



Day-flying moths

(Sesiidae, Castniidae, Zygaenidae,
Immiidae, Geometridae, Uraniidae,
Erebidae and Noctuidae)

10

Clearwing Moth

Pseudosesia oberthuri (Le Cerf, 1916)



Plate 181 Lee Point, Casuarina Coastal Reserve, NT
Photo: Axel Kallies



Plate 182 Lee Point, Casuarina Coastal Reserve, NT
Photo: Axel Kallies

Distribution

This species is endemic to the study region. It occurs in the north of the Northern Territory, where it is restricted to the higher rainfall areas of the north-western corner of the Top End (> 1,300 mm mean annual rainfall). It extends from the Tiwi Islands (Melville Island) (G. F. Hill) south to Mt Burrell on Tipperary Station (Braby 2011a) and east to Kakadu National Park (Nourlangie Rock) (A. Kallies). The larval food plants are considerably more widespread than the known geographic range, occurring in the Kimberley and throughout the Top End and coastal islands of the western Gulf Country. Further surveys are thus required to determine whether *P. oberthuri* occurs in these areas and is more widespread than present records indicate. Males of the species are usually detected by attracting them to artificial pheromone lures (Kallies 2001).

Habitat

Pseudosesia oberthuri breeds along the edges of semi-deciduous monsoon vine thicket and in savannah woodland where the larval food plants grow either as vines (*Ampelocissus acetosa*) or as shrubs (*A. frutescens*) (Braby 2011a).

Larval food plants

Ampelocissus acetosa, *A. frutescens* (Vitaceae). The main food plant appears to be *A. acetosa* (Kallies 2001; Braby 2011a).

Seasonality

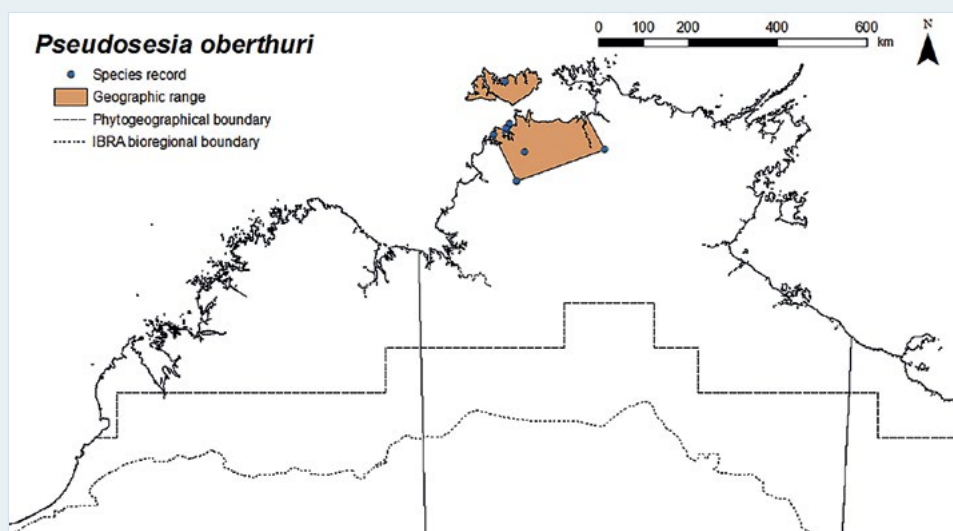
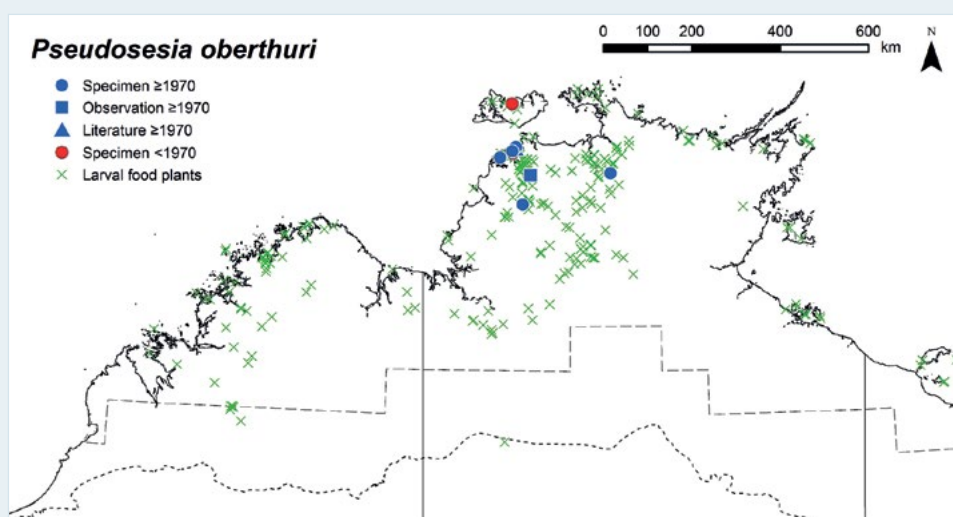
Adults are seasonal, occurring only during the wet season and early dry season (January–May), but there are too few records ($n = 10$) to assess temporal changes in abundance. The life cycle is incompletely known. The immature stages (larvae or pupae) have been recorded sporadically from January to May. Near Darwin, NT, large numbers of fully grown larvae and pupae have been found in March (A. Kallies, pers. comm.). The larvae feed in the woody stems of their food plants (*Ampelocissus* spp.), which are short-lived seasonal perennial vines or shrubs. The larvae cause significant swelling of the stems and sometimes multiple larvae (> 10) can be found in a single large gall. During the dry season, the food plants senesce and remain dormant as underground tubers; they then resprout and regenerate during the ‘build-up’ following the pre-monsoon storms. Presumably, only a single generation is completed annually, but it is not clear whether the species survives the dry season as eggs or early instar larvae.

Breeding status

This species is resident in the study region.

Conservation status

LC. The species *P. oberthuri* is a narrow-range endemic (geographic range = 29,990 sq km) and occurs in several conservation reserves, including East Point Reserve, Casuarina Coastal Reserve and Kakadu National Park. Despite its restricted occurrence, there are no known threats facing the taxon.

[illegible]

Northern White-spotted Sun-moth

Synemon phaeoptila Turner, 1906



Plate 183 Cobourg Peninsula, NT
Photo: M. F. Braby



Plate 184 Pinkerton Range, NT
Photo: M. F. Braby

Distribution

This species occurs in the western half of the Top End of the study region. It extends from moist coastal areas of high rainfall (> 1,600 mm mean annual rainfall) to drier inland areas, reaching its southernmost limit on the Pinkerton Range, NT (Braby 2011a). It generally occurs in higher rainfall areas (> 800 mm) than *Synemon wulwulam*, although the ranges of the two species overlap in the area between Adelaide River, Katherine and the Victoria River District, NT. The geographic range corresponds well with the spatial distribution of its larval food plant, although the food plant also occurs in the Kimberley and on the Tiwi Islands, NT. Further field surveys are thus required to determine whether *S. phaeoptila* occurs in these areas. Outside the study region, *S. phaeoptila* occurs in northern Queensland.

Habitat

Synemon phaeoptila breeds in savannah woodland, favouring open grassy areas where the larval food plant grows as a perennial grass (Braby 2011a).

Larval food plant

Chrysopogon latifolius (Poaceae).

Seasonality

Adults are seasonal, occurring only during the wet season (November–February), before the flight season of *Synemon wulwulam*. They are most abundant during December and January following the first substantial rainfall events, when the larval food plants resprout or regenerate after fire. In some locations or seasons they may also be common in February, depending on the timing of the monsoon rains. The immature stages (eggs and fresh pupal shells) have been recorded in February. The larvae are believed to feed underground on the thick rhizome of the food plant. Presumably, one generation is completed annually and the larvae develop during the late wet season and dry season.

Breeding status

This species is resident in the study region.

Conservation status

LC.

Kimberley Sun-moth

Synemon sp. 'Kimberley'



Plate 185 East of Borda Island, WA
Photo: You Ning Su



Plate 186 East of Borda Island, WA
Photo: You Ning Su

Distribution

This undescribed species is endemic to the northern Kimberley, where it occurs in the higher rainfall areas (> 1,000 mm mean annual rainfall), its presence in the region first detected in 2000 by G. Swann. It is currently known from only two coastal locations 150 km apart: on the mainland east of Borda Island (Williams et al. 2016) and Bertram Cove, south of Cape Bernier (G. Swann), WA. Further field surveys are required to determine whether *Synemon* sp. 'Kimberley' occurs elsewhere in the Kimberley, particularly in the more inland areas.

This species was provisionally placed under *Synemon phaeoptila* by Williams et al. (2016: 146) based on limited material (one female and one male), but with the caveat that '[i]t is possible that this is an undescribed species ... More specimens, and better quality material from the Kimberley is required before a thorough taxonomic assessment can be made'. Examination and comparison of additional material (14 males, two females) recently collected by J. E. and A. Koeyers indicate that it is indeed a distinct species. *Synemon* sp. 'Kimberley' differs from *S. phaeoptila* in several characters—namely, the adults are substantially smaller in size; the wings are narrower and a different shape, with the forewing obovate and apex more rounded, and the hindwing termen straighter and less rounded; the pattern on the upperside of the forewing is less complex, being uniformly grey with black veins, the white cell spot consists of a small delicate dull white rounded spot (rather than a larger, brighter white oblique bar enclosed by a variable black patch in *S. phaeoptila*), and the broad iridescent silver curved streak along

the cubital vein is usually absent or poorly developed; and the prominent orange-brown terminal band on the upperside of the hindwing in males is absent or, when present, reduced to a series of indistinct spots separated by dark veins. In addition, on the underside of the forewing, females have four distinct black elongate subapical spots, which are absent in *S. phaeoptila*, and males have the ground colour predominantly dark brown, with the orange-brown area substantially reduced to a narrow margin near the termen, whereas in *S. phaeoptila* only the inner half is dark brown, which contrasts against the outer portion, which is bright orange-brown.

Habitat

The breeding habitat of *Synemon* sp. 'Kimberley' has not been recorded. Adults have been collected in coastal *Acacia–Grevillea* low open woodland, where the putative larval food plant grows as a dominant perennial grass on sandstone (Williams et al. 2016).

Larval food plant

Not recorded in the study region; possibly *Chrysopogon fallax* (Poaceae) (Williams et al. 2016).

Seasonality

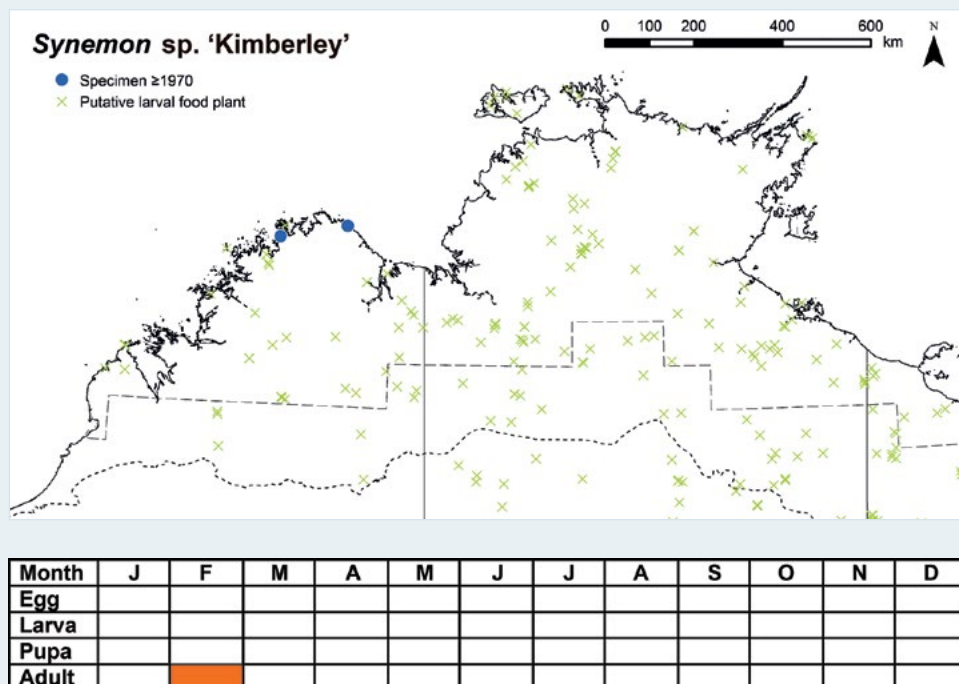
The seasonal abundance and breeding phenology of this species are not well understood. Adults have been recorded only in February, but we have too few records ($n = 3$) to assess any seasonal changes in abundance. It is likely the flight period is limited to the wet season, similar to that of *S. phaeoptila*. Presumably, one generation is completed annually and the larvae develop during the late wet season and dry season.

Breeding status

This species is resident in the study region.

Conservation status

DD. The species *Synemon* sp. 'Kimberley' is currently known from only two locations in the study region (AOO is likely to be < 2,000 sq km, with spatial buffering of records providing a first approximation of 1,400 sq km). Although both sites are located within conservation reserves (Balangarra and Uunguu IPAs), further investigations are required to clarify the ecological requirements, critical habitat, distribution and conservation status of this species.



Golden-flash Sun-moth

Synemon wulwulam Angel, 1951



Plate 187 Pine Creek, NT
Photo: M. F. Braby



Plate 188 Mt Burrell, NT
Photo: M. F. Braby

Distribution

This species occurs widely in the study region, extending from the Kimberley through the Top End and Northern Deserts to the western Gulf Country. In the Kimberley, it has been recorded from Derby, the Mitchell Plateau, Kununurra and the Lake Argyle area (Williams et al. 2016), WA. In the Northern Territory, it extends from the higher rainfall areas of the Top End, reaching its northernmost limit at Adelaide River (Angel 1951), to drier inland areas of the semi-arid zone (< 400 mm mean annual rainfall), where it occurs as far south as the Barkly Tableland (Barkly Homestead Roadhouse and 22 km east–north-east of Soudan Homestead) (E. D. Edwards and M. Mathews). It generally occurs in lower rainfall areas (< 1,400 mm) than *Synemon phaeoptila*, although the ranges of the two species overlap in the area between Adelaide River, Katherine and the Victoria River District, NT. The larval food plants are more widespread than the known geographic range; thus, further field surveys are required to determine whether *S. wulwulam* is present in the southern Kimberley and Northern Deserts (Tanami Desert). Outside the study region, *S. wulwulam* occurs in western Queensland, reaching its easternmost limit at Cloncurry just outside the boundary of the study region.

Habitat

Synemon wulwulam breeds in savannah woodland, favouring open grassy areas, where the larval food plants grow as perennial grasses (Braby 2015e; Williams et al. 2016).

Larval food plants

Chrysopogon setifolius, *Sorghum plumosum* (Poaceae).

Seasonality

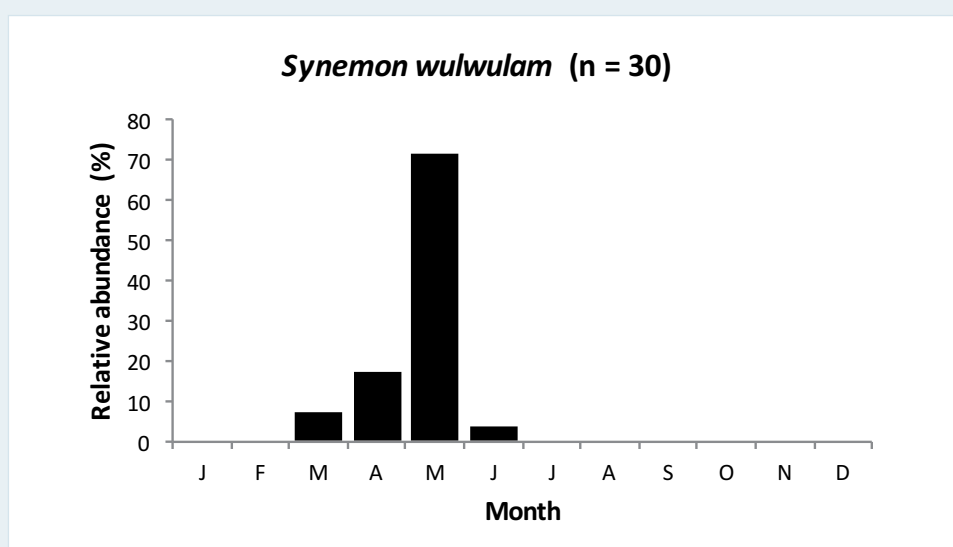
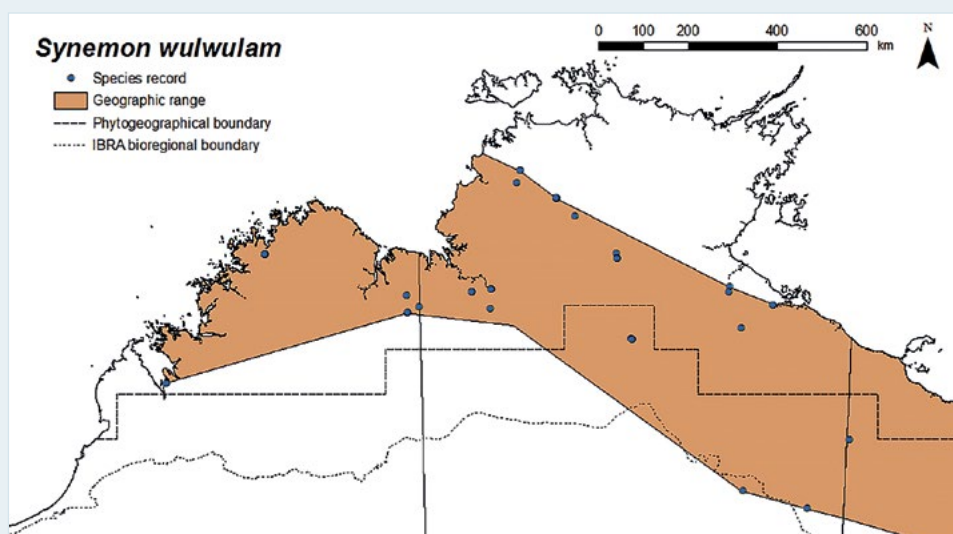
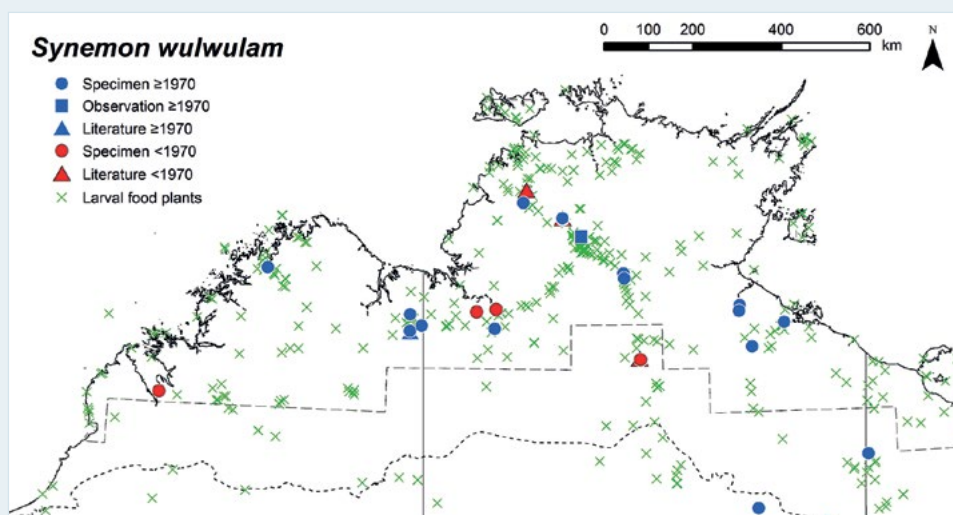
Adults are seasonal, occurring only during the early dry season (March–June), after the flight season of *Synemon phaeoptila*. They are most abundant in May. The immature stages (eggs and a fresh pupal shell) have also been recorded in May. The larvae are believed to feed underground on the thick rhizome of the food plants. Presumably, one generation is completed annually and the larvae develop during the late dry season and wet season.

Breeding status

This species is resident in the study region.

Conservation status

LC.



Month	J	F	M	A	M	J	J	A	S	O	N	D
Egg												
Larva												
Pupa												
Adult												

Month	J	F	M	A	M	J	J	A	S	O	N	D
Egg												
Larva												
Pupa												
Adult												

White-veined Sun-moth

Synemon sp. 'Roper River'



Plate 189 Nathan River, Limmen National Park, NT
Photo: M. F. Braby



Plate 190 Nathan River, Limmen National Park, NT
Photo: M. F. Braby

Distribution

This undescribed species is endemic to the study region. It is restricted mainly to the western Gulf Country, where it occurs in the lower rainfall areas (< 800 mm mean annual rainfall). There is also an isolated record further west in the southern Kimberley (16 km south-east of Halls Creek, WA) based on a historical specimen collected in 1944 (in WADA) (Williams et al. 2016). It extends as far south as the Barkly Tableland (Ranken Road 1 km north of the Barkly Highway, NT) in the semi-arid zone (< 400 mm). Its northernmost limit is Roper River (N. B. Tindale) and the easternmost limit is 15 km west of Musselbrook Resource Centre (G. Daniels and M. A. Schneider), NT. The larval food plants are considerably more widespread than the known geographic range; thus, further field surveys are required to determine whether *Synemon* sp. 'Roper River' is more widespread in the southern Kimberley and Northern Deserts, particularly in the intervening area between Halls Creek and the NT–Qld border.

Habitat

Synemon sp. 'Roper River' breeds in savannah woodland, favouring flat open grassy areas where the larval food plants grow as perennial grasses (Braby 2011a; Williams et al. 2016). Although the geographic range falls within that of *Synemon wulwulam* and although it has a similar flight period to that species, the two species are rarely found together.

Larval food plants

Chrysopogon fallax, *C. pallidus* (Poaceae).

Seasonality

Adults are seasonal, occurring only in the early dry season (May). The immature stages (fresh pupal shells) have also been recorded in May. The larvae are believed to feed underground on the thick rhizome of the food plants. Presumably, one generation is completed annually and the larvae develop during the late dry season and wet season.

Northern Forester Moth

Pollanisia sp. 7



Plate 191 Darwin, NT
Photo: M. F. Braby

Habitat

The breeding habitat of *Pollanisia* sp. 7 has not been recorded. The putative larval food plant grows as a pioneer shrub or small tree up to 6 m high along the edges of wet and dry monsoon forests.

Larval food plants

Not recorded in the study region; possibly *Pipturus argenteus* (Urticaceae), which is a food plant for the closely related *Pollanisia eumetopus* Turner, 1926 in north-eastern Queensland (Tarmann 2004; Mollet and Tarmann 2010).

Seasonality

The seasonal abundance and breeding phenology of this species are not known.

Breeding status

This species is assumed to be resident in the study region.

Conservation status

DD. *Pollanisia* sp. 7 has not been recorded for more than 110 years since it was first discovered in 1908. Targeted field surveys to clarify the distribution and status of this species should be a high priority.

Distribution

This undescribed species is endemic to the study region, where it is known from only a single specimen collected from Darwin, NT, in 1908 by F. P. Dodd (Tarmann 2004). The putative larval food plant (*Pipturus argenteus*) occurs mainly in the higher rainfall areas (> 1,000 mm mean annual rainfall) in the eastern half of the Top End. Further field surveys are required to determine whether *Pollanisia* sp. 7 is still extant in the Darwin region (e.g. Black Jungle) or occurs elsewhere in the Top End.

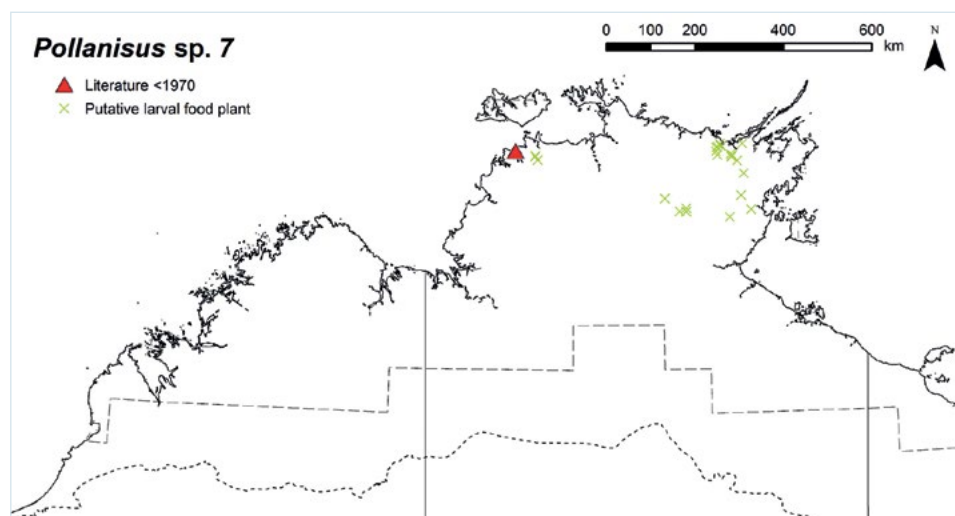




Photo: Western Lost City, Limmen National Park, NT, M.F. Braby

Yellow Forester Moth

Hestiochora xanthocoma Meyrick, 1886

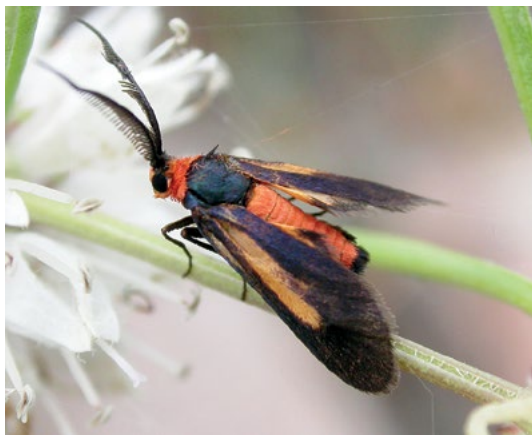


Plate 192 Wongalara Wildlife Sanctuary, NT
Photo: M. F. Braby

Distribution

This species occurs in the northern and eastern Kimberley and Top End of the study region. It occurs mainly in higher rainfall areas, although it has been recorded in drier areas (c. 800 mm mean annual rainfall). It has been recorded from several widely dispersed localities, including Jack Creek Bay and Palm Island, WA, in the northern Kimberley (J. E. & A. Koeyers); and Keep River National Park (Jarrnarm), Darwin, Howard Springs, Katherine (Tarmann 2004), East Alligator River in Kakadu National Park (A. Kallies), Wongalara Wildlife Sanctuary (Braby 2012a) and further east on Groote Eylandt (Tarmann 2004), NT. Further field surveys are required to determine whether *H. xanthocoma* occurs on the Tiwi Islands and in northern and north-eastern Arnhem Land of the Top End. Outside the study region, *H. xanthocoma* occurs in northern and south-eastern Queensland.

Habitat

The breeding habitat of *H. xanthocoma* has not been recorded in the study region. Most locations at which adults have been collected comprise woodland on sandstone or sandy soil. At Wongalara Wildlife Sanctuary, NT, several adults were observed on a hill supporting low open woodland with a spinifex understorey on sandstone; they were feeding locally on flowers growing in the ground layer (Braby 2012a).

Larval food plants

Not recorded in the study region.

Seasonality

The seasonal abundance and breeding phenology of this species are not well understood. Adults have been recorded mainly in the late wet season and early dry season (March–June), as well as in the late dry season (October), but there are too few records ($n = 10$) to assess any seasonal changes in abundance. The seasonal history of the immature stages is not known.

Breeding status

This species is resident in the study region.

Conservation status

LC.

Orange-banded Velvet Moth

Birithana cleis (R. Felder & Rogenhofer, 1875)



Plate 193 Leanyer, Darwin, NT
Photo: M. F. Braby



Plate 194 Leanyer, Darwin, NT
Photo: M. F. Braby

Distribution

This species has a disjunct distribution, occurring in the northern Kimberley and more widely in the Top End, where it occurs in the higher rainfall areas (> 900 mm mean annual rainfall). The southern limits of its range include Mitchell Falls National Park (Mertens Creek), WA (E. P. Williams); and Fish River Station (6 km south-east of Fish River homestead) (Braby and Kessner 2012) and Wongalara Wildlife Sanctuary (Wongalara homestead) (Braby 2012a), NT. The geographic range falls within the spatial distribution of its larval food plants, which occur very widely throughout the study region. Further surveys are thus required to determine more precisely the southern limits of *B. cleis* and whether it is present on the Tiwi Islands and Groote Eylandt, NT. Outside the study region, *B. cleis* occurs in Ambon and north-eastern Australia.

Habitat

Birithana cleis breeds in savannah woodland and riparian open forest where the larval food plants grow as mistletoes (parasitic shrubs) on various trees, including *Eucalyptus*, *Planchonia*, *Alstonia*, *Erythrophleum* and *Grevillea* (Anderson and Braby 2009; Braby 2011a, 2015e). It also breeds in suburban parks and gardens.

Larval food plants

Amyema sanguinea, *Decaisnina signata*, *Dendrophthoe glabrescens*, *Dendrophthoe odontocalyx* (Loranthaceae).

Seasonality

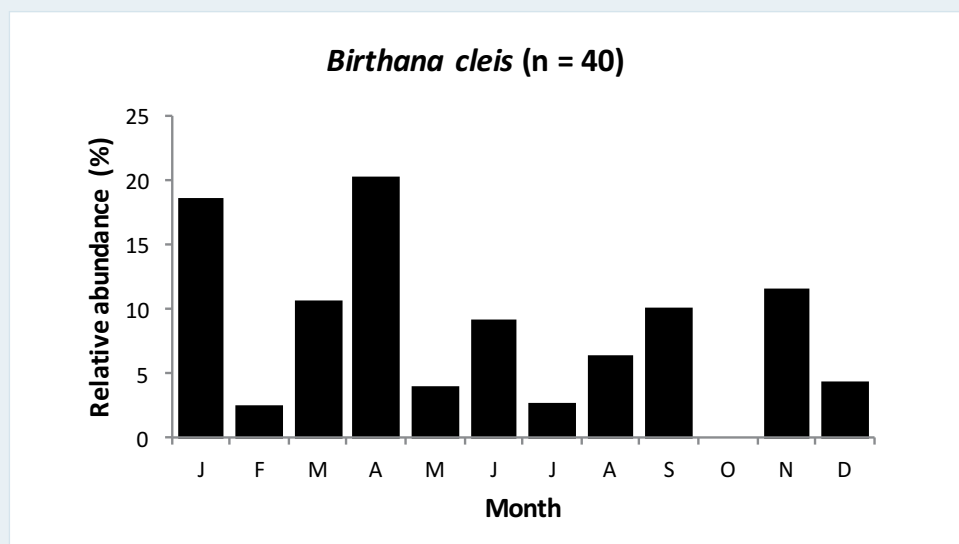
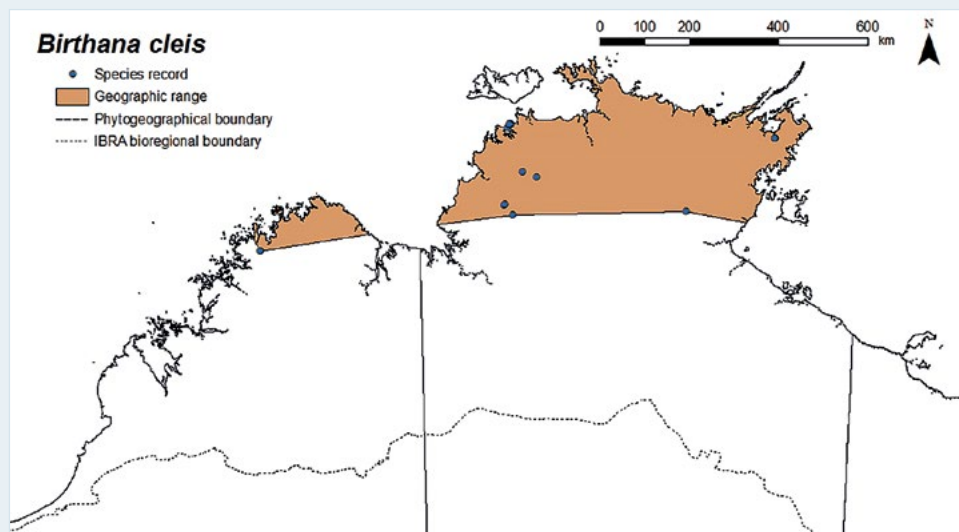
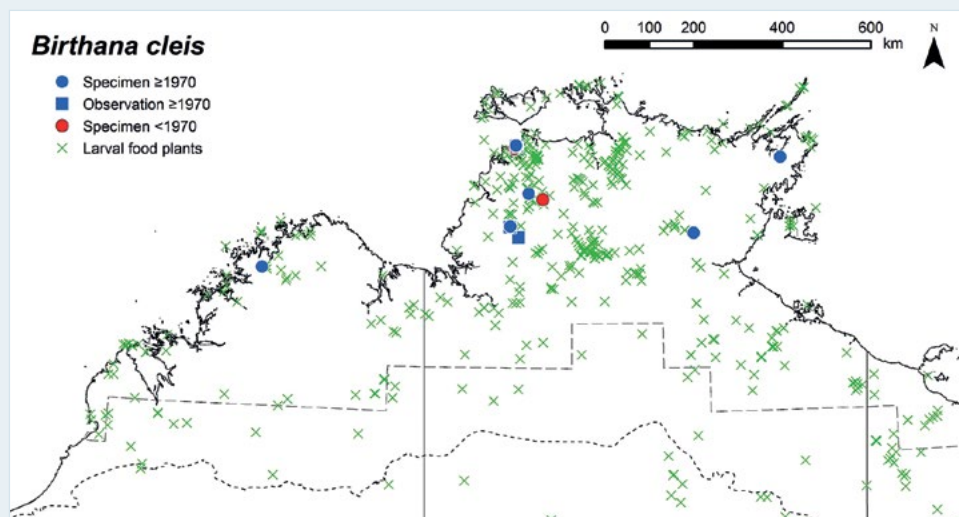
Adults occur during most months of the year. In general, adults tend to be more numerous during the wet season (January and March–April), but they may be locally common at other times of the year depending on the synchronous development of the immature stages, of which the larvae feed gregariously on the foliage of their mistletoe food plants. The immature stages have been recorded during all months of the year, indicating that breeding occurs continuously and several generations are completed annually.

Breeding status

This species is resident in the study region.

Conservation status

LC.



Month	J	F	M	A	M	J	J	A	S	O	N	D
Egg												
Larva												
Pupa												
Adult												

Flame Geometer Moth

Ctimene sp. 'Top End'



Plate 195 Mosquito Creek, Gove Peninsula, NT
Photo: M. F. Braby



Plate 196 Riyala, Elizabeth Valley, NT
Photo: Ian Morris

Distribution

This undescribed species is endemic to the study region. It is restricted to the north of the Northern Territory, where it occurs in the higher rainfall areas (> 1,200 mm mean annual rainfall) of the Top End.

Habitat

The breeding habitat of *Ctimene* sp. 'Top End' has not been recorded in the study region. Adults have been recorded only in semi-deciduous monsoon vine thicket and riparian evergreen monsoon vine forest in which they no doubt breed. The species also occurs in the suburbs and rural areas of Darwin, NT, where suitable patches of monsoon forest habitat persists.

Larval food plants

Not recorded in the study region.

Seasonality

The seasonal abundance and breeding phenology of this species are not well understood. Adults have been recorded during most months of the year, but there are too few records ($n = 14$) to assess any seasonal changes in abundance. In general, adults tend to be more numerous during the mid dry season (July–September). The seasonal history of the immature stages is not known.

Breeding status

This species is resident in the study region.

Conservation status

LC. Although the species *Ctimene* sp. 'Top End' has a restricted range, there are no known threats facing the taxon.

Six O'clock Moth

Dysphania numana (Cramer, 1779)



Plate 197 Marrara, Darwin, NT
Photo: M. F. Braby

Distribution

This species occurs in the northern Kimberley and in the Top End of the study region. It generally occurs in the higher rainfall areas (> 900 mm mean annual rainfall). It has been recorded as far south as the Prince Regent Nature Reserve (Youwanjela Creek and Roe River), WA (L. Scott-Virtue and S. Black); and the Bradshaw Field Training Area (Fitzmaurice River catchment) (Archibald and Braby 2017) and Ngukurr (S. Normand), NT. Its geographical range corresponds well with the spatial distribution of its larval food plant, although the food plant extends slightly further inland into lower rainfall areas. Outside the study region, *D. numana* occurs from Maluku, Tanimbar and the Kai and Aru islands, through mainland New Guinea and adjacent islands and north-eastern Australia to the Bismarck Archipelago, Bougainville and the Solomon Islands.

The taxonomic status of *Dysphania numana* in northern Australia requires closer scrutiny. The adults and immature stages (larvae) are phenotypically distinct from populations elsewhere in the range, and it is likely more than one species is involved in the complex, with the population in the Kimberley and Top End probably comprising a separate species (Prout 1921–34).

Habitat

Dysphania numana breeds in a variety of wet and dry monsoon forests where the larval food plant grows as a small to medium-sized evergreen tree. Typical habitats include semi-deciduous monsoon vine thicket on coastal lateritic cliffs and in drier inland rocky sandstone escarpments and gullies, evergreen monsoon vine forest associated with permanent freshwater streams and perennial springs, mixed riparian monsoon forest–woodland along creeks and mixed tall paperbark swampland with rainforest elements in the understorey. Adults regularly disperse into savannah woodland, but they rarely breed in this habitat.

Larval food plant

Carallia brachiata (Rhizophoraceae).

Seasonality

Adults occur throughout the year. They appear to show little seasonal variation in abundance, although they tend to be more numerous during the early to mid dry season (May–August), but they may also be common during the late wet season. The immature stages have been recorded during most months of the year except during the ‘build-up’ (October and November); they may be numerous during the mid to late wet season and early dry season (January–June), when the food plant produces new leaf growth. The species breeds continuously throughout the year and several generations are completed annually.

Breeding status

This species is resident in the study region.

Conservation status

LC.

Zodiac Moth

Alcides metaurus (Hopffer, 1856)



Plate 198 Mackay, Qld
Photo: M. F. Braby

Distribution

This species is known only from the Top End of the study region. It has been recorded at two locations in eastern Arnhem Land, NT: Elcho Island (Galiwinku) in the Wessel Islands, based on several observations and photographs during the 'build-up' between 1971 and 1976 by I. Morris; and at Nhulunbuy (Drimmie Head) on Gove Peninsula, based on a specimen collected in October 2006 by L. Wilson (Braby 2014a). Outside the study region, *A. metaurus* occurs in northern and north-eastern Queensland.

Habitat

The breeding habitat of *A. metaurus* has not been recorded in the study region.

Larval food plants

Not recorded in the study region; possibly *Endospermum myrmecophilum* (Euphorbiaceae). In north-eastern Queensland, the food plants include *Omphalea* spp. and *Endospermum* spp., all of which are tropical rainforest vines or tall trees (Coleman and Monteith 1981; Monteith and Wood 1987; Harrison 2010; Moss 2010). None of these species occurs on Gove Peninsula or the Wessel Islands, NT, and only one (*E. myrmecophilum*) occurs in the Northern Territory, where it is restricted to the Tiwi Islands and north-western corner of the Top End.

Seasonality

The seasonal abundance and breeding phenology of this species are not well understood. Adults have been recorded only during the late dry season (October and November). In Queensland, the species is well known for its overwintering aggregations and migratory flights (Smithers and Peters 1977; Coleman and Monteith 1981).

Breeding status

Alcides metaurus does not appear to have become permanently established in the study region. It is likely the records from north-eastern Arnhem Land represent vagrants that dispersed from northern Queensland across the Gulf of Carpentaria to the Northern Territory associated with large-scale migration of adults following the breakup of their winter dry season aggregations.

Conservation status

NA.

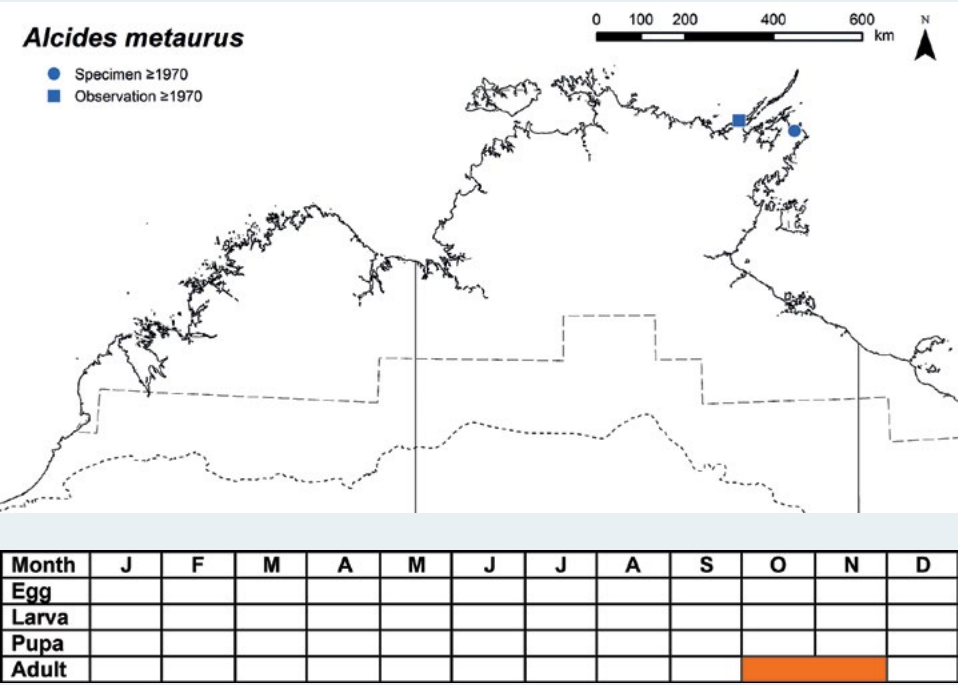


Photo: NE Arnhem Land, NT, M.F. Braby



Photo: Daguragu, NT, M.F. Braby

Galaxy Day-moth

Genus 1 sp. 'Sandstone'



Plate 200 Kakadu National Park, NT
Photo: M. F. Braby

Distribution

This undescribed species, which has not yet been assigned to a genus according to material curated in the ANIC, has a very wide but sporadic distribution within the study region. It occurs in both high and low rainfall areas (600–1,500 mm mean annual rainfall), extending from moist coastal areas to the semi-arid zone. It has been recorded as far south-west as Broome, WA (M. S. Moulds); as far north as the Arnhem Land Plateau, NT (15 km south-west by south of Nimbuwah Rock) (E. D. Edwards and M. S. Upton); and as far south-east as Boodjamulla/Lawn Hill National Park, Qld (Amphitheatre Springs 27 km north of Musselbrook Camp) (E. D. Edwards). Further field surveys are required to determine whether Genus 1 sp. 'Sandstone' is more widely distributed than available records indicate, particularly in the Kimberley and the Limmen Bight area in the Gulf of Carpentaria. Outside the study region, Genus 1 sp. 'Sandstone' occurs in northern Queensland.

Habitat

The breeding habitat of Genus 1 sp. 'Sandstone' has not been recorded. All specimens have been collected in eucalypt heathy woodland associated with sandstone breakaways, escarpments and rocky outcrops, in which they no doubt breed.

Larval food plants

Not recorded in the study region.

Seasonality

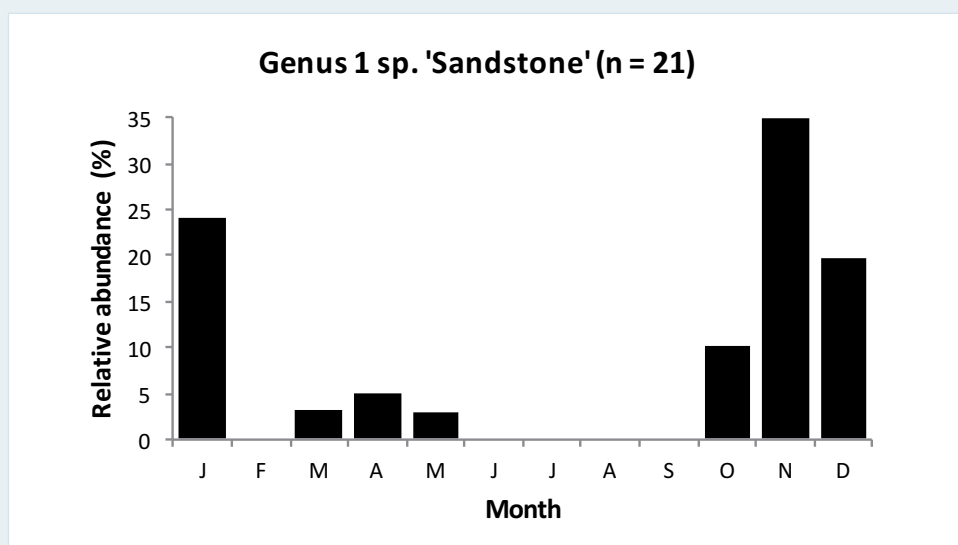
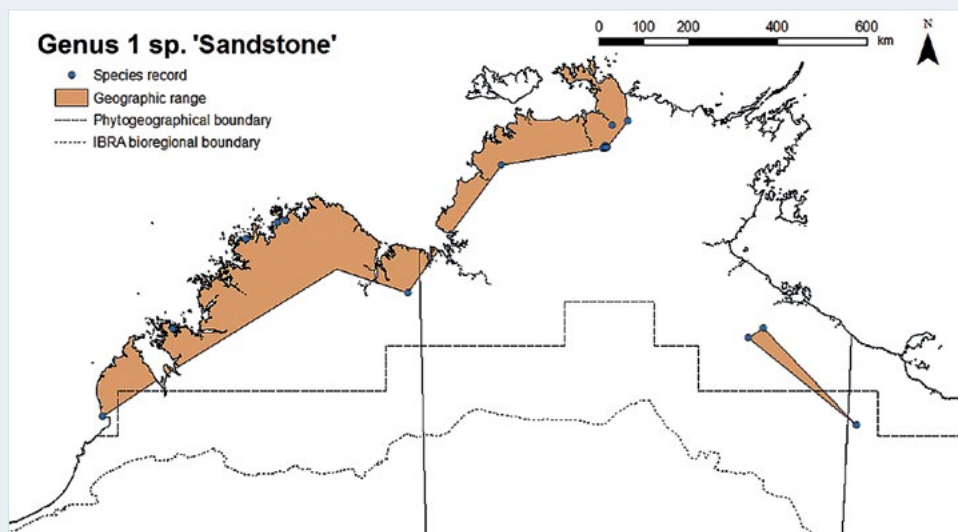
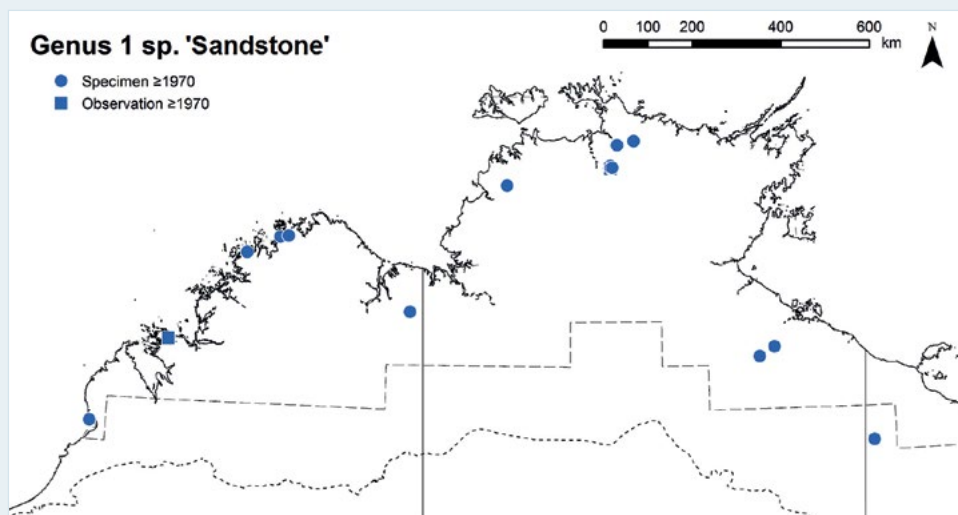
Adults are seasonal, occurring mainly during the warmer months of high humidity and high temperatures (October–May), with a peak in abundance during the early wet season (November–January), depending on the timing of the pre-monsoon storms. The breeding phenology and seasonal history of the immature stages have not been recorded, but it is possible there is only a single generation annually, followed by a partial second generation in the late wet season. Presumably, the species survives the dry season in pupal diapause.

Breeding status

This species is resident in the study region.

Conservation status

LC.



Pale Banded Day-moth

Leucogonia cosmopsis (Lower, 1897)



Plate 201 Dundee Beach, NT
Photo: M. F. Braby



Plate 202 Black Point, Cobourg Peninsula, NT
Photo: M. F. Braby

Distribution

This species occurs in the northern and eastern Kimberley and western half of the Top End of the study region. It occurs mainly in higher rainfall areas, although it has been recorded in drier areas (c. 800 mm mean annual rainfall) at Keep River National Park, NT (Cockatoo Creek) (G. Cocking, Y. N. Su and A. Zwick). Further field surveys are required to determine whether *L. cosmopsis* occurs in the eastern half of the Top End. Outside the study region, *L. cosmopsis* occurs in northern Queensland.

Habitat

The breeding habitat of *L. cosmopsis* has not been recorded in the study region. Adults have been collected mostly at night by light traps set in savannah woodland and semi-deciduous monsoon vine thicket.

Larval food plants

Not recorded in the study region.

Seasonality

Adults are seasonal, occurring mainly during the wet season (November–March), but there are too few records ($n = 19$) to assess temporal changes in abundance. In general, adults tend to be more numerous during the early wet season (December and January). The breeding phenology and seasonal history of the immature stages have not been recorded, but it is possible there is only a single generation annually, followed by a partial second generation. Presumably, the species survives the dry season in pupal diapause.

Breeding status

This species is resident in the study region.

Conservation status

LC.

Laced Day-moth

Ipanica cornigera (Butler, 1886)



Plate 203 Black Point, Cobourg Peninsula, NT
Photo: M. F. Braby



Plate 204 Black Point, Cobourg Peninsula, NT
Photo: M. F. Braby

Distribution

This species occurs in the eastern Kimberley, the Top End, Northern Deserts and western Gulf Country of the study region. It extends very widely from moist coastal areas to drier inland areas of the semi-arid zone (< 400 mm mean annual rainfall), where it has been recorded as far south as Three Ways Roadhouse 25 km north of Tennant Creek, NT (M. S. Upton). It also occurs in the arid zone of central Australia beyond the southern boundary of the study region. Further field surveys are required to determine whether *I. cornigera* occurs more widely in the Kimberley, eastern Arnhem Land and western Queensland in the Gulf Country. Outside the study region, *I. cornigera* occurs from Indonesia, through mainland New Guinea to central, north-eastern and eastern Australia.

Habitat

The breeding habitat of *I. cornigera* has not been recorded in the study region. Adults have been collected mostly at night by light traps set in savannah woodland and semi-deciduous monsoon vine thicket, often in disturbed areas.

Larval food plants

Not recorded in the study region.

Seasonality

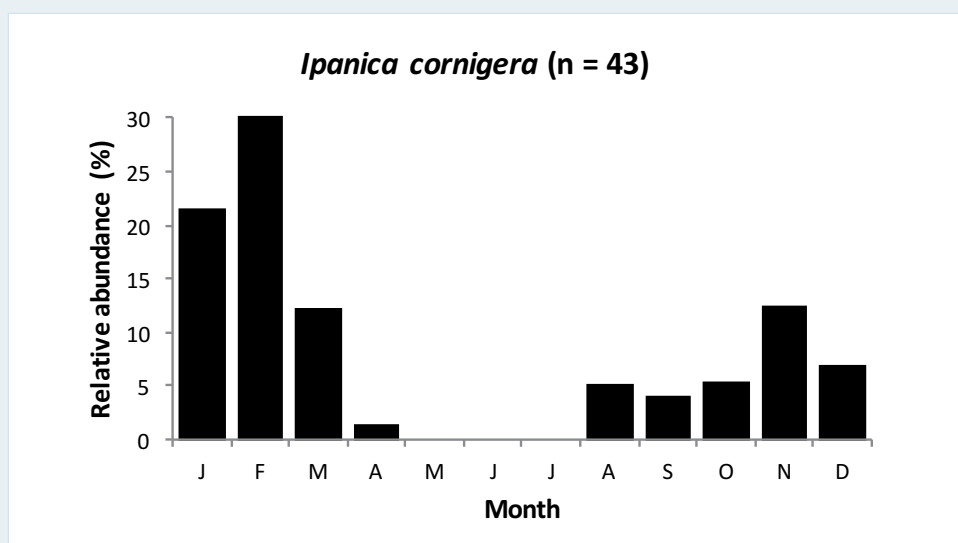
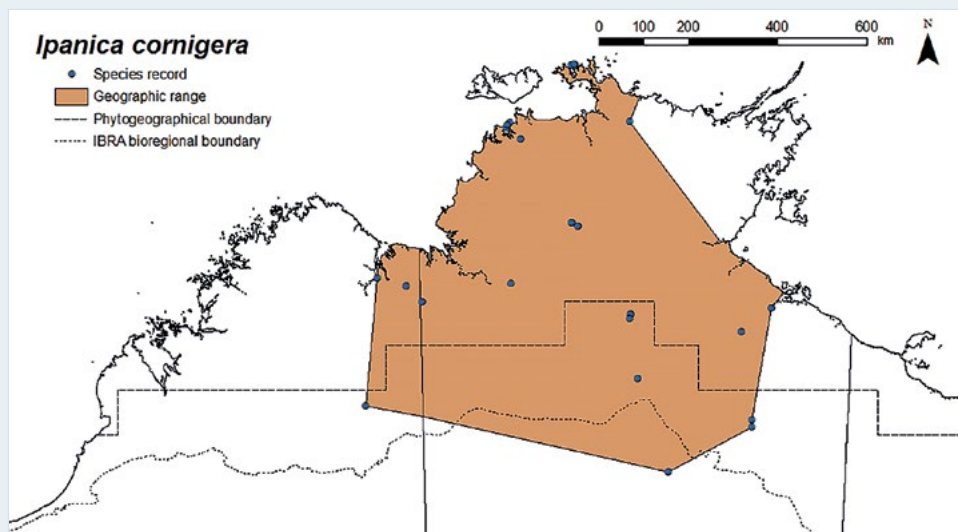
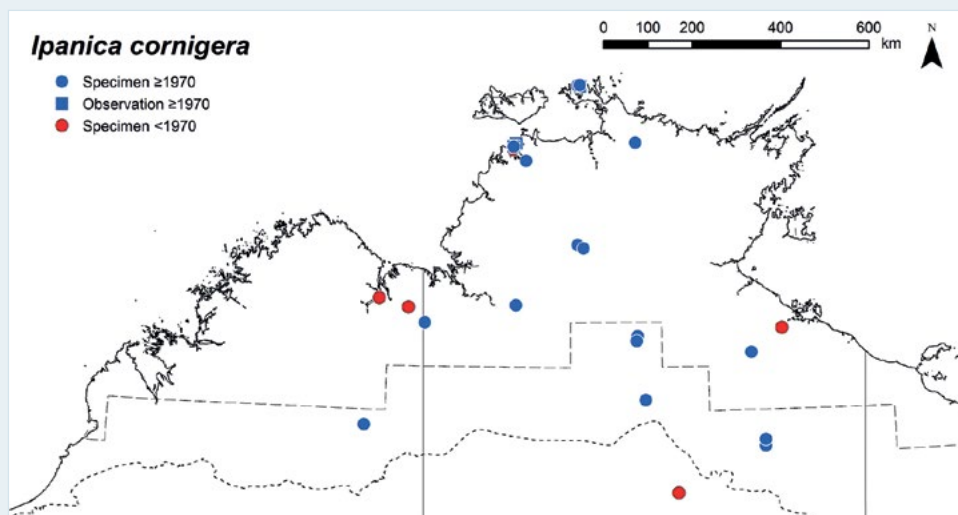
Adults are seasonal, occurring during the late dry season and wet season (August–April), but they are most abundant during the mid wet season (January and February) following the first monsoon rains. The breeding phenology and seasonal history of the immature stages have not been recorded, but it is possible there are only one or two generations annually. Presumably, the species survives the dry season in pupal diapause.

Breeding status

This species is resident in the study region.

Conservation status

LC.

[illegible]

Orange-banded Day-moth

Periopta diversa (Walker, [1865])

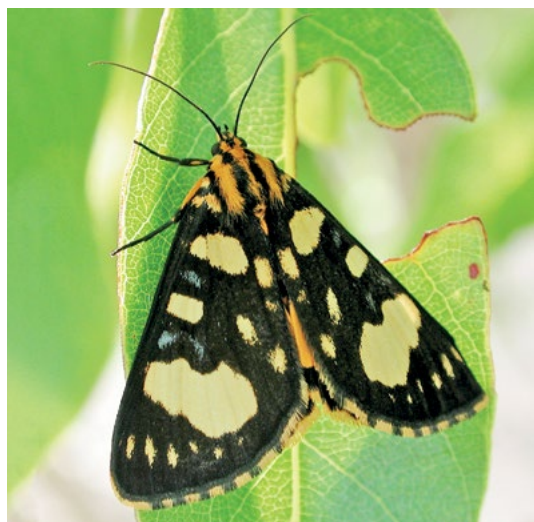


Plate 205 Leanyer, Darwin, NT
Photo: M. F. Braby

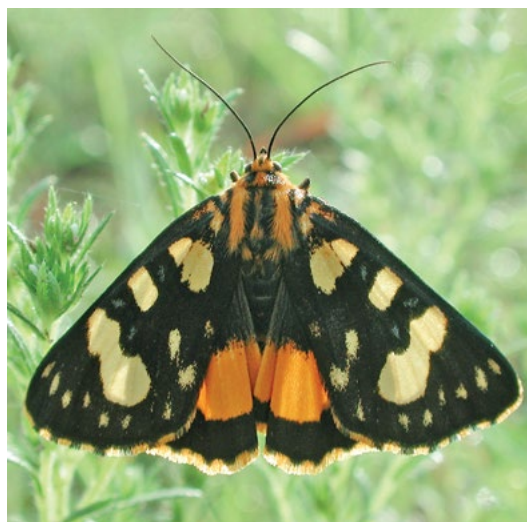


Plate 206 Leanyer, Darwin, NT
Photo: M. F. Braby

Distribution

This species occurs in the northern and eastern Kimberley, the Top End, Northern Deserts and western Gulf Country of the study region. It extends widely from moist coastal areas to drier inland areas of the semi-arid zone (< 500 mm mean annual rainfall), where it has been recorded as far south as the Barkly Tableland, NT (c. 140 km north of Barkly Homestead Roadhouse) (M. S. Moulds). The geographic range falls within the spatial distribution of the known and putative larval food plants (*Spermacoce* spp.), which occur very widely throughout the study region. Further field surveys are thus required to determine whether *P. diversa* occurs more widely in the southern Kimberley, the eastern half of the Top End and western Queensland in the Gulf Country. Outside the study region, *P. diversa* occurs in north-eastern Queensland.

Habitat

Periopta diversa breeds in grassland and open woodland, favouring open disturbed areas of bare ground where the larval food plants grow as pioneer annual herbs (Braby 2011a, 2015e).

Larval food plants

Spermacoce phalloides (Rubiaceae); also **Spermacoce articularis*, **Oldenlandia corymbosa* (Rubiaceae); probably other *Spermacoce* spp.

Seasonality

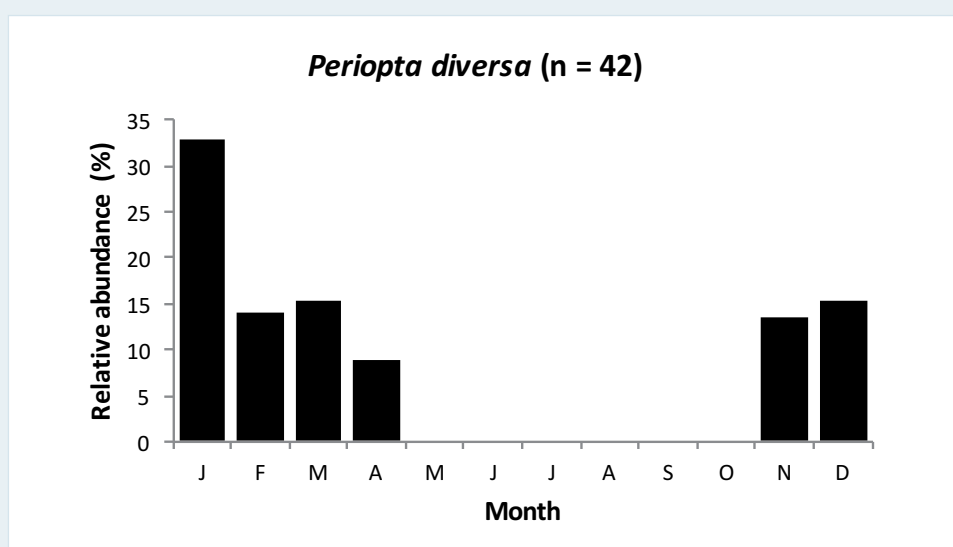
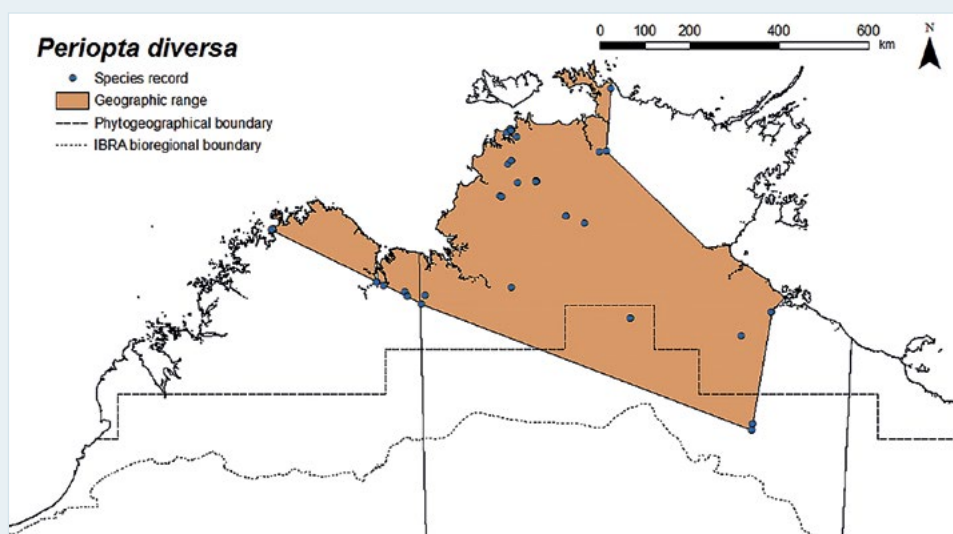
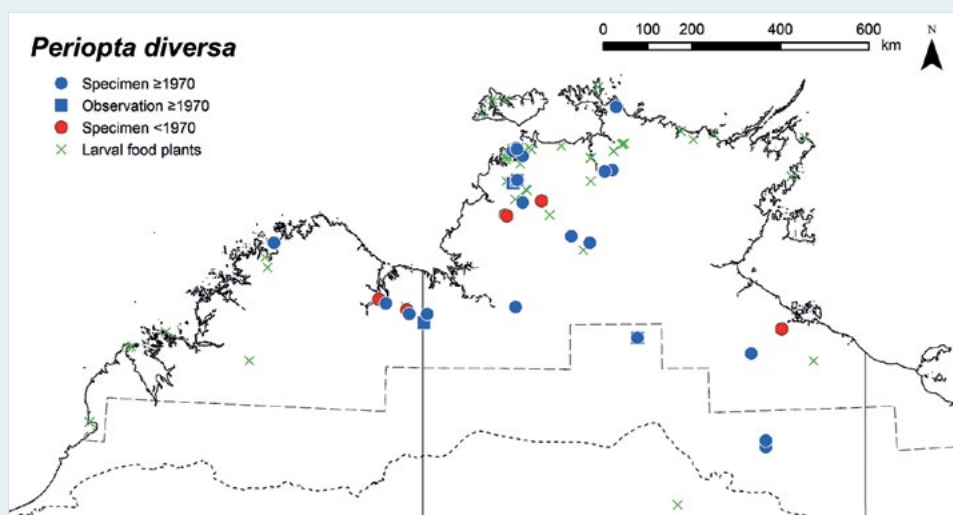
Adults are seasonal, occurring only during the wet season (November–April), with a peak in abundance in December and January. The start of the flight season is triggered by the first substantial pre-monsoon storms, but the timing of adult emergence varies from year to year, depending on when the wet season commences. The immature stages (eggs or larvae) have been recorded only from December to February. The larvae feed on the foliage of their food plants, which are short-lived annuals, and it is likely only one or two generations are completed during the flight season, depending on the duration of the wet season. Presumably, the species, like *Periopta ardescens* and other agaristines, survives the dry season in pupal diapause.

Breeding status

This species is resident in the study region.

Conservation status

LC.



Month	J	F	M	A	M	J	J	A	S	O	N	D
Egg												
Larva												
Pupa												
Adult												

Chestnut Day-moth

Periopta ardescens (Butler, 1884)



Plate 207 Timber Creek, NT
Photo: M. F. Braby



Plate 208 Dundee Beach, NT
Photo: M. F. Braby

Distribution

This species occurs in the northern and eastern Kimberley and the western half of the Top End of the study region. It occurs mainly in the higher rainfall areas, although it has been recorded in drier inland areas (c. 800 mm mean annual rainfall), where it has been collected as far south as Kununurra, WA (M. S. Moulds and B. J. Moulds); and 11 km south-south-east of Timber Creek, NT. The geographic range falls within the spatial distribution of its larval food plants, which occur more widely in the southern Kimberley, Tiwi Islands, eastern half of the Top End, Groote Eylandt and coastal islands of the western Gulf Country. Further field surveys are thus required to determine whether *P. ardescens* occurs in these areas. Outside the study region, *P. ardescens* occurs in north-eastern Queensland.

Habitat

Periopta ardescens breeds along the edges of semi-deciduous monsoon vine thicket and in savannah woodland where the larval food plants grow either as vines (*Ampelocissus acetosa*) or as shrubs (*A. frutescens*) (Braby 2011a).

Larval food plants

Ampelocissus acetosa, *A. frutescens* (Vitaceae).

Seasonality

Adults are seasonal, occurring only during the early to mid wet season (October–February), with a peak in abundance in December. The immature stages (eggs or larvae) occur mainly in November and December. The larvae feed on the new soft leaf growth of the food plants, which regenerate from underground tubers during the ‘build-up’ following the pre-monsoon storms and/or an increase in humidity. The food plants are short-lived seasonal perennial vines or shrubs and they senesce towards the end of the wet season and early dry season. The duration of the pupal stage is variable and there is probably only a single generation annually. The species survives the dry season in the pupal stage, which may remain in diapause for one to two years (Braby 2011a).

Breeding status

This species is resident in the study region.

Conservation status

LC.

Pearl Day-moth

Radinocera vagata (Walker, 1865)

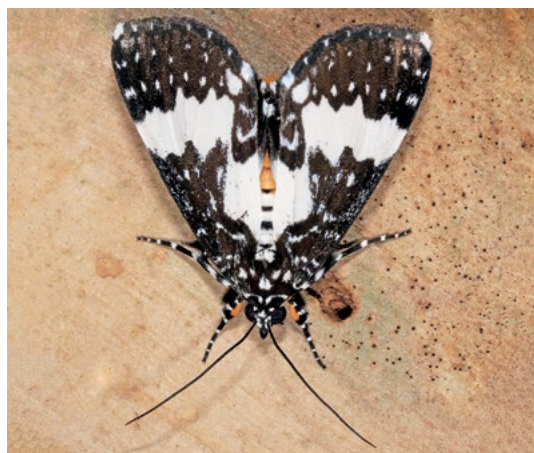


Plate 209 Dundee Beach, NT
Photo: M. F. Braby



Plate 210 Dundee Beach, NT
Photo: M. F. Braby

Distribution

This species occurs in the northern and eastern Kimberley, the Top End, Northern Deserts and western Gulf Country of the study region. It extends from moist coastal areas to drier inland areas of the semi-arid zone (c. 500 mm mean annual rainfall), where it has been recorded as far south as Elliott, NT (I. Archibald). The geographic range falls within the spatial distribution of its larval food plants. The food plants, however, occur more widely in the southern Kimberley, Tiwi Islands, eastern half of the Top End, Groote Eylandt and western Queensland in the Gulf Country; thus, further field surveys are required to determine whether *R. vagata* occurs in these areas. Outside the study region, *R. vagata* occurs from the Lesser Sunda Islands, through mainland New Guinea to north-eastern Queensland.

Habitat

Radinocera vagata breeds mainly in savannah woodland and coastal paperbark woodland or swampland where the larval food plants grow either as vines (*Ampelocissus acetosa*, *Cayratia* spp.) or as shrubs (*A. frutescens*) (Braby 2011a, 2015e). It also breeds along the edges of coastal semi-deciduous monsoon vine thicket.

Larval food plants

Ampelocissus acetosa, *A. frutescens*, *Cayratia trifolia*, *C. maritima* (Vitaceae).

Seasonality

Adults are seasonal, occurring only during the 'build-up' and wet season (October–April), but they are most abundant in November and December following the pre-monsoon storms. The immature stages (larvae) have been recorded from October to March, but they are more prevalent earlier in the wet season (November–January), depending on the timing of rainfall. The larvae feed on the new soft leaf growth of the food plants, which regenerate from underground tubers during the 'build-up' following the pre-monsoon storms and/or an increase in humidity. The food plants are short-lived seasonal perennial vines or shrubs and they senesce towards the end of the wet season and early dry season. The duration of the pupal stage is variable and there is probably only a single generation annually, followed by a partial second generation in the late wet season. The species survives the dry season in the pupal stage, which may remain in diapause for up to 10 months.

Breeding status

This species is resident in the study region.

Conservation status

LC.

Boulder Day-moth

Radinocera sp. 'Sandstone'



Plate 211 Kakadu National Park, NT
Photo: M. F. Braby



Plate 212 Kakadu National Park, NT
Photo: Justin Armstrong

Distribution

This undescribed species is endemic to the study region, its presence detected only as recently as 2009 (Braby 2015e). It has a disjunct distribution and is known from only two locations: Jack Creek Bay, WA, in the northern Kimberley, where a single female was collected in 2016 (J. E. and A. Koeys); and Kakadu National Park, NT (Nourlangie Rock) (Braby 2015e). Although the larval food plant is considerably more widespread in the study region, *Radinocera* sp. 'Sandstone' is confined to areas where the plant grows on sandstone in the higher rainfall areas (> 900 mm mean annual rainfall). Further field surveys are thus required to determine whether it occurs elsewhere in the Kimberley.

Habitat

Radinocera sp. 'Sandstone' breeds in sandstone foot-slope boulders at the base of escarpments where the larval food plant grows as a vine (Braby 2015e).

Larval food plant

Ampelocissus acetosa (Vitaceae).

Seasonality

Adults are seasonal, occurring only during the 'build-up' and early wet season (October–January), but there are too few records ($n = 9$) to assess temporal changes in abundance. In general, adults tend to be more prevalent in November and December, depending on the timing of the pre-monsoon storms. The immature stages (eggs or larvae) have

been recorded only in November and December. The larvae feed on the new soft leaf growth of the food plant, which regenerates from an underground tuber during the 'build-up' following the pre-monsoon storms and/or an increase in humidity. The food plant is a short-lived seasonal perennial vine and it senesces towards the end of the wet season and early dry season. The duration of the pupal stage is variable and there is probably only a single generation annually, followed by a partial second generation in the mid wet season. The species survives the dry season in the pupal stage, which may remain in diapause for up to 12 months.

Breeding status

This species is resident in the study region.

Conservation status

LC. Despite the wide geographical range of the species, available data suggest *Radinocera* sp. 'Sandstone' has a disjunct distribution with a limited AOO. The two known locations both occur in conservation reserves: Unguu IPA and Kakadu National Park. Despite its restricted occurrence, there are no known threats facing the taxon.

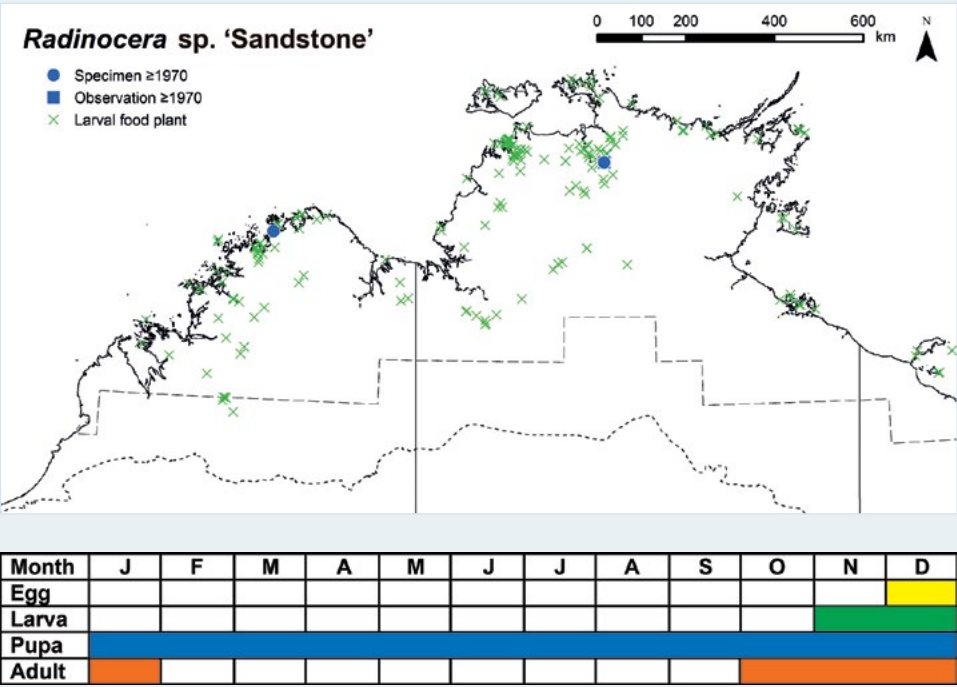


Photo: Nourlangie Rock, Kakadu National Park, NT, M.F. Braby

Speckled Day-moth

Idalima metasticta Hampson, 1910

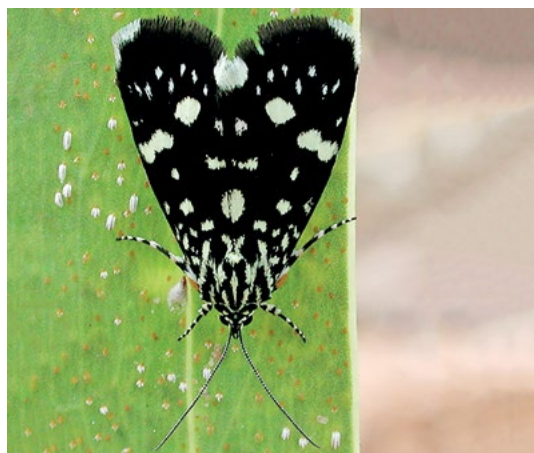


Plate 213 Litchfield National Park, NT
Photo: M. F. Braby

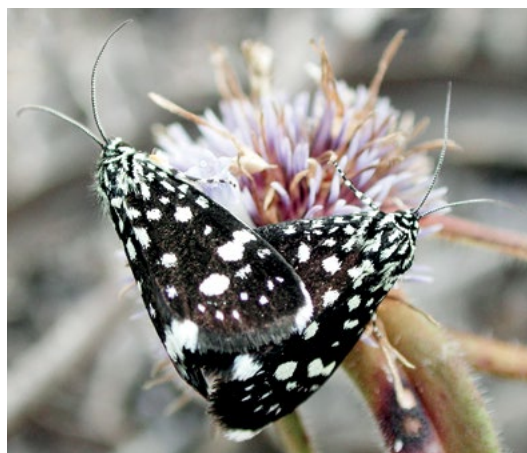


Plate 214 Nhulunbuy, NT
Photo: M. F. Braby

Distribution

This species is endemic to the study region. It is restricted to the Top End, where it occurs mainly in areas that receive more than 800 mm mean annual rainfall. Its southernmost limits include Mataranka Homestead and Birdum near Larrimah, NT. The geographic range corresponds well with the spatial distribution of its larval food plants, indicating that *I. metasticta* has been well sampled in the region.

Habitat

Idalima metasticta breeds in savannah woodland where the larval food plant (*Hibbertia dilatata*) grows as a low perennial shrub on lateritic outcrops and rocky hill slopes. It also breeds in eucalypt heathy woodland where an alternative food plant (*H. juncea*) grows as a low perennial shrub on white coastal sand and relatively flat sandy terrain between sandstone outcrops (Braby 2015e).

Larval food plants

Hibbertia dilatata, *H. juncea* (Dilleniaceae).

Seasonality

Adults occur during most months of the year, but they are most abundant during the early wet season (November and December) following the pre-monsoon storms. However, they may also be locally abundant at other times of the year (e.g. October), depending on the timing of the first significant rainfall events. They are generally very scarce or absent during the dry season (May–September), except on Gove Peninsula, where the dry season is less pronounced and adults may be locally abundant in July. The immature stages (eggs or larvae) have been recorded sporadically from November to June. Freshly emerged females have been observed mating in July and October, indicating that breeding also occurs at these times of the year. The larvae feed on the soft new cladodes and flowers of the food plants. Presumably, several generations are completed annually and the species survives the dry periods in pupal diapause.

Breeding status

This species is resident in the study region.

Conservation status

LC.

Indigo Day-moth

Idalima leonora (Doubleday, 1846)

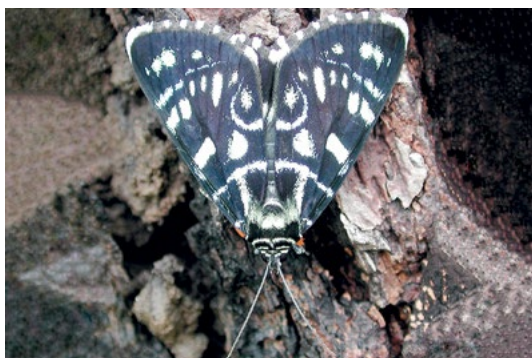


Plate 215 Cobourg Peninsula, NT
Photo: M. F. Braby

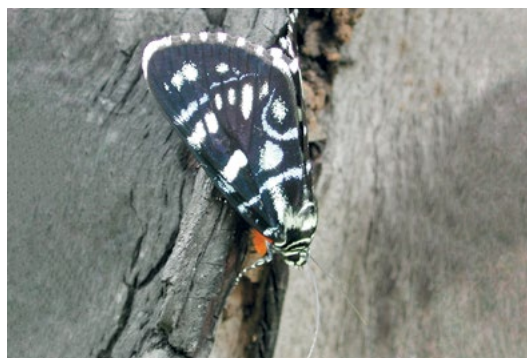


Plate 216 Cobourg Peninsula, NT
Photo: M. F. Braby

Distribution

This species is endemic to the study region. It has a disjunct distribution, occurring in the northern Kimberley (Mitchell Plateau, WA) and in the Top End. It generally occurs in the higher rainfall areas (> 1,300 mm mean annual rainfall), although it has been recorded as far south as Manbullo, NT (c. 900 mm), based on a historical record in the AM in which a specimen was collected in 1916. The geographic range in the Top End corresponds reasonably well with the spatial distribution of its two known larval food plants (*Hibbertia* spp.); however, these plants are absent from the Kimberley, the Darwin area and Litchfield National Park, NT, indicating that several other (as yet unreported) food plants are used in these areas.

The taxonomic status and relationships of *Idalima leonora* require further investigation. Kiriakoff (1977) treated the taxon as a polytypic species, with two allopatric subspecies: *I. leonora leonora* from the Northern Territory and *I. leonora tasso* (Jordan, 1912) from northern Queensland. However, Edwards (1996) treated *I. leonora tasso* as a distinct species, *I. tasso*. The classification of Edwards (1996) is tentatively followed in this work.

Habitat

Idalima leonora breeds in savannah woodland and eucalypt heathy open woodland where the larval food plants grow as perennial shrubs on sandy loam or rocky sandstone outcrops (Braby 2011a). Adults have also been recorded in eucalypt heathy woodland on white coastal sand, where they no doubt breed.

Larval food plants

Hibbertia brownii, *H. candicans* (Dilleniaceae).

Seasonality

Adults occur during most months of the year, but they are most abundant during the early wet season (November–February), depending on the timing of the pre-monsoon storms or monsoon rains. They are generally scarce or absent during the late wet season and dry season. The immature stages (eggs or larvae) have been recorded mainly during the wet season (November–March); however, on Cobourg Peninsula, NT, adults were noted to be locally common in August and females were observed ovipositing on the larval food plant (*Hibbertia brownii*), which was resprouting from rootstock following a dry season burn two months earlier. Presumably, several generations are completed annually and the species normally survives the dry periods in pupal diapause.

Breeding status

This species is resident in the study region.

Conservation status

LC. Although the species *I. leonora* has a wide geographical range, the impact of inappropriate fire regimes—particularly an increase in the frequency of dry season burns in some areas of the range, such as sandstone communities—requires further investigation. Although the larval food plants resprout from rootstock, if the fire regime is too frequent, with short interfire intervals, there may be little or no recruitment. Thus, *I. leonora* may qualify as Near Threatened (NT) in future. Monitoring of the abundance or occupancy of the moth and its food plants is required to clarify the effect of fire frequency as a key threatening process. The fire regime needs to be carefully managed (e.g. an interfire interval of more than five years) to ensure the food plants have sufficient time to mature, flower and set seed.

Splendid Day-moth

Idalima aethrias (Turner, 1908)



Plate 217 Berry Springs, NT
Photo: M. F. Braby



Plate 218 Mt Burrell, NT
Photo: M. F. Braby

Distribution

This species occurs in the north of the Northern Territory of the study region. It is restricted to the higher rainfall areas (> 1,300 mm mean annual rainfall) of the north-western corner of the Top End. It has been recorded as far south as Daly River Mission (J. F. Hutchinson) and Kakadu National Park (near Twin Falls) and as far east as the King River, NT. The geographic range closely corresponds with the spatial distribution of its larval food plants. The food plants, however, also occur slightly further south, at Fish River Station and Katherine Gorge, and extend further east to Gove Peninsula and Groote Eylandt; thus, further field surveys are required to determine whether *I. aethrias* occurs in these areas, particularly in the eastern half of the Top End. Outside the study region, *I. aethrias* occurs in north-eastern Queensland.

Habitat

Idalima aethrias breeds in savannah woodland where the larval food plants grow as small perennial shrubs (Braby 2011a).

Larval food plants

Hibbertia brevipedunculata, *H. cistifolia*
(Dilleniaceae).

Seasonality

Adults are seasonal, occurring during the 'build-up', wet season and early dry season (October–May), but they are most abundant during the early wet season (November and December) following the

first substantial pre-monsoon storms. The immature stages (eggs or larvae) have been recorded during the wet season (November–February). The duration of the pupal stage is variable and there is probably only a single generation annually, followed by a partial second generation in the late wet season. The species survives the dry season in the pupal stage, which may remain in diapause for up to 11 months.

Breeding status

This species is resident in the study region.

Conservation status

LC. The species *I. aethrias* has a restricted range in the study region within which it occurs in several conservation reserves, including Litchfield National Park, Garig Gunak Barlu National Park and Kakadu National Park. However, the impact of inappropriate fire regimes in some areas of the range requires further investigation. Although the larval food plants are currently listed as Least Concern (LC) under the *TPWCA* and resprout from rootstock, if the fire regime is too frequent, with short interfire intervals, there may be little or no recruitment. Thus, *I. aethrias* may qualify as Near Threatened (NT) in future. Monitoring of the abundance or occupancy of the moth and its food plants is required to clarify the effect of fire frequency as a key threatening process. The fire regime needs to be carefully managed (e.g. an interfire interval of more than five years) to ensure the food plants have sufficient time to mature, flower and set seed.

Rock-art Day-moth

Idalima sp. 'Arnhem Land'



Plate 219 Kakadu National Park, NT
Photo: M. F. Braby

Distribution

This undescribed species is endemic to the study region. It occurs in the Top End, where it is restricted to the Arnhem Land Plateau, its presence in the region first detected in 1972. It has been recorded from two locations: 15 km south-west by south of Nimbuwah Rock (E. D. Edwards and M. S. Upton) and Kakadu National Park (Nourlangie Rock), NT (Braby 2015e). The larval food plant occurs throughout the Arnhem Land Plateau, as well as in eastern Arnhem Land; thus, further field surveys are required to determine whether *Idalima* sp. 'Arnhem Land' is more widely distributed in these areas than present records indicate.

Habitat

Idalima sp. 'Arnhem Land' breeds in eucalypt heathy woodland on broken sandstone hill slopes where the larval food plant grows as a perennial shrub in the understorey (Braby 2015e).

Larval food plant

Hibbertia candicans (Dilleniaceae).

Seasonality

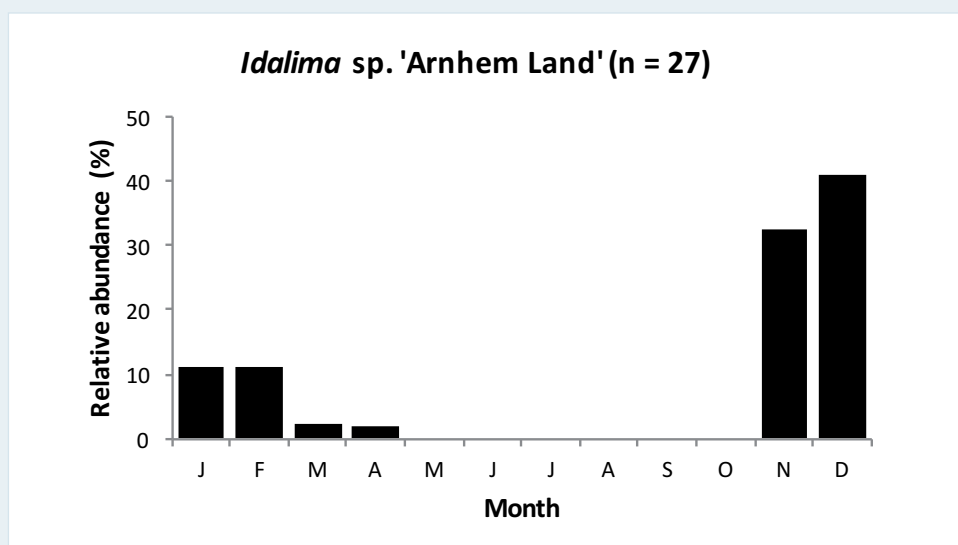
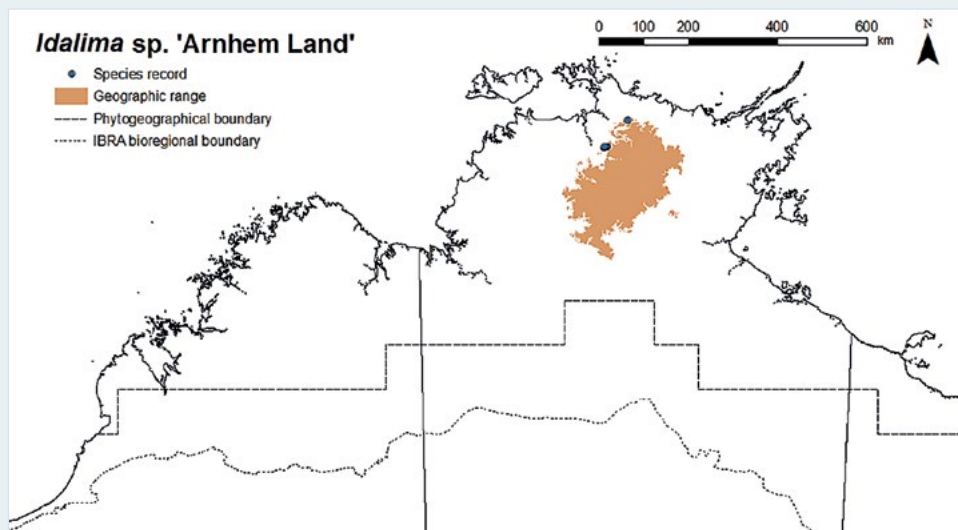
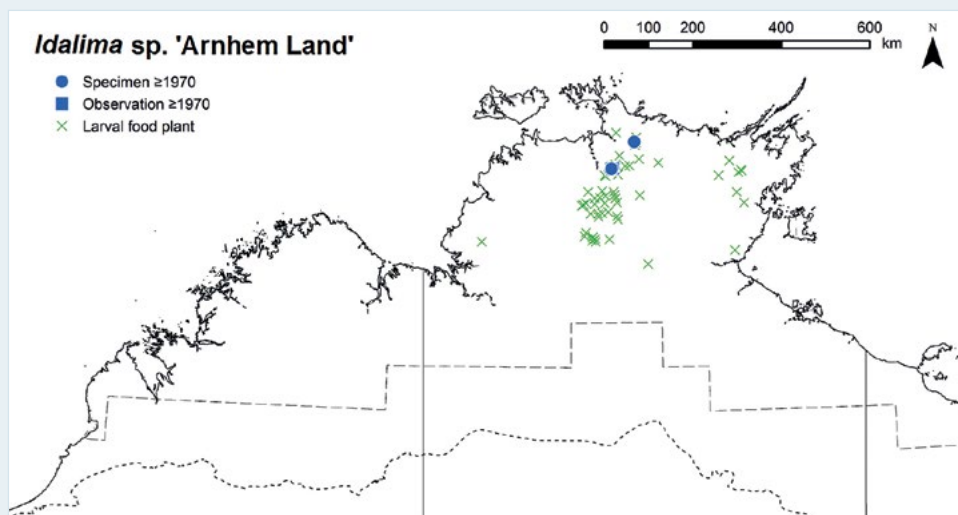
Adults are seasonal, occurring only during the wet season (November–April), but they are most abundant during the early wet season (November–January) following the pre-monsoon storms, although they are never observed in large numbers or high densities. The immature stages (eggs or larvae) have been recorded during the wet season (December–April). There is probably only a single generation annually, followed by a partial second generation in the late wet season. Presumably, the species survives the dry season in pupal diapause.

Breeding status

This species is resident in the study region.

Conservation status

Near Threatened (NT). The species *Idalima* sp. 'Arnhem Land' is a short-range endemic (AOO is likely to be < 2,000 sq km, with spatial buffering of records providing a first approximation of 1,400 sq km), with the entire range occurring within a single conservation reserve (Kakadu National Park). However, it may qualify for a threatened category in the near future because the taxon is threatened by inappropriate fire regimes, particularly too frequent fires (every one–two years) on the Arnhem Land Plateau (see also Russell-Smith et al. 1998, 2002). Although the larval food plant is currently listed as Least Concern (LC) under the *TPWCA* and it resprouts from rootstock, if the fire regime on sandstone plant communities is too frequent, with short interfire intervals, there may be little or no recruitment. That is, the population of *Idalima* sp. 'Arnhem Land' is likely to be reduced in future based on a projected decline in the AOO, quality of its habitat and/or number of locations (criteria A3c, D2). Monitoring of the abundance and occupancy of the moth and its food plant is required for this species. The fire regime on the sandstone plateau–breakaway country needs to be carefully managed (e.g. an interfire interval of more than five years) to ensure the food plant has sufficient time to mature, flower and set seed.

[illegible]

Kakadu Whistling Moth

Hecatesia sp. 'Arnhem Land'

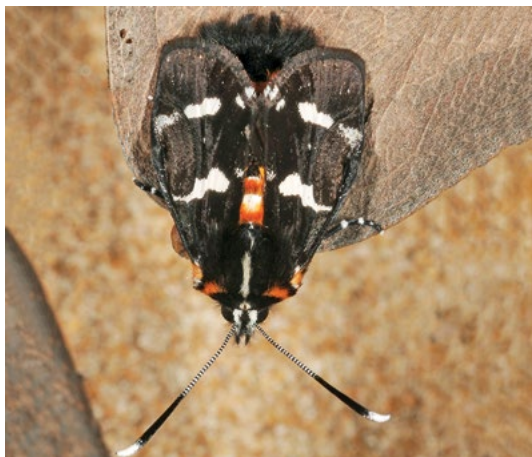


Plate 220 Kakadu National Park, NT
Photo: M. F. Braby



Plate 221 Kakadu National Park, NT
Photo: M. F. Braby

Distribution

This undescribed species is endemic to the study region. It occurs in the Top End, where it is restricted to the Arnhem Land Plateau, its presence in the region first detected in 1973. It is currently known from only two locations: 6 km south-south-west of Oenpelli (J. C. Cardale and M. S. Upton) and Kakadu National Park (Nourlangie Rock) (Braby 2015e), NT. Although the larval food plant is very widely distributed throughout the study region, *Hecatesia* sp. 'Arnhem Land' is confined to areas where the plant grows on sandstone in the higher rainfall areas (> 900 mm mean annual rainfall).

Habitat

Hecatesia sp. 'Arnhem Land' breeds in long-unburnt eucalypt heathy woodland on steep broken sandstone hill slopes where patches of the larval food plant grow as a scrambling parasitic vine in superabundance over understorey shrubs (Braby 2015e).

Larval food plant

Cassytha filiformis (Lauraceae).

Seasonality

Adults appear to be rare and seasonal, having been recorded only during the wet season (November–April) and early dry season (June), but there are too few records ($n = 7$) to assess temporal changes in abundance. The immature stages (eggs or larvae) have been recorded from December to March. All pupae reared during the wet season developed directly with

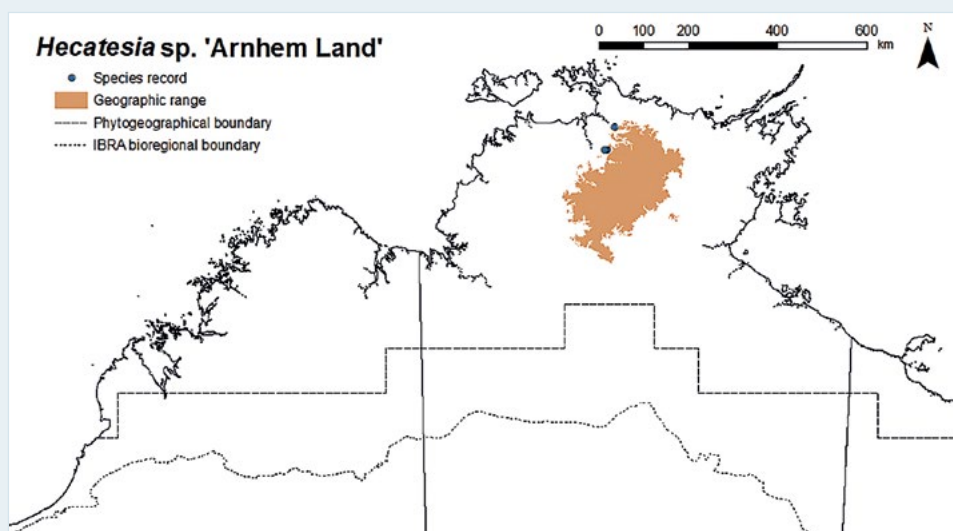
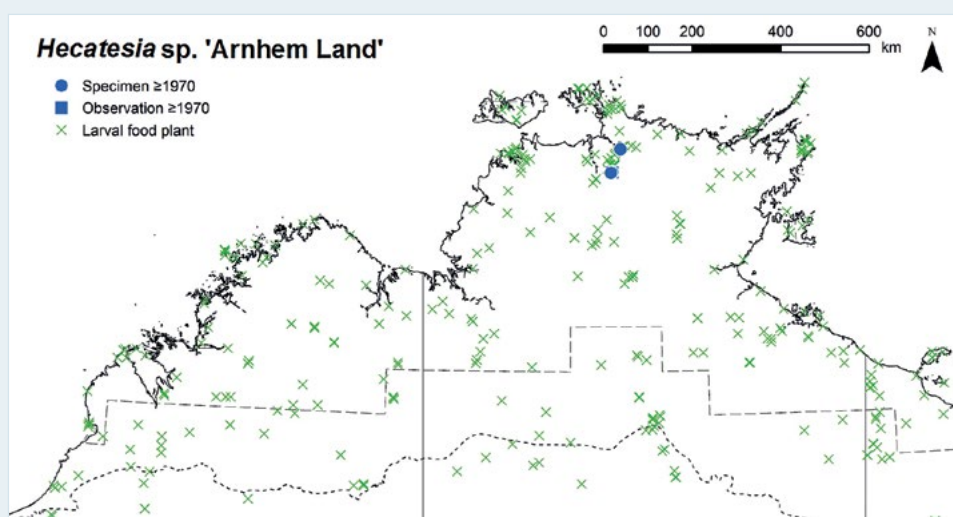
no evidence of diapause, suggesting that several generations are completed at this time. However, it is likely the species survives the late dry season in pupal diapause and that adult emergence is triggered by the pre-monsoon storms during the 'build-up'.

Breeding status

This species is resident in the study region.

Conservation status

Near Threatened (NT). The species *Hecatesia* sp. 'Arnhem Land' is a narrow-range endemic (AOO is likely to be < 2,000 sq km, with spatial buffering of records providing a first approximation of 1,400 sq km), with the entire range occurring within a single conservation reserve (Kakadu National Park). However, it may qualify for a threatened category in the near future because the taxon is threatened by inappropriate fire regimes, particularly too frequent fires, with short interfire intervals (every one–two years), on the Arnhem Land Plateau (see also Russell-Smith et al. 1998, 2002). That is, the population of *Hecatesia* sp. 'Arnhem Land' is likely to be reduced in future based on a projected decline in the AOO, quality of its habitat and/or number of locations (criteria A3c, D2). Monitoring of the abundance and occupancy of the moth and its food plant is required for this species. The fire regime on the sandstone plateau-breakaway country needs to be carefully managed to ensure that long-unburnt patches of habitat (with an interfire interval of more than five years) persist, which will encourage high local densities of the food plant.



Month	J	F	M	A	M	J	J	A	S	O	N	D
Egg												
Larva												
Pupa												
Adult												

Mimetic Whistling Moth

Hecatesia sp. 'Amata'



Plate 222 Keep River National Park, NT
Photo: M. F. Braby



Plate 223 Keep River National Park, NT
Photo: M. F. Braby

Distribution

This undescribed species is restricted to the lower rainfall areas (600–800 mm mean annual rainfall) of the Kimberley and Northern Deserts, where it has been recorded from three locations: 'Barrier Range' near Napier Range, WA, based on a male specimen in the ANIC collected some time in 1887 (see Froggatt 1934); and Keep River National Park (Braby 2015e) and Daly Waters, NT. The larval food plant is considerably more widespread than the known geographic range; thus, further field surveys are required to determine whether *Hecatesia* sp. 'Amata' is more widespread in the semi-arid zone than present records indicate. Outside the study region, *Hecatesia* sp. 'Amata' occurs in north-eastern Queensland (M. F. Braby, unpublished data).

Habitat

Hecatesia sp. 'Amata' breeds in long-unburnt eucalypt open woodland on flat sandy loam where the larval food plant grows as a fine scrambling parasitic vine in superabundance on various grasses, particularly *Triodia* (Braby 2015e).

Larval food plant

Cassytha capillaris (Lauraceae).

Seasonality

Adults appear to be seasonal, having been recorded only during the wet season (January–April), but there are too few records ($n = 4$) to assess temporal changes in abundance. The immature stages (larvae) have been recorded in February and March. All pupae reared during the wet season developed directly with no evidence of diapause, suggesting that at least two generations are completed at this time. However, it is likely the species survives the late dry season in pupal diapause and the first monsoon rains trigger adult emergence.

Breeding status

This species is resident in the study region.

Conservation status

LC. The species *Hecatesia* sp. 'Amata' has a restricted range within which it occurs in at least one conservation reserve (Keep River National Park). However, the effect of inappropriate fire regimes in some areas of the range requires further investigation because breeding colonies are likely to be impacted by too frequent fires, with short interfire intervals (every one–two years), such as prescribed control burns. Thus, *Hecatesia* sp. 'Amata' may qualify as Near Threatened (NT) in future. The fire regime needs to be carefully managed to ensure that long-unburnt patches of habitat (with an interfire interval of more than five years) persist, which will encourage high local densities of the food plant.

Painted Day-moth

Agarista agricola (Donovan, 1805)



Plate 226 Kakadu National Park, NT
Photo: Rod Kennett



Plate 227 Mt Burrell, NT
Photo: M. F. Braby

Distribution

This species is represented by two subspecies: *A. agricola biformis* Butler, 1884, which is endemic to the study region, and *A. agricola agricola* (Donovan, 1805). Both subspecies occur in the north of the Northern Territory, where they are restricted to the higher rainfall areas (> 1,300 mm mean annual rainfall). *Agarista agricola biformis* occurs in the north-western corner of the Top End, reaching its southernmost occurrence at Daly River, NT, whereas *A. agricola agricola* appears to be geographically separated, confined to Gove Peninsula, where it has been recorded at Drimmie Head, Nhulunbuy (L. Wilson) and Macassan Beach (B. Hoffmann), NT. The geographic range of *A. agricola* corresponds well with the spatial distribution of the known and putative larval food plants (*Leea* spp.). The food plants, however, also occur on the Tiwi Islands and Groote Eylandt, NT; thus, further field surveys are required to determine whether the species is present in these areas. Outside the study region, *A. agricola* occurs from Timor, through mainland New Guinea to north-eastern and eastern Australia.

Habitat

Agarista agricola breeds in the ecotone between savannah woodland and monsoon vine thicket or along the very edge of semi-deciduous monsoon vine thicket on rock outcrops where the larval food plant (*Leea rubra*) grows as a deciduous perennial shrub 1–3 m high (Braby 2011a). Adults have also been recorded near evergreen monsoon vine forest where the putative larval food plant (*Leea indica*) grows in the understorey; the larvae readily feed on this plant in captivity, suggesting *A. agricola* probably breeds in this habitat.

Larval food plants

Leea rubra (Vitaceae); probably *Leea indica*.

Seasonality

Adults are seasonal, occurring only during the 'build-up' and wet season (October–May), but there are too few records ($n = 23$) to assess temporal changes in abundance. In general, adults tend to be more numerous during the 'build-up' (October and November) following the first substantial pre-monsoon storms and then again during the late wet season (March and April). The breeding phenology is not well understood. The immature stages have been recorded from October to December. The larvae feed on the foliage of the food plant, which is seasonally deciduous, dropping its leaves as the dry season progresses. Presumably, at least two generations are completed annually and the species survives the dry season in pupal diapause.

Graceful Day-moth

Cruria donowani (Boisduval, 1832)



Plate 228 Mt Burrell, NT
Photo: M. F. Braby

Distribution

This species occurs in the northern and eastern Kimberley, the Top End, Northern Deserts and western Gulf Country of the study region. It extends from moist coastal areas to drier inland areas of the semi-arid zone (c. 700 mm mean annual rainfall), where it has been recorded as far south as 35 km north of Dunmarra and McArthur River, NT. It has also been recorded at Walker Creek 36 km east of Karumba, Qld, just outside the eastern boundary of the study region. The geographic range falls within the spatial distribution of its larval food plant, which occurs more widely in the southern Kimberley, Tiwi Islands, eastern half of the Top End and Groote Eylandt. Further field surveys are thus required to determine whether *C. donowani* occurs in these areas. Outside the study region, *C. donowani* occurs in Timor and throughout eastern Australia.

Habitat

Cruria donowani breeds in savannah woodland where the larval food plant grows as a vine, often at the base of tree trunks (Braby 2015e). Adults are readily attracted to flowers of *Erythrophleum chlorostachys* on which males seek females for mating.

Larval food plant

Cayratia trifolia (Vitaceae).

Seasonality

Adults are seasonal, occurring only during the 'build-up', wet season and early dry season (October–May), but they are most abundant from November to January, depending on the timing of the pre-monsoon storms, and before the arrival of monsoon rains. The immature stages (eggs and larvae) have been recorded in December. The larvae feed on the new soft leaf growth of the food plant, which regenerates from an underground tuber during the 'build-up' following the pre-monsoon storms and/or an increase in humidity. The food plant is a short-lived seasonal perennial vine and senesces during the dry season. The duration of the pupal stage is variable and there is probably only a single generation annually, followed by a partial second generation in the late wet season. The species survives the dry season in the pupal stage, which may remain in diapause for up to 10 months.

Breeding status

This species is resident in the study region.

Conservation status

LC.

Tiger Day-moth

Cruria darwiniensis (Butler, 1884)



Plate 229 Howard Springs Nature Park, NT
Photo: M. F. Braby

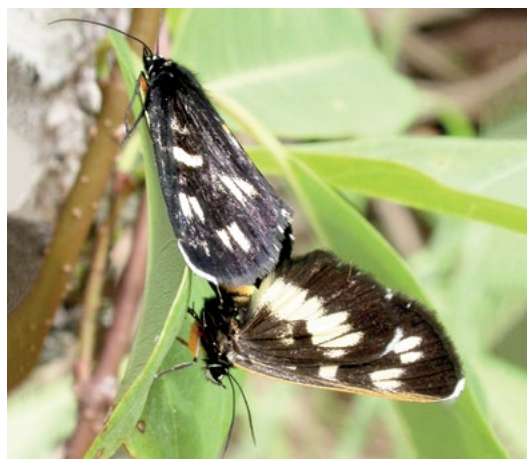


Plate 230 Howard Springs Nature Park, NT
Photo: M. F. Braby

Distribution

This species is endemic to the study region. It occurs in the north of the Northern Territory, where it is restricted to the higher rainfall areas (> 900 mm mean annual rainfall) of the Top End, reaching its southernmost limit at Katherine, NT. The geographic range is wider than the spatial distribution of its known larval food plant (*Typhonium flagelliforme*), indicating that several other (as yet unreported) food plants are used. In particular, *Typhonium cochleare* occurs commonly in the southern and eastern areas of the range of *C. darwiniensis*.

The taxonomic status and relationships of *Cruria darwiniensis* require further investigation. Kiriakoff (1977) treated the taxon as a polytypic species, with two allopatric subspecies: *C. darwiniensis darwiniensis* (Butler, 1884) from the Northern Territory and *C. darwiniensis platyxantha* (Meyrick, 1891) from northern Queensland. However, Edwards (1996) treated *C. darwiniensis platyxantha* as a junior synonym of *C. tropica* (T. P. Lucas, 1891), which was considered a distinct species, whereas *C. darwiniensis* was treated as a synonym of *C. donowani* (Boisduval, 1832). In this work, *C. darwiniensis*, which is clearly a species distinct from *C. donowani*, is tentatively treated as a full species endemic to the Top End pending further investigation of its relationship with *C. tropica*.

Habitat

Cruria darwiniensis breeds in mixed paperbark–pandanus swampland where the known larval food plant grows as a seasonal geophytic herb in low-

lying water (Braby 2011a). Adults have also been collected in savannah woodland and mixed semi-deciduous monsoon vine thicket on limestone, where it almost certainly breeds on alternative food plants, especially *Typhonium cochleare*, which typically grows in eucalypt open forest on seasonally waterlogged sandy soils and occasionally in monsoon vine thicket.

Larval food plants

Typhonium flagelliforme (Araceae); probably other *Typhonium* spp., including *T. cochleare*.

Seasonality

Adults are seasonal, occurring only during the wet season (November–April), but they are most abundant in January and February. The immature stages (eggs or larvae) have been recorded from January to March during and following the monsoon rains. The larvae feed on the foliage of the food plant, which is a short-lived seasonal herb. The duration of the pupal stage is variable and there are probably only two generations annually. The species survives the dry season in the pupal stage, which may remain in diapause for up to nine months.

Breeding status

This species is resident in the study region.

Conservation status

LC.

Mistletoe Day-moth

Comocrus behri (Angas, 1847)



Plate 231 Cocoparra National Park, NSW
Photo: M. F. Braby



Plate 232 Cocoparra National Park, NSW
Photo: M. F. Braby

Distribution

This species occurs in the northern Kimberley at Drysdale River Station, WA (S. Craswell), the Top End, Northern Deserts and western Gulf Country of the study region, its presence detected only as recently as 2008 (Braby 2011a). It extends from moist coastal areas to drier inland areas of the semi-arid zone (< 600 mm mean annual rainfall), where it has been recorded as far south as Limbunya Station and Kalkaringi in the Victoria River District and the Favenc Range, NT (Braby 2011a, 2015e). The larval food plants are considerably more widespread than the known geographic range, occurring also in the southern Kimberley, Tiwi Islands, Groote Eylandt and western Queensland in the Gulf Country; thus, further field surveys are required to determine whether *C. behri* is established in these areas. Outside the study region, *C. behri* occurs throughout eastern and southern Australia, as well as in the arid zone of central Australia (Braby 2011a).

Habitat

Comocrus behri breeds in a variety of eucalypt woodland, open woodland and low open woodland habitats where the larval food plants grow as mistletoes (parasitic shrubs) on various trees, including *Eucalyptus*, *Corymbia* and *Acacia* (Braby 2011a, 2015e).

Larval food plants

Amyema bifurcata, *A. sanguinea*, *A. villiflora*, *Diplatia grandibractea* (Loranthaceae).

Seasonality

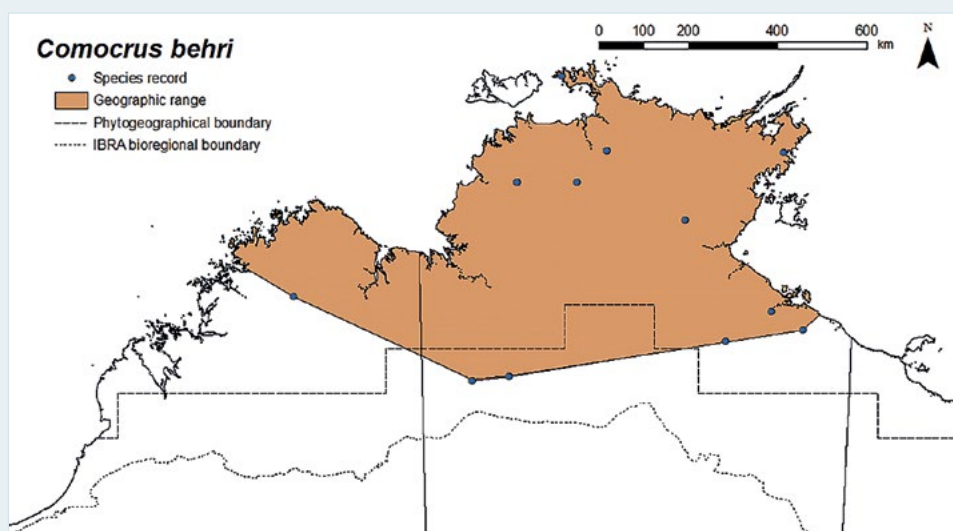
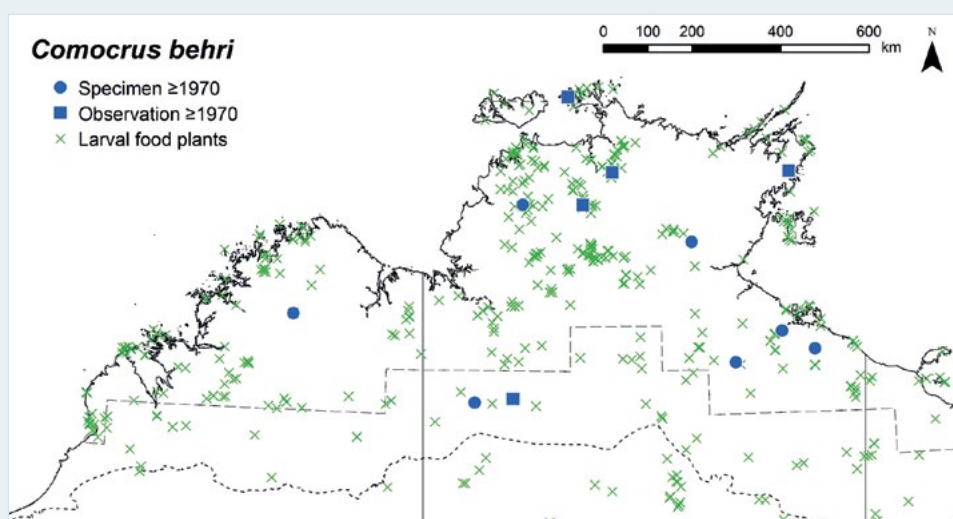
Adults have been recorded during most months of the year, but there are too few records ($n = 19$) to assess any seasonal changes in abundance. In general, adults tend to be more numerous during the second half of the year (June–December), particularly during the mid to late dry season (similar to *Delias argenthona* and *Ogyris* spp., which also use Loranthaceae as their larval food plants); however, adults of *C. behri* are usually rare and are never observed in large numbers or high densities, unlike in the temperate areas of south-eastern Australia. The immature stages (larvae or pupae) have been recorded sporadically from May to November, when adults are more abundant. Presumably, the species breeds continuously and several generations are completed annually.

Breeding status

This species is resident in the study region.

Conservation status

LC.



Month	J	F	M	A	M	J	J	A	S	O	N	D
Egg												
Larva												
Pupa												
Adult												

This text is taken from *Atlas of Butterflies and Diurnal Moths in the Monsoon Tropics of Northern Australia*, by M.F. Braby, D.C. Franklin, D.E. Bisa, M.R. Williams, A.A.E. Williams, C.L. Bishop and R.A.M. Coppen, published 2018 by ANU Press, The Australian National University, Canberra, Australia.