

Wilinggin-West Kimberley Bush Blitz ***Heteroptera (True Bugs)***

18-29 July 2022

Submitted 20 February 2023:

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List of contributors

List of contributors to this report.			
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Abstract

On this Bush Blitz trip specimens representing 99 different species from 28 families of Heteroptera were collected. The mirid bugs (Miridae – 22 species) and shield bugs (Pentatomidae – 14 species) were the most species rich and abundant in the collections taken during the Wilinggin-West Kimberley Bush Blitz (see Appendix 1). Eight of the species are believed new to science, with several others requiring further study. The included collection event data provides host plant association records for some of the encountered species.

1. Introduction

The hemipteran suborder Heteroptera is one of the core target taxa for the Bush Blitz program (Cassis and Symonds 2016). Heteroptera is represented in Australia by 2500+ species (Australian Faunal Directory), with near 500 new species described in the past 20 years (e.g., Symonds and Cassis 2018). Much of the taxonomic impediment pertains to the families Miridae and Tingidae, which are sister-taxa (Cassis 2019). These taxa are generally phytophagous, feeding on a broad range of host plants, particularly eudicot angiosperms.

The Wilinggin-West Kimberley Bush Blitz provided a significant opportunity to collect Heteroptera in the Kimberley, an area which has been little sampled for true bugs.

2. Methods

2.1 Site selection

Most Heteroptera are herbivorous, and are best collected by targeting their host plants, which ideally should be in flower or in seed. Because of the timing of the trip, much of the vegetation was very dry, with few plant species in flower. Sites were therefore chosen primarily based on proximity to water and the potential for healthy host plant communities. Such sites included pools, creeks, rivers and other pockets of green vegetation, as observed during helicopter trips to other sites. Some plant species were specifically targeted, such as *Pandanus*, *Triodia*, *Drosera* and *Byblis*, as they are known host plants for several Heteroptera of interest to our team. Other plants were surveyed adventitiously based on phenology, for example *Calytrix exstipulata* was flowering at the time of the trip and was found to host many heteropterans, especially shield bugs (Pentatomidae). We were particularly interested in collecting on the carnivorous plants (*Drosera* and *Byblis*), which harbour the kleptoparasitic genus *Setocoris*; the study group of one of us (Zoe Bloesch).

2.2 Survey techniques

Collecting was primarily by beating vegetation, but also by sweeping, by hand, peeling bark, and via light trap. Collected specimens were either euthanised with ethyl acetate or by placing them in a freezer upon return to base camp. Specimens were mounted and where multiple individuals of a species were collected some specimens were stored in 100% ethanol for future DNA sequencing.

2.2.1 Methods used at standard survey sites

The above heteropteran survey techniques were used at the standard survey sites. Riparian vegetation with flowers or seeds were targeted for beat sampling.

2.3 Identifying the collections

Specimens were initially sorted to family-group level, and then to morphospecies. In order to ensure consistency in morphospecies determination, WAM morphospecies were photographed, with these images then cross-checked against UNSW specimens. Specimens were then compared to existing collections in both institutions. Formal genus-group and species-group identifications were supported by examination of type photographs held at UNSW and the scientific literature.

3. Results and Discussion

3.1 Un-named or not formalised taxa

Table 1. Un-named species that require additional research.

TAXON	COMMENT
<i>Agramma</i> SP001	<i>Agramma</i> is under review by G Cassis.
AGRI GN001 SP001	More research is required.
<i>Amorbus</i> SP001	<i>Amorbus</i> is under review by G Cassis,
<i>Aphylum</i> SP001	The taxonomy of <i>Aphylum</i> requires further investigation.
BERY GN001 SP001	The Berytidae is under review by Dr TJ Henry (USNM) and G Cassis.
<i>Campylomma</i> SP001	Identification of <i>Campylomma</i> requires investigation of the male genitalia.
<i>nr Campylomma</i> SP002	The Australian Nasocorini requires revision. This species is similar to <i>Campylomma</i> but is not considered congeneric. This requires additional comparative material and is beyond scope.
<i>nr Campylomma</i> SP003	As above
<i>nr Campylomma</i> SP004	As above
<i>Cephaloplatus</i> SP001	Further comparative research is required for a definitive identification.
CREM GN001 SP001	Identifications of the tribe Cremnorrhini requires detailed genitalic investigation.
Cydnidae SP001	The Cydnidae require further research.
Cydnidae SP002	As above.
<i>Dysdercus</i> (<i>Paradysdercus</i>) SP001	More research is required.
<i>nr Epimixia</i> SP001	This species is similar to <i>Epimixia</i> but required further comparison to species of the Kimberley described by Cassis et al. (2019).
<i>Eurystylus</i> SP001	<i>Eurystylus</i> is yet to be documented for Australia. This genus is widespread in the Eastern Hemisphere and this species appears to be a representative of the genus. More research is required.

<i>nr Eurystylus</i> SP001	This species is similar to <i>Eurystylus</i> but is not likely a representative of the genus. More research is required.
<i>Eysarcoris</i> SP001	More research is required.
<i>Eysarcoris</i> SP002	More research is required.
<i>Frontimiris</i> SP001	Dissections are required to assess if it is conspecific with <i>Frontimiris</i> previously described from the Kimberley (Cassis et al. 2019).
<i>Germalus</i> SP001	More research is required.
GERR GN001 SP001	More research is required.
<i>Goondnomdanepa</i> SP001	More research is required.
<i>Havinthus</i> SP001	The Australian Harpactocorinae are under review by Dr Tatarnic. More research is required.
<i>Heinsius</i> SP001	Only two species of <i>Heinsius</i> are described. More research is required to determine whether this belongs to either of the described species.
<i>Heinsius</i> SP002	As above.
<i>Malandiola</i> SP001	<i>Malandiola</i> is under review by PhD student Christian Sherlock at UNSW. It is likely a new species
<i>Meschia</i> SP001	This is likely a new species. More research is required.
MIRI GN001 SP001	More research is required.
<i>Nerthra</i> SP001	This species belongs to a <i>Nerthra</i> genus-group that is under review at UNSW.
<i>Nethersia</i> SP001	<i>Nethersia</i> is under review by PhD student Christian Sherlock at UNSW. More research is required.
<i>nr Nethersia</i> SP002	As above.
<i>Novatilla</i> SP001	More research is required.
<i>Ochterus</i> SP001	More research is required.
<i>Ocirrhoe</i> SP001	<i>Ocirrhoe</i> is a poorly defined genus with multiple new species. It is likely a synonym of <i>Cuspicona</i> . More research is required.
<i>Oecophyllodes</i> SP001	More research is required. Possibly a new species.

<i>Oncocephalus</i> SP001	The reduviid tribe Stenopodaini is poorly documented in Australia. More research is required.
<i>Opistostenus</i> SP001	More research is required.

ORTH GN001 SP001	The Australian Orthotylinae is under review by multiple researchers at UNSW. Dissections are required to assess the identity of this species. More research is required.
ORTH GN001 SP002	As above.
ORTH GN001 SP003	As above.
ORTH GN001 SP004	As above.
<i>Pachygrontha</i> SP001	More research is required.
<i>Paraplea</i> SP001	More research is required.
Peiratinae SP001	This subfamily of Reduviidae is poorly understood in Australia. More research is required.
PHYL GN001 SP001	More research is required.
PHYL GN001 SP002	More research is required.
PHYL GN001 SP003	More research is required.
<i>Plinthisus</i> SP001	More research is required.
<i>Poecilosphodrus</i> SP002	As above.
<i>Pseudoloxops</i> SP001	More research is required.
<i>Remauderiana</i> SP001	More research is required.
RHYP GN001 SP001	More research is required.
RHYP GN001 SP002	More research is required.
RHYP GN001 SP003	More research is required.
RHYP GN001 SP004	More research is required.
RHYP GN001 SP005	More research is required.
RHYP GN001 SP006	More research is required.
<i>Riptortus</i> SP001	There are multiple new species of <i>Riptortus</i> that require description. More research is required.
<i>Setocoris</i> SP_MONT	This is a new species that has been recorded as new in previous Bush Blitz surveys for Monsoonal Australia. Cassis and Cheng are about to describe this species.
<i>Spilostethus</i> SP001	More research is required.
<i>Sthenaridea</i> SP001	More research is required.
<i>Ulonemia</i> SP001	This species is new to science. It has been described by Ryan Shofner of UNSW, and is currently in press.

3.2 Putative new species (new to science)

In this report, 'putative new species' means an unnamed species that, as far as can be ascertained, was identified as a new species as a direct result of this Bush Blitz. Images of the new species are given in Figure 1.

Table 2. Putative new species (new to science)	
Species	Comment
<i>Gorareduvius</i> SP001 n.sp.	This species is new to science and is currently being described by N Tatarnic
nr <i>Nethersia</i> SP001 n.sp.	This species is recognised by G Cassis as new to science.
nr <i>Nethersia</i> SP003 n.sp.	This species is recognised by G Cassis as new to science.
<i>Valleriola</i> SP001 n.sp.	<i>Valleriola</i> is known only from Queensland. This species is not the same as the two described Queensland species.
<i>Singhalesia</i> SP001 n.sp.	<i>Singhalesia</i> is under review by G Cassis. This species is new to science.
HARP GEN001 SP001 n.sp.	This genus and species is recognised by N Tatarnic as new to science.
<i>Birna</i> SP001 n.sp.	This species is recognised by N Tatarnic as new to science.
<i>Poecilosphodrus</i> SP001	Only one species of <i>Poecilosphodrus</i> is described, however there are likely several species. These are under review by Dr Tatarnic. More research is required.

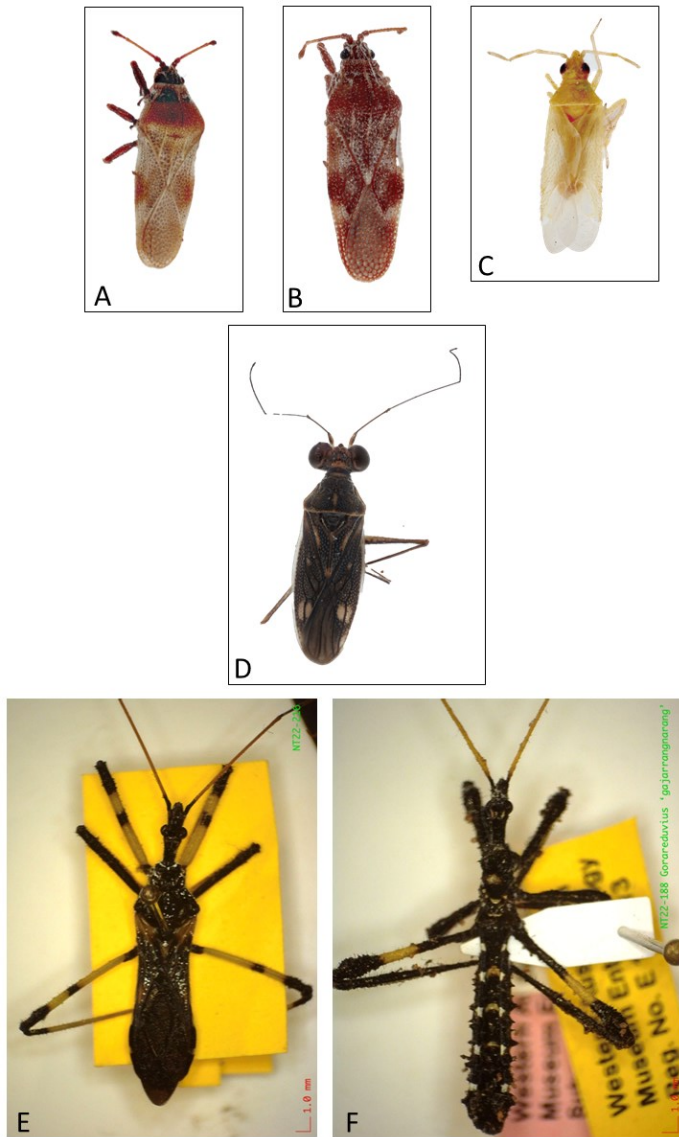


Figure 1: Images of some putative new species found on this Bush Blitz. A: nr *Nethersia* SP001 n.sp., B: nr *Nethersia* SP003 n.sp., C: *Singhalesia* SP001 n.sp., D: *Valleriola* SP001 n.sp., E: *Pseudosphodrus* SP001 and F: *Gorareduvius* SP001 n.sp.

3.3 Exotic and pest species

Table 3. Exotic and pest species recorded			
Exotic/pest species	Location sighted/observed	Indication of abundance	Comments
None			

3.4 Threatened species

Table 4. Threatened species			
Species	Listing status and level (EBPC, State/Territory)	Location sighted/observed	Indication of abundance
None			

3.5 Range extensions

Species	Location sighted/observed	Distance from nearest known record (km)	Comments
<i>Pomponatus typicus</i>	-16.901539 125.161436	TBD	See conclusions

3.6 Genetic information

No genetic sampling was undertaken. Some specimens were stored in 100% ethanol for possible future DNA analysis.

4. Information on species lists

We have taken a cautious approach to the naming species, as most heteropterans requires additional investigation that requires detailing of the male and female genitalia.

5. Information for land managers

There is no evidence at had that would suggest that any of the collected heteropteran species are of conservation significance. Below and in Appendix 1 there are documented host plants which are noteworthy in the event that any of the host plants become threatened, it is important to take note of downstream coextinction risk to the heteropteran species herein.

6. Other significant findings

Twenty-two provisionally identified plant species yielded heteropterans. The most significant hosts were as follows: 1) ***Drosera indica* complex and *Byblis* spp.**: which harboured numerous specimens of *Setocoris* SP_MONT, known hosts of this soon to be described species of kleptoparasitic species; 2) ***Calytrix exstipulata***: from which seven species of heteropterans were collected (*Aspideurus flavescens*, *Eysarcoris* SP002, *Germalus* SP00, nr *Nethersia* SP001, ORTH GN001 SP001, *Oxycarenum arctatus* and RHYP GN001 SP003); 3) ***Pandanus* sp.**: which was the putative host of seven plant species (AGRI GN001 SP001, *Campylomma* SP002, *Frontimiris* SP001, *Pomponatus typicus*; 4) ***Stemodia lythrifolia***: which was host to nine heteropteran species (*Agramma* SP001, *Eysarcoris* SP002, *Germalus* SP001, *Malandiola* SP001, nr *Epimixia* SP001, nr *Campylomma* SP003, ORTH GN001 SP002, *Plinthisus* SP001 and *Singhalesia* SP001); and, 5) ***Triodia* sp. (sticky)**: harboured two species of *Poecilosphodrus* (*Poecilosphodrus* SP001 and SP002).

7. Conclusions

This Bush Blitz was conducted over a short period of time in mid-July 2022. It was the dry season at this time, which is the least favoured period for collecting heteropteran in the Australian Monsoonal tropics. Nonetheless, a surprising number of species were collected, 99 species in all, with eight definite new species, and numerous others likely given that additional research is required. What was equally surprising with the large number of families encountered, with 28 families represented, accounting for near half of the 66 families found in continental Australia (Cassis and Gross 1995, 2002). In addition, 566 specimens were collected.

Some of the noteworthy species in the current collections include:

- 1) ***Aphylum* SP001**. This is the most northerly collected species of this rare and endemic family of Australian Heteroptera. The Aphylidae have been variously ranked, from a pentatomid subfamily. The identity of the Wilinggin-West Kimberley species requires additional investigation, which may shed light on the family-group status of the aphylids. This species is in alignment with the other representatives of the Aphylidae (Cassis and Gross 2002), including its peculiar dome shape and exaggeratedly expanded pronotum, rendering it as a cryptozoic and xerophilic stink bug.
- 2) ***Pomponatus typicus***. This is the first record of this species in Western Australia. It is a known associate of a number of myrtaceous host plants, and in particular *Melaleuca* spp. (Cassis and Gross 2002). It was collected on *Pandanus* in the Wilinggin-West Kimberley Bush Blitz, but is likely an example of a dryland aggregation (Cassis et al. 2016).
- 3) ***Vallerioloa* SP001**. This species is one of the most interesting of all the heteropterans collected on the Wilinggin-West Kimberley Bush Blitz. It belongs to the family Leptopodidae, which are poorly represented and rarely encountered in Australia. There are two species of *Vallerioloa* known from tropical Queensland (Cassis and Gross 1995), but are not considered conspecific to the species of the genus reported herein. Not only are these species rare, they are also very difficult to catch, being active and lightning fast predators, which are on wet rocks in streams and in riparian sites.
- 4) ***Setocoris* SP_MONT**. This species is well known in the UNSW bug lab and is about to be published. It is widespread in the Australian Monsoonal Tropics, from the west tropics of Queensland to the Kimberley. It is known from unrelated carnivorous plant genera (Byblidiaceae: *Byblis* and Droseraceae: *Drosera indica* complex). This kleptoparasitic bug can evade capture on the sticky trichomes of its host plants through pretarsal adaptations, and steal the plant prey of their carnivorous plant hosts. The Wilinggin-West Kimberley Bush Blitz records provides additional records for this fascinating insect.
- 5) **nr *Nethersia* SP001 and SP002**. These species are closely related to the genus *Nethersia*, which was revised by Cassis et al. (2016). This work recognised it within a complex of genera and species, with highly simplified morphology. Presently, PhD student Christian Sherlock at UNSW is revising this complex, and will determine the generic and species boundaries of these two species in his thesis.
- 6) ***Gorareduvius* SP001**. This new species of assassin bug is currently being described by N Tataric with colleagues. It represents a unique lineage of assassin bugs who use sticky plant resin for prey capture and maternal care. Such behaviour has not been formally documented in the Australian fauna.

Table 6. The number of species of Heteroptera by captured during the Wilinggin-West Kimberley Bush Blitz.

FAMILY	No. SPECIES
Alydidae	2
Aphylidae	1
Berytidae	2
Blissidae	2
Coreidae	4
Cydnidae	2

Gelastocoridae	1
Geocoridae	1
Gerridae	1
Hydrometridae	1
Leptopodidae	1
Lygaeidae	4
Meschiidae	1
Mesoveliidae	2
Miridae	22
Nepidae	2
Ochteridae	1
Oxycarenidae	1
Pachygronthidae	3
Pentatomidae	14
Pleidae	1
Pyrrhocoridae	1
Reduviidae	8
Rhyparochromidae	8
Scutelleridae	2
Stenocephalidae	1
Tingidae	9
Veliidae	1
TOTAL	99

Acknowledgements

We thank the Bush Blitz team for logistics and funding to participate in the Wilinggin-West Kimberley Bush Blitz.

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Appendices

Appendix 1. List of Heteroptera recorded during the Wilinggin-West Kimberley Bush Blitz

FAMILY	SUBFAMILY	TRIBE	SCIENTIFIC NAME
Alydidae	Alydinae	Alydini	<i>Riptortus</i> SP001
Alydidae	Micrellytrinae	Leptocorisini	<i>Leptocorisa acuta</i>
Aphylidae			<i>Aphylum</i> SP001
Berytidae	Metacanthinae		<i>Metacanthus pertener vittatus</i>
Berytidae			BERY GN001 SP001
Blissidae	Blissinae		<i>Heinsius</i> SP001
Blissidae	Blissinae		<i>Heinsius</i> SP002
Coreidae	Agriopocorinae		AGRI GN001 SP001
Coreidae	Coreinae	Acanthocorini	<i>Pomponatius typicus</i>
Coreidae	Coreinae	Amorbini	<i>Amorbus</i> SP001
Coreidae	Coreinae	Mictini	<i>Mictis profana</i>
Cydnidae	Cephaloecteinae		Cydnidae SP001
Cydnidae			Cydnidae SP002
Gelastocoridae	Nerthrinae		<i>Nerthra</i> SP001
Geocoridae	Geocorinae		<i>Germalus</i> SP001
Gerridae			GERR GN001 SP001
Hydrometridae			<i>Hydrometra papuana</i>
Leptopodidae			<i>Valleriola</i> n.sp.
Lygaeidae	Ischnorhynchinae		<i>Crompus</i> SP001
Lygaeidae	Lygaeinae		<i>Graptostethus servus</i>
Lygaeidae	Lygaeinae		<i>Spilostethus</i> SP001
Lygaeidae	Orsillinae	Nysiini	<i>Nysius vinitor</i>
Meschiidae			<i>Meschia</i> SP001
Mesoveliidae	Mesoveliinae		<i>Mesovelia horvathi</i>
Mesoveliidae	Mesoveliinae		<i>Mesovelia hungerfordi</i>
Miridae	Bryocorinae	Dicyphini	<i>Nesidocoris tenuis</i>
Miridae	Bryocorine	Dicyphini	<i>Setocoris</i> SP_MONT
Miridae	Bryocorinae	Dicyphini	<i>Singhalesia</i> SP001 n.sp.
Miridae	Bryocorinae	Eccritotarsini	<i>Frontimiris</i> SP001
Miridae	Mirinae	Mirini	<i>Oecophyllodes</i> SP001
Miridae	Mirinae	Mirini	<i>Eurystylus</i> SP001
Miridae	Mirinae	Mirini	MIRI GN001 SP001
Miridae	Mirinae	Mirini	nr <i>Eurystylus</i> SP001
Miridae	Orthotylinae	Orthotylini	ORTH GN001 SP001
Miridae	Orthotylinae	Orthotylini	ORTH GN001 SP002
Miridae	Orthotylinae		ORTH GN001 SP003
Miridae	Orthotylinae	Orthotylini	ORTH GN001 SP004
Miridae	Orthotylinae	Orthotylini	<i>Pseudoloxops</i> SP001

Miridae	Phylinae	Cremonorrhinini	CREM GN001 SP001
Miridae	Phylinae	Nasocorini	<i>Campylomma</i> SP001
Miridae	Phylinae	Nasocorini	nr <i>Campylomma</i> SP002
Miridae	Phylinae	Nasocorini	nr. <i>Campylomma</i> SP003
Miridae	Phylinae	Nasocorini	nr <i>Campylomma</i> SP004
Miridae	Phylinae	Phylinae	PHYL GN001 SP003
Miridae	Phylinae		PHYL GN001 SP001
Miridae	Phylinae		PHYL GN001 SP002
Miridae	Phylinae		<i>Sthenaridea</i> SP001
Nepidae			<i>Goondnomdanepa</i> SP001
Nepidae			<i>Laccotrephyes tristis</i>
Ochteridae			<i>Ochterus</i> SP001
Oxycarenidae			<i>Oxycareus arctatus</i>
Pachygronthidae	Teracriinae		<i>Stenophyella macreta</i>
Pachygronthidae	Teracriinae		<i>Opistostenus</i> SP001
Pachygronthidae	Pachygronthinae		<i>Pachygrontha</i> SP001
Pentatomidae	Pentatominae	Antestiini	<i>Antestiopsis cederwaldi</i>
Pentatomidae	Pentatominae	Antestiini	<i>Novatilla</i> SP001
Pentatomidae	Pentatominae	Antestiini	<i>Plautia affinis</i>
Pentatomidae	Pentatominae	Carpocorini	<i>Cephaloplatus</i> SP001
Pentatomidae	Pentatominae	Eysarcorini	<i>Eysarcoris</i> SP001
Pentatomidae	Pentatominae	Eysarcorini	<i>Eysarcoris</i> SP002
Pentatomidae	Pentatominae	Halyini	<i>Anchises parvulus</i>
Pentatomidae	Pentatominae	Halyini	<i>Birna</i> SP001
Pentatomidae	Pentatominae	Halyini	<i>Poecilometis calidus</i>
Pentatomidae	Pentatominae	Halyini	<i>Poecilometis nigriventris</i>
Pentatomidae	Pentatominae	Menidini	<i>Aspideurus flavescens</i>
Pentatomidae	Pentatominae	Menidini	<i>Menida spectabilis</i>
Pentatomidae	Pentatominae	Piezodorini	<i>Piezodorus oceanicus</i>
Pentatomidae	Pentatominae	Rhynchocorini	<i>Ocirrhoe</i> SP001
Pleidae			<i>Paraplea</i> SP001
Pyrrhocoridae			<i>Dysdercus (Paradysdercus)</i> SP001
Reduviidae	Harpactocorinae		<i>Gorareduvius</i> SP001
Reduviidae	Harpactocorinae		HARP GN001 SP001
Reduviidae	Harpactocorinae		<i>Havinthus</i> SP001
Reduviidae	Harpactocorinae		<i>Poecilosphodrus</i> SP001
Reduviidae	Harpactocorinae		<i>Poecilosphodrus</i> SP002
Reduviidae	Stenopodainae		<i>Oncocephalus</i> SP001
Reduviidae	Peiratinae		Peiratinae SP001
Reduviidae	Emesinae		<i>Ploiaria</i> SP001
Rhyparochromidae	Plinthisinae		<i>Plinthisus</i> SP001
Rhyparochromidae	Rhyparochrominae		<i>Remauderiana</i> SP001

Rhyparochromidae	Rhyparochrominae		RHYP GN001 SP001
Rhyparochromidae	Rhyparochrominae		RHYP GN001 SP002
Rhyparochromidae	Rhyparochrominae		RHYP GN001 SP003
Rhyparochromidae	Rhyparochrominae		RHYP GN001 SP004
Rhyparochromidae	Rhyparochrominae		RHYP GN001 SP005
Rhyparochromidae	Rhyparochrominae		RHYP GN001 SP006
Scutelleridae	Scutellerinae		<i>Choerocoris paganus</i>
Scutelleridae	Scutellerinae		<i>Lampromicra senator</i>
Stenocephalidae			<i>Dicranocephalus aroonanus</i>
Tingidae	Tinginae		<i>Agramma</i> SP001
Tingidae	Tinginae		<i>Malandiola</i> SP001
Tingidae	Tinginae		<i>Nethersia</i> SP001
Tingidae	Tinginae		nr <i>Epimixia</i> SP001
Tingidae	Tinginae		nr <i>Nethersia</i> SP001
Tingidae	Tinginae		nr <i>Nethersia</i> SP002
Tingidae	Tinginae		nr <i>Nethersia</i> SP003
Tingidae	Tinginae		<i>Ulonemia</i> SP001
Tingidae	Tinginae		<i>Ulonemia</i> SP002
Veliidae	Microveliinae		<i>Microvelia (Picaultia)</i> SP001