia ochropa* Stål, 1858 by subsequent designation (Oshanin 1912).

Diagnosis: *Leptodictya* can be separated from all other genera of Tingidae by the paranota, each of which are dorsally reflexed, but expanded laterally and folded over itself, forming a carnula along each lateral margin.

Geographic distribution: Southern United States to Argentina (Drake and Ruhoff 1965a).

Comments: This is a fairly large genus, containing over 50 described species. The genus *Leptodictya* almost exclusively feeds on members of Poaceae, including several agriculturally important species (e.g., corn, sugarcane) (Drake and Ruhoff 1965a). *Leptodictya tabida* (Herrich-Schäffer) is the most important lace bug pest of sugar cane in the Neotropics as it has the potential to negatively impact its host (Hall 1991). Like most tingids, if there are many individuals on a host, they can cause leaves to senesce prematurely (Chang 1986).

Leptopharsa Stål, 1873

(Figs. 2.22-27)

Leptostyla Stål, 1873: 120. (junior homonym of *Leptostyla* Lioy, 1864, Diptera; syn. by Kirkaldy, 1904).

Leptopharsa Stål, 1873: 122.

Gelchossa Kirkaldy, 1904: 280. (unnecessary new name for *Leptostyla* Stal, 1873, syn. by Drake, 1928)

Type species *Leptostyla* Stål, 1873: *Tingis oblonga* Say 1825 by subsequent designation (Drake 1922). ***Leptopharsa* Stål, 1873:** *Leptopharsa elegantula* Stål by subsequent designation (Drake 1922). ***Gelchossa* Kirkaldy, 1904:** *Tingis oblonga* Say 1825 by subsequent designation (Drake 1922).

Diagnosis: *Leptopharsa* is a large genus with many members displaying diverse shapes and forms; as such, it is difficult to provide a succinct diagnosis. In general, all members have long and slender antennae, the paranota are usually biseriate, which at times are much wider, but generally close to the same width of the hemelytra across the discoidal cell, their hemelytra are

generally lacey and hyaline, the discoidal cell generally reaches one-third to one-half the distance to the apices of the hemelytra, and the rostral laminae are parallel to diverging, but never constricted (as in *Vatiga*) or with a transverse lamina (as in *Gargaphia*).

Geographic distribution: Canada to Argentina, West Indies, Africa and Australia (Queensland) (Drake and Ruhoff 1965a). Papua New Guinea (Drake and Ruhoff 1965b)

Comments: As mentioned above, *Leptopharsa* is a large genus; Drake and Ruhoff (1965) included over 105 described species in their catalog, and several additional species have been recently described. Several species of *Leptopharsa* are considered to be economically important, but one of the most important is *L. gibbicarina* Froeschner, which attacks oil palms [Areaceae] in Colombia (Froeschner 1976). Another important species is *L. heveae* Drake and Poor, which feeds on *Hevea brasiliensis*, the rubber tree [Euphorbaceae] (Drake and Poor 1935). *Leptopharsa flava* Monte feeds on rubiaceaceous plants and Silva (1956) reported this species from Coffee.

Leptoypha Stål, 1873

Leptoypha Stål, 1873: 121, 129.

Type species: *Tingis mutica* Say, 1832 by monotypy (Stål 1873).

Diagnosis: In general, members of this genus lack cephalic spines, but have occipital spines in the form of short tubricles, the paranota are usually carinate, but may be areolate anteriorly (e.g., *L. brevicornis* Champion), and the median pronotal carina is always present. Lateral pronotal carinae, if present, are only on the triangular posterior projection of the pronotum. Most members of this genus also have an upturned costal area of the hemelytra.

Geographic distribution: Southern Canada, to Guatemala, Panama, Brazil, Hispaniola, Cuba, Russia, China, Korea, Japan, Malaysia, Philippines, and Australia (Drake and Ruhoff 1965a).

Comments: This genus currently contains nearly 20 species, half of which occur in the southern United States. Two to three species occur in Mexico, Central American, and/or the West Indies, and another is known only from Brazil. Drake and Hambleton (1939), however, indicated that the generic limits need to be broadened to hold the Brazilian species, *L. brasiliensis*. Although host plant associations from several different families have been reported, there seems to be a preference for members of the family Oleaceae, especially ash (*Fraxinus* spp.).

Liotingis Drake, 1930

(Figs. 2.28)

Liotingis Drake, 1930: 270-271.

Type species: *Liotingis evidentis* Drake by original designation.

Diagnosis: *Liotingis* can be separated from other tingid genera by the bucculae which are united apically and do not project forward, by the long spines on the head, by the long distinct antenniferous tubercles, and by the paranota which project laterally and are not reflexed.

Geographic distribution: Brazil (Drake and Ruhoff 1965a)

Comments: Three of the four described species have been recorded from species of *Aspidosperma* [Apocynaceae]. All known host associations known are species of the Apocynaceae (Drake and Hambleton 1934, 1935).

Macrotिंगis Champion, 1897

Macrotिंगis Champion, 1897: 22.

Type species: *Macrotिंगis biseriata* Champion 1897 by subsequent designation (Drake and Poor 1936).

Diagnosis: This genus is similar to *Ceratotingis*, but can be separated from that genus by the presence of only one cephalic spine.

Geographic distribution: Mexico to Panama (Froeschner 2003).

Comments: Drake and Ruhoff (1965), in their catalog, included three described species and one variety in this genus, one of which has since been transferred to the genus *Ceratotingis*. More recently, the described variety has been elevated to species status, and another species has been described (Froeschner 2003). No biological information has been published for any of the species except that one species has been collected at lights.

Megalocysta Champion, 1897

Megalocysta Champion 1897:5.

Type species: *Megalocysta pellucida* Champion by monotypy.

Diagnosis: *Megalocysta* can be separated from other tingid genera by the unicarinate pronotum and by the massive pronotal hood which covers the entire pronotum, and by the sutural areas of the hemelytra which mostly overlap.

Geographic distribution: Panama (Drake and Ruhoff, 1965a)

Comments: This genus contains a single described species, for which no biological information has been published.

Mexibyrsa New genus

(Figs. 1.4)

Diagnosis: This genus is similar to *Pliobyrsa*, but can be separated by the larger hood which covers the entire head in dorsal view, by the two cephalic spines, by the completely biseriate paranota, and by the shape of the discoidal cell which is open near apex.

Description: Minute, testaceous, covered with long, fine setae. Width across hemelytra at its widest point much greater than width across paranota,

Head testaceous, armed with two long slender spines; antennae long, slender, beset with long, fine hairs. Bucculae closed anteriorly.

Pronotal hood produced forward, covering head in dorsal view. Pronotum tricarinate, carinae uniseriate, median carina nearly as tall as hood; paranota biseriate. Hemelytra large, extending far beyond apex of abdomen, costal areas broad; subcostal areas much narrower than costal areas, subvertical; discoidal cell small, reaching one third the length of the wing.

Type species: *Mexibyrsa woolleyi* new species, by present designation.

Comments: This genus is only known from the species described herein. No biological information was presented from the label, because the type was collected using a malaise trap.

Mexibrysa woolleyi new species

Description:

Head testaceous, armed with two long slender spines, each nearly reaching middle of basal antennal segments. Antennae long, slender, beset with long fine hairs; basal segment stout,

moderately long; segment two thinner, one-third the length of segment one; segment three slender, with several rows of long, fine hairs, slender, length of segment three more than two times longer than basal segment; segment four missing. Eyes narrow in lateral view, only as wide as width of basal antennal segment. Bucculae closed anteriorly, produced apically, minutely areolate, triseriate. Rostrum stout, long, nearly extending to base of abdomen;

Pronotum coarsely punctate, light orange; inflated hood with three rows of areolae laterally, hood produced forward, covering head in dorsal view; tricarinate, carinae uniseriate, with large, rectangular areolae; median carina nearly as tall as hood; paranota biseriate, slightly reflexed upwards. Hemelytra hyaline, elongate, extending beyond apex of abdomen by half its length, with minute spinules along costal margins; costal areas broad, five areolae wide at widest, some nerves lightly infuscate; subcostal area biseriate, uniseriate apically, subvertical next to discoidal cell; discoidal cell ill-defined, small, biseriate; sutural area mostly uniseriate, biseriate apically. Rostral laminae low, uniseriate on mesothorax, carinate elsewhere. Thoracic sterna testaceous, with long, fine setae. Legs slender, with several rows of long setae; coxae conical, minutely punctate; trochanters long, hairy; femora and tibiae subequal in length; tarsi minute, first segment extremely small, second segment three to four times larger than segment one.

Abdomen orange, with small, short setae.

Measurements: Length: 2.89, width across paranota: 0.72, width across hemelytra: 1.86, antennal segments one through three respectively: 0.20, 0.08, 0.72.

Type material: Holotype: MEXICO: Veracruz: Mpio. San Andrés Tuxtla, Est. Biol. Los Tuxtlas, Sendero Vigia 4 Trail, 460', 17-22-VI-1997, Wilson and Woolley, 97/018, malaise trap (1♀ TAMU).

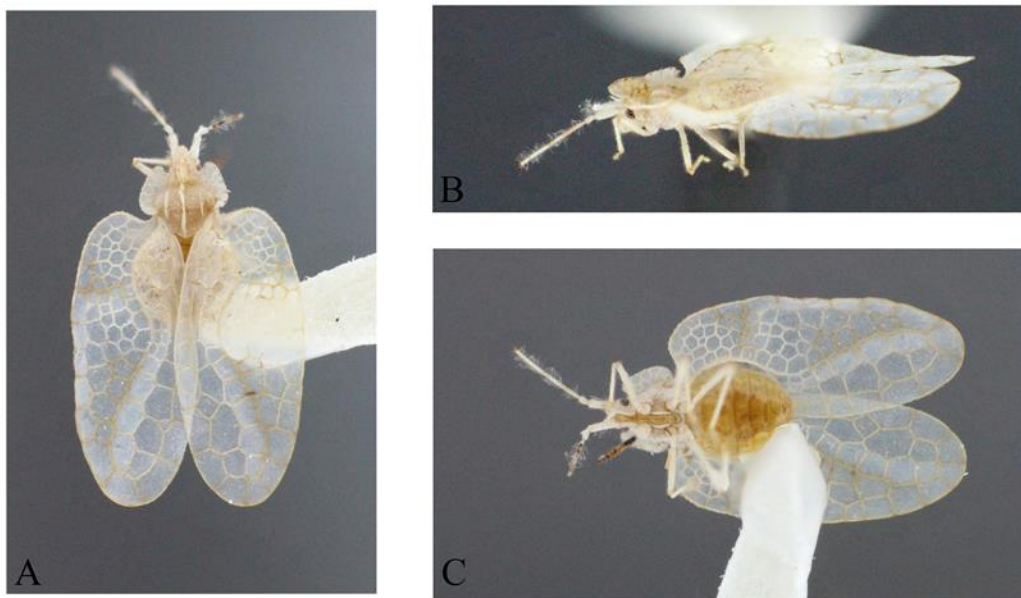


Figure 1.4: *Mexibyrsa woolleyi*, new species. **A.** Dorsal habitus, **B.** Lateral habitus, **C.** Ventral habitus.

Mexicotingis Henry, Montemayor, and Knudson, 2017

Mexicotingis Henry, Montemayor, and Knudson, 2017: 271-272, 277.

Type species: *Mexicotingis brailovskyi* Henry, Montemayor, and Knudson, 2017 by original designation.

Diagnosis: This genus can be separated from other similar genera by the spindle-shaped first antennal segment, the poorly developed cephalic spines and the narrow paranota.

Geographic distribution: Mexico (Henry *et al.* 2017)

Comments: This genus at present only contains one species, *Mexicotingis brilovskyi*, which has been reported to feed on several species of *Quercus* [Fagaceae] and one record for *Persea* sp. [Lauraceae] (Henry *et al.* 2017).

Neobyrsa, new genus

(Figs. 2.29)

Type species: *Neobyrsa panamensis* new species, by present designation.

Diagnosis: *Neobyrsa* can be separated from other similar genera with the following characters: paranota and hemelytra hyaline, paranota slightly reflexed and directed forward. Hood narrow and pointed apically, but not tall.

Geographic distribution: Panama.

Comments: This genus will be described in a later work.

Neotingis Drake, 1922

Neotingis Drake, 1922: 366-337.

Type species: *Neotingis hollandi* Drake, 1922 by original designation.

Diagnosis: Members of *Neotingis* are very similar in appearance to species within the genus *Phatnoma*, but they can be easily separated from that genus by having fewer spines on the head, by the paranota which have only one acute angle, and no spiniform projections (Drake 1922).

Geographic distribution: Brazil (Drake and Ruhoff 1965a).

Comments: This genus is currently monotypic, containing only *N. hollandi*. No biological information has been reported for this species. The holotype was originally said to be deposited in the Carnegie Museum in Pittsburgh, Pennsylvania, but a search for this specimen in that collection was unsuccessful.

Niborskiana Montemayor, 2012

Niborskiana Montemayor, 2012: 52.

Type species: *Tigava notabilis* Drake, 1922 by original designation (Montemayor 2012)

Diagnosis: Very similar to *Tigava* and other related genera, but separated from them by the head which possesses postero-orbital plates, and by the carinate costal area of the hemelytra.

Geographic distribution: Brazil (Montemayor 2012).

Comments: This recently described genus presently contains two described species, one of which has been reported as occurring on a plant species of the family Fabaceae.

Nyctotingis Drake, 1922

Nyctotingis Drake, 1922: 362-363.

Type species: *Nyctotingis osborni* Drake, 1922 by original designation.

Diagnosis: Members of *Nyctotingis* can be separated from other similar genera by the general fuscous color, carinate paranota, unicarinate pronotum, and wide costal areas of the Hemelytra.

Geographic distribution: Ecuador, Peru, Bolivia, and Brazil (Drake and Ruhoff 1965a).

Comments: This genus presently contains two described species. The type species, *N. osborni*, has been recorded from bamboo [Poaceae] (Drake and Hambleton 1945).

***Oedotisingis* Drake, 1942**

Oedotisingis Drake, 1942: 19.

Type species: *Australotisingis williamsi* Drake, 1928 by original designation.

Diagnosis: *Oedotisingis* can be separated from other similar genera by the reflexed paranota which are inflated and do not cover the lateral carinae. One species, *O. mexicana* Drake, has smaller and less inflated paranota.

Geographic distribution: Mexico and Ecuador (Drake and Ruhoff 1965a).

Comments: This genus currently contains two described species. The only biological information available is that Drake and Ruhoff (1965) stated in their catalog that *O. mexicana* had been “intercepted on orchid plants at port-of-entry, Laredo, Texas.”

***Pachycysta* Champion, 1898b**

Pachycysta Champion, 1898b: 59.

Type species: *Pachycysta diaphana* Champion, 1898b by monotypy.

Diagnosis: *Pachycysta* can be separated from all other tingid genera by the following characters: bucculae not contiguous anteriorly; veins surrounding areolae of dorsal surface covered with short hairs, but membrane lacking hairs; pronotal hood present; pronotum tricarinate, lateral carinae usually reflexed inward towards median carina; paranota broad,

foliaceous, usually narrowed apically (except in *P. diaphana*); hemelytra ovate; subcostal vein sinuate; discoidal cell slightly concave.

Geographic distribution: Costa Rica, Venezuela, Peru, Bolivia, and Brazil (Drake and Ruhoff 1965a).

Comments: There are currently five described species in this genus. Only a single host plant association has been recorded: *P. hambletoni* Drake and Poor has been recorded from *Guettarda viburnoides* [Rubiaceae] (Monte 1941). Drake (1928b) provided a key for the identification of the species known at that time.

Paraceratotingis Henry, Montemayor, and Knudson, 2017

Paraceratotingis Henry, Montemayor and Knudson, 2017: 272-273, 277.

Type species: *Paraceratotingis convergens* Henry, Montemayor and Knudson, 2017 by original designation.

Diagnosis: This genus is similar to the genus *Ceratotingis*, but is easily separated by the converging occipital spines and the paranota which are constricted near the pronotal collar.

Geographic distribution: Venezuela (Henry *et al.* 2017)

Comments: This genus is currently monotypic, containing only the type species, *P. convergens*. No biological information has been reported for this species.

Phaeochila Drake and Hambleton, 1945

Phaeochela Drake and Hambleton 1945: 358-359.

Type species: *Amblystira hirta* Monte 1940 by original designation.

Diagnosis: This genus is extremely similar to *Amblystira*, but can be readily separated from that genus by the presence of long, fine setae on the pronotum and hemelytra.

Geographic distribution: Peru and Brazil (Drake and Ruhoff 1965a).

Comments: This genus is currently monotypic, containing only the type species, *P. hirta*. No biological information has been reported for this species.

Phymacysta Monte, 1942

(Figs: 2.31)

Phymacysta Monte 1942: 106-107.

Type species: *Leptostyla tumida* Champion 1897 by original designation.

Diagnosis: *Phymacysta* can be separated from all other tingid genera by the long antennae, with segment one being extremely long; a large pronotal hood which is either bulbous or narrow, but tall; the paranota are usually large, but may be narrow as in *P. praestantis* (Drake). The pronotum may either be unicarinate or tricarinate, but the median carina is usually tall (Monte 1942, Hurd 1946).

Geographic distribution: Southern United States (Texas) to Argentina and the Caribbean Islands (Drake and Ruhoff 1965a).

Comments: This genus presently contains five described species. *Phymacysta magnifica* (Drake) has been recorded from *Chuquiragua glabra* [Asteraceae] (Drake and Hambleton 1938), and *P. tumida* has been reported from several plant species, in the plant families Bignoniaceae and Malpighiaceae (Drake 1922, Monte 1940, Drake and Cobben 1960).

***Planibyrsa* Drake and Poor, 1937**

Planibyrsa Drake and Poor 1937: 164-165.

Type species: *Leptobyrsa splendida* Drake 1922 by original designation.

Diagnosis: This genus can be separated from all other tingid genera by the generally flattened body, by the paranota which are explanate and directed forward beyond the apex of the head, by the median carina on the pronotum that lacks areolae, and by the large flat hemelytra.

Geographic distribution: Peru, Bolivia, Brazil, and Argentina (Drake and Ruhoff 1965a).

Comments: This genus presently contains four described species. Two of the known species have been recorded from plants in the family Bignoniaceae (Drake and Bondar 1932, Monte 1937); another species has been recorded on a species of *Serjania* [Sapindaceae] (Monte 1937).

***Pleseobyrsa* Drake and Poor, 1937**

Pleseobyrsa Drake and Poor 1937: 165.

Type species: *Pleseobyrsa boliviana* Drake and Poor, 1937 by original designation.

Diagnosis: *Pleseobyrsa* can be separated from other similar genera of Tingidae by the smaller paranota which are not directed anteriorly beyond the apex of head, by the pronotum with areolate carinae, and by the subvertical subcostal area.

Geographic distribution: Guatemala

Comments: Drake and Ruhoff (1965) included nine species in this genus in their catalog, but four of these species have subsequently been transferred to the genus *Stragulotingis*

Froeschner (Froeschner 1969, 1991). Two additional species have been described (Froeschner 1991, Montemayor *et al.* 2011), bringing the current total number of species in the genus to seven. *Pleseobyrsa chiriquensis* (Champion) and *P. boliviana* Drake and Poor have both been reported to feed on avocado (*Persia americana*) [Lauraceae] (Monte 1947, Drake and Ruhoff 1965). Montemayor *et al.* (2011) recently described a new species from Costa Rica that also feeds on *Persea americana*, bringing the total number of avocado-feeding tingids to four species (See also *Pseudacysta*).

***Pliobyrsa* Drake and Hambleton, 1946**

Pliobyrsa Drake and Hambleton 1946: 148.

Type species: *Leptopharsa inflexa* Drake and Hambleton 1938 by original designation.

Note that Drake and Hambleton (1938) actually listed the type species as *Leptopharsa inflata* which is a *lapsus calami*.

Diagnosis: This genus is easily separated from other similar tingid genera by the combination of the following characters: pronotal hood small, with paranota biseriate with large areolae; hemelytra extremely wide, much wider than the paranota and also very elongate, extending far beyond apex of the abdomen; and the discoidal cell is located within the basal one-fourth of the hemelytra.

Geographic distribution: Guatemala and Brazil (Drake and Ruhoff 1965a).

Comments: This genus currently contains six described species. A couple of the included species have been recorded as feeding on species of *Ocotea* [Lauraceae] (Drake and

Hambleton 1938), and another species was reported from a species of *Mollinedia* [Monimiaceae] (Drake and Hambleton (1934).

Pseudacysta Blatchley, 1926

Pseudacysta Blatchley 1926: 483, 497.

Type species: *Acysta perseae* Heidemann, 1908 by original designation.

Diagnosis: This genus can be separated from *Acysta* and other similar tingid genera by the paranota which are reduced to areolate flaps at the humeral angles.

Geographic distribution: Southern United States (California, Florida, Louisiana, Texas), Mexico, and the Caribbean (Humeres *et. al* 2009).

Comments: The only included species, *Pseudacysta perseae*, has been reported to feed on *Persea* spp. and *Cinnamomum camphora* [Lauraceae] (Heidemann 1908).

Spheroacysta Stål, 1873

Spheroacysta Stål 1873: 120, 128.

Type species: *Tingis globifera* Stål 1858 by subsequent designation (Drake 1928).

Diagnosis: This genus can be separated from other similar genera of Tingidae by the hemispherical pronotal hood, the usually inflated median carina, the uniseriate costal area of the hemelytra, and by the apices of the dicoidal cells each with a tumidity.

Geographic distribution: Ecuador, Brazil, Bolivia, Paraguay and Argentina (Drake and Ruhoff 1965a) Mexico (Brilovsky and Torres 1986)

Comments: Drake and Ruhoff (1965) catalogued 12 species in this genus. An additional species was recently described by Guidoti and Montemayor (2014), bringing the current total number of species in *Sphaerocysta* to 13. The only biological information available is that several species have been recorded from undetermined plant species in the family Bignoniaceae. This genus has been confused with *Dicysta* by Brailovsky and Torres (1986) and Forero (2006).

Stenocysta Champion, 1897

Stenocysta Champion 1897: 28.

Type species: *Stenocysta pilosa* Champion by monotypy.

Diagnosis: *Stenocysta* can be separated from other tingid genera by the anti-apical fourth antennal segment, the tall, but narrow hood, the extremely broad yet angulate paranota, and the areolae of pronotum and hemelytra lined with setae.

Geographic distribution: Panama (Champion 1897).

Comments: This genus is only known from the original type specimen and has not been reported from any other location beside the type locality.

Stephanitis Stål, 1873

Tingis Laport, 1833: 48.

Stephanitis Stål, 1873: 119, 123.

Tingis Lethierry and Severin, 1896 (not Fabricius, 1803): 12.

Cadamustus Distant, 1903: 47. (syn. by Horváth, 1906)

Maecenas Kirkaldy, 1904: 41. (unnecessary new name for *Tingis* Lethierry and Severin, 1896; syn. by Horváth, 1906)

Calliphanes Horváth, 1906: 34. (unnecessary new name for *Stephanitis* Champion, 1898b; syn. by Drake and Maa, 1953)

Mokanna Distant, 1911: 111. (syn. by Horváth, 1912)

Type species: *Stephanitis* Stål, 1873: *Acanthia pyri* Fabricius, 1775 by subsequent designation (Horváth, 1906). ***Cadamustus* Distant, 1903:** *Cadamustus typicus* Distant, 1903 by indication. ***Maecenas* Kirkaldy, 1904:** *Acanthia pyri* Fabricius, 1775 by subsequent designation (Drake and Ruhoff 1960). ***Calliphanes* Horváth, 1906:** *Tingis mitratus* by original designation. ***Mokanna* Distant, 1911:** *Mokanna princeps* Distant, 1911, by original designation.

Diagnosis: This genus is superficially similar to *Corythucha*, but can be easily separated from that genus by the extremely long setae on the antennae and by the paranota which lack a basal fold.

Geographic distribution: United States, Brazil, Europe, Asia, and Pacific Islands.

Comments: Members of the genus *Stephanitis* (currently over 65 described species total) are distributed throughout the Old World. *Stephanitis* is represented in the Neotropics only by four Brazilian species, several of which have been reported to feed on Grasses [Poaceae] (Drake and Ruhoff 1965a). As well as *Stephanitis pyroidies* which has been introduced to multiple countries of the Americas (Blanchard 1926, Drake and Ruhoff 1965a). There are currently three subgenera (*Menodora* Horváth, *Norba* Horváth, and *Omoplax* Horváth) currently recognized within this genus.

***Teleonemia* Costa, 1864**

(Figs: 2.32-35)

Teleonemia Costa 1864: 144.

Tingis (*Amaurosterphus*) Stål 1868: 92.

Teleonemia (*Amaurosterphus*) Stål 1873: 131. (syn. by Champion, 1897).

Tingis (*Americia*) Stål 1873: 131. (syn. by Champion, 1898a).

Type species: *Teleonemia* **Costa, 1864:** *Teleonemia funerea* Costa, 1864 by monotypy.

***Amaurosterphus* Stål, 1868:** *Tropidcheila morio* Stål, 1855, by subsequent designation (Van Duzee 1917). ***Americia* Stål 1873:** *Tingis* (*Americia*) *albilatera* Stål, 1873 by subsequent designation (Van Duzee 1917).

Diagnosis: *Teleonemia* is another large genus in which members vary greatly in form. In general, they all usually have pilose antennae, the cephalic spines are generally curved downwards or adpressed to the head, the pronotal collar is at times tectiform and produced into a small hood-like structure, the paranota are always reflexed upwards, and at times adpressed to the sides of the prothorax, the costal areas of the hemelytra are generally narrow in most forms, but it is wider in a few species.

Geographic distribution: Canada (British Colombia) to Chile and Argentina* (Drake and Ruhoff 1965a), except also see comments below.

Comments: This is a large genus, currently containing over 80 described species. Many of the known species have been recorded from a variety of plant species within several different families (Drake and Ruhoff 1965). *Teleonemia scrupulosa* Stål has been introduced into Africa, Australia, Asia, and several Pacific Islands to control the weed *Lantana camara* (Drake and

Ruhoff 1965a) and *T. elata* Drake has been introduced into Australia for the biological control of *Lantana* species (Harley and Kassulke, 1971).

***Tigava* Stål, 1860**

Tigava Stål 1858: 63.

Type species: *Tigava praezellens* Stål, 1860 by monotypy.

Diagnosis: Members of this genus are extremely elongate and usually light to dark brown. The first antennal segment is extremely long and thick, and the head possesses small tubercle-like spines.

Geographic distribution: Mexico to Argentina.

Comments: Drake and Ruhoff (1965) catalogued 15 species within this genus, but two of those species have been transferred to the genus *Niborskiana*, and one species was transferred to the genus *Ceratotingis*, thus leaving 12 species in *Tigava*. Several species have been recorded from a variety of possible host plants, but there seems to be a preference for plant species in the family Bombacaceae.

***Tingicesa* Koçak and Kemel, 2010**

Tingicesa Koçak and Kemel 2010: 152. (Replacement name for *Idiostyla* Drake 1945)

Idiostyla Drake 1945: 98. (junior homonym of *Idiostyla* Meyrick, 1921 Cosmopterigidae; syn. by Koçak and Kemel, 2010)

Type species: *Tigava anonae* Drake and Hambleton 1938 by original designation (Drake 1945).

Diagnosis: This genus is similar to species of *Leptopharsa* and *Vatiga*, but can be separated from them by the first antennal segment being more than five times longer than the second, by the paranota which have an elongate basal cell near the pronotal collar, and by the rostral laminae which are not constricted about the middle.

Geographic distribution: Brazil (Drake and Ruhoff 1965a).

Tingis Fabricius, 1803

Tingis Fabricius 1803: 124.

Phyllontocheila Fiber 1844: 59. (syn. Oshanin, 1912)

Platychilae Fiber 1844: 59. (syn. Horvath, 1906)

Monanthia (Platychilae) Puton 1879: 107. (syn. Drake and Ruhoff, 1960)

Phyllontochila [Sic] Lethierry and Severin 1896: 17.

Type species: *Cimex cardui* Linnaeus, 1758 by subsequent designation (Latrielle 1810).

***Phyllontocheila* Fiber 1844:** *Monanthia ampiata* Herrich Schaeffer 1839, by subsequent designation (Distant 1903). ***Platychilae* Fiber 1844:** *Cimix cardui* Linnaeus, 1758 by subsequent designation (China 1943). ***Monanthia (Platychilae)* Puton 1879:** *Cimix clavicornis* Linnaeus, 1758 by subsequent designation (Westwood 1840).

Diagnosis: This genus contains members which are usually tan to brown, often with some fuscous markings; in general, they are ovate and relatively flat. The paranota are usually biseriate and moderately reflexed upward, or they are narrow and nearly adpressed to the sides of the pronotum; the hemelytra are not extremely large, and are only slightly wider than the width across the paranota.

Geographic distribution: Old World, Panama, Colombia, Brazil, Paraguay (Drake and Ruhoff 1965a)*.

Comments: The genus *Tingis* is distributed throughout the Old World (over 80 described species) and is only represented in the Neotropics by five described species. It should also be noted that there are several subgenera still recognized. Species of *Tingis* have been recorded from a number of different host plants in several plant families.

Ulocysta Drake and Hambleton, 1945

(Figs: 2.36)

Ulocysta Drake and Hambleton 1945: 364-365.

Type species: *Ulocysta praestabilis* Drake and Hambleton, 1945 by original designation.

Diagnosis: *Ulocysta* can be separated from all other tingid genera by the paranota which are explanate and moderately reflexed, by the median carina which is expanded laterally into a pronotal hood that does not completely cover the head and extends backwards over the abdomen, and by the widely diverging wing apices.

Geographic distribution: Colombia (Drake and Ruhoff 1965^a).

Comments: This genus is currently monotypic, containing only *Ulocysta praestabilis*. No biological information is available for this genus.

Ulotingis Drake and Hambleton 1935

Ulotingis Drake and Hambleton 1935: 144-145.

Type species: *Acysta brasiliensis* Drake 1922 by original designation.

Diagnosis: This genus can be separated from all other tingid genera by the carinate paranota, and by the two upraised areas of the wing; one at the apex of the discoidal cell and one near the middle of the cubitus vein.

Geographic distribution: Brazil (Drake and Ruhoff 1965a).

Comments: This genus currently contains four described species, three of which have been recorded from plant species (including *Psidium guajava*) from the family Myrtaceae (Drake and Hambleton 1935, 1938); the fourth species has been recorded from several species of the genus *Byrsonima* [Malpighiaceae] (Drake and Bondar 1932, Monte 1937).

Vatiga Drake and Hambleton, 1946

Vatiga Drake and Hambleton 1946: 10.

Type species: *Vatiga vicosana* Drake and Hambleton, 1946 = *Leptopharsa manihotae* Drake 1922 by original designation.

Diagnosis: One of the many genera included in the *Tigava* generic complex, *Vatiga* can be separated from all neotropical general by the presence of cephalic spines, and by the rostral laminae which are constricted on the mesothorax, but then become wider on the metathorax.

Geographic distribution: South America and the Caribbean islands (Drake and Ruhoff 1965a), and Nicaragua (Maes 1998, Maes and Knudson 2016).

Comments: There are currently five described species in this genus due to several synonyms (Froeschner 1993). Several species of *Vatiga* are considered to be pests because they feed on the plant genus *Manihot* (Drake and Ruhoff 1965, Froeschner 1993). Also known as cassava or yuca, *Manihot* is an important agricultural crop throughout the Neotropics; its roots

are used as a source of carbohydrates. It is the third-largest source of carbohydrates for human consumption in the world (Fauquet and Fargette 1990).

Zatingis Drake, 1928

Zatingis Drake 1928:44-45.

Type species: *Zatingis extraria* Drake, 1928 by original designation.

Diagnosis: This genus is not confused with other genera in the Neotropics and can be easily separated from all other tingid genera by the long, slender, cephalic spines and the stout antenniferous tubercles, the paranota which are directed forward as a spiniform process, and by the acute wing apices.

Geographic distribution: Paraguay (Drake and Ruhoff 1965a).

Comments: This genus is currently monotypic, containing only *Zatingis extraria*. No biological information is available for this genus.

Zelotingis Drake and Hambleton, 1946

Zelotingis Drake and Hambleton 1946: 9-10.

Type species: *Stenocysta aspidospermae* Drake and Hambleton 1934 by original designation.

Diagnosis: *Zelotingis* is very similar to *Stenocysta*, but can be separated from that genus by the fourth antennal segment being attached at the apex of the preceding segment and the shorter discoidal cell (Drake and Hambleton 1946).

Geographic distribution: Brazil and Paraguay (Drake and Ruhoff 1965a).

Comments: This genus is currently monotypic. The only described species, *Zelotingis aspidospermae* has been recorded as feeding on *Aspidosperma melanocalyx* (Drake and Hambleton 1934).

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CHAPTER TWO: THE TINGIDAE (HEMIPTERA: HETEROPTERA) OF SOUTHERN CENTRAL AMERICA (NICARAGUA, COSTA RICA, AND PANAMA)

Abstract

The lace bugs (Heteroptera: Tingidae) of southern Central America (Nicaragua, Costa Rica, and Panama) have been documented and revised. The area studied has 153 known species among 43 genera. The following new genera are reported for **Costa Rica**: *Acysta* Champion, *Anommatocoris* China, *Aristobyrza* Drake and Poor, *Corycera* Drake, *Dicysta* Champion, *Eocader* Drake and Hambleton, *Eurypharsa* Stål, *Liotingis* Drake, *Phymacysta* Monte, *Stenocysta* Champion, and *Zetekella* Drake. New genera reported for **Panama** include *Eocader*, *Pachycysta* Champion, and *Ulocysta* Drake and Hambleton. New species country records are as follows: **Nicaragua**: *Leptopharsa longipennis* (Champion) and *Teleonemia inops* Drake and Hambleton; **Costa Rica**: *Acysta interrupta* Champion, *Amblystira fuscitarsis* Champion, *Amblystira silvicola* Drake, *Anommatocoris zeteki* Drake and Froeschner, *Aristobyrza latipennis* (Champion), *Atheas fuscipes* Champion, *Corycera panamensis* Drake and Poor, *Corythaica carinata* Uhler, *Corythucha championi* Drake and Cobben, *Dicysta sagillata* Drake, *Eocader vegrandis* Drake and Hambleton, *Eurypharsa fenestrata* Champion, *Eurypharsa nobilis* (Guérin-Méneville), *Gargaphia jucunda* Drake and Hambleton, *Gargaphia nigrinervis* Stål, *Gargaphia panamensis* Champion, *Leptodictya (Hanuala) tabida* (Herrich-Schäffer), *Leptopharsa bifasciata* (Champion), *Leptopharsa distantis* Drake, *Leptopharsa guatemalensis* Drake and Poor, *Leptopharsa lenatis* Drake, *Leptopharsa ovariantis* Drake and Hambleton, *Megalocysta pellucida* Champion, *Phymacysta vesiculosa* (Champion), *Pleseobyrza nigriceps* (Champion),

Stenocysta pilosa Champion, *Teleonemia bifasciata* Champion, *Teleonemia cylindricornis* Champion, *Teleonemia forticornis* Champion, *Teleonemia jucunda* Drake, *Teleonemia longicornis* Champion, *Teleonemia prolixa* (Stål), *Teleonemia rugosa* Champion, *Teleonemia sandersi* Drake and Hambleton, *Teleonemia tricolor* (Mayr), *Teleonemia validicornis* Stål, *Tigava convexicollis* Champion, and *Zetekella zeteki* Drake; **Panama:** *Amblystira morrisoni* Drake, *Amblystira pallipes* (Stål), *Ceratotingis costarriquense* Montemayor, *Corythaica carinata*, *Corythucha agalma* Drake and Cobben, *Corythucha spinosa* (Dugès), *Eocader bouclei* (Bruner), *Gargaphia interrogationis* Monte, *Leptocysta sexnebulosa* (Stål), *Leptodictya (Hanuala) cretata* Champion, *Leptodictya (Hanuala) fraterna* Monte, *Leptopharsa gracilentata* (Champion), *Leptopharsa ovantis* Drake and Hambleton, *Pachycysta schildi* Drake, *Pleseobyrsa perseae* Montemayor, González-Herrera, and Villalobos, *Pliobyrsa translucida* (Champion), *Sphaerocysta fumosa* Drake, *Teleonemia absimilis* Drake and Hambleton, *Teleonemia jucunda*, *Teleonemia morio* (Stål), *Teleonemia schildi* Drake.

New taxa described in this manuscript are as follows: *Acanthopharsa deltoides*, **new genus, new species**, *Carinacader lewisi*, **new genus, new species**, *C. minuta*, **new species**, *Neobyrsa panamensis*, **new genus, new species**, *Amblystira acanthopterum*, **new species**, *Amblystira monteverde*, **new species**, *Amblystira sauroni*, **new species**, *Amblystira serkisi*, **new species**, *Corycera abrupta*, **new species**, *Corycera selvado*, **new species**, *Corycera zurdoi*, **new species**, *Corythucha anamesa*, **new species**, *Leptodictya bifasciata*, **new species**, *Leptodictya chrysoptera*, **new species**, *Leptodictya gigas*, **new species**, *Leptodictya kabuto*, **new species**, *Leptodictya porrasae*, **new species**, *Leptodictya veroae*, **new species**, *Leptopharsa acrokurti*, **new species**, *Leptopharsa cerosoma*, **new species**, *Leptopharsa leavengoodi*, **new species**,

Leptopharsa pyrropterum, **new species**, *Leptopharsa specter*, **new species**, *Leptopharsa triseriata*, **new species**, *Liotingis exiguus*, **new species**, *Pachycysta stennocories*, **new species**, *Phymacysta kruegerae*, **new species**, *Stragulotingis meconota*, **new species**, *Teleonemia ceronotus*, **new species**, *Teleonemia omrio*, **new species**, *Teleonemia radagasti*, **new species**, *Teleonemia rhoplocera*, **new species**, and *Ulocysta tricarinata*, **new species**. Lastly, *Teleonemia bierigi* Monte **is synonymized** with *Teleonemia forticornis* Champion. Keys for all species in the region covered are provided as well as color photographs for additional diagnostic assistance.

Introduction

The lace bugs (Hemiptera: Tingidae) are a group of small true bugs with piercing-sucking mouthparts, all of which are phytophagous. Several species have been known to cause considerable damage to their host plants, and some are agricultural pests. Members of the genus *Vatiga* feed almost exclusively on cassava, *Manihot* spp. (Euphorbiaceae) (Froeschner 1991), which is an agriculturally important source of starch for people in many Latin American and African countries. Several other species of lace bugs have been reported to feed on crops such as cacao, citrus, cotton, eggplant, guava, oil palm, pineapple, rubber tree, and tomato (Monte 1941, Drake and Ruhoff 1965, Froeschner 1977). Due to their small size and, their well-camouflaged appearance, they have often been overlooked during collection expeditions. A thorough knowledge of the lace bug fauna will provide data for studies on their biology, ecology, and zoobiogeography.

The lace bug fauna has not been fully documented for Costa Rica. Maes and Knudson (2016) recently published a preliminary list of the species of Tingidae found in Nicaragua, but

there are no synoptic works on the Heteroptera of Costa Rica, even though several studies have been conducted on a few species or on other related groups. For example, Pacheco-Chaves (2014) focused on the Gerromorpha and reported new records from Costa Rica; Henry (2012) revised the mirid genus *Tytthus* Fieber, which includes several Central American species found in Costa Rica. Although now out-of-date, the most comprehensive work on the Heteroptera of Central America is the *Biologia Centrali Americana* series edited by Goodman and Salvin, with various sections authored by Distant (1880-1893) and Champion (1897, 1898). Froeschner (1999) developed a catalogue of the Heteroptera of Panama in which a list of all of the species described and reported from Panama up to that point was compiled. More recently, Montemayor *et al.* (2011), Guidoti *et al.* (2014), and Knudson *et al.* (2017) studied a few tingid genera and species occurring in Costa Rica. Guilbert (2015) listed 43 species of Tingidae known to occur in Costa Rica, most of which can be corroborated from Drake and Ruhoff (1965). Several others are from newer sources (Froeschner 1995, Torres Miller 2001). I have not been able to locate the source for several of the records included on Guilbert's list. Conversely, records of several species have been recently published that are not included in Guilbert's list (Guidoti *et al.* 2014). Finally, two new species have been described recently from Costa Rica (Montemayor 2008, Montemayor *et al.* 2011). Because Guilbert's (2015) source is a website, it is sometimes difficult or impossible to determine which literature has been included.

There have been 45 species of Tingidae recorded from Costa Rica (Drake and Ruhoff 1965, Guilbert 2015, Montemayor 2008, Montemayor *et al.* 2011, Guidoti *et al.* 2014). There are many other species of Tingidae found throughout the neotropics including several hundred found in Brazil alone (Drake and Ruhoff, 1965). An additional 42 species have been found in Panama,

and an additional 41 species have been found in Guatemala irrespective of Panama. It is unknown if some of these species may be present in Costa Rica because of limited knowledge of their geographic distributions and biologies.

In comparison, the state of Connecticut has the most species of Tingidae recorded for a single U.S. state, totaling 35 (Drake and Ruhoff 1965, Froeschner 1986), whereas Costa Rica has 45 recorded species. Southern Central America is considered to be one of the world's biodiversity hot-spots and may contain as much as 9% of the world's biodiversity while occupying less than one percent of the Earth's total landmass (Fund 2012). Given that there are currently about 2700 described species of tingids world wide, a simple extrapolation would indicate that there should be approximately 250 species present in southern Central America.

Materials and Methods

Species records for this study were collected from the literature. All species listed by Guilbert (2015) were corroborated by Drake and Ruhoff (1965), Torres Miller (2001), Froeschner (2002), and Guidoti *et al.* (2014). Other records were collected from Montemayor (2008), Montemayor *et al.* (2011), Maes and Knudson (2016), and Knudson *et al.* (2017).

Specimens were examined from the following research collections (with curator who arranged the loan of material):

AHKC - Alexander H. Knudson, personal collection, Fargo, ND

AMNH - American Museum of Natural History, New York, NY, Randall T. Schuh

BMNH - British Museum of Natural History, London, England, Mick Webb

CASC - California Academy of Sciences, San Francisco, CA, Norm Penny

CMNH - Carnegie Museum of Natural History, Pittsburgh, PA, John Rawlins

DARC - David A. Rider personal collection, Fargo, ND

FMNH - Field Museum of Natural History, Chicago, IL, Crystal Maier

FSCA - Florida State Collection of Arthropods, Gainesville, FL, Susan E. Halbert

INBio - Instituto Nacional de Biodiversidad, Santo Domingo, Costa Rica, Theodore J. Lewis

JMLC - John M. Leavengood Jr. personal collection, Tampa, FL

MEL - Museo Entomológico de León, Nicaragua, Jean Michel Maes

MNCR - Museo Nacional de Costa Rica, San Jose, Costa Rica

UMRM - University of Missouri Insect Collection, Columbia, MO, Robert Sites

MZUCR - University of Costa Rica Museo de Zoología, San Jose, Costa Rica, Paul Hanson

NDSIRC - North Dakota State Insect Reference Collection, Fargo, ND

TAMU - Texas A&M University, College Station, TX, E. G. Riley.

UCDC - Bohart Museum of Entomology, University of California, Davis, CA, Steve Heydon

UGCA - University of Georgia Collection of Arthropods Athens, GA, Joseph V. McHugh

UGACR - Teaching Collection, University of Georgia, Costa Rica Campus, San Luis, Jose
Montero

UNDG - University of North Dakota Insect Collection, Grand Forks, ND, Jefferson Vaughan

USNM - United States National Museum of Natural History, Washington, DC, Thomas Henry

WIRC - Wisconsin Insect Research Collection, Madison, WI, Craig M. Brabant

WRME - University of Manitoba, Winnipeg, Canada, Barb Sharanowski

A field trip to Costa Rica was conducted during the summer of 2016 (May 20-June 15). Collecting permits were obtained through the Ministerio de Ambiente y Energia, San Jose, Costa Rica (permit number: SINAC-8E-GUS-PI: R-059-20116). Export permits were also obtained from the same agency (permit number: 272-DGVS-2016).

Insects were mainly collected by using the following three methods; sweeping vegetation with an insect net; beating vegetation into a beat sheet; and hand-collecting specimens attracted to a light hung in front of a white sheet. Flight intercept traps were also used. These were constructed by placing aluminum pans below a vertical sheet of clear plastic wrap. All small insects were then collected via an aspirator. Tingidae collected were preserved in 95% alcohol until processed. Representatives were pointed. Holotypes of any new species collected or described herein will be deposited in the USNM unless otherwise noted. Paratypes will be deposited in respective collections as noted.

Two study sites (Fig 2.1) were ultimately selected for collection and careful investigation: The University of Georgia, Costa Rica campus near Monteverde (UGACR), and the Organization for Tropical Studies: La Selva Biology Station.

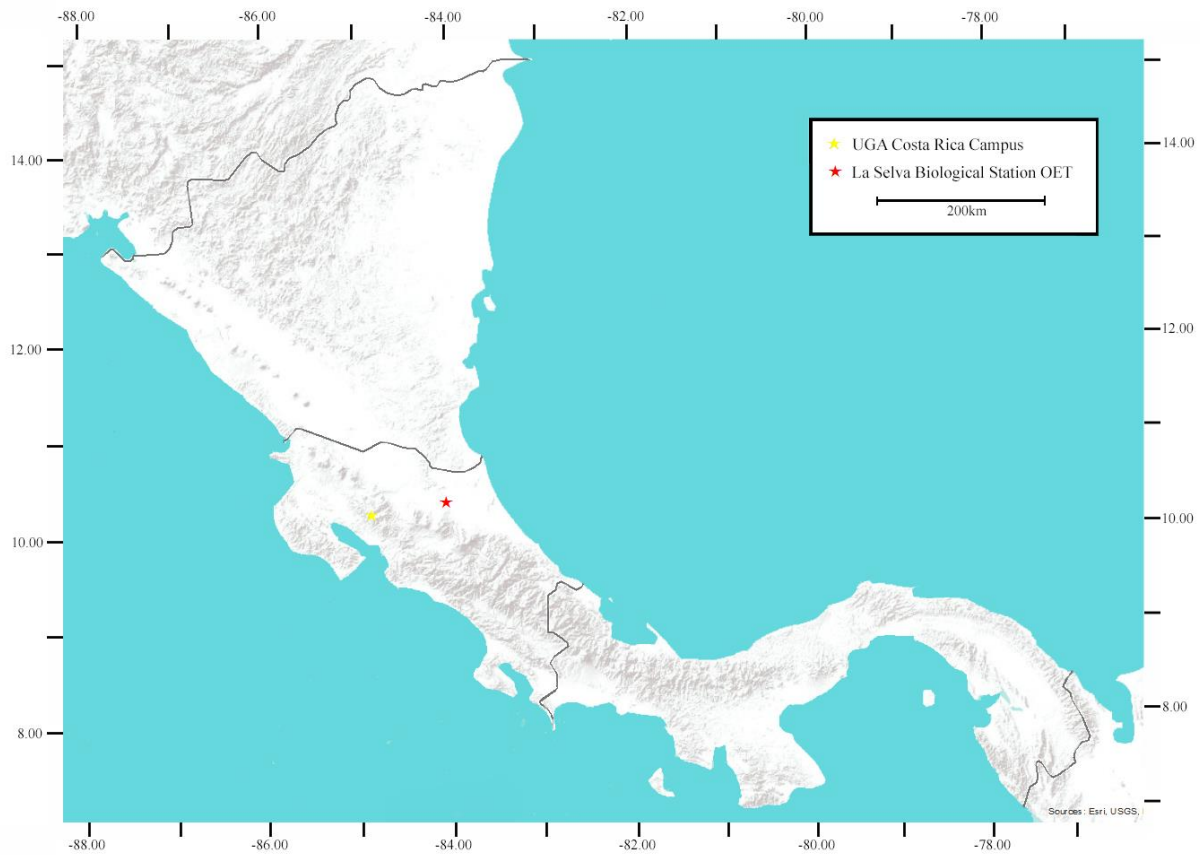


Figure 2.1: Study site location and study area.

Study site info: UGACR is located at 10.282, -84.799 or 2 km North West of San Luis de Monteverde. This area is on the edge of the Monteverde Cloud Forest Preserve, and has some protected forest as well as agricultural production and pasture areas. Monteverde has a mean annual temperature of 18.5°C and a mean annual rainfall of 2.52 meters (Clark *et al.* 2000).

La Selva Biological Station is located at 10.419, -84.018, or 3 km south of Puerto Viejo de Sarapiquí. Nestled at the northeast foothills of Barro Carrillo National Park, this area encompasses 1,600 hectares of tropical wet Atlantic forests, that average four meters of rainfall per year (OTS). The mean annual temperature fluctuates from 21°C to 30°C.

Specimens were examined by using a Wild M5 stereomicroscope with 10X eyepieces and an optic doubler. Precision Digital Positioners (Model 3486-1. Boeckler Instruments, Tucson, Arizona) connected to Microcode Digital Dials (IKL Inc., Newport Beach, California) were used to take measurements, which are given in millimeters (mm). Total length was measured from the apices of the frontal cephalic spines to the apices of the hemelytra in repose. Total width was measured at the widest extent in dorsal view; however, other species with exceptionally wide paranota or humeral angles that did not account for the maximum width were also measured. The thickness was measured from the top of the median carina above the pronotal disk to the margin of the rostral laminae. Figures 1.2 and 1.3 illustrate where measurements were taken. Multiple photographs were taken using a Canon EOS 7D with an automatic extension tube set (Model DG. Kenko Tokina Co., Ltd., Tokyo, Japan) and a macro photo lens (Model MP-E 65mm, Canon Inc. Tokyo, Japan) attached to a Stack Shot motorized rail (Cognisys, Inc., Traverse City, Michigan). Photographs were then montaged and edited in Adobe Photoshop CS 6.

Taxonomic Review of the Tingidae of Southern Central America

Key to Subfamilies of Tingidae (modified from Drake and Ruhoff 1965, Froeschner 1996)

- 1 Eyes poorly developed in coleopteroid individuals; if eyes well developed, then
 - membranous portion of hemelytra well developed; ostiolar peritreme elongate, Y-shaped, myrmecophiles Vianaidinae Kormilev
 - Eyes well developed; hemelytra usually not coleopteroid; hemelytra areolate; ostiolar peritreme may or may not be present, but if present never Y-shaped2

- 2(1) Clavus of each hemelytron developed similarly to mesocorium, not depressed below its surface, rarely with little more than base covered by posterior margin of pronotum; visible abdominal sternites I-II fused Cantacaderinae Stål
- Clavus of each hemelytron more weakly developed than mesocorium, depressed below its surface, usually entirely covered by posterior triangular extension of pronotum; visible abdominal sternites I-IV fused..... Tinginae Laporte

Key to the tribes of Cantacaderinae (modified from Froeschner 1996)

- Stenocostal area present at least in basal part of hemelytra Cantacaderini Stål
- Stenocostal area absent from hemelytra..... Phatnomatini Drake and Davis

Key to the tribes of Tinginae (Froeschner 2001)

- 1 Head very long, prolonged in front of antennal insertions, subporrect; apex of antennal segment one (and at times segment two) not surpassing apex of clypeus Ypsotingini Drake and Ruhoff*
- Head short, little produced in front of antennal insertions, sharply declivent; antennal segment one with apical half or more surpassing apex of clypeus2
- 2(1) All tarsi slender, segment two at most only partially swollen Tingini Laporte
- All tarsi with segment two distinctly broader than segment one, largely ovate in outline, upper surface convex, lower surface flat to concave with fine hairs.....Litadeini Drake and Ruhoff

* The Ypsotingini are not known to occur in the neotropics and are not native to the Americas.

Family: Tingidae

Subfamily: Vianidinae Kormilev, 1955

Anommatocoris China, 1945

Anommatocoris coibensis López, Costas, and Vázquez, 2016

Comments: López *et al.* described this species from Coiba Island, Panama. This species was not encountered during the present study.

Host plant: No host plants have been recorded for this species.

Anommatocoris zeteki Drake and Froeschner, 1962

Comments: Drake and Froeschner (1962) originally described this species from Panama. The record from Costa Rica represents a new country record.

Specimens examined: COSTA RICA: Puntarenas, Osa Peninsula, Rancho Quemado, 200m -83.566714°, 8.679096° 1-XII to 31-XII-1991. F. A. Quesada (2 INBio). Holotype ♂ and Allotype ♀, PANAMA: Barro Colorado Island, Panama Canal Zone, VII-VIII-1943, J. Zetek. (USNM).

Host plant: No host plants have been recorded for this species.

Subfamily: Cantacaderine

Tribe: Cantacaderini

***Carinacader*, new genus**

Diagnosis: Among the genera of Cantacaderini whose scutellum is covered by the pronotum, *Carinacader* can be distinguished by the extremely tumid pronotum which extends over the posterior portion of the head, by the paranota which are narrow and lack spines, and by the stenocostal area which is not expressed dorsally.

Description: General color fuscous to ochraceous; shape elongate ovate. Antennal segments one and two subequal in length; segment three thin, long; segment four slightly swollen in apical third; bucculae open anteriorly, rostrum short, surpassing pro-mesothoracic suture. Pronotum pentacarinat, lateral carinae depressed at calli; pronotal disk swollen, extremely tumid; tectiform hood extending over and covering base of head dorsally, nearly touching eyes, also extending posteriorly over scutellum; paranota, narrow, uniseriate, with minute hairs along lateral margins. Hemelytra with lateral margins parallel, apex of hemelytra extending beyond apex of abdomen. Rostral laminae may be diverging or converging.

Type species: *Carinacader lewisi*, new species, by present designation

Key to the species of southern Central America

- 1 Suprahumeral carinae more elevated, with distinct single row of areolae
.....*Carinacader minuta* new species
- Suprahumeral carinae only slightly elevated, with indistinct areolae

.....*Carinacader lewisi*, new species

Carinacader lewisi, new species

Description: General color dark brown with testaceous markings; general shape elongate, ovate.

Head small, with four spines, frontal spines porrect, tubercle-like; antenniferous tubercles small, sharply pointed; antennae brown, beset with fine hairs and wax; antennal segments one and two short, subequal in length; segment three slender, elongate; segment four shorter, about one-fourth the length of segment three, bicolored, basal half brown, but apex testaceous; eyes large, touching pronotum. Bucculae open apically; rostrum short, with all four segments subequal in length, reaching halfway between pro- and mesothoracic suture.

Pronotum punctate; pronotal disk extremely tumid, pentacarinata; suprahumeral and lateral carinae low, areolae indistinct; median carina taller, with one row of areolae. Pronotum covering head in dorsal view, carinae continue to apex of pronotum; paranota with small areolae; posterior extension of pronotum abruptly testaceous, covering scutellum and basal area of clavus. Hemelytra slightly wider than pronotum, extending one-half beyond the length of abdomen; brown, stenocostal area uniseriate with small areolae; costal area biseriate; subcostal area triseriate at base, six areolae wide at widest; RM vein testaceous, curved inwards medially; discoidal cell not quite reaching middle of wing, four areolae wide at widest. Rostral laminae low, uniseriate, narrow on pro- and mesothorax, crescentic on metathorax. Legs fuscous, coxae conical, femora and tibiae subequal in length; tarsal segment one extremely small; segment two long, curved; tarsal claws brown.

Abdomen narrower than thorax, each sternite with a prominent median fold along lateral margins. Pygophore slightly narrower than preceding abdominal segment, with two basal depressions.

Measurements: (n=10): length: 2.90-3.20, width across humeral angles: 1.01-1.11, width at widest: 1.01-1.10, maximum thickness: 0.59-0.64, height of median carina: 0.06-0.07, length of antennal segments one through four, respectively: 0.11-0.13, 0.11-0.13, 1.05-1.07, 0.33-0.38.

Specimens examined: Holotype: Prov. Limón: Pococí. R.F. Cordillera Volcánica Central. Las Minas. 10.186111°, -83.915556°, 400-500m. 28-III-4-IV-2012. W. Porras. Tp. Malaise. L_N_240821_545778 #105499, INB0004348353 (♂ INBio); Paratypes: Same data as holotype; INB0004348354, INB0004348355, INB0004348357 (3♂ INBio); COSTA RICA: Prov. Alajuela: R.B. San Ramón. 10.215927°, -84.587977°, 1000m. 15-XI-1994 al 28-I-1995. G. Carballo. Trampa Malaise. L_N_244100_472100 #4496, INB0004139714 (1♂ INBio); Prov. Alajuela: Guatuso. Cote. Fca. José Martínez. 10.59°, -84.852806°, 478m. 12-30-I-2010. J. A. Azofeifa, M. A. Zumbado. Tp. Malaise. L_N_285508_443155 #98714 INB0004279074, INB0004279075 (2♂ INBio); Prov. Alajuela: San Ramón. Est. Biol. Villa Blanca. 10.201361°, -84.485101°, 1000-1100m. 21-V-15-VIII-2011. W. Porras. Tp. Malaise. L_N_242482_483371 #104344, INB0004325594, INB0004325595 (2♂ INBio); Prov. Heredia: Sarapiquí. P.N. B. Carrillo. 16Km SSE La Virgen. 10.269277°, -84.085947°, 1050-1150m. 9-22-IV-2001. INBio-OET-ALAS. Malaise, 11/M/17/097. L_N_250000_527100 #97071, INB0004215978 (1♂ INBio); Prov. Heredia: Sarapiquí. P.N. B. Carrillo. 16Km SSE La Virgen. 10.269277°, -84.085947°, 1050-1150m. 21-IV-2001. INBio-OET-ALAS. Malaise. 11/M/03/083. L_N_250000_527100 #97141, INB0004216977 (1♂ INBio); Prov. Heredia: Sarapiquí. P.N. B.

Carrillo. 16Km SSE La Virgen. 10.269277°, -84.085947°, 1050-1150m. 21-III-2001. INBio-OET-ALAS. Malaise. 11/M/17/077. L_N_250000_527100 #97177, INB0004217375 (1♂ INBio); Prov. Heredia: Sarapiquí. P.N. B. Carrillo, 16Km SSE La Virgen. 10.269277°, -84.085947°, 1050-1150m. 9-IV-2001. INBio-OET-ALAS. Malaise, 11/M/20/100. L_N_250000_527100 #97213, INB0004220317 (1♂ INBio); Prov. Heredia: Sarapiquí. P.N. B. Carrillo, 16Km SSE La Virgen. 10.269277°, -84.085947°, 1050-1150m. 21-III-9-IV-2001. INBio-OET-ALAS. Malaise, 11/M/01/061. L_N_250000_527100 #97214, INB0004220354 (1♂ INBio); Prov. Heredia: Sarapiquí. P.N.B. Carrillo, 16Km SSE La Virgen. 10.269277°, -84.085947°, 1050-1150m. 21-III-2001. INBio-OET-ALAS. Malaise. 11/M/03/063. L_N_250000_527100 #97284, INB0004220626 (1♂ INBio); Prov. Heredia: Sarapiquí. P.N.B. Carrillo, 16Km SSE La Virgen. 10.269277°, -84.085947°, 1050-1150m. 21-III-2001. INBio-OET-ALAS. Malaise. 11/M/07/067. L_N_250000_527100 #97286, INB0004220719 (1♂ INBio); Prov. Heredia: Sarapiquí. P.N. B. Carrillo, 16Km SSE La Virgen. 10.269277°, -84.085947°, 1050-1150m. 9-IV-2001. INBio-OET-ALAS. Malaise, 11/M/20/080. L_N_250000_527100 #97211, INB0004220168 (1♂ INBio); Prov. Heredia: Sarapiquí. P.N.B. Carrillo. 16Km SSE La Virgen. 10.269277°, -84.085947°, 1050-1150m. 21-III-9-IV-2001. INBio-OET-ALAS. Malaise, 11/M/02/062. L_N_250000_527100 #97575, INB0004223621 (1♂ INBio); Prov. Heredia: Sarapiquí. P.N.B. Carrillo, 16Km SSE La Virgen. 10.269277°, -84.085947°, 1050-1150m. 9-21-IV-2001. INBio-OET-ALAS. Malaise, 11/M/10/090. L_N_250000_527100 #97583, INB0004223843 (1♂ INBio); Prov. Limón: Pococí. R.F. Cordillera Volcánica Central. Las Minas. 10.186111°, -83.915556°, 400-500m. 11-21-III-2012. W. Porras. Tp. Malaise. L_N_240821_545778 #105497, INB0004347987 (1♂ INBio); Prov.

Limón: Pococí. R.F. Cordillera Volcánica Central. Las Minas. 10.186111°, -83.915556, 400 a 500m. 21-28-III-2012. W. Porras. Tp. Malaise. L_N_240821_545778 #105498, INB0004348160, INB0004348161 (2♂ INBio); Prov. Limón: Pococí. R.F. Cordillera Volcánica Central. Las Minas. 10.186111°, -83.915556°, 400-500m. 2-9-V-2012. W. Porras. Tp. Malaise. L_N_240821_545778 #105504 INB0004390156, INB0004390167 (2♂ INBio); Prov. Puntarenas: Sendero La Tarde, Cerro de Oro 5,6 Km NW del Cerro Rincón, Península de Osa, 8.566943°, -83.492258, 300m. 26-31-V-1995. A. M. Maroto, L_S_280100_519200 #5424. INB0004139121 (1♂ INBio).

All type specimens will be retained in the INBio Collection.

Host plant: Unknown.

Etymology: This species is named in honor of Dr. Theodore James “Jim” Lewis of INBio, whose support and encouragement has helped me immensely.

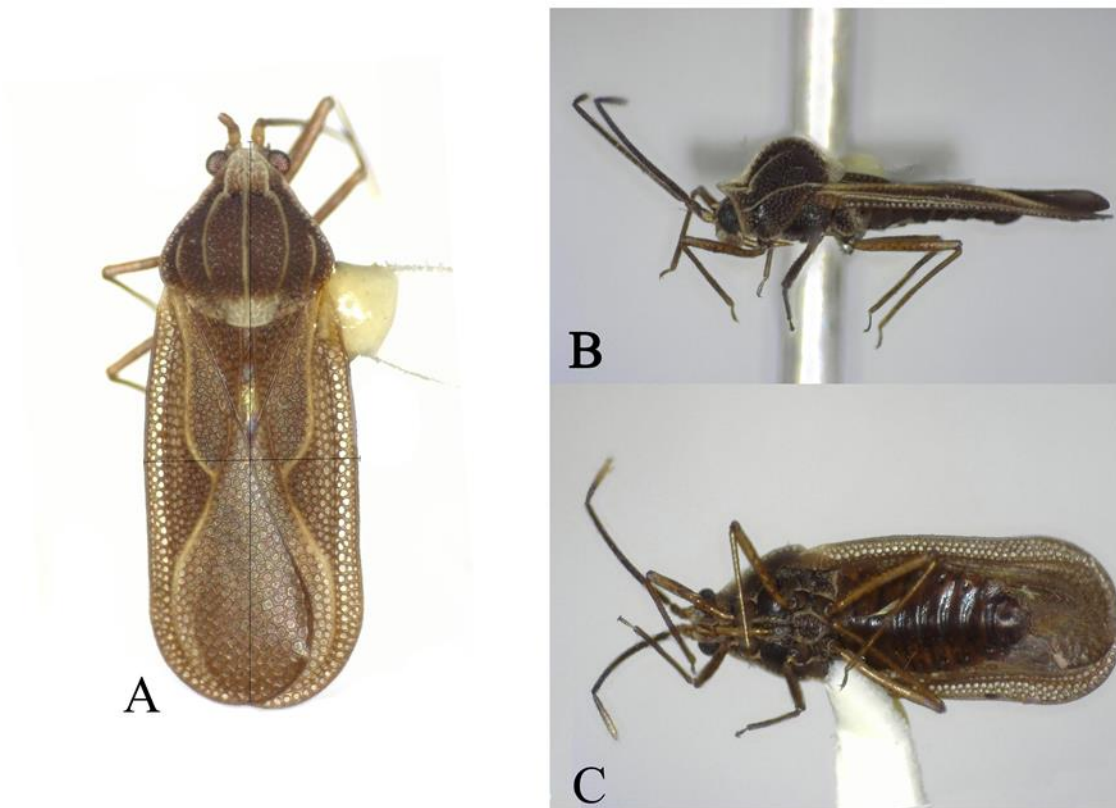


Figure 2.2: *Carinacader lewisi*, new species. **A.** Dorsal habitus, **B.** Lateral habitus, **C.** Ventral habitus.

Carinacader minuta, new species

Description: Extremely minute; ovate; lateral hemelytral margins subparallel; minutely punctate; light brown to testaceous.

Head armed with four spines; preocular spines porrect, long, stout, apices blunt; frontal spines long, slightly shorter than occipital spines, blunt, incurving. Antennae short; basal segment stout; segment two slightly shorter than segment one, two times long as wide; segments three and four lacking. Antenniferous tubercles short, about as long as width of eye, blunt. Bucculae biseriata, short, not extending beyond posterior margin of head. Rostrum extremely

stout, moderately long, extending beyond middle of mesosternum, basal segment short, not reaching prothorax, segments two through four subequal in length to basal segment.

Pronotum mostly brown, pitted to areolate, strongly tumid, pentacarinata; median carina low, long, produced anteriorly to form a small tectiform hood, partially covering posterior region of head, uniseriate, cells tall and rectangular; lateral carinae nearly as long and tall as median carina, each nearly uniform in height, uniseriate, areolae rectangular; suprahumeral carinae short, occurring only on pronotal disk, uniseriate, areolae large, rectangular; paranota moderately reflexed; carinae extremely low on posterior extension of pronotum, abruptly testaceous, covering scutellum and base of clavus, there with three to four rows of areolae. Hemelytra brownish, elongate, ovate, weakly constricted beyond middle; costal area irregularly biseriata, slightly reflexed; subcostal area mostly triseriate basally, quadriseriata at widest; RM and cubitus veins tall, but narrow; discoidal area obtusely triangulate, not reaching middle of wing, quadriseriata at its greatest width; clavus triangular, acute, half as long as discoidal cell, with two to three rows of areolae; sutural area of wing with seven to eight rows of areolae, almost completely overlapping; hemelytra extending one-quarter of its length beyond apex of abdomen. Stenocostal area narrow, well developed; hypocostal area uniseriate. Rostral laminae short, subparallel on pro- and mesothorax, crescentic on metathorax. Legs long, slender; coxae elongate, conical; trochanters short, two times as long as wide; femora moderately long, subequal in length; tibiae slightly longer than femora; tarsi minute, basal segment short, about as long as wide, second segment extremely long, more than six times longer than basal segment; pretarsi minute, diverging slightly at about 45 degrees.

Abdomen elongate, segments light brown, subequal; pygophore prominent, as long as three abdominal segments.

Measurements (n=1): length, 1.80; width across humeral angles, 0.60, width at widest, 0.73; maximum height of pronotal disk, 0.40; height of median carina, 0.14; length of antennal segments one and two, respectively, 0.08, 0.10

Specimen examined: Holotype: COSTA RICA: Heredia, Estacion Biologico La Selva, 10° 26'N, 84° 01'W, 5-I-2000, FOT/ 46/01-40, *Eugenia* sp. (1♂ DARC). Holotype will be conserved in the USNM

Host plant: Even though the holotype was collected by insecticidal fogging of *Eugenia* sp. [Myrtaceae] the actual host of this species may be epiphytic in nature. Several studies have shown that many species of epiphytic plants may be present on one given host tree. Schuettpelez and Trapnell (2006) reported 126 morphospecies of epiphytic plants growing on one host tree.

Etymology: This species is named for its small size.

Note: The holotype specimen was examined in detail when first received, but was subsequently damaged before specimen preparation. This specimen was also slightly teneral at collection and, as such, is slightly shriveled due to desiccation.



Figure 2.3: *Carinacader minuta*, new species. **A.** Dorsal habitus, **B.** Lateral habitus, **C.** Ventral habitus.

Taurcader, new genus

Diagnosis: Among the genera of Cantacaderini that possess a scutellum covered by the pronotum, *Taurcader* can be distinguished by the absence of lateral carinae and by the extremely elevated median carina, which anteriorly forms a tectiform hood that covers the base of the head.

Description: Ovate, brownish. Head armed with four spines; occipital spines extremely long, frontal spines short tubercles. Antennae slender, similarly developed as other cantacaderine genera. Pronotum punctate, tricarinate; median carina tall and arching; lateral carinae lacking; suprahumeral carinae small, short, with few areolae. Hemelytra ovate, costal area subequal to subcostal area at base; subcostal and discoidal areas uniform, without cross-veins. Bucculae not

extending behind head; rostral laminae subparallel, but crescentic on metathorax, legs slender, elongate.

Type species: *Taurcader hexabison* new species, by present designation.

Etymology: The paired cephalic spines with the long head make this tingid appear somewhat bull-like.

Taurcader hexabison, new species

Description: Color, red brown, veins (except Cu) and edges of carinae tan. General shape ovate, hemelytra appearing somewhat coleopteroid.

Head armed with four spines; occipital spines long, sharp, erect, slightly downcurving, more than four times longer than width of eye; frontal spines small, short, tuberculate. Antenniferous tubercles half as long as basal antennal segment; antennae slender, concolorous with body and head; segment one short, stout; segment two three-quarters the length of basal segment, slightly thinner than preceding; segment three four times as long as basal segment, slender; segment four slightly longer than basal segment, weakly clavate, apically fuscous, beset with small fine hairs. Eyes protruding from head. Bucculae open anteriorly, short, irregularly bi- to triseriate. Rostrum four-segmented, but appearing three-segmented ventrally, moderately long, reaching beyond middle of mesothorax, segments one through three subequal in length, segment four nearly two times as long as segment one, clothed with short, fine hairs.

Pronotum red brown, coarsely punctate, tricarinate; median carina elevated, four cells wide at greatest breadth, arching along length; lateral carinae lacking; suprahumeral carinae small, short, with four to five rows of long, rectangular areolae; paranota biseriate, slightly

reflexed, with small irregular areolae. Hemelytra ovate, extending slightly beyond apex of abdomen; costal area triseriate, comprised of evenly spaced, small cells; subcostal area quadriseriate at base, but widening to ten rows of areolae at its greatest width; RM vein extremely thick; discoidal cell reaching middle of wing, comprised of five to six irregular rows of areolae; Cu vein slightly elevated; sutural area of wing with five rows of areolae wide at its greatest width, partially overlapping; stenocostal area long, well developed, but only visible ventrally; hypocostal ridge uniseriate, with an occasional intercalary cell. Rostral laminae shallow, uniseriate, subparallel on pro- and mesothorax, crescentic-shaped on metathorax. Legs red brown; coxae conical, trochanters short, one-fourth length of coxae; femora slender, beset with fine pubescence; tibiae very slender, subequal in length to femora; metathoracic legs longer than pro- or mesothoracic legs; tarsi small, slender; segment one extremely short, globose, segment two slender, extremely long, five to six times longer than basal segment; pretarsi short, slender, tarsal claws subparallel, not diverging.

Abdomen stout, segments subequal in length medially. Female genitalia with gonocoxae scalloped.

Measurements: Measurements (n=1): length: 1.56, width across humeral angles: 0.44, width at widest: 0.92, maximum extent of pronotal disk: 0.20, height of median carina: 0.10, length of antennal segments one and two; 0.10, 0.08.

Specimen examined: Holotype: COSTA RICA: Heredia, Estacion Biologico La Selva, 10° 26'N, 84° 01'W, 19-X-1994, FOT/ 26/01-40, *Pouteria standleyana* (1♀ DARC). Holotype will be conserved in the USNM.

Host plant: The holotype was collected by insecticidal fogging of *Pouteria*

standleyana [Sapotaceae].

Etymology: This species is named after the North Dakota State University nickname the “Bison”, and after the NDSU football team, which won six National championships within seven consecutive years (i.e. 2011-2015, 2017).

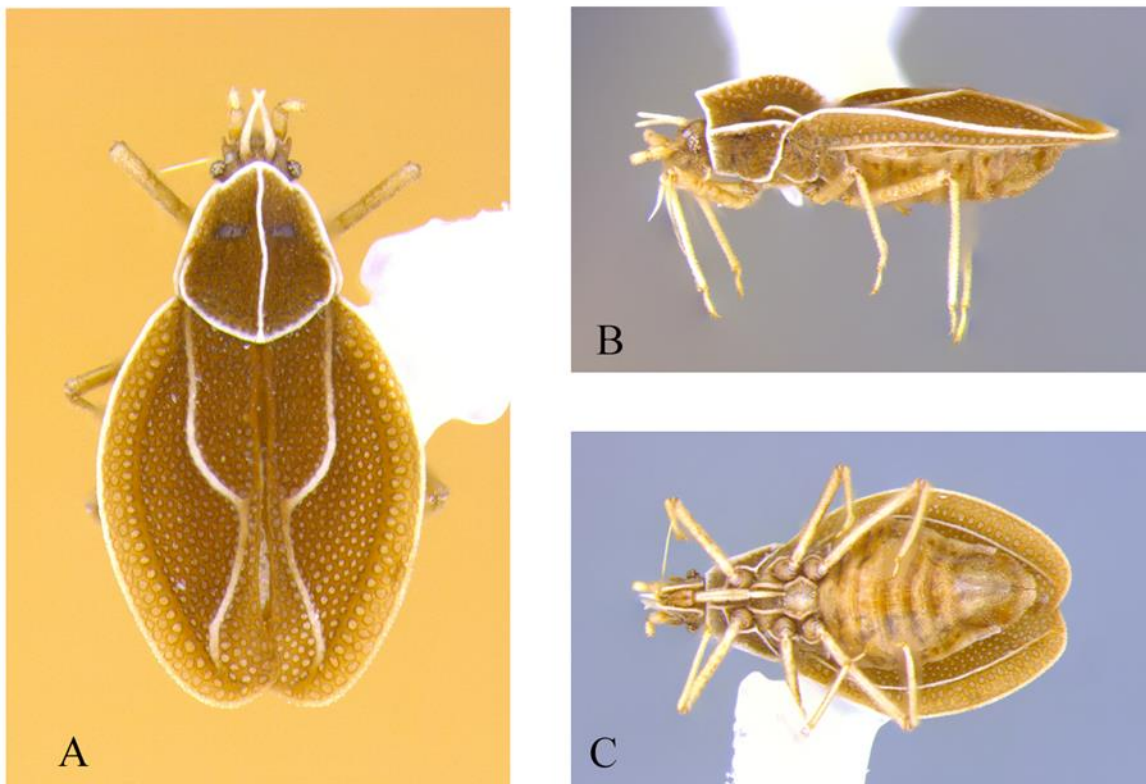


Figure 2.4: *Taurcader hexabison*, new species. **A.** Dorsal habitus, **B.** Lateral habitus, **C.** Ventral habitus.

Tribe: Phatnomatini

Eocader Drake and Hambleton, 1934

Key to the species of southern Central America (modified from Froeschner 1996)

- 1 Each paranotum on anterior pronotal lobe strongly, subtriangularly explanate, its width greater than transverse diameter of eye*Eocader vegrandis* Drake and Hambleton
- Each paranotum on anterior pronotal lobe not explanate, its width distinctly less than transverse diameter of eye *Eocader bouclei* (Bruner)

Eocader bouclei (Bruner, 1940)

Comments: This species was originally described from Cuba (Bruner 1940) as *Montea bouclei*. Monte (1942b) transferred it to the genus *Eocader*. It has not been recorded outside of Cuba until now; the record from Panama represents a new country record.

Specimen examined: PANAMA: mi 197747, 26-V-2000, Coll. V. Arias, Host *Prunus* sp. (1♂ USNM).

Host plant: *Prunus* sp. [Rosaceae].

Eocader vegrandis Drake and Hambleton, 1934

Comments: This species was originally described from Brazil (Drake and Hambleton 1934), and it has subsequently been recorded from Argentina (Carpintero and Montemayor 2008), the specimens listed below represent a significant range extension northwards, and is a new country record for Costa Rica.

Specimens examined: COSTA RICA: Heredia, Estacion Biologico La Selva, 10° 26'N, 84° 01'W, 4-I-2000, FOT/ 45/01-40, *Poureme minor* (1♂ DARC). Heredia, Estacion Biologico La Selva, 10° 26'N, 84° 01'W, 3-I-2000, FOT/ 44/17, *Meliosma vernicosa* (1♂ ♀ DARC).

Host plant: This species was originally recorded from *Bombax* [=Pseudobombax] munguba (Drake and Hambleton, 1934, Monte 1939) [Malvaceae]. Collected from insecticidal fogging of *Meliosma vernicosa* [Sabiaceae].

Phatnoma Fieber, 1844

Key to the species of southern Central America

- 1 Middle of costal area with four rows of cells*Phatnoma marmorata* Champion
- Middle of costal area with five rows of cells*Phatnoma annulipes* Champion

Phatnoma annulipes Champion, 1897

Comments: Champion (1897) originally described this species from Mexico, Guatemala, and Panama. Drake and Hambleton (1945) recorded it from Costa Rica. Drake and Ruhoff (1965) also listed this species from Honduras, Peru, and Venezuela.

Specimens examined: HONDURAS: El Paraiso Reserva Biologica Yuscaran, 14-VII-2001, R. Turnbow (1♂ UGAC); Atlantia: La Cebia, Curla, 30-VIII-1984, C.W. O'Brien (1♂ USNM). COSTA RICA: Cartago: Quebrada Segunda, Tapantí, 1150. AGO 1994. G. Mora. Malaise. L_N_194000_560000 #3253 (1 INBio); Heredia: Estacion Biologico La Selva, 10° 26'N, 84° 01'W, 10-X-1994, FOT/ 21/01-40, *Ilex skutchii* (1♀ DARC); Heredia: Estacion Biologico La Selva, 10 26'N, 84 01'W, 4-I-2000, FOT/ 45/01-40, *Poureme minor* (1♂ 1♀ DARC); Limón: Limón, Fca. Sandoval-RECOPE, Polígono (Sitio D, herbazal ó área abierta). 24m, 10-IV-2011,

M. Solís, C. Viquez. Tp. de Mantillo (Hojarasca). L_N_220420_634192 #101968 (1 INBio); Puntarenas: Estacion Biologica Las Cruces, 6km S San Vito, 847' N, 82° 57'W, 17-20-IV-2003, E. G. Riley, TAMU-ENTO, X0775358 (1♀ TAMU); Puntarenas: Est. Altamira, Buenos Aires PILA ACLA, 1300-1450m. 26-IX-16-X-1995. R.Villalobos, Red de Golpe L_S_331700_572100 #6346 (1 INBio). PANAMA: Colon Pr. PNAR Lago Gatun, 27-VII-12-VIII-1999, 920'8"N, 7950'52"W, A. Gillogly + J.B. Woolley, Malaise 99/096 el. 300ft. (1♀ TAMU); Panama Prov. Km. 7.5, El Llano-Carti Rd. Elev. 350m, 4-6-VI-[1995], flight intercept trap, A. R. Gillogly (1♂ TAMU).

Host plant: Drake and Hambleton (1945) recorded this species as having been taken on *Vernonia sp.* [Asteraceae]. Also, Swezey (1945) recorded a specimen found in “orchid packing” originally shipped from Venezuela, and intercepted in Washington D. C. Collected from insecticidal fogging of *Ilex skutchii* Edwin ex T.R. Dudley & W.J. Hahn [Aquifoliaceae].

Phatnoma marmorata Champion, 1897

Comments: This species was originally described from Panama (Champion 1897), and was subsequently recorded from Costa Rica (Monte 1941). Drake and Ruhoff (1965) also listed this species from Brazil, Ecuador, Honduras, and Trinidad.

Specimens examined: COSTA RICA: Heredia: Sarapiquí: La isla, 100-200m, 30-V-19-VI-2013, I. Chacon, Malaise trap, LN266175522264 #17005 (1INBio); Heredia: Est. Biol. La Selva, 50-150m, 1026'N, 8401'W, 5-8-III-2001, E. G. Riley (3♂1♀ TAMU); Prov. Limón, Pococí, Colorado, Sector Cerro Cocorí, 30Km N. Cariari. 100m. 10-II-09-III-1995. E. Rojas. Malaise. L_N_567500_286000 #4502 (1 INBio); Limón. Pococí. R.F. Cordillera Volcánica

Central. Las Minas. 400-500m. 13-26-VIII-2012. W. Porras. Tp. Malaise. L_N_240821_545778 #105514 (1 INBio). PANAMA: Canal Zone, Fort Kobbe, 8-VI-1985, E. Riley & D. Rider (2♀ DARC); Canal Zone: Cerro Galera, 22-V-[19]80, E. Riley, D. LeDoux (1♂ UMRM). Canal Zone: Knight, Coco Solo Hospital, 2-VII-1974, C.W & L.B. O'Brien and Marshall (1♂ USNM).

Host plants: Drake and Ruhoff (1965) listed this species as having been collected from Cacao [Malvaceae] and cultivated pineapple [Bromeliaceae].

Zetekella Drake, 1944

Zetekella zeteki Drake, 1944

Comments: This species was originally described from Panama, and until now it has not been recorded from outside that country (Drake and Ruhoff 1965) so the records listed below from Costa Rica and Venezuela represent new country records.

Specimens examined: COSTA RICA: Heredia, Estacion Biologico La Selva, 10° 26'N, 84° 01'W, 18-VI-1999, W/ 11/006, 50-150m (2♀ 1♂ DARC); Heredia, Estacion Biologico La Selva, 10° 26'N, 84° 01'W, 18-VI-1999, W/ 13/008, 50-150m (1♀ DARC). VENEZUELA: El Tucuco, Perija, Zulia, 24-VI-1979, R.W. Brooks, A. A. Grigarick, J. McLaughlin, R. O. Schuster (2♂ 2♀ 1 nymph UCDC).

Host plants: No host plants have been recorded for this species.

Subfamily: Tinginae

Tribe: Litadeini

Aristobyrsa Drake and Poor, 1937a

Aristobyrsa latipennis (Champion, 1897)

Comments: Champion (1897) originally described this species in the genus *Leptobyrsa* from Panama. Drake and Poor (1937a) subsequently transferred this species to a new genus. Monte (1940b) first reported this species from Brazil. Drake and Ruhoff (1965) also listed this species from Peru. The specimens listed below from Costa Rica and Surinam represent new country records.

Specimens examined: COSTA RICA: Heredia Estacion Biologia La Selva, 100m, 10°26'N, 84°01'W, 5-III-1994, C. Godoy (1♂ MZUCR); Prov. Heredia: Sarapiquí la Virgen, 10.433333N, -84.016667W, 5-III-1993, Danilo Brenes, ex: *Carapa guianensis* (2 INBio); Prov. Limón: Rio Sardinas, R.N.F.S. Barra del Colorado, 10.64405N, -83.742005W, 10m. 16-20-III-1994, F. Araya, L N 291500_564700 # 2798 (1 INBio). PERU: Madre de Dios Rio Tambopata Res., 30km SW Pto. Maldonado 290m, 12°50'S, 69°20'W, 14-IX-1982, R. C. Wilkerson, Insect Flight trap (1♀ DARC); Huanuco, Tingo Maria, 800m 21-24-VIII-1971, C. & M. Vardy, B. M. 1971-533 (1♂ BMNH). SURINAM: Marowijne River, VII- 1965, E. A. M. Gale, Cambridge Expedition. B. M. 1965-516 (1♂ BMNH). BRAZIL: Rondonia: 62 km SW Ariquemes, Fzda. Rancho Grande, 11-X-1993, C. W. & L. B. O'Brien, at Mercury vapor and uv light (1♂ USNM); Rondonia: 62 km SW Ariquemes, Fzda. Rancho Grande, 10-X-1993, on fresh fallen palm spathe, C. W. O'Brien, (1♂ USNM).

Host plants: *Lucuma* sp. [Sapotaceae] (Drake and Ruhoff 1965). Also recorded above from *Carapa guianensis* [Meliaceae].

Stragulotingis Froeschner, 1969

Key to the species of southern Central America

- 1 Pronotum tricarinate2
- Pronotum unicarinate..... *Stragulotingis meconota*, new species
2(1) Frontal cephalic spines not surpassing apex of first antennal segment, parallel with median spine (in dorsal view)*Stragulotingis englemani* Froeschner
- Frontal cephalic spines nearly as long as first antennal segments, directed inwards
.....*Stragulotingis plicata* (Champion)

Stragulotingis englemani Froeschner, 1991

Comments: Froeschner (1996) originally described this species from Panama.

Specimens examined: PANAMA: Canal Zone: Colon: Humid Forest. Canopy fogging, 2-14-VII-1979. E. Broadhead et al. B. M. 1979-125, On *Hura crepitans* Linnaeus, Many macro epiphytes on trunk no lianas on crown. (4♂4♀ BMNH).

Host plant: Collected from insecticidal fogging of *Hura crepitans* [Euphorbiaceae].

Stragulotingis meconota, new species

Description: Large, rectangular, testaceous to orange brown.

Head large, wide, armed with five thick, stout, spines; occipital spines short, porrect, reaching apical margin of eye; median spine long, porrect, projecting towards middle of first antennal segment; frontal spines, long, projecting from head, two-thirds as long as basal antennal segment. Antennae long, testaceous, clothed in long fine hairs; segment one stout, moderately long; segment two stout, half as long as segment one; segment three yellowish, slender, about three times longer than segment one; segment four not as slender, nearly as long as segment three. Bucculae parallel, not contiguous apically; rostral laminae low, uniseriate, widening on pterothorax; rostrum long, apex reaching metathorax, yellow with, apex infusate.

Pronotum wide, punctate, orange, distinctly unicarinate; median carina low, uniseriate; lateral carinae represented by nearly obsolete ridges, only on pronotal disk; calli triangular, glabrous; pronotal collar raised anteriorly, forming tectiform hood, extending over base of head; paranota explanate, areolate, projected far forward anterior of head, apical margin with slender, stout spines, quadriseriate at its greatest width; triangular posterior process of pronotum areolate, pointed posteriorly. Hemelytra rectangular, nerves mostly orange, but each with with two spots composed of testaceous nerves; lateral margins of hemelytra armed with stout spinules; nerves of costal area infusate, except two patches laterad of discoidal cell, six rows of areolae at its widest point; subcostal area mostly quadriseriate basally, but five to six rows of areolae wide apically; discoidal cell elongate, narrow, quadriseriate, covering abdomen; sutural area irregularly triseriate; hind wings reduced, not extending to apex of abdomen.

Legs yellow to orange, covered with long fine hairs, pro- and mesothoracic legs subequal and close together, metathoracic legs longer, separated far from preceding pairs; coxae globose, orange, sunken; trochanters yellow orange, elongate; femora fusiform, stout, elongate; tibiae slender, shorter than femora; basitarsus brown, extremely small, globose; second tarsal segment brown, hairy, elongate, extremely inflated; pretarsi minute, brown, widely diverging. Abdomen red brown, hairy, ovate in female, elongate in male; pygophore cylindrical, hairy; parameres sickle-shaped, hairy basally.

Measurements: (n=3) Width across paranota: 0.84-0.87, width at widest: 2.23-2.37, length: 2.96-3.02, Antennal segments one through four, respectively: 0.21-0.22, 0.10-0.12, 0.60-0.63, 0.48-0.50. Holotype: Width across paranota: 0.872, width at widest: 2.23, length: 2.96, Antennal segments one through four, respectively: 0.21, 0.10, 0.60, 0.50.

Specimens examined: Holotype: COSTA RICA: Heredia, Est. Biol. La Selva, 10 26'N, 84 01'W, 5-I-2000, CC 1200m, FOT/46/+40, *Eugenia* sp. (1♂ DARC). Paratypes: COSTA RICA: Heredia: Est. Biol. La Selva, 10 26'N, 84 01'W, 5-I-2000, CC 1200m, FOT/46/01, *Eugenia* sp. (1♂ DARC); Heredia: Est. Biol. La Selva, 10 26'N, 84 01'W, 19-X-1994, 50-100m, FOT/26/01-40, *Pouteria standleyana* (1♂ 1♀ DARC). Holotype will be deposited in the USNM; paratypes in the USNM, and the personal collection of the author (AHKC).

Etymology: This species is named for the elongate (*meco-*) paranota (*-nota*), which reach anteriorly beyond the anterior margins of the eyes.

Host plants: Collected from fogging of *Pouteria standleyana* = *Pouteria glomerata* [Sapotaceae] and *Eugenia* sp. [Myrtaceae].



Figure 2.5: *Stragulotingis meconota*, new species. **A.** Dorsal habitus, **B.** Lateral habitus, **C.** Ventral habitus.

Stragulotingis plicata (Champion, 1897)

Comments: Champion (1897) originally described this species, in the genus *Leptobyrsa*, from Panama. Swezey (1945) indicated that this species had been intercepted in Washington, D.C., on an orchid shipped from Costa Rica. Drake and Ruhoff (1965) also listed this species from Venezuela and Brazil.

Specimen examined: PANAMA: Colon: Fort Sherman, 19-VII-1999, el 180ft. 09° 19' 41"N, 79°57' 15"W, J. B. Wolley, 99/038 (1♂ TAMU).

Host plant: Intercepted on *Cattleya dowiana aurea* from Costa Rica at port of entry Washington D.C. (Swezey 1945).

Subfamily: Tinginae

Tribe: Tingini

Acanthocheila Stål, 1860

Acanthocheila armigera Stål, 1860

Comments: Stål (1860) originally described this species from Rio de Janeiro, Brazil, but it was later recorded from Nicaragua (Drake and Poor 1937b), Costa Rica (Froeschner 1995), and Panama (Champion 1897). Arnold (2005) also recorded *A. armigera* from Costa Rica, believing it to be a new record, but Froeschner (1995) had previously mentioned it from Costa Rica. Drake and Ruhoff (1965) also listed this species from Argentina, Bolivia, Colombia, Cuba, Ecuador, Guatemala, Haiti, Honduras, Jamaica, Mexico, Peru, Trinidad, United States (Texas, Puerto Rico), and Venezuela.

Specimens examined: MEXICO: Tamaulipas: El Cielito, nr. Encino, 28-30-VIII-1985, T. J. & E. G. Riley (3♂1♀ DARC). GUATEMALA: Santa Rosa: ca 13km, S jct. Hwy. 16 on CA 1, 14°11'51"N, 90°21'38"W, 700m, 6-I-2007, Sweep, T. A. Catanach TAC2007/016 (1♀ TAMU). HONDURAS: Tegucigalpa, 900-1200m, VI-1981, N. H. L. Krauss (1♀ AMNH). EL SALVADOR: Santa Tecla, 900-950m, VIII-1975, N.H.L. Krauss (1♂ AMNH). COSTA RICA: Cartago: Turrialba, 600-700m, 12-VIII-1975, N. H. L. Krauss (1♀ AMNH); Limon: Zent, 23-IV-1957, R.D. Shenefelt, RDS 57-142 (1♂ WIRC); Heredia: La Selva Biological Station, 2Km South Pt. Viejo, 3-5-VI-1984, Rider, Riley & LeDoux (1♂ DARC); Heredia: La Selva Biological Station, 2Km South Pt. Viejo, 16-19-I-1987, J. Negron (2♂ DARC); Heredia: La Selva Biological Station, 2Km South Pt. Viejo, 15-22-III-1987, J. Negron (1♂ 2♀ DARC); Heredia: La Selva Biol., Sta. 3kmS Pto. Viejo, 10°26'N, 84°01'W, 24-VII-1993, H. A. Hespeneheide (1♂

MZUCR); Heredia: Rio Frio, Banano 100m, IX-1989, Edgar Quirces (1♀ MZUCR); Heredia: Estación Biológica La Selva, 50-150m, 10°26'N, 84°01'W, 4-6-IV-2003, E. G. Riley (9♂ TAMU); Heredia: Estacion Biologia La Selva 150m, 10°26'N, 84°01'W, 17-VIII-1996, INBIO OET, C.L. and S.L. Staines, sweeping edge of soccer field (1♂2♀ CMNH); Puntarenas: Alto San Luis de Monteverde, 11-X-98 (1♀ UGACR); Puntarenas: Estación Biológica Las Cruces, 6km S, San Vito, at light, 08°47'N, 82°57'W, 17-20-IV-2003, E. G. Riley (28♂8♀ TAMU). PANAMA: C. Z.: Summit, XII-1953 N. L. H. Krauss (1♂ AMNH); Prov. Colon: Madden Dam, 100m, 9°12'N, 79°37'W, 12-V-[19]96, H. Stockwell (3♀ TAMU); Prov. Chiriqui: Ojo de Agua, Fca. Hartmann, 8.86159°N, 82.74339°W, 4-5,000 ft., 1-4-VIII-2011, Coll. E. G. Riley (2♂ TAMU).

Host plants: This species has been recorded from several possible host plants:

Bougainvillea glabra [Nyctaginaceae] (Maes and Knudson 2016), *Coffea arabica* [Rubiaceae] (Maes and Knudson 2016), *Nicotiana tabacum* [Solanaceae] (Monte 1940c), *Nicotiana sp.* [Solanaceae] (Stonedahl and Dolling 1992), *Ouratea sp.* [Ochnaceae] (Silva 1956), *Pisonia tomentosa* [Nyctaginaceae] (Monte 1937), *Pisonia sp.* [Nyctaginaceae] (Drake and Hambleton 1934), *Sida paniculata* [Malvaceae] (Ojeda and Neciosup 1974).

Acanthopharsa, new genus

Description:

Minute, triangular, spiny. Antennae moderately long; covered with fine hairs. Pronotum finely punctate; paranota with irregular spines along lateral margins; tricarinate. Hemelytra constricted; spines along lateral margin; RM vein elevated above cubitus vein in lateral view.

Rostrum moderately long. Abdomen narrow; spiracular peritremes on abdomen projecting outward.

Diagnosis: *Acanthopharsa* can be easily separated from *Leptopharsa* and other similar genera by the irregular spines along the paranotal margins.

Type species: *Acanthopharsa deltoides* new species, by present designation.

Etymology: This generic name has been chosen to represent the spiny (*acantho*) part (*pharsa*) of the genus *Leptopharsa* Stål.

Acanthopharsa deltoides, new species

Description:

Frontal spines erect, short; occipital spines extremely long, porrect, as long as first antennal segment, curved, median spine long, porrect, nearly as long as occipital spines; eyes small, red. Antennae moderately long; first segment stout infusate, second antennal segment tan, shorter, one-third the length of segment one; segment three tan, slender, extremely long, more than four times longer than segment one; segment four short, clavate, covered with fine hairs, black, basely tan. Pronotum finely punctate; paranota biseriate, with irregular spines and spinules along lateral margin; hood extremely minute, low, porrect; tricarinate; median carina uniseriate, biseriate at middle, low, but arched medially, taller than lateral carinae; lateral carinae; median carina taller than lateral carina, uniseriate, subparallel. Wings constricted, spines along lateral margins, extending far beyond apex of abdomen; costal area biseriate, triseriate at widest; subcostal area uniseriate, biseriate at middle, cells infusate along subcostal extension; RM vein elevated above cubitus vein in lateral view; discoidal cell narrow, triseriate, extending

to middle of wing; sutural area triseriate at widest. Bucculae biseriate, closed apically. Rostrum moderately long, extending to mesocoxae, yellowish red, tip black; rostral laminae extremely low, uniseriate. Legs yellow, slender; tarsi reddish fuscous. Abdomen narrower than thorax.

Measurements: (n=1): Length: 2.27, width at widest: 1.20, length of antennal segments one through four, respectively: 0.22, 0.10, 1.21, 0.33.

Specimens examined: Holotype: PANAMA: Colon Province. PNAR. Lago Gatun, malaise 99/100 e. 300 ft., 9° 20' 08" N 79° 50' 52" W, A. Gilgoly 4-13- VII-1999 (1♂ TAMU) Holotype will be deposited in the TAMU Holotype collection.

Etymology: This species is named for its general triangular (*delt-*) appearance.

Host plant: No host plants have been recorded for this species.

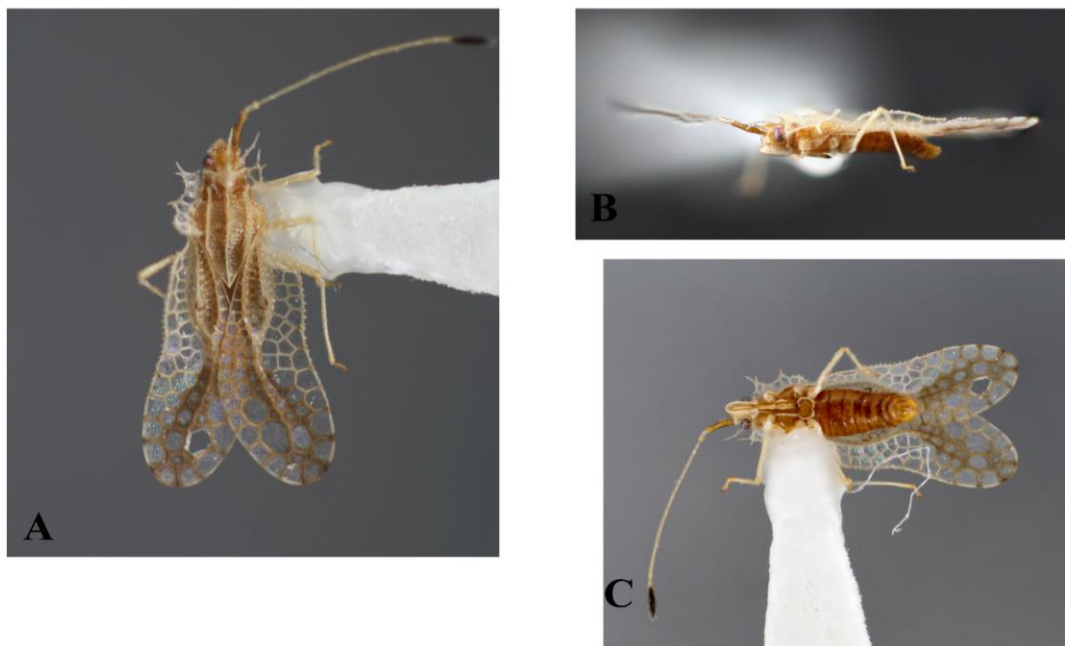


Figure 2.6: *Acanthoparsa deltoides*, new species. **A.** Dorsal habitus, **B.** Lateral habitus, **C.** Ventral habitus.

Acysta Champion, 1898

Key to the species of Southern Central America

- 1 Paranota entire along pronotum *Acysta orthointegra*, new species
- Paranota interrupted before humeral angles *Acysta interrupta* Champion

Acysta interrupta Champion, 1898

Comments: This species was originally described from Panama, and until now it has not been recorded from outside of that country. The specimen listed below represents a new country record for Costa Rica.

Specimens examined: COSTA RICA: Heredia: Estacion Biologico La Selva, 10° 26'N, 84° 01'W, 15-X-1994, Fuk/24/01-40, 50-150m, *Virola koschnyii* (1♂ DARC). PANAMA: Canal Zone: Colon; Humid Forest, Canopy fogging, 2-14-VII-1979. E. Broadhead *et al.*, on *Cordia alliodora* Cham., No macro-epiphytes on trunk, some lianas on crown. (1♀ BMNH); Intercepted Miami Florida 14-XII-1967, In Moss (1♂ USNM).

Host plants: Collected from insecticidal fogging of *Cordia alliodora* [Boraginaceae] and *Virola koschnyii* [Myristicaceae], found in moss

Acysta orthointegra, new species

Comments: Maes (1998) reported this species, as *Oedotingis* sp. from Nicaragua. It was later listed from Nicaragua by Maes and Knudson (2016) as *Acysta* new species.

Diagnosis: This species can be separated from all other species of *Acysta* by the uninterrupted paranota which are not narrowed laterad of the calli.

Description:

Head dark black, with one long prominent spine; Median spine long, adpressed to head, basally dark black, abruptly testaceous on apical half; occipital spines short, tuberculate, adpressed to head. Eyes nearly touching pronotal collar. Antennal segment one concolorous with head, short; segment two half as long as segment one, testaceous; segment three extremely long, testaceous, segment four black, beset with long, fine hairs, more than half as long as segment three. Antenniferous tubercles half as long as segment one. Bucculae biseriate, closed apically.

Pronotum black coarsely punctate, tricarinate; pronotal collar raised to form a small tumid hood, with three to four rows of cells; paranota biseriate, hyaline; triangular posterior projection rounded in posterior margin, two rows of hyaline cells at apex. Hemelytra obovate; costal area with four to five rows of cells, mostly hyaline except basal and apical fuscous crossbars; subcostal area triseriate with occasional intercalary cells; subcostal extension uniseriate; discoidal cell five to six rows of areolae wide at widest, black except small testaceous area near junction of RM vein; sutural area seven to eight rows wide at widest, most cells small, but with several large cells near apex. Veins infusate, cells hyaline; hypocosta uniseriate. Rostral laminae uniseriate, widening posteriorly. Legs testaceous, pro- and mesothoracic legs subequal in length, metathoracic legs slightly longer; tarsi black. Ostiolar peritremes extremely large, protruding from thorax, nearly as large as each metathoracic coxa.

Abdomen black, ovate, covered with wax and short hairs. Subgenital plates with outer apical margins quadrate.

Measurements: (n=2): Length: 3.01-3.04, width: 1.42-1.61, length of antennal segments one through four, respectively: 0.13-0.15, 0.10, 0.58-0.64, 0.38-0.42. Holotype: Length: 3.01, width: 1.61, length of antennal segments one through four, respectively: 0.13, 0.10, 0.58, 0.42.

Specimens examined: Holotype: MEXICO: Chiapas: Mpio, Jaltenango, Reserva El Triunfo, Sendero Palo Gordo, 6400', 15° 39'22"N; 92°48'31"W, 20-VII-1997, J. B. Woolley, 97/050, screen sweep (1♀ TAMU). Paratype: NICARAGUA: Jinotega, 16-VIII-[19]89, F. Reinbolt (1♀ MEL). Type specimens will be maintained in the collections listed above.

Host plant: No host plants have been recorded for this species.

Etymology: This species is named for the uninterrupted paranota which are not narrowed near the cali. *Acysta integra* Champion is a similar species, but the paranota of the afformentioned species are narrowed opposite the cali.

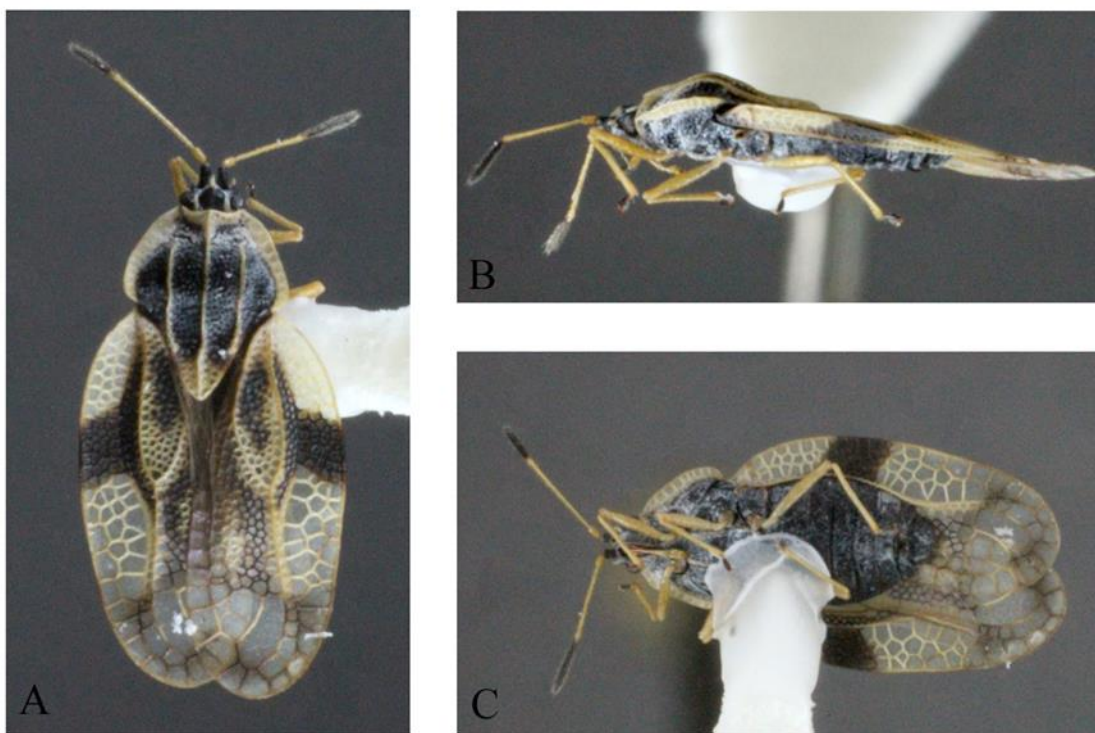


Figure 2.7: *Acysta orthointegra*, new species. **A.** Dorsal habitus, **B.** Lateral habitus, **C.** Ventral habitus.

Aepycysta Drake and Bondar, 1932

Key to the species of Southern Central America

- 1 Pronotum tricarinate..... *Aepycysta schwartzi* (Drake)
- Pronotum unicarinate..... *Aepycysta decorata* Monte

Aepycysta decorata Monte, 1941

Comments: This species was originally described from Costa Rica. It has yet to be found outside of that country.

Specimens examined: COSTA RICA: San Jose: Villa Colón ida, “El Rodeo” 300m, 7-VII-1994, A. Valerie, G. Vega (1♀ MNCR); Prov. Puntarenas: Punta Leona, Bosque situado al NO del Hotel, 9.701646° N, -84.6567220° W, - 100m, 11-XI-2004, J. Azofeifa Zuñiga, Red Noyes, L_N_187227_464509 #79182 (20 INBio); Prov. Guanacaste. Nicoya. Est. Corral de Piedra, 10.238569°N, -85.330807°W, 16m. 3-VII-2005. B. Gamboa, J. Gutiérrez, M. Moraga, J. Azofeifa, Y.Cárdenas. Red Noyes. L_N_246766_390721 #83763 (1 INBio); Prov. Guanacaste: Bagaces, P. N. Palo Verde, Sector Palo Verde, Quebrada Huertón, 10.366668°N, -85.383266°W 10m. 13-VII-1999. I. Jiménez. Red de Golpe L_N_260952 _385020 #52846 (1 INBio); Prov. Guanacaste: P.N. Palo Verde, Bagaces, Alred. Estación Palo Verde, 10.35° N, -85.352778° W, 10 - 50m, 15-XI-2004, M. Moraga, Red Noyes, L_N_259098_388353 #78877 (1 INBio).

Host plant: No host plants have been recorded for this species.

Aepycysta schwarsi (Drake, 1922)

Comments: This species was originally described, in the genus *Galeatus*, from Panama (Drake 1922); it is still only known from Panama. The specimen listed below from the Darien Province of Panama represents the closest record to Colombia.

Specimens examined: PANAMA: Darien: Ensenada del Guayabo, 7° 20' N, -78° 05' W, Sea level- 250m, I-1983, J. H. Martin (1♂ BMNH); Panama: Parq. Nac. Soberania, Pipeline rd. at Km 2, 16-V-1993, E. Riley (1♀ TAMU); Panama: Panama Canal, Lion Hill Island I, 6-VI-1982, R. B. Kimsey DEV (1♂♀ UCDC); Panama: CZ, 23-I-[19]11, E. A. Schwarz (2♀ Paratypes, USNM); Panama: Cerro Campana, 8° 42'N, 79° 55'W, 900m 24-VI-1973, Erwin and Hevel, central American expedition 1973 (1♀ USNM).

Host plant: No host plants have been recorded for this species.

Amblystira Stål, 1873

Key to the species of southern Central America

- 1 Hemelytral margins constricted about middle (at least faintly).....2
- Hemelytral margins obviously convex or parallel, but not constricted7
- 2(1) Costal area of hemelytra not more than carinate, lacking areoles *A. morrisoni* Drake
- Costal area of hemelytra at least uniseriate3
- 3(2) Costal area of wing bi- to triseriate, at least basally.....4
- Costal area of hemelytra uniseriate basally5
- 4(3) Costal area biseriate basally, uniseriate to biseriate apically *Amblystira opaca* Champion
- Costal area completely triseriate *Amblystira serkisi*, new species

5(3) Head with occipital spines	6
- Head without occipital spines	<i>Amblystira silvicola</i> Drake
6(5) Costal area of hemelytra completely uniseriate	<i>Amblystira pallipes</i> (Stål)
- Costal area of hemelytra uniseriate basally, but biseriate at widest .....	.....<i>Amblystira scita</i> Drake and Hambleton
7(1) Costal area of hemelytra with a basal and apical hyaline or whitish area.	8
- Costal area of hemelytra mostly unicolorous or only with a mesal hyaline area	9
8(7) Costal area of wing mostly biseriate (caution: costal area may appear like a narrow membranous structure basally), lateral row along costa very narrow with minute areolae, second row wider with areolae larger, and increasing in size near apex; length 2.2-2.5mm ..	.....<i>Amblystira fuscitarsis</i> Champion
- Costal area of wing mostly triseriate, but appearing biseriate, first row very narrow and offset on membranous area, inner two rows wider; length 3mm.....	.....<i>Amblystira sauroni</i> , new species
9(7) Costal area of hemelytra with a large hyaline area extending nearly throughout	10
- Costal area of hemelytra with a much smaller hyaline area, making up at most one-third of extent	<i>Amblystira acanthopterum</i> , new species
10(9) Pronotum tricarinate; costal area of wing entirely hyaline	<i>Amblystira marginata</i> Drake
- Pronotum unicarinate: costal area of wing mostly hyaline except near apex.....	.....<i>Amblystira melanosoma</i> Monte

Amblystira acanthopterum, new species

Description:

General color black with two white markings; dorsally pronotum and body together obovate, wings narrowing to apex.

Head small, black; occipital spines reduced to small, short tubercles, adpressed to head. Antennae short, slender, fuscous; segment one and two barrel-shaped, subequal; segment three much longer, covered with a few, evenly spaced, long, fine hairs; segment four half as long as segment three, fuscous basally, but mostly black, covered with longer, fine, evenly spaced hairs. Bucculae closed anteriorly; rostrum light fuscous, short, surpassing pro-mesothoracic suture.

Pronotum black, coarsely punctate on apical area, areolate on triangular process of pronotum, unicarinate. Median carina low, uniseriate; cells small and distinct on posterior portion of pronotum. Paranota reduced to carina-like processes, serrate along lateral margins. Hemelytra elongate, straight, extending far beyond apex of abdomen, black, except a white hyaline space near apex of costal area. Costal area irregularly triseriate throughout: subcostal vein with a ventral spine near apical third; subcostal area four to five rows of areolae wide at widest; RM vein extremely straight, raised; discoidal cell extending to middle of wing, elongate, four areolae wide at widest; sutural area very broad, seven to eight areolae wide at widest. Rostral laminae extremely low, uniseriate, widely diverging on pterothorax. Legs yellow brown, covered with regularly spaced long hairs, each pair of legs gradually increasing in length from prothorax to metathorax; coxae globose; femora thick, stout, tibiae much thinner, subequal to femora, tarsi fuscous, tarsal claws extremely small, narrow.

Abdomen black, thick, stout, ovate, with small, fine hairs basally, long fine hairs on pygophore.

Measurements: (n=2) 2.72-2.89 long, 1.21-1.29 wide, antennal segments one through four: 0.07-0.12, 0.11-0.12, 0.49-0.66, 0.28-0.37. Holotype: 2.89 long, 1.29 wide, antennal segments one through four: 0.12, 0.12, 0.49, 0.28.

Specimens examined: Holotype: COSTA RICA: Prov. Guanacaste: Estacion Pitilla 9 km. S. de Santa Cecilia, 700m. III-1995. C. Moraga, L_N_329950_380450 #4357 (1♂ INBio). Paratype: PANAMA: Prov. Coclé: 3 km. N. El Valle La Mesa, el. 3050 ft., 21-VII-1999, 0838'13"N, 8007'28"W JB Woolley 99/045 (1♂ TAMU). Types will be conserved in their respective collections.

Host plant: No host plants have been recorded for this species.

Etymology: This species is named of the spine (Acantho) found on the ventral side of the wing (ptera).

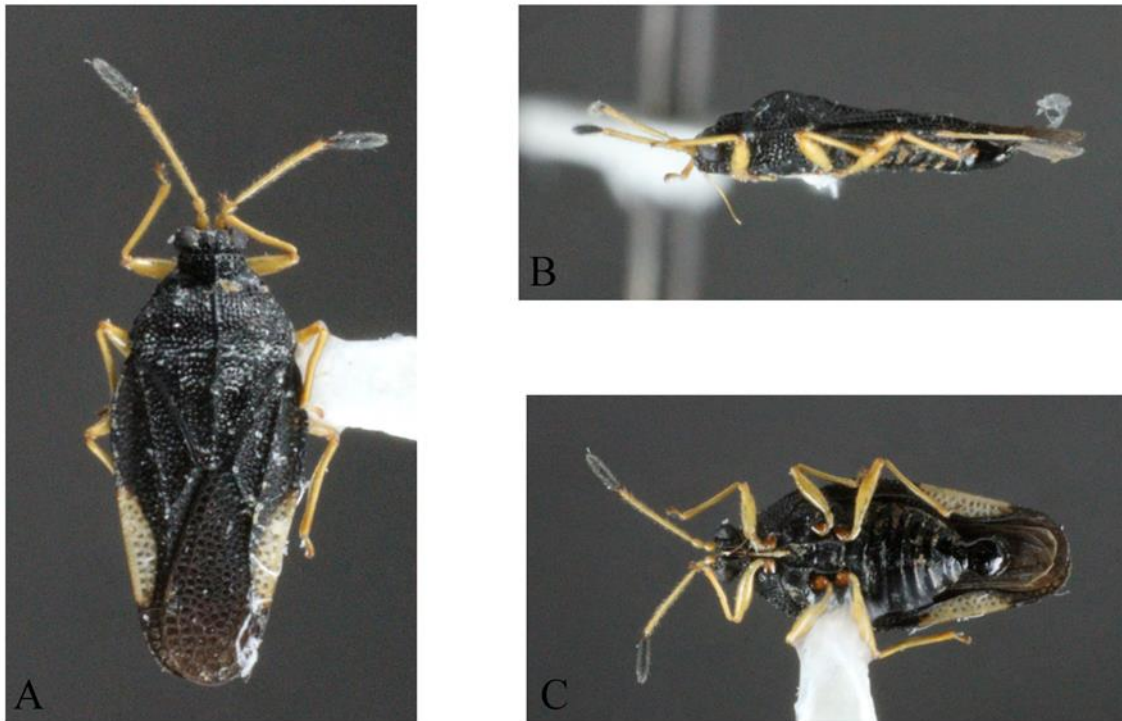


Figure 2.8: *Amblystira acanthopterum*, new species. **A.** Dorsal habitus, **B.** Lateral habitus **C.** Ventral habitus.

Amblystira fuscitarsis Champion, 1897

Comments: Champion (1897) originally described this species from Guatemala and Panama. Maes and Knudson (2016) recorded this species from Nicaragua. Drake and Ruhoff (1965) listed this species also from Mexico, Colombia, Brazil, Haiti, and Cuba. The specimens listed below from Costa Rica and Bolivia represent new country records.

Specimens examined: GUATEMALA: Guatemala City; 23-IX-[19]44, E. J. Hambleton. C. J. Drake Coll. 1956 (1♀ CAS). COSTA RICA: Prov. Guanacaste: A.C.T, Santa Cruz, Est Bosque Nal Diriá. 150m, 10.172386N, -85.595884W, 24-27-XI-1998. E. Ulate. Manual (red, libre) L_N_239550_361650 #52473 (1 INBio). BOLIVIA: Dept. Santa Cruz: Santa Cruz De la

Sierra, -17.798369, -63.071123, 26-XII-2016 to 2-I-2017, Sweeping/Beating, Collectors A. H. Knudson & E. Condarco Calles (1♂ AHKC).

Host plants: This species has been recorded from three possible host plants, all in the Fabaceae: *Derris elliptica* (Drake and Hambleton 1945, Alayo 1967), *Lonchocarpus domingensis* (Alayo 1967), and *Lonchocarpus sericeus* (Bruner *et al.* 1945).

Amblystira marginata Drake, 1922

Comments: This species was originally described from the Canal Zone, Panama. Hurd (1946) recorded this species from Costa Rica

Specimens examined: PANAMA: Canal Zone: Colon: Humid Forest, Canopy fogging, 2-14-VII-1979, E. Broadhead *et al.* B.M. 1979-125; on *Anacardium excelsum* Skeels; Many macro epiphytes on trunk, no lianas on crown (15♂20♀, 1 nymph BMNH); Madden Lake: Canal Zone: 9°15'N, 79°35'W 20-IX-[19]73, D. Englemann (1♀ USNM); Canal Zone: Panama City: Monsoon Forest, Canopy fogging, 15-30-VII-1979, E. Broadhead *et al.* B.M. 1979-125; on *Anacardium excelsum* Skeels; (1♂ BMNH); Canal Zone: Panama City: Monsoon Forest, Canopy fogging, 15-30-VII-1979, E. Broadhead *et al.* B.M. 1979-125; on *Luehea seemanii* T. & P.; No macro epiphytes on trunk, some lianas on crown (1♀ BMNH); Prov. Veraguas: Santa Fe, 20-II-1999, R. Turnbow (1♂ UGAC).

Host plants: Collected from insecticidal fogging of *Anacardium excelsum* [Anacardiaceae] and *Luehea seemanii* [Malvaceae]

Amblystira melanosoma Monte, 1941

Comments: Monte (1941) originally described this species from Costa Rica. It has not been recorded from any other country.

Specimen examined: COSTA RICA: Suiza Turilba, P. Schild Col, C. J. Drake Coll. 1956 (1♂ USNM).

Host plant: No host plants have been recorded for this species.

Note: In Monte's (1941) original publication he states that this species is most closely related to *Amblystira marginata* Drake, but differs from it by the unicarinate pronotum, the wider costal area and the matte spot at the apex of the hemelytra. The USNM specimen differs from the original description by having the costal area of the wing with a much shorter hyaline area and the constricted hemelytra. This specimen is slightly teneral which may account for some, but not all of the variation. Since this specimen was determined by Drake and is only representative variation of this species, I will treat it as an aberrant *A. melanosoma*.

Amblystira monteverde, new species

Description:

General color black, shining black, with two white markings; dorsally pronotum and body together elongate ovate.

Head black, glabrous, eyes porminate; antennae moderately long, slender, yellow; segment one stout, segment two subequal in length, less stout; segment three extremely long, covered with few, evenly spaced, long, fine hairs; segment four two thirds as long as segment three, basal fourth yellow fuscus, immediately black to apex, covered with longer, fine hairs.

Bucculae closed anteriorly, biseriate, black, with minute hairs; rostrum infuscate in basal third, then yellow, short, surpassing pro-thoracic coxae.

Pronotum black, coarsely punctate, weakly tricarinate. Median carina extremely low, lateral carinae present only on posterior triangular projection. Calli shining, glabrous, black. Paranota reduced to carina-like processes, serrate along lateral margins. Hemelytra ovate, elongate, extending far beyond apex of abdomen, black, except a white hyaline space near apex of discoidal cell. Costal area biseriate throughout; subcostal area four rows of areolae wide at widest; sub costal extension uniseriate, concolorous with basal subcostal area; discoidal cell extending to middle of wing, triangular, four areolae wide at widest; sutural area very broad, seven areolae wide at widest, basal areoles small, gradually increase in size apically; hypocosta uniseriate. Metathoracic wings slender, narrow, elongate, extending one third beyond apex of abdomen. Thoracic pleurae punctate, black; sterna glabrous, black; rostral laminae low, uniseriate, black, widely diverging on pterothorax. Ostolar peritremes ovate, black. Legs yellow brown, covered with regularly spaced long hairs, each pair of legs gradually increasing in length from prothorax to metathorax; coxae globose, slightly infuscate; femora, stout; tibiae much thinner, subequal to femora, tarsi fuscous, tarsal claws stout, elongate.

Abdomen black, broad, ovate, glabrous. Pygophore black, extremely long, longer than two preceding abdominal segments, fine hairs on venter; parameres dark brown, angulate near base, straight towards apex, beset with few hairs along lateral margins.

Measurements: (n=2) Length: 3.00, width: 1.08-1.13, length of antennal segments one through four, respectively: 0.09-0.10, 0.08-0.09, 0.62-0.73, 0.41-0.42. Holotype: Length: 3.00, width: 1.08, length of antennal segments one through four, respectively: 0.10, 0.09, 0.73, 0.41.

Specimens examined: Holotype: COSTA RICA: Puntarenus Prov. 4-5km. Above Monteverde, sweeps in 20 vegetation in divide mist forest, 19-23-III-1973, D. R. Whitehead (1♂ USNM). Paratype: Same data as holotype (1♂ USNM).

Host plant: No host plants have been recorded for this species.

Etymology: This species is named for its known distribution.

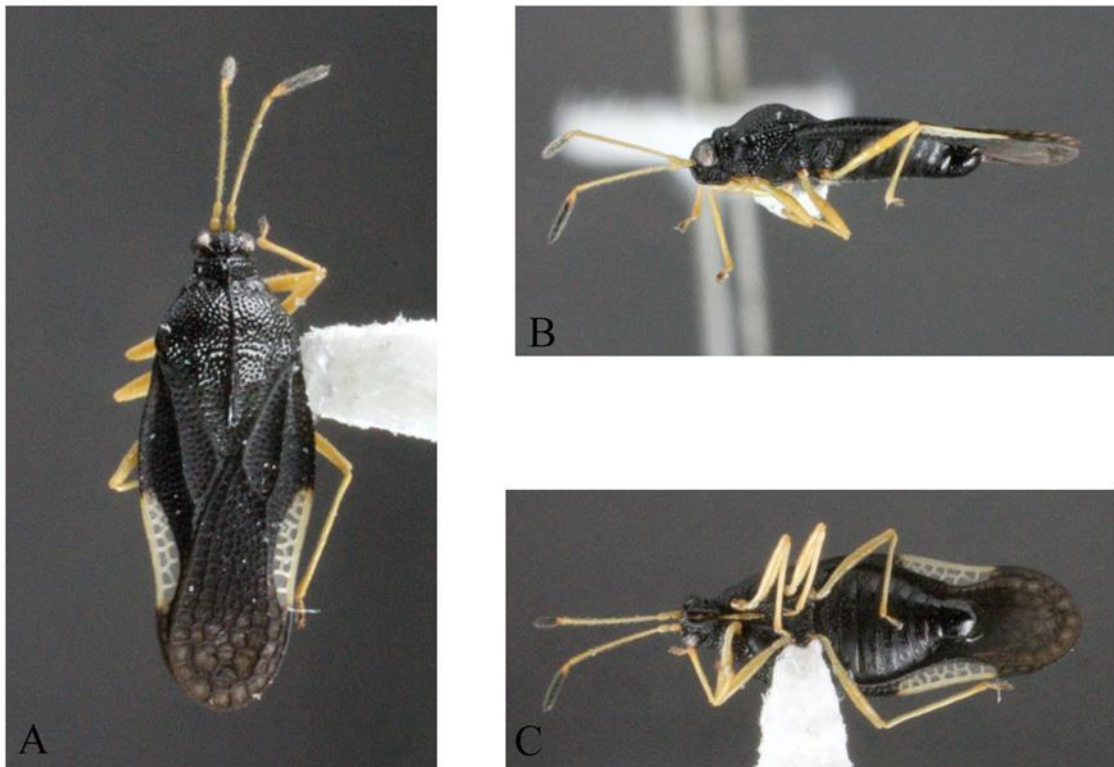


Figure 2.9: *Amblystira monteverde*, new species. **A.** Dorsal habitus, **B.** Lateral habitus, **C.** Ventral habitus.

Amblystira morrisoni Drake, 1922

Comments: Drake (1922) originally described this species from the Dominican Republic; until now, it has not been reported elsewhere. The specimen listed below represents a new country record for Panama.

Specimen examined: PANAMA: Darien: Ensenada de Guayabo, 1-III-1983, J. H. Martin, B.M. 1983-478. (1♀ BMNH)

Host plant: No host plants have been recorded for this species.

Amblystira opaca Champion, 1897

Comments: Champion (1897) originally described this species from Guatemala. Drake and Ruhoff (1965) listed this species also from Panama and Nicaragua. The specimens listed below from Mexico and Belize represent new records for those countries.

Specimens examined: MEXICO: Quintana Roo: 9km w Carrillo Puerto, 20-X-1991, R. Turnbow (1♂ UGCA). GUATEMALA: Cocales, 14-V-1965, E. J. Hambleton, 31-65, (2♂2♀ USNM). BELIZE: Orange Walk District: 1.4 mi E. Tres Lagunas, 2-I-1996, Roadside Pond, (1♂ CAS).

Host plant: *Derris elliptica* [Fabaceae] (Drake and Ruhoff, 1965).

Amblystira pallipes (Stål, 1858)

Comments: The type locality for this species is Rio de Janeiro, Brazil (Stal 1960). Drake and Ruhoff (1965) listed this species also from Colombia, Peru, and Venezuela. The specimen listed represents a new country record for Panama.

Specimens examined: PANAMA: Colon Prov: Parque National Soberania, Canal Area 3 km N of Gamboa, Pipeline road km 0-4, secondary forest, beating, L. Sekerka lgt. 16-X-2007 (1♂ BMNH).

Host plants: *Bredemeyera* sp. [Polygalaceae] (Monte 1939) and *Serjania* sp. [Sapindaceae] (Drake and Hambleton 1935, Monte 1939). Drake and Hambleton (1944) also listed this species from an unknown species belonging to the family Sapindaceae.

Amblystira sauroni, new species

Description:

Head black, devoid of spines except two frontal tumidities on frons; antenniferous tubercles extremely short, blunt. Antennae moderately long; segment one black, stout, moderately long; segment two, three quarters length of preceding, narrower, black; segment three four times as long as basal segment, yellow, with some short, scattered hairs, segment four moderately clavate, mostly black except yellow base, with more long fine hairs. Bucculae biseriate, but appearing uniseriate; rostrum short, stout, barely surpassing pro/mesothoracic suture.

Pronotum black, pitted, tricarinate, with some wax; calli bright shining, black: paranota carinate. Hemelytra rectangular, extending one-third beyond apex of abdomen; costal vein broadly flattened; costal area unbiseriate, mostly black, except basally and subapically with white veins and hyaline cells; subcostal area triseriate, with some wax, black; RM vein thick and upraised; discoidal cell trapezoidal, black, with five to six rows of areolae at widest, cubitus vein weakly developed; sutural area with six areolae at widest, outer row with large rectangular cells, apex of hemelytra with large hyaline cell. Rostral laminae subparallel on mesothorax, crescentic on metathorax, uniseriate, covered with wax.

Pro- and mesothoracic legs subequal in length; metathoracic legs one-fourth longer, all infuscate, with two regular rows of hairs on tibiae, tibiae with lighter bands of testaceous; tarsi testaceous, extremely small, with many hairs on ventral surface.

Abdomen short, stout, black, with some short stout hairs on venter. Pygophore small, narrow, compressed to abdomen; parameres long, curved, sickle-like, with stout, fine hairs on outer edge.

Measurements: (n=1) Length: 3.02, width: 1.42, length of antennal segments one through four, respectively: 0.12, 0.11, 0.582, 0.46.

Specimen examined: Holotype: PANAMA: Prov. Coclé: 3 km N. El Valle, La Mesa, el. 2850 ft. 8° 38'12"N, 80° 6'52"W, 21-23-VII-1999, J. Schaffner (1♂ TAMU).

Host plant: No host plants have been recorded for this species.

Etymology: This species is named after the Eye of Sauron from the Lord of the Rings trilogy. The large hyaline cell surrounded by black cells on the apex of the hemelytra have a similar appearance as a large eye.



Figure 2.10: *Amblystira sauroni*, new species. **A.** Dorsal habitus, **B.** Lateral habitus, **C.** Ventral habitus.

Amblystira scita Drake and Hambleton, 1944

Comments: This species was originally described from Costa Rica, and it has not yet been recorded from outside of that country.

Specimens examined: COSTA RICA: Pablo Schild (1♀ USNM).

Host plant: No host plants have been recorded for this species.

Amblystira serkisi, new species

Description:

General color black except a white hyaline area on costal margin of wing.

Head black, without spines. Antennae longer than in *Amblystira acanthopterum*, similarly marked; segments one and two subequal, segment three much longer, with long fine hairs, segment four slightly longer than half the length of segment three. Bucculae partially closed anteriorly; rostrum short, extending to middle of mesosternum.

Pronotum black, constricted apically, punctate, unicarinate; median carina extremely low, indistinctly areolate anteriorly, but with minute areolae posteriorly; triangular projection of pronotum punctate; paranota weakly serrate, reduced to carinate processes. Hemelytra extremely elongate slightly constricted near middle, weakly serrate; costal area black, but interrupted medially by white, biseriate basally to triseriate at widest; subcostal area quadriseriate at widest; RM vein as in *Amblystira acanthopterum*; discoidal cell short, not reaching middle of wing; sutural area of wing extremely broad, six to seven rows of areolae wide. Rostral laminae low, uniseriate, widely diverging on pterothorax. Legs yellowish, fore and middle legs subequal in length, metathoracic legs longer; femora thicker than tibiae, not as thick as femora in *Amblystira acanthopterum*.

Abdomen elongate ovate, black, without hairs; pygophore large, prominent, wider than abdomen, apically covered with fine hairs, parameres covered with short fine hairs dorsally.

Measurements: (n=1) 3.20 long, 1.00 wide, antennae: segments 1-3: 0.12, 0.12, 1.00.

Specimens examined: Holotype: COSTA RICA: Prov. Guanacaste: Finca Loaiciga, 6 km sur de Santa Cecilia, 500-500 m. 23-IX-14-X-1992, P. Rios, L N 332400_380400 (1♂ INBio).

Holotype will be deposited in the INBio type collection.

Host plant: No host plants have been recorded for this species.

Etymology: This species is named after Andy Serkis, the actor who played Gollum in the Lord of the Rings film trilogy.



Figure 2.11: *Amblystira serkisi*, new species. **A.** Dorsal habitus, **B.** Lateral habitus.

Amblystira silvicola Drake, 1922

Comments: Drake (1922) originally described this species from Bolivia (Rio Machupe), two localities in Brazil, and Guyana. Drake and Ruhoff (1965) listed this species also from Argentina, and Paraguay. The specimen listed below represents a new country record for Costa Rica.

Specimen examined: COSTA RICA: Puntarenas: Est. Carara, 200 m, Res. Biol. Carara, 9.774293N, -84.527464W, R. Zuñiga, 1-28-II-1990, L- N 195250_478700 (1 INBio)

Host plants: *Serjania* sp. [Sapindaceae] (Monte 1939) and an undetermined species of the family Bignoniaceae (Monte 1938, 1939).

Amboatingis Drake and Ruhoff, 1960

Amboatingis ainsliei (Drake and Poor, 1938)

Comments: Drake and Poor (1938) originally described this species from Guatemala. It has since been recorded from Nicaragua (Maes and Knudson 2016) and Costa Rica (Knudson *et al.* 2017).

Specimens examined: GUATEMALA: El Progreso: Guastatoya, 5km S jct. Rio Sanarate and CA9, 6051m, 14° 50' 19"N, 90° 04' 16"W, 9-I-2007, J. R. Jones (1♀ TAMU). COSTA RICA: Guanacaste: La Pacifica near Cañas, 22-26-V-1984, E. Riley, D. Rider & D. LeDoux (3♀ DARC).

Host plant: No host plants have been recorded for this species.

Ambycysta Drake and Hurd, 1945

Ambycysta gibbifera (Picado, 1913)

Comments: Picado (1913) originally described this species in the genus *Leptostyla* from Costa Rica. It was later transferred first to the genus *Megalocysta* Champion (Drake 1928b), and then later to this genus (Drake and Hurd 1945). To date, *A. gibbifera* has not been recorded from any other country.

Specimens examined: COSTA RICA: [Cartago]: Orosi, XI, C. Picado coll, ex bromelias on trees (2♀ USNM); [Cartago]: La Funte, V-26-1929, A. Alfaro, J. C. Lutz Collection 1961 (1♂ USNM).

Host plant: *Aechmea* sp. [Bromeliaceae] (Picado, 1913)

Atheas Champion, 1898

Key to the species of Southern Central America (adapted from Champion 1898)

- 1 Antenniferous tubercles slender, sharply pointed; costal area of hemelytra broad, triseriate on apical half *Atheas flavipes* Champion
- Antenniferous tubercles short, stout; costal area of hemelytra mostly biseriate.....2
- 2(1) Mesosternal laminae parallel *Atheas fuscipes* Champion
- Mesosternal laminae converging near middle *Atheas nigricornis* Champion

Atheas flavipes Champion, 1898

Comments: This species was originally described from Panama (Champion 1898); it has also been recorded from southern Brazil (Drake and Hambleton 1938).

Specimens examined: PANAMA: Panama Prov. Parq. Nac. Soberania, Madden For. Rd. El 40, 9° 04' 50"N, 79° 37' 27"W, 20-28-VII-1999, Malaise, Gillogly & Wolley (1♂ TAMU); Canal Zone: Pipeline Rd., 1-III-1983, J. H. Martin, B. M. 1983-478, On *Machaerium*. (6♂2♀ BMNH); Canal Zone: Barro Colorado I., 1-III-1983, J. H. Martin, B. M. 1983-478, On *Machaerium* sp. (2♂5♀ BMNH).

Host plant: Recorded in the literature from *Machaerium angustifolium* [Fabaceae] (Drake and Hambleton 1938). Some of the examined specimens listed above were also collected on a species of *Machaerium*.

Atheas fuscipes Champion, 1898

Comments: Champion (1898) originally described this species from specimens collected from two localities in Mexico (Tabasco, Veracruz) and from Guatemala. Maes (1998) and Maes and Knudson (2016) recorded *A. fuscipes* from Nicaragua. Drake and Ruhoff (1965) listed this species also from El Salvador, Brazil, Bolivia, and Paraguay. The specimens listed below from Costa Rica, Colombia, and Venezuela represent new records for those countries.

Specimens examined: MEXICO: Chiapas: Villa Las Rosas, 845m. 23-29-VI-1981, W. R. Dolling. B.M. 1981-411, Subtropical regenerating scrub (2♂ 2♀ BMNH); Morelos: 55 km. S. On Mexico-Yautepec rd. 6-VI-1981, W. R. Dolling. B.M. 1981-411, Subtropical regenerating scrub (2♀ BMNH). EL SALVADOR: Santa Tecla: 171-S, 16-I- [19]59, P.A.B. Paul A. Berry Collection. (3♀ UMRM). COSTA RICA: Cartago: Pejibaye, 24-24-III-1987, W. E. Steiner. Malaise trap in old field and agricultural area (1♂ USNM). COLOMBIA: Tolima: Honda, 13-

VI-1965, J. A. Ramos Collector (1♂♀ USNM). VENEZUELA: Brrancas: Obispos, Barrinas, 6-VII-1979, R. W. Brooks, A. A. Grigarick, J. McLaughlin, R. O. Schuster (1♂ UCDC).

Host plant: This species has been recorded from two plant species in the family Fabaceae: *Eupatorium adenophorum* (Torres Miller 2001) and field beans (Drake and Hambleton 1934), and also from one plant species in the Cannabaceae: *Celtis brasiliensis* (Monte 1939).

Atheas nigricornis Champion, 1898

Comments: Champion (1898) originally described this species from Mexico (Veracruz) and from several localities in Guatemala. Drake and Ruhoff (1965) listed this species also from Ecuador, Honduras, and the United States (Arizona and Texas).

Specimens examined: MEXICO: Michoacan: Cotija: 14-IX-1975, B. Villegas (5♂8♀ UCDC); Puebla: Tepesco 6km s. Calmecca. 6-IX-1985, G. Ekis (1♂ UCDC). GUATEMALA: Dept. Guatemala: Guatemala City, 15-XI-1979, M. Monzón (1♂♀ UCDC).

Host plants: *Alnus acuminata* [Betulaceae] and *Parosela citriodora* = *Dalea foliolosa* [Fabaceae] (Hurd, 1946).

Ceratotingis Montemayor, 2008

Key to the Central American species of *Ceratotingis* (Modified from Montemayor 2009)

- 1 Costal area of wing biseriate *Ceratotingis zeteki* (Drake)
- Costal area of wing uniseriate 2

- 2(1) Cuticle anterodorsal to eyes thicker, raised, yellowish and rugose; segment one more than five times the length of the head *Ceratotingis rafaeli* Montemayor
- Cuticle anterodorsal to eyes with same characteristics as the rest of the head; segment one approximately four times the length of the head....*Ceratotingis costarriquense* Montemayor

***Ceratotingis costarriquense* Montemayor, 2008**

Comments: Montemayor (2008) described this species from Costa Rica, and it has not been recorded from outside of that country. So, the specimens listed below from Panama represent a new country record.

Specimens examined: COSTA RICA: Puntarenas: Monteverde 1500m. K. Nishida. *Cecropia obtusifolia* (13♂ 16 ♀ AHKC); Heredia: Santo Domingo, *Cecropia*, VII-2008, P. Hansen (4♂ 18♀ AHKC); Heredia: Santo Domingo, 2-III-2016, P. Hansen (4♂ 4♀ AHKC). Heredia: Santo Domingo, V-2016, P. Hansen (1♂ 2♀ AHKC). PANAMA: Gatun C. Z., Tres Rios Plantation, III-1930, T. O. Zschokke coll. (1♂ ♀ CAS).

Host plants: Host plants reported herein include *Cecropia obtusifolia* and *Cecropia* sp. [Urticaceae]. The type specimen was collected on *Phaseolus vulgaris* [Fabaceae] (Montemayor 2008)

***Ceratotingis rafaeli* Montemayor, 2008**

Comments: Montemayor (2008) originally described this species from Panama. It has also been reported from Nicaragua (Maes and Knudson 2016).

Specimens examined: PANAMA: Chiriqui Prov. Reserva la Fortuna. Estacion biologia, 3900ft, 843'18"N, 82'14'17"W, 4-10-VIII-1999, J. C. Schaffner (1♂ USNM).

Host plant: The type specimen was collected on sapling trees (Montemayor 2008)

Ceratotingis zeteki (Drake, 1950)

Comments: Drake (1950) originally described this species, in the genus *Macrotingis*, from Panama. Maes and Knudson (2016) reported this species from Nicaragua.

Specimens examined: NICARAGUA: Car. Diriamba, 1900', 14-VII-1974, C. W. & L. O'Brien & G. B. Marshall (1♂4♀ CAS)

Host plant: No host plants have been recorded for this species.

Corycera Drake, 1922

Key to the species of *Corycera* of southern Central America

- 1 General color brown testaceous; costal area of hemelytra uniseriate2
- General color black with white or hyaline markings on hemelytra3
- 2(1) Costal area of wing carinate in basal half, thence abruptly uniseriate beyond discoidal cell
.....*Corycera abrupta*, new species
- Costal area of wing uniseriate throughout *Corycera selvado*, new species
- 3(1) Subcostal area of hemelytra quadriseriate: discoidal cell with six rows of areolae at widest
.....*Corycera panamensis* Drake and Poor
- Subcostal area of hemelytra triseriate; discoidal cell quadriseriate at widest.....
.....*Corycera zurdoi*, new species

Corycera abrupta, new species

Description:

General coloration dark brown.

Head armed with five spines; occipital spines extremely long, extending beyond anterior margin of eye, downcurved, adpressed to head; median spine long, stout, downcurved, one and one-half times as long as first antennal segment; frontal spines short, slightly longer than one-half length of median spine, meeting median spine to form cephalic horn. Antennae moderately long, reaching wing base when directed backward; first segment light brown, stout; segment two yellowish, two-thirds as long as segment one; segment three slender, extremely long, five times as long as segment one; segment four yellow basally then abruptly fuscous apically, nearly half as long as segment three, with long fine hairs. Bucculae biseriate, not contiguous anteriorly, opening narrow, but wide enough for labrum to fit. Rostrum long, surpassing mesocoxae, yellow brown with apex, black infuscate.

Pronotum light ochraceous, tricarinate; pronotal collar produced apically into a small tumid, hood-like structure, four rows of areolae wide; paranota apically uniseriate, but mostly carinate; calli black, covered in wax; transverse suture present on posterior margin of pronotal disk. Hemelytra concolorous with Pronotum, narrow, elongate, one-third of which extends beyond apex of abdomen; costal area of hemelytra carinate on basal two-thirds, uniseriate on apical third; subcostal area biseriate, except triseriate beyond apex of discoidal cell; discoidal cell quadriseriate at widest; sutural area with five to six rows of areolae at its widest. Thoracic sterna blackish, rostral laminae uniseriate, subparallel on mesothorax, crescentic on metathorax. Legs

mostly yellow, coxae concolorous with thorax; each pair of legs increasing in length from pro- to metathorax.

Abdomen concolorous with thorax. Pygophore small, prunose, punctate; parameres small, curved.

Measurements: (n=3): Length: 2.42-2.46, width: 0.63-0.70, length of antennal segments one through four, respectively: 0.09-0.11, 0.07-0.08, 0.55-0.67, 0.29-0.30. Holotype: Length: 2.44, width: 0.67, length of antennal segments one through four, respectively: 0.11, 0.07, 0.67, 0.29.

Specimens examined: Holotype: PANAMA: Canal Zone: Colon: Humid Forest, Canopy fogging, 2-14-VII-1979, E. Broadhead et al. B.M. 1979-125; on *Hura crepitans* Linnaeus; Many macro epiphytes on trunk, no lianas on crown (1♂ BMNH). Paratype: Same as holotype (1♀ BMNH).

Host plant: The holotype was collected from insecticidal fogging of *Hura crepitans* [Euphorbiaceae].

Etymology: This species is named for the costal area which abruptly transitions from carinate to areolate near its basal third.

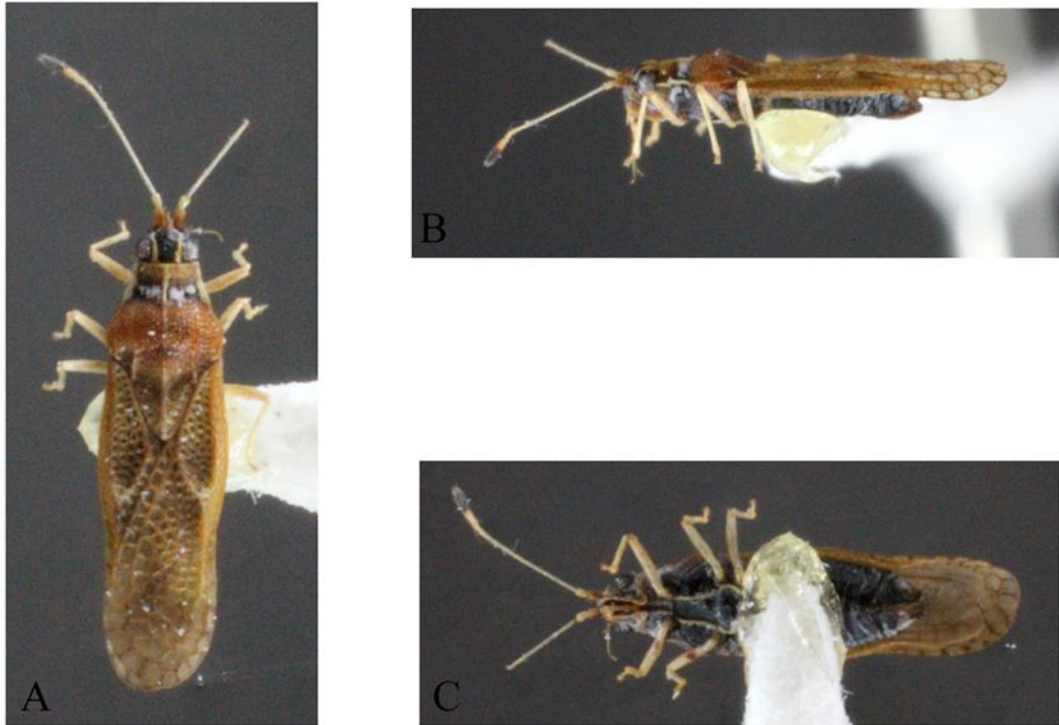


Figure 2.12: *Corycera abrupta*, new species. **A.** Dorsal habitus, **B.** Lateral habitus, **C.** Ventral habitus.

Corycera panamensis Drake and Poor, 1938

Comments: The type locality for this species is from the Canal Zone, Panama (Drake and Poor 1938), and it has not been reported from outside of that country since. The specimens listed below from Costa Rica represent a new record for that country.

Specimens examined: COSTA RICA: Limon: 27-IV-1995, on banana, (5♂ USNM). PANAMA: [Bocas del Torro]: Changuinola, 30-IV-1967, C. B. Stephens, Banana leaves (1♂ USNM); [Bocas del Torro]: Changuinola, 29-IV-1967, C. B. Stephens, ex Banana Lvs. (3♂1♀ USNM); Bocas del Torro: 3km W. Fortuna Hwy. continental divide trail, 5-VIII-1999, el 3730 ft. 8477"N, 8212'51"W, J. C. Schaffner (6♂2♀ TAMU); Prov. Colche: 3km N. El Valle, La

Mesa, el 2850 ft. 8°38'12"N, 80°6'52"W, J. Schaffner (2♂6♀ TAMU); Prov. Panama: km. 7.5 on El Llano-Carti Rd., 400m., 20-VI-1996, Gillogly & Schaffner (1♂ TAMU).

Host plant: From data examined herein: taken on banana leaves [Musaceae].

Note: Members of the Musaceae are not native to the Americas (Simmonds 1993), so it is more likely that the native host plant for this species is a species from a different family of the Zingiberales native to the Americas, or this tingid species has successfully transitioned to this introduced plant species.

Corycera selvado, new species

Description:

General coloration brown to testaceous.

Head armed with five spines; occipital spines, adpressed to head, reaching two-thirds of eye; median spine long, downcurved; frontal spines shorter, upcurved, meeting median spine, forming cephalic horn as in other *Corycera* species. Antennae long, segment one brown, stout, as long as median spine, but stouter; segment two yellow, half as long and half as wide as preceding segment; segment three yellow, extremely long, four to five time as long as segment one; segment four brown, one-half as long as segment three. Bucculae bi-triseriate, open anteriorly by about width of labrum. Rostrum yellow, apically infuscate nearly reaching middle of mesosternum.

Pronotum brown, pitted, tricarinate, carinae low; paranota carinate, but uniseriate opposite calli and pronotal collar; pronotal collar projected to form a hood-like structure, four rows of areolae anterior of calli; wax anterior and posterior of calli. Triangular posterior

projection lighter, areolate. Hemeleytra brown, elongate, extending one-third beyond apex of abdomen, narrow, spatulate near apex, constricted beyond middle; costal area uniseriate, with long narrow cells; subcostal area biseriate; subcostal extension uniseriate; discoidal cell with four rows of areolae at widest, small, nearly reaching middle of hemelytra; sutural area with five to six rows at widest, cells small, outer row comprised of larger rectangular cells. Rostral laminae widely diverging, low, uniseriate. Legs all subequal in length; coxae concolorous with thorax; trochanters, femora and tibiae yellowish; tibiae with very fine short hairs on venter; tarsi small, brown.

Abdomen elongate, concolorous with thorax, some wax present; female with tubercles or angular projections along posterior margins of pregenital segments.

Measurements: (n=5): Length: 2.65-2.78, width: 0.75-0.81, length of antennal segments one through four, respectively: 0.12-0.16, 0.07-0.10, 0.78-0.87, 0.40-0.45. Holotype: Length: 2.75, width: 0.75, length of antennal segments one through four, respectively: 0.15, 0.07, 0.78, 0.40.

Specimens examined: Holotype: COSTA RICA: Prov. Heredia: Est. Biol. La Selva, L/13/305, 10°26'N, 84°01'W, 2-II-1998, 50-150m (1♂ DARC). Paratypes: Same data as holotype (1♀ DARC); COSTA RICA: Prov. Heredia: Est. Biol. La Selva, L/13/662, 10° 26'N, 84° 01'W, 10-VI-1999, CES 350m (6♀ DARC); Prov. Heredia: Est. Biol. La Selva, L/07/310, 10°26'N, 84°01'W, 9-II-1998, 50-150m (1♀ DARC); Prov. Heredia: Est. Biol. La Selva, L/07/335, 10°26'N, 84°01'W, 16-III-1998, 50-150m (2♂2♀ DARC); Prov. Heredia: Est. Biol. La Selva, L/13/662, 10°26'N, 84°01'W, 16-III-1998, CES 350m (1♀ DARC); Prov. Heredia: Est. Biol. La Selva, 50-150m, 10°26'N, 84°01'W, III-1998, INBio-OET(2 INBio). PANAMA: Canal Zone: Barro

Colorado Is. L. T. 65', 7-III-[19]72, Col: D. Engleman (1♂ USNM); Canal Zone: Barro Colorado Isl. L. t. Trap 65', 28-XII-[19]72, Col: D. Engleman (1♂ USNM).

Host plant: Unknown.

Etymology: This species name is a portmanteau of the type localities, La Selva and Barro Colorado Island.

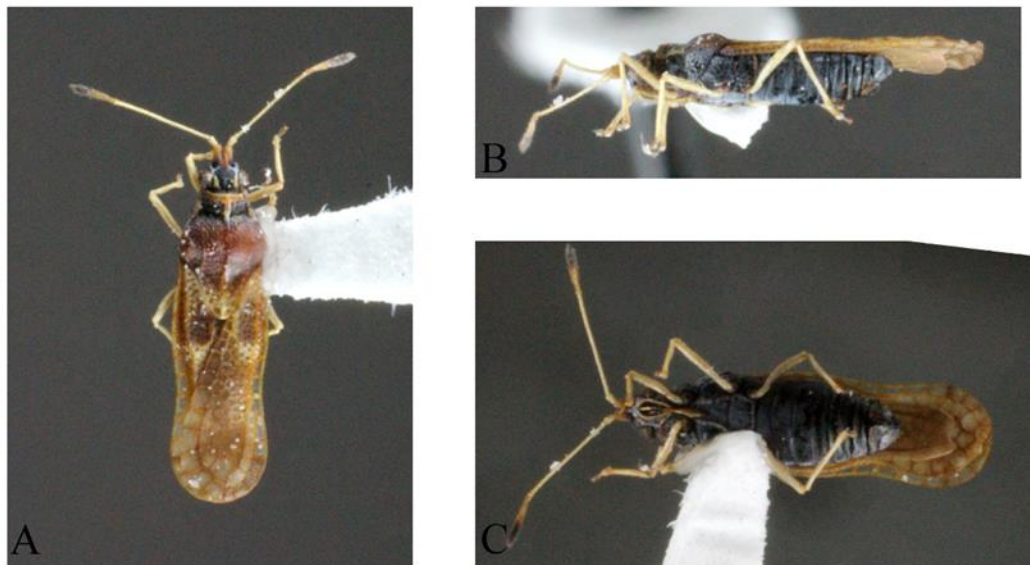


Figure 2.13: *Corycera selvado*, new species. **A.** Dorsal habitus, **B.** Lateral habitus, **C.** Ventral habitus.

Corycera zurdoi, new species

Diagnosis:

Generally elongate, mostly infusate

Head ferruginous, covered with mild wax; occipital spines extremely long, adpressed towards, nearly approaching antennal base; median spine stout, porerect, touching frontal spines, forming a cephalic horn, reaching middle of basal antennal segment. Antennae mostly ferougenous; fist segment elongate, stout; second segment half as long as preceding, less stout;

segment three extremely long four times as long as basal segment, slender, with long fine hairs; fourth antennal segment, mildly clavate, slightly longer than basal two segments taken together. Bucculae contiguous anteriorly, biseriata, brownish, areolae hyaline; rostrum elongate, reaching beyond posterior margin of mesocoxae, slender, yellowish.

Pronotum brown, punctate, tri carinate; calli dark brown, obscured by wax. Median carina low, uniseriate, produced apically into a tectiform hood; lateral carinae slightly more than carinate; paranota biseriata in apical half, uniseriate in apical half. Hemelytra elongate, ovate, mostly brown; costal area of hemelytra testaceous, biseriata; subcostal area triseriate, veins infuscate, areolae hyaline; subcostal extension uniseriate with large rectangular cells; discoidal cell quadriseriate at widest, elongate, narrower than width of costal area; sutural area dark brown, six areole wide at widest, cells increase in size towards apex; hypocosta uniseriate throughout. Rostral laminae uniseriate, subparallel on mesothorax, crescentic on metathorax. Thoracic plurae moderately punctate, but obscured by fringes of wax; thoracic sterna glabrous, brown; ostiolar peritremes elongate. Coxae slightly infuscate; trochanters femora and tibiae light yellowish, with few regular rows of hairs; tarsi darkly infuscate, with many hairs ventrally.

Abdomen brown, elongate, segments invaginate along middle. Pygophore large, moderately elongate, roughly as long as to preceding abdominal segments; parameres sickle-shaped, broadly arching, with few stout hairs along lateral margin.

Measurements: (n=3): Length: 2.30-2.44, width: 0.89-0.92, length of antennal segments one through four, respectively: 0.18-0.20, 0.09-0.11, 0.70-0.77, 0.24-0.28. Holotype: Length: 2.40, width: 0.89, length of antennal segments one through four, respectively: 0.18, 0.09, 0.71, 0.27.

Specimens examined: Holotype: PANAMA: Prov. Coclé: 3 km. N. El Valle, La Mesa, el. 3050ft. 21-VII-1999, 8° 38' 13"N, 80° 07' 28"W, J. B. Woolley, 99/045 (1♂ TAMU).

Paratypes: Same data as Holotype (1♂ TAMU). PANAMA: Prov. Veraguas: 8km. W. Sante Fe, Cerro Tute, el 3000 ft, 24-VII-1999, 8°30' 26"N, 81°06' 49"W, J. B. Woolley, 99/053 (1♂ TAMU).

Host plant: Unknown.

Etymology: This species is named in honor of the taxi driver Luis “Zurdo” f. Delgado M. who helped me find a car rental for this project. Thank you very much Luis!

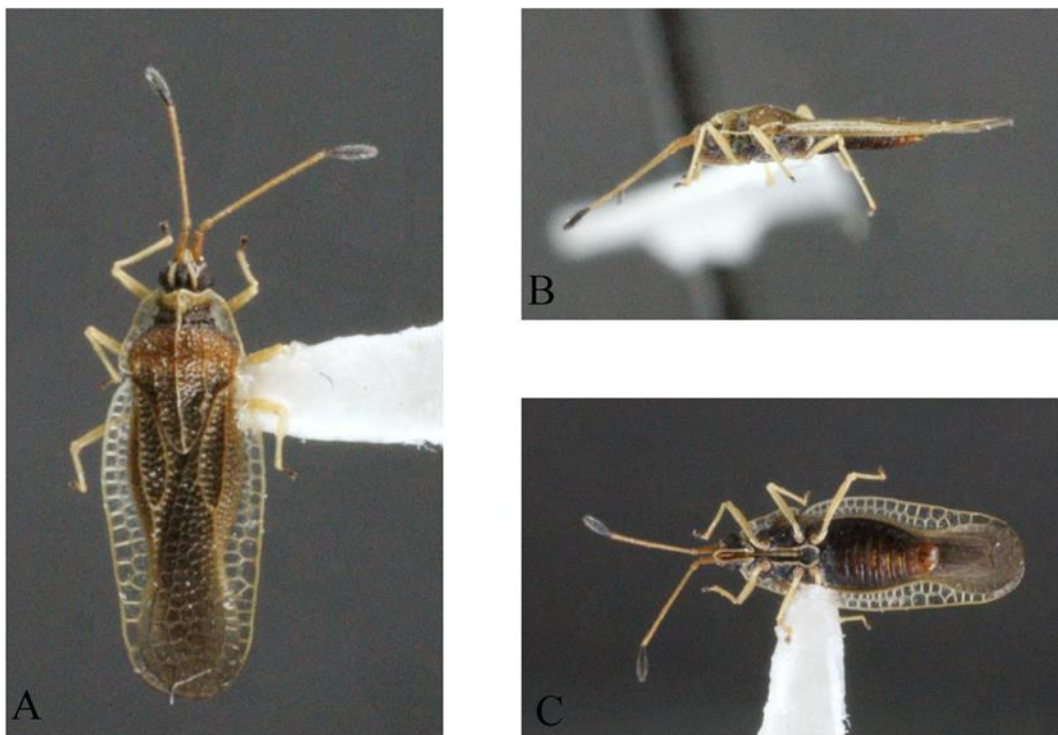


Figure 2.14: *Corycera zurdoi*, new species. **A.** Dorsal habitus, **B.** Lateral habitus, **C.** Ventral habitus.

Corythaica Stål, 1873

Key to the species of Central America

- 1 Hypocostal ridge triseriate at base *Corythaica venusta* (Champion)
- Hypocostal ridge uniseriate at base 2
2(1) Pronotal hood straight in dorsal view with a distinct median vein flanked by a row of
cells *Corythaica carinata* (Uhler)
- Pronotal hood not straight from above, without a distinct median vein
..... *Corythaica passiflorae* (Berg)

Corythaica carinata Uhler, 1894

Comments: Uhler (1894) originally described this species from the West Indies Island of Grenada. Its known distribution is relatively broad as it has been recorded from many other West Indies Islands, a number of Central American countries, and the southern United States. From the study region covered in this work, it has been recorded previously from Costa Rica (Arnold 2005) and Nicaragua (Maes and Knudson 2016). The specimens listed below from Belize and Panama represent new records for those countries.

Specimens examined: UNITED STATES: Florida: Monroe Co. W. Key Largo, 30-IV-1988, E. G. Riley & F. W. (1♂ AHKC); Texas: Hidalgo Co. Bentsen Rio Grande State Park, 18-VI-1969, Board & Hafernik (2♀ TAMU); Texas: Bexar Co. San Antonio, Ebony Hill Res. Sta. Kendal residence, 27-V-1992, E. G. Riley (1♂♀ TAMU). MEXICO: Vera Cruz: 5mi NW Lerdo de Tejada, 10-VI-1965, Burke, Mayer Schaffner (2♂10♀ TAMU). BELIZE: Roaring Creek, VIII-1953, N. H. L. Krauss (1♂ AMNH). HONDURAS: La Ceiba, 0-100m, VI-1981, N. H. L.

Krauss (1♂♀ AMNH). COSTA RICA: Puntarenas, 12-VIII-1972, J. Maldonado C (3♂ USNM). PANAMA: Cerro Azul, 8-I-1974, J. A. Slater, J. Harrington (1♂ AMNH); Madden Forrest Res. C. Z., 9-I-1974, J. A. Slater & J. Harrington (1♂ AMNH).

Host plants: *Achyranthes aspera* [Amaranthaceae] (Drake and Cobben 1960), *Althaea rosea* [Malvaceae] (Bruner *et al.* 1945), *Corchorus hirsutus* [Malvaceae] (Drake and Cobben 1960), *Passiflora foetida* [Passifloraceae] (Drake and Cobben 1960), *Piriqueta ovata* [Passifloraceae] (Drake and Cobben 1960), *Sida procumbens* [Malvaceae] (Drake and Cobben 1960), and *Solanum melongena* [Solanaceae] (Gibson 1919b, Hurd 1945, Arnold 2005). Cassava [Euphorbiaceae] (Bennett and Alam 1985), *Phaseolus vulgaris* [Fabaceae] (Maes and Knudson 2016), *Psidium guajava* [Myrtaceae] (Maes and Knudson 2016), passion fruit [Passifloraceae] (Bennett and Alam 1985), and eggplant [Solanaceae] (Barber 1939, Bennett and Alam 1985).

Corythaica passiflorae (Berg, 1884)

Comments: Montemayor and Melo (2012) state that all specimens fitting Kogan's (1960) neotype of *Corythaica cyathicollis* (Costa 1864) should be considered *C. passiflorae* and no specimens exist that agree with Costa's (1964) illustration of *C. cyathicollis*. All records of *C. cyathicollis* need to be corroborated due to confusion between several species. Pertinent to this study Drake and Bruner (1924) described the synonym *Corythaica planaris* from Panama. Drake and Ruhoff (1965) listed *C. cyathicollis* also from Windward Islands (Grenada, Martinique, St. Vincent), Puerto Rico, Cuba, Netherlands Antilles (Aruba, Curacao), Leeward Islands (St.

Eustatius, Saba, St. Martin), Colombia, Venezuela, Peru, Brazil, and Argentina. The records from Honduras and Trinidad represent new country records.

Specimens examined: HONDURAS: Cortez, 14.79851,-88.00607, Sweep *Solanum jamaicensis*, A, Samayoa, 21-VI-2008 FSCA# E2008-6106 (3♂3♀ FSCA). PANAMA: Canal Zone: Ft. Clayton, IX-[19]44 (2♂4♀ CAS). TRINIDAD: St. Augustine, I.C.T.A, on grass, 9-XII-1952 (2♂2♀ WRME).

Host plants: *Passiflora caerulea* [Passifloraceae], *Ricinus communis* [Euphorbiaceae], *Lycopersicum esculentum*, *Solanum argillicolum*, *Solanum balbisii*, *Solanum bonariense*, *Solanum elaeagnifolium*, *Solanum gilo*, *Solanum grandijlorum*, *Solanum hirtum*, *Solanum juripeba*, *Solanum lycopersicum*, *Solanum mclongena*, *Solanum nigrum v. americanum*, *Solanum paniculatum*, *Solanum pulverulentum*, *Solanum quitoense*, *Solanum racemiflorum*, *Solanum racemosum*, *Solanum sisymbrijolium*, *Solanum tabacijolium*, *Solanum torvum*, *Solanum tuberosum*, *Solanum variabile*, tobacco [Solanaceae], and cabbage [Brassicaceae], (Drake and Ruhoff, 1965). From label data above: *Solanum jamaicensis*.

***Corythucha* Stål, 1873**

Key to the species of southern Central America

- 1 Median carina as tall or taller than pronotal hood *Corythucha gossypii* (Fabricius)
- Median carina distinctly lower than pronotal hood.....2
- 2(1) Median carina broadly rounded or mostly straight in lateral view3
- Median carina sinuate in lateral view5

- 3(2) Median carina an acute scalene triangle in lateral view
..... *Corythucha championi* Drake and Cobben
- Median carina trapezoid-shaped, not triangular.....4
- 4(3) Hemelytra with two apical fuscous cross bands..... *Corythucha anamesa*, new species
- Hemelytra mostly devoid of fuscous, lacking two apical cross bands
..... *Corythucha agalama* Drake and Cobben
- 5(2) Median carina of nearly uniform height throughout *Corythucha palmatis* Drake
- Median carina becoming increasingly taller near hood.....6
- 6(5) Hood moderately inflated and beset with spines; dorsal margin of median carina and much
of wing beset with spinules..... *Corythucha spinosa* (Dugés)
- Hood tumidly inflated, with few spines, apex and median carina mostly devoid of spinules..
..... *Corythucha unifasciata* Champion

***Corythucha anamesa*, new species**

Description:

General markings; hemelytra and pronotum with hyaline hyaline, but with brown infuscations, covered with stout spinules. Paranota with two markings; one on anterior half and posterior half; hemelytra with sub-basal and mesial fuscous marks on costal area of hemelytra; hemelytra with two apical fuscous bands.

Head fuscous to black, with light wax, antennae light yellow, uniform in color; segment one stout; segment two half as long as basal segment, less stout; segment three elongate, three times as long as basal segment, slender, with four rows of broadly spaced, long, slender hairs; segment four clavate in apical third, with, long, fine, hairs. Buculae contiguous anteriorly, light fuscous, wide, biseriate. Rostrum light yellow, apex infusate, long, reaching posterior margin of mesocoxae.

Pronotum testaceous to light fuscous, punctate, tricarinate. Pronotal hood moderately inflated, one and one-half times longer than tall, mostly testaceous, fuscous apically; median carina half as tall as pronotal hood at tallest, angulate rounded in lateral view, biseriate, with fuscous band. Lateral carinae long and tall, nearly touching posterior of pronotal hood, uniseriate. Margins of paranota with long, infusate spinules. Lateral margins of hemelytra and discoidal cell with spinules, Hemelytra rectangular, constricted near middle; costal areas triseriate; subcostal areas biseriate, sub-vertical and inflated along middle discoidal cell; each discoidal cell irregularly triseriate, subcostal extensions uniseriate; sutural areas irregularly triseriate at widest; each hypocosta uniseriate, hyaline. Thoracic sternites black; pleurites fuscous to black, with some white wax; rostral laminae uniseriate, low, testaceous, subparallel on mesothorax, crescentic on metathorax. Legs yellow, coxae fuscous; femora and tibiae with several regular rows of long, fine hairs; tarsi infusate, minute, with hairs ventrally.

Abdomen broad, ovate, black, appearing wrinkled laterally. Pygophore prominent, fuscous brown; lateral margins dorsally with three to four thick, stout setae near base of parameres; parameres light brown, narrow, sickle-shaped, broad basally, very slender apically,

with slender hairs dorsally. Female abdomen broader, but apex narrowed, subgenital plate contrastingly fuscous, genital plates black, unicolorous with abdomen.

Measurements: (n=5): Length: 2.80, width: 1.59, height: 0.81, length of antennal segments one through four, respectively: 0.14, 0.09, 0.56, 0.24.

Specimens examined: Holotype: PANAMA: Darien: along road in vicinity of El Real de Santamaria, 26-V-1977, Junius Bird (1♂ AMNH). Paratypes: NICARAGUA: Masaya, 18-VII-[19]88, S/*Artemisa*. (7♀ MEL); Managua: IV-[19]90, B. Garcete (2♂ 2♀ MEL).

Host plant: *Artemisa* sp. [Asteraceae].

Etymology: This species is morphologically similar to *Corythucha morelli* Osborn and Drake, and *Corythucha marmorata* Uhler. It is almost, but not (*ana-*) quite morphologically between (*-mesat*) these two species.

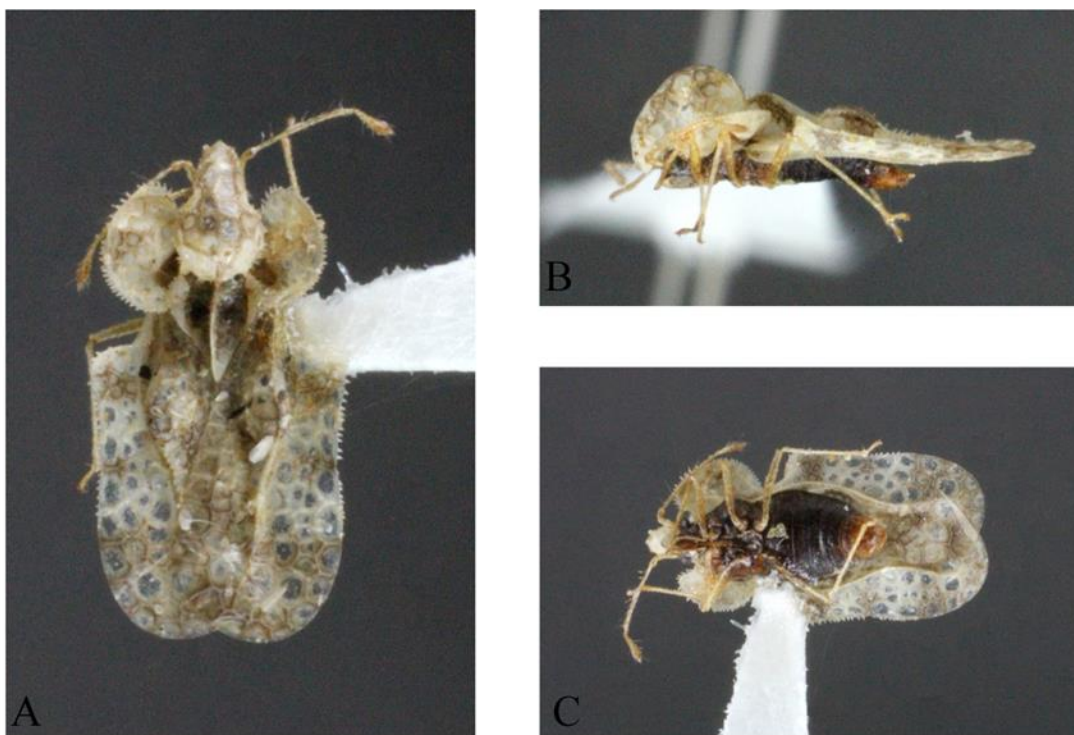


Figure 2.15: *Corythucha anamesa*, new species. **A.** Dorsal habitus, **B.** Lateral habitus, **C.** Ventral habitus.

Corythucha agalma Drake and Cobben, 1960

Comments: Drake and Cobben (1960) originally described this species from Guatemala and from the Island of Saba in the Netherlands Antilles. The specimens listed below from Panama represent a new country record.

Specimens examined: PANAMA: Chiriqui Prov: Lagunas del Volcan, 5km SW Volcan, 4220 ft 0845' 52"N, 8240' 33"W, 30-VII-4-VIII-1999, Malaise, Gillogly & Woolley, 99/068 (3♀ TAMU).

Host plant: Drake and Cobben (1960) indicated that their specimens were collected on a plant in the family Asteraceae, probably a species of *Vernonia*.

Corythucha championi Drake and Cobben, 1960

Comments: Drake and Cobben (1960) indicated that Champion (1897) “confused four species of the Genus *Corythucha* with the type specimen of *decens* Stål”, including this one in which they described as new. A result of this confusion is that a number of subsequent records of *C. decens* actually are applicable to this species. The type locality for this species is Curaçao in the Netherland Antilles, but they also included paratypes from Colombia, El Salvador, Guatemala, Mexico (Veracruz), and the United States (Pennsylvania). The specimens listed below from Costa Rica represent a new record for that country.

Specimens examined: GUATEMALA: Los Cerritos, 5-VII-[19]44, E. J. Hambleton (1♂ FMNH). COSTA RICA: Prov. Puntarenas: Punta Leona, Bosque situado al NO [Norto Oeste] del Hotel, 0-100m, 11- XI-2004, J. Azofeifa Zuñiga, Red Noyes, L_N_187227_464509 #79182 (1 INBio); Prov. Guanacaste: P.N. Palo Verde, Bagaces, Alred. Estación Palo Verde, 10.35N, -

85.352778W, 10 - 50m, 15-IX-2004, M. Moraga, Red Noyes, L_N_259098_388353 #78877 (1 INBio).

Host plants: Drake and Cobben (1960) listed two plant species as host, both in the family Malvaceae: *Abutilon umbellatum* and *Ayenia magna*.

Corythucha gossypii (Fabricius, 1794)

Comments: This is a common and widespread species, and has been recorded from the southern United States, Mexico, Central America, the West Indies, and northern South America. It has been recorded from all three countries included in the study region for this work: Costa Rica (Leonard and Mills 1931), Nicaragua (Drake and Hambleton 1945), and Panama (Leonard and Mills 1931). The specimens listed below from Belize represent a new country record.

Specimens examined: UNITED STATES: Puerto Rico, Guanica Forest, Hwy 334, 28-V-1986, E. G. Riley & D. A. Rider (1♀DARC). MEXICO: Quintana Roo, Cancun, 19-VIII-2010, D. A. Rider (4♂17♀DARC). GUATEMALA: [Dept. Solola] Lk. Atitlan, 17-XI-1975 (2♂2♀ WIRC); Guatemala City, 22-VII-1931, D. M. Bates, 612 (1♂AMNH); Antigua 1500-1600m, VII-1980, N. H. L. Krauss (1♂ AMNH). BELIZE: San Pedro Sula, VIII-1975, N. L. H. Krauss (1♂2♀ AMNH); Belize, 0-20m, VII-1975, N. H. L. Krauss (1♂♀AMNH). HONDURAS: Lancetilla, M. Bates Collector (1♂♀AMNH). COSTA RICA: Limon: Los Diamantes, Guápiles 200m, 20-V-1988, Col. Paul Hanson, *Xanthosoma saggitifolium* (7♂2♀ MZUCR); Limon: Guápiles, 150m, 30-V-1985, A. Solís, Tiquizque (19♂ 5♀ MNCR); Heredia: Santo Domingo, 1200m, Bauhinia, P. Hanson, V-2011 (7♂ 2♀ MZUCR); Puntatenas: Monteverde, 26-V-3-VI-1984, E. Riley, D. Rider, D. LeDoux (14♂8♀DARC). PANAMA: Veraguas Prov. Alto de Piedra, 5.5 Km. West Santa Fe, 24-VI-1996, A. R. Gillogly (1♂ TAMU).

Host plants: *Annona diversifolia*, *Annona muricata*, *Annona squamosa* soursop [Annonaceae], *Atamisquea emarginata*, *Capparis cynophallophora*, *Capparis flexuosa* [Capparaceae], *Arachis hypogaea*, *Cajanus indicus*, *Canavalia ensiformis*, *Cassia emarginata*, *Dahlia* sp., *Erythrina berteroana*, *Ichthyomethia piscipula*, *Phaseolus limensis* [Fabaceae], *Carica papaya* [Caricaceae], *Citrus medica*, lemon, grapefruit, orange, *Xanthoxylum martinicense* [Rutaceae], *Gossypium* sp., *Hibiscus esculentus*, *Hibiscus rosa-sinensis*, *Hibiscus* sp. [Malvaceae], *Jatropha gossypifolia*, *Jatropha multifida*, *Jatropha* sp., *Ricinus communis* [Euphorbiaceae], *Lagenaria leucantha* [Cucurbitaceae], *Musa paradisiaca* [Musaceae], *Prunus persicus* [Rosaceae], *Roystonea regia*, *Xanthosoma saggitifolium*, yautia [Arecaceae], *Solanum lycopersicum*, *Solanum melongena*, *Solanum torvum* [Solanaceae], mango [Anacardiaceae] (Drake and Ruhoff, 1965).

Corythucha palmatis Drake, 1929

Comments: This species was originally described from Costa Rica (Drake 1929), and it has not been reported from outside of that country.

Specimens examined: COSTA RICA: San Jose: 14 mi. N. San Isidro del General, 7300' 10-VII-1974, C. W. & L. O'Brien & G. B. Marshall (1♂ 1♀ CAS).

Host plants: No host plants have been recorded for this species.

Corythucha spinosa (Dugès, 1889)

Comments: This species was originally described from Mexico (Silao de la Victoria, Guanajuato). It has since been reported from Cuba (Guerin-Meneville 1857), California (Van

Duzee 1917), Trinidad and Tobago, and Costa Rica (Drake and Ruhoff, 1965). The specimens listed below from Panama represent a new record for that country.

Specimens examined: MEXICO: Veracruz: Near Montepio, UNAM Biological Station “Los Tuxtlas” 10-16-VI-1981 W. R. Doling, B.M. 1981-411, Tropical rainforest, general collecting (4♂4♀ BMNH). COSTA RICA: Prov. Cartago: Ochozogo. San Nicolás, Finca Kirqua. 9.912884N -83.935777W, 1760m. 4-11-I-2011. W. Porras. Tp. Malaise. L_N_210600_543600 #102550 (1 INBio); Prov. Cartago: Ochozogo. San Nicolás, Finca Kirqua, 9.912884N, -83.935777W, 1760m. 11-I-14-II-2010. W. Porras. Tp. Malaise. L_N_210600_543600 #104340 (1 INBio); Alajuela: 10 km. N of San Pedro, 26-VII-[19]90; Coll: by G. M. Chamberlain (1♀ TAMU); Rincon Nat. Park, 1-III-1983, J. H. Martin, B. M. 1983-478 (1♂♀ BMNH). PANAMA: Chiriqui: Boquette, R. P., 20-V-1962, H. Ruckes (1♂♀ AMNH); Chiriqui: 4 Km. W. Colcancito Volcan Baru, 1330m., 3-VII-1996, Gillogly & Schaffner (6♂ 3♀ TAMU); Prov. Chiriqui: 4 km. W. Volcancito, Volcan Baru, 1330 m. 3-VII-1996, Gillogly & Schaffner (46♂ 23♀ TAMU); Prov. Chiriqui: 3.5 km. ne. Santa Clara, 1450 m., 5-7-VII-1996, Gillogly & Schaffner (32 ♂11♀ 2? TAMU); Prov. Chiriqui: 4 km. W. Volcancito, Volcan Baru, 1330 m, 3-VII-1996, Gillogly & Schaffner (26♂7♀ TAMU).

Host plants: *Bambusa sp.* [Poaceae] (Drake and Brunner 1924), *Lantana camara* [Verbenaceae] (Perkins and Swezey 1924), *Ricinus communis* [Euphorbiaceae] (Dugès 1889), *Solanum torvum* [Solaneace] and *Triumfetta grossulariaefolia* [Malvaceae] (Bruner, Scaramuzza and Otero 1945).

Corythucha unifasciata Champion, 1897

Comments: Champion (1897 originally described this species from Mexico (Morelos), Guatemala, and Panama. There are no other country records for this species.

Specimens examined: GUATEMALA: Baja Verapaz: Finca Santa Rosa, 12-X-2006, R. Turnbow (1♂ UGAC)

Host plant: No host plants have been recorded for this species.

Dichocysta Champion, 1898

Dichocysta pictipes Champion, 1898

Comments: Champion (1898) originally described this species from Guatemala and Panama. It has subsequently been recorded from both Arizona (Heidemann 1899, Barber 1910, Drake 1918b) and Florida (Drake 1918b) in the United States, from Mexico (Drake 1938) and from the Central American countries Costa Rica (Blatchley 1926) and Honduras (Drake 1928c). Drake and Ruhoff (1965) listed this species also from Texas. The specimen listed below from Belize represents a new record for that country.

Specimens examined: MEXICO: Guerrero: 18mi south Chilpancingo, 19-VII-1963, F. D. Parker, L. A. Stange Collectors (1♀ UCDC); Michoacan: 10mi S. Of Uruapan, 11-IV-1990, Ferreira, Schaffner (1♀ TAMU); Tobasco: Tapa, 6-V-1957, R. D. Shenefelt, On Cacao, RDS 57-234 (1♂ WIRC). GUATEMALA: Suchitepequez: Los Tarrales Reserve 700 m., 5-VI-2005, R. Turnbow (3♂3♀ UGAC). BELIZE: S. C. Mile 13 Sothern Highway, 19-VIII-1977, C. W. & L. O'Brien & G. B. Marshall (1♀ CAS). HONDURAS: Francisco Morazon: 3.2 km S. Cataramas, 1-VI-1993, R. Turnbow (1♀ UGAC), Choluteca: 18km W San Marcos de Colon, 6-VIII-1977, C.W. and L.B. O'Brien and G. B. Marshall (1♂ USNM), Atlantia: La Cebia, Curla, 4-IX-1984,

C.W. O'Brien, on Cacao (1♂ USNM). COSTA RICA: Heredia: La Selva Biological Station, 2Km South Pt. Viejo, 16-19-I-1987, J. Negron (1♀ DARC); Prov. Guanacaste: Est. Las Pailas, 800m, P. N. Rincon de la Vieja, 1-22-VII-1992, D. Garcia, L- N 306300_388600 (1 INBio).

Host plant: Cacao [Malvaceae] (Drake 1928c).

Dictyla Stål, 1874

Key to the species of southern Central America

- 1 Paranota reflexed to lateral margin, barely reaching dorsal surface and several rows of areolae spaced from lateral carinae, RM vein slightly curved *Dictyla monotropidia* Stål
- Paranota strongly reflexed to dorsal surface and nearly touching lateral carinae, RM vein strongly curved and "C" shaped *Dictyla c-nigrum* (Champion)

Dictyla c-nigrum Champion, 1898

Comments: Champion (1898) originally described this species, in the genus *Monanthia*, from Nicaragua, Guatemala, and from the Mexican state of Veracruz. Pertinent to the study region covered in this work, this species was subsequently recorded from Costa Rica (Drake 1929, Monte 1941). Drake and Ruhoff (1965) listed this species also from Haiti, Jamaica, Brazil, and Guadeloupe Island. Barber (1939) listed this species from Puerto Rico. The records from Belize, and Honduras represent new country records.

Specimens examined: United States: Puerto Rico: Cayey: Cayey univ. Cayey campus, 2-VIII-1996, 187°N, 66°10'W, T. J. Henry, A. G. Wheeler Jr. Coll. (5♂ 5♀ 2nymphs USNM). MEXICO: Yucatan: 13 mi E Valladolid, 7-VIII-1974, C. W. and L. B. O'Brien and Marshall (4♂

5♀ USNM). BELIZE: La Celba, VI-1981, N. L. H. Krauss, B.M. 1983-240 (4♂ 3♀ BMNH); Belize: Nr airport, 10mi n.w. Belize City. 1-5-VIII-1978, P. S. Broomfield B. M. 1979-33 (1♂ 1♀ BMNH); Toledo: 15 mi. N.W. of Punta Gorda, Big Fall, 30-VIII-1978, P. S. Broomfield B. M. 1979-33 (1♀ BMNH). HONDURAS: Dept. Santa Barbara: La Fe, Inst. Hondurena de Café, 30-V-1993, M. C. Thomas (1♀ FSCA); La Ceiba, Rio Congrejal South, 21-VII-1978, Ric Bessin (1♀ DARC). COSTA RICA: Heredia: Santo Domingo, 1200m, *Cordia spinescens*, P. Hanson, 1-V-2011 (2♂4♀ MZUCR); Cartago: X-1953, N. L. H. Krauss (3♂ AMNH).

Host plant: From Label data listed above: *Cordia spinescens* [Boraginaceae].

Dictyla monotropidia Stål, 1858

Comments: This species was originally described from Rio de Janeiro, Brazil. It has subsequently been recorded from many countries in Central America, the West Indies, and South America. Pertinent to this study, it has been recorded from Costa Rica (Drake 1929), Nicaragua (Maes 1998, Maes and Knudson 2016), and Panama (Champion 1898; Drake 1922, 1932)

Specimens examined: MEXICO: Chiapas: Chicoasen, 4-X-1986, R. Turnbow (1♂♀ UGAC). GUATEMALA: Escuintla 20-VIII-1975, N. L. H. Krauss (1♀ AMNH). HONDURAS: Tela, 0-50m, V-1981, N. L. H. Krauss (1♀ AMNH); Atlantida Dep. Lancetilla Bot. Gardens, 26-V-1993, M. C. Thomas (5♂ 1♀ FSCA). NICARAGUA: Masaya Vic. Laguna de Apoyo 25-XII-1992, Van den Berghe (1♂ CMNH). COSTA RICA: Heredia: Puerto Viejo, La Selva, 100m, 16-XI-1991 P. Hanson, *Cordia* (4♂ MZUCR); San Jose: 18-VII-1956, L. C. Euitert, Cat. No. Univ. Farm 3° (1♀ FSCA); San Jose: 27-VI-1925, Coll. Schmidt (1♂ CMNH); Cartago: Turrialba, 640m, 10-X-1981, Collector: R. Davidson, Beating (1♂ CMNH). PANAMA:

Bocas del Toro, Changuinola, 31-VII-1981, B. K. Dozier (1♂♀ FSCA); Canal Zone, Red Tank, 30-VI-1924, N. Banks (1♂ AMNH); Canal Zone, Fort Kobbe, 4-VI-1985, E. G. Riley (1♀ DARC); Darien: Rio Tuquesa, 4-6-VII-[19]75, 500', Col. Engleman (3♂1♀ USNM).

Host plants: This species has been recorded from several species of *Cordia* [Boraginaceae]: *Cordia alliodora* (Hurd, 1946), *Cordia curassavica* (Silva 1956), *Cordia gerascanthus* (Drake 1926), *Cordia tomentosa* (Monte 1937), *Cordia trichostoma* (Monte 1937), *Cordia* sp. (Drake and Hambleton 1938). It was also recorded from *Jatropha curcas* (Maes and Knudson 2016) [Euphorbaceae] and two species of *Gossypium* [Malvaceae]: *Gossypium barbadense* (Ojeda and Neciosup 1974) and *Gossypium hirsutum* (Fenton 1934). Finally, Swezey (1945) reported that this species was intercepted in Texas on an orchid [Orchadaeae] from Mexico).

Dicysta Champion, 1897

Key to the species of southern Central America

- 1 Paranota in lateral view less than one-third height of hood and median carina
 *Dicysta sagillata* Drake
- Paranota in lateral view nearly as high as hood and median carina *Dicysta vitrea* Champion

Dicysta sagillata Drake, 1922

Comments: Drake (1922) originally described this species from Panama. It was subsequently recorded from Brazil (Monte 1939). The specimens listed below from Costa Rica represent a new record for that country.

Specimens examined: COSTA RICA: Heredia: Estacion Biologico La Selva, 10° 26'N, 84° 01'W, 10-X-1994, FOT/ 21/01-40, *Ilex skutchii* (1♂ DARC); Heredia: Est. Biol. La Selva 10° 26'N, 84° 01'W, 15-X-1994, FUK/ 24/01-40, *Virola koschnyii* (1♂ 2♀ DARC); Heredia: Est. Biol. La Selva 10° 26'N, 84° 01'W, 8-X-1994, FUK/ 19/01-40, *Virola koschnyii* (1♀ DARC); Heredia: Est. Biol. La Selva 10° 26'N, 84° 01'W, 2-XI-1994, 50-150m, FPM/ 31/01-40, *Pentaclethra macroloba* (1♂ DARC). PANAMA: Canal Zone: Colon; Humid Forest, Canopy fogging, 2-14-VII-1979. E. Broadhead *et al.*, on *Spondias mombin* Linnaeus, A few macro-epiphytes on trunk, many lianas on crown. (5♂ BMNH); CZ: Pipeline Rd. Canopy Sample, 11-IV-[19]76, *Luehea seemannii*, Sp. No. GGM/YL (1♀ USNM).

Host plants: The only host plant information recorded prior to this study is that Monte (1939) reported it from an unidentified species of Bignoniaceae. Host plant information from specimens examined in this study: collected by insecticidal fogging of *Ilex skutchii* [Aquifoliaceae], *Luehea seemannii* [Malvaceae], *Pentaclethra macroloba* [Fabaceae], *Spondias mombin* [Anacardiaceae], and *Virola koschnyii* [Myristicaceae].

Dicysta vitera Champion, 1898

Comments: This species was originally described from Panama (Champion 1898). Drake and Ruhoff (1965) listed this species also from Brazil, Peru, and Paraguay.

Specimen examined: PANAMA: CZ: Pipeline Rd. Canopy Knockdown, *Luhea seemanni*, 24-X-1975 (1♂ USNM).

Host plants: This species has been recorded from several host plants, all in the family Bignoniaceae: *Adenocalymna* sp. (Drake and Hambleton 1935), *Mansoa glaziovii* (Drake and

Bondar 1932), *Petastoma formosum* (Monte 1937), and *Petastoma samydoides* (Monte 1937). It is also recorded herein from Canopy fogging of *Luhea seemannii* [Malvaceae].

Eurypharsa Stål, 1873

Key to the species of southern Central America

- 1 Costal margin of wing mostly convex, comprised of many rows of subequal cells, the outer rows infusate then abruptly hyaline to subcostal area
.....*Eurypharsa nobilis* (Guérin-Ménéville)
- Costal margin of wing slightly constricted, comprised of small infusate cells with patches of large hyaline cells near base and apex of discoidal cell.....*Eurypharsa fenestrata* Champion

Eurypharsa fenestrata Champion, 1898

Comments: Champion (1898) originally described this species from Panama; it has not been recorded to date from outside that country. The specimen listed below from Costa Rica represents a new country record.

Specimens examined: COSTA RICA: Heredia: Est. Biol. La Selva 10° 26'N, 84° 01'W, 15-X-1994, FUK/ 24/01-40, *Viola koschnyi* (1♂ DARC).

Host plants: There have been no host plants recorded for this species prior to this study. It is herein recorded from insecticidal fogging of *Viola koschnyi* [Myristicaceae].

Eurypharsa nobilis (Guérin-Méneville, 1844)

Comments: This species was originally described from Bolivia and Colombia (Guérin-Méneville 1844). Drake and Ruhoff (1965) listed this species also from Brazil, and Peru. The specimens listed below from Costa Rica represents a new country record.

Specimens examined: COSTA RICA: Puntarenas: Quepos, P. N. Manuel Antonio 80m, 9.387728N, -84.132806W, 1-31-XII-1991 G. Varela, L-S 370900_448800 (1 INBio); Guanacaste: Santa Rosa National Park, 10.83641N, -85.615491W, 9-14-VI-1978, D. H. Janzen (1 INBio); Limón: R.B. Hitoy Cerere, Send. Espavel, 560m, 9.661438N, -83.030709W, 11-III to 1-IV- 2003, E. Rojas, B. Gamboa, W. Arana, Tp. Malaise #2, L_S_401200_569800 #73629 (1 INBio). BOLIVIA: Santa Cruz Dept: 3.7Km SSE Buena Vista Hotel Flora Y Fauna; ca. 400m, 1729S, 6333W, beating, 28-IV-2004, Cols: A. Cline & J. Wappes (4♂1♀ UMRM).

Host plants: No host plants have been recorded for this species.

Gargaphia Stål, 1862

Key to the species of southern Central America

- 1 Paranota angulate along lateral margin2
- Paranota rounded along lateral margin, not angulate3
- 2(1) Antennae, Pronotum, and Hemelytra with long, fine hairs sutural area of wing biserriate at apex..... *Gargaphia valerioi* Drake
- Antennae, pronotm and hemelytra without long, fine hairs, sutural area of wing triserriate near apex of wing*Gargaphia nigrinervis* Stål
- 3(1) Costal area with four or more rows of areolae4

- Costal area with less than four rows of areolae7
- 4(3) Base of paranota with elongate cell near apex*Gargaphia panamensis* Champion
- Base of paranota with a series of small areolae near apex5
- 5(4) Discoidal cell rectangular at apex (RM and cubitus veins meet at nearly right angle)
..... *Gargaphia manni* Drake and Hurd
- Discoidal cell acute at apex (RM and cubitus veins meet in an acute angle)6
- 6(5) Paranota tri-quadriseriate on apical third; discoidal cell with six or more rows of areolae.....
..... *Gargaphia patricia* (Stål)
- Paranota uniseriate on apical third; discoidal cell with four to five rows of areolae
..... *Gargaphia jucunda* Drake
- 7(3) Costal area completely biseriate8
- Costal are biseriate at base, but appearing triseriate in apical half*Gargaphia paula* Drake
- 8(6) Subcostal area of wing triseriate*Gargaphia interrogationis* Monte
- Subcostal area of wing biseriate *Gargaphia vanduzeei* Gibson

***Gargaphia interrogationis* Monte, 1941**

Comments: This species was originally described from Costa Rica, and it has not been recorded from any other country. The specimens listed below from Panama represent a new record for that country.

Specimens examined: COSTA RICA: Prov. Heredia: La Selva Biological Station, Arboretum, Stream Intercept trap, 26-V-2016. C. De la Rosa. (1? AHKC). PANAMA: Canal Zone: Colon: Humid Forest, Canopy fogging, 2-14-VII-1979, E. Broadhead et al. B.M. 1979-

125; on *Luehea seemannii* T. & P.; no macro epiphytes on trunk, some lianas on crown (1♂♀ BMNH).

Host plant: None have been recorded in the literature. The two specimens listed above from Panama were collected from Insecticidal fogging of *Luehea seemannii* [Malvaceae].

Gargaphia jucunda Drake and Hambleton, 1942

Comments: Drake and Hambleton (1942) originally described this species from Panama; this remains the only country recorded for this species. The specimen listed below from Costa Rica represents a new country record.

Specimens examined: COSTA RICA: Puntarenas: Las Alturas Field Station, 20km N. San Vito de Hava, 26-30-III-[19]91, DeVries 1400m, Malaise Trap (1♂ AMNH).

Host plant: No host plants have been recorded for this species.

Gargaphia manni Drake and Hurd, 1945

Comments: Drake and Hurd (1945) originally described this species from Bolivia, and no records outside of that country have been published. Smith (1996), in an unpublished dissertation examined a specimen (conserved in the USNM) from El Salvador, but the specimen is currently missing, so this record cannot be confirmed. Although no records or specimens are known from the study area covered by this work, this species is included because it has been recorded both north and south of the study area.

Specimens examined: Holotype: BOLIVIA: Wuachi; W. M. Mann collector; Mulford Bio Expl 1921-22; Type No. 57236 USNM (1♂ USNM)

Host plant: No host plants have been recorded for this species.

Gargaphia nigrinervis Stål, 1873

Comments: The type locality for this species is in Colombia (Stål 1873). From the study area covered in this work, this species has been recorded from Nicaragua (Maes and Knudson 2016) and Panama (Champion 1897). Drake and Ruhoff (1965) listed this species also from Venezuela, Peru, Guatemala, and the Netherlands Antilles (Aruba, Curacao, Bonaire). The specimens listed below from Costa Rica represents a new record for that country.

Specimens examined: NICARAGUA: Chinandega, Coll. Baker; California Academy of Sciences collection, 1980 gift from Pomona College (2♂ 2♀ CASC). COSTA RICA: Puntarenas, Cabo Blanco, Absolute Reserve 0-200m, N09°34.7 W085°08.2, I-2006, P. Careless (1♂ UGACR); Prov. Puntarenas: Lepanto, Estación Karen Mogensen, 315m, 6 OCT 2003, D. Briceño, M. Solís, Red Noyes, L_N_205300_419750 #75606 (1 INBio). PANAMA: Gatun C. Z., III-1930, Tres Rios Plantation, T. O. Zschokke Collector (1♂ 2♀ CASC).

Host plants: *Jatropha urens* [Euphorbiaceae] (Drake and Cobben 1960), and *Solanum* sp. [Solanaceae] (Monte 1940c).

Gargaphia panamensis Champion, 1897

Comments Champion (1897) originally described this species from Panama; it has not been recorded from any other country. The specimens listed below from Costa Rica represents a new country record.

Specimens examined: COSTA RICA: Heredia: Estacion Biologico La Selva, 10° 26'N, 84° 01'W, 10-X-1994, FOT/ 21/01-40, *Ilex skutchii* (1♂ DARC); Prov. Alajuela. Guatuso. Buenavista. Fca. La Garroba 93m. 13-30-I-2010. J. A. Azofeifa, M. A. Zumbado. Tp. Malaise. L_N_309080_439154 #98713 (1 INBio); Prov. Alajuela: Guatuso. Buenavista. Fca. La Garroba. 93m. 13-16-IV-2010. J. A. Azofeifa, M. Moraga. Tp. Malaise. L_N_309080_439154 #98773 (1 INBio). PANAMA: Prov. Colon: Fort Sherman, 19-VII-1999, 180ft. 9° 19'41"N, 79° 57'13"W, J. B. Woolley 99/038 (1♂2♀ TAMU); Prov. Colon: Rio Guanche, 5km S Portobelo, N 9°30.202', W79° 39.903', 18-VII-1999, el. 100ft., J. B. Woolley 99/031 (1♂ 1♀ TAMU); Canal Zone: Barro Colorado Isl. 20-IV-[19]84, Col: Marina Wong; Dodge Engleman Collection (1♂ USNM); Veraguas: Alta Piedra, Santa Fe, 850m el. 11-16-VIII-2012, Coll: J. B. Heppner (1♀ JMLC/FSCA).

Host plant: No host plant records have been listed to date. One of the specimens listed above was collected on *Ilex skutchii* [Aquifoliaceae].

Gargaphia patricia (Stål, 1862)

Comments: Stål (1862) originally described this species in the genus *Monanthia* from Veracruz, Mexico. *Gargaphia patricia* has been recorded from all three countries included in the present study area: Costa Rica (Monte 1941, Maes and Knudson 2016), Nicaragua (Maes and Knudson 2016), and Panama (Champion 1897). Drake and Ruhoff (1965) listed this species also from Guatemala, Colombia, Venezuela, and Argentina.. The specimens listed below from El Salvador represents a new record for that country.

Specimens examined: EL SALVADOR: Santa Tecla: 444-520B, 4-VII-[19]55, M. S. V. (3♂ 3♀ UMRM). NICARAGUA: San Marcos, Coll: Baker; California Academy of Sciences Collection 1980 Gift from Pomona College (1♀ CAS). COSTA RICA: Cartago: San Ramón de tres Ríos, Parque del Este, 22-VII-1989, Angel solís (1♂ MNCR); Prov. San Jose: Escazu, Cerro Sn Miguel, R. Agres, 1500m, I Curso Microlepidop., VIII-1990, L- N 207500_522000 (5 INBio); Prov. Limon: Amubri, 70m, Talamanca, 12-30-X-1992, G. Gallardo L- S 385500_578050 (1 INBio); Prov. Guanacaste: Estacion Pitilla 9 km. S. de Santa Cecilia, 700m. ENE 1995. C. Moraga, L_N_329950_380450 #4354 (1 INBio); Prov. San José: Santa Ana. Z.P. Cerros de Escazú. Camino a Bebedero. 1640m. 5-IV-2007. M. A. Zumbado. Colecta Libre. L_N_209000_518500 #96026 (5 INBio); Prov. Cartago: Ochomogo. San Nicolás, Finca Kirqua. 1760m. 23- XII-2010-21-I-2011. W. Porras. Tp. Malaise. L_N_210600_543600 #104341(1 INBio). PANAMA: Chiriqui Prov. Cerro Horqueta Rd. 1 km n. Bouete, Elev. 1300m. 2-VII-1996, Gillogly & Schaffner (2♂ TAMU); Chiriqui: Vulcon Area, 22-V-1973, 1530m, coll. D. Englemann, (1♂ USNM). Canal Zone: Barro Colorado Island, 13-III-1967, #67, P.B. Kannowski (1♂ UNDG).

Host plant: The only host plant information known is a record from an unidentified species of Euphorbiaceae (Monte 1940c).

Gargaphia paula Drake, 1939a

Comments: This species was originally described from Panama (Drake 1939a). It was recently recorded from Costa Rica and Ecuador (Guidoti *et al.* 2014). Drake and Ruhoff (1965) listed this species also from Brazil, and Peru.

Specimens examined: COSTA RICA: Puntarenas: Rincon de Osa, Osa Peninsula 14-16 -July- 1969, Toby Schuh, Janet Crane (3♂ 1♀ AMNH); Prov. Heredia: Puerto Viejo de Sarapiquí, La Selva Biological Research Sta., 24-26-VIII-2010, Col: J. M. Leavengood Jr. (1♂ JMLC); Prov. Alajuela: Caño Negro, R.N.V.S., 20m. 2-14-IX-1994. K. Flores, L_N 450200_319100 #3215 (INBio). PANAMA: 2 Mi S of Chepo, 8-I-1974, J. A. Slater & J. Harrington, James A Slater collection, (3♂ AMNH).

Host plant: Guidoti *et al.* (2014) provided the first host plant information for this species, all of which are from the genus *Arachis* [Fabaceae]: *Arachis appressipila*, *A. glabrata*, *A. helodes*, *A. pintoii*, *A. repens*, *A. vallsii* and from hybrids of *A. pintoii* with the aforementioned species.

Gargaphia valerioi Drake, 1941

Comments This species was originally described from Costa Rica (Drake 1941), and it has not to date been recorded from any other country.

Specimens examined: Holotype: COSTA RICA: La Gloria: alt. 900m.; M. Valerio coll, VII-[19]31; Type No. 55138 (1♂ USNM).

Host plant: No host plants have been recorded for this species.

Gargaphia vanduzzeii Gibson, 1919c

Comments This species was originally described from a single damaged specimen from Costa Rica (Gibson 1919c), and it was later recorded from Cuba (Hurd 1946). This species was not encountered during the present study.

Host plant: No host plants have been recorded for this species.

Leptobrysa Stål, 1873

Leptobrysa decora Drake, 1922

Comments: Drake (1922) originally described this species from Colombia (type locality) and Ecuador. The specimens listed below from Guatemala represent a new record for this country.

Specimens examined: GUATEMALA: Cocales, 15-V-1964, E. J. Hambleton, 44, (1♂1♀ USNM).

Host plants: *Citrus aurantium* [Rutaceae] (Monte 1938) *Lantana camera* [Verbenaceae] (Harley and Kassulke 1971), and *Tectona grandis* [Lamiaceae] (Misra and Sen Sarma 1986).

Leptocysta Stål, 1873

Leptocysta sexnebulosa (Stål, 1873)

Comments: This species was originally described from Rio de Janeiro, Brazil (Stål 1860). It has subsequently been recorded from several South American countries: Colombia, Venezuela, Peru, Argentina, and Paraguay (Drake and Ruhoff). The specimens listed below from Panama and Bolivia represent new records for those countries.

Specimens examined: PANAMA: Prov. Chiriqui: Chiriqui Grande, 19-IX-2007, 08° 56' 32"N, 82° 09' 20"W 30m, Vegetation along road, Beating and sweeping, L. Sekerka & D Windsor lgt. (1♀ BMNH); Los Santos: Las Tablas 11-X-1975, coll. S. Martinez (2♀ USNM). VENEZUELA: Zulia: El Tucuco Perija, 24-VI-1979, R. W. Brooks, A. A. Grigarick, J. McLaughlin, R. O. Schuster (1♂ UCDC). PERU: Tingo Maria: 1km E. of town, at edge of

woodland, 2-5-VIII-1971, P. S. & H. L. Broomfield B.M.1971-486, Forested eastern foothills of the Andes, 2000ft (2♀ BMNH); Tingo Maria: Roadside veg. 2 mi E. of town, 4-VIII-1971, P. S. & H. L. Broomfield B.M.1971-486, Forested eastern foothills of the Andes, 2000ft (1♀ BMNH). BRAZIL: Rondonia: 62 km SW Ariquemes, Nr. Fzda. Rancho Grande, 6-15-XII-1990, D. A. Rider & J. E. Eger (1♀ 2♂ DARC); Rondonia: 62 km SW Ariquemes, Fzda. Rancho Grande, 6-X-1993, C. W. & L. B. O'Brien, at Mercury vapor light (1♀ USNM); Sao Paulo: Cipo, 16-II-1976, V. N. Alin (1♂ DARC). BOLIVIA: Dept. La Paz: 2.47km NE Coroico, -16.170606°, -67.713894°, 11-I-2017, A. H. Knudson & V. Calles Torrez (1♀ AHKC).

Host plants: *Antennaria* sp. (Drake and Hamblton 1934), *Mikania* sp. (Monte 1937), *Vernonia* sp. (Monte 1939) [Asteraceae], and *Ipomoea batatas* (Drake and Hamblton 1934) [Convolvulaceae].

Leptodictya Stål, 1873

Key to the species of Southern Central America

- 1 Hemelytra with a broad basal crossbar of infusate cells.....
.....*Leptodictya bifasciata*, new species
- Hemelytra without a distinct infusate crossbar basally2
- 2(1) Pronotal disk shining black, possibly wax covered; hemelytra completely hyaline, veins mostly devoid of fuscous markings.....3
- Pronotum testaceous to light brown, not shining black; hemelytra with some fuscous marking, or some wing veins infusate8

3(2) Median and occipital cephalic spines extremely long, surpassing or nearly surpassing apex of first antennal segment.....	4
- Median and occipital cephalic spines shorter, not surpassing apex of first antennal segment	6
4(3) Frontal cephalic spines nearly as long as median; costal area of hemelytra four to five areolae wide at widest, discoidal cell with an upraised diagonal crossvein.....	5
- Frontal cephalic spines half as long as median; costal area of hemelytra six areolae wide at widest, discoidal cell lacking an upraised diagonal crossvein	
..... <i>Leptodictya chrysoptera</i> , new species	
5(4) Costal area of hemelytra subequal in width with discoidal cell.....	
..... <i>Leptodictya plana</i> Heidemann	
- Costal area of hemelytra one and a half times as wide as discoidal cell	
..... <i>Leptodictya tabida</i> (Herrich-Schäffer)	
6(3) Costal area four areolae wide at widest.....	<i>Leptodictya bambusae</i> Drake
- Costal area with five or more rows of areolae at widest	7
7(6) Paranota appearing constricted near pronotal collar; suiteral area of hemelytra with four rows of areolae at widest	<i>Leptodictya porrasae</i> , new species
- Paranota not appearing constricted near pronotal collar; suiteral area of hemelytra with three rows of areolae at widest.....	<i>Leptodictya evidens</i> Drake
8(2) Paranota and hemelytra mostly or completely black	9
- Paranota and hemelytra at most infuscate only on apical third	10
9(8) Costal area of hemelytra broad, with seven to eight irregular rows of areolae	

- *Leptodictya circumcincta* Champion
- Costal area of hemelytra narrower, with six irregular rows of areolae
- *Leptodictya nigrina* Monte
- 10(8) Margins of paranota and hemelytra infusate, subcostal extension of hemelytra also
infusate beyond discoidal cell, remainder of wings whitish.....
- *Leptodictya veroae*, new species
- Wing veins infusate on apical third of hemelytra and along margin of costal area 11
- 11(10) Paranota with four rows of areolae when viewed from above
- *Leptodicta kabuto*, new species
- Paranota biseriate when viewed from above 12
- 12(11) Occipital spines nearly as long as first antennal segment *Leptodictya fraterna* Monte
- Occipital spines very short, not reaching one-third the length of first antennal segment . 13
- 13(12) Large, more than 10mm; sutural area of hemelytra with four to five irregular
rows of areolae *Leptodictya gigas*, new species
- Smaller, at most 7mm; sutural area of hemelytra with three irregular rows of areolae
- *Leptodictya cretata* (Champion)

***Leptodictya (Hanuala) bambusae* Drake, 1918a**

Comments: This species was originally described from Puerto Rico (Drake 1918a), and it has subsequently been recorded from several other West Indies Islands, the United States (Texas), Mexico, and several countries in Central America and northern South America (Drake and Ruhoff 1965). Although it has been reported from both north and south of the present study

area, it has not been recorded from any of the three countries covered in this work, nor have I examined specimens from Costa Rica, Nicaragua, or Panama

Specimens examined: EL SALVADOR: San Salvador, 8-S, 4-V-[19]58, P.A.B[erry]. Paul A. Berry Collection. (6♂ 3♀ UMRM).

Host plants: *Bambusa vulgaris* (Drake 1918a), *Dendrocalamus sirictus* (Drake and Ruhoff, 1965), *Saccharum officinarum* (Drake 1926, Bruner *et al.* 1945), maize (Drake and Hambleton 1945) [Poaceae].

Leptodictya bifasciata, new species

Description:

General coloration variegated brownish golden.

Head covered in white wax, with five spines; occipital spines long, twice as long as width of eye, porrect; median spine short, porrect; lower spines long, subequal in length to occipital spines, porrect. Antennae golden-brown; segment one short, stout; segment two slightly shorter, thinner; segment three long, slender, covered with long fine hairs; segment four one-third length of segment three, with long hairs. Bucculae closed apically; rostrum extending to metasternum.

Pronotum brown, covered with white wax, punctate, tricarinate; lateral carinae constricted near middle in dorsal view, low, uniseriate; median carina projecting forward over head as a roof-like structure, low on pronotal disk, slightly higher than lateral carinae, uniseriate, areolae small, but distinct, paranota biseriate, reflexed. Hemelytra broadly ovate, mostly hyaline with fuscous nerves; costal area eight rows wide with small areolae basally, areolae increasing in

size towards apical margins of hemelytra; subcostal area biseriate; discoidal area six areolae wide at widest, elongate, extending to middle of wing; sutural area narrow, three to four areolae wide. Rostral laminae low, uniseriate, subparallel. Legs light brown, subequal in length.

Abdomen light brown. Pygophore elongate, stout; parameres strongly curved, apically pointed, but flattened and much broader basally, thicker part covered with long fine hairs.

Measurements: (n=1): 3.00 long, 1.70 wide, antennal segments one to four, respectively: 0.25, 0.10, 1.20, 0.40.

Specimen examined: Holotype: COSTA RICA: Prov. Guanacaste: Est. Maritza, 600 m, lado O Vol. Orosi, A. Gutierrez, 27-II-10-III-1992, L- N 326900_373000; INBIOCRI 000889400 (1♂ INBio). Holotype will be deposited in the INBio collection.

Host plant: No host plants have been recorded for this species.

Etymology: This species is named for the basal and apical (*bi-*) fuscous crossbars (*-fasciata*) of the hemelytra, a character that is unique to this species of *Leptodictya*.



Figure 2.16: *Leptodictya (Hanuala) bifasciata*, new species. **A.** Dorsal habitus, **B.** Lateral habitus.

Leptodictya chrysoptera, new species

Description:

Broadly ovate, tan to light fuscous.

Head red-brown with five spines; occipital spines porrect, long, surpassing middle of first antennal segment; median spine much longer, extending beyond apex of first antennal segment, porrect; middle lower spines much shorter, extending to middle of first antennal segment, porrect. Antennae light brown; first antennal segment short, second antennal segment shorter, one-third length of segment one; segment three and four wanting. Bucculae continuous anteriorly, produced forward, three to four rows of areolae wide; rostrum long, extending beyond posterior margin of mesosternum, apically fuscous.

Pronotum brown, lightly punctate, tricarinate, carinae subparallel; lateral carinae low, areolate, areolae minute, uniseriate; median carina higher, uniseriate, apically formed into a small hood-like structure; paranota reflexed, biseriate, not touching apices of lateral carinae. Wings ovate; light fuscous tan, areolae hyaline, minutely serrate along basal half of wing margin; costal area seven to eight areolae wide; subcostal area uniseriate; discoidal area six areolae wide at widest, elongate, extending beyond middle of wing; sutural area four areolae wide at widest. Rostral laminae low, subparallel, uniseriate; legs subequal in length, tan; femora thick; tibiae thinner; tarsi dark fuscous.

Abdomen broad, elongate, tan.

Measurements: (n=1): 3.80 long, 2.10 wide. Antennal segments one and two: 0.60, 0.12.

Specimen examined: Holotype: COSTA RICA: Prov. Guanacaste: Carrillo, Playa Hermosa. 0m. 16-19 AGO 1995. J.E. Eger. Manual (red, libre) L_N_284400_352660 #56741; INB0003974047 (1♀ INBio). Holotype will be deposited in the INBio collection.

Host plant: No host plants have been recorded for this species.

Etymology: This species is named for the golden (*chryso-*) colored hemelytra (*-ptera*).



Figure 2.17: *Leptodictya (Hanuala) chrysoptera*, new species. Dorsal habitus.

Leptodictya (Hanuala) circumcincta Champion, 1897

Comments: The type locality for both this species (Champion 1897) and its synonym, *Leptodictya fusca* Drake (1928a), is in Panama. Drake and Ruhoff (1965) listed this species from Ecuador.

Specimens examined: PANAMA: Canal Zone, Curundu, 16-20-VIII-1968, D. H. Habeck, Sweeping. (1♀ FSCA); Panama: Cerro Campana, 850M, 840'N, 7956'W, 7-VII-1977, H. A. Hespénhede (1♂ USNM); Panama province: Cerro Campana, 11-15-V-1980, E. G. Riley, D. LeDoux (2♂ UMRM); Vreraguas: 7mi W. Sona, 7-VII-1974, O'Brien & Marshall (1♂♀ CAS).

Host plant: No host plants are known for this species.

Leptodictya (Hanuala) cretata Champion, 1897

Comments: Champion (1897) originally described this species from Guatemala. It was subsequently recorded from Costa Rica (Drake 1931). The specimens listed below from Panama represent a new country record.

Specimens examined: COSTA RICA: Prov. Puntarenas, Cerro Frantzius. 2134m. 8-VI-1997. R. Villalobos. L_S_334150_574450 #46810 (1 INBio); Prov. Heredia. Sarapiquí. P.N. B. Carrillo, 16Km SSE La Virgen. 1050-1150m. 9-21-III-2001. INBio-OET-ALAS. Malaise, 11/M/03/043. L_N_250000_527100 #97212 (4 INBio); Prov. Heredia: 16km SSE La Virgen, 1050-1150 m, 10°16'N, 84°05'W, 9-14-III-2001, E. G. Riley, Primary forest (2♀ TAMU); Prov. Alajuela. Guatuso. P.N. Volcán Tenorio. Falda Norte V. Tenorio 1 Los Quemados. 1200-1300m. 12-VII-17-VIII-2011. J. A. Azofeifa. Tp. Malaise. L_N_295800_426100 #102737 (1 INBio).

PANAMA: Prov. Chiriqui Rsva. La Fortuna Est. Biológica 3900 ft, 8°43'18"N, 82°14'17"W, 4-10-VIII-1999, J. C. Schaffner (14 ♀ TAMU); Prov. Chiriqui: Reserva La fortuna, Estación Biológica, el 3900 ft, 9-VIII-1999, 8°43'18"N, 82°14'17"W, J. B. Woolley 99/019 (1 ♀ TAMU); Prov. Chiriqui: Rsva. La Fortuna Est. Biológica el 3900 ft. 8°43'18"N, 82°14'17"W, 7-9-I-2001, yellow pan traps, M. Yoder (1 ♀ TAMU); Prov. Chiriqui: Rsva. La Fortuna Est. Biológica 3900 ft, 8°43'18"N, 82°14'17"W, 4-10-VIII-1999, J. C. Schaffner (12 ♂ TAMU). Prov: Chiriqui: Rsva. La fortuna, Est. Biológica el 3900 ft. 8°43'18"N, 82°14'17"W, 7-9-I-2001, yellow pan traps, M. Yoder (1 ♂ TAMU).

Host plant: Bamboo [Poaceae] (Drake and Ruhoff, 1965).

Leptodictya (Hanuala) evidens Drake, 1928a

Comments: Drake (1928a) originally described this species from Panama. Drake and Ruhoff (1965) listed this species also from Peru.

Specimens examined: PERU: Cusco: Keros, Valley Ccosnipata, 1-IV-1952, F. Woytkowski; on *Guadua* sp.?, Gramineae; J. C. Lutz Col. 1961(1 ♀ USMN).

Host plant: The single specimen examined in this study was listed as from *Guadua* sp. [Poaceae].

Leptodictya (Hanuala) fraterna Monte, 1941

Comments: This species was originally described from Costa Rica (Monte 1941), and it has not been recorded from any other country. The specimens listed below from Panama represent a new record for that country.

Specimens examined: COSTA RICA: San Jose: Unter blöt tern von bamboose, 1911-1912, H. Schmidt. Leg, 6-3-1913 (1♀ USNM). San Jose: 20-VIII-1944, E. J. Hambleton (19♂ 8♀ USNM); San Jose: 8km w La Caja, Schmidt 1930 (3♂ USNM). PANAMA: R. P., Chiriqui: Cerro Punta, 10-V-1962, H. Ruckes (1♂ 1♀ AMNH); Chiriqui Pr: PN Volcan Baru, 5 km E Cerro Punta, 8°50'17"N, 82°32'9"W, 2750m, 31-VII-1999, JB Woolley 99/071 (16♂ 9♀ TAMU).

Host plant: Bamboo [Poaceae] (Drake and Hambleton 1945), and also cited as such above.

Leptodictya gigas, new species

Description:

Head black, armed with five spines; occipital spines short, adpressed to head; median spine moderately short, downcurving, adpressed to head; frontal spines long; erect, white basally, infusate apically. Bucculae closed anteriorly, triseriate. Antennae long, reaching to basal half of hemelytra when directed posteriorly; segment one long, black; segment two one-fourth as long as one, black; segment three basally black, four to five times longer than segment one; segment four black, one-third length of segment three.

Pronotum black, pitted, with some whitish wax, tricarinate; median carina tall anterior of pronotal disk; lateral carinae low, uniseriate; pronotal collar inflated to form a tumid hood covering head in dorsal view, as tall as median carina median carina of hood infusate; paranota reflexed, biseriate above, triseriate below white veins, cells hyaline, outer margin infusate. Hemelytra broad, veins mostly white, areolae hyaline, mixed with infusate veins and some cells; costal area broad, with eight to ten rows of areolae opposite discoidal cell, outer row of

areolae infusate, thenceforth hyaline, veins infusate apically, but cells hyaline; subcostal area of hemelytra biseriate, with two regular rows of cells, veins infusate except small area near apex of discoidal cell; discoidal cell with six to seven rows of cells. Rostral laminae biseriate, subparallel on prothorax and mesothorax, on metathorax anteriorly broadening, but then directed inwards. Thorax dark black; coxae black; trochanter, femora, and, tibiae dark amber; tarsi infusate. Ostiolar peritreme elongate, narrow.

Abdomen black Subgenital plate brown, genital plates excavate apically.

Measurements: (n=1): Length: 5.72, width: 3.11, length of antennal segments one through four, respectively: 0.27, 0.155, 1.52, 0.56.

Specimen examined: Holotype: COSTA RICA: Cartago: Turrialba, 610m. 3-VI-1973, Ginter Ekis (1♀ USNM).

Host plant: No host plants have been recorded for this species.

Etymology: This species is named for its exceptionally large (*giga-*) size.

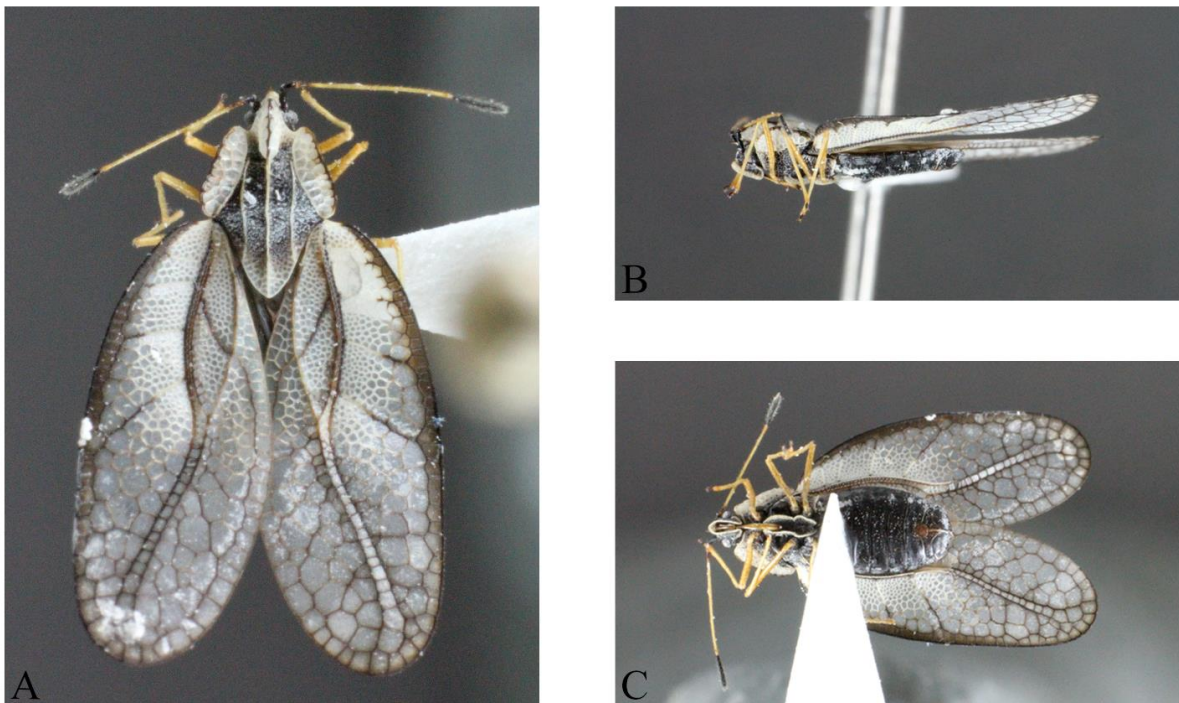


Figure 2.18: *Leptodictya (Hanuala) gigas*, new species. **A.** Dorsal habitus, **B.** Lateral habitus, **C.** Ventral habitus.

Leptodictya kabuto, new species

Description:

Head black, with five spines; occipital spines stout at base, protruding sharply, porrect, reaching beyond antennal base, brown with black tips; median spine downcurved, brown, infusate apically; frontal spines subequal in length with median spine, but half as long as first antennal segment. Eyes large, oblong. First antennal segment long, stout, black; second antennal segment two-thirds as wide as first, half as long as first; segment three extremely long, five to six times as long as segment one, yellow, with regularly spaced short, stout hairs; segment four moderately long, one-fourth to one-third as long as segment three. Bucculae closed apically, triseriate, mostly black, but yellowish apically. Rostrum moderately long, slightly surpassing

mesocoxae, first segment black, tip yellow; second segment basally black, then yellow-brown; third segment yellow-brown; fourth segment basally yellow brown, black apically.

Pronotum black, punctate, tricarinate, pores with some wax; pronotal collar produced in a tumidly inflated hood, covering base of head; median carina tall, especially cephalad of pronotal disk, uniseriate, infuscate along apical margin; lateral carinae half as tall as median; paranota reflexed, outer margin infuscate, cells hyaline, triseriate dorsally, biseriate with occasional intercalary cells ventrally; posterior triangular projection white, areolate, areolae hyaline.

Hemelytra long, ovate, veins whitish basally, infuscate beyond abdomen; costal area of hemelytra broad, nine to ten row wide at widest, cells infuscate apically, veins infuscate; subcostal area biseriate, white testaceous; subcostal extension uniseriate, cells and veins infuscate; discoidal cell eight to nine rows wide at widest, oblong, elongate, reaching apes of abdomen, transverse vein with mild infuscation; sutural area four to five rows wide at widest, with pentagonal to hexagonal cells, veins infuscate, cells hyaline; hypocosta uniseriate, hyaline.

Thorax black; ostiolar peritreme elongate, ovate, projecting outward basally black, but outward projections yellowish. Rostral laminae biseriate, basal row infuscate, second row hyaline with white veins, subparallel along mesothorax, converging and closed behind on metathorax.

Sclerites above meso and metacoxae black, but yellow near vertical sutures. Coxae concolorous with thorax; legs yellow brownish, slightly darker than rostral laminae; mesothoracic legs shortest, prothoracic and metathoracic legs longer and subequal in length; trochanters, femora and tibiae brownish; tibiae with two regular rows of hairs; tarsi black, second tarsal segment with hairs ventrally.

Abdomen black, stout, elongate, much wider than thorax. Basal subgenital plate, lightly brown, mostly black; genital plates black; slightly excavate, protruding outward, covered with short regular hairs.

Measurements: (n=1): Length: 5.01, width: 2.45, length of antennal segments one through four, respectively: 0.27, 0.12, 1.66, 0.54.

Specimens Examined: Holotype: PANAMA: Prov. Chiriqui: Contental Divide Trail, n. Las Nubes, 14-16-VI-[19]95, elev. 2350-2490m., A. R. Gillogly (1♀ TAMU). Holotype will be deposited in the TAMU holotype Collection.

Host plant: No host plants have been recorded for this species.

Etymology: This species is named after a samurai helmet or a kabuto, because of the pronotal hood and the long cephalic spines.



Figure 2.19: *Leptodictya (Hanuala) kabuto*, new species. **A.** Dorsal habitus, **B.** Ventral habitus.

Leptodictya (Hanuala) nigra Monte, 1941

Comments: This species was originally described from Alajuela, Costa Rica, and it has apparently not been encountered since. No specimens were examined during the present study.

Host plant: No host plants have been recorded for this species.

Leptodictya (Hanuala) plana Heidemann, 1913

Comments: The type locality for this species is Oklahoma in the United States. Drake and Ruhoff (1965) also listed this species from several other states in the U. S. (Alabama, Florida, Mississippi, Kansas, Texas) and Mexico. Wheeler (2008) reported this species from Arizona and New Mexico. Maes and Knudson (2016) listed this species from Nicaragua.

Specimens examined: MEXICO: Sonora: 12 mi N Benjamin Hill, 2-X-2008, R. Ternbow (2♂ 1♀ UGAC).

Host plant: Graminae [Poaceae] (Drake and Ruhoff 1965). *Pennisetum ciliare* *Setaria leucopila* and *Muhlenbergia rigens* (Wheeler 2008).

Leptodictya porrasae, new species

Description:

Small, elongate, ovate, light fuscous.

Head black with five spines; occipital spines porrect, short, barely surpassing eye; median spine shorter, slightly erect; middle lower spines longer, extending to half the length of the first antennal segment, porrect. Antennae dark brown to black; first antennal segment short, second antennal segment shorter, half as long as segment one; segment three long, clothed with stiff

short hairs; segment four black, shorter, one-third the length of segment three, with longer stiff hairs. Bucculae continuous anteriorly, three to four rows of areolae wide; rostrum long, extending to apical margin of mesosternum, apically fuscous.

Pronotum lightly punctate, tricarinate, carinae subparallel; lateral carinae low, indistinctly areolate; median carina higher, uniseriate, apically formed into a small hood-like structure; paranota reflexed, biseriate, touching apices of lateral carinae. Hemelytra ovate; light fuscous tan, areolae hyaline, minutely serrate along basal half of wing margin; costal area four to five areolae wide; subcostal area biseriate; discoidal area six areolae wide at widest, elongate, extending to middle of wing; sutural area five areolae wide at widest. Rostral laminae prominent, subparallel, uniseriate. Legs subequal in length, brown; femora thick; tibiae thinner; tarsi dark fuscous.

Abdomen narrow, elongate, black, short fine hairs present near spiracles.

Measurements: (n=5) 3.60-3.90 long, 1.70-1.90 wide, antennal segments one through four, respectively: 0.18-0.21, 0.10-0.12, 1.20-1.27, 0.45-0.51. Holotype: 3.80 long, 1.80 wide, antennal segments one through four, respectively: 0.20, 0.12, 1.25, 0.50.

Specimens examined: Holotype: COSTA RICA. Prov. Cartago: Ochomogo, San Nicolás, Finca Kirqua, 1760m. 3-23-II-2011, W. Porras. Tp. Malaise. L_N_210600_543600 #102550 (1♂ INBio). Paratypes: Same data as holotype (12 INBio). COSTA RICA. Prov. Cartago: Ochomogo, San Nicolás, Finca Kirqua, 1760m. 4-11-I-2011, W. Porras. Tp. Malaise. L_N_210600_543600 #102550 (5 INBio); Prov. Cartago: Ochomogo, San Nicolás, Finca Kirqua, 1760m. 28-III-1-IV-2011, W. Porras. Tp. Malaise. L_N_210600_543600 #102550 (11 INBio); Prov. Cartago: Ochomogo, San Nicolás, Finca Kirqua, 1760m. 22-30-XI-2010, W.

Porras. Tp. Malaise. L_N_210600_543600 #102550 (5 INBio); Prov. Cartago: Ochomogo, San Nicolás, Finca Kirqua, 1760m. 23-XII-21-1-2011, W. Porras. Tp. Malaise. L_N_210600_543600 #102550 (8 INBio); Prov. Cartago: Ochomogo, San Nicolás, Finca Kirqua, 1760m. 5-XII-2010, W. Porras. Tp. Malaise. L_N_210600_543600 #102550 (3 INBio); Prov. Cartago: Ochomogo, San Nicolás, Finca Kirqua, 1760m. 11-I-14-II-2010, W. Porras. Tp. Malaise. L_N_210600_543600 #102550 (8 INBio); Prov. Cartago: Ochomogo, San Nicolás, Finca Kirqua, 1760m. 21-I-10-II-2011, W. Porras. Tp. Malaise. L_N_210600_543600 #102550 (2 INBio); Prov. Cartago: Paraíso, Cachí, Fca. F13 Dagoberto Badilla Sandoval, 1110m. 14-III-2014, C. Viquez, Aspiradora G-Vac, Gira 8, L_N_199421_555219 #108620 (1 INBio). All type specimens will be deposited in the INBio collection.

Host plant: No host plants have been recorded for this species.

Etymology: This species is named in honor of W. Porras, who collected nearly the entire type series.



Figure 2.20: *Leptodictya (Hanuala) porrasae*, new species. Dorsal habitus.

Leptodictya (Hanuala) tabida (Herrich-Schäffer, 1840)

Comments: Herrich-Schäffer (1840) originally described this species from Mexico. Pertinent to this study, it was subsequently recorded from Panama (Heidemann 1913). Drake and Ruhoff (1965) listed this species also from the U.S. (Texas), Cuba, Guatemala, El Salvador, and Venezuela. The specimens listed below from the Honduras and Costa Rica represent new record for those country records.

Specimens examined: MEXICO: Veracruz: Mpio. Jilotepec, 0.3 mi. N Jilotepec 4060, 14-VI-1997, (3♂1♀ TAMU); Veracruz: Cordoba, 21-IX-1984, C. W. Agnew (1♂ TAMU). HONDURAS: near Choluteca, 15-XII-1982, Ex cult. Sorghum, O. T. Rosenow (3♂1♀5nymphs TAMU). COSTA RICA: Heredia: San Joaquín de Flores, 0.200Km al N de Iglesia. 1054m. 04 ABR-04 May 1995. C. Viquez. Malaise. L_N_519700_220900 #5513 (4 INBio).

Host plants: Bamboo (Drake 1931), maize (Drake 1931), Sugarcane (Maes and Knudon 2016) [Poaceae]. Label data from specimens above: sorghum [Poaceae].

Leptodictya veroae, new species

Description:

Head, thorax, and abdomen mostly black. Hemelytra mostly ivory to white, except a fuscus v in repose.

Head black, covered with minute particles of wax, armed with five spines; occipital spines moderately long, reaching antennal base in dorsal view, mostly white; median spine long erect tubercle, projecting straight forward, apically infuscate; paired frontal spines brownish, sharper, but blunt, slightly shorter than median spine. First antennal segment stout, moderately

long, reaching beyond apex of head, black; second antennal segment black, narrower, two-thirds as wide, half as long as preceding; third antennal segment moderately long, two to three times as long as first antennal segment, basal one-fourth black, fading to yellowish; fourth antennal segment black with minute hairs. Bucculae closed anteriorly, mostly biseriate, with few intercalary cells, basally infusate, apically testaceous. Rostrum reaching between mesocoxae, mostly yellow, basally black.

Pronotum black, covered in white wax, tricarinate; median carinae moderately high, whitish, apically infusate, arching anterior of pronotal disk; pronotal collar produced to form a small hood-like structure, hyaline cells, apically infusate; calli black, with some wax; lateral carinae low, uniseriate; paranota triseriate dorsally; ventrally quadriseriate, mostly yellow white veins with some fuscous markings, cells hyaline. Hemelytra lanceolate near apex, nearly devoid of infuscation; costal area of hemelytra infusate only along outer margin to tornus, eight to ten rows of areolae wide at widest; subcostal area biseriate, veins ivory, cells hyaline; subcostal extension uniseriate, infusate, forming a fuscous v in repose; discoidal cell elongate, six to seven rows wide at widest; RM vein slightly infusate at apex of discoidal cell; sutural area of hemelytra crescentic, six to seven rows of areolae wide at widest, mostly ivory, but cells hyaline, cells infusate near subcostal extension and apex of hemelytra. Thoracic sterna black; rostral laminae biseriate, basally black, apical row ivory, laminae subparallel on mesothorax; crescentic on metathorax. Coxae black; trochanters, femora, tibiae brown; tarsi black; pro- and metathoracic legs subequal in length; mesothoracic leg one-fourth shorter; tibiae with two regular rows of short, fine hairs; tarsi with hairs ventrally.

Abdomen slightly surpassing discoidal cell of hemelytra; sternites smooth. Subgenital plates black; genital plates, excavate apically, slightly quadrate, wax in declivity.

Measurements: (n=2): Length: 3.77-4.38, width: 1.72-1.86, length of antennal segments one through four, respectively: 0.32-0.34, 0.12-0.17, 1.20-1.44, 0.37-0.38. Holotype: Length: 3.77, width: 1.86, length of antennal segments one through four, respectively: 0.32, 0.12, 1.20, 0.38.

Specimens examined: Holotype: PANAMA: Prov. Bocas Del Toro: La Culebra Trail, 3-4 Km. N. Boquete, 1650-1800m. 10-IX-[19]98, A. R. Gillogly (1♂ TAMU) Paratype: PANAMA: Prov. Chiriqui: Continental Divide Trail n. Las Nubes, 14-16-VI-[19]95, elev. 2350-2490m., A. R. Gillogly (1♀ TAMU). Types will be conserved in the TAMU type collection.

Host plant: No host plants have been recorded for this species.

Etymology: This species is named in honor of my wife Veronica “Vero” Calles Torres.

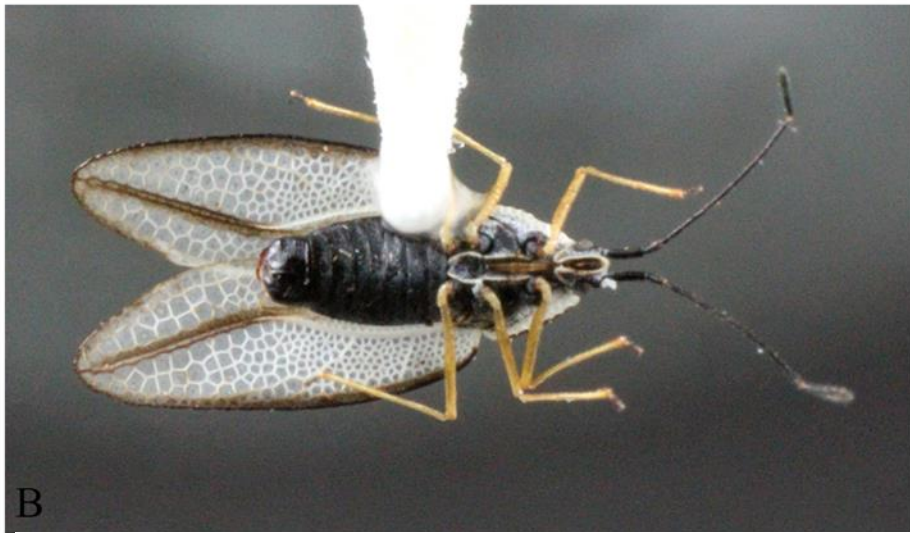


Figure 2.21: *Leptodictya (Hanuala) veroae*, new species. **A.** Dorsal habitus, **B.** Ventral habitus.

Leptopharsa Stål, 1873

Key to the species of southern Central America

- 1 Costal area of hemelytra with a basal cross bar2
- Costal area of hemelytra without a basal cross bar3
- 2(1) Costal area of hemelytra mostly biseriate and constricted near middle
..... *Leptopharsa constricta* (Champion)
- Costal area of hemelytra tri to quadriseriate; not constricted near middle
..... *Leptopharsa bifasciata* (Champion)
- 3(1) Hemelytra broad, costal area with four or more rows of areolae at widest4
- Hemelytra narrower, costal area of hemelytra with no more than three rows of areolae at
widest.....7
- 4(3) Hemelytra and paranota devoid of fuscous markings.....
.....*Leptopharsa specter*, new species
- Hemelytra with at least a few veins infuscate5
- 5(4) Abdomen covered in wax*Leptopharsa cerosoma*, new species
- Abdomen nearly devoid of wax6
- 6(5) Paranota with at most three rows of areolae, median carina tall and broadly rounded
..... *Leptopharsa acrokurti*, new species
- Paranota with more than four rows of areolae at widest; median carina with two peaks, but
concave between the two peaks*Leptopharsa elata* (Champion)
- 7(3) Pronotum unicarinate *Leptopharsa unicarinata* Champion
- Pronotum tricarinate8

8(7) Sutural area of hemelytra completely overlapping	9
- Sutural area of hemelytra not completely overlapping	12
9(8) Veins of paranota, hood and hemelytra mostly unicolorous	10
- Hemelytra not unicolorous.....	<i>Leptopharsa zeteki</i> Drake
10(9) Pronotal hood, not much taller than pronotal disk; median carina low, with small areolae	
.....	11
- Pronotal hood taller than pronotal disk; carinae tall, with elongate areolae; discoidal cell with four rows of areolae	<i>Leptopharsa lenatis</i> Drake
11(10) Discoidal cell of hemelytra with six or more rows or areolae. <i>Leptopharsa distantis</i> Drake	
- Discoidal cell of hemelytra with four rows of areolae	
.....	<i>Leptopharsa pyrrhopterum</i> , new species
12(8) Costal area of hemelytra with veins mostly fuscous on apical fourth, with occasional fuscous veins basally near discoidal cell.....	13
- Costal area of hemelytra with apical half or more of veins with fuscous markings	20
13(12) Subcostal, discoidal, and sutural areas of hemelytra infuscate	14
- Subcostal, discoidal, and sutural areas of the hemelytra not infuscate.....	16
14(13) Paranota mostly biseriate throughout	15
- Paranota triseriate	<i>Leptopharsa furculata</i> (Champion)
15(14) Discoidal cell of hemelytra with three to four rows of cells, length 2.6 to 3.5 mm	
.....	<i>Leptopharsa divisa</i> (Champion)
- Discoidal cell of hemelytra with four to six rows of cells, length 3.7 to 4.3 mm.....	
.....	<i>Leptopharsa ovantis</i> Drake and Hambleton

16(13) Costal area of hemelytra triseriate at widest	17
- Costal area of hemelytra biseriate at widest.....	18
17(16) Pronotal hood completely covering head in dorsal view; discoidal cell triseriate at widest..	
.....	<i>Leptopharsa triseriata</i> , new species
- Pronotal hood covering base of head in dorsal view; discoidal cell quadriseriate at widest .	
.....	<i>Leptopharsa longipennis</i> (Champion)
18(16) Cells of costal area of hemelytra subequal in size	19
- Outer cells of costal area of hemelytra twice as wide as inner row of cells	
.....	<i>Leptopharsa lineata</i> (Champion)
19(18) Basal antennal segment dark black; apical veins of hemelytra darkly infusate	
.....	<i>Leptopharsa gracilentata</i> (Champion)
- Basal antennal segment testaceous to lightly infusate; apical veins of hemelytra	
testaceous to lightly infusate	<i>Leptopharsa guatemalensis</i> Drake and Poor
20(12) Costal veins of hemelytra completely infusate	
.....	<i>Leptopharsa fuscofasciata</i> (Champion)
- Costal veins of hemelytra mostly infusate along outer row of cells starting near apex of	
discoidal cell and infusate near apical fourth	21

21(20) Pronotal hood globose, extremely tall; median carina two-thirds as tall as pronotal hood, broadly arched; costal area of hemelytra triseriate at widest

..... *Leptopharsa setigera* (Champion)

- Pronotal hood tall, narrow, not globose; median carina as tall as pronotal hood, nearly angulate at apex, then low on posterior triangular projection; costal area of hemelytra quadriseriate at widest *Leptopharsa leavengoodi*, new species

Leptopharsa acrokurti, new species

Description:

Elongate, small, body jet black.

Head black with three spines; median spine erect, half as long as antennal segment one; occipital spines short, adpressed to head. Antennae black except segment three fuscus, beset with short fine hairs; segment one extremely long, stout, three and one-half times longer than segment two; segment two short, stout; segment three long, three times longer than segment one; segment four black, two-thirds the length of segment one. Bucculae contiguous anteriorly, rostrum moderately long, reaching posterior margin of mesosternum.

Pronotum black, coarsely punctate, tricarinate; lateral carinae moderately raised, uniseriate, with large rectangular cells; median carina extremely tall, three times taller than lateral carina, with large rectangular cells; hood as tall as median carina, inflated, completely covering head dorsally. Paranota biseriate, each with large apical cell basally. Hemelytra weakly convex along lateral margins, hyaline, dark fuscous band along subcostal extension; costal vein with small spinules along basal half; costal area mostly triseriate, quadriseriate at widest in some

specimens, subcostal area irregularly triseriate at widest, wings tumid along RM vein and discoidal cell; discoidal cell triseriate at widest, not reaching beyond basal third; sutural area three to four areolae wide. Wings extending far beyond apex of abdomen. Rostral laminae low, uniseriate. Legs fuscotestaceous, slender.

Abdominal venter black, with minute hairs.

Measurements: (n=2): 3.00-3.05 long, 1.70-1.75 wide, antennal segments one through four respectively; 0.04-0.05, 0.12-0.13, 1.75-1.77, 0.50-0.55. Holotype: 3.00 long, 1.70 wide, antennal segments one through four respectively; 0.04, 0.12, 1.75, 0.50.

Specimens examined: Holotype: COSTA RICA. Prov. Heredia. Sarapiquí. P.N. B. Carrillo. 16Km SSE La Virgen. 1050-1150m. 9-22-IV-2001. INBio-OET-ALAS. Malaise. 11/M/09/089. L_N_250000_527100 #97156 (1♂INBio). Paratype: COSTA RICA. Prov. Heredia. Sarapiquí. P.N.B. Carrillo, 16Km SSE La Virgen. 1050-1150m. 21-III-2001. INBio-OET-ALAS. Malaise. 11/M/20/060. L_N_250000_527100 #97283 (1♀INBio).

Host plant: No host plants have been recorded for this species.

Etymology: This species is named for the dorsally (*acro-*) curved (*-kurti*) median carina on top of the pronotum.



Figure 2.22: *Leptopharsa acrokurti*, new species. **A.** Dorsal habitus, **B.** Lateral habitus.

Leptopharsa bifasciata (Champion, 1897)

Comments: This species was originally described in the genus *Leptostyla* from Guatemala (Champion 1897), and it has not since been recorded from any other country. The specimens listed below from Mexico and Costa Rica represent new records for those countries.

Specimens examined: MEXICO: Vera Cruz: Tebanca, Lake Catemaco, 8-VI-[19]65, Burke, Meyer, Schaffner (1♂ TAMU). COSTA RICA: Prov. Heredia: Sarapiquí. Z.P. La Selva. Est. Biol. La Selva. 50-150m.3/7/1985. H. A. Hespenehede. L_N_268800_535300 (1 INBio).

Host plant: No host plants have been recorded for this species.

Leptopharsa cerosoma, new species

Description:

Elongate, small, body black, but obscured by white testaceous wax.

Head testaceous with five spines; median spine erect, half as long as antennal segment one; occipital spines long, erect; lower median spines blunt, half as long as median spine. Antennae black except segment three fuscous, beset with long, fine hairs; segment one extremely long, stout, more than four times as long as segment two; segment two short, stout; segment three, fuscous, long, three times as long as segment one; segment four, one-half length of segment one. Buculae contiguous anteriorly, rostrum short, not reaching posterior margin of mesosternum, apical segment very short, truncate, fuscous apically.

Pronotum white, punctate, tricarinate; lateral carinae moderately raised, uniseriate, with large rectangular cells; median carina mostly uniseriate, with intercalary cells, extremely tall, three and one-half times taller than lateral carina, with large rectangular cells; hood almost as tall

as median carina, inflated, completely covering head dorsally; paranota triseriate. Hemelytral apices diverging, convex, hyaline, some light fuscous makings; each costal vein with small spinules along entire outer margins; costal areas mostly triseriate, quadriseriate at widest, subcostal areas biseriate, hemelytra weakly tumid along RM veins and discoidal cells, wax present along sides of RM veins; discoidal cell triseriate at widest, reaching beyond basal third; sutural area three to four areolae wide. Wings extending far beyond apex abdomen. Rostral laminae low, uniseriate, subparallel. Legs basally light fuscous, apical half of femora dark brown; tibiae light brown, slender; tarsi brown.

Abdominal venter white with wax, minute hairs present.

Measurements: (n=1) Holotype: 3.30 long 1.70 wide, antennal segments one through four, respectively: 0.40, 0.12, 1.56, 0.77.

Specimens examined: Holotype: COSTA RICA. Prov. Heredia. Sarapiquí. Z.P. La Selva. Est. Biol. La Selva. 50-150m, 8-VII-1993.H.A.Hespenheide. L_N_268800_535300; INBIO CRI001245417 (1♀INBio). Paratype: COSTA RICA: Prov. Limon, Est. Hitoy Cerere, 100 m, R. Cerere, Res. Biol. Hitoy Cerere, G. Garballo 6-25-XI-1991. L- N 184200_643300; INBIO CRI000524086 (1♂INBio). Specimens will be conserved in the INBio type collection.

Host plant: No host plants have been recorded for this species.

Etymology: This species is named after the wax (*cero-*) covered thorax and abdomen (*-soma*).

Note: Male paratype is missing most of the wax on the body.

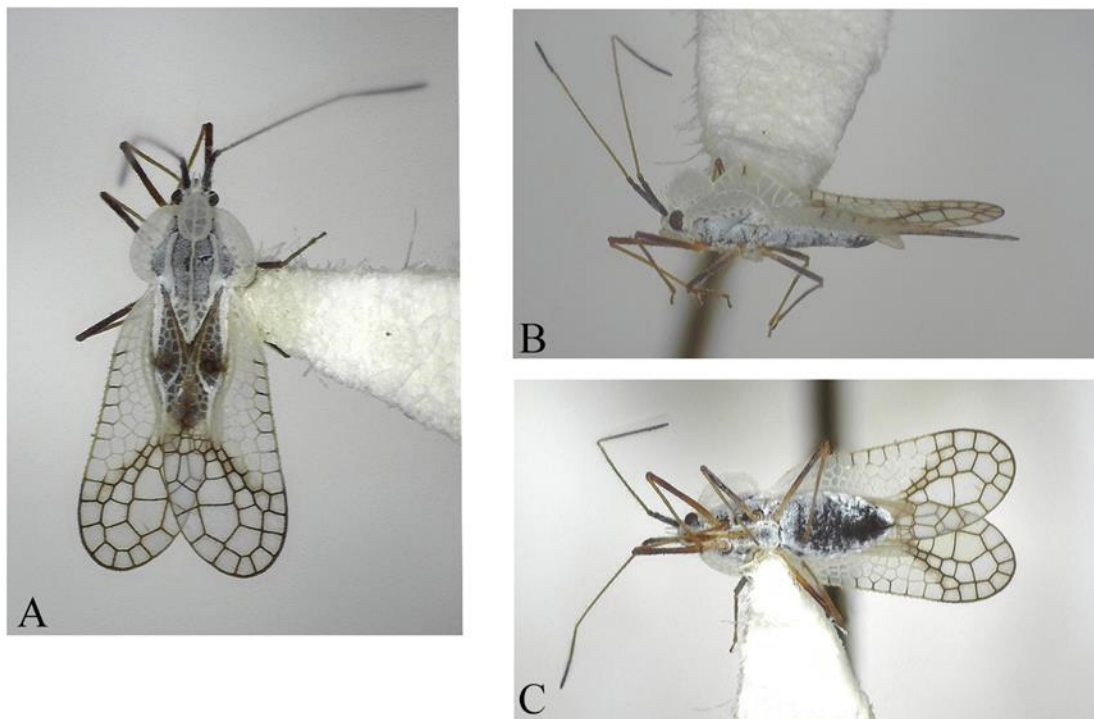


Figure 2.23: *Leptopharsa cerosoma*, new species. **A.** Dorsal habitus, **B.** Lateral habitus, **C.** Ventral habitus.

Leptopharsa constricta (Champion, 1897)

Comments: This species was originally described in the genus *Leptostyla* from Guatemala and Panama (Champion 1897); it was subsequently recorded from Jamaica (Van Duzee 1907). The specimens listed below from Belize represent a new country record.

Specimens examined: BELIZE: Belize: Hattieville Rode, 3km. SW. Belize City, 11-31-VII-1978, P. S. Broomfield, B.M. 1979-33, Clearing in secondary forest (1♂ BMNH); Toledo: Punta Gorda, foot of Saddleback Hill, 17-21-VIII-1978, P. S. Broomfield, B.M. 1979-33, Open Grassland and scrub. (1♂ BMNH). PANAMA: Almirante, 17-VII-1948, E. J. Hambleton (2♂ USNM).

Host plant: No host plants have been recorded for this species.

Leptopharsa distantis Drake, 1928a

Comments: Drake (1928a) originally described this species from San Luis Potosí in Mexico, and it has not been recorded from any other locality since. The specimens listed below from Guatemala, Belize, Honduras, and Costa Rica represent new records for those countries. Drake and Ruhoff (1965) unjustifiably emended the species name to *L. distans*.

Specimens examined: MEXICO: Veracruz, Mpio. Puente National El Crucero, nr. Puente national, 13-VI-1997, Wilson & Woolley, 97/013, screen sweep (1♂ TAMU); Veracruz, Mpio. Puente National El Crucero, nr. Puente national, 13-VI-1997, Wilson & Woolley, 97/013, screen sweep (1♂♀ TAMU). GUATEMALA: Peten, Tikal, Mayan ruins, 23-II-1996, J. H. Martin 6704. Apocynaceae (3♂ 7♀, 3 nymphs BMNH); Antigua, 1500-1600m, V-1980, N. H. L. Krauss (6♂ 4♀ USNM, 2♀ AMNH). BELIZE: Stann Crk Dist, 16 km w. Dangriga, Mama Noots-Bocawina, 16° 55.6'N, 88° 23.8'W, 6-VI-2014, elev. 83m, M. F. Keller (1♂ UCDC). HONDURAS: Atlantida, 15km west of La Ceiba, 9-30-VII-1996. 175m. Malaise trap. R. Lehman (1♀ TAMU). COSTA RICA: Cartago: IX-1953, Collector N. L. H. Krauss (1♀ AMNH).

Host plant: Several of the specimens listed above from Guatemala simply had the family name Apocynaceae on the labels.

Leptopharsa divisa (Champion, 1897)

Comments: The type locality for this species (originally described in the genus *Leptostyla*) is in Panama (Champion 1897). It was subsequently recorded from Costa Rica (Monte 1941) and Guatemala (Drake and Hambleton 1945, 1946).

Specimens examined: PANAMA: Panama: Cerro Jefe, 9-VI-1985, E. Riley & D. Rider (1♂ DARC); Panama: Cerro Campana, 150m, 8°40'N, 79°56'W, 13-V-[19]73, Stockwell (1♀ USNM); Panama: Cerro Campana, 16-VII-[19]76, Wane E. Clarke, 8°40'N, 79°56'W, 820m (1♂ USNM); Coclé: El Valle de Coclé, 16-VIII-1981, Coll. D. Engleman (1♂ USNM).

Host plant: Drake and Hambleton (1946) listed this tingid from “an undetermined species of Rubiaceae.”

Leptopharsa elata (Champion, 1889)

Comments: Champion (1897) originally described this species, in the genus *Leptostyla*, from Guatemala and the Mexican state of Guerrero. Pertinent to the present study area, this species has also been recorded from Costa Rica (Monte 1942a). Drake and Ruhoff (1965) listed this species also from El Salvador.

Specimens examined: EL SALVADOR: S. Tecla, 444-525B, 4-VII-[19]55, M. S.V. Paul A. Berry Collection. (3♂ 3♀ UMRM). COSTA RICA: Guanacaste: la cruz: Santa Elena, Estacion, murcielago, 18-XI-1994, Carolina Cano (2 INBio).

Host plant: One specimen was beaten from *Geonoma* sp. [Areaceae] at La Selva Biological station, but the specimen flew away before it could be collected. Subsequent beating of the same palm and other plants did not provide additional specimens.

Leptopharsa furculata (Champion, 1897)

Comments: Originally placed in the genus *Leptostyla*, this species was described from Guatemala and Panama (Champion 1897). Drake and Ruhoff (1965) listed this species also from Mexico and Costa Rica. The record from Honduras represents a new country record.

Specimens examined: HONDURAS: Dto-Fco, Morazan Monte Uyuca, Nr. Zamorano, 1900m, 1-15-IX-1992, C. Porter & L. Stange (1♂1♀FSCA). COSTA RICA: Heredia: La Selva biol. Sta., 3 Km S Puerto Viejo, 10 26'N, 84 01'W, 23-VIII-1992, H. A. Hespeneide (1♀ MZUCR); Heredia: Serapiqui: La verjen, La isla, 100-200m, 4-V-1-VI-2011, I. Chacon, Malaise trap, LN26617552264#102208 (1♂♀INBio); Heredia: Serapiqui: La isla, 100-200m, 2-VII-2-VIII-2012, I. Chacon, Malaise trap, LN26617552264 #104937 (1♂2♀ INBio); Limon: pococi, Cuatro Esquinas, P.N. Tortueguero, 0m, 30-IX-1989, 10.930083N, -84.608124W (1 INBio); Turrialba: 1-III-1983, J. H. Martin, B.M. 1983-478 (3♂2♀ BMNH); San Jose: 15-IX-1947, E. J. Hambleton; 32 (2♂ USNM). PANAMA: Gamboa: 1-V-[19]72, R.E. Froeschner (1♀ USNM).

Host plant: Recorded in the literature from an undetermined species of Rubiaceae (Hurd 1946).

Leptopharsa fuscofasciata (Champion, 1897)

Comments: The type locality for this species, originally described in the genus *Leptostyla*, is from Bugaba, Panama (Champion 1897). It has not been recorded from any other country.

Specimens examined: PANAMA: Barro Colorado I. 1-III-1983, J. H. Martin, B.M. 1983-478 (1♂ BMNH); Panama: Camino del Oleoducto, 15-II-1999, R. Turnbow (1♂ UGAC).

Host plant: No host plants have been recorded for this species.

Leptoharsa gracilenta (Champion, 1897)

Comments: This species was originally described (in the genus *Leptostyla*) from Guatemala (Champion 1897), and it was subsequently recorded from several localities in Brazil (Drake and Bondar 1932, Drake and Hambleton 1938). The specimen listed below from Panama represent a new country record.

Specimen examined: PANAMA: Canal Zone: Barro Colorado I. 19-VI-1982, R. B. & L. S. Kimsey, De Vac. (1♂ UCDC).

Host plant: *Machaerium stipitatum* [Fabaceae] (Drake and Hambleton, 1938)

Leptoharsa guatemalensis Drake and Poor, 1939

Comments: Drake and Poor (1939) originally described this species from Guatemala. It has not been recorded to date from outside that country. The specimens listed below from Costa Rica represent a new record for that country.

Specimens examined: COSTA RICA: Limon, XI-59, N. L. H. Krauss (5♂ 1♀ USNM)

Host plant: No host plants have been recorded for this species.

Leptoharsa leavengoodi, new species

Description:

General large, median carina extremely tall, hemelytra triangular.

Head black, with five spines; occipital spines erect, directed upwards, long, sharp; median spine long, directed upwards, nearly reaching pronotal hood; paired frontal spines erect, half as long as median spine. Basal antennal segment extremely long, black, with some hairs; second antennal segment short, black, with some hairs; third antennal segment slender, extremely long, two and one-half times as long as segment one; segment four slightly curved, slightly shorter than basal antennal segment. Bucculae biseriate, yellowish; rostrum moderately long reaching mesothorax, but obscured by point.

Pronotum punctate, black, obscured by white wax tricarinate; pronotal collar forming a very tall, tumid hood, covered with long, erect, slender hairs; median carina somewhat hump-shaped, as tall as pronotal hood, uniseriate with one extra cell at apex of disk; paranota biseriate, with a few intercalary cells. Hemelytra elongate, wide, with long slender hairs; costal area of hemelytra mostly devoid of infuscation except along apex and outer margin, quadriseriate; subcostal area biseriate; subcostal extension uniseriate, cells mildly infusate, veins infusate; discoidal cell triseriate, with some infusate veins at apex. Sutural area three to four rows wide at widest, nearly all veins infusate, except those at apex of discoidal cell, cells hyaline, increasing in size to apex; hypocosta uniseriate, with regular row of cells. Thoracic sterna black, obscured by light wax. Rostral laminae uniseriate. Ostiolar peritremes are almost yellowish, apically infusate. Coxae light brown; femora basally yellowish, infusate and brown; all tibiae and tarsi missing.

Abdominal venter black; sutures between segments and seven, and seven and eight, with fringes of wax; venter of segment eight with long fine hairs. Pygophore roughly as wide abdomen; parameres chocolate brown, basally with two to three hairs.

Specimen examined: Holotype: COSTA RICA: Heredia Prov. Puerto Viejo de Sarapiquí: La Selva Biological Research Sta., 24-26-VIII-2010, Col: J. M. Leavengood Jr. (1♂ JMLC).

Measurements: (n=1): Length: 3.26, width: 1.40, height: 0.74, length of antennal segments one through four, respectively: 0.33, 0.11, 1.44, 0.62.

Host plant: No host plants have been recorded for this species.

Etymology: This species is named in honor of its collector John M. Leavengood Jr. (USDA APHIS), who is a friend and fellow bug worker.



Figure 2.24: *Leptopharsa leavengoodi*, new species. **A.** Dorsal habitus, **B.** Lateral habitus.

Leptopharsa lenatis Drake, 1930

Comments: Drake (1930) originally described this species from Peru and Brazil (Santarem). The specimens listed below from Costa Rica represents a new country record. Drake and Ruhoff (1965) unjustifiably emended the species name to *lenitis*.

Specimens examined: COSTA RICA: Prov. Puntarenas: Punta Leona, Bosque situado al NO del Hotel, 0-100m, 11-XI-2004, J. Azofeifa Zuñiga, Red Noyes, L_N_187227_464509 #79182 (1♀ INBio); Prov. Puntarenas: Est. Quebrada Bonita, R.B. Carara, 100m. V-VI-1989. R. Zuniga, L_N_195250_469850 #7434 (1♂ INBio).

Host plant: No host plants have been recorded for this species.

Leptopharsa lineata (Champion, 1897)

Comments: Originally, this species was described in the genus *Leptostyla*; the type locality is in Guatemala (Champion 1897). Drake and Ruhoff (1965) listed this species also from Brazil, Peru, and Argentina. The specimens listed below from Mexico represent a new record for that country.

Specimens examined: MEXICO: Tabasco: 10mi. E. Cardenas, 12-VI-[19]65, Burke, Myer, Schaffner (4♂1♀ TAMU); Tabasco; 15 mi. NE, 4mi. s. Villahermosa, 13-VI-[19]65, Burke, Myer, Schaffner (1♂ TAMU); Tabasco: Tapa, 21. VII-1974, W. F. Chamberlin (1♂ TAMU).

Host plant: Recorded in the literature from Gramineae [Poaceae] (Monte 1939).

Leptopharsa longipennis (Champion, 1897)

Comments: Champion (1897) originally placed this species in the genus *Leptostyla*. The type locality for this species is in Guatemala. It has not since been recorded from any other country. The specimen listed below from Nicaragua represents a new country record.

Specimens examined: GUATEMALA: Baja Verapaz; Cola de Mico on Hwy. 5, 7.5 km S. Jct. CA 14, 1380m. 15° 14' 02"N, 90° 18' 58" W, 8-I-2007, J. R. Jones (1♂3♀ TAMU). NICARAGUA: Matagalpa: Fuente Pura, 1500m, 22-I-1994, Maes/Tellez & Van Den Berghe (1♀ MEL).

Host plant: No host plants have been recorded for this species.

Leptopharsa oventis Drake and Hambleton, 1945

Comments: This species was originally described from Peru (Drake and Hambleton 1945), and it was subsequently recorded from Guatemala (Hurd 1946). The specimens listed below from Costa Rica and Panama represent new records for those countries.

Specimens examined: COSTA RICA: Heredia: La virgen. 1050-1150m, 10° 16'N, 84°05'W, 9-14-III-2001, E. G. Riley, Primary forest. (4♂3♀ TAMU). PANAMA: Prov. Coclé: 3km N. El Valle La Mesa, el. 3050ft. 21-VII-1999, 08° 38' 13"N, 80°07' 28"W, J. B. Wooley 99/045 (1♀ TAMU); Chiriqui Prov. La Fortuna, Est. Biologica. El. 3900' 08° 43' 18"N, 82°14' 17"W, 7-9-I-2001, Yellow Pan traps, M. Yoder (1♀ TAMU).

Host plant: No host plants have been recorded for this species.

Leptopharsa pyrrhopterum, new species

Description:

General red brown, mostly unicolorous, except costal areas of hemelytra.

Head with five spines; brownish; occipital spines long, adpressed to head, reaching base of median spines; median spine darker, brown, downcurved, half as long as first antennal segment; frontal spines concolorous with median spines, both incurving, points converging and nearly touch. Basal antennal segment nearly as long as head, stout; second segment half as long as first; third segment three to four times as long as segment one, yellow; fourth segment subequal in length with first, with some hairs, brownish. Bucculae biseriate, closed apically; rostrum long, reaching posterior margin of mesosternum.

Pronotum unicolorous, brown, punctate; tricarinate median carina highest, lateral carinae scarcely more than carinate; pronotal collar produced to form a tiny hood; calli obscured by wax; paranota biseriate apically, uniseriate at humeral angles. Hemelytra with costal areas lightly yellowish, rest concolorous with pronotum; costal areas regularly biseriate, slightly infusate at tips; subcostal margins biseriate, veins brown, cells hyaline; subcostal extensions uniseriate, cells hyaline, veins brown; discoidal cells four areolae wide at widest, elongate, reaching two-thirds of the distance to abdominal apex; sutural area five to six areolae wide at widest, cells mildly infusate, veins infusate. Each ostiolar peritreme brown, small. Thorasic sterna dark brown. Rostral laminae subparallel on mesosternum, crescentic on metasternum. Legs elongate, mesothoracic legs shortest, prothoracic and metathoracic legs longer; coxae brown, trochanters and the rest of legs yellow.

Abdomen dark brown, pygophore (damaged) ventral view moderately large, slightly elongate, nearly as long as two preceding segments. Female genital plates slightly excavate, directed inwards.

Measurements: (n=2) Length: 2.27-2.33, width: 0.81-0.87, length of antennal segments one through four, respectively: 0.15-0.16, 0.06-0.07, 0.67-0.70, 0.23-0.24. Holotype: Length: 2.33, width: 0.81, length of antennal segments one through four, respectively: 0.16, 0.06, 0.70, 0.24.

Specimens examined: Holotype: COSTA RICA: Heredia: Estacion Biologico La Selva, 10° 26'N, 84° 01'W, 19-X-1994, FOT/ 26/01-40, *Pouteria standleyana* (1♂ DARC), Paratype: Same data (1♀ DARC). Types will be conserved in the USNM.

Host plant: Collected from insecticidal fogging of *Pouteria standleyana* [Sapotaceae]

Etymology: This species is named for the red orange (*pyrrho*) color of the hemelytral (*-ptero*) veins.

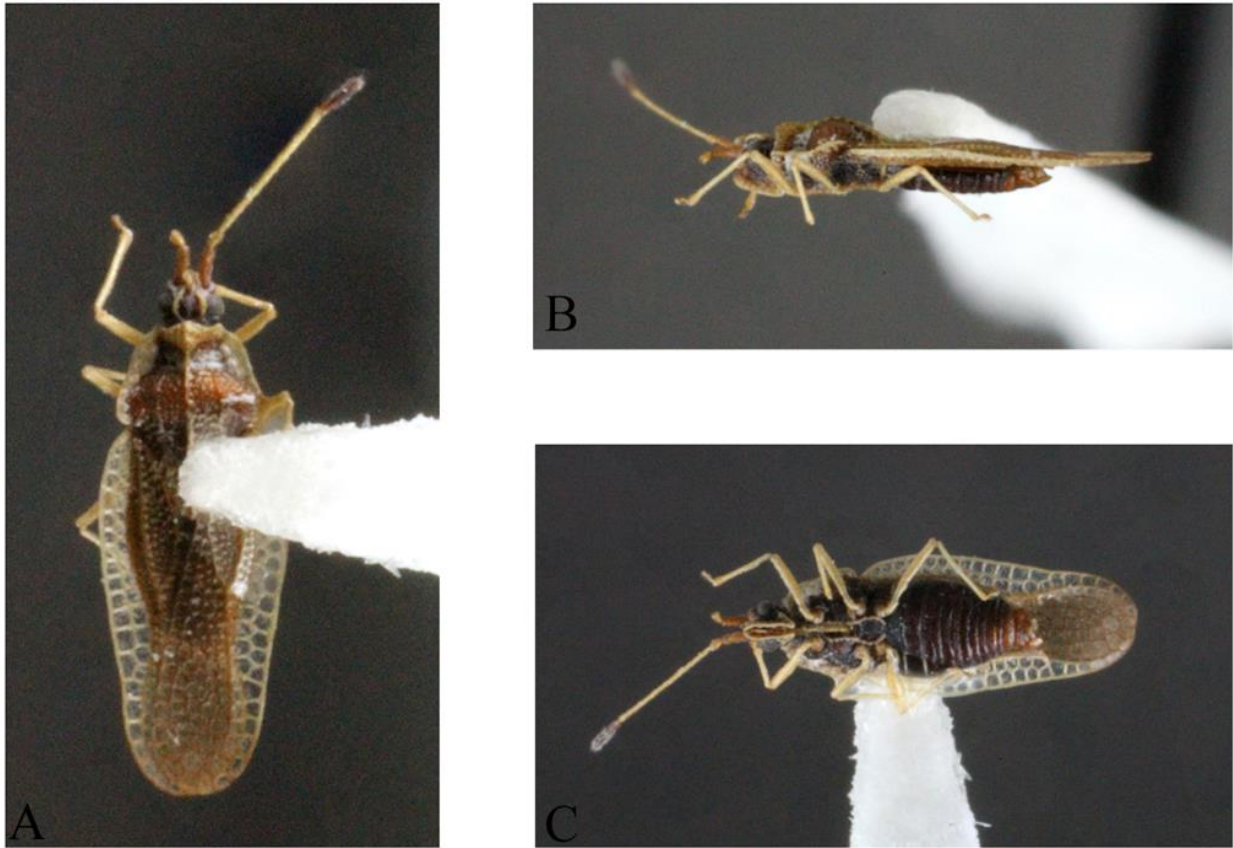


Figure 2.25: *Leptopharsa pyrropterum*, new species. **A.** Dorsal habitus, **B.** Lateral habitus, **C.** Ventral habitus.

Leptopharsa setigera (Champion, 1897)

Comments: Champion (1897) originally described this species in the genus *Leptostyla* from Bugaba, Panama. It has not been recorded from outside of Panama, and no specimens of this species were encountered during the present study.

Host plant: No host plants have been recorded for this species.

Leptopharsa specter, new species

Description:

Mostly unicolorous, light yellow-white.

Head lightly testaceous to yellowish, armed with five spines; occipital spines extremely long, reaching base of first antennal segment, converging and meeting base of median spine, adpressed to head; median spine subequal in length to frontal spines, adpressed to head; frontal spines shorter, directed downward; apices converging. Antennae moderately long, surpassing discoidal cell when directed posteriorly; basal antennal segment moderately long, moderately stout, yellowish; second antennal segment not as stout, one-third as long as basal segment; segment three slender, one and one-half times as long as segment one, with minute hairs; segment four elongate, half as long as segment three, with some minute hairs. Bucculae biseriate, closed apically. Rostrum moderately long reaching posterior margin of mesosternum.

Pronotum coarsely punctate, tricarinate; pronotal collar with small tumid hood, with two row of areolae; calli devoid of wax, sunken; median carina, strongly developed throughout its length, uniseriate, with extremely minute cells; lateral carinae scarcely more than carinate, only present on posterior of pronotal disk and posterior triangular projection; posterior triangular projection areolate; paranota biseriate, outer cells elongate, much longer opposite calli, hyaline. Hemelytra elongate, ovate, unicolorous; costal margin quadriseriate at widest; subcostal area biseriate; subcostal extension uniseriate; discoidal cell poorly developed, quadriseriate at widest; sutural area elongate, biseriate at widest (in holotype), triseriate in paratypes, with large rows of cells; hypocosta uniseriate, with minute regular hairs. Rostral laminae low, wide, uniseriate, subparallel on meso- and mostly on metathorax. Legs unicolorous, subequal in length; tarsi extremely minute, slightly infusate.

Male abdomen short, elongate. Pygophore moderately stout; parameres hook-like with some hairs along outer margin. Female abdomen slightly broader, subgenital plate darker, gonacoxae rounded, not excavate.

Measurements: (n=3) Length: 2.36-2.66, width: 1.27-1.37, length of antennal segments one through four, respectively: 0.22-0.28, 0.09-0.12, 0.88-0.1.07, 0.47-0.55. Holotype: Length: 2.36, width: 1.27, length of antennal segments one through four, respectively: 0.28, 0.09, 0.1.07, 0.52.

Specimens examined: Holotype: COSTA RICA: Alajuela: Cano Negro, Tenideros, 41m, 2-IX-2005, M. Moraga, J. Azofcifa, y. Cardenas, Red de Barrido. L.N. 313346-450130 (1♂ INBio). Paratypes: Same data as holotype: (1♀ INBio). PANAMA: Panama: Las Cumbres, 1-IX-1982, Hank Wolda, Malaise Trap (1♀ UCDC).

Host plant: No host plants have been recorded for this species.

Etymology: This species is named for its uniform pale color which makes this tingid appear ghost like (*specter*) and for my surprise of another new species of *Leptopharsa* appearing from the INBio collection after my initial visit to Costa Rica.

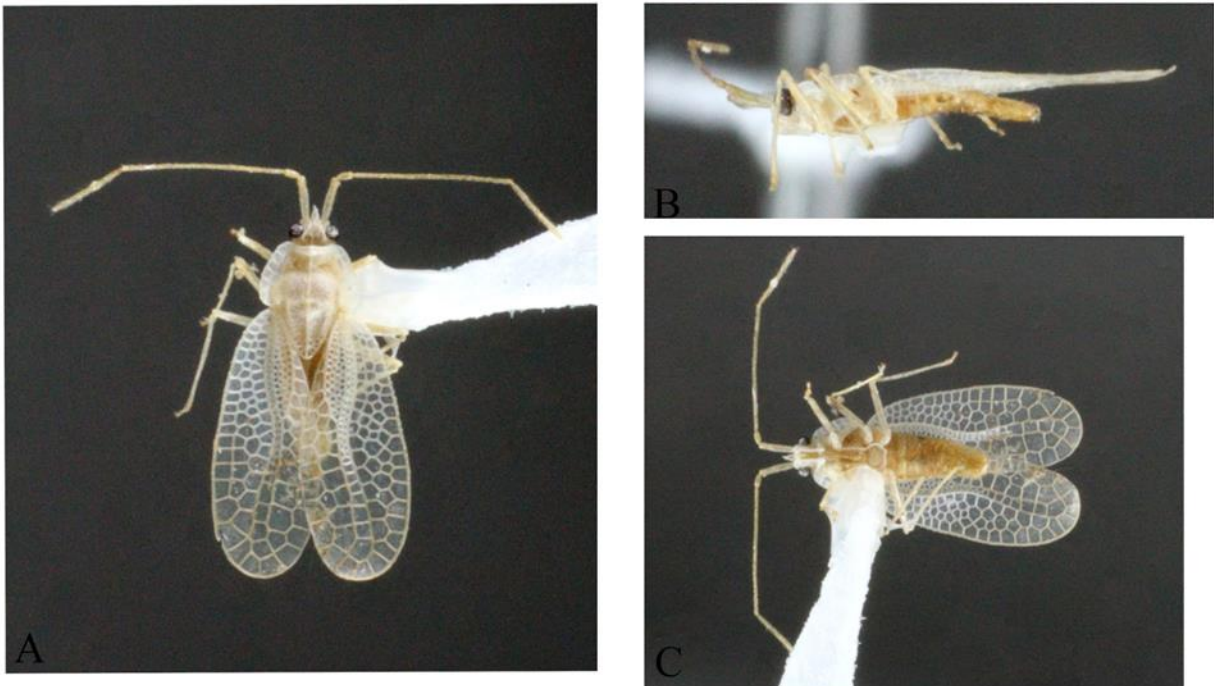


Figure 2.26: *Leptopharsa specter*, new species. **A.** Dorsal habitus, **B.** Lateral habitus, **C.** Ventral habitus.

Leptopharsa triseriata, new species

Description:

General shape triangular, hemelytra constricted.

Head black with three spines; occipital spines elongate; outspreading, apically infusate; median spine erect, basally yellow, apically infusate; antennae moderately long, covered with hairs. Antennae with basal segment elongate, brown, with some wax; second segment one-fourth to one-third as long as basal segment, light brown; third segment three to four times longer than basal antennal segment, lighter than preceding; fourth segment subequal in length to basal segment, darkly infusate. Bucculae biseriata, yellow, closed anteriorly; rostrum moderately long, reaching between mesocoxae, unicolorous light brown.

Pronotum, punctate, obscured by wax, tricarinate; pronotal collar areolate, formed into a tall, tumid hood; median carina as tall as pronotal hood, tallest extent on pronotal disk, infuscate; lateral carinae half as tall as median; posterior triangular projection basally black, apically testaceous; paranota biseriate, reflexed, hyaline. Hemelytra weakly constricted beyond middle; costal areas triseriate, hyaline; subcostal areas biseriate, subvertical; subcostal extensions uniseriate, infuscate; discoidal cells triseriate, hyaline, veins infuscate; sutural area quadriseriate at widest, veins infuscate, cells hyaline, cells on apex extremely large. Wings extending one-fourth beyond apex of abdomen. Rostral laminae uniseriate, widely spreading on meso- and metathorax. Ostiolar peritremes black, elongate, narrow. Thoracic sterna, covered by wax, pitted. Legs subequal in length, covered with some hairs; coxae brown; thenceforth to tarsi yellow brown; tarsi minute; basal segment extremely small; second tarsal segment elongate, finger-like, slightly darker in color.

Abdomen black, covered with some wax, elongate extending slightly beyond discoidal cell. Pygophore prominent; hairs near apex; parameres basally with four to five hairs, sickle-shaped.

Measurements: (n=5) Length: 2.40-2.51, width: 1.01-1.05, length of antennal segments one through four, respectively: 0.15-0.16, 0.05-0.06, 1.11-1.21, 0.38-0.40. Holotype: Length: 2.40, width: 1.01, length of antennal segments one through four, respectively: 0.15, 0.05, 1.11, 0.38.

Specimens examined: PANAMA: Canal Zone: Panama City, Monsoon forest, Canopy fogging, 15-30-VII-1979, On *Spondias mombin* Linnaeus, E. Broadhead et al. B. M. 1979-125, A few macro epiphytes on trunk many lianas on crown (1♂ BMNH). Paratypes: Same data as

holotype (2♂6♀ BMNH); Canal Zone: Colon, Humid forest, Canopy fogging, 2-14-VII-1979, On *Spondias mombin* Linnaeus, E. Broadhead et al. B. M. 1979-125 No macro epiphytes on trunk many lianas on crown. (1♂2♀ BMNH).

Host plant: Collected by insectidal fogging of *Spondias mombin* [Anacardiaceae].

Etymology: This species is named for the triseriate (*triseriata*) discoidal cell which separates this species from *Leptopharsa longipennis* Champion.

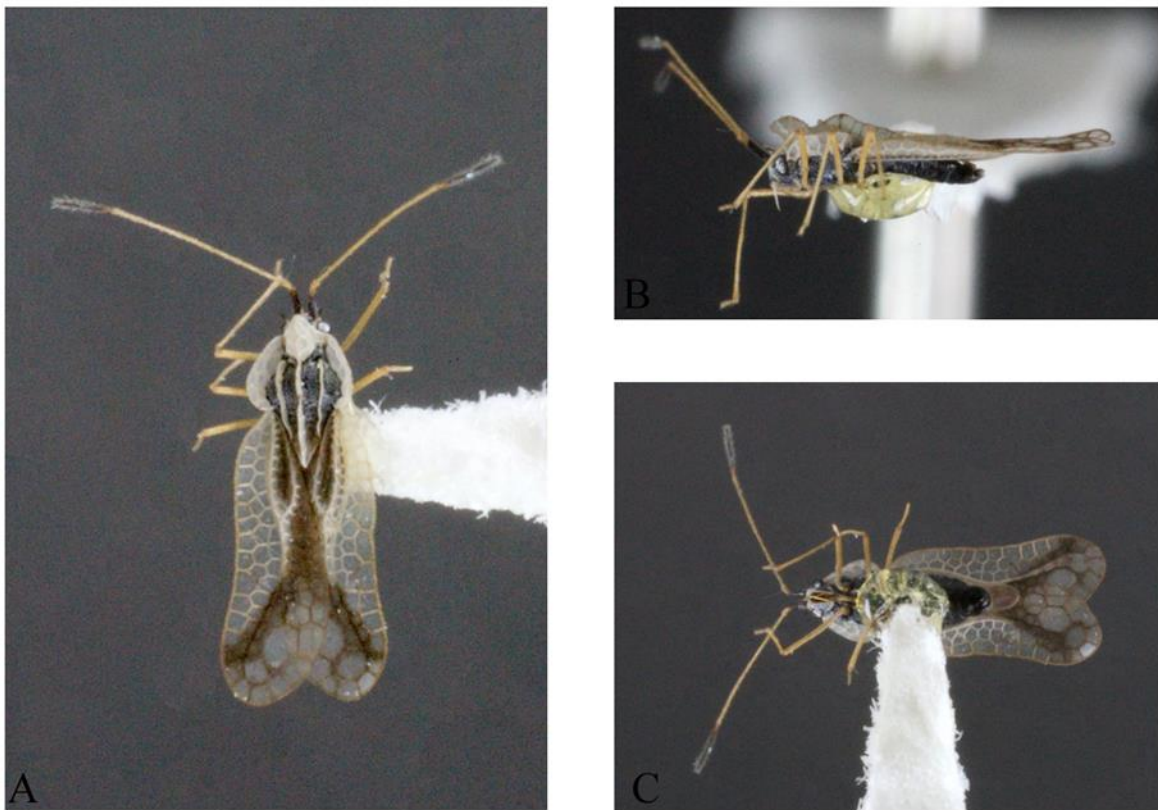


Figure 2.27: *Leptopharsa triseriata*, new species. **A.** Dorsal habitus, **B.** Lateral habitus, **C.** Ventral habitus.

Leptopharsa unicarinata Champion, 1897

Comments: This species was originally described by Champion (1897) from Panama. It has not been recorded from any other country, and it was not encountered during the present study.

Host plant: No host plants have been recorded for this species.

Leptopharsa zeteki Drake, 1939a

Comments: Drake (1939a) originally described this species from Barro Colorado, Panama. There have been no other records reported for this species. The specimens listed below from Guatemala and Costa Rica represent new records for those countries.

Specimens examined: GUATEMALA: EL Progreso: ca. 6km E jct. CA 9 on Hwy 17, 308m, 14° 55'15"N, 89°57'57"W, 9-I-2007, T. A. Catanach, Sweep, TAC2007/034 (1♂6♀ TAMU); Baja Verapaz: Los Ranchitos Hospedaje on CA 14, ca. 15 km S Purulha, 1715m, 15° 12'58"N, 90°13'09"W, 9-I-2007, J. R. Jones (1♀ TAMU). COSTA RICA: Puntarenas, Rincon de Osa, Osa Peninsula 14-16 -July- 1969, Toby Schuh, Janet Crane (2♀AMNH ♂ USNM); Prov. Alajuela: Caño Negro, R.N.V.S, 20m. 14-25-IV-1996. K. F. Flores, L_N_319100_450200 #7633 (1 INBio). PANAMA: Gatun Locks, C. Z. French Canal, 11-I-1974, J. A. Slater, J. Harrington (1 ♀ AMNH).

Host plant: No host plants have been recorded for this species.

Leptoypha Stål, 1873

Leptoypha morrisoni Drake, 1922

Comments: This species was originally described from the Dominican Republic. Pertinent to this study, it has also been listed from the Canal Zone in Panama (Drake and Hambleton 1939). Additionally, Drake and Ruhoff (1965) listed this species from the Jamaica, Haiti, Cuba, and the United States (Florida).

Specimens examined: DOMINICAN REPUBLIC: Nagua: 30-VII-1978, R. O. Schuster (1♂♀ UCDC). PANAMA: Canal Zone, Diablo Hts. 5-VI-[19]76, Coll. E. G. Riley (1♀ UMRM); Canal Zone, Diablo Hts. 24-VI-[19]76, Coll. E. G. Riley (1♂ 1♀ UMRM).

Host plant: Mangle (Drake and Ruhoff 1965) [Rhizophoraceae].

Liotingis Drake, 1930

Liotingis exiguus, new species

Description:

Extremely minute, testaceous to golden brown.

Head red brown; armed with three long spines; occipital spines absent, median spine present; paired frontal spines long, nearly as long as antennal segments one and two taken together; antenniferous tubercles erect, extremely long, as long as antennal segment one; eyes black, small, upper occipital area slightly depressed. Antennae slender, indistinctly hairy; segment one stout, moderately long; segment two about half as long and more slender than

segment one; segment three long, three and one-half times longer than segment one; segment four weakly clavate, as long as segments one and two taken together, mostly black, but testaceous at base. Bucculae contiguous anteriorly, triseriate, contrastingly yellow compared to head. Rostrum short, yellow, reaching onto apical half of mesosternum.

Pronotum brown, minutely punctate; tricarinate, carinae subparallel, not high, indistinctly uniseriate; collar weakly tectiform, areolate; calli red brown, concolorous with head, glabrous, triangular; paranota wide, minutely serrate along lateral margin, mostly triseriate in apical two-thirds, biseriate at humeral angles, areolae minute; posterior triangular process of pronotum concolorous with pronotal disk, punctures increasing in size posteriorly, lateral carina form lateral sides of projection. Hemelytra narrow, oval, elongate, golden brown; veins with evenly spaced, minute spinules; lateral margins of hemelytra with extremely minute, but stout spinules; costal area of wing triseriate, with most lateral row widest, rectangular; subcostal area of wing biseriate throughout; discoidal cell narrow, elongate, extending to apex of abdomen, five rows of areolae wide at widest; sutural area of wings completely overlapping, five areolae wide at widest. Hypocostal laminae uniseriate. Hind wings long, narrow, extending to one-fourth beyond apex of abdomen. Rostral laminae low, uniseriate, constricted on mesothorax, widening on metathorax, curved behind. Ostiolar peritremes extremely small, indistinct. Legs yellow, covered with minute hairs; coxae yellowish brown; trochanters brown; femora yellow, slender, fusiform, slightly curved ventrally; tibiae subequal in length to femora, slender, widening apically; first tarsal segment extremely small, second tarsal segment much larger, distinct, slightly arched dorsally, widening posteriorly, with long fine hairs underneath, pretarsi extremely minute, brown, strongly curved.

Abdomen red brown, stout, with few small whitish hairs; paratergites covered with few, but more, scattered hairs; third gonapophysis projecting from posterior of abdomen.

Measurements: (n=1) Width across paranota: 0.73, width at wings: 0.92, length: 2.01, Antennal segments one through four, respectively: 0.15, 0.09, 0.50, 0.26.

Specimen examined: Holotype: COSTA RICA: Heredia: Est. Biol. La Selva, 10° 26' N, 84° 01' W, 5-I-2000, CC 1200m, FOT/46/01, *Eugenia* sp. (1♀ DARC). The holotype will be conserved in the USNM.

Note: The GPS coordinates on the label data for the holotype are not very accurate, because the specimen was actually collected near the 1200 m marker of the Camino Central (CC) trail at La selva biological station. GPS coordinates that are likely closer to the collecting locality are as follows: 10° 24' 58.251"N, 84° 0' 35.8236"W.

Host plant: Collected from insecticidal fogging of *Eugenia* sp. [Myrtaceae]. The host plant of this species may be a vine of the Apocynaceae, since all other members of *Liotingis* feed on species of Apocynaceae (Drake and Ruhoff 1965).

Etymology: This species is named for its small size.



Figure 2.28: *Liotingis exiguus*, new species, dorsal habitus.

Macrotिंगis Champion, 1897

Macrotिंगis biseriata Champion, 1897

Comments Champion (1897) originally described this species from a couple localities in Panama. It has since been recorded from both the Honduras (Drake 1928c) and Costa Rica (Froeschner 2003).

Specimens examined: COSTA RICA: Heredia: Estacion Biologico La Selva, 10° 26'N, 84° 01'W, 14-V-1998, L/ 12/375 (1♂ DARC); Cartago: Turrialba, 6-13- III-1967, Enns Beer, & Peck (1♂ UMRM). PANAMA: Chiriqui: Citrico Dolega, 10-II-1974, Coll. D. Engleman, (1♂ USNM).

Host plant: No host plants have been recorded for this species.

Megalocysta Champion, 1897

Megalocysta pellucida Champion, 1897

Comments: This species was originally described from Panama (Champion 1897), and it has not been recorded from any other country. The specimens listed below from Costa Rica represents a new country record.

Specimens examined: COSTA RICA: Heredia: Estacion Biologica La Selva, 50-150m, 10° 26'N, 84° 01'W, 4-6- IV-2003, E. G. Riley (1♀ TAMU); Serapiqui: la verjen, La isla, 100-200m, 5-IV-3-V-2011, I. Chacon, Malaise trap, LN266175522264 #102137 (1♂ 1♀ INBio);

Cartago: Turrialba, 13-III-1957, Coll: W. R. Enns, (1♀ UMRM). PANAMA: Coclé, El Valle, 10-13-VI-1985, E. Riley & D. Rider (1♀ DARC).

Host plant: No host plants have been recorded for this species.

Neobyrsa, new genus

Diagnosis: *Neobyrsa* can be separated from other similar genera by the following characters; paranota and wings hyaline, paranota are slightly reflexed and directed forward. Hood narrow and pointed apically, but not tall.

Description:

Generally flat, wings and paranota broadly expanded. Head with moderately long spines, downcurved, adpressed to head. Antennae moderately long, extending to wing base, tan, hairy at tip. Pronotum punctate; hood narrow, moderately low, subtruncate at apex; tricarinate; paranota flat, widely expanded laterally and projected forward; slightly reflexed upward. Hemelytra widely expanded; costal area of wing three to five areolae wide; subcostal area uniseriate to biseriate; discoidal area of wing triseriate, not closed behind. Hind wings extremely small, not extending to apex of abdomen. Bucculae contiguous apically, pointed forward, biseriate; rostrum moderately long; Rostral laminae subparallel to slightly converging.

Type species: *Neobyrsa panamensis* new species, by present designation.

Etymology: This genus is named for its similarity to *Leptobyrsa* Stål and other genera.

Neobyrsa panamensis, new species

Description:

Extremmley flat, hemelytra broad.

Head with moderately long spines, downcurved, adpressed to head; medium spine extremely long, adpressed to head, extending to clypeus; occipital spines shorter, adpressed to head, nearly extending to clypeus. Antennae moderately long, when directed posteriorly, extending to wing base; first antennal segment long, tan, beset with few scattered long hairs; second antennal segment extremely short, tan; segment three extremely long, two and one-half times longer than segment one, tan; segment four long, about one-half times as long as segment three, fuscous basally, black on apical half, beset with long fine hairs. Bucculae contiguous apically, pointed forward, biseriate; rostrum moderately long, extending to end of rostral sulcus.

Pronotum punctate; hood narrow, moderately low, subtruncate at apex, comprised of two rows of cells along lateral margins; tricarinate; median carina, half as tall as pronotal hood, gradually sloping posteriorly, uniseriate; lateral carina nearly as tall as median carina, uniseriate, subparallel, rounded in lateral view; paranota flat, widely expanded laterally and projected forward beyond head; slightly reflexed upward, quadriseriate at widest. Hemelytra widely expanded; costal area of wing quadriseriate at base, triseriate at apex; subcostal area biseriate near wing base, uniseriate apically; discoidal cell open behind, triseriate; sutural area uniseriate. Rostral laminae uniseriate. Legs slender, tan; femora long; tibiae slightly longer than femora; tarsi long, slender. Ostiolar peritremes minute, red brown.

Abdomen light red, narrow.

Measurements: (n=3) Length: 3.47-3.55, width: 2.85-2.89; height of hood: 0.33-0.36; length of antennal segments one through four, respectively: 0.40-0.43, 0.11-0.12, 1.10-1.20, and 0.68-0.70. Holotype: Length: 3.55, width: 2.85; height of hood: 0.36; length of antennal segments one through four, respectively: 0.40, 0.12, 1.10, and 0.70

Specimens examined: Holotype: PANAMA: Chiriqui Pr.: Resve. La Fortuna, Est. Biologica. El. 3900' N8° 43' 18" W 82° 14' 17", 7-9-I-2001, Yellow pan traps. M. Yoder. (1♂ TAMU). Paratypes: PANAMA: Chiriqui Pr.: Resve. La Fortuna, Est. Biologica. El. 3900' N8° 43' 18" W 82° 14' 17", 7-9-VIII-1999, ypt. 99/ 079, J. Schaffner & J. B. Woolley (1♂ TAMU); Bocas del Toro: Trail off Oleoducto. 4km W Fortuna Hwy. 5-VIII-1999, el. 3640 ft, 08° 47' 14" N 82° 12' 50"W, J. B. Woolley 99/083 (1♀ TAMU). All types will be deposited in the TAMU type collection.

Host plant: No host plants have been recorded for this species.

Etymology: This species is named for its current known distribution.

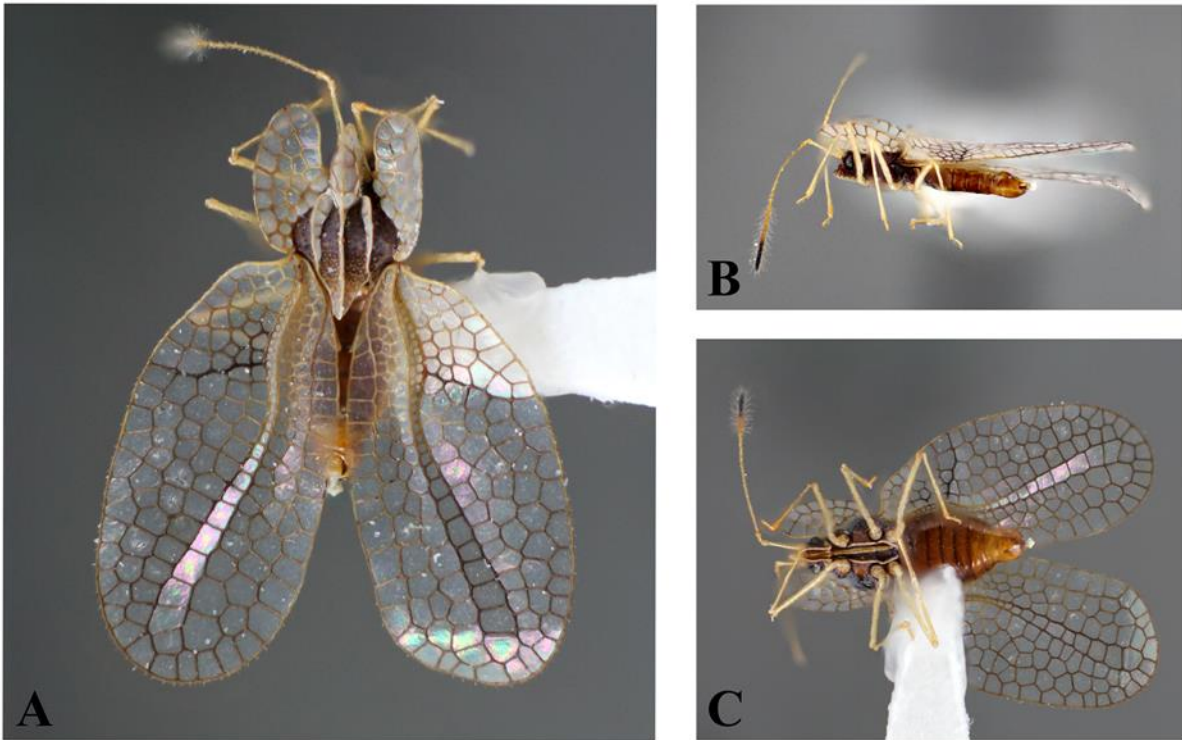


Figure 2.29: *Neobyrsa panamensis*, new species. **A.** Dorsal habitus, **B.** Lateral habitus, **C.** Ventral habitus.

Pachycysta Champion, 1898

Key to the species of southern Central America

- 1 Costal area of hemelytra quadriseriate at widest *Pachycysta shildi* Drake
- Costal area of hemelytra triseriate at widest *Pachycysta stenocorys*, new species

Pachycysta schildi Drake, 1928d

Comments: This species was originally described from Turrialba, Costa Rica (Drake 1928d), and was subsequently recorded from Venezuela (Monte 1942a). The specimen listed below represents a new country record for Panama.

Specimens examined: PANAMA: Coclé: Cerro Gaital, 10-12-VI-1985, E. Riley & D. Rider (1♀DARC); Bocas Del Torro: 2.3 rd. mi. N from Continental Divide, 27-V-1993, E. Riley (1♂ TAMU).

Host plants: No host plants have been recorded for this species.

Pachycysta stenocorys, new species

Description:

General color pale yellow, covered in long, fine hairs.

Head light brown, covered in yellowish wax, occipital spines atrophied to small tubercles, other spines adpressed to head. Antennae ferruginous, pilose, covered in wax, segment one stout, densely pilose; segment two not as wide, half the length of segment one; segment three extremely long; segment four long, not quite one-third the length of segment three. Rostrum long, almost reaching third abdominal segment.

Pronotum light brown, moderately convex, tricarinate; paranota narrowed apically, there three areolae wide, four areolae wide at humeral angles; pronotal hood small, about as long as tall, apically angulate, impressed laterally; median carina gradually sloping from pronotal hood,

uniseriate, apical areolae large, rectangular, hyaline, extending onto posterior process of pronotum; lateral carinae adpressed to hood and median carina, apically high, feebly carinate posteriorly, uniseriate, areolae large, rectangular. Hemelytra rectangular; costal area broad, irregularly triseriate; subcostal vein slightly sinuate, subcostal area biseriate; radius media vein elevated; discoidal area four areolae wide at widest; sutural area four to five cells wide, slightly wider than costal area. Hind wings moderately narrow, extending slightly further beyond abdomen than other species. Bucculae uniseriate with small areolae, open apically. Rostral laminae narrow and slightly constricted on prothorax, much wider on pterothorax, uniseriate. Legs bicolored, with scattered hairs; femora thick, red; tibiae half as wide, yellow; tarsi light yellow, segment one small; segment two long, five times longer than segment one, tarsal claws not widely diverging.

Abdomen red brown, covered with scattered hairs. Pygophore slightly wider than preceding abdominal segment and more than two times longer than preceding abdominal segment.

Measurements: (n=1): Length: 4.38, width: 2.12, height of hood: 0.70, length of antennal segments one to four, respectively: 0.30, 0.18, 1.66, 0.64.

Specimen examined: Holotype: PANAMA: Chiriqui Prov. Lagunas del Volcan, 5km SW Volcan, 4220 ft, 8° 45' 52"N, 82° 40' 33"W, 30-VII-4-VIII-1999, Malaise, Gillogly & Woolley 00/068, TAMU ENTO X0553996. (1♂ TAMU). Holotype will be deposited in TAMU Holotype collection.

Etymology: this species is named after its narrow (*steno-*) pronotal hood (*cory-*) which is compressed laterally.

Host plant: No host plants have been recorded for this species.

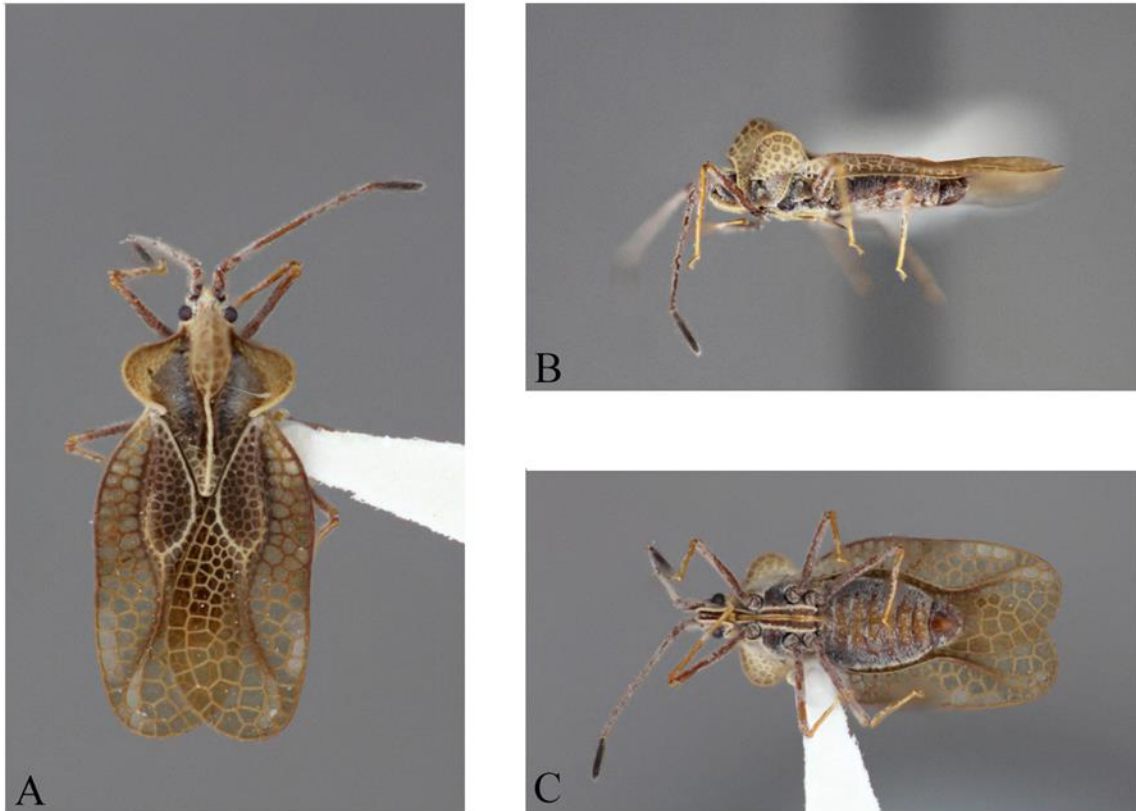


Figure 2.30: *Pachycysta stenocorys*, new species. **A.** Dorsal habitus, **B.** Lateral habitus, **C.** Ventral habitus.

Phymacysta Monte, 1942

Key to the species of southern Central America

- 1 Paranota reflexed and shell-like 2
- Paranota raised but not reflexed as to form a shell *Phymacysta tumida* (Champion)
- 2(1) Pronotum unicarinate *Phymacysta kruegerae*
- Pronotum tricarinate *Phymacysta vesiculosa* (Champion)

Phymacysta kruegerae, new species

Description:

General coloration testaceous, with veins mildly infuscate, most areolae hyaline; shape broad, triangular.

Head small, covered with fine, white wax; occipital spines reduced to small, short tubercles, other spines absent. Eyes red, small. Antennae white basally, apically fuscous, covered with thin, long hairs; segment one long; segment two extremely short, less than one-fourth the length of segment one; segment three extremely long, basally white, apically infuscate, roughly two and one-half times longer than segment one; segment four long, two-thirds length of segment three, basally infuscate, apically black. Rostrum long, extending beyond metacoxae, testaceous, apically black.

Pronotum punctate, lightly infusate; pronotal hood narrow, nearly as tall as paranota; medium carina extremely tall, one-fourth taller than hood, triseriate, cells extremely large and rectangular, the apical row of areolae partially infusate near dorsal vein; paranota foliaceous, reflexed upward, large, shell-shaped, four to five rows of areolae wide, beset with a few, fine hairs. Hemelytra long, more than two times length of abdomen, narrowed basally, extremely broad apically, armed with small spines and long hairs along margins, dorsally with scattered thin, white hairs, veins lightly infusate; costal margins mostly biseriate along apical fourth, widely expanding posteriorly to five areolae wide; subcostal area mostly uniseriate, but biseriate along posterior edge of discoidal cells; discoidal cells narrow, biseriate; sutural areas of hemelytra mostly biseriate. Hind wings extremely small, not extending to apex of abdomen. Bucculae triseriate, areolae extremely minute, contiguous apically. Rostral laminae short, uniseriate, subparallel. Thoracic pleura lightly dusted with white wax. Legs testaceous, femora and tibiae subequal in length, beset with fine, long white hairs; femoral-tibial joints infusate, tarsi dark brown, extremely hairy ventrally.

Abdomen reddish, covered with fine, white wax, beset with small fine hairs. Pygophore large, protruding from abdomen, beset with long, fine hairs; parameres strongly curved inward, overlapping, beset with hairs basally along outer margin. Female genital capsule with long, fine, curved hairs along lateral apical margin.

Measurements: (n=5) Length: 3.67, width at widest: 2.71; width of paranota: 1.73, height of paranota: 0.91; height of hood: 0.77; height of median carina: 0.95; length of antennal segments one through four, respectively: 0.54, 0.11, 1.40, and 1.04.

Specimens examined: Holotype: PANAMA: Panama: Panama Canal, Tigre Island, 21-VI-1982, R. B. Kimsey (1♂ UCDC). Paratypes: PANAMA: Panama: Panama Canal, Tigre Island, 31-VI-1982, R. B. Kimsey DEV. (1♂ UCDC); Panama, Canal Zone, Barro Colorado Island, 6-VI-1982, R. B. & L. S. Kimsey (1♀ UCDC); Panama, Canal Zone, Barro Colorado Island, 1-III-1983, J. H. Martin, B. M. 1983-478, *Faramea* sp. (1♂♀ BMNH); Panama: Canal Zone: Panama City, Monsoon forest, Canopy fogging, 15-30-VII-1979, On *Spondias mombin* Linnaeus, E. Broadhead et al. B. M. 1979-125 (1♀ BMNH); Panama: P. N. Soberania, Old Gamboa rd, el 40m, 12-VIII-1999, 09 5' 00"N 79 40' 22"W J. B. Woolly 99/098 (1♀ TAMU); Area Can., Barro Colorado Isl. 20-IV-[19]84, Col: Marina Wong, Dodge Engleman Collection 1990 (2♂2♀ USNM); Area Can., Barro Colorado Isl. 19-V-[19]84, Col: Marina Wong, Dodge Engleman Collection 1990 (1♂ USNM); Area Can., Barro Colorado Isl. 16-II-[19]84, Col: Marina Wong, Dodge Engleman Collection 1990 (2♀ USNM).

Host plant: Some of the specimens above were collected from insecticidal fogging of *Spondias mombin* [Anacardiaceae].

Etymology: This species is named in honor of new friend and classmate Caitlin Krueger Ph.D. student, Department of Entomology, North Dakota State University, whose support and humor has encouraged me these past years.

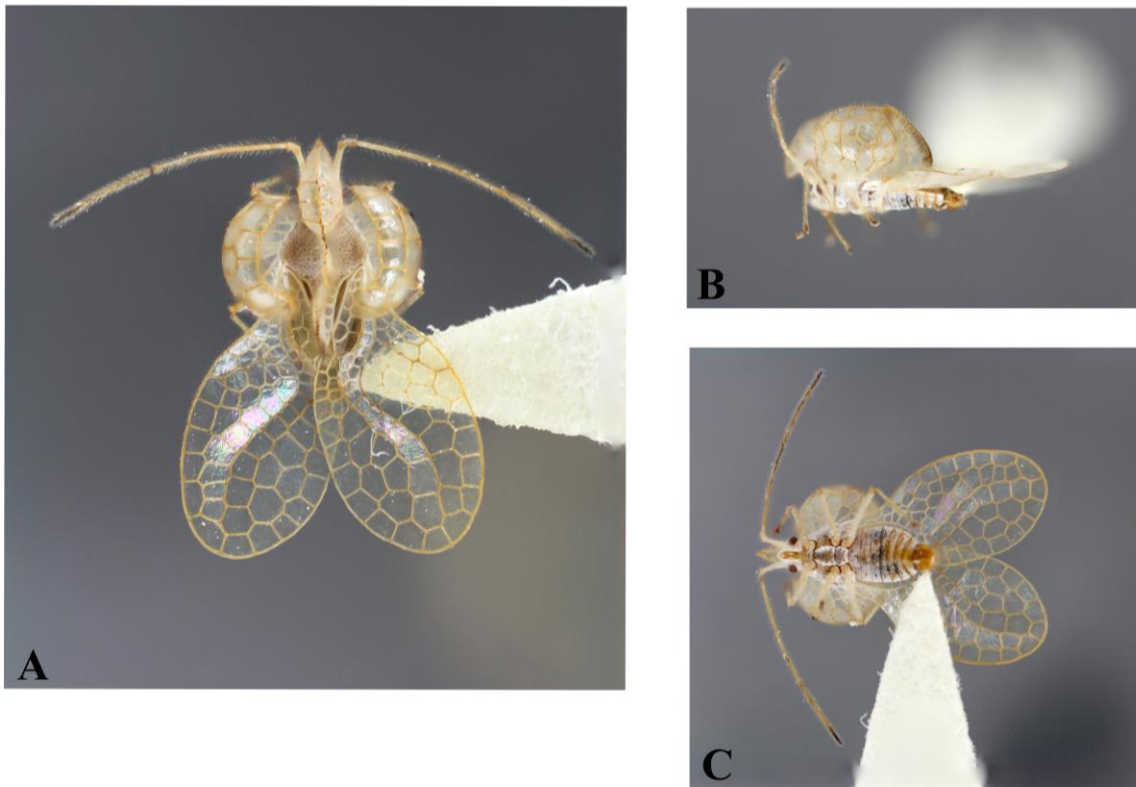


Figure 2.31: *Phymacysta kruegerae*, new species. **A.** Dorsal habitus, **B.** Lateral habitus, **C.** Ventral habitus.

Phymacysta tumida (Champion, 1897)

Comments: This species was originally described in the genus *Leptostyla* from Guatemala. Pertinent to this study, it was subsequently recorded from Panama (Drake and Hambleton 1945). Drake and Ruhoff (1965) listed this species also from Jamaica, Haiti, Trinidad, Cuba, Netherlands Antilles (Aruba, Bonaire, Curaçao), Leeward Islands (St. Eustatius), the United States (Texas), Mexico, Venezuela, Brazil, and Ecuador. Hanson and Nishida (2016) show a picture of this species from Costa Rica.

Specimens examined: MEXICO: Veracruz: Mipo. San Andrés Tuxtlas, Est. Biol. Los Tuxtlas, Vigia 4 Trail, 700', 17-22-VI-1997, Wilson & Woolley, 97/022 malaise trap (1♂ TAMU). GUATEMALA: Guatemala: Guatemala city, 4-VI-1989, K & S Bloem colrs (2♀ UCDC). PANAMA: Panama: Tigre Island CZ, 24-VII-1982, R. B. Kimsey, Devac (1♂♀ UCDC); Panama: Barro Colorado Island, 31-V-1982, R. B. Kimsey (1♂ UCDC); Panama: Barro Colorado Island, 14-VI-1982, R. B. Kimsey (1♂ UCDC); Panama: Pantera Island, 6-VI-1982, R. B. Kimsey, Devac (1♂ UCDC); Panama: CZ: Barro Colorado is. 9° 10'N, 79° 15'W, 2-7-VII-1973, Erwin and Hevel Central American Expedition 1973 (1♂♀ USNM).

Host plants: *Adenocalymma bracteatum* (Monte 1939) [Bignoniaceae], *Malpighia glabra* (Drake and Cobben 1960), *Malpighia puniceifolia* (Monte 1940c), *Malpighia urens* (Drake 1922) [Malpighiaceae].

Phymacysta vesiculosa (Champion, 1897)

Comments Champion (1897) originally described this species in the genus *Leptostyla* from Panama; it has not been recorded from any other country. The specimens listed below from Costa Rica and Colombia represent new records for those countries.

Specimens examined: COSTA RICA: Puntarenas: Osa: sierpe, Rancho Quemado, 200m, 30-IX-1991, 8.679096 N, 83.566714W, Javier Quesada (3♂1♀ INBio); Guanacaste Est. Pitilla, 700m, 9 km S Sta. Cecilia, P. N. Guanacaste, 14-IV-9-V-1993 (1♂ INBio). COLOMBIA: Caldas: (ant), IX-1973, S. Madrigal; Ex. Verbenaceae; C. J. Drake Coll (3♂1♀ USNM).

Host plant: Several of the specimens listed above from Colombia were apparently collected from an undermined species in the plant family Verbenaceae.

Pleseobyrsa Drake and Poor, 1937a

Key to the species of southern Central America

- 1 Pronotum tricarinate*Pleseobyrsa chiriquensis* (Champion)
- Pronotum unicarinate2
- 2(1) Subcostal area with three rows of areolae*Pleseobyrsa nigriceps* (Champion)
- Subcostal area with four to six rows of areolae
-*Pleseobyrsa perseae* Montemayor, González-Herrera and Villalobos

Pleseobyrsa chiriquensis (Champion, 1897)

Comments: This species was originally described from Panama in the genus *Leptobyrsa*. Hurd (1946) listed *P. chiriquensis* from Costa Rica. Other countries from which this species has been recorded that are outside the present study area include Colombia and Venezuela (Drake and Ruhoff 1965).

Specimens examined: COSTA RICA: San Jose, UCR Campus, 1100m, *Persea* sp. , 6-XII-2007 (1♂4♀MZUCR); Cartago: Paraíso. Est. Tapantí, Sendero Arboles Caídos. 1100-1200m. 29-III-2011-19-II-2012. R. Zúñiga, C. Mora. Tp. Malaise. L_N_193800_556000

#103555 (1 INBio); [San Jose]: San Pedro de Montes oca, 20-XI-1934, Cheallu (on avocado) C. H. bayou; C. J. Drake Collection; Chiriquensis 65' (3♂2♀ USNM). PANAMA: Buguba, Champion [2 cotypes] (1♂1♀ USNM).

Host plant: This species has been recorded from *Persea americana* [Lauraceae] (Monte 1947). Several specimens listed above were also collected on avocado or *Persea* sp.

Pleseobyrsa nigriceps (Champion, 1897)

Comments: When Champion (1897) originally described this species (in the genus *Leptobyrsa*), he indicated that he had two specimens from Guatemala, and two specimens from Panama. To date, this species has not been recorded from any other country. The specimens listed below from Costa Rica represents a new country record.

Specimens examined: COSTA RICA: Cartago: Ochomogo. San Nicolás, Finca Kirqua. 1760m. 4-11-I-2011. W. Porras. Tp. Malaise. L_N_210600_543600 #102550 (2 INBio).

Host plant: No host plants have been recorded for this species.

Pleseobyrsa persea Montemayor, González-Herrera and Villalobos, 2011

Comments: Montemayor et al. (2011) recently described this species from Alajuela, Costa Rica. The specimen listed below from Panama represents a new country record.

Specimens examined: COSTA RICA. Prov. Cartago. Ochomogo. San Nicolás, Finca Kirqua. 1760m. 11-I-14-II-2010. W. Porras. Tp. Malaise. L_N_210600_543600 #104340 (1

INBio); Prov. Cartago. Ochomogo. San Nicolás, Finca Kirqua. 1760m. 30-XI-5-XII-2010. W. Porras. Tp. Malaise. L_N_210600_543600 #104317 (1 INBio). PANAMA: Chiriqui Pr: Las Nubes P.N. La Amistad, 8 km NW Cerro Punta, 1-VIII-1999, el. 2400m, 8° 54' 05"N, 82° 37' 13"W, J. C. Schaffner, (1♀ TAMU).

Host plant: *Persea americana* or more commonly known as avocado [Lauraceae] (Montemayor *et al.* 2011).

Pliobyrsa Drake and Hambleton, 1946

Pliobyrsa translucida (Champion, 1897)

Comments: Champion (1897) originally described this species (in the genus *Leptobyrsa*) from Guatemala; it has not been recorded from any other country. The specimens listed below from Panama represent a new country record.

Specimens examined: PANAMA: Panama, P. N. Soberania, Old Gamboa Rd. 09 05' 00"N, 79 40' 22" W, 12-VIII-1999, 40m, J. B. Wolley 99/098, TAMU ENTO X0547224 (1♂ TAMU); Canal Zone: Pipeline Rd. Canopy Sample, *Luehea seemanni*, 11-IV-1976, GGM/YL (2♀ USNM); Canal Zone: Pipeline Rd. Canopy Sample, *Luehea seemanni*, 30-III-1976, GGM/YL (1♀ USNM); Barro Colorado Isl. 16-II-[19]84, Col: Marina Wong, Dodge Engleman Collection 1990 (1♂ USNM); Area Can., Barro Colorado Isl. 19-V-[19]84, Col: Marina Wong, Dodge Engleman Collection 1990 (1♀ USNM); Barro Colorado I. 1-III-1983, J. H. Martin, B.M. 1983-478 (1♂ BMNH).

Host plants: No host plants have been listed in previous literature, but several of the specimens listed above were collected by Insecticidal fogging of *Luehea seemanni* Planchon and Triana [Malvaceae]

Note: Champion (1897) stated that this species was apterous [lacking hind wings]. Champion's observation is not supported here, because the specimens examined from Panama in this study have hind wings.

Sphaerocysta Stål, 1873

Comment: Guidoti and Montemayor (2013) mention that this genus occurs in Panama, but they do not indicate which species are found in this country.

Sphaerocysta fumosa Drake, 1928a

Comments: Drake (1928a) originally described this species from Pará, Brazil; there are no other published records of this species. There is an unpublished record from a thesis by Guidoti Soares (2014) that reported this species from Panama; since this record remains unpublished, the specimen listed below represents a new record for that country.

Specimens examined: PANAMA: Los santos a la Playa, 1.5. Km N Pedase, sea level, 7° 33'N, 80°1' W, 21-VI-1973, Erwin and Hevel Central American Expedition 1973 (1♀ USNM).

Host plant: No host plants have been recorded for this species.

Note: Brailovsky and Torres (1985) reported a species of *Dicysta* from Mexico, and they provided an illustration (numbered 38). The specimen in this illustration is actually a member of

the genus *Sphaerocysta* Stål, and it is likely to be *S. fumosa* Drake. This report, plus Guidoti and Montemayor's (2014) mention of *Sphaerocysta* from Panama suggests that the genus is likely distributed from southern Mexico to northern Argentina.

Stenocysta Champion, 1897

Stenocysta pilosa Champion, 1897

Comments: Champion (1897) originally described this species from Bugaba, Panama; it has not been recorded from outside of Panama. The specimens listed below from Costa Rica represent a new country record.

Specimens examined: COSTA RICA: Heredia: Estacion Biologica La Selva, 50-150m, 10° 26'N, 84° 01'W, 5-8- III-2001, E. G. Riley (16♂14♀ TAMU); Prov. Heredia. Sarapiquí. Z.P. La Selva. Est. Biol. La Selva. 50-150m. II-III-1993, P. Hanson, Malaise L_N_268800_535300 (1 INBio).

Host plant: No host plants have been recorded for this species.

Teleonemia Costa, 1864

Key to the species of southern Central America

- 1 Costal area of hemelytra with three or more areolae at widest2
- Costal area of hemelytra with two or fewer rows of areolae at widest3
- 2(1) Costal area of hemelytra biseriate beyond middle and triseriate at widest
..... *Teleonemia picta* Champion
- Costal area triseriate to middle and four to five rows wide at widest
..... *Teleonemia tricolor* (Mayr)
- 3(1) Costal area of hemelytra uniseriate throughout.....7
- Costal area of hemelytra at least partially biseriate4
- 4(3) Costal area of hemelytra almost completely biseriate
..... *Teleonemia absimilis* Drake and Hambleton
- Costal area of hemelytra uniseriate on basal half, but biseriate beyond middle5
- 5(4) Hemelytra and pronotum testaceous, with few varied fuscous markings, pronotum
completely unicolorous6
- General color mostly dark brown, but pronotal hood and triangular posterior projection of
pronotum light yellow *Teleonemia brevipennis* Champion

6(5) Antennae moderately long and stout, median carina of pronotum upraised anteriorly	
.....	<i>Teleonemia cylindricornis</i> Champion
- Antennae shorter and slender, median carina of pronotum not upraised anteriorly	
.....	<i>Teleonemia variegata</i> Champion (in part)
7(3) Pronotum completely covered with wax.....	8
- Pronotum nearly devoid of wax, but some hairs may be present	9
8(7) Third antennal segment not reaching base of hemelytra (when directed backwards);	
hemelytra strongly constricted, costal area with a regular row of areolae, only moderately	
reflexed basally, subcostal area almost subvertical with numerous hairs	
.....	<i>Teleonemia sandersi</i> Drake and Hambleton
- Third antennal segment reaching base of wing; hemelytra weakly constricted, costal area	
very narrow, reflexed basally, subcostal area mostly subvertical, with few hairs	
.....	<i>Teleonemia ceronotus</i> , new species
9(7) Long, slender species; hemelytra not constricted beyond middle, but possibly expanded near	
apex	10
- Long, more broad species; hemelytra constricted beyond middle	19
10(9) Rostrum reaching second abdominal sternite.....	<i>Teleonemia morio</i> (Stål)

- Rostrum shorter, not reaching base of abdominal sternites 11

- 11 (10) Mostly black with tumid hood brown; costal area of hemelytra with regular rectangular cells *Teleonemia omrio*, new species

- Brown or dark colored, but lacking contrasting brown tumid hood, costal area of hemelytra with irregular or round cells 12

- 12(11) Paranota and costal area of hemelytra lighter than other parts of dorsum; discoidal cell with four to five rows of areolae at widest 13

- unicolorous, dark chocolate brown; discoidal cell with seven rows of areolae at widest....
.....*Teleonemia radagasti*, new species

- 13 (12) Dorsum completely unicolorous and ochreous *Teleonemia ochracea* Champion

- Dorsum not usually completely unicolorous, or if unicolorous, not ochraceous 14

- 14 (13) Golden colored species variegated with fuscous; Base of third antennal segment much wider than apex *Teleonemia rhopalocera*, new species

- Species may be variegated in color, but base of third antennal segment not much wider than apex 15

- 15 (14) Antennae extremely pilous; costal area of hemelytra alternating with hyaline and infusate cells..... 18

-	Antennae not as pilous; costal area of hemelytra not with alternating hyaline and infusate cells	16
16 (15)	Hemelytra with basal and apical transverse fuscous bars	
	.....<i>Teleonmeia bifasciata</i> Champion	
-	Hemelytra without crossbars.....	17
17 (16)	Larger speices; fourth antennal segment one-third the length of third antennal segment; discoidal cell with five areolae wide at widest	
	.....<i>Teleonemia prolixa</i> (Stål)	
-	Smaller species; fourth antennal segment one-half length of third; discoidal cell with four rows of areola at widest	
	.....<i>Teleonemia atrata</i> Champion	
18 (14)	Fourth antennal segment subequal to segments one and two combined; occipital spines reaching middle of eye; discoidal cell four areolae wide at widest.....	
	.....<i>Teleonemia pilicornis</i> Champion	
-	Fourth antennal segment one-third the length of segments one and two combined; occipital spines surpassing eye; discoidal cell with four to five rows of areolae	
	<i>Teleonemia prunellae</i> Drake and Hambleton	
19 (9)	Discoidal cell of hemelytra with flecks of wax and hairs	
	.....<i>Teleonemia scrupulosa</i> Stål	
-	Discoidal cell of hemelytra completely devoid of noticeable hairs and wax	20
20 (19)	Light brown with variegated fuscous.....	22

-	Dark unicolorous species	21
21 (20)	Antennae distinctly hairy with long fine hairs, median and frontal spine reduced to thick tubercles, apices of hemelytra rounded in repose	
	.....<i>Teleonemia schildi</i> Drake and Hambleton	
-	Antennae pilous, with shorter thicker hairs, median and frontal spines longer and slender, not tubricules; apices oh hemelytra truncated, and blunt in repose.....	
	.....<i>Teleonemia rugosa</i> Champion	
22(20)	Subcostal area of hemelytra uniseriate throughout its entire length.....	23
-	Subcostal area of hemelytra biseriate adjacent to discoidal cell	24
23(22)	Cells of costal area of hemelytra subequal to those of subcostal and discoidal areas of hemelytra.....	<i>Teleonemia notata</i> Champion
-	Cells of costal area of hemelytra elongate, one and one-half times longer than cells of subcostal or discoidal areas of hemelytra	<i>Teleonemia sacchari</i> (Fabricius)
24(22)	Discoidal cell quadriseriate with an occasional intercalary cell.....	
	.....<i>Teleonmia forticornis</i> Champion	
-	Discoidal cell with at least five or more rows of areolae.....	26
26(24)	Moderately long (4.5-5) species	27
-	Long and slender species (5.5-6mm)	<i>Teleonemia jucunda</i> Drake

27(26) Antennae pilose, fourth segment more than one-third as long as preceding.....

..... *Teleonemia validicornis* Stål

- Antennae pilose, but hair adpressed to antennae, fourth antennal segment not quite one-third the length of preceding..... *Teleonemia longicornis* Champion

Teleonemia absimilis Drake and Hambleton, 1944

Comments: Drake and Hambleton (1944) originally described this species from Colombia, and up to now, it has not been recorded from any other country. The specimen listed below from Panama represents a new country record.

Specimen examined: PANAMA: Panama, Cerro Campana, I-1-2002, 680-730m, Weston Opitz Coll. (1♀ AMNH).

Host plant: No host plants have been recorded for this species.

Teleonemia atrata Champion, 1898

Comments: This species was originally described from Bugaba, Panama (Champion 1898). Drake and Ruhoff (1965) listed this species also from Guatemala, and Brazil. The record from Costa Rica represents a new country record.

Specimens examined: COSTA RICA: Prov. Guanacaste: Estac. Pitilla, 700 m, 9 km S Sta. Cecilia, XI-1989, C. Moraga & P. Rios, L N 330200_380200 (1 INBio); Prov. Puntarenas: Rancho Quemado, Pen. de Osa, A. C. Osa, 200 m. 4-21-I-1994, A. H. Gutierrez, L S 292500_511000 # 2570 (1 INBio); Prov. Alajuela: Sect. San Ramon de Dos Rios, 620m. 20-II-3-III-1995. C. Cano, L N 318100_381900 #4398 (1 INBio). PANAMA: Montanas Azul, I-1971, J. Maldonado C. (13♂2 ♀ USNM); Panama: 8km. NE Cerro Jefe, 27-III-[19]76, 700m, H. P. Stockwell (1♂♀ USNM); Cerro Campana, 800m, R. de Pan., 8°40'N, 79° 56'W 23-X-[19]72, Engleman (1♀ USNM).

Host plant: No host plants have been recorded for this species.

Teleonemia bifasciata Champion, 1898

Comments: Champion (1898) originally described this species from Guatemala and Panama. Drake and Ruhoff (1965) listed this species also from Brazil and Grenada. The specimens listed below from Trinidad, Honduras, and Costa Rica represent new records for those countries.

Specimens examined: TRINIDAD: St. George Co: Curepe, 29-VII-1978, R. M. Barinowski (2♂2♀ USNM). HONDURAS: Santa Barbara, La Fe, 10-X-1993, R. Turnbow (1♂ UGAC). COSTA RICA: Prov. Limon: Amubri, 70m. 3-28-II-1995. G. Gallardo, L S 385000_578100 #4389 (1 INBio); Prov. Puntarenas: Rancho Quemado, Pen. de Osa, 200m. 14-28-VII-1993. A. Gutierrez, L S 292500_511000 # 2254 (1 INBio). PANAMA: C.Z.: Galeta Is. 9° 23'N, 79°52'W, 26-VI-[19]75, Coll. D. Engleman (1♂ USNM)

Host plant: This species has been recorded in the literature from a species of *Lantana*. [Verbenaceae] (Hurd 1946).

Teleonemia brevipennis Champion, 1898

Comments: This species was originally described from the Amazon region of Brazil (Champion 1898). The specimen listed below from Costa Rica represents a new country record.

Specimens examined: COSTA RICA: Heredia: 11km SE La Virgen, 450-550m, 10°20'N, 84°04'W, 12-14-IV-2003, E. G. Riley (1♀ TAMU).

Host plants: Several different host plants have been reported in the literature: *Buddleia* sp. (Drake and Poor 1939) [Buddlejaceae], *Cassia* sp. (Drake and Hambleton 1934) [Fabaceae], *Ipomoea fistulosa* (Silva 1956) [Convolvulaceae], *Vernonia polyanthes* Drake and Hambleton 1938) [Asteraceae] and *Vernonia* sp. (Monte 1940a).

Teleonemia ceronotus, new species

Description:

Large broad species, general color variegated fuscous brown.

Head elongate, brown, completely obscured dorsally by wax; occipital spines extremely long, adpressed to head, nearly reaching antennal base; median spine downcurved, adpressed to head, thick, stout; frontal spines converging in front of first antennal segment. Antennae with first antennal segment short, stout, very pilous, not as long as head; second antennal segment

slightly shorter than first, extremely pilose; third antennal segment extremely long, stout, extremely pilose, six to seven times as long as first antennal segment; fourth antennal segment short, slightly longer than first antennal segment, pilose. Bucculae obscured by wax, mostly triseriate, brown. Rostrum reaching between mesothoracic coxae.

Pronotum tricarinate, pitted, punctate, brown; pronotal collar slightly produced to form a small hood-like structure; calli devoid of wax, but remainder of pronotum covered with wax; posterior triangular projection areolate. Carinae subequal in height, subparallel, uniseriate; paranota uniseriate, adpressed to lateral prothorax. Hemelytra constricted, variegated, brownish, extending one fifth the length beyond apex of abdomen; costal margins of hemelytra weakly uniseriate throughout, but appearing carinate, reflexed, with variegated infuscation; subcostal areas biseriate, variegated with testaceous and dark fuscous, subcostal extension uniseriate; discoidal area triangular, occupying one-third of wing in dorsal view, four areolae wide at widest, variegated with wax; sutural area of hemelytra eight to ten areolae at widest, completely overlapping. Rostral laminae subparallel on mesothorax, crescentic on metathorax, covered with wax. Legs subequal in length; coxae, femora, tibiae, and tarsi dark brown, mostly obscured by wax; some parts of trochanters and apical half of tibiae and tarsi devoid of wax; basitarsus minute; second tarsal segment extremely elongate, slender.

Abdomen elongate, brownish, with yellow wax. Pygophore one-third narrower than abdomen; two concavities on ventral surface of pygophore, filled with wax; parameres extremely stout basally, but narrowing toward apex, covered with hairs and wax basally, slender near apex.

Specimens examined: Holotype: MEXICO: Oaxaca: Puerto Escondido, 15-VII-1985, Jones, Schaffner (1♀ TAMU). Paratypes: Same data as holotype (3♀ TAMU). COSTA RICA: Mata de Limon Pacif; VIII-1972, J. C. Maldonado C (1♀ USNM); Prov. Puntarenas. P.N. Carara. Estación Quebrada Bonita, 11-III-1994, M. Epstein, L_N_194500_469850 #76218 (1♀ INBIO); Prov. Puntarenas: Est. Quebrada Bonita, R.B. Carara, 100m. V-VI-1989. R. Zuniga, L_N_195250_469850 #7434 (1♀ INBio); Prov. Puntarenas: Garabito, Finca Queb. Bonita-Garabu. La Fila. 100-150m. 23-24-XI-2008, Zumbado, Hernández, Azofeifa, Moraga. Amarilla. LS_391360_397860 #95320 (1♀ INBio); Prov. Guanacaste: Pueblo Ostional, Orilla de Quebrada Biscoyol, 0 - 5m, 16-VI-2004, D. Briceño, Red de Golpe, L_N_221090_349100 #77415 (1♀ INBio).

Measurements: (n=5): length: 4.59-5.09, width: 1.32-1.37, antennal segments one through four, respectively: 0.29-0.38, 0.21-0.22, 1.56-1.57, 0.32-0.44. Holotype: length: 5.09, width: 1.32, antennal segments one through four, respectively: 0.29, 0.22, 1.56, 0.32.

Host plant: No host plants have been recorded for this species.

Etymology: This species is named for the pronotum (*-notus*) which is covered with wax (*cero-*).

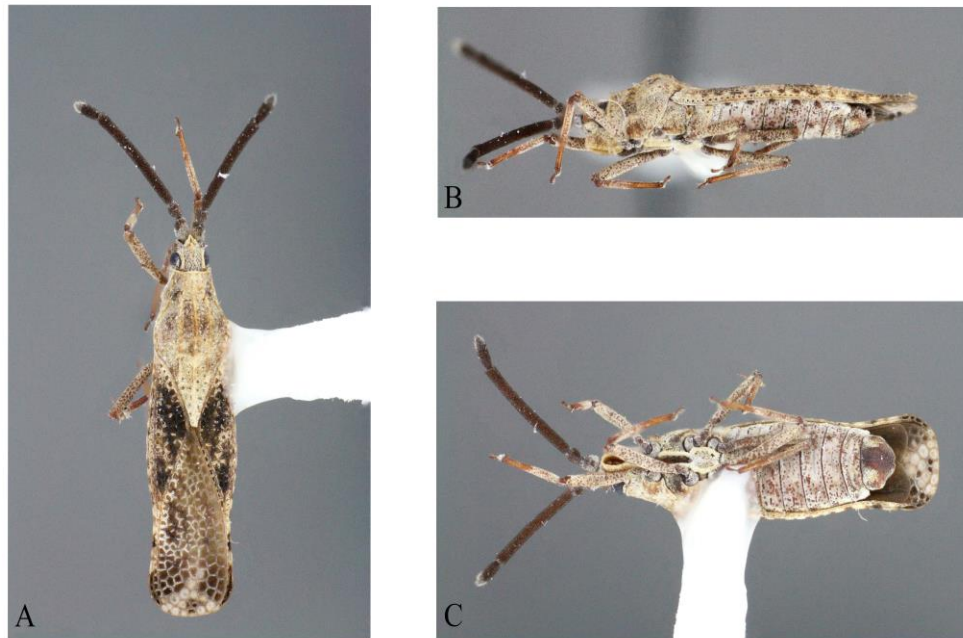


Figure 2.32: *Teleonemia ceronotus*, new species. **A.** Dorsal habitus, **B.** Lateral habitus, **C.** Ventral habitus.

Teleonemia cylindricornis Champion, 1898

Comments: This species was originally described from Belize and several localities in Guatemala (Champion 1898). Drake and Ruhoff (1965) listed this species also from Jamaica, the United States (Illinois, Mississippi), Mexico and Honduras). The specimen listed below from Costa Rica represents a new country record.

Specimens examined: MEXICO: Tamaulipas: vic. Gomez Farias, 14-VII-1982, R. Turnbow (2♂8♀ TAMU); Tamaulipas: Bocatoma w. s., 7km SSE Gomez Farias, 20-VII-1982, R. Turnbow (1♂ TAMU); Tamaulipas: Mpio. Gomez Farias, Altas Cimas to Canindo, 900-1400m, 31-VII-1994, R. Jones (1♂ TAMU); Tamaulipas: Cny. La Libertad 7-III-1986, Kovarik, Jones, Haack (1♀ TAMU); Campeche: 31.5 mi. n. Hopelchén, 1-VIII-1980, Schaffner, Weaver, Friedlander (2♂2♀ TAMU); Quintana Roo: Mile Post 334, S of Cancun, Hwy. 307, 9-VIII-1990,

J. E. Eger (1♀ TAMU); San Luis Potosi: Puerto Verde, 64km.w. Ciudad Valles, 15-VII-1982, R. Turnbow (1♀ TAMU); Mexico: Malinalco, 27-IV-1984, J.C. Schaffner (1♀ TAMU); Vera Cruz: 3 mi. E. Papantla, 7-VI-[19]65, Burke, Meyer, Schaffner (1♂ TAMU). COSTA RICA: Heredia Prov: La Selva Biol. Sta. 3km S Pto. Viejo, 10 26'N, 84 01'W; 3-8-VIII-1992, G. Wright, Malaise Trap, Second Growth, SOC1000 (1♀ MZUCR).

Host plant: No host plants have been recorded for this species.

Teleonemia forticornis Champion, 1898

Comments: Champion (1898) originally described *Teleonemia forticornis* from Panama; *Teleonemia bierigi* was originally described from Costa Rica (Monte 1943). Drake and Ruhoff (1965) listed *T. forticornis* also from Brazil, Peru, and Argentina. The specimen listed below from Honduras represents a new record for that country.

Specimens examined: HONDURAS: Atlantida: PN Pico Bonito, Esta. CURLA, 18-VII-2001, R. Turnbow (1♀UGAC). COSTA RICA: Prov. Heredia: La Selva Biol. Sta. Successional plots, 1-2 years, 27-VII-1987, Leg. David G. Furth. (1♀ USNM); Prov. Heredia: Estacion Biologica La Selva 50-150m, 10°26'N, 84°01'W, 4-6-IV-2003, E. G. Riley (1♀ TAMU); Prov. Limón: Pococí, Colorado, Sector Cerro Cocorí, 30Km N. Cariari. 100m. 10-I-11-II-1995. E. Rojas. Malaise. L_N_567500_286000 #4507 (1♀ INBio). PANAMA: El Valle de Coclé, 24-V-[19]75, Col: Dodge Engleman (1♀ USNM); Coclé Prov: 6km. S El Valle, 20-V-1991, R. Turnbow (1♀UGAC) Bocas del Torro Prov.: 24 km W. Punta Peña, 22-II-1999, R. Turnbow

(1♀UGAC); Prov. Panama: Cerro Campana, 700m 8°40'N, 79°56'W, 20-I-[19]96, H. Stockwell (1♀ TAMU).

Host plant: A single host plant species, *Ipomoea batatas* [Convolvulaceae], has been recorded in the literature (Monte 1939).

Note: In comparison of the species description of *Teleonmia bierigi* Monte (1943) and photographs of the type specimen with those of *Teleonemia forticornis*, I have found no evidence that these two aforementioned species are diagnosable; I propose a **new synonymy** of *T. bierigi* with *T. forticornis*.

Teleonemia inops Drake and Hambleton, 1944

Comments: Drake and Hambleton (1944) originally described this species from Honduras, and it has not been recorded from outside that country. The specimens listed below from Mexico and Nicaragua represent new records for those countries.

Specimens examined: MEXICO: Chiapas: 1km. S. Ocosingo, 18-X-1988, R. Turnbow (1♀ UGAC); Chiapas: Hwy 195, 15km S. Jct. Hwy. 190, 15-X-1988, R. Turnbow (1♀ UGAC). HONDURAS: El Paraiso, vic. Yuscaran, 2-VI-1993, R. Turnbow (2♂1♀ UGAC); El Paraiso, vic. Yuscaran, 25-V-1993, R. Turnbow (1♂ UGAC). NICARAGUA: 5.5 mi NE Nandaime, 24VIII-1972, G. F. & S. Hevel (1♀ USNM).

Host plant: No host plants have been recorded for this species.

Teleonemia jucunda Drake, 1939b

Comments: Drake (1939b) originally described this species from Brazil (Bahia – type locality), Guyana, and French Guiana; until now, it has not been recorded from any other country. The specimens listed below from Costa Rica and Panama represent new country records

Specimens examined: COSTA RICA: Heredia: La Selva Biological Station, 2Km South Pt. Viejo, 3-5-VI-1984, Rider, Riley & LeDoux (1♀ DARC). PANAMA: Bocas del Torro Prov.: 24 km S. Punta Peña, 21-II-1999, R. Turnbow (1♀ UGAC).

Host plant: No host plants have been recorded for this species.

Teleonemia longicornis Champion, 1898

Comments: This species was originally described from the Amazon region in Brazil; it has also been recorded from Mato Grosso do Sul in Brazil (Drake 1930). It has not previously been recorded from the present study area. The specimen listed below from Costa Rica represents a new country record.

Specimens examined: COSTA RICA: Herida: Serapiqui: La isla, 100-200m, 15-VIII-27-IX-2011, I. Chacon, Malaise trap, LN26617525522264 #102827 (1♂ INBio).

Host plant: No host plants have been recorded for this species.

Teleonemia cf longicornis Champion, 1898

Specimen examined: COSTA RICA: Guanacaste: 6 mi. S. 6 mi. W. Cañas, Taboga, 10°19'N, 85°09'W, 13-17-II-1967, H. A. Hespenehede. Donation from James A. Slater collection (1♂AMNH).

Note: This specimen differs from the holotype and other specimens of *Teleonemia longicornis* by the uniseriate subcostal area.

Teleonemia morio (Stål, 1955)

Comments: This species was originally described in the genus *Tropidocheila* from Brasilia (Stål 1855). It has subsequently been recorded from several other localities in Brazil, but it has not been recorded from the present study area. The specimen listed below from Panama represents a new country record.

Specimens examined: PANAMA: Canal Zone: Pipeline Road, 30-VI-[19]74, Col: D. Engleman (1♂ USNM). BRAZIL: Rondonia: 62 km SW Ariquemes, Fzda. Rancho Grande, 16-X-1993, C. W. & L. B. O'Brien (1♀ USNM).

Host plants: This species has been recorded from several species of the genus *Annona* [Annonaceae]: *Annona cherimola* (Bondar 1936), *Annona reticulata* (Monte 1938), and *Annona squamosa* (Drake and Hambleton 1934, Broglio *et al.* 2012).

Teleonemia notata Champion, 1898

Comments: When Champion (1898) originally described this species, he indicated that he had “numerous” specimens from localities in Veracruz, Mexico, from Guatemala, and from Panama. Maes and Knudson (2016) recorded this species from Nicaragua. Drake and Ruhoff (1965) also listed this species from Cuba. The specimens listed below from Jamaica, Dominican Republic, Honduras, and Costa Rica represent new records for those countries.

Specimens examined: JAMAICA: St. Ann Parish, Fern Gully, 5-VIII-[19]85, J. E. Eger Coll. (1♂ TAMU). DOMINICAN REPUBLIC: San Cristobal Prov: San Cristobal (1♂ TAMU). MEXICO: Tamaulipas: Bocatoma, 7 Km SSE Gomez Farias: 5-7-I-[19]81, E. Riley (1♀ UMRM); S.L.P: 2.4 mi N State border of Hidalgo & S. L. P. 4-I-[19]81. E. Riley (1♂ UMRM). HONDURAS: Olancho: Montana del Malacate, 11-VI-2003, R. Turnbow (1♂3♀ UGAC). COSTA RICA: Prov. Cartago: Monumento Nacional Guayabo, Turrialba, 1100m. IX-1994. G. Fonseca, L_N_570300_217200 #3202. (1 INBio). PANAMA: Boquette, X-1959, N. L. H. Krauss (1♂ USNM); Panama pr. Cerro Campana, 700m 840'N, 7956'W, 20-I-[19]96, H. Stockwell (1♂ TAMU); Veraguas Pr. Rio Cobre, 50 km west Santiago, 7-VII-1996, J. C. Schaffner (2♀ TAMU).

Host plants: Recorded in the literature from: *Adenostegia filifolia* (Hurd 1946) and, *Adenostegia pilosa* (Hurd 1946) [Orobanchaceae], *Duranta repens* (Bruner *et al.* 1945), and, *Lantana sp.* (Perkins and Swezey 1924) [Verbenaceae].

Teleonemia ochracea Champion, 1898

Comments: This species was originally described from Volcan de Chiriqui in Panama (Champion 1898), and it has not been recorded from any other country. This species was not encountered during the present study.

Host plant: No host plants have been recorded for this species.

Teleonemia omrio, new species

Description:

Entirely black except pronotal collar and hood yellow brown.

Head black, covered with minute amounts of wax, armed with five spines; occipital spines adpressed to head, reaching beyond eye, concolorous with head; median spine short tuberculate, concolorous with head; frontal spines similar to median spine, adpressed to median spine. Basal antennal segment stout, not very elongate, black; second antennal segment shorter than first; third antennal segment extremely long, slightly pilose; fourth antennal segment shorter, one-fourth length of third. Bucculae bi- to triseriate; rostrum long, just reaching anterior margins of metacoxae.

Pronotum punctate, pores with wax, triangular posterior projection areolate, areolae with wax; pronotal collar produced to form a small, tumid hood; paranota uniseriate, adpressed to thorax; tricarinate, carinae subequal in height, subparallel. Hemelytra elongate, black; costal areas uniseriate each with a regular row of rectangular, hyaline cells, veins slightly lighter than

rest of hemelytra; subcostal area uniseriate, elongate, infusate; discoidal cell triangular, obtuse, five to six rows wide at widest, infusate, with some wax. Sutural area broad, ten to twelve areolae wide at widest, completely overlapping, entirely infusate. Hypocosta black uniseriate, veins. Metathoracic wings extending slightly beyond apex of abdomen, hemelytra extend slightly beyond wings. Thoracic sterna black, areolae of pleura with wax; rostral laminae uniseriate, diverging, with mild wax along lateral margins.

Abdomen elongate, all black, covered in wax. Pygophore elongate, black with some waxy covering, with two indentations on ventral surface; parameres black, covered with wax, left paramere one-fourth longer than right paramere.

Specimens examined: Holotype: PANAMA: Canal Zone: Panama City: Monsoon Forest, Canopy fogging, 15-30-VII-1979, E. Broadhead et al. B.M. 1979-125; on *Ficus insipida* W., No macro epiphytes on trunk, some lianas on crown (1♂ BMNH). Paratypes: Same data as holotype (2♂ 2♀ BMNH); PANAMA: Canal Zone: Pipeline Rd. Canopy Knockdown, *Luehea seemannii*, 24-X-1975 (1♀ USNM); PANAMA: Canal Zone: Colon: Humid Forest, Canopy fogging, 2-14-VII-1979, E. Broadhead et al. B.M. 1979-125; on *Spondias mombin* Linnaeus; A few macro epiphytes on trunk, many lianas on crown (3♂ 1♀ BMNH); Canal Zone: Panama City: Monsoon Forest, Canopy fogging, 15-30-VII-1979, E. Broadhead et al. B.M. 1979-125; on *Cassia moschata* H. B. K., No macro epiphytes on trunk, many lianas on crown (4♂ 2♀ BMNH). COSTA RICA: Prov. Heredia: F. La Selva: 3km S Pto. Viejo. 10°26'N, 84°01'W, 31-VII-1976, H. A. Hespenheide (1♂ USNM). Types will be conserved in their respective collections.

Measurements: (n=5): Length: 5.64, width: 1.52, length of antennal segments one through four, respectively: 0.23, 0.17, 2.66, 0.89. Holotype: Length: 5.64, width: 1.52, length of antennal segments one through four, respectively: 0.23, 0.17, 2.66, 0.89.

Host plants: Collected from insecticidal fogging of *Ficus insipida* [Moraceae], *Luehea seemannii* [Malvaceae], *Spondias mombin* [Anacardiaceae], and *Cassia moschata* [Fabaceae].

Etymology: The species is named because of its similarity to *Teleonmia morio*. To tie these two species together, I propose the epithet (*omrio*), which is an anagram for *morio*.

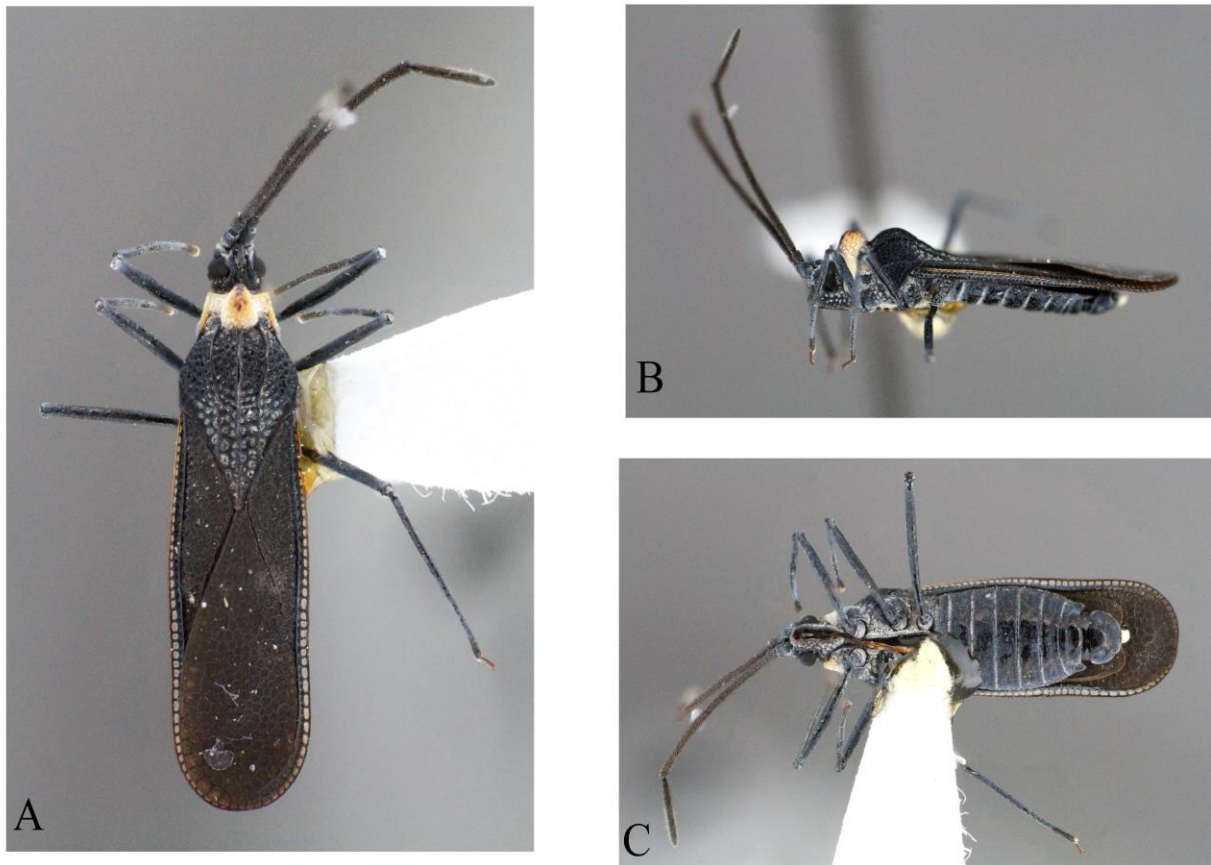


Figure 2.33: *Teleonemia omrio*, new species. **A.** Dorsal habitus, **B.** Lateral habitus, **C.** Ventral habitus.

Teleonemia picta Champion, 1898

Comments: Champion (1898) originally described this species from a couple different localities in Panama. The specimen listed below from Costa Rica represents a new country record.

Specimens examined: COSTA RICA: Puntarenas Prov. Golfito, 21-26-VII-1981, H.V. Weems Jr., G. B. Edwards Forest edge (1♂ FSCA). PANAMA: Bayano, 18.4km. W. Ipeti, 25-II-1999, R. Turnbow (1♀UGAC).

Host plant: No host plants have been recorded for this species.

Teleonemia pilicornis Champion, 1898

Comments: This species is only known from the type locality in Guatemala (Champion 1898). The specimens listed below from Mexico and Costa Rica represent new records for those countries.

Specimens examined: MEXICO: Chiapas: 12km s. Palenque, 3-VIII-1988, Robert W. Jones (1♀ TAMU). COSTA RICA: Prov. Guanacaste: P.N. Palo Verde, Bagaces, Estación Palo Verde, 10 - 50m, 15-XI-2004, M. Moraga, Red Noyes, L_N_259098_388353 #78878 (4 INBio).

Host plant: No host plants have been recorded for this species.

Teleonemia prolixa (Stål, 1860)

Comments: Stål (1860) originally described this species in the genus *Lacometopus* Fieber; the type locality is Rio de Janeiro, Brazil. Pertinent to this study, this species has been recorded from Nicaragua (Maes and Knudson 2016) and Panama (Champion 1898). Drake and Ruhoff (1965) listed this species also from Trinidad, Jamaica, Puerto Rico (Mona Island), Mexico, Guatemala, Colombia, Venezuela, Surinam, Guyana, Ecuador, Peru, Bolivia, Paraguay, Argentina. The specimens listed below from Honduras and Costa Rica represent new records for those countries.

Specimens examined: HONDURAS: Liberia: 6-IX-1984, Rain Forest, C.W. O'Brien (1♀ USNM). COSTA RICA: Prov. Alajuela: Bijagua. San Miguel. 400-500m. 12-VI-2006. J. A. Azofeifa. Libre. L_N_302300_426900 #86656 (2 INBio); Heredia Prov: La Selva Biol. Sta., 3 km S. Pto. Viejo, 1026'N 8401'W, 17-IV-1988, H. A. Hespenshide, *Aegiphila falcata* (1♀ MZUCR); Prov. Heredia: Finca Naranjo Valenciana, 2 km sur Pueblo Nuevo, Sarapiquí, 90m, 4-31-1-1993, M. Ortiz, L- N 271800_523750 (3 INBio); Prov. Guanacaste: Estac. Pitilla, 700m, 9km S. Santa Cecilia, Oct 1989, C. Moraga & P. Rios, L- N 330200_380200 (11 INBio). COLOMBIA: Amazonas Prov. Letica, 2-7-IV-1975, Col: D. Engleman (1♂ USNM). BRAZIL: Petropolis, XII-1970, J. Maldonado C. (5♂8♀ USNM).

Host plants: Several possible host plants have been recorded in the literature: *Acacia riparia* (Drake and Ruhoff 1965) [Fabaceae], *Cinchona* sp. (Drake and Poor 1938) [Rubiaceae], and *Lantana camara* (Monte 1938, 1940a) [Verbenaceae]. One of the specimens examined in this study (see above) was labeled as being collected on *Aegiphila falcata* [Lamiaceae].

Teleonemia prunellae Drake and Hambleton, 1946

Comments: Drake and Hambleton (1946) originally described this species from Guatemala City in Guatemala. It has also been recently recorded from Nicaragua (Maes and Knudson 2016). The specimens listed below from the United States (Texas) and Costa Rica represent new records for those countries.

Specimens Examined: U.S.A: Texas: Colorado Co. Columbus, 1-I-1989, Coll: R. S. Anderson, Berl. Riparian ravine litter (1♀ TAMU); Texas: Hidalgo Co. LRGVNWR, McManus Unit, 26. 05380N, 98.04987W, 30-III-26-IV-2010, FIT-ground, J. King & E. Riley-1879 Ebony-guayacan association; TAMU-ENTO: X0604633 (1♀ TAMU). MEXICO: Veracruz; Mpio, San Andres Tuxtula. Est. Biol. Los Tuxtlas Vigia 4 Trail 100m, 17-22-VI-1997, Wilson & Woolley, 97/027 Malaise trap (1♀ TAMU); Veracruz; Mpio, San Andres Tuxtula. Est. Biol. Los Tuxtlas Vigia Trail 450-700', 18-VI-1997, Wilson & Woolley, 97/027 Screen Sweep (1♂ TAMU); Veracruz; Mpio, San Andres Tuxtula. Est. Biol. Los Tuxtlas Darwin Trail 120'-300', 19-VI-1997, Wilson & Woolley, 97/028, Screen Sweep (1♀ TAMU); Veracruz: Mpio. Puente Nacional El crucero nr. Puente Nacional, 13-VI-1997; Wilson & Woolley, 97/013, Screen Sweep (3♂1♀ TAMU); Veracruz; Near Montepio, UNAM Biological Station "Los Tuxtlas" 10-16-VI-1981 W. R. Dolling, B.M. 1981-411, Tropical rainforest, general collecting (1♂♀ BMNH); Tamaulipas: 51 miles east of Cd. Victoria, 24-X-1985, R. Jones & P. Trevino (1♀ TAMU); Colima: 9mi. NE Comala, 18-19-VII-1983, Schaffner, Kovarik, Harrison (1♀ TAMU). COSTA RICA: Prov. Guanacaste: Est. Murcielago, 80m. 3-19-IX-1994. F. A. Quesada, L_N_347200_320300 #3225 (2 INBio); Prov. Guanacaste: Est. Murcielago, P. N. Guanacaste, 100 m. 31-X-18-XI-1994, F. A. Quesada, L N 320300_347200 # 3328 (8 INBio); Prov. Guanacaste: Est. Palo Verde, 10m, P. N.

Palo Verde, 25 to 27-XI-1992, U. Chavarria, L N 259000_388400 (2 INBio); La Caja, Reimoser, C. J. Drake Col. (1? USNM) Guanacaste: Palo Verde OTS, Comelco, Bagaces area. sweep sample, voucher specimen, 5-20-VII-1971, D.H. Janson, IV-27 (1♂ USNM).

Host plant: The only host plant record known is *Prunella vulgaris* [Lamiaceae] (Drake and Hambleton 1946)

Teleonemia radagasti, new species

Description:

Uniformly colored dorsally, chocolate brown to black; general shape elongate, slightly widening from head to wing apices; body covered in short, thick pubescence.

Head with moderately long occipital spines, adpressed to head. Antennae distinctly pilose, covered with thick stout hairs; segment one stout, short; segment two thinner, two-thirds the length of segment one; segment three long, thinner than segment two, but stout; segment four weakly clavate, more than one-third length of segment three. Eyes moderately large, brown. Bucculae contiguous anteriorly, triseriate; rostrum moderately long, extending to posterior margin of mesosternum.

Pronotum brown, punctate, sharply tricarinate; lateral carinae low, uniseriate; median carina twice as tall as lateral pair, uniseriate; paranota narrow, reflexed alongside of pronotum, uniseriate, but appearing carinate from above; triangular posterior projection areolate. Wings chocolate brown, cells infuscate with brown, elongate ovate; costal area uniseriate, areolae small,

gradually increasing in size apically; subcostal area uniseriate, areolae similar to costal area; discoidal cell large, triangular, seven rows of areolae wide at widest, apex extending beyond middle of wing; sutural area extremely large, comprising two-thirds of wing, ten rows of areolae at widest. Rostral laminae thick, pilose, diverging posteriorly. Legs uniform in color; femora thickened about middle, hairy, tibiae more slender, subequal in length to femora, pilose, apically with a thick tuft of setae; tarsi pilose ventrally; tarsal claws sharply curved, widely diverging.

Abdomen red brown with short, stout, tan setae; abdominal segments appearing rugose laterally; apex of abdomen broad, with long setae.

Measurements: (n=3): 5.5 long, 1.5-1.6 wide, antennal segments one through four, respectively: 0.22-0.25, 0.15-0.16, 1.63-1.75, 0.43-0.44. Holotype: 5.5 long, 1.5-1.6 wide, antennal segments one through four, respectively: 0.25, 0.165, 1.75, 0.43

Specimens examined: Holotype: COSTA RICA: Prov. Puntarenas: Rancho Quemado, Pen. Osa, F. Quesada, IV-1991, L- S 292500_511000 (1♂INBio). Paratypes: Same data as holotype (1♂♀ INBio). Types will be conserved in the INBio type collection.

Host plant: No host plants have been recorded for this species.

Etymology: This species is almost uniformly brown, and is not as colorful or patterned as its congeners. I name it in honor of J. R. R. Tolkien's underappreciated fictional wizard, Radagast the Brown.



Figure 2.34: *Teleonemia radagasti*, new species.
Dorsal habitus.

Teleonemia rhopalocera, new species

Description:

Mostly brown, with lighter testaceous markings.

Head brown, armed with five spines; occipital spines downcurved, adpressed to head, extending beyond base of median spine, concolorous with head; median spine tuberculate, down curved, adpressed to head; frontal spines, directed towards each other, forming small tubercles. First antennal segment short, stout; second segment half as long as first, more pilose, darker brown; third segment pilose, basally clavate, swollen, but narrowing towards apex; fourth segment elongate, one-fourth length of third, slightly narrower than third. Bucculae quadriseriate, rather broad, extremely long, extending to near procoxae, basally covered with wax, ochraceous brown. Rostrum moderately long, mostly brownish, reaching base of abdomen.

Pronotum dark brown, hood and collar lighter yellow brown, fades on posterior triangular projection. Pronotal collar inflated apically to form a tectiform hood, nearly as tall as pronotal disk. Paranota uniseriate, adpressed to side of pronotum. Pronotum tricarinate, median carina moderately tall, lateral carinae half as tall as median carina, uniseriate, constricted on posterior portion of pronotal disk and posterior triangular projection. Hemelytra elongate, mostly yellow brown basally, darker infusate on middle and apex; each costal area uniseriate, cells hyaline, apex infusate; subcostal areas biseriate, cells hyaline, veins brownish, subcostal extensions uniseriate; discoidal cell six areolae wide at widest, trapezoidal shaped, basally hyaline to lightly infusate, infusate near apex; sutural are of wing extremely wide, 10 to 12 areolae wide at widest, mostly infusate, completely overlapping; hypocosta uniseriate, elongate, with light

brown veins, cells hyaline. Legs subequal in length, unicolorous, but tarsi more darkly infuscate; femora and tibiae with short fine hairs; tarsi extremely minute, with hairs on ventral surface of second tarsal segment. Thoracic pleurites elongate, brown, ostioilar peritremes elongate, light brown.

Abdomen light brown, wax filling sutures between sternites. Pygophore ventrally with two small concavities with wax; parameres basally darker fuscous than pygophore. Basally in same plane, left paramere curved apically to overlap right paramere, with hairs along outside margins; dorsal margin of pygophore with hairs.

Specimens examined: Holotype: COSTA RICA: Heredia: Estación Biológica La Selva, 50-100m, 10° 26'N 84° 01'W, 4-6-IV-2003, E. G. Riley; TAMU-ENTO, X0775140 (1♂ TAMU). Type will be conserved in the TAMU type collection.

Measurements: (n=1): Length: 4.41, width: 1.23, length of antennal segments one through four, respectively: 0.18, 0.14, 1.89, 0.48.

Host plant: No host plants have been recorded for this species.

Etymology: This species is named for its clavate (rhopala-) third antennal (-cera) segment.

Note: Holotype is a teratological specimen, the left third antennal segment is formed apically like the right fourth segment. However, the bases of the third antennal segments are nearly identical.

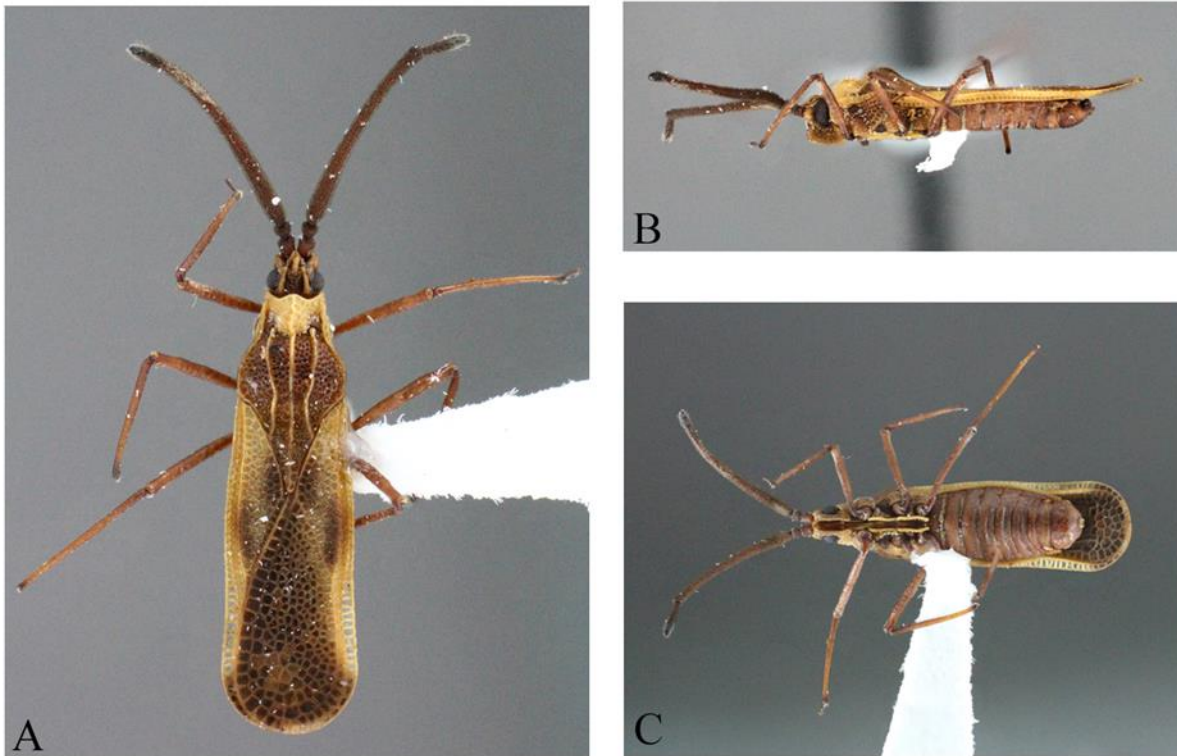


Figure 2.35: *Teleonemia rhopalocera*, new species. **A.** Dorsal habitus. **B.** Lateral habitus, **C.** Ventral habitus.

Teleonemia rugosa Champion, 1898

Comments: Champion (1898) had specimens of this species from both Guatemala and Panama when he originally described this species. Drake and Ruhoff (1965) listed this species also from Honduras and Bolivia. The specimens listed below from Costa Rica represents a new country record.

Specimens examined: HONDURAS: Atlantida: PN Pico Bonito, Rio Zacate, 16-V-2002, R. Turnbow (1♀UGAC). COSTA RICA: Cartago: Turrialba, Volcan Turrialba, 1450m, 3-VI-1973, Ginter Ekis (1♂ USNM); Heredia Prov. La Selva Biological Station. Successional

Plots 0-1 year. 26-VII-1989, leg. David G. Furth (1♀ USNM); Prov. Puntarenas: P.N. Carara. Estación Quebrada Bonita. 11-III-1994. M. Epstein. L_N_194500_469850 #76218 (3 INBio). PANAMA: Canal Zone: Pipeline Rd. Canopy Knockdown, *Luehea seemannii*, 24-X-1975 (2♂ 1♀ USNM); Canal Zone, Gamboa, Rio Agua Salud, VII-1967, W. W. Wirth (1♂ USNM); Panama: Madden Forest, 27-V-1973, Ginter Ekis (1♂ USNM).

Host plant: Several specimens examined in this study (see above) from the Canal Zone in Panama were listed as having been collected on *Luehea seemannii* [Malvaceae].

Teleonemia sacchari (Fabricius, 1794)

Comments: Fabricius (1794) originally described this species in the genus *Acanthia*; he listed the type locality as “Americae meridionalis Insulis.” Relevant to this study, Drake (1932) recorded *T. sacchari* from Panama. Additionally, Drake and Ruhoff (1965) listed this species also from Brazil, Mexico, the United States (California, Florida), and from most of the West Indies Islands. The specimen listed below from Costa Rica represents a new country record.

Specimens examined: USA: Florida: Monroe Co. Big Pine Key, 29-III-[19]79, E. G. Riley & D. LaDoux (2♀ UMRM); Florida: Monroe Co. Upper Matecumbe Key, Islamorada, 29-III-[19]79, E. G. Riley & D. LeDoux (1♀ UMRM); Florida: Monroe Co. Craig Key, 29-III-[19]79, E. G. Riley & D. LeDoux (1♀ UMRM). COSTA RICA: Prov. Guanacaste: Est. Murcielago, P. N. Guanacaste, 100 m. 5-18-XI-1994, C. Cano, L N 320300_347200 # 3329 (1 INBio).

Host plants: Several possible host plants have been listed in the literature: *Lantana cámara* (Drake 1926, Drake and Cobben 1960), *Lantana canescens* (Drake and Cobben 1960), *Lantana involucrata* (Bruner *et al.* 1945), and *Lantana* sp. (Drake and Cobben 1960), all in the family Verbenaceae, from a species of *Verbesina* (Wolcott 1923) in the family Asteraceae, and also “sugar” (Drake and Ruhoff 1965), probably referring to sugarcane in the grass family, Poaceae.

Teleonemia sandersi Drake and Hambleton, 1944

Comments: Drake and Hambleton (1944) originally described this species from Panama; it was later recorded from Honduras (Hurd 1946).

Specimens examined: PANAMA: Canal Zone: N⁹15': W7⁹ 57', Piña Road, 30-VIII-1973, D. Engleman (1♀ AMNH); Canal Zone: Gatun Spillway, 9¹7'N, 79⁵6'W, 28-X-[19]72, Col. D. Engleman (1♀ USNM); Canal Zone: Empire, 9⁵'N, 79⁴0'W, 29-X-[19]72, Col. D. Engleman (1♀ USNM); Canal Zone: Escobal Road 5-9 Atl. 30-VII-[19]74, Col. D. Engleman (1♂ USNM).

Host plant: No host plants have been recorded for this species.

Teleonemia schildi Drake, 1940

Comments: This species was originally described from Costa Rica (Drake 1940), and it has not since been recorded from any other country. The specimens listed below from Honduras and Panama represent new records for those countries.

Specimens examined: HONDURAS: Olancho: Montana del Malacate, 27-VII-2001, R. Turnbow (1♂♀ UGAC). COSTA RICA: Alajuela: Bijagua, 29-VII-1990, W. F. Chamberlain (1♀ TAMU); Heredia Prov: La Selva Biol. Sta., 3 km S. Pto. Viejo, 10°26'N 84°01'W, 25-VIII-1993, H. A. Hespenhide, *Aegiphila falcata* (1♂ MZUCR). PANAMA: Canal Zone: N°15': W79°57', Piña Road, 30-VIII-1973, D. Engleman (1♂ AMNH); Bocas Del Torro: 2.3 rd. mi. N from Contential Divide, 27-V-1993, E. Riley (1♀ TAMU); Darien Pr. Cana Pirre Camp, 5-V-[20]05, N745.825°, W7743.325°, El. 1320m A. R. Gillogly (1♀ TAMU); Panama: Boquete, X-1959, N. L. H. Krauss (1♂ USNM).

Host plant: One of the specimens examine in this study (see above) from the La Selva Biological Statio, Costa Rica was listed as having been collected on *Aegiphila falcata* [Lamiaceae].

Teleonemia scruplosa Stål, 1873

Comments: When Stål (1873) originally described this species, he indicated that he had specimens from both Colombia and Rio de Janeiro, Brazil. This species has also been recorded from all three countries included in the present study: Costa Rica (Drake 1929, as one of its synonyms, *Teleonemia lantana*), Nicaragua (Maes and Knudson 2016), and Panama (Champion 1898). Drake and Ruhoff (1965) listed this species also from Cuba, Jamaica, Trinidad, Haiti, Windward Islands (Grenada, St. Vincent), Netherlands Antilles (Aruba, Curaçao, Klein Bonaire, Bonaire), United States (Texas, Florida, Hawaii), Mexico, Guatemala, Guyana, French Guiana,

Venezuela, Peru, Paraguay, Fiji Islands, Greater Sunda Islands (Java), Senyavin Islands (Ponape), Australia, India, and Mascarene Islands (Mauritius).

Specimens examined: MEXICO: Tamp. 23mi. Sc victoric, 25-V-1974, C.W. and L.B. O'Brien and Marshall (1♂ USNM). HONDURAS: Copan: 11km NE Copan 4-VIII-1977, C.W. and L.B. O'Brien and Marshall (1♀ USNM). NICARAGUA: Managua: Bolona, VII-1971, J. Maldonado C. (1♀ USNM); Managua: Outskirts W. Bolona, VII-1971, J. Maldonado C. (4♂4♀ USNM). COSTA RICA: San Ramon 3 Rios, 10-VIII-1972, J. Maldonado C. (1♂ USNM). PHILLIPPINES: Luzon: Laguna, Los Banos, 31-III-1983, J.A. Jackman (1♂ TAMU).

Host plants: This species has been recorded from a number of different plants; literature records include: *Callirhoe involucreata* (Drake 1918b) in the family Malvaceae; *Lantana aculeata* (Beeson and Chatterjee 1940), *Lantana brasiliensis* (Silva 1956), *Lantana camara* (Kirkaldy 1907, Drake 1926, Monte 1940a, Drake and Cobben 1960), *Lantana canescens* (Drake and Cobben 1960), *Lantana montevidensis* (Fullaway 1951), *Lippia alba* (Drake and Cobben 1960), and *Lippia brasiliensis* (Monte 1938), all in the family Verbenaceae; *Myoporum sandwicense* (Maehler 1955) in the family Scrophulariaceae; *Xanthium* sp. (Fullaway 1951) in the family Asteraceae; and ebony (Blatchley 1926) in the family Ebenaceae.

Teleonemia tricolor (Mayr, 1865)

Comments: This species was originally described in the genus *Monanthia* from specimens collected from Venezuela (Mayr 1865). Relevant to this study, this species has been recorded from Costa Rica (Arnold 2005) and Panama (Champion 1898). Drake and Ruhoff (1965) listed this species also from Brazil, Colombia, Surinam, Ecuador, Paraguay, Peru,

Argentina, Guatemala and Trinidad. The specimens listed below from Mexico and Honduras represent new records for those countries.

Specimens examined: MEXICO: Tabasco: 8Mi W. Cardenas, 7-X-1976, Cate & Clark (1♂ TAMU); Tabasco: 10Mi E. Cardenas, 12-vi-1965, Burke, Myer, Schaffner (1♂ TAMU). HONDURAS: Com. Lago Yojoa, 19-VII-1974, C. W. & L. O'Brien & Marshall (4♀ CAS). COSTA RICA: Prov. Limon: Manzanillo, 0-100 m, RNFS Gandoca y Manzanillo, 6-27-I-1993, K. Taylor, L- S 398100_610600 (1 INBio). PANAMA: Panama prov: Las Cumbres, TV Hill, 26-VI-1974, C. W. & L. O'Brien & Marshall (1♀ CAS); Panama prov: Cerro Campana, 850m, 840'N, 79°56'W, 1-VII-1970, H. A Hespenthide, (1♀ USNM). ECUADOR: Orellana: Payamino Research Station 0° 29' 36.01"S, 77° 17' 29.15"W, 300m, Tropical Rainforest, Pitfall trap, 30-VII-11-VIII-2008, Coll: CPDT Gillett, BMNH {E} 2008-88 (1♀ BMNH).

Host plants: Literature records include *Cucurbita moschata* (Drake and Hambleton 1938), *Sechium edule* (Silva 1956), and *Sicana odorifera* (Silva 1956), all in the family Cucurbitaceae.

Teleonemia validicornis Stål, 1873

Comments: Stål (1873) originally described this species from Colombia. Pertinent to the present study, this species has been recorded previously from Panama (Hurd 1946). Drake and Ruhoff (1965) listed this species also from Surinam, French Guiana, Guyana, Brazil, Argentina, Venezuela, and the Netherland Antilles (Curacao). The specimens listed below from Costa Rica represent a new country record.

Specimens examined: COSTA RICA: Heredia Province: La Selva Biological Station, 5-VI-2016, A. H. Knudson, Ex. Begoniaceae (1♂ 1♀ NDSIRC); Puntarenas Prov: Golfito, 21-26-VII-1981, H. V. Weems Jr., G. B. Edwards Forest edge (1♀ FSCA). PANAMA: Canal Zone: Pipeline Rd. Canopy Knockdown, *Luehea seemannii*, 24-X-1975 (1♀ USNM); Punta Vacamonte, 852'N, 7940'W, 13-V-[19]73, Col: D. Engleman (1♀ USNM); Chepo, 500m, 4-II-[19]73, Col: D. Engleman (1♀ USNM).

Host plants: *Jacaranda paucifoliata* [Bignoniaceae], *Lantana camara*, [Verbenaceae], *Machaerium oblongifolium*, *Machaerium oblongifolium* v. *subglabrum* [Fabaceae] (Drake and Ruhoff 1965).

Teleonemia variegata Champion, 1898

Comments: When Champion originally described this species in 1898, he indicated he had four specimens: two from Mexico (Guerrero), and two from Guatemala. Pertinent to the present study, this species has been recorded from Nicaragua (Maes and Knudson 2016). Drake and Ruhoff (1965) listed this species also from Honduras and the United States (Arizona).

Specimens examined: MEXICO: Nuevo Leon: 29mi SW. Linares, 5700', 15-VIII-1971, C. W. & L. O'Brien & Marshall (1♀ UMRM); Nuevo Leon: 23.6mi SW. Linares, 3-VII-1974, Clarke, Murray, Ashe, Schaffner (3♂5♀ TAMU); Nuevo Leon: 9mi W. Iturbidae, 3-VII-1974, Clarke, Murray, Ashe, Schaffner (1♂♀ TAMU); Nuevo Leon: 3mi S. Pacheco, 3-VII-1974, Taken at light, Clarke, Murray, Ashe, Schaffner (1♂2♀1? TAMU); Puebla: 7.3 miles Southwest Izucar de Matamoros, 22-VII-1981, Bogar, Schaffner, Friedlander (2♂2♀ TAMU); Puebla: 5

miles Southeast Izucar de Matamoros, 20-VII-1981, Carroll, Schaffner, Friedlander (1♂♀ TAMU); Puebla: 4 miles east of Azumbilla, 22-VII-1981, Carroll, Schaffner, Friedlander (3♂ TAMU); Puebla: 13.3 miles ne. Tehuitzingo, 13-14-VII-1974, Clarke, Murry, Ashe, Schaffner (1♂ TAMU); Nayarit: Volcan Ceboruco, 8-12km. W. Jala, 4-X-1990, R. Turnbow (1♂2♀ TAMU); Oaxaca: 3.4 mi. se. Matatlan, 12-VII-1981, Bogar, Schaffner, Friedlander (1♀ TAMU).

Host plant: *Lantana* sp. (Perkins and Swezey 1924) [Verbenaceae].

Tigava Stål, 1860

Key to the species of southern Central America

- 1 Pronotum tricarinate*Tigava pulchella* Champion
 - Pronotum unicarinate*Tigava convexicollis* Champion

Tigava convexicollis Champion, 1898

Comments Champion (1898) originally described this species from Panama, and it has not been recorded from outside that country. The specimen listed below from Costa Rica represents a new country record.

Specimens examined: COSTA RICA: Guanacaste Prov.: Est. Pitilla, 700m, 9km S Sta. Cecilia, P. N. Guanacaste, P. Rios, 4-25 XI-1991, L-N 330200_380200 (1 INBio). PANAMA: Canal Zone: Colon: Humid Forest. Canopy fogging. 2-14-VII-1979, E. Broadhead et al. B.M.

1979-125, Many macro epiphytes on trunk, no lianas on crown. On *Hura crepitans* Linnaeus (1♂ BMNH).

Host plant: No host plants have been recorded previously in the literature. One of the specimens examined during this study (see above) from Panama was collected by insecticidal fogging of *Hura crepitans* [Euphorbiaceae].

Tigava pulchella Champion, 1898

Comments: When Champion (1898) originally described this species, he indicated that he had three specimens from Mexico (Veracruz). Relevant to the present study, this species has been recorded from Nicaragua (Maes and Knudson 2016). Drake and Ruhoff (1965) listed this species also from Cuba, Guatemala, and Honduras.

Specimens examined: GUATEMALA: Cocales, 14-V-1965, E. J. Hambleton, 29-65 (1♂ USNM); San Marcos, rd. to Bojanal, 23-X-2006, R. Turnbow (1♂ UGAC); Dept. El Progreso: San Agustín AC, 11-21-VIII-1965, Flint and Ortiz (1♂ USNM).

Host plant: No host plants have been recorded for this species.

Tingis Fabricius, 1803

Tingis gamboana Drake and Hambleton, 1945

Comments Drake and Hambleton (1945) originally described this species from the Canal Zone in Panama; it has not been recorded from any other country. Champion (1887) reported an undescribed species of *Acysta* from Panama, this species is actually *Tingis gamboana* and is listed below. The specimen listed below from Belize represents a new country record.

Specimens examined: BELIZE: Orange Walk Dist. Rio Bravo Cons. Area Well Trail, 7-14-IV-1995, P.W. Kovarik, ex. Yellow Pan Traps (1♂ TAMU). PANAMA: Canal Zone: Colon: Humid Forrest, Canopy fogging, 2-14-VII-1979. E. Broadhead et. al. A few macro epyphytes on trunk, many lianas on crown, on *Spondias mombin* Lineaus, (2♂ BMNH); Canal Zone: Colon: Humid Forrest Canopy fogging, 2-14-VII-1979. E. Broadhead et. al. No macro epyphytes on trunk, few lianas on crown, on *Sterculia apetala* Karst. (1♂ BMNH); Chacoj, Vera Paz, Champion; B. C. A. Rynch.II. *Acysta* sp. Det. Champion (1♀ BMNH).

Host plant: This species has been recorded in the literature from elm [Ulmaceae] (Drake and Hambleton 1945). Specimens examined during this study (see above) were collected by canopy fogging of *Spondias mombin* [Anacardiaceae] and *Sterculia apetala* [Malvaceae].

Ulocysta Drake and Hambleton, 1945

Ulocysta tricarinata, new species

Description:

Overall dorsal profile triangular.

Head armed with four spines; occipital spines short, adpressed to head; median spines short tubercles, porrect. Antennae long, brown covered with short, stiff, dark hairs; segment one moderately long, segment two short, one-fourth length of segment one; segment three extremely long, roughly two and one-half times longer than segment one; segment four shorter, half as long as segment two, black at apex. Bucculae contiguous apically, biseriate; rostrum short, extending to anterior margins of metacoxae, yellow, apex infusate.

Pronotum finely punctate, mostly covered by large, inflated hood, four to five rows of areolae along lateral margins; paranota moderately reflexed, biseriate, margins with minute spinules; tricarinate; lateral carina reduced to small triangular flaps; median carina inflated from apex to triangular posterior projection of pronotum, median carina not inflated along posterior fourth and under hood, posterior three cells infusate. Wings broad, apices diverging broadly; costal vein with two rows of minute spinules, costal area biseriate at base, quadriseriate at widest; subcostal area sigmoidal, biseriate; discoidal cell biseriate, extending to basal third of wing; sutural area of wing biseriate. Rostral laminae low, uniseriate; thorasic sterna red; legs slender; femora slightly curved basally; tibiae subequal in length to femora; tarsi minute, slightly darker than legs.

Abdomen large, red, broadly ovate. Pygophore rectangular, elongate, as long as length of two preceding abdominal segment; parameres sickle-shaped, with some long fine hairs.

Specimens examined: Holotype: PANAMA: Panama Province, P. N. Soberania, Old Gamboa rd, el 40m, 12-VIII-1999, 9° 05' 00"N 79° 40' 22" W, J. B. Wolley 99/098 (1♂ TAMU). Paratypes: Area Can., Barro Colorado Isl. 20-IV-[19]84, Col: Marina Wong, Dodge Engleman Collection 1990 (1♀ USNM); Area Can., Barro Colorado Isl. 16-II-[19]84, Col: Marina Wong, Dodge Engleman Collection 1990 (1♂3♀ USNM); Area Can., Barro Colorado Isl. 19-IV-[19]84, Col: Marina Wong, Dodge Engleman Collection 1990 (2♂3♀ USNM); Area Can., Barro Colorado Isl. 15-IV-[19]84, Col: Marina Wong, Dodge Engleman Collection 1990 (1♂ USNM); Area Can., Barro Colorado Isl. 14-III-[19]84, Col: Marina Wong, Dodge Engleman Collection 1990 (1♂♀ USNM); Area Can., Barro Colorado Isl. 18-V-[19]84, Col: Marina Wong, Dodge Engleman Collection 1990 (1♂ USNM); Canal Zone: Panama City, Monsoon forest, Canopy fogging, 15-30-VII-1979, On *Spondias mombin* Linnaeus, E. Broadhead et al. B. M. 1979-125 (1♀ BMNH); Canal Zone: III-1983, J. H. Martin (1♂ BMNH); Barro Colorado I. I-III-1983, J. H. Martin, B.M. 1983-478, *Faramea* sp. (1♀ BMNH). Types will be conserved in their respective collections.

Measurements: (n=5): Length: 3.00-3.19, width at widest: 2.43-2.54, height of hood: 0.72-0.77, width of hood: 0.56-0.57, length of antennal segments one through four, respectively: 0.43-0.44, 0.10-0.11, 1.29-1.32, 0.80-0.82. Holotype: Length: 3.19, width at widest: 2.54, height of hood: 0.77, width of hood: 0.57, length of antennal segments one through four, respectively: 0.43, 0.11, 1.29, 0.82.

Etymology: This species has a tricarinate pronotum, unlike the type species of the genus (*Ulocysta praestabilis* Drake and Hambleton, from Colombia), which lacks lateral carinae.

Note: With the description of this new species, the generic description of *Ulocysta* will need to be broadened to now include species with a tricarinate pronotum.

Host plant: One specimen examined in this study (see above) was collected from *Faramea* sp. [Rubiaceae]; another was collected from insecticidal fogging of *Spondias mombin* [Anacardiaceae].

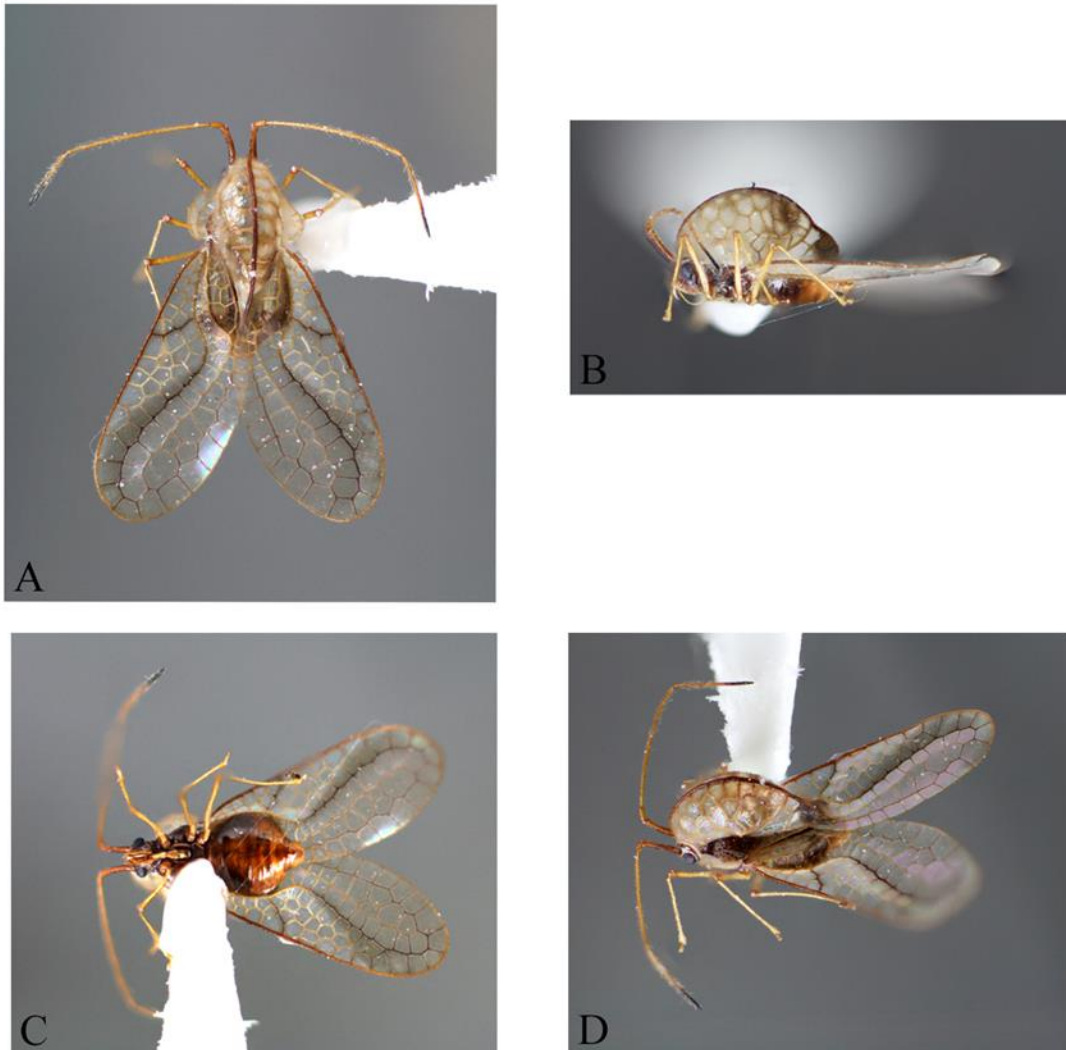


Figure 2.36: *Ulocysta tricarinata*, new species. **A.** Dorsal habitus, **B.** Lateral habitus, **C.** Ventral habitus, **D.** Angle habitus.

Vatiga Drake and Hambleton, 1945

Vatiga manihotae (Drake, 1922)

Comments: Drake (1922) originally described this species (in the genus *Leptopharsa*) from Trinidad. Drake and Ruhoff, in their 1965 catalog, listed this species from several other

West Indies Islands, and from several countries in South America. Froeschner (1993) added Colombia and Venezuela to the list of countries from which this species has been collected. Although there are no records from the present study area, and none have been examined from Costa Rica, Nicaragua, or Panama, the specimens listed below from Mexico, Honduras, and El Salvador (all new country records) now places this species both to the north and to the south of the area covered in this study. It is likely to be discovered in one or all of these countries eventually. The specimens from Bolivia listed below also represent a new country record for that country.

Specimens examined: MEXICO: Quintana Roo: along rd. betw. Coba & N. Xcan, 9-VI-1987, C. L. Smith & L. D. Hermann (1♂ UGAC); Jalisco: La Hermita, elev. 634m. 20° 48.040'N, 104° 56.563'W, 31-VII-2006, J. Bernal, A. Gillogly (3♂1♀ TAMU). HONDURAS: Atlantida, La Ceiba, 18-V-2002, R. Turnbow (4♂4♀ UGAC). EL SALVADOR: C.N.A., S. Tecla, 409-16, 5-IX-[19]52, M.S.V. Paul A. Berry Collection. (3♂ UMRM). BOLIVIA: Dept. La Paz: 6.82 km SE Caranavi, -15.868396°, -67.513129°, 5-I-2017, A. H. Knudson (6♂2♀ AHKC).

Host plants: *Manihot utilissima*; *Manihot* sp. [Euphorbiaceae] (Drake and Ruhoff 1965).

Note: Maes (1998), Maes and Knudson (2016) both report an undetermined species of *Vatiga* from Nicaragua. The specimens cited in the 1998 publication were seized by the Nicaraguan Ministry of Agriculture, so further study of the specimens has not been possible. It is likely, however, that the specimens are probably *V. manihotae*.

Discussion

Many species found in neighboring countries like Panama and Nicaragua are now documented in Costa Rica, whereas several species previously described or recorded only from Costa Rica, have now been found in Panama. There are interesting discoveries of note including expanded species distributions. Several species previously recorded from South America and northern Central America are also present in the region. Most notably *Amblystira pallipes*, *Eurypharsa nobilis*, *Leptocysta sexnebulosa*, *Leptopharsa lenatis*, *Sphaerocysta fumosa*, and *Teleonemia longicornis*, all previously known from South America, have now been found within the present study area. *Amboingis senta*, *Leptopharsa distantis*, *Tigava pulculla*, all previously described from Guatemala are all now recorded from Costa Rica. Despite these apparent range extensions, we cannot determine if these new records are true range extensions due to changing climate, habitat loss, or under-collection. These new records may be the product of species that were already present and are just now being locally documented. Furthermore, type localities are just one useful tool in taxonomy and may not necessarily be important for understanding native distribution. The best example in the family Tingidae is the species *Calonoma uhleri* Drake, which was described from the Leeward Islands in the Caribbean, but was later discovered in Australia. A subsequent study by Drake and Ruhoff (1960, 1965) showed that this species was originally indigenous to Australia and not a native Caribbean species. Currently there are very few invasive species of Tingidae in the neotropics, with *Calonoma uhleri* in the Caribbean, *Corythucha cilliata* (Say) and *Stephanitis pyrioides* (Stål) in South America being the only known examples. So far, Costa Rica has no known introduced species of Tingidae. Some apparent disjunct distributions of several species of Tingidae are most likely explained from the

lack of collecting in northern South America and Central America. Despite the intense collecting efforts of many individuals throughout the Canal Zone of Panama, there are many other species of Tingidae that likely occur in Panama, but they may be missed due to collecting method. For instance, some species of tingidae are only known from insecticidal fogging, like *Carinacader minuta*, *Liotingis exigus* and *Taurcader hexabison*. As such, these species likely occur high in the canopy, which is not easily accessible without ropes and a climbing harness. Another factor to consider is the potential for severe storms that can potentially displace insects over hundreds of kilometers (Wikteliuss 1981).

Another implication regarding this research is that an economically important genus *Vatiga* has now been recorded for Central America from several different localities. Maes (1998) reported an undetermined species of *Vatiga* from Nicaragua, but many institutions or individuals are unaware of this publication. Furthermore, as stated previously, the Nicaraguan Ministry of Agriculture seized the specimens, so a species specific identification is not possible at this time (Maes personal communication). Through further study, loans of material, and personal collecting; *Vatiga* is now documented from Mexico, El Salvador, Honduras, Nicaragua, and Bolivia. So far, the only areas where *Vatiga* is currently considered a serious agricultural pest of cassava (*Manihot* spp. [Euphorbaceae]) is South America, and recently in Reunion island off the coast of East Africa (Streito *et al.* 2011).

There are many factors that influence pest species and invasiveness, such as susceptible cultivars, climate variation, inappropriate application or misuse of agricultural chemicals, lack of integrated pest management (IPM) control, including minimal or no crop rotation. Several studies hypothesized the invasiveness of *Vatiga* species in yucca producing areas around the

world. (Montemayor *et al.* 2015). Most specimens of *Vatiga* examined were older, from the 1960s or 70s, but several specimens were from the 1990s and 2000s. *Vatiga* may be present in Central America, but in low numbers due to any aforementioned factor that determines its potential as a pest species. However, *Vatiga* may be under collected due to lack of sampling in proper environments, poor timing, or poor scouting. Generally, when individuals of *Vatiga* are found, they form an aggregation (Silva *et al.* 2016).

Cassava is grown throughout much of the tropical world and surprisingly, *Vatiga* has remained restricted to the neotropics, except Reunion Island. I speculate that the Central American and Mexican specimens are introductions from South America and may not represent established populations. However, there is evidence that many tingid species thrive under introduced settings (Picker and Griffiths 2014).

The 2016 collecting trip in Costa Rica yielded a total of 20 specimens of Tingidae, representing four species and four genera. Active searching on known host plants of many common species of Tingidae yielded only *Acanthocheila armigera*. All other efforts were unsuccessful. For example, the plant family Fabaceae is known to have many tingid specialists across different genera, such as *Amblystira*, *Atheas*, and *Leptopharsa*, but extensive collecting on all fabaceous plants produced results only in the Auchenorrhyncha and an occasional plant bug (Heteroptera: Miridae). Further searching on *Achemea* [Bromeliaceae] was unsuccessful. New host plant records that are included in this manuscript were explored, but were also unproductive. There were several species of broad leaf trees that were encountered in the field, but were too tall to collect from using the equipment at hand. The sparse numbers of individual specimens can be explained mostly due to the extended dry season of 2016. In general collecting, few

representative specimens of Heteroptera were acquired and when many were found, most were immature specimens. Further collecting during different times of the year is necessary for encountering other species of Tingidae likely to be found in southern Central America.

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CHAPTER THREE: CONCLUSIONS

The Tingidae of southern Central America consist of a diverse assemblage of species. Like one would expect, there are several widespread species found within the study area; some examples include *Acanthochiela armigera*, *Amblystira fuscitarsis*, *Corythaica passiflorae*, *Corythucha gossypii* and *Teleonemia scrupulosa*. There also are widespread North American species that occupy the study area like *Corythaica carinata*, *Corythucha spinosa*, *Dichocysta pictipes*, *Leptopharsa divisa*, *L. elata*, and *Phatnoma annulipes*. Several species with widespread South American distributions just reach the study area; *Amblystira pallipes* and *A. silvacola* just reach Panama and Costa Rica, respectively, and *Eurypharsa nobilis* has now been found in northern Costa Rica. Other examples of southern species or genera reaching North America are *Sphaerocysta fumosa* now in Panama and Mexico (Guidoti 2014, Brialovski and Torres 1986) as well as *Leptocysta sexnebulosa* from Panama and a likely new species of *Leptocysta* from the Mexican state of Tabasco.

The faunal interchange between North and South America is clear and evident with many examples in the Tingidae. The genus *Pachycysta* is mostly a South American genus with two representatives in Costa Rica and Panama. Several northern species reach the study area as well; *Amboingis ainsliei* is found from Guatemala to northern Costa Rica, *Leptopharsa oblonga* is found in Guatemala and now Nicaragua, and *Tigava pulchella* is found from southern Mexico to northern Nicaragua.

Costa Rica appears to have several unique species present; *Ambycysta gibbifera*, *Aepycysta decorata* and several new species have only been found in Costa Rica. Several genera exhibit interesting species distributions or patterns. The genus *Amblystira* has two widespread

species that occur throughout Central or South America, but these species also have several closely related, yet isolated and locally distinct species. *Amblystira fuscitarsis* appears closely related to two species, but one is only found in Honduras (*A. syuapensi*) and *A. sauroni* new species, has only been found in Panama) Several new genera have also been discovered and the most noteworthy are *Carinacader* and *Taurcader* because they represent the first species of the Cantacaderini in North America.

Costa Rica and Panama both appear to have a slight Caribbean faunal influence. *Corythucha agalma* was described from Saba (Leeward Islands) and has been found in Guatemala and now Panama. *Corythucha championi* was described from Curacao, although Champion reported this species as *C. decens* (Stål) from Guatemala. It has now since been found in south Texas, Mexico, El Salvador, Costa Rica, Panama, and Colombia. Panama also has two other species that were previously only known from the Caribbean. *Leptopha morrisoni* feeds on mangrove and is found on Hispaniola, Cuba and in the Canal Zone in Panama. *Amblystira morrisoni* was described from the Dominican Republic, but is now reported from Panama. There is not enough collecting history or information present of Tingidae to truly understand whether certain species originated on islands and then migrated to the mainland or the converse of this statement.

Several other genera found in the study have interesting and disjunct distributions; *Acysta* is found from southern Mexico to Brazil, but *Acysta australica* Drake, is found in Queensland Australia. The genus *Dicysta* is found from Costa Rica to Paraguay, but also has several species found in Australia, New Guinea and New Caledonia. The Indo-pacific and Australian species are

morphologically distinct from their New World counterparts. As such these species are likely a distinct subgenus or new genus.