

Arachnida – Spiders

DAVID J. COURT

Scientific Name:

Agorius sp. A

Common Name:

Peanut Long-patella
Jumping Spider

Order/Family:

Araneae: Salticidae

National Status: Vulnerable (VU)

Habitat and Ecology: Known from swamp forest, in the foliage and leaf litter. In Singapore this habitat exists in only small areas, though collecting has not been sufficient to demonstrate whether it is exclusive to a single forest type.

Distribution: So far, known only from Singapore.

Threats: Loss of primary forest in the past might have been responsible for its rarity. Any further reduction in forest, particularly freshwater swamp forest, could be a threat.

Photo: W.P. Maddison



Scientific Interest and Potential Value: Part of the freshwater swamp forest animal community, but the extent to which it uses dryland forest is unknown. Singapore is the only known locality to date.

Conservation Measures: Its key habitat within the Central Catchment Nature Reserve is fully protected.

Scientific Name:

Argiope mangal Koh, 1991

Common Name:

Mangrove Silver-faced Spider

Order/Family:

Araneae: Araneidae

National Status: Vulnerable (VU)

Habitat and Ecology: Confined to mangrove forest.

Distribution: Malaysia (Selangor, Perak), Brunei, and Singapore (Lim Chu Kang, Sungei Buloh, Pulau Ubin).

Photo: Chris Ang



Threats: Any further reduction of, or fogging of, mangrove areas would constitute threats.

Scientific Interest and Potential Value: A mangrove specialist.

Conservation Measures: One known locality is within a nature reserve and other localities are within mangroves managed for conservation. It would be

good to reserve as much additional mangrove as is available and possible.

Scientific Name:
Boagrius pumilus Simon,
1893

Common Name:
Dwarf Palp-footed Spider

Order/Family:
Araneae: Palpimanidae

National Status: Vulnerable (VU)

Habitat and Ecology: It is found in deep, moist leaf litter in forest.

Distribution: Peninsular Malaysia and Singapore.

Threats: No known direct threat other than the possible loss of forest or degradation of forest quality.

Drawing: M. Roberts in M&M 2000,
Malayan Nature Journal



Scientific Interest and Potential Value: The genus *Boagrius* is restricted to Southeast Asia and is seldom seen or collected. The *Boagrius* in Singapore need further taxonomic study in order to clarify the number of species present.

Conservation Measures: Suitable habitat is protected within the Bukit Timah Nature Reserve and Central Catchment Nature Reserve.

Scientific Name:
Boagrius sp.

Common Name:
Goldfish Palp-footed Spider

Order/Family:
Araneae: Palpimanidae

National Status: Vulnerable (VU)

Habitat and Ecology: Found in deep, moist forest leaf litter in lowland forest.

Distribution: So far, only observed within Singapore.

Threats: No known direct threat other than the possible loss of forest, or degradation in forest quality.

Photo: James W.B. Koh



Scientific Interest and Potential Value: Recorded as *Boagrius pumilus* in Koh & Court 2017 but based on morphological details it is unlikely to be of that species.

Conservation Measures: Its known locality in Bukit Timah Nature Reserve is legally protected.

Scientific Name:
Calommata sundaica
(Doleschall, 1859)

Common Name:
Sunda Calommata

Order/Family:
Araneae: Atypidae

National Status: Nationally Extinct (NEx)

Habitat and Ecology: Inhabits burrows amongst buttress roots of roadside trees. Burrows are reported to be vertical and lined with elastic, closely woven silk. Entrance surrounded by a sill of 1-2 mm., usually concealed by fallen leaves and closed by cottonwool-like silk. Abraham 1924 provided a figure of a burrow and its side branch (leading to the surface).

Distribution: Indonesia (Java, Sumatra) and Singapore.

Threats: Not known, but might include loss of microhabitat, and introduced predators such as centipedes, flatworms.

Scientific Interest and Potential Value: This species belongs to the Atypidae, an ancient family of the mygalomorph spiders. All species of this family are of particular phylogenetic interest. *Calommata* is a remarkably cryptic genus. It is renowned by arachnologists for being exceedingly difficult to detect in the field. It may well still exist in Singapore without being detected. If sufficient specimens are found the Southeast Asian species of this genus should undergo

Photo: Siti Maimon



Calommata sundaica specimen from Lee Kong Chian Natural History Museum.

a modern taxonomic review (to allow comparison with recently revised *Calommata*, e.g., Levy 2007 and later workers).

Conservation Measures: Suitable habitat is protected within the Bukit Timah Nature Reserve and Central Catchment Nature Reserve.

Scientific Name:
Colopea malayana Lehtinen,
1982

Common Name:
Peninsular Diamond Carapace
Spider

Order/Family:
Araneae: Stenochilidae

Photo: Paul Ng



National Status: Endangered (EN)

Habitat and Ecology: In Singapore it is confined to primary forest within the Bukit Timah Nature Reserve.

Distribution: Southern Thailand (the type locality), Peninsular Malaysia (Selangor) and Singapore.

Threats: Forest loss or degradation would threaten the species.

Scientific Interest and Potential Value: If sufficient *Colopea* specimens are found the species of this genus should undergo a modern taxonomic review.

Conservation Measures: Its only known locality within Singapore is legally protected.

Scientific Name:
Copocrossa sp.

Common Name:
Cigar Jumper

Order/Family:
Araneae: Salticidae

National Status: Vulnerable (VU)

Habitat and Ecology: Occurring on foliage in forests including secondary forests. Little else is known.

Distribution: Singapore (Admiralty Park, Thomson Nature Park, Windsor Nature Park).

Threats: Currently unknown.

Scientific Interest and Potential Value: A rarely observed species, as yet undescribed and formally named. To date, all the mature examples observed have been males.

Conservation Measures: All the localities known so far are under the management of the National Parks Board as publicly accessible nature parks.

Photo: Mervyn Yeo



Scientific Name:
"Coremiocnemis" sp. A

Common Name:
 Singapore Feather-duster
 Tarantula

Order/Family:
 Araneae: Theraphosidae

National Status: Endangered (EN)

Habitat and Ecology: Occurs under rocks in moist parts of primary rain forest.

Distribution: So far only known from Singapore.

Threats: Collection for the pet trade is a potential threat.

Scientific Interest and Potential Value: Even the genus of this undescribed species is uncertain, and it is included here as an example of the challenges of conserving species whose basic characteristics are unknown.

Conservation Measures: The known locality is legally protected.

Photo: Zeslin W.W. Soh



Scientific Name:
"Coremiocnemis" sp. B

Common Name:
 Brown Feather-duster
 Tarantula

Order/Family:
 Araneae: Theraphosidae

National Status: Endangered (EN)

Habitat and Ecology: Ground level in primary and maturing secondary forests.

Distribution: So far known from Singapore, but because of taxonomic uncertainty its complete distribution is not known.

Photo: Chris Ang



Threats: Loss of forest in the past could have reduced the population. Collection for the pet trade is a potential threat.

Scientific Interest and Potential Value: The second edition of the Singapore Red Data Book listed this as *Coremiocnemis valida*.

Conservation Measures: It has been recorded close to but not within legally protected areas.

Scientific Name:
Cyrtarachne conica (O. Pickard
Cambridge, 1901)

Common Name:
Conical Spider

Order/Family:
Araneae: Araneidae

National Status: Vulnerable (VU)

Habitat and Ecology: Found in low-growing shrubs at the edges of forest.

Distribution: Indonesia (Sumatra), Brunei and Singapore.

Threats: Habitat loss or degradation.

Scientific Interest and Potential Value: Of particular biological interest. Constructs a modified orb-web amongst low-lying shrubs or herbage at the edges of rainforests. The abdomen resembles the shell of a snail.

Photo: Joseph K.H. Koh



Conservation Measures: Most known localities are within the legally protected nature reserves. In the second edition of the Singapore Red Data Book, it was listed as Endangered, but a few individuals have been recorded since, justifying a downgrading of its threat status.

Scientific Name:
Desis martensi L. Koch, 1872

Common Name:
Von Martens' Reef Spider

Order/Family:
Araneae: Desidae

National Status: Vulnerable (VU)

Habitat and Ecology: Known from fewer than five localities, found between tidemarks and surviving immersion by remaining within a water-tight cocoon that is lodged in a crevice in the rocks or coral.

Photo: Chris Ang



Distribution: Peninsular Malaysia and Singapore.

Threats: There has been some reduction in coastal habitat caused by reclamation projects. Marine pollution by oil spill or other chemical release (e.g. toxic antifouling chemicals, detergents) could occur. This could be caused by accident near petrochemical facilities, or collision between, or illegal discharge by, ships in the Malacca and Johor Straits.

Scientific Interest and Potential Value: One of the four intertidal spider species in Singapore. During low

tide, especially at night, the spiders leave their retreats to hunt for amphipods, small crabs, or marine scale worms and seize them in their powerful projecting mouthparts.

Conservation Measures: At least one of its known localities is within a legally protected nature reserve. Protection of natural intertidal habitats will be challenging in the face of sea level rise. Vigilance regarding coastal water quality; rapid clean-up task forces available on call; enforcement of anti-pollution laws as necessary.

Scientific Name:
Diplocanthopoda marina
Abraham, 1925

Common Name:
Marine Jumper

Order/Family:
Araneae: Salticidae

National Status: Vulnerable (VU)

Habitat and Ecology: Among rocks, coral rubble and oyster and barnacle beds.

Distribution: Peninsular Malaysia and Singapore.

Threats: There has been reduction of habitat through reclamation projects. Marine pollution by oil spill or other chemical release (e.g. toxic antifouling chemicals, detergents) could occur. This could be caused by accident near petrochemical facilities, or collision between, or illegal discharge by, ships in the Malacca and Johor Straits. Possible reclamation schemes might load water with sediment which then interferes with intertidal organisms.

Scientific Interest and Potential Value: One of the four intertidal spider species in Singapore. The spiders can sit, run, and even hop on the water surface. They forage for marine creatures (including intertidal flies) and hide in an underwater chamber sealed by thick silk during high tide. The chamber may be built between rock crevices, within dead barnacle shells or between



Photo: Chris Ang

the valves of dead oysters. Eggs are laid in the chamber which also acts as a nursery for the spiderlings before they disperse.

Conservation Measures: A few of its known localities are within legally protected or managed nature areas. The spider would be threatened by insensitive development (such as building a sea wall) to protect shorelines against sea level rise. Vigilance regarding coastal water quality; rapid clean-up task forces available on call; enforcement of anti-pollution laws as necessary.

Scientific Name:
Dolomedes sp. C

Common Name:
Wide-belted Fishing Spider

Order/Family:
Araneae: Pisauridae

National Status: Endangered (EN)

Habitat and Ecology: On aquatic plants or banks in open areas along the edges of reservoirs and natural water bodies.

Distribution: Peninsular Malaysia and Singapore.

Threats: A possible threat would, in some areas, include fogging for mosquitoes or other nuisance insects.

Scientific Interest and Potential Value: Not seen in Singapore since 1982. Taxonomic uncertainty in the genus *Dolomedes* limits current knowledge of habits, habitat and distribution.

Photo: Joseph K.H. Koh



Conservation Measures: The conservation of natural or semi-natural vegetation along water margins is likely to benefit the species. Several reservoirs are surrounded by legally protected nature reserves.

Scientific Name:
Epidius sp. A

Common Name:
Singapore Long-palped Crab Spider

Order/Family:
Araneae: Thomisidae

National Status: Vulnerable (VU)

Habitat and Ecology: Lowland forest, and possibly shrubs and trees in adjacent parkland.

Distribution: Because of taxonomic uncertainty, so far it is confirmed only from Singapore.

Threats: Loss of forest would have been a historical threat.

Photo: Chris Ang



Scientific Interest and Potential Value: Known from only one female specimen at one locality in Singapore.

Conservation Measures: The known locality is legally protected as a nature reserve, but other forested nature reserves may also provide suitable habitat.

Scientific Name:

Epidius sp. B

Common Name:

Masked Long-palped
Crab Spider

Order/Family:

Araneae: Thomisidae

Photo: David J. Court



National Status: Vulnerable (VU)

Habitat and Ecology: The known specimen was found in low growing vegetation near the margin of a secondary forest.

Distribution: Because of taxonomic uncertainty, so far it is confirmed only from Singapore.

Threats: Loss of forest would have been an historical threat.

Scientific Interest and Potential Value: Known from only one female specimen at one locality in Singapore. An effort should be made to recollect the species, especially the male, and increase our knowledge about the species. The possibility that *Epidius* sp. A and sp. B are conspecific needs to be investigated.

Conservation Measures: The known locality is legally protected as a nature reserve, but other forested nature reserves may also provide suitable habitat.

Scientific Name:

Henriksenia nepenthicola (Fage, 1928)

Common Name:

Singapore Pitcher-plant Crab Spider

Order/Family:

Araneae: Thomisidae

Photo: David J. Court



National Status: Vulnerable (VU)

Habitat and Ecology: Occurring within seral communities (swamps, vacant land, developing belukar forest) where suitable for growth of the pitcher plant *Nepenthes gracilis*. These are typically regrowth after clearance or landslides on steep, degraded, nutrient poor soils.

Distribution: Indonesia, Peninsular Malaysia and Singapore.

Threats: Land development might cause further reduction of seral communities (swamps, vacant land, developing belukar forest) suitable for *Nepenthes gracilis*. This would be deleterious for *H. nepenthicola*. After 30 to 50 years, belukar itself will become less suitable for *Nepenthes* (and hence for *H. nepenthicola*). Some swampy areas may be fogged for mosquito control.

Scientific Interest and Potential Value: As an obligate commensal, *H. nepenthicola* dwells inside either *Nepenthes gracilis* pitchers (*Nepenthes*

tobaica in Sumatra) or, much less often, in *Nepenthes rafflesiana* or *rafflesiana* X *gracilis* hybrids, growing in seral communities with poor nutrients, waterlogged or eroded soils. The spiders are remarkable for their ability to dive into and move about in the pitcher's enzyme-rich digestive fluid without coming to harm. A survey of *Nepenthes* pitchers throughout Singapore could obtain more data on the distribution and fecundity of both *Henriksenia nepenthicola* and *Thomisus nepenthophilus*.

Conservation Measures: Two known sites in Singapore are reserved, but they are elongated so that their margin/area ratio is high. *Nepenthes*-containing areas within the sites are relatively small.

Scientific Name:
Hitobia sp. D

Common Name:
Strong-armed Tapir
Ground Spider

Order/Family:
Araneae: Gnaphosidae

National Status: Vulnerable (VU)

Habitat and Ecology: Forest undergrowth

Distribution: So far known only from one site in Singapore.

Threats: Small remaining area of suitable habitat, and potential loss or degradation of forest.

Scientific Interest and Potential Value: Nothing is known about this species other than the fact that it, the female at least, has extraordinarily stout first pair of

Photo: David J. Court



legs. The pose it can take and actions that it makes are suggestive of an ant species. Within the Gnaphosidae, no other species has been described with such modified forelegs.

Conservation Measures: The single known locality is legally protected within a nature reserve.

Scientific Name:

Idioctis littoralis Abraham,
1924

Common Name:

Intertidal Brush-footed
Spider

Order/Family:

Araneae: Barychelidae

National Status: Vulnerable (VU)

Habitat and Ecology: Intertidal zone, mainly in mangroves. It lives in a tube retreat, often on the wall of mud lobster mounds, sometimes in mud between mangrove roots.

Distribution: Peninsular Malaysia, Singapore.

Threats: There has been historical reduction of habitat through reclamation projects. Marine pollution by oil spill or other chemical release (e.g. toxic antifouling chemicals, detergents) could occur. This could be caused by accident near petrochemical facilities, or collision between, or illegal discharge by, ships in the Malacca and Johor Straits. Possible reclamation schemes might load water with sediment which then interferes with intertidal organisms.



Scientific Interest and Potential Value: One of the four intertidal spider species in Singapore. The entrance of each burrow is made watertight with a wafer-like door made of fine debris bound together within by silk. Passing prey (small insects and crustaceans) alerts the spider, and it rapidly emerges to seize the prey directly. When disturbed the spider may hold tightly to the inside of its door or tube and keep it closed.

Conservation Measures: Its limited sites of occurrence are largely within protected and managed areas. Permanent protection of all mangroves that include mud lobsters (*Thalassina anomala*) would be beneficial. Vigilance is needed regarding coastal water quality. Rapid clean-up task forces available on call, and enforcement of anti-pollution laws as necessary.

Scientific Name:

Leucauge celebesiana
(Walckenaer, 1841)

Common Name:

Celebes Silver Orb
Weaver

Order/Family:

Araneae: Tetragnathidae

National Status: Vulnerable (VU)

Habitat and Ecology: Damp places such as edges of waterfalls, but occasionally among grasses in open areas fringing forests.



Distribution: Malaysia (Peninsula, Sabah), Singapore, Indonesia (Sulawesi - the type locality, West Papua, Sumatra), Brunei, Laos, the Philippines, parts of China, Japan and India.

Threats: Reduction of habitat area, especially of sheltered damp places.

Scientific Interest and Potential Value: In other countries this large *Leucauge* species is associated with lowland waterfalls as well as with misty habitats at altitudes above 1,000 metres. By comparison, in Singapore, such high humidity habitats are scarce and

this may limit the local population of *L. celebesiana*. If this is substantiated a population decline could indicate a relative drying of the forest ecosystem.

Conservation Measures: It occurs in the already legally protected nature reserves. Some currently unprotected damp areas might be enhanced and protected.

Scientific Name:

Leviaraneus noegeatus (Thorell, 1895)

Common Name:

Banner Orb Weaver

Order/Family:

Araneae: Araneidae

National Status: Vulnerable (VU)

Habitat and Ecology: Occurs in forest edges.

Distribution: Myanmar and Singapore.

Threats: The decline of this species might have been related to the past reduction in forest areas. Potential threats include further degradation or loss of forest and continued fogging.

Scientific Interest and Potential Value: Appears to be mostly an edge species, found on the fringes of forest.

Conservation Measures: The nature reserves are legally protected. Continuation of the management and maintenance of the Nature Reserves will be needed.

Photo: Joseph K.H. Koh



Scientific Name:
Macracantha arcuata
(Fabricius, 1793)

Common Name:
Longhorn Spiny Spider

Order/Family:
Araneae: Araneidae

National Status: Endangered (EN)

Habitat and Ecology: Shadier fringes of primary and secondary forest.

Distribution: Malaysia (Peninsula, Sabah, Sarawak), Singapore, Indonesia (Sumatra, Java, Maluku), Brunei, Thailand, Laos, Myanmar, the Philippines, and parts of China and India.

Threats: Previously it was listed as Vulnerable (VU). Its current status is likely due to the historical reduction in forest cover. The small size of the remaining forest, and the possibility of further reduction or degradation, are continuing threats.

Photo: Chris Ang



Scientific Interest and Potential Value: The female builds a large web up to a metre in diameter with an open hub between tall trees above eye level or among shrubs a metre or so above the ground. The spider hangs on the underside of the slightly inclined web with the median spines pointing downward.

Conservation Measures: Its known localities are legally protected within Bukit Timah and Central Catchment Nature Reserves.

Scientific Name:
Milonia obtusa Thorell, 1892

Common Name:
Obtuse Leaf-rolling Orb Weaver

Order/Family:
Araneae: Araneidae

National Status: Endangered (EN)

Habitat and Ecology: Foliage in forests.

Distribution: Singapore and nearby parts of Malaysia (Johor) and Indonesia (Batam).

Photo: Chris Ang



Threats: Loss of primary forest in the past might have been responsible for its rarity. The small size of the remaining forest, and the possibility of further reduction or degradation, are continuing threats.

Scientific Interest and Potential Value: As in *Acusilas*, the female constructs a partial orb-web and hides in a rolled leaf retreat suspended in the web.

Conservation Measures: Some of its known known localities are legally protected within Bukit Timah and Central Catchment Nature Reserves.

Scientific Name:
Monodontium bukittimah
Raven, 2008

Common Name:
Bukit Timah Brush-footed
Trapdoor Spider

Order/Family:
Araneae: Barychelidae

National Status: Vulnerable (VU)

Habitat and Ecology: Lowland rain forest

Distribution: Currently known only from Singapore.

Threats: Loss of primary forest in the past might have been responsible for its rarity, and further forest loss or degradation would threaten the species.

Scientific Interest and Potential Value: As in each of the four other *Monodontium* species in the region, it possesses biseriate claws. This apparent plesiomorphic trait hints that *Monodontium* is a phylogenetically relict taxon at the base of the Barychelidae.

Conservation Measures: The habitat in which individuals of this species are found is legally protected as a Nature Reserve.

Photo: David J. Court



Scientific Name:
Omothymus violaceopes
 (Abraham, 1924)

Common Name:
 Singapore Blue Tarantula

Order/Family:
 Araneae: Theraphosidae

National Status: Endangered (EN)

Habitat and Ecology: On mature trees within lowland forest, where it is arboreal. It has been reported from holes and deep recesses in tree trunks in back mangroves (*Xylocarpus moluccensis*). Recently reported from secondary forests, less frequently from primary forest. Large specimens appear capable of catching and consuming large insects, smaller tree frogs and lizards, and perhaps even nestling birds.

Distribution: Singapore, with similar but possibly genetically distinct populations in neighbouring parts of Peninsular Malaysia and Indonesia (Sumatra). Until molecular evidence indicates the contrary, the Singaporean, Malaysian and Indonesian populations should be considered as distinct from one another.

Threats: Deforestation of both mangrove and dry land during land reclamation schemes. In addition, at least one of the spider's host tree species was extensively used for timber to construct houses and boats. Unsustainable poaching by pet traders and amateur collectors. The species has been offered for sale via on-line portals at high prices and it is likely that specimens are freshly caught from the wild. The species is arboreal and is threatened by any loss of suitable forest habitat, in particular the loss of trees bearing crevices suitable for the spiders' retreats (Young trees without crevices are completely unsuitable). The possible introduction of exotic crevice inhabiting organisms that would deter or out-compete *O. violaceopes* as well as spider-eating animals e.g., birds such as hornbills.



Photo: Lim Swee Cheng

Scientific Interest and Potential Value: This is one of the most charismatic spider species in Singapore and the world. Pet traders and their customers, attracted to this species because of its brilliant violet-blue colour and "temperamental attitude", report online that the life span for females in captivity is 13-15 years and for males, 3 to 7 years. These are likely only estimates. The life span of wild specimens may be significantly different.

Conservation Measures: Suitable policing patrols by park rangers to detect/deter poaching (both physically and by on-line monitoring), and appropriate public education. Special protection of old growth forest trees both in nature reserves and in other forested land and parks. Execute a research programme where the basic aspects of this spider's biology are studied including its natural prey, enemies, life cycle. This might include the setting up of artificial retreats in known *O. violaceopes* inhabited areas in the wild, to see if dispersing spiderlings can make use of them as "nest boxes" or permanent retreats. If successful, a captive breeding population could possibly be established.

Scientific Name:
Paraplectana sp. C

Common Name:
White-eyed Ladybird Spider

Order/Family:
Araneae: Araneidae

National Status: Vulnerable (VU)

Habitat and Ecology: Foliage in primary and secondary forests. No other data.

Distribution: Known from Singapore, and this or closely similar forms have been recorded from neighbouring countries in Southeast Asia.

Threats: Loss of primary forest in the past might have been responsible for its rarity. Additional forest loss or habitat degradation might threaten it further.

Photo: Chris Ang



Scientific Interest and Potential Value: It is either conspecific with or closely related to one or some of a few species already reported in several other Southeast Asian countries.

Conservation Measures: The single known locality in Singapore is within a legally protected nature reserve.

Scientific Name:
Paratheuma armata
(Marples, 1964)

Common Name:
Can-opener Marine Spider

Order/Family:
Araneae: Dictynidae

National Status: Vulnerable (VU)

Habitat and Ecology: Coral rubble, shells of dead barnacles and other encrustations.

Distribution: *Paratheuma armata* ranges 9000km between Singapore and American Samoa in the Pacific (where Swains Is. is the type locality). In Singapore it has been recorded from one of the Southern Islands and may occur on others.

Photo: Chris Ang



Threats: Marine pollution by oil spill or other chemical release (e.g. toxic antifouling chemicals, detergents) could occur. This could be caused by accident near petrochemical facilities, or collision between, or illegal discharge by, ships in the Malacca and Johor Straits. Possible reclamation schemes might load water with sediment which then interferes with intertidal organisms.

Scientific Interest and Potential Value: One of the four intertidal spider species in Singapore. It constructs a small funnel-like silk retreat that is submerged at high tide and within which the spider survives immersion in a water-tight cocoon. During low tide it emerges and roams about in search of prey.

Conservation Measures: Limited marine areas in Singapore are conserved, e.g. Sungei Buloh Wetland Reserve, Mandai, Chek Jawa Wetlands, but it is uncertain whether the species occurs there. Vigilance regarding coastal water quality; rapid clean-up task forces available on call; enforcement of anti-pollution laws as necessary.

Scientific Name:

Peng sp.

Common Name:

Box-headed Black Ant Mimic

Order/Family:

Araneae: Corinnidae

National Status: Vulnerable (VU)

Habitat and Ecology: Foliage in secondary forests.

Distribution: The Singapore male is not yet known, therefore the species is unidentified and its distribution uncertain. Named *Peng* species are known from Malaysia (Sabah, Sarawak); Myanmar; Sri Lanka.

Threats: Reduced habitat and hence, reduced population may be restricting the species' population (reduced fecundity).

Scientific Interest and Potential Value: This species is of great biological interest; it is one of the best ant

Photo: Joseph K.H. Koh



mimics among all Southeast Asian spiders. The deception is achieved by a constriction of the cephalothorax, mimicking the division between the head and thorax of a large black ant.

Conservation Measures: Continuation of the management and maintenance of the nature reserves and parks.

Scientific Name:

"Philoponella" quadrituberculata
(Thorell, 1892)

Common Name:

Mexican Hat Spider

Order/Family:

Araneae: Uloboridae

Photo: Joseph K.H. Koh



National Status: Endangered (EN)

Habitat and Ecology: On shrubs in open and sunny areas. The spider builds a web that resembles an upside-down Mexican hat: a horizontal orb web which is attached to a downward-pointing conical structure (a modified orb web with the hub at the apex of the cone).

Distribution: It has been recorded from the neighbouring countries of Malaysia (Johor), Indonesia (Central Java, Sulawesi), Brunei.

Threats: It is not understood why it has not been found recently in what would appear to be suitable habitat.

Scientific Interest and Potential Value: Workman (1896) claimed that this species was “not uncommon in Singapore”, in association with pineapple plants. No recently collected specimens or recently taken images have been confirmed as belonging to this species.

Conservation Measures: The status EN has been applied rather than NEx because there are candidate specimens in the Singapore collections which have not been examined in detail. No conservation measures can be undertaken unless it can be re-located.

Scientific Name:
Phoroncidia lygeana
(Walckenaer, 1841)

Common Name:
Spiny Phoroncidia

Order/Family:
Araneae: Theridiidae

National Status: Endangered (EN)

Habitat and Ecology: Foliage in the understorey of forest.

Distribution: Indonesia (Java, Batam), Brunei and Singapore.

Threats: Loss of primary forest in the past might have been responsible for its rarity. In future any further forest reduction or degradation in quality would increase risk to the already reduced population.

Scientific Interest and Potential Value: Appears to be a mimic of a spiky and unpalatable caterpillar suspended on a silk strand.

Photo: Joseph K.H. Koh



Conservation Measures: The habitat in which individuals of this species are found is legally protected. To minimise further impact from the reduced area of forest habitat in Singapore, it is essential to maintain the integrity of the ecosystems in the Bukit Timah and Central Catchment Nature Reserves.

Scientific Name:
Piranthus api Maddison, 2020

Common Name:
Orange Strong-armed Jumper

Order/Family:
Araneae: Salticidae

National Status: Vulnerable (VU)

Habitat and Ecology: Near mangroves, deep amongst tall grasses overhanging a moist ditch.

Distribution: So far known only from Singapore.

Threats: Loss of mangroves or other wetlands in the past might have been responsible for its rarity. The currently protected sites are fragmented and form only a small total area of habitat. Loss of mangrove and its moist inland edge would further threaten the species.

Scientific Interest and Potential Value: First collected in 2019 and described in the following year, the species is limited to two known localities at Sungei Buloh and Jalan Bahar. Two other species of *Piranthus* have recently been found in Singapore. *P. mandai* Maddison 2020, like *P. api*, is a rare endemic and considered Vulnerable (VU). The other, *P. kohi* Maddison 2020, is found in Singapore, Malaysia and Brunei and is considered to be of Least Concern (LC).

Photo: W.P. Maddison



Conservation Measures: One of the two known localities is legally protected as a nature reserve, while the other is not protected. The protection of other mangrove locations in Singapore including their landward fringes, and any other localities recorded for the species in future, would be beneficial.

Scientific Name:
Platythomisus octomaculatus
(C.L. Koch, 1845)

Common Name:
Eight-spotted Crab Spider

Order/Family:
Araneae: Thomisidae

Photo: Joseph K.H. Koh



National Status: Vulnerable (VU)

Habitat and Ecology: Mostly associated with and known from low or mid-level mangrove vegetation, although occasionally found in forest further inland. Constructs retreats by fastening 2-3 leaves together, often of the Sea hibiscus, *Hibiscus tiliaceus* L.

Distribution: Brunei, Indonesia, Malaysia and Singapore. In Singapore most of the known localities (e.g., Sungei Buloh, Mandai, Chek Jawa, Pulau Ubin) are coastal, in or near mangroves but it has also been found in abandoned rubber plantation.

Threats: Loss of primary forest in the past might have been responsible for its rarity. Any further reduction of mangrove and forest habitat, fogging against mosquitoes, or poaching for the pet trade (in which it occasionally appears) might represent additional threats.

Scientific Interest and Potential Value: Has been observed consuming large and dangerous prey such

as a mantid and a large wasp. Possesses some unusual body posturing and leg-shivering behaviour that would be worthy of study. May be a Mullerian mimic, that is, one that gains enhanced protection from would-be predators by possessing a colour pattern or other visually recognisable trait also exhibited by one or more other species, both, or all of which are venomous, toxic or otherwise noxious. Abraham was the first to notice that the colour pattern of *C. octomaculatus* matches with the pentatomid bug *Catacanthus incarnatus* of the Family Scutelleridae. The scutellarids *Cantao ocellatus* and *Calliphara nobilis* are also similar. These bugs are all found in "octomaculatus territory" and all can produce a toxic spray (likely derived from toxins in the sap of the plants upon which they feed).

Conservation Measures: Maintain the protection afforded by the reserves in which it is found, as well as to increase the protection status of ecologically similar but currently unreserved areas.

Scientific Name:

Platythomisus sp.

Common Name:

Three-spotted Crab Spider

Order/Family:

Araneae: Thomisidae

National Status: Endangered (EN)

Habitat and Ecology: On understorey leaves in freshwater swamp forest.

Distribution: Singapore, and possibly Sarawak.

Threats: Loss of swamp forest during the last century may have led to its current rarity. Deterioration in forest quality is a potential threat.

Photo: David J. Court



Female *Platythomisus* sp.

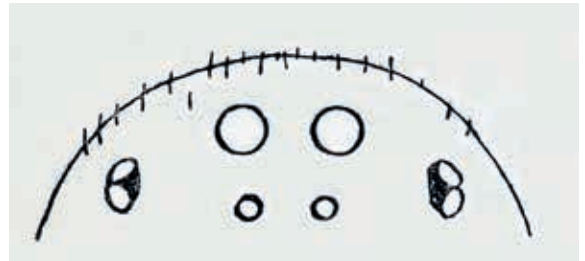
Scientific Interest and Potential Value: It is only known from a single example collected in 2013. The discovery of this species, smaller than the better-known *P. octomaculatus*, was a surprise. It is likely to be a new and undescribed species. A similar if not identical species has been recently (2021) observed and photographed in Sarawak, Malaysia.

Conservation Measures: The single known locality is protected within the Central Catchment Nature Reserve. It would be excellent if staff of the reserve or spider enthusiasts with access keep an eye out for further records of this visually distinctive spider so as to confirm its persistence.

Scientific Name:
Sarascelis raffrayi Simon, 1893

Common Name:
Raffray's Palp-footed Spider

Order/Family:
Araneae: Palpimanidae



Sarascelis sp. dorsal. Drawing: Simon, 1893 fig. 363

National Status: Nationally Extinct (NEx)

Habitat and Ecology: Most recently collected from leaf litter on the ground in primary lowland forest.

Distribution: Singapore, India

Threats: Loss of primary forest in the past might have been responsible for its rarity.

Scientific Interest and Potential Value: *Sarascelis raffrayi* is listed from Singapore and India. As reported by Simon, *Sarascelis* spp. are similar to *Boagrius*

spp. (also in the Palpimanidae) but are considerably larger. Simon considered a distinguishing character for *Sarascelis* to be the eye arrangement in dorsal view (see picture above, adapted from Simon's 1893 sketch). Other *Sarascelis* spp. are found in Africa and India.

Conservation Measures: The last record for Singapore was from Bukit Timah Nature Reserve in 1988. It is assumed to be a valid taxon, conceivably still existing in Singapore, but without being recently detected. Field workers are encouraged to be on alert for the possible re-discovery of this species so that appropriate conservation measures can be taken.

Scientific Name:
Selenocosmia sp.

Common Name:
Singapore Black Tarantula

Order/Family:
Araneae: Theraphosidae



Photo: Joseph K.H. Koh

National Status: Endangered (EN)

Habitat and Ecology: Occurring on the ground in lowland forest, occasionally extending into adjacent forest fringe habitats.

Distribution: Singapore. [A similar but not necessarily identical species has been seen in Malaysia (Johor)].

Threats: Loss of forest in the past might have been responsible for its rarity. If so, further clearing of forest would be an additional threat. Poaching for the pet trade or individually by amateur collectors. Introduction of invasive predator species of flatworms, centipedes or wasps.

Scientific Interest and Potential Value: A large selenocosmiine tarantula. This species is likely to be undescribed, with a range that may or may not extend beyond Singapore. Specimens from Singapore have previously been identified as *Selenocosmia javanensis* but do not match *Selenocosmia* species from Java, which is the type locality of *S. javanensis*. Predominantly lives in silk-lined burrows in moist ground near tree roots, sometimes also in nearby grassy patches. Likely to prey upon larger forest floor invertebrates, possibly small frogs and lizards. Males when mature leave their retreat to search for females. Females have been seen roaming the forest floor whilst carrying their egg sac.

Conservation Measures: The forest habitat in which individuals of this species are found is protected as nature reserves or managed in adjacent parks.

Scientific Name:
Stephanopis sp.

Common Name:
Thorny Crab Spider

Order/Family:
Araneae: Thomisidae

National Status: Vulnerable (VU)

Habitat and Ecology: Little known. On dead fronds of climbing ferns and leaves of other plants in the denser undergrowth of primary and secondary forests. It is well camouflaged: the body can become encrusted with soil particles and leaf-litter fragments, the legs and body carry numerous tiny warts, minute spines, and setae bearing microscopic Velcro-like hooks, all of which help to trap and hold the debris. Once photographed feeding upon a spider.

Distribution: Brunei, Malaysia (Sabah) and Singapore

Threats: Loss of primary forest in the past might have been responsible for its rarity. Current threats are not understood. Specimens have been found sporadically during beating or shaking of undergrowth. However,

Photo: David J. Court



it is often missing from apparently suitable habitat. Long term viability of *Stephanopis* populations may be dependent upon sufficient understorey ferns and climbers.

Scientific Interest and Potential Value: Other *Stephanopis* species are in two poorly defined groups with a less-usual geographic distribution: Group (A) occurring in Australasia and Southeast Asia to southern China; Group (B) in South America.

Conservation Measures: The habitat(s?) in which individuals of this species are found are largely protected as a Nature Reserve.

Scientific Name:
"Tarrocanus" sp.

Common Name:
 Cone-eyed Crab Spider

Order/Family:
 Araneae: Thomisidae

National Status: Critically Endangered (CR)

Habitat and Ecology: Mangrove vegetation. Nothing further is known about this unique "cone-eyed" species.

Distribution: Singapore. Only a single specimen has been found, in 2016.

Threats: Loss of forest in the past, particularly of mangroves, might have been responsible for its rarity.

Scientific Interest and Potential Value: This undescribed species, superficially with similarities to the genus *Tarrocanus* from Sri Lanka, appears to belong to

Photo: Joseph K.H. Koh



an undescribed genus. Hence the name given above is placed in inverted commas.

Conservation Measures: The known habitat is in the established Pasir Ris Park. If sufficient living examples could be found, captive breeding and/or translocation to additional sites might be attempted.

Scientific Name:
Tetragnatha josephi
 Okuma, 1988

Common Name:
 Mangrove Long-jawed Spider

Order/Family:
 Araneae: Tetragnathidae

National Status: : Vulnerable (VU)

Habitat and Ecology: Confined to mangroves

Distribution: Singapore, Brunei

Threats: Loss of mangrove forest in the past might have been responsible for its rarity. Additional losses of mangroves, whether to development or alteration of the coastline in response to sea level rise, represent further

Photo: Paul Ng



potential threats as well as accidental fogging (intended against mosquitoes) and marine pollution.

Scientific Interest and Potential Value: Lim Chu Kang mangroves represent the type locality and only known site, where it was first found in 1976. The time is now ripe for a research project into the detailed biology of this and other mangrove-inhabiting spider species, with attention to prey, life cycle etc.

Conservation Measures: It is present at a single site, Lim Chu Kang, which is now under management by the National Parks Board as parkland for conservation purposes, contiguous with the Sungei Buloh Wetland

Reserve. Prevention of fogging programmes and the enforcement of anti-marine pollution laws would be significant steps towards its long-term conservation.

Scientific Name:
Thomisus nepenthophilus
Fage, 1930

Common Name:
Pitcher-plant Horned
Crab Spider

Order/Family:
Araneae: Thomisidae

National Status: : Vulnerable (VU)

Habitat and Ecology: Likely to be an obligate commensal inside *Nepenthes gracilis* pitchers (*Nepenthes tobaica* in Sumatra) in seral communities such as “belukar”, characterised with poor nutrients, waterlogging or eroded terrain.

Distribution: Indonesia (North Sumatra) and Singapore.

Threats: This species is much rarer than *Henriksenia nepenthicola* and occurs only in large patches of *Nepenthes*. There are not many such sites left in Singapore, and those that remain are threatened by development. Some swampy areas may be fogged for mosquito control. These same threats were present in the past and may still continue. There seems to be a time-lag, between when *Nepenthes* first establishes in

an area, and when the spider is able to colonise the pitchers. The fewer the pitchers are available, the longer the time lag is likely to be.

Scientific Interest and Potential Value: Unlike *Henriksenia nepenthicola*, they do not dive into and move about in the pitcher fluid. A survey of *Nepenthes* pitchers throughout Singapore should ascertain the distribution and fecundity of *Thomisus nepenthophilus* (and *Henriksenia nepenthicola*).

Conservation Measures: We would suggest a species recovery programme for this species: in large patches where this species can be found, the *Nepenthes* plants along with their spider inhabitants can be transplanted to certain parts of Pulau Ubin where their preferred habitats still exist.



Scientific Name:

Thomisus perspicillatus
(Thorell, 1890)

Common Name:

Buffalo Horn Crab Spider

Order/Family:

Araneae: Thomisidae

National Status: Endangered (EN)

Habitat and Ecology: Foliage on roadside and secondary forest.

Distribution: Singapore, Malaysia ("Borneo", Sabah, Sarawak)

Threats: This subtly coloured species would appear to require a particular kind of vegetation from which to prey (e.g., leaf colour, texture). The adventive plant

Photo: Marcus F.C. Ng



Female *Thomisus perspicillatus* on a leaf at a Nature Park.

species now tending to invade forest margins may be less suitable than those that are indigenous.

Scientific Interest and Potential Value: Fewer than ten specimens recorded by nature photographers in recent years. Specimens from Singapore not known in collections.

Conservation Measures: The locality in which this species has been observed is protected.

Scientific Name:

Xyphinus hystrix Simon,
1893

Common Name:

Porcupine Goblin Spider

Order/Family:

Araneae: Oonopidae

National Status: Vulnerable (VU)

Habitat and Ecology: In leaf litter in primary forest.

Distribution: Peninsular Malaysia (Pahang - Pulau Tioman) and Singapore.

Threats: Loss of forest cover over the last century could have caused its present rarity. As it is limited to a single site, Bukit Timah Nature Reserve, stochastic events as well as long-term decline in forest quality are potential threats to a small population.

Photo: David J. Court



Scientific Interest and Potential Value: An oonopid with a "charismatic" spiny appearance (both male and female exhibit four carapacial spines).

Conservation Measures: The habitats like those in which this species have been found are largely protected as nature reserves. Continued protection of the nature reserves is required.

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Miscellaneous Arthropoda and Onychophora

HWANG WEI SONG

The second edition Red Data Book listed a total of 27 species (excluding the Odonata) under the chapter of “Springtails, Peripatus and insects (to moths): Arthropoda”. Some taxa to which a few of the 27 species belong to have since had scientists embark on studies resulting in an increase in the breadth and depth of species that could be assessed for a category of threat status in this edition of the Red Data Book. The taxa that have benefitted from increased study and assessment are the Diptera (Flies), Coleoptera (Beetles), Hymenoptera: Vespidae (Wasps), Hymenoptera: Formicidae (Ants), Lepidoptera: Pyralidae & Gracilariidae (Moths), Orthoptera (Katydid & Crickets) and Isoptera (Termites). Thirteen of the twenty seven species are now listed under their respective taxa chapter in this book. Of the fourteen species remaining, the *Eoperipatus sumatranus* is no longer considered an Arthropod, but is now classified in its own phylum, Onychophora. A detailed writeup has been provided for it here as well as a species (*Dysdercus decussatus*) that has since been upgraded from Endangered in the second edition to Least Concern.

Scientific Name:***Dysdercus decussatus*****Common Name:**

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Order/Family:**Hemiptera/Pyrrhocoridae****National Status:** Least Concern (LC)

Habitat and Ecology: This species is known to feed exclusively on the seeds of Sea hibiscus (*Hibiscus tiliaceus*) and Portia tree (*Thespesia populnea*). Both adults and immatures aggregate in large numbers when the trees produce fruits and seeds.

Distribution: This species is found throughout the Oriental Region, including Singapore, from Sri Lanka to Papua New Guinea, as well as the Solomon Islands, Ryukyu islands, Taiwan island and Northern Australia.

Threats: The close association of this species with their preferred host plants means that their fate is directly affected by the prevalence and availability of their host plants. Currently the Sea hibiscus is much more widespread than the Portia tree in Singapore, which has a more limited distribution locally. The associated colour morphs of the cotton stainer bugs are currently skewed in representation in accordance to the host plant abundance. Ensuring the survival of the host plants will indirectly provide the long-term survival of this species in Singapore.

Scientific Interest and Potential Value: This species was previously assessed in the second edition of this book under the name *Dysdercus simon* (Taeuber, 1927), with an Endangered status assigned due to its host plant specificity to the Portia tree found only in back mangrove areas. This was done despite the taxonomic synonymy of *Dysdercus simon* to *Dysdercus decussatus* by Freeman in 1946, who regarded both (and a few others) to be the same species with intermediate forms across its wide-spanning native range. Suspicion that *Dysdercus simon* may be a distinct species due to non-overlapping host plants, lack of intermediate forms present in Singapore, and observed morphological differences, the previous assessors made the decision to recognize *Dysdercus simon* as a distinct species to

Photo: Dennis Murphy (from 2nd edition Singapore Red Data Book)



be featured in the second edition. Since then, there has been no formal taxonomic act published to resurrect the *Dysdercus simon* as a valid species nor new evidence presented. Therefore, we consider this taxonomic issue as unresolved at the moment, and we follow the valid species name *Dysdercus decussatus* for the combined populations that feed on both host plants, with the recognition that two distinct colour morphs exist (black headed vs. red headed), with possibly non-overlapping host plant preferences. Since the combined populations of the two colour morphs occur over a more widespread area within Singapore, due to the ubiquity of the Sea hibiscus plant that supports the red-headed cotton stainer bug more abundant in numbers, the Least Concern conservation status is assigned to reflect this updated condition.

Conservation Measures: Due to the host-plant specificity of this species, its long-term survivability is highly dependent on the availability of its host plant species.

Scientific Name:

Eoperipatus sp.

Common Name:

Velvet worm

Order/Family:

Onychophora/Peripatidae

National Status: Endangered (EN)

Habitat and Ecology: This species is entirely restricted to primary and secondary rainforest, where it lives in the leaf litter and forest understorey. It is a nocturnal predator that captures other terrestrial arthropods by secreting a sticky substance to ensnare them. The females are known to give birth to live young. Its cryptic lifestyle and sparse population density makes it a difficult organism to study

Distribution: This species distribution is currently unknown due to its uncertain taxonomic status.

Threats: The species is only found in Bukit Timah, Central Catchment Nature Reserve and Pulau Ubin within Singapore. The species is restricted to forest habitats with suitable prey availability. This species is vulnerable from any perturbations to its environment.

Photo: Leong Tzi Ming
(from 2nd edition Singapore Red Data Book)



Being at a higher trophic level as a predator, their numbers are also relatively less abundant and more sensitive to disturbances.

Scientific Interest and Potential Value: Velvet worms represent a very ancient lineage of terrestrial arthropods, with the genus *Eoperipatus* only present in Southeast Asia, with relatively low diversity of four known species so far. The previous identity of the *Eoperipatus* as *Eoperipatus sumatranus* in Singapore is no longer a valid name and the true species identity of the local species remains to be determined.

Conservation Measures: Due to the specificity of this species to forested areas especially old growth, mature rainforests, its long-term survivability is highly dependent on the protection of these habitats.

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Arthropoda – Tanaidacean Crustaceans

CHIM CHEE KONG

Scientific Name:

Phoxokalliapseudes singaporensis
Drumm & Heard, 2011

Common Name:

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Order/Family:

Tanaidacea / Kalliapseudidae

National Status: Least Concern (LC)

Habitat and Ecology: This suspension feeder is one of the most common tanaids in shallow subtidal soft bottom habitats (12–54 m depths) along the Singapore Strait (pers. obs.). Sites of occurrence include southeast of Pulau Tekong, Eastern Bunkering, southwest of Bedok Jetty, east of Lazarus Island Beach and southwest of Jurong Island. The biology of this local species is unknown but other species of kalliapseudids were found to feed on diatoms and crustaceans in Florida, U.S.A. (Drumm, 2005) and were prey for many benthic fishes in Brazil (Contente et al., 2009a, 2009b, 2012).

Photo: Chim Chee Kong



Distribution: Only known from Singapore, including the unknown shallow subtidal type locality where it was first collected in 1905–1907 (Drumm & Heard, 2011).

Threats: Unknown but possibly marine trash.

Scientific Interest and Potential Value: N.A.

Conservation Measures: Unpublished long-term quantitative data (2009 to 2020) showed that this species is quite common in at least two localities along the Singapore Strait with no obvious decline in numbers. Main conservation measures should include enforcing laws against illegal dumping of trash into the sea.

Scientific Name:

Xenosinelobus balanocolus
Chim & Tong, 2019

Common Name:

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Order/Family:

Tanaidacea/Tanaididae

National Status: Data Deficient (DD)

Habitat and Ecology: This small tanaid appears to be confined to the inside of the empty shells of the volcano barnacle *Tetraclita*, which traps rainwater to

Photo: Chim Chee Kong



create a hyposaline environment (Chim et al., 2016). Other members of the subfamily Sinelobinae were also found in habitats with freshwater influx such as rivers and mangroves (Chim & Tong, 2019).

Distribution: Only known from the intertidal rocky shores and seawalls at Lazarus and St. John's Islands, Singapore, where it was originally described based on material collected in 2014. Even though no systematic survey has been conducted since then, a recent ad hoc sampling of about 100 *Tetraclita* shells in 2022 failed to collect any tanaids.

Threats: Loss and degradation of rocky shores in Singapore.

Scientific Interest and Potential Value: N.A.

Conservation Measures: Protection of existing rocky shores.

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Arthropoda – Freshwater Decapod Crustaceans

YIXIONG CAI, DANIEL J.J. NG, LYDIA X. GAN, ELYSIA X.P. TOH, DARREN C.J. YEO

The conservation status of the freshwater decapod fauna of Singapore is updated here based on the results of comprehensive freshwater habitat surveys conducted in the past 15 years. Twenty-five species were appraised, including six shrimp species that were assessed as Nationally Extinct, viz., *Macrobrachium rosenbergii*, *M. scabriculum*, *M. neglectum*, *M. idae*, *Caridina sumatrensis*, and *C. bruneiana*, representing 24% of the total native freshwater decapod fauna. All six species are amphidromous, producing numerous, small eggs and having pelagic larval stages that undergo development in downstream tidally influenced estuaries and/or coastal areas to complete their life cycles. Conversion of earthen streams to concrete storm drains together with barraging of river mouths to create reservoir impoundments in the last five decades could be a key factor in their loss. Of the 19 extant freshwater decapod species, six are crabs and 13 are shrimps. Three species of primary freshwater crabs, *Johora singaporensis*, *Parathelphusa reticulata* and *Irmengardia johnsoni*, are endemic to Singapore, with the first two assessed as nationally Endangered, being restricted to very small areas, and the third as nationally Vulnerable, having a relatively larger range. Of the 13 extant species of shrimps, two (*Macrobrachium platycheles* and *Caridina gracilipes*) are nationally Critically Endangered, and seven (*Macrobrachium equidens*, *M. pilimanus*, *Caridina gracilirostris*, *C. peninsularis*, *C. temasek*, *C. malayensis*, and *Potamalpheops amnicus*) are nationally Endangered. Singapore is highly urbanised, and freshwater habitats that support native freshwater decapods are relatively rare, especially for those with tidal influence to support amphidromous species. Conservation and research efforts, however, have been key in ensuring the persistence and survival of freshwater decapods, for example, research focus on the rare and endemic Singapore freshwater crab *J. singaporensis* has contributed significantly to understanding and protection of equally rare hill stream habitats. Updates in this third edition of the Singapore Red Data Book provide impetus and reference for further environmental attention and public feedback for supporting and informing conservation management of aquatic biodiversity.

Scientific Name:

Johora singaporensis Ng 1986

Common Name:

Singapore freshwater crab

Order/Family:

Decapoda: Potamidae

National Status: Endangered (EN)

Habitat and Ecology: Relatively undisturbed forest hill streams, often found under rocks or leaf litter on the stream bed. Has semi-terrestrial habits and will go on land to scavenge for food opportunistically and is largely active nocturnally.

Distribution: Known only from Bukit Timah Nature Reserve, and small populations in hill streams around Bukit Gombak and Bukit Batok.

Threats: Loss or degradation of habitat, water acidification.

Scientific Interest and Potential Value: Endemic to Singapore, this species was initially assumed to be an allied species *J. johorensis*. Since its discovery in 1986, the species has grown to become an icon of conservation in Singapore; highlighting how the highly urbanized

Photo: Daniel Ng



city-state can still harbour unique biodiversity not found anywhere else, and the importance of conservation of our existing natural environment. The species' stenotopic habits, however, also equate to a highly restricted distribution locally; for example, extirpation of the species at one locality, Jungle Fall Valley, meant a significant loss of the already small population.

Conservation Measures: A dedicated conservation strategy was established for *J. singaporensis* in 2015, aiming to further biological knowledge and ensure the conservation of the species through coherent and complementary efforts among multiple stakeholders, such as long-term monitoring and research, in-situ conservation of hill streams, and ex-situ breeding programmes. Continued protection of Bukit Timah Nature Reserve and hill stream habitats are essential for the survival of this stenotopic and rare species.

Scientific Name:

Parathelphusa reticulata Ng 1990

Common Name:

Swamp forest crab

Order/Family:

Decapoda: Gecarcinucidae

National Status: Endangered (EN)

Habitat and Ecology: Largely aquatic in habit. Found in well-shaded freshwater swamp forest with shallow water of low pH (5.0–5.5). Digs burrows by the side of muddy banks. Very secretive and only active

Photo: Daniel Ng



nocturnally. Feeds largely on plant matter and leaf litter but will scavenge for animal matter opportunistically.

Distribution: Only known from Nee Soon Swamp Forest. The species is endemic to Singapore.

Threats: Loss or degradation of habitat

Scientific Interest and Potential Value: One of three freshwater crab species endemic to Singapore, the species was discovered relatively recently in 1990. Previously confused with the more common *Parathelphusa maculata*, closer examination of specimens revealed key morphological differences and a distinctive, reticulated colour pattern in *P. reticulata*.

Conservation Measures: Since its discovery in 1990, the species has been known mostly from a 55-hectare area within Nee Soon Swamp forest, but it has been reported in drains and streams near the edge of the swamp forest. As Nee Soon Swamp Forest is the last substantial patch of freshwater swamp forest in Singapore, and the only habitat suitable for the species, continued protection of the swamp forest and surrounding buffer areas is essential. In addition, an ex-situ breeding programme for the species has been established.

Scientific Name:

***Geosesarma nemesi* Ng 1986**

Common Name:

Little land crab

Order/Family:

Decapoda: Sesarmidae

National Status: Endangered (EN)

Habitat and Ecology: Semi-terrestrial habits and digs shallow burrows under rocks and vegetation next to small freshwater streams in well-shaded forests. Primarily herbivorous but will scavenge for animal matter opportunistically.

Distribution: In Singapore, found mainly in Bukit Timah Nature Reserve and in several streams in Bukit Batok and Bukit Gombak. Also occurs in southern Peninsular Malaysia.

Threats: Forest clearance and water pollution. The species used to be common at Bukit Timah Hill but the only intact populations now live on the reserve, and surprisingly, in several small streams across Upper Bukit Timah Road in the Bukit Batok and Bukit Gombak. Most other peripheral populations have been exterminated by indiscriminate use of chemical pesticides used to exterminate mosquito larvae. Such pesticides, which are often indiscriminately sprayed even on flowing streams and clean waters with small fishes where mosquito larvae are absent, are very harmful to freshwater life, and can exterminate whole communities of stream invertebrates.

Photo: Daniel Ng



Scientific Interest and Potential Value: This species was first described from Bukit Timah Hill in Singapore in 1986 after having long been mistaken for another species, *G. ocypoda*, originally described from Sumatra. This highland species can be tricky to differentiate superficially from its lowland counterpart in Singapore, *G. perracae*.

Conservation Measures: Conservation of good primary and late secondary forests. Properly and carefully planned and thought-out use of insecticides and other anti-mosquito measures near freshwater habitats.

Scientific Name:
Caridina gracilirostris
De Man 1892

Common Name:
Needlenose caridina

Order/Family:
Decapoda: Atyidae

National Status: Endangered (EN)

Habitat and Ecology: Only found in lower reaches of rivers and streams with tidal influence. Diet includes small animals, organic detritus and plankton. Produces numerous, small eggs that undergo typically prolonged larval development.

Distribution: In Singapore, found in coastal, tidal-influenced streams such as streams at Sembawang and Sungei Sim pang. Has a widespread distribution across Southeast Asia and the Indo-West Pacific, including Malaysia, Indonesia, Thailand, Cambodia, Taiwan, Japan, Palau, the Philippines, Fiji, India and Madagascar.

Photo: W. Klotz



Threats: Loss or degradation of habitat, impoundment of estuarine areas.

Scientific Interest and Potential Value: This species is popular within the aquarium trade, favoured for its unique and elongated red rostrum. In 2007, a taxonomic revision of *C. gracilirostris* led to the recognition of a new species group.

Conservation Measures: *Caridina gracilirostris* is rare in Singapore, probably due to the widespread impoundment and degradation of estuarine areas, limiting its access to coastal waters for completion of its life cycle. Preservation and careful management of such areas that remain is essential to ensuring that the species can continue to thrive in Singapore's waters.

Scientific Name:
Macrobrachium pilimanus
(De Man 1879)

Common Name:
Muff river prawn

Order/Family:
Decapoda: Palaemonidae

National Status: Endangered (EN)

Habitat and Ecology: Occurs in fast-flowing, rocky hill streams. Omnivorous diet, but prefers animal matter and can actively prey on other aquatic organisms. Produces relatively few large eggs that undergoes abbreviated larval development.

Photo: Cai Yixiong



Distribution: In Singapore, only found in two hill streams, in the Bukit Gombak and Bukit Batok area. Also occurs in similar habitats in Malaysia, Indonesia, Brunei and Thailand.

Threats: Loss or degradation of habitat. Currently restricted to two streams in Singapore, making the population highly vulnerable to stochastic events that could impact the hill streams.

Scientific Interest and Potential Value: *Macrobrachium pilimanus* recorded from Singapore in 1961 proved to be a misidentification. Close examination of the specimen, collected in 1956 from unexpected freshwater swamp habitat of Nee Soon Swamp Forest (but within an unusually fast-flowing portion), revealed it to belong to an allied but hitherto

undescribed species, *M. platycheles*, which was described in 1995. Nevertheless, the real *M. pilimanus* was discovered eventually in 2013, in Bukit Gombak in an isolated hill stream, a habitat type that is typical for the species.

Conservation Measures: Pilot efforts include managed translocation of *M. pilimanus* to evaluate its suitability for a species-targeted conservation strategy. The species was formally included as part of the National Parks Board's Species Recovery Programme in 2021.

Scientific Name:
Potamalpheops amnicus
Yeo & Ng 1997

Common Name:
Riverine alpheid shrimp

Order/Family:
Decapoda: Alpheidae

National Status: Endangered (EN)

Habitat and Ecology: Found in forest streams. Often found clinging to root mats, submerged vegetation and overhangs near stream banks. The eggs are relatively few and large with larvae undergoing abbreviated development.

Distribution: In Singapore, occurs in Central Catchment Nature Reserve. Also occurs in Peninsular Malaysia, and Pulau Bintan (Indonesia).

Threats: Loss or degradation of habitat.

Scientific Interest and Potential Value: The description in 1997 of *P. amnicus* represents the first



record in Singapore of a freshwater snapping shrimp, although this primitive species lacks the distinctive snapping claws of its more advanced marine counterparts. Previously recorded from a single stream in the Central Catchment Nature Reserve, the species have since been found in more localities around Singapore, albeit in low numbers. This could be due to its cryptic behaviour.

Conservation Measures: Continued protection of the Central Catchment Nature Reserve will be necessary for the long-term survival of the species. There is also a heritage significance since the species was described first from Singapore.

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