

Hemiptera (Reduviidae) – Assassin Bugs

HWANG WEI SONG, CHOO RUISENG, YEO HUIQING

Scientific Name:

Acanthaspis signifera

Common Name:

–

Order/Family:

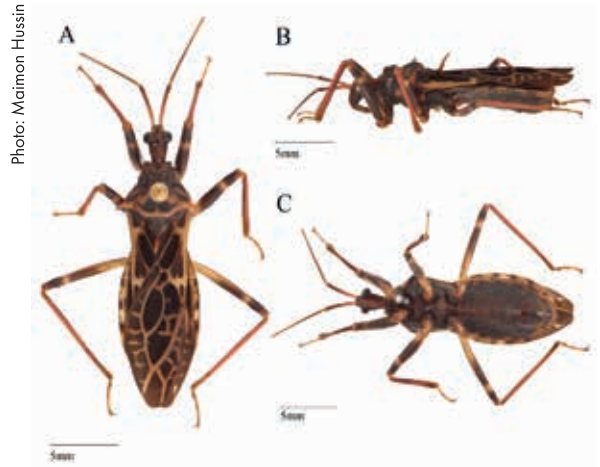
Hemiptera: Reduviidae

National Status: Vulnerable (VU)

Habitat and Ecology: This species is nocturnal and has a corticolous lifestyle (associated with tree-bark living). Any specific host plant association is unknown, but it is found only on large, mature trees with rough, scaly, or fissured bark where it can hide within crevices in the day. During the night, they can be seen hunting for prey on the tree trunk, which are most likely to be exclusively certain species of ants and termites. Immatures exhibit camouflaging behavior using debris and sometimes prey carcasses.

Distribution: Known to occur in Malacca, Malaysia and Java, Indonesia as well.

Threats: The species is only found in Central Catchment Nature Reserve within Singapore, where there are old growth primary rainforests or mature secondary forests. The species is likely restricted to mature forests based on its preferred microhabitat and specialized prey availability. Given its restricted diet and microhabitat requirements, the species is vulnerable from any perturbations to its environment. Being at a higher trophic level as an insect predator, their numbers are also relatively less abundant and more sensitive to disturbances.



Photoplate for *Acanthaspis signifera*.

Scientific Interest and Potential Value: Information about this species is practically unknown besides its formal scientific description. Ecological and behavioral information are limited and partially inferred by known attributes of close relatives, with slight variations to be expected. Given its strong association to a functional forest ecosystem, this is a potential bioindicator species for environmental assessments.

Conservation Measures: Given its known restriction within the Central Catchment Nature Reserve within Singapore, continued protection of the existing forests, and proper management towards forest recovery will help ensure its survival locally. Availability of suitable habitats outside of the Central Catchment Nature Reserve in time may allow expansion of the species range to other areas in Singapore.

Scientific Name:
Acanthaspis signifera

Common Name:
-

Order/Family:
Hemiptera: Reduviidae

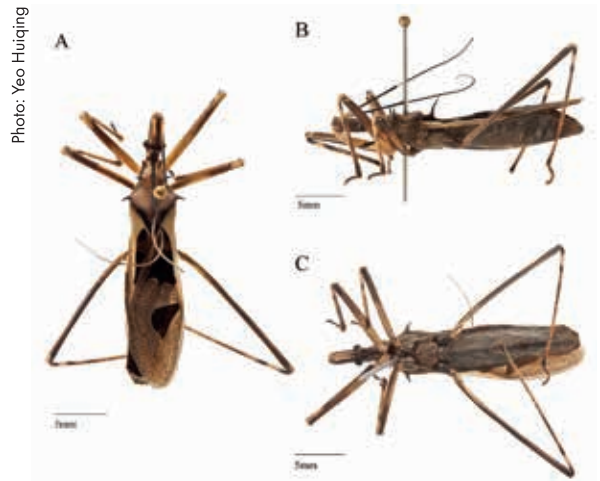
National Status: Vulnerable (VU)

Habitat and Ecology: This species is nocturnal and found usually on low-lying vegetation in forested areas. Its specific habitat and ecology is not well-studied, but it is presumed to be a mature forest-specific species and a generalist predator that feeds on a variety of nocturnal arthropods. It has been documented to feed on various orthopterans (crickets and grasshoppers), and molecular gut analysis shows it feeds on spiders too.

Distribution: This species is recorded to occur in Peninsular Malaysia, Myanmar, and Northern India (Sikkim).

Threats: Given its restricted range within Central Catchment Nature Area locally, this species is likely to be highly sensitive to microclimatic conditions and prey availability. Any habitat modification or loss will significantly impact the already diminished local population further.

Scientific Interest and Potential Value: This species is the largest assassin bug species present in



Photoplate for *Canthesancus gula*.

Singapore, and potentially plays a significant role as a micro-predator in a functional forest ecosystem. Given its relatively large size and ease of identification, it can potentially be a useful bioindicator species for forest monitoring purposes. The venom that it injects to subdue prey has never been studied and houses potential pharmaceutical value.

Conservation Measures: This species is only known to occur in the Central Catchment Nature Reserve within Singapore, which suggests this species may not survive in more fragmented forests and require a larger contiguous mature rainforest with sufficient prey availability. Any disturbances that might affect the microclimatic conditions and prey availability within the nature reserve is likely to impact the species rapidly.

Scientific Name:
Cosmolestes picticeps

Common Name:

–

Order/Family:
Hemiptera: Reduviidae

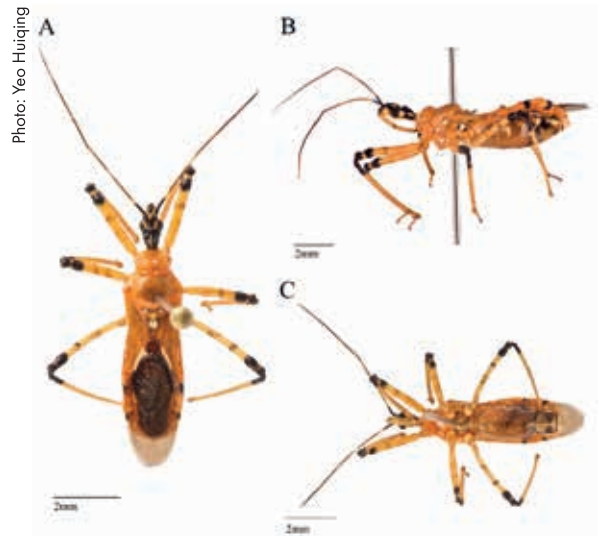
National Status: Least Concern (LC)

Habitat and Ecology: This species is usually found on low-lying vegetation with fair amount of sunlight exposure. They are generalist predators, that feeds on a variety of insect prey including beetles, wasps, flies and moths.

Distribution: This species is recorded to occur in Penang, Java, Borneo, and Sumatra.

Threats: This species appears to be adapting well to the urban environment, with sightings in both urban parks and nature reserves. It is still more commonly observed in forested areas so its adaptation to urban environments has its limits. Prey availability and suitable microhabitats for egg-laying and nymphal development are likely ecological determinants.

Scientific Interest and Potential Value: This species is likely to be the most conspicuous and most commonly



Photoplate for *Cosmolestes picticeps*.

encountered assassin bug in Singapore, given its diurnal nature on low-lying vegetation and its bright colouration. It's relatively common occurrence throughout the island suggests a suite of traits adapted for urban greenery living and may be a suitable candidate to consider as a native natural enemy for urban gardens/farming due to its appetite for lepidopteran prey.

Conservation Measures: This species appears to be doing relatively well in urban greenscapes. Further greening and natural corridors established is likely to help this species thrive locally.

Scientific Name:***Gardena melinarthrum*****Common Name:**

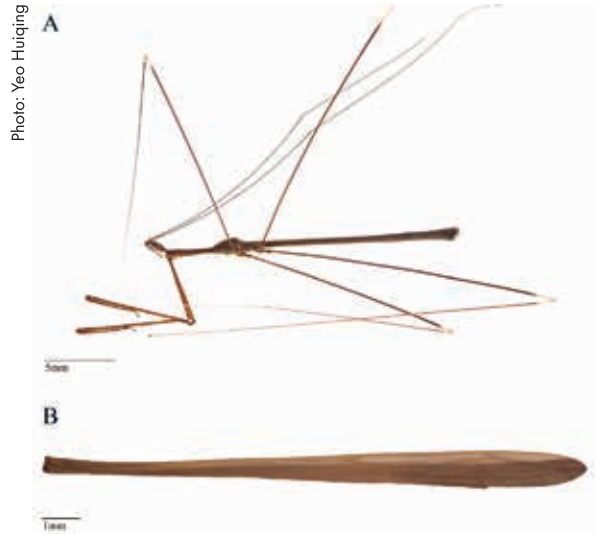
-

Order/Family:**Hemiptera: Reduviidae****National Status:** Vulnerable (VU)

Habitat and Ecology: This species is usually found on the forest floor, leaf litter, or on lower parts of tree trunks. It is found thus far only in Central Catchment Nature Reserve, Bukit Timah Nature Reserve and Dairy Farm Nature Park, suggesting that it requires primary or mature secondary rainforests to survive. It is nocturnal and specializes in hunting small spiders such as Pholcidae species, in leaf litter or on understorey vegetation.

Distribution: This species has a widespread distribution, recorded to be present in Sri Lanka, India, Philippines, Lombok island, Sumatra, Java, Formosa, China, Australia and Japan.

Threats: This species appears to be limited by the availability of suitable mature secondary forests locally, and likely present only in Central Catchment Nature Reserve, Bukit Timah Nature Reserve and the adjacent buffer parks. Microhabitat conditions and prey availability are likely to contribute to its limited range. More severe dry spells or greater exposure to sunlight that affect the understorey conditions in our nature reserves are likely to have a detrimental impact on the existing population. Insecticides that leave long-term residuals in the soil that doesn't breakdown naturally are likely to impact this and other leaf litter species long after cessation of application.

Photoplate for *Gardena melinarthrum*.

Scientific Interest and Potential Value: This species is the largest of the thread-legged assassin bugs subfamily in Singapore. This group of assassin bugs have evolved innovative, specialized spider hunting strategies that include aggressive mimicry and the ability to cut through spider webs undetected. It is not known how this species captures its prey and if different types of spiders require different strategies.

Conservation Measures: This species represents one of the key micropredators in the leaf litter community in our rainforests, an assemblage of species that is severely understudied. Measures that can help ensure the long-term maintenance of our forest ecosystem with minimal disturbance will contribute to its sustained survival locally.

Scientific Name:
Inara flavopicta

Common Name:
-

Order/Family:
Hemiptera: Reduviidae

National Status: Least Concern (LC)

Habitat and Ecology: The immature stage of this species is better known than the adult. The immatures are predominantly ant specialists, piling the ant carcasses on their backs after feeding, presumably as a form of camouflage against predators and also prey. The immatures feed mostly on *Dolichoderus* ants and are active at night. This species is most often found in forest understorey vegetation and appears to be doing well in urban forests outside of the nature reserves.

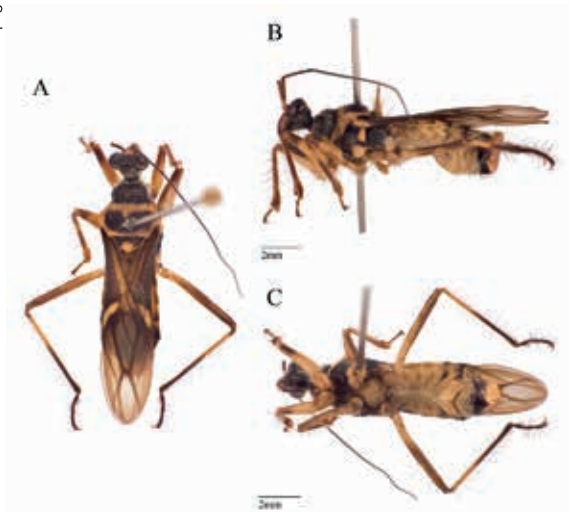
Distribution: This species is also recorded in Penang and Sarawak, Malaysia.

Threats: This species appears to be adapting well to urban forests environment, due to the availability of prey species and suitable microhabitats. Due to its prey specialization, any disturbances that can affect prey availability will have a knock-on effect on this species. One potential threat at forest fringes close to residential areas will be the application of insecticides with a long residual effect.

Scientific Interest and Potential Value: The immature of this species is known for its peculiar carcass-piling behavior that is almost exclusively ants. How the immature constructs the ant carcass pile is being studied, together with the potential of aggressive mimicry use to hunt for prey undetected. Given its reliance on a forest habitat, but with the ability to adapt to certain disturbances, it can be used as a bioindicator species as well.

Conservation Measures: This species appears to be adjusting well to urban forest environments. More efforts in creating green corridors and forest habitats will allow this species to expand its current range and promote better population connectivity.

Photo: Yeo Huiqing



Photoplate for *Inara flavopicta*.

Photo: Hwang Wei Song



Inara flavopicta nymph with ant carcass pile.

Scientific Name:

Lisarda erecta

Common Name:

–

Order/Family:

Hemiptera: Reduviidae

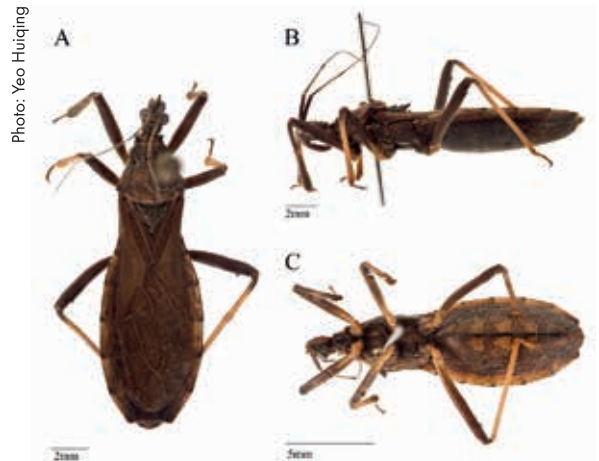
National Status: Endangered (EN)

Habitat and Ecology: This species is found on the forest floor, on leaf litter, or low-lying vegetation in secondary regrowth forests. Feeds exclusively on termites. Only known in Singapore from Chek Jawa forest, Pulau Ubin.

Distribution: This species was originally described from Myanmar.

Threats: Habitat loss due to human development is the likely cause of this very restricted range.

Scientific Interest and Potential Value: This species and other congeners specialize on forest termite species. While other species are relatively abundant in mainland Singapore, this species has a very limited range on Pulau Ubin island and has so far not been



Photoplate for *Lisarda erecta*.

found on the main island. There is interest in the hunting behavior that this group of species performs to capture termite prey, given formidable termite defenses against predators. This includes the venom they inject, which may have potential applications.

Conservation Measures: While ongoing efforts to find additional populations of this species is ongoing, its only known range within the small Chek Jawa forest is vulnerable to any major disturbances.

Scientific Name:
Triatoma rubrofasciata

Common Name:
Kissing Bug

Order/Family:
Hemiptera: Reduviidae

National Status: Data Deficient (DD)

Habitat and Ecology: This is the only known blood-feeding Triatominae species known to occur in Singapore. Previously considered to be abundant in local settlements (kampung) and even built-up urban areas in the early 1970s, this species has apparently disappeared into obscurity. It is capable of feeding on different blood hosts, including peridomestic animals such as chickens, dogs and humans. Its preferred host is likely to be rats. They are usually found living near to their hosts, among piles of dead wood, or in tight crevices where they can shelter in the day and emerge at night to feed. They are attracted to artificial light when sourcing for new hosts.

Distribution: This species is tropicopolitan.

Threats: This human-associated species appears not as adaptive to highly built-up urban living environments, although the rat population is still highly abundant. Hence it is unknown whether the local population has



Photoplate for *Triatoma rubrofasciata*.

drastically declined due to habitat loss or has adapted to a more reclusive lifestyle.

Scientific Interest and Potential Value: Although this species does not carry the protozoan parasite *Trypanosoma cruzi*, which causes Chagas Disease in the Americas, they can harbor other endemic trypanosomes that can cause sickness in other wildlife such as the Long-tailed macaques.

Conservation Measures: Although not a significant player, this species should be part of our insect vector biosurveillance for any potential zoonotic disease spread. More data on its presence and distribution locally required before further recommendations can be put forth.

Scientific Name:
Velitra rubropicta

Common Name:
—

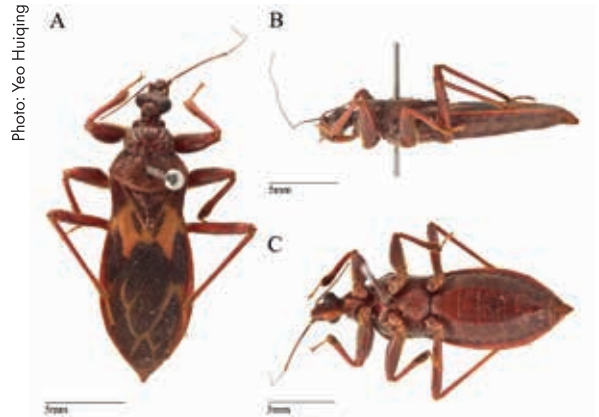
Order/Family:
Hemiptera: Reduviidae

National Status: Endangered (EN)

Habitat and Ecology: This species is only found in mature secondary or primary forests where there are suitably large trees present for it to seek shelter under tree bark. Its cryptic lifestyle makes further study on this species challenging. It presumably feeds on other bark-living arthropods given it is rarely seen elsewhere. Museum records showed a wider distribution in the past, but now it is likely present only in the nature reserves in small numbers.

Distribution: This species is widespread in Southeast Asia and known to occur in Java, Sumatra, Borneo, Indochina, Malacca, Philippines and China.

Threats: This species requires a rare resource in our forests: mature old-growth trees with suitable tree bark for it to hide under. Lack of such trees locally due to historical clearing of local forests and logging activities has reduced the availability of this ecological niche.



Photoplate for *Velitra rubropicta*.

Scientific Interest and Potential Value: This species represents a unique clade of assassin bugs that are dorso-ventrally flattened and associated with tree bark-living. This group is predominantly found in South-east Asian forest ecosystems and serves as a useful bioindicator of old growth forests. Given its relatively large size for an assassin bug, its venom has research potential.

Conservation Measures: Further protection of existing old growth trees in the nature reserves will help with the continued survival of this species. It will take decades or centuries to significantly increase the number of old growth trees to a substantial amount that can further boost this species population, hence its fate remains precarious.

Scientific Name:
Vesbius purpureus

Common Name:
–

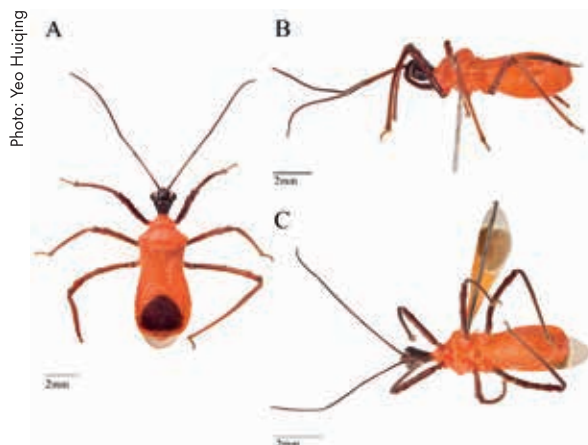
Order/Family:
Hemiptera: Reduviidae

National Status: Data Deficient (DD)

Habitat and Ecology: This species is commonly found in village houses elsewhere in Southeast Asia, and presumably present in local kampungs before resettlement began. The village houses provide similar shelter that this species prefers, such as hollowed tree trunks, caves and cliff crevices, and similar types of prey. It is considered to be a generalist predator, capable of feeding on ants, small moths and flies. It has been found outside of nature reserves in Singapore in the past, but no recent records have been documented.

Distribution: This species is known to occur in Peninsular Malaysia, Papua New Guinea, Myanmar, Sri Lanka, Bangladesh and China.

Threats: This species is not uncommon in other countries, adapting well to human dwellings and urban



Photoplate for *Vesbius purpureus*.

environments, but do not appear to thrive as well in Singapore's built-up space. Further studies are needed to determine if there is a healthy population within the protected nature reserves or urban parks.

Scientific Interest and Potential Value: Given its adaptability to selected human environments, this species can serve as a useful biological control agent in plant nurseries, urban farms and gardens.

Conservation Measures: Further understanding of suitable local natural environment is needed.

References

- Lent H. & Wygodzinsky P. (1979) Revision of the Triatominae (Hemiptera, Reduviidae), and their significance as vectors of Chagas' disease, Bulletin of the American Museum of Natural History, 163(3), 123–520.
- Stål C. (1863) Formae speciesque novae reduviidum, Annales de la Societe entomologique de France, 3(4):25-58.
- Tan M.K., Yeo H., Lee J.X.Q. (2015) Diversity of entomofauna (Orthoptera, Reduviidae and Aculeata) in the Mandai lake road area, Singapore, Nature in Singapore, 8, 37-51.
- Wygodzinsky P.W. (1966) A monograph of the Emesinae (Reduviidae, Hemiptera), Bulletin of the American Museum of Natural History, 133: 1–614.