LIVING WORLD

Journal of The Trinidad and Tobago Field Naturalists' Club

2024

THE TRINIDAD AND TOBAGO FIELD NATURALISTS' CLUB

The Trinidad and Tobago Field Naturalists' Club was founded on 10 July, 1891. Its name was incorporated by an Act of Parliament (Act 17 of 1991). The objects of the Club are to bring together persons interested in the study of natural history, the diffusion of knowledge thereof and the conservation of nature.
Monthly meetings are held at St. Mary's College on the second Thursday of every month except December.
Membership is open to all persons of at least fifteen years of age who subscribe to the objects of the Club.

Mission Statement
To foster education and knowledge of natural history and to encourage and promote activities that lead to the appreciation, preservation and conservation of our natural heritage.

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Editorial

Our Guest Editorial this year focuses on the latest global coral bleaching event declared earlier this year. Anjani Ganase explains how this event has already had a catastrophic impact on Tobago's coral reefs, and that the impacts on the ecosystem will be felt by Tobago's biodiversity, including its humans, for a long time to come. While the future of the world's coral reefs is bleak under even the most optimistic climate change scenarios, Anjani outlines some of the ways in which we, as a nation and as individuals, must act urgently to minimize the speed and extent of the devastation and the future environmental, social and economic impacts.

In addition to our guest Editorial, this year's issue of the journal is brim full of new discoveries and natural history observations, including five Research Papers, twelve Nature Notes and our regular Report of the TTBSDC.

As usual, the Lepidoptera are well-represented thanks to Matthew Cock continuing to document T&T's butterflies and moths and, importantly, supporting and encouraging the efforts of citizen science toward this end in good TTFNC style. In a novel departure from moths collected at lights, Rainer Deo and Matthew give an account of moths attracted to fruit baits.

Our other Research Papers include dispersal of Moriche Palm fruit within the Aripo Savannas by Linton Arneaud, Aidan Farrell and Michael Oatham, and an illustrated checklist of invertebrates collected from pools of water held in the leaf whorls of epiphytic bromeliads by Pierre Rogy *et al*., which emphasizes the potential of these hidden ecosystems for addressing ecological questions.

Of our lepidopteran Nature Notes, three focus on documenting the life histories of *Lophocampa walkeri, Euclea cippus* and *Quadrus tetrastigma*, respectively. The other two focus on mating behaviour, with notes on *Theope* spp. butterflies mating at night and an inter-species mating of *Melanis* spp.

The other notes include a mixed bag of "firsts": an albino Lowland Paca, captured by a camera trap, is the first documented record for Trinidad; four species of tarantulas are recorded for the first time from Chacachacare; a first record of folivory in the bat *Artibeus planirostris trinitatis*; and the first record of a Great Egret Preying on a Greater Windward Skink.

The final three notes focus on animal behaviour, one explores plant selection by the leafcutter ant *Atta cephalotes*, one describes an active anti-predator behaviour observed in the land snail *Plekocheilus glaber* and the final note records nocturnal activity by three predominantly diurnal snake species in Trinidad.

This issue of Living World ends with the regular report of the Trinidad & Tobago Birds Status and Distribution Committee. This year there we no new bird records for T&T but the Committee has now adjudged that there is a self-sustaining feral population of Red and Green Macaws in Trinidad, and they have been added to the official checklist.

On an editorial note, the Living World committee have made a few changes to the journal style guidelines, including a modified reference & citation format, and the recommendation to include DOIs with hyperlinks in the reference list where available. We have also added instructions for citing iNaturalist observations in a standardized manner, These and more changes are already included on the 'Author Guidelines' page of the website. In 2023 we guided researchers in recognizing the sovereignty of genetic materials and local regulations. This includes gaining permission for collecting, deposition of voucher specimens in official collections, and communication with the forestry department to share findings. This year we build on this theme of transparency and accountability by encouraging our authors to publish their raw data either as supplementary files with their submission or, for more substantial datasets, on data-sharing platforms. This recommendation is in line with a shift towards open access datasets in the wider scientific publishing community over the last decade; Rogy *et al's* contribution to this issue sets an excellent example in this regard.

Finally, sincere thanks to all who have contributed to the 2024 issue of the journal, whether as authors, reviewers or editorial committee members. All have played a vital role in knowledge sharing and expanding our understanding and appreciation of the biodiversity of the region.

Amy Deacon, Graham White

Cover Photograph

Our cover photographs shows a Pinktoe Tarantula *Avicularia avicularia* selecting only the best natural history books for its hideout - including the TTFNC's trusty trail guide which is available for purchase via the club. Photo taken at Ajoupa Gardens by Amy Deacon.

Guest Editorial

2024 MASS CORAL BLEACHING: TIPPING POINT FOR TOBAGO'S REEFS?

Anjani Ganase, Institute of Marine Affairs

The world is currently reeling from the fourth global coral bleaching event on record, declared by the National Oceanic and Atmospheric Administration (NOAA) in April 2024 (NOAA, 2024). For the Caribbean, this means two consecutive years of severe heat stress: mass bleaching experienced in the Northern Caribbean in 2023, and the Southern Caribbean in 2024. We are in the midst of a coral crisis with Tobago reefs experiencing record levels of heat stress. I will recap how we got here, what it means for us, and highlight imperatives that may help curb the worst for our future.

History of mass coral bleaching in Trinidad & Tobago

Coral reefs of Tobago experience warm 'summertime' temperatures typically between the months of July and November, and during this time, many coral species carry out sexual reproduction. However marine heat waves may expose corals to unseasonably warm temperatures or an extended period of exposure to warmer temperatures that results in heat stress. The thermal tolerance threshold for corals (1°C above the highest summertime mean temperature) in Tobago is 29.4˚C and once water temperatures exceed this threshold corals begin to accumulate heat stress, which can result in bleaching (NOAA, Coral Reef Watch, 2024). Degree Heating Weeks (DHW) is a measure of the accumulated heat stress over 12 weeks, and bleaching is typical above 8 DHW.

Overall, the wider Caribbean Region has suffered from eight mass bleaching events (1998, 2005, 2010, 2011, 2015, 2017, 2023, 2024) over the past 30 years. In the preceding decades, coral bleaching was recorded on localised scales, once every 25 to 30 years (Hughes *et al.* 2018). During these marine heat waves, heat stress is not evenly distributed across the Caribbean and hotspots have varied geographically throughout the years. The Eastern and Southern Caribbean regions have a history of exposure to greater heat stress compared to the Western, Northern and Southwestern areas of the Caribbean (Muñiz-Castillo *et al.* 2019). As a result, Tobago is one of the islands that has higher bleaching and mortality risk compared to the rest of the Caribbean.

While the 1998 bleaching event mostly impacted the Western Caribbean and The Bahamas, the Global Coral Reef Monitoring Network (GCRMN) reported that Buccoo Reef (Eastern Reef monitoring site) showed no impacts of bleaching to its coral cover (1996: 29%, 2000: 31%) (Hoetjes *et al.* 2002). However, the impacts to other reefs around the island remained unknown.

The 2005 marine heat wave, resulting in the most extensive bleaching in the region (until now), impacted 42% of Caribbean reefs, including Tobago (Muñiz-Castillo *et al.* 2019). Bleaching assessments conducted by Buccoo Reef Trust, found that an average of 66% of corals were bleached across Tobago, with sites along the Caribbean coast showing up to 85% bleaching (O'Farrell and Day 2006). Meanwhile, sites in Speyside showed relatively low bleaching. At that time, Buccoo Reef Trust recommended that Speyside's reefs be designated a marine protected area given their presumed resilience to heat stress. While bleaching was extensive, the coral mortality (of surveyed sites) was low at ~ 18%, where the most impacted were brain corals (73% of the mortality), and 32% of the bleached corals suffered partial mortality (O'Farrell and Day 2006). In the aftermath of the 2005 bleaching event, coral diseases became more prevalent on Tobago's reefs and coral recruitment was significantly reduced (Mallela and Parkinson 2008; Mallela and Crabbe 2009).

While the 2010 bleaching event was less widespread throughout the Caribbean region compared to 2005, the heat stress experienced in Tobago was more severe and resulted in greater mortality. In 2010, the Institute of Marine Affairs (IMA) conducted its first assessment of coral bleaching across three major reef systems – Buccoo, Culloden and Speyside. In contrast to the 2005 bleaching event, Speyside reefs suffered the highest bleaching and mortality. The 2010 bleaching event accounted for the largest mortality event recorded in Tobago with an estimated loss of ~ 38% coral cover (Alemu I and Clement 2014). IMA's long-term monitoring estimates an average of ~ 50% decline in coral cover across all monitoring sites in the aftermath of this bleaching event (average coral cover in 2010: 29.8%, 2011: 15.2%, 2020: 14.5%) with no significant recovery observed at monitored sites to date (Ganase 2020, Ganase and Lochan 2023 Fig. 1).

Most mass bleaching events were strongly driven by the ENSO (El Niño Southern Oscillation) that resulted in warmer, drier conditions in 1997 - 1998, 2009 – 2010, 2014 – 2016, 2023 -2024, with the exception of 2005 (Eakin *et al.* 2010). Over the last five years, Tobago's reefs have experienced low-level bleaching during the warmer months of the year, even under La Niña conditions (cooler, wetter conditions) from 2020 to 2022, as reported by marine-users and by the IMA through its reef monitoring programme. With impacts from climate change, La Niña events are now warmer than ENSO events occurring 30 years ago (Hughes *et al.* 2018). Trinidad & Tobago and the rest of the world were bracing for the worst as we entered ENSO conditions in 2023.

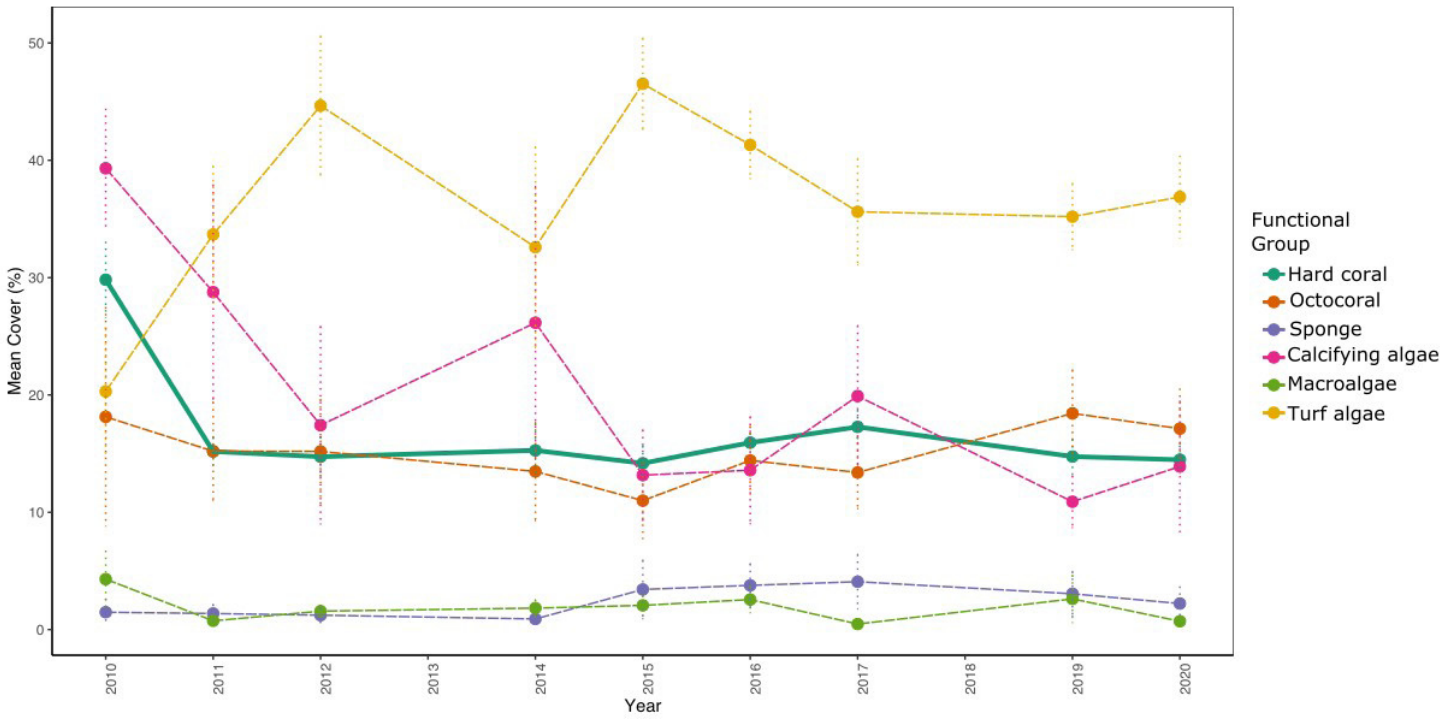

Fig.1. Long-term average change in coral reef benthic compositions from 2010 to 2020 for IMA monitoring sites around Tobago.

The 2023 and 2024 mass coral bleaching event

Summer temperature profiles for Trinidad & Tobago in 2023 revealed 19 Degree Heating Weeks between August and November 2023 (NOAA Coral Reef Watch, 2023). There were several reports of bleaching around Tobago, and a bleaching assessment in November showed between 20% and 60% partial and full bleaching at five sites, with Charlotteville and Mt Irvine faring the worst (Lochan and Ganase, 2024). The most impacted species were the grooved brain, massive starlet, great star and the mountainous star corals, which had over 70% of their colonies bleached at one or more sites.

Critically endangered species, such as the elkhorn corals at Mt Irvine, fared better with 98% of the colonies observed not affected (Lochan and Ganase, 2024). Even though there was some mortality of the massive starlets and the grooved brain corals, we also observed some partial recovery of other species by March 2024. However, by April 2024, NOAA officially declared the fourth global coral bleaching event given extensive bleaching occurring in Australia, north and western Caribbean and the Indo-Pacific with a possible continuation of more marine heat waves during the summer of 2024.

Trinidad & Tobago was placed under Bleaching Alert Level 2 (risk of reef-wide bleaching with mortality of heat-sensitive corals) by August and was then upgraded to Bleaching Alert Level 5 (the highest risk level with a risk of near complete mortality of more than 80 % of corals) by October 2024 with records of sea surface temperatures around 30°C, and as high as 33°C at specific sites (Ganase, pers. obs.). From September to November, IMA received several reports from marine resource users, namely boating and diving tour operators, of coral bleaching across many reef sites and on many species. In November 2024, the IMA conducted a rapid reef assessment at eight sites in southwest and northeast Tobago, with impacts of bleaching being observed at all sites, as well as observations of extensive coral bleaching beyond survey areas (Plate 1). Thermal stress impacted all sites with > 50% of corals displaying impact from heat stress in the form of bleaching, paling and recent mortality at seven out of eight sites (Fig. 2). The most impacted site was the Buccoo Reef Marine Protected Area (MPA) with 78.6% of its corals affected by bleaching (Plate 1B). The corals most severely impacted are the large (> 1m in diameter) colonies of dominant reef-builder species that are critical habitat providers on Tobago's reefs. These species include the mountainous star and boulder brain corals; these large colonies are slow growing and possibly hundreds of years old. Many of these colonies were fully bleached. Mountainous star corals, which contribute more than 50% of hard coral cover to Tobago's forereefs, showed 100% impact from heat stress at Melville Drift and Angel Reef (Plate 1 A&D), and > 75% impact at Castara, Culloden, Buccoo and Booby Island (Fig. 3). Other severely impacted species include the great star coral (> 95% impacted at six sites) and lettuce corals (> 90% impacted at all sites) (Fig. 3).

In 2024, the IMA monitored elkhorn and staghorn patches at Mt Irvine and within the Buccoo Reef Marine Park for bleaching and mortality. At Mt Irvine, partial bleaching was observed in over 500 colonies, with some colonies already

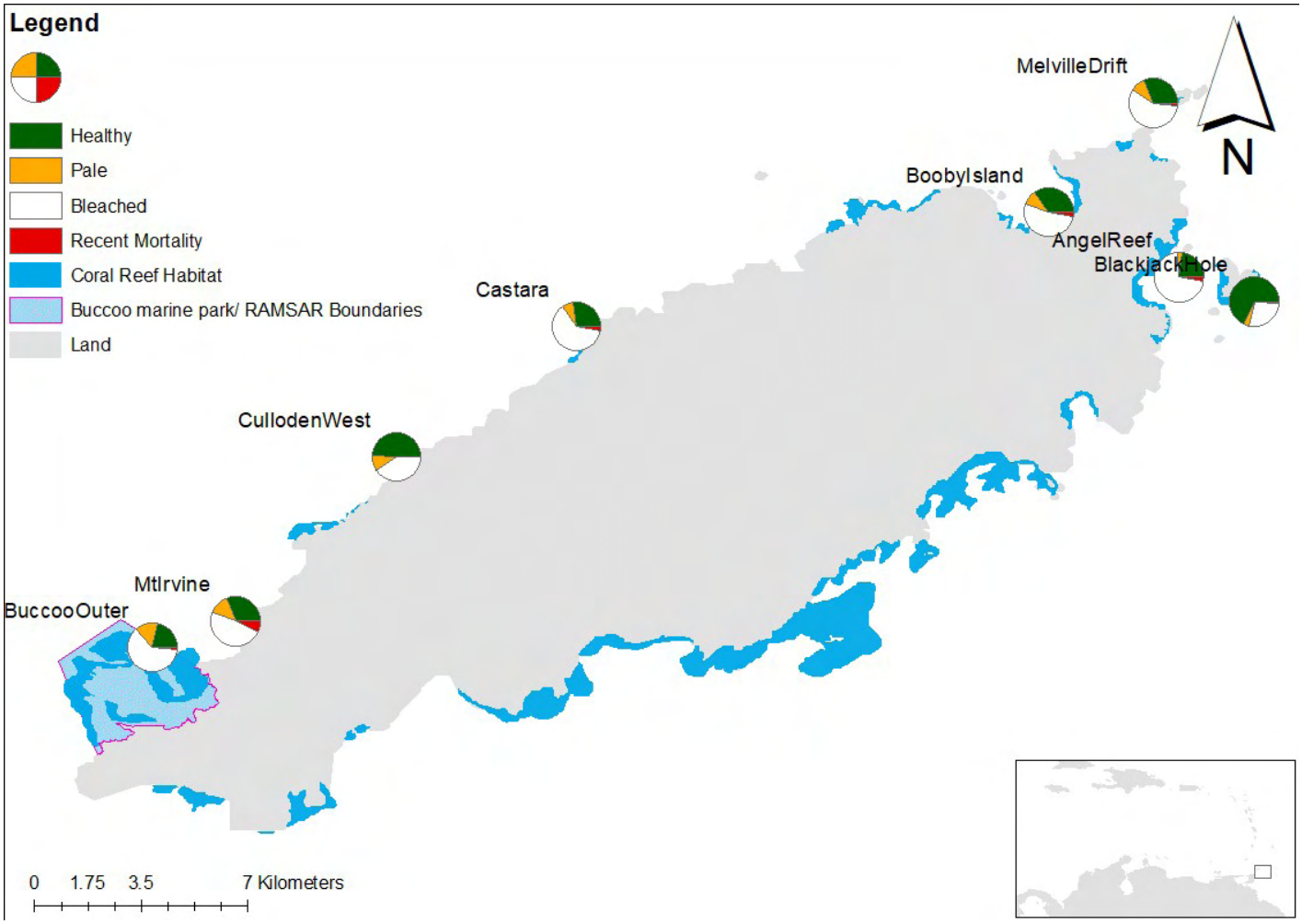

Fig. 2. Coral bleaching assessment showing the percentage bleaching impacts of eight survey sites around Tobago in November 2024

suffering from partial mortality. Within the outer lagoon of Buccoo, there was 100% mortality of a large staghorn patch, likely to result in extinction at that site. As the only sizeable patch in Tobago, there are concerns about wider local extinction (Plate 1 C). There was also 100% mortality of a large elkhorn patch in the eastern side of the Buccoo back reef area. Despite faring well in 2023, these corals have now succumbed to the heat stress.

Of concern is the impact on the recovery potential of the corals that have experienced repeated heat stress and were not fully recovered from the 2023 bleaching along with the severity of the 2024 marine heat wave with over 25-degree heating weeks (NOAA 2024). The heat stress experienced by coral reefs in Tobago and the wider Caribbean is unprecedented and we continue to monitor for disease outbreaks and die off in the aftermath.

Implications for Tobago's coral reefs

According to the IPCC Special Report (1.5°C) on the impacts of global warming, a rise in global temperature of 1.5°C above pre-industrial levels will result in 70-90% decline of coral populations, while a 2°C rise in temperature will result in 99% decline (IPCC 2018). Given the current trajectory of carbon emissions, it is expected that the 1.5°C will be exceeded as early as 2027 (estimated range 2027-2040) (WMO 2024). Globally, the average projected onset of annual severe bleaching (ASB) events is expected to be 2045 for middle of the road emissions scenarios (SSP2-4.5) which are closest to our current trajectory. For these scenarios, a 3.8-4.2°C rise is certain by the end of the century (IPCC, CMIP6 Models; van Hooidonk 2020). The onset of annual severe bleaching for the high emissions scenario (SSP 5-8.5) is 2034 (van Hooidonk 2020).

Under the high emissions scenario for Trinidad & Tobago, it is projected that 80% of our coral reefs are expected to experience ASB by 2025 with the remaining 20% likely to experience ASB between 2030 and 2034 (van Hooidonk 2020). However, for middle of the road scenarios, the delay in onset is still less than 10 years for most reefs (van Hooidonk 2020). If emissions are not curtailed, coral reef management and restoration will not be effective.

Possible interventions

The future of coral reefs around the world and here in

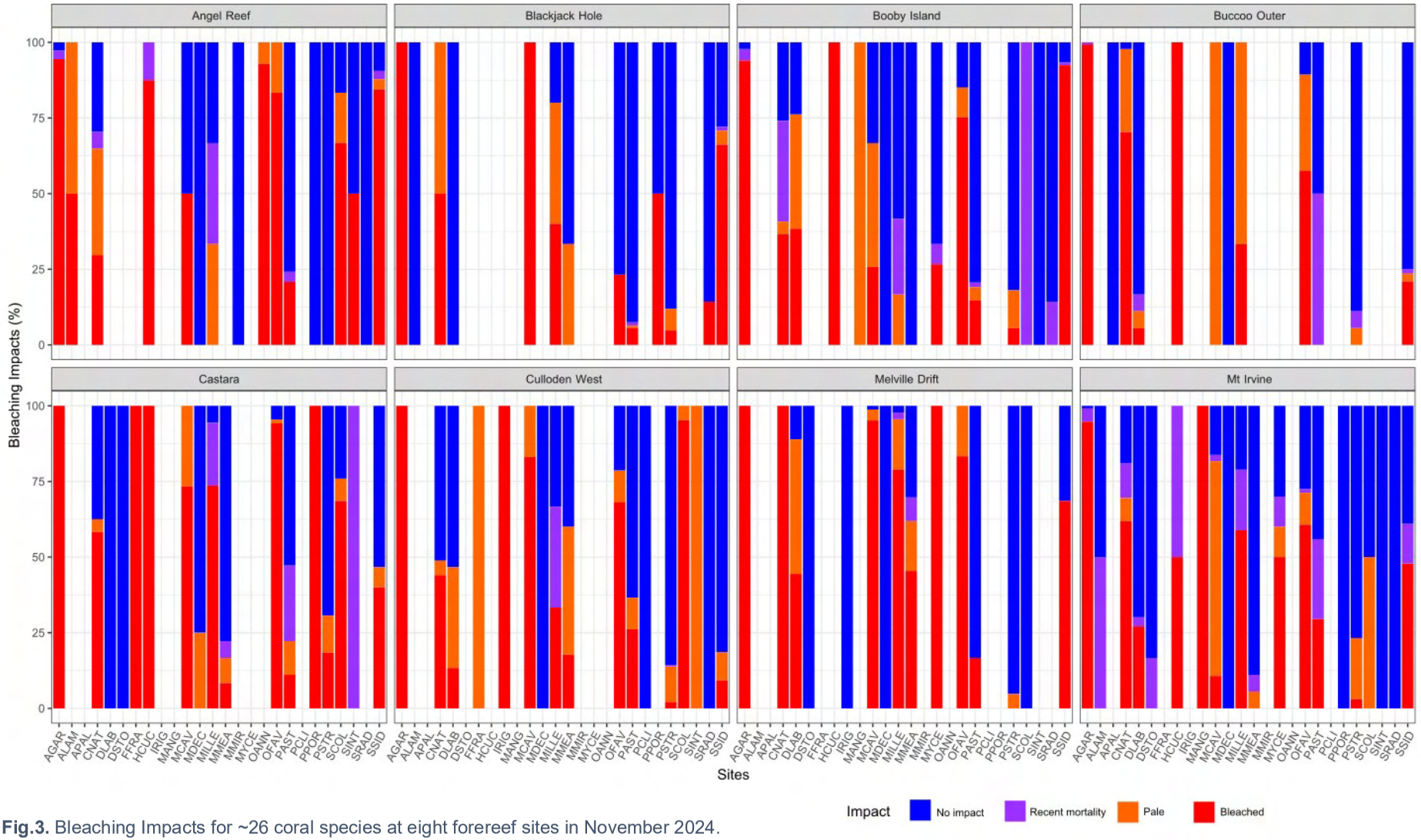

Fig.3. Bleaching Impacts for ~26 coral species at eight forereef sites in November 2024.

Species list: AGAR- *Agaricia spp.; ALAM – Agaricia lamarcki, APAL – Acropora palmata, CNAT – Colpophyllia natans, DLAB – Diploria labyrinthiformis, DSTO – Dichocoenia stokesii, FFRA – Favia fragum, HCUC – Helioseris cucullata, IRIG – Isophyllia rigida, MANG – Mussa angulosa, MCAV – Montastraea cavernosa, MDEC – Madracis decactis, MILLE – Millepora sp., MMIR – Madracis mirabilis (now called M. auretenra), MYCE- Mycetophyllia spp., OANN – Orbicella annularis, OFAV – Orbicella faveolata, PAST – Porites astreoides, PCLI – Pseudodiploria clivosa, PPOR – Porites porites, PSTR – Pseudodiploria strigosa, SCOL – Scolymia spp., SINT – Stephanocoenia intersepta, SRAD – Siderastrea radians, SSID – Siderastrea siderea.*

T&T is bleak. We are likely to suffer significant loss and perhaps local extinction of critical species. Coral reefs are vital to Tobago's fisheries and tourism, as well as provide coastal protection, especially in south-west Tobago. According to Burke *et al.* (2008), the annual value of our coral reefs is estimated between $120 - $164 million USD (2006 estimate). This value is based on fisheries and reef-related tourism products, as well as coastal protection for Tobago. Unfortunately, severe mass bleaching events are expected to reduce the economic value of coral reefs by 50% (Cesar *et al.* 2003). Added to this are the costs to repair coastal erosion and saltwater intrusion from storm surge and sea-level rise as coral reefs degrade and erode.

Recommended interventions include large-scale marine protected areas, coral breeding and restoration programmes, and cryopreservation of coral larvae for posterity. Most of these are already underway in Mexico, Florida, Puerto Rico, and Curaçao. Many Caribbean Islands have also set up land-based facilities to serve as coral sanctuaries and stations for scientific breeding to build thermal tolerance and genetic resilience. Marine spatial models are constructed to identify priority coral reef sites that are most likely to survive climate change with the efforts of management and restoration. Given the importance of tourism and fisheries to many islands, governments are implementing active management of all ocean activities and working to protect marine areas (encouraged by the global effort to protect 30% of the Earth's land and ocean by 2030), while developing coral restoration technologies and sustainable mariculture for food security.

The Institute of Marine Affairs (IMA), through the Marine Resilience Initiative (MARIN) Tobago seeks to build ocean resilience against climate change. The project has three main components (1) implementing strategies of adaptive management and a Marine Resilience Network (MRN) for sustainable ocean resilience, (2) the restoration of sensitive marine ecosystems, coral reefs and seagrasses, that considers population genetics, and (3) building ocean stewardship. The IMA has partnered with SECORE International (secore.org) in conducting coral restoration using larval propagation strategies in Tobago, which started in July 2024. Most bleaching reports by stakeholders were submitted through the Marine Resilience Network, where the IMA regularly communicates on project updates and shares guidelines on responsible use.

Immediate action for coral recovery

Urgent management is necessary to facilitate coral recovery in the aftermath of mass bleaching. Most important is coral disease management as all corals (bleached and non-bleached) are more susceptible to diseases as heat stress severely compromises their immunity. While 8% of Tobago's corals chronically suffer from coral diseases (Ganase and Lochan 2023), Trinidad & Tobago is on the alert for the arrival of the highly virulent and transmissible Stony Coral Tissue Loss Disease (SCTLD), which has decimated coral reefs throughout the Caribbean region. The disease results in rapid tissue loss and death within a few months. Currently, Grenada is the closest island to Tobago where SCTLD is present. Recommended management actions include: avoiding diving, fishing or hunting on severely bleached reefs or reefs with signs of disease. If diving is essential, disinfection of gear between dive sites is recommended.

The second concern is the risk of algal blooms when reefs suffer from high coral mortality. While corals, as reef builders, create new reef structures for other marine life to utilise, under scenarios of high coral mortality, the remaining coral skeletons can quickly become overgrown by algae. High nutrient pollution, grey water outflow from drains, wastewater discharge and fertiliser run off, all encourage opportunistic algal blooms following a mass bleaching event. In the absence of a healthy herbivore population to graze the algae and keep the reef surfaces clean, algal blooms can prevent coral recruitment by smothering and overgrowing juvenile corals. As corals only reproduce once a year between June and October, it is necessary to manage algal blooms by (1) restricting fishing on impacted reefs, especially of algae grazers such as parrotfish, doctorfish, conch, crabs and sea urchins, and (2) controlling water quality and sedimentation by regulating land clearing activities during peak rain and flood periods.

Our Future

Trinidad & Tobago urgently needs to safeguard our marine resources. Effective management of our marine ecosystems is long overdue, and investment into climate adaptation is needed. Coral bleaching is one example of climate disaster that small-island ecosystems face, and the sudden loss of these natural resources will have critical economic and social consequences. The issue of protection is not a scientific one, but a social one. We are a society that has prospered for 100 years from oil and gas. While we are culturally connected to this industry which is intertwined in our carnival, economy and politics, we have disregarded and ignored our other natural resources with little care or understanding about their importance, unless there is profit to be made.

Unfortunately, the economic losses as a result of the decline of coral reefs will be felt by citizens of Trinidad & Tobago. Our leaders need to hold high polluting nations accountable for carbon emissions as our ocean health depends on it. At the same time, we must commit to reducing carbon emissions and protecting our own marine environments. We are responsible for holding our leaders accountable.

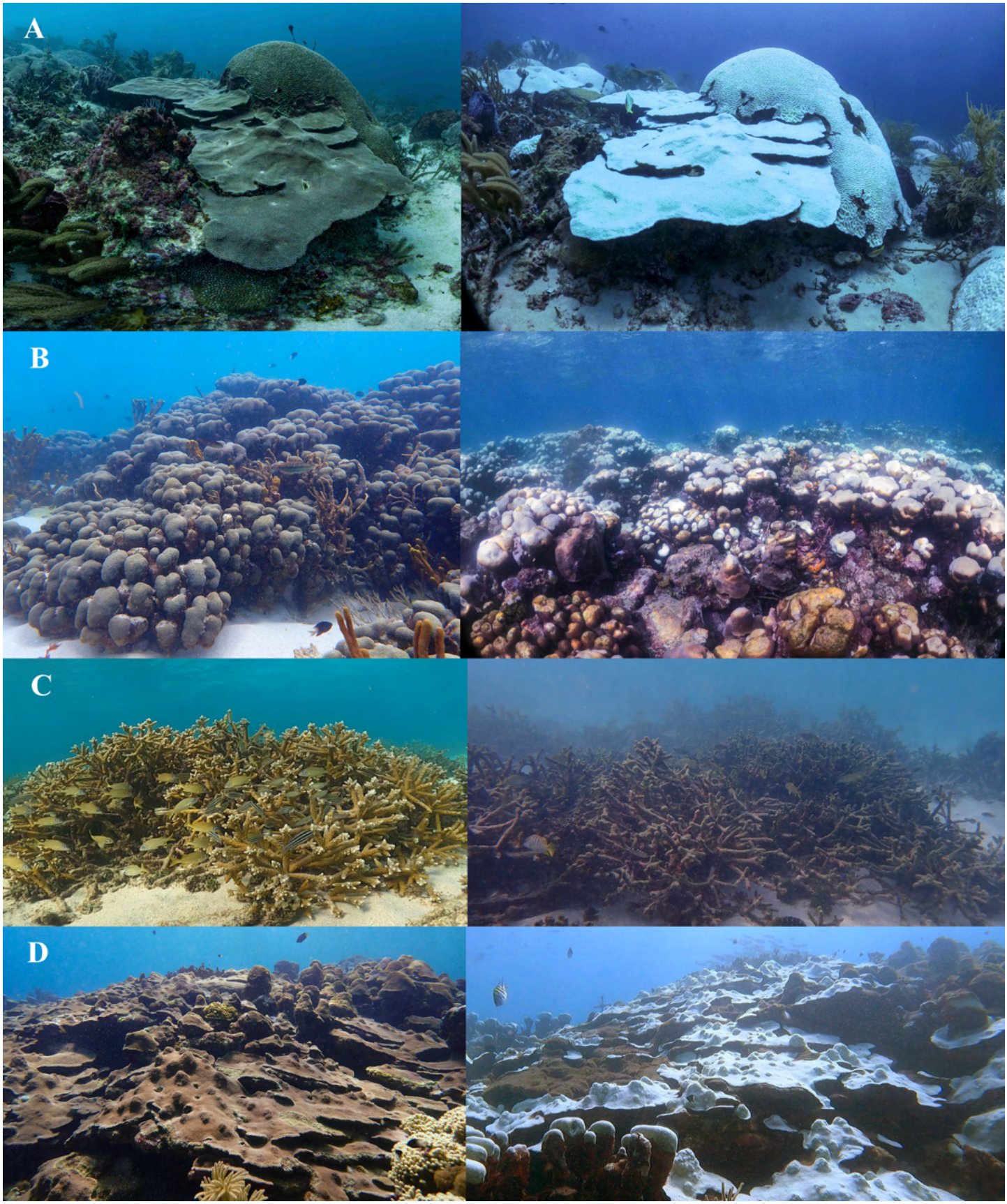

Plate 1. Healthy corals (left) and the same colonies (right) after the 2024 coral bleaching event. A: Mountainous star and boulder brain corals at Melville Drift reef off St Giles Island. B: Boulder star corals at Coral Gardens in the Buccoo Reef Marine Park. C: Vibrant staghorn coral patch in the Buccoo Reef Marine Park taken in February 2024 but completely dead in November 2024. D: Mountainous star corals of Angel Reef in Speyside. All photos courtesy IMA.

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Tuft moths (Lepidoptera, Nolidae) of Trinidad & Tobago

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ABSTRACT

Information and illustrations are provided regarding the 37 species of Nolidae moths now known from Trinidad, and eight known from Tobago (22% of Trinidad total). Eleven genera and five subfamilies are known from Trinidad & Tobago: Afridinae (1 species), Diphtherinae (2 species), Collomeninae (12 species), Eligminae (7 species), Nolinae (15 species). Before 2017, only five species of Nolidae had been recorded from Trinidad & Tobago, seven have been recorded since then, and 25 species are here recorded from the country for the first time

Key words: biology, checklist, DNA barcodes, identification, Afridinae, Diphtherinae, Collomeninae, Eligminae, Nolinae

INTRODUCTION

Trinidad and Tobago are two small islands off the northeast coast of South America with a combined land area of about 5100 km2 and maximum elevation slightly below 1000 m. Together with some smaller associated islands, they make up the country Trinidad & Tobago. As continental islands, they have a biota that is a subset of that of the nearby South American mainland. The fauna of Trinidad is the better known of the two, and Tobago being further offshore has a biota that is largely a subset of that of Trinidad.

The family name tuft moths used here, is based on only two of the nine subfamilies of Nolidae (Nolinae and Collomeninae) and refers to the tufts of scales found on the wings of many of their species (best seen in Figs. 58 and 73). Despite the restricted relevance of the common name, it appears to be coming into common use in the absence of any alternatives.

Nolidae is one of the four families of quadrifid Noctuoidea (families in which forewing vein M2 arises closer to the origin of M3 than to the origin of M1 in the lower part of the discal cell so that the cubital vein appears to be four-branched), the others being Euteliidae, Erebidae and Noctuidae (Zahiri *et al.* 2013). The nine subfamilies of Nolidae contain what appear to be disparate elements (Fig. 1) that were previously considered to belong to Noctuidae or Arctiidae but are united by their molecular genetics, by constructing a ridged boat-shaped cocoon that bears a vertical exit slit at one end, and two morphological characters (Zahiri *et al.* 2013).

The current family concept and subfamily composition of Nolidae was developed by Holloway (1998) and Kitching and Rawlins (1998) and refined and confirmed by the molecular phylogenetics of Zahiri *et al.* (2013). However, Zahiri *et al.*'s (2013) analysis did not include Afridinae, whose placement in Nolidae is based on Kitching and Rawlins (1998) and Lafontaine and Schmidt (2010) and is yet to be confirmed based on multi-gene molecular phylogenetics (Palting and Moore 2022).

Nolidae contains an estimated 1740 described species, placed in 186 genera (Nieukerken *et al.* 2011) in seven subfamilies (Zahiri *et al.* 2013), of which five are found in Trinidad & Tobago. The group occurs worldwide but shows a primarily Palaeotropical distribution (Kitching and Rawlins 1998). Here we treat 37 species in 11 genera from Trinidad &Tobago (Table 1). Of these, eight species (22% of the Trinidad total, a ratio of 4.6:1) in six genera occur in both Trinidad and Tobago. Inasmuch as Trinidad is 16 times the size of Tobago, according to the species-area relationship it is estimated to have about 2.3 times as many species in any given taxon or group, given similar topography and climate, and this relationship holds up well for the well-studied land and fresh-water biota of the islands as a whole (Starr and Hardy 2022), suggesting that the Tobago fauna in this family is less thoroughly known than the Trinidad

Table 1. Overview of the Nolidae of Trinidad and Tobago

Subfamily	Trinidad		Tobago		
	Genera	species	Genera	species	Genera
Afridinae	1	1	1	1	*Afrida*
Diphtherinae	2	2		0	*Diphthera, Lepidodes*
Collomeninae	4	12	2	2	*Collomena, Motya, Neostictoptera, Rhabdotina*
Eligminae	2	7	1	1	*Elaeognatha, Iscadia*[1]
Nolinae	2	15	2	4	*Meganola, Nola*
Total	11	37	6	8	

[1] This genus will probably need to be split as it appears to comprise very different species.

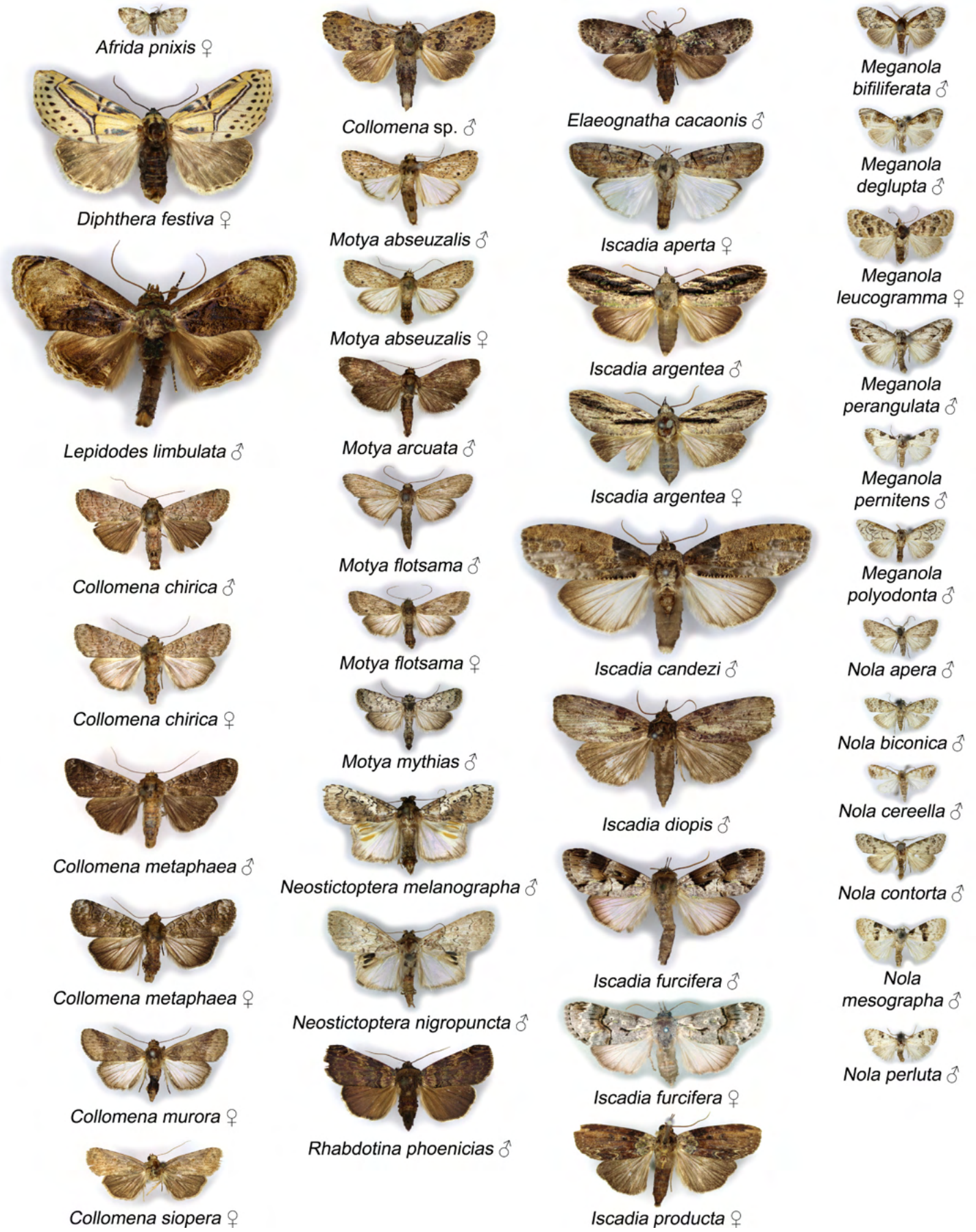

Fig. 1. Nolidae of Trinidad and Tobago. Life size; see enlarged species figures for details.

fauna. Kaye and Lamont (1927) listed just two species of Eligminae and one of Nolinae, although two other species of Eligminae had also been recorded from Trinidad (Druce 1910, Hampson 1912). Since 2017, seven more have been recorded from both Trinidad and Tobago (Cock 2017, Cock and Kelly 2020, Cock et al. 2022, Cock et al. 2023), and so remarkably, 25 species (68%) reported here are new records for Trinidad.

The reader is referred to the lengthy introductions in Cock (2021a, 2022) regarding the approach and layout used here. Images of living moths were collated from the many shared by the photographers either directly, or through iNaturalist (iNaturalist.org). In preparing this work, I consulted the following collections:

MJWC the private research collection of M.J.W. Cock, UK;
NHMUK The Natural History Museum, London, UK;
NMS National Museums of Scotland, Edinburgh, UK;
OUMNH Oxford University Museum of Natural History, UK;
USNM National Museum of Natural History (formerly United States National Museum), Washington DC, USA;
UWIZM University of the West Indies Zoology Museum, St. Augustine, Trinidad & Tobago.

FAMILY NOLIDAE BRUAND, 1846

Subfamily Afridinae Kitching & Rawlings, 1998

Type and only genus *Afrida* Möschler, 1886. Hampson (1900) treated *Afrida* as a genus in Lithosiidae (now Erebidae, Arctiinae, Lithosiini). Dyar (1913) reviewed and expanded the genus, commenting that he did not believe it belonged in Lithosiidae, rather in Noctuidae (which at that time included the subfamilies that comprise Nolidae today). Draudt (1919) maintained it as a genus of Lithosiinae of the Arctiidae. Franclemont (1983) introduced the tribe Afridini Franclemont as part of Lithosiinae, but this was a *nomen nudum* (Speidel and Naumann 2004). Kitching and Rawlings (1998) validated the use of subfamily Afridinae for *Afrida*, and suggested they may be nolids of uncertain affinity. Zahiri *et al*. (2013) continued to treat Afridinae as belonging in Nolidae, but did not have material to include in their genetic analysis.

Afrida Möschler, 1886

Type species: *Afrida tortriciformis* Möschler, 1886, TL Jamaica.

Afrida pnixis Dyar, 1913

Figs. 2–4.
OD: Dyar (1913): *Afrida pnixis*, TL Panama.
TT: *Afrida pnixis* Dyar: Cock *et al*. (2022)
Historical notes. Cock *et al*. (2022) reported this species from Tobago, stating that it is also found in Trinidad. Trinidad specimens were identified by comparison with the type (USNM, ♂ Panama) and the NHMUK series.
Taxonomic issues. There are no public DNA barcodes in BOLD. The living adult in a photo from Tobago (Fig. 4) is distinctly pinker than the pinned specimens from Trinidad (Figs. 2–3), but until specimens are available for critical examination, it is assumed to be the same as the species identified as *A. pnixis* from Trinidad.
Identification. This small species is obscurely marked in shades of grey (Figs. 2-4). The sexes are similar, except the male is slightly smaller and has pectinate antennae.
Biology in Trinidad & Tobago. According to Wagner *et al*. (2011), in eastern North America the caterpillars of *Afrida ydatodes* Dyar feed on lichens and tree algae, so this is probably also the case for *A. pnixis*.
Status in Trinidad & Tobago. Apparently, this is an uncommon species, although easily overlooked. It may be associated with disturbed habitats.
Centeno: ?♀ (no abdomen) resting on citrus, 24.vii.1968 (E.J. Rankin) [UWIZM ex CABI]
Curepe, MVL: ♀ 4.ix.1978 (M.J.W. Cock) [MJWC] (Fig. 3); ♂ 9.ix.1978 (M.J.W. Cock) [MJWC] (Fig. 2)
TOBAGO, Englishman's Bay, 11.28 -60.68: ? 9.i.2022 (A. Deacon photo) [iNaturalist 104684168]

Fig. 2. Male *Afrida pnixis*, Curepe, MVL, 9.ix.1978

Fig. 3. Female *Afrida pnixis*, Curepe, MVL, 4.ix.1978.

Fig. 4. *Afrida pnixis*, Englishman's Bay, 9 January 2022, A. Deacon [iNaturalist 104684168]; ©, under CC-BY-NC (after Cock *et al*. 2023).

Subfamily Diphtherinae Fibiger & Lafontaine, 2005

Formerly the monotypic genus *Diphthera* was placed in Noctuidae, but Fibiger and Lafontaine (2005) established the Subfamily Diphtherinae for this genus alone. Zahiri *et al*. (2013) added the Neotropical genus *Lepidodes* and redefined the subfamily. This subfamily has not previously been reported from Trinidad, although both genera are present on the island. Neither genus is known from Tobago.

***Diphthera* Hübner 1809**

Type species: *Diphthera elegans* Hübner, 1809 a synonym of *D. festiva* Fabricius, 1775.

***Diphthera festiva* (Fabricius, 1775)**

Figs. 5–7.

OD: Fabricius (1775): *Bombyx festiva*, TL America.

Historical notes. Perhaps surprisingly, this distinctive species has not previously been reported from Trinidad. Trinidad material was identified by comparison with the NHMUK series.

Taxonomic issues. This species seems to be BOLD:AAA3373 which includes sequences from USA, Mexico, Costa Rica, Honduras, Colombia, Cuba, and the Dominican Republic.

Identification. This pale yellow species with dark spots and lines is distinctive. The sexes are similar.

Biology in Trinidad. The food plants in Costa Rica are Malvaceae, especially species of *Waltheria* (Janzen and Hallwachs 2022). However, in Puerto Rico, in addition to *W. indica* (= *W. americana*), it has been reared on *Mimosa quadrivalvis* (= *Morongia leptoclada*, Fabaceae) (Van Zwaluwenburg 1918). Also, Crumb (1956) examined caterpillars collected 'on rice' in Texas, and reported moths labelled 'larva on pecan' from Alabama and 'feeding on sweet potato' from Louisiana. Given the consistent use of Malvaceae found by Janzen and Hallwachs (2022), it is not obvious how to interpret these divergent records. The caterpillars are gregarious and drop to the ground if disturbed. The oval pupal case is formed on the stem of the food-plant and covered by grass and bits of leaves (Van Zwaluwenburg 1918). Janzen and Hallwachs (2022) include images of the caterpillars, based on which I identified those in Fig. 7 on an unknown plant near Kernahan as this species.

Status in Trinidad. An uncommon species with no obvious habitat association.

Curepe, MVL: ♂ undated (F.D. Bennett) (det. *Noropsis hieroglyphica* Cramer by R.E. Cruttwell, a synonym) [UWIZM CABI.3535]; ♀ 9.viii.1978 (M.J.W. Cock) [MJWC]

Forest Reserve, 10.16 -61.58: ? 8.xii.2020 (I. Kalliecharan photo) [iNaturalist 66313461]

Guayaguayare, Vespry, 10.16 -61.03: ? 4.viii.2023 (R. Deo photo) [iNaturalist 176996456]

Kernahan: caterpillars on unidentified host 3.xi.2018 (S. Stewart photo) [iNaturalist 18295404], (N. Solomon photo) [iNaturalist 18064070] (Fig. 7)

Parrylands Oilfield, MVL: ♀ 25.vii.1981 (M.J.W. Cock) [MJWC] (Fig. 5)

Penal: ? 28.vii.2010 (K. Sookdeo photo, moths 07) (Fig. 6)

St. Augustine: ? 24.xi.2020 (stefairy photo) [iNaturalist 65542405]

North Trinidad: ? 21.xi.2020 (avinhardeo photo) [iNaturalist 65375958]

Fig. 5. Female *Diphthera festiva*, Parrylands Oilfield, MVL, 25.vii.1981.

Fig. 6. *Diphthera festiva*, Penal: 28.vii.2010, K. Sookdeo photo; ©, with permission.

Fig. 7. Caterpillars of *Diphthera festiva* on unidentified food plant, Kernahan, 3.xi.2018, N. Solomon [iNaturalist 18064070]; ©, under CC-BY-NC.

***Lepidodes* Guenée**

Type species: *Lepidodes limbulata* Guenée, 1852, TL Colombia.

***Lepidodes limbulata* Guenée, 1852**

Figs. 8–10.

OD: Guenée (1852): *Lepidodes limbulata*, TL Colombia.

Historical notes. This species was identified by comparison with the NHMUK series.

Taxonomic issues. This appears to be BIN BOLD:AAJ9324 from French Guiana.

Identification. The relatively large size is perhaps the most obvious distinguishing feature of this otherwise obscurely marked species. The female has more rounded forewings.

Biology in Trinidad. No information from Trinidad, but in Costa Rica, Janzen and Hallwachs (2022) reared this species from Malpighiaceae, especially *Bunchosia* spp.

Status in Trinidad. An uncommon species, found in forested areas.

Cumaca Road, 4.6 miles, MVL: ♂ 18.vii.1981 (M.J.W. Cock) [UWIZM CABI.3791]

Fig. 8. Male *Lepidodes limbulata*, Morne Bleu, Textel Installation, at light, 20.ix.1978.

Fig. 9. Female *Lepidodes limbulata*, Parrylands Oilfield, MVL, 25.vii.1981.

Fig. 10. *Lepidodes limbulata*, Upper Guanapo Valley, 10.72 -61.26, by night, 31.xii.2022, R. Deo photo, [iNaturalist 145666425]; ©, with permission.

Upper Guanapo Valley, 10.72 -61.26, by night: ♂ 31.xii.2022 (R. Deo photo) [iNaturalist 145666425] (Fig. 10)
Inniss Field, MVL: ♂ 17.v.1999 (M.J.W. Cock) [MJWC]
Matura, 10.67 -61.06: ♂ 21.xi.2020 (C. McMayo photo) [iNaturalist 65409519]
Morne Bleu, Textel Installation, at light: ♂ 20.ix.1978 (M.J.W. Cock) [MJWC, TL-974] (Fig. 8)
Parrylands Oilfield, MVL: ♀, ? 25.vii.1981 (M.J.W. Cock) [♀ MJWC; ? NHMUK, TL-974] (Fig. 9)
Upper Guanapo Valley, 10.72 -61.26, by night: ♂ 31.xii.2022 (R. Deo photo) [iNaturalist 145666425] (Fig. 10).

Subfamily Collomeninae Zahiri, Lafontaine, & Schmidt,2013

Hampson (1912) treated this subfamily as part of Sarrothripinae (Noctuidae).

***Collomena* Möschler 1890**

Type species: *Collomena elota* Möschler, a synonym of *C. filifera* Walker, a Caribbean species, similar to *C. chirica* with a plain white hindwing. Janzen and Hallwachs (2022) include a small number of *Collomena* spp. reared

from Combretaceae (*Combretum*, *Terminalia*), Myrtaceae (*Eugenia*) and Ulmaceae (*Celtis*). Adults rest with the wings held at an angle over the substrate, and the abdomen elevated above them (Fig. 16), although not as upright as in *Motya* spp. (Fig. 23). *Collomena filifera* (Walker, 1857) occurs throughout the Antilles to French Guiana and Brazil (Zagatti *et al*. 1995–2001, Becker and Miller 2002), so it might also be found in Trinidad and Tobago. It is similar to *C. chirica*, but the hindwing is plain white in the male and only slightly marked at the margin in the female (Becker and Miller 2002).

***Collomena chirica* (Schaus, 1906)**

Figs. 11–12.

OD: Schaus (1906): *Casandria chirica*, TL Mexico.

TT: *Collomena chirica* (Schaus): Cock (2017)

Historical notes. Cock (2017) reported this species from Tobago, indicating it also occurred in Trinidad. It was identified by comparison with NHMUK series, a paratype (USNM, ♀ Mexico) and USNM series.

Taxonomic issues. There are no DNA barcode sequences in BOLD. Trinidad is a long way from the type locality, Mexico, so this identification may be regarded as provisional.

Identification. This species is similar in size and markings to *C. metaphaea*, but consistently paler. There seem to be various small characters of the forewing markings which will separate the two, e.g. the discal spot is larger in *C. metaphaea*, the costal portion of the outer margin of the basal band is indent in *C. chirica*, but much less so in *C. metaphaea*, etc. The forewings of the male are darker than those of females, and males have a uniformly dark hindwing, whereas in the female the hindwing is pale basally and discally. The forewing of male *C. chirica* is comparable in shade to that of the female of C. *metaphaea*.

Status in Trinidad & Tobago. An uncommon species with no obvious habitat association.

Curepe: ♂ 5-6.ix.1969 (F.D. Bennett) [NHMUK]

Curepe, MVL: ♀ 13.ix.1978 (M.J.W. Cock) [MJWC]; ♂ 27.viii.1980 (M.J.W. Cock) [MJWC]; ♂ 2.ix.1980 (M.J.W. Cock) [UWIZM CABI.7289]; ♂ 8.ix.1980 (M.J.W. Cock) [MJWC] (Fig. 11); 2♂ 23-28.ix.1980 (M.J.W. Cock) [MJWC; UWIZM CABI.7288]; ♀ 29.ix-2.x.1980 (M.J.W. Cock) [MJWC]

Morne Bleu, Textel Installation, at light: ♀ 3.vii.1978 (M.J.W. Cock) [MJWC]; ♂ 2.iii.1981 (M.J.W. Cock) [UWIZM CABI.7287]

St Benedict's, MVL: ♀ 26.v.1981 (M.J.W. Cock) [MJWC] (Fig. 12)

TOBAGO, Scarborough, Marden House, MVL: ♀ 9.i.1982 (M.J.W. Cock) [MJWC]

TOBAGO, Nr. Speyside, MVL: ♀ 14-17.v.1982 (M.J.W. Cock) [MJWC]

Fig. 11. Male *Collomena chirica*, Curepe, MVL, 8.ix.1980.

Fig. 12. Female *Collomena chirica*, St Benedict's, MVL, 26.v.1981.

***Collomena metaphaea* (Hampson, 1912)**
Figs. 13–16.
OD: Hampson (1912): *Casandria metaphaea*, TL Panama.
Historical notes. Identified by comparison with type (NHMUK, ♂ Panama) and NHMUK series.
Taxonomic issues. No public DNA barcodes in BOLD.
Identification. See notes under *C. chirica* above.
Status in Trinidad. An occasional species in forested habitats.
Aripo Savannah, at light: ♀ 26.iii.2016 (K. Sookdeo photo moths 87) (Fig. 16)
Brasso Seco, 10.747 -61.265, at light: ?♂ 10.iv.2021 (R. Deo photo) [iNaturalist 73657740] (Fig. 15)
Caparo: ♂ xi.1905 (S.M. Klages) [NHMUK]; ♂ (S.M. Klages) [NHMUK]
Cumaca Road, 0.5 miles, MVL: 2♀ 27.x.1980 (M.J.W. Cock) [MJWC; UWIZM CABI.7290] (Fig. 14)
Cumaca Road, 4.6 miles, MVL: ♂, ♀ 18.vii.1981 (M.J.W. Cock) [MJWC] (Fig. 13)
Morne Bleu, Textel Installation, at light: ♂ 5.ix.1978 (M.J.W. Cock) [MJWC]
Valencia Forest, MVL: ♀ 5.viii.1981 (M.J.W. Cock) [MJWC]

Fig. 13. Male *Collomena metaphaea*, Cumaca Road, 4.6 miles, MVL, 18.vii.1981.

Fig. 14. Female *Collomena metaphaea*, Cumaca Road, 4.6 miles, MVL, 18.vii.1981.

Fig. 15. Male *Collomena metaphaea*, Brasso Seco, at light, 10.iv.2021, R. Deo (iNaturalist observation 73657740); ©, with permission.

Fig. 16. Female *Collomena metaphaea*, Aripo Savannah, at light, 26.iii.2016, K. Sookdeo; ©, with permission.

***Collomena murora* (Dyar, 1914)**
Figs. 17–18.
OD: Dyar (1914): *Casandria murora*, TL Panama.
Historical notes. Identified by comparison with the types (USNM, 2♂, ♀ Panama). I had identified this as *Motya steniptera* Schaus by comparison with NHMUK series, but it is not that species (type USNM, ♂ French Guyana).
Taxonomic issues. No public DNA barcode sequences in BOLD.
Identification. I have not seen the male from Trinidad, but Rainer Deo's photograph (Fig. 18) may be one. The female dorsal forewing is two shades of brown, the base and medial band being darker.
Status in Trinidad. A rare species.
Curepe, MVL: ♀ 23.viii.1980 (M.J.W. Cock) [MJWC] (Fig. 17)
Nariva Swamp, Manzanilla-Mayaro Road, milestone 46.5, MVL: ♀ 19.i.1988 (M.J.W. Cock) [MJWC]
Provisional identification: Caroni Swamp Visitor Centre: ? 15.xii.2022 (R. Deo photo) [iNaturalist 144474236] (Fig. 18)

Fig. 17. Female *Collomena murora*, Curepe, MVL, 23.viii.1980.

Fig. 18. A possible male of *Collomena murora*, Caroni Swamp Visitor Centre, 15.xii.2022, R. Deo [iNaturalist 144474236]; ©, with permission.

***Collomena siopera* (Dyar, 1914) complex**
Fig. 19.
OD: Dyar (1914): *Casandria siopera*, TL Panama and Mexico.
Historical notes. Identified by comparison with paratypes (Panama, USNM) and USNM series (none from Trinidad), and NHMUK series. My female specimen differs in that hindwing is uniformly dark brown, with paler brown cilia, so I refer to this as *Collomena siopera* complex.
Taxonomic issues. BOLD:AAA8669 from Costa Rica contains material identified as *C. siopera*. Given that this species was described from Panama and Mexico, a lectotype needs to be designated.
Identification. A predominantly grey species, with the distal area tinged with brown. The hindwing is uniformly brown

Fig. 19. Female *Collomena siopera* complex, Curepe, MVL, 20.viii.1978.

with darker veins and paler cilia, and there is a black patch on the ventral forewing near the base.

Status in Trinidad. A rare species.

Curepe, MVL: ♀ (abdomen detached in gelatin capsule) 20.viii.1978 (M.J.W. Cock) [MJWC, TL-442] (Fig. 19)

Curepe, MVL: ♀ 1.ix.1978 (M.J.W. Cock) [NHMUK, TL-442] (this record merits rechecking).

***Collomena* sp. A**

Fig. 20.

Historical notes. Not previously recorded from Trinidad.

Taxonomic issues. This appears to be an undescribed species. I have found un-named material to match this in NHMUK from French Guyana and in USNM from Venezuela, El Salvador and French Guyana.

Identification. The female is not known from Trinidad. This is a grey species with distinct dark markings and the submarginal area with a chestnut tint. The hindwings are paler basally, unlike those of other *Collomena* spp. from Trinidad, which are uniformly dark brown in the male.

Status in Trinidad. Only one Trinidad record, from Morne Bleu.

Morne Bleu, Textel Installation, at light: ♂ 20.ix.1978 (M.J.W. Cock) [MJWC] (Fig. 20)

***Motya* Walker, 1859**

Type species: *Motya abseuzalis* Walker. Janzen and Hallwachs (2022) include a few records of *Motya* spp. reared from Combretaceae. Like *Collomena* spp. the wings are held at an angle over the substrate, with the abdomen lifted above them, but unlike *Collomena* (Fig. 16), the abdomen is usually at a right angle to the substrate (Fig. 23). The Trinidad *Motya* spp. are consistently smaller than the Trinidad *Collomena* spp.

***Motya abseuzalis* Walker, 1859**

Figs. 21–24.

OD: Walker (1859): *Motya abseuzalis*, TL Brazil.

Historical notes. Identified by comparison with the type (OUMNH, ♀ Brazil (OUMNH 2023a)).

Taxonomic issues. There are three public DNA barcodes of this species from Florida that are identified as *M. abseuzalis* and form BOLD:ACM4438. If this identification is correct, this is a widespread species occurring from Brazil to Florida, and *M. abseuzalis* should be the correct name for Trinidad as well.

Identification. The sexes are similar, apart from the longer abdomen and more pointed wings of the male. This small grey species has rows of marginal and submarginal spots

Fig. 20. Male *Collomena* sp. A, Morne Bleu, Textel Installation, at light, 20.ix.1978.

Fig. 21. Male *Motya abseuzalis*, Curepe, MVL, 12.x.1980.

Fig. 22. Female *Motya abseuzalis*, Curepe, MVL, 26.viii.1978.

Fig. 23. Male *Motya abseuzalis*, South Oropouche, Mon Desir, 24.xii.2021, T.P. Maharaj [iNaturalist 103627958]; ©, under CC-BY-NC.

Fig. 24. Male *Motya abseuzalis*, Chacachacare Island, at light, 24.i.2015, K. Sookdeo; ©, with permission.

on the dorsal forewing, the latter including a large spot near the tornus and two large spots near the apex. The irregular postmedial line is more obvious in some individuals (Fig. 23) than in others. The hindwing is pearly white, with only the distal veins, and narrowly the margin dark brown. The veins of the ventral forewing are dark in contrast to the ground colour. The female of *M. flotsama* is similar, but the submarginal row of spots is reduced and the larger apical submarginal spots are missing, the margin of the dorsal and ventral hindwing is broadly diffuse dark brown, and the veins of the ventral forewing are not dark.

Biology in Trinidad. No information from Trinidad. Heppner (2003) gives a food plant in Florida as button mangrove, *Conocarpus erectus* (Combretaceae), which also occurs in Trinidad.

Status in Trinidad. An occasional species in Trinidad with no obvious habitat association. Also recorded from Chacachacare Island.

Arima Valley, Simla, MVL: ♂ 15.ii.1981 (M.J.W. Cock) [MJWC]

Curepe, MVL: ♀ 26.viii.1978 (M.J.W. Cock) [MJWC, TL-430] (Fig. 22); ? 3.xi.1978 (M.J.W. Cock) [NHMUK, TL-430]; ♀ 23-28.ix.1980 (M.J.W. Cock) [MJWC]; ♀ 29.ix-2.x.1980 (M.J.W. Cock) [MJWC]; ♂ 12.x.1980 (M.J.W. Cock) [MJWC] (Fig. 21)

Guayaguayare, Rushville: ?♀ 18.iii.2023 (R. Deo photo) [iNaturalist 152893346]

Morne Bleu, Textel Installation, at light: ♀ 10.viii.1979 (M.J.W. Cock) [MJWC]

South Oropouche, Mon Desir: ♂ 24.xii.2021 (T.P. Maharaj photo) [iNaturalist 103627958] (Fig. 23)

CHACACHACARE ISLAND, at light: ♂ 24.i.2015 (K. Sookdeo photo moths 57) (Fig. 24); ♀ 19.ii.2023 (R. Deo photo) [iNaturalist 149321938]

***Motya arcuata* (Schaus, 1910)**

Fig. 25.

OD: Schaus (1910): *Casandria arcuata*, TL Costa Rica.

Historical notes. Trinidad material was identified by comparison with the type (USNM, ♂ Costa Rica) and NHMUK series.

Taxonomic issues. Material identified as this species from Costa Rica forms BOLD:AAD4948, but barcodes from South America need to be obtained and compared to assess the wider distribution.

Identification. The male is dark grey-brown on both wings

Fig. 25. Male *Motya arcuata* or near, Cumaca Road, 4.6 miles, MVL, 18.vii.1981.

and surfaces, with a strongly convex costal margin to the forewing, in the male slightly angled at about two-thirds. The female is not known from Trinidad, but judging from the specimens illustrated in BOLD:AAD4948, it is similar to the male, but with a smoothly convex forewing costa.

Biology in Trinidad. No information from Trinidad, but Janzen and Hallwachs (2022) reared a specimen from *Terminalia amazonia* (Combretaceae).

Status in Trinidad. A rare species in Trinidad, only collected on the Cumana Road.

Cumaca Road, 0.5 miles, MVL: ♂ 27.x.1980 (M.J.W. Cock) [MJWC]

Cumaca Road, 4.6 miles, MVL: ♂ 18.vii.1981 (M.J.W. Cock) [MJWC] (Fig. 25); ♂ 21.x.1982 (M.J.W. Cock) [MJWC].

***Motya flotsama* (Dyar, 1914)**

Figs. 26–27.

OD: Dyar (1914): *Casandria flotsama*, TL Panama.

Historical notes. I have not examined the type material, but

Fig. 26. Male *Motya flotsama*, Arima Valley, Simla, MVL, 15.ii.1981.

Fig. 27. Female *Motya flotsama*, Curepe, MVL, 25.viii.1978.

identified this species by comparison with the illustration in 'Lepidoptera of the French Antilles' website (Zagatti *et al*. 1995–2001). Unfortunately, this website is currently unavailable on line, and the archive copy cited does not include this illustration. I have also examined the types of *M. insignis* Dyar (USNM ♂, ♀ French Guyana), which are close, but not an exact match.

Taxonomic issues. Poole (1989) listed this species in '*Cassandria* of authors', but Zagatti *et al*. (1995–2001) placed it in *Motya* based on the male genitalia.

Identification. The male is almost unmarked grey, with more pointed wings and a longer abdomen than the female. The female is similar to *M. abseuzalis*, but see under that species for differences.

Status in Trinidad. An uncommon species, recorded from Curepe and the Arima Valley.

Arima Valley, Simla, MVL: ♂ 15.ii.1981 (M.J.W. Cock) [MJWC] (Fig. 26)

Curepe, MVL: ♀ 25.viii.1978 (M.J.W. Cock) [MJWC] (Fig. 27); ♀ 22.ix.1980 (M.J.W. Cock) [MJWC]; ♀ 12.x.1980 (M.J.W. Cock) [MJWC]; 2♀ 23-28.ix.1980 (M.J.W. Cock) [MJWC]

***Motya mythias* (Schaus, 1921)**

Figs. 28–29.

OD: Schaus (1921): *Casandria mythias*, TL Guatemala.

Historical notes. Identified by comparison with the paratype (USNM, Guatemala) and USNM series (none from Trinidad).

Taxonomic issues. Material from Costa Rica identified as this species forms BOLD:AAE6482. Despite the Central American type locality, Trinidad material seems a good match.

Identification. This species is smaller than the other *Motya* spp. known from Trinidad. It is silvery grey, with crisp black markings including a circular discal spot, a jagged postmedial line and rows of marginal and submarginal spots. The sexes are similar apart from the longer male abdomen.

Status in Trinidad. Rare, only recorded from Valencia Forest on the 'Long Stretch'.

Valencia Forest, MVL: ♀ 31.vii.1981 (M.J.W. Cock) [NHMUK]; ♂ 5.viii.1981 (M.J.W. Cock) [MJWC, TL-968] (Fig. 28); ♀, ? iv.1980 (M.J.W. Cock) [♀ MJWC; ? NHMUK, TL-968] (Fig. 29)

Fig. 28. Male *Motya mythias*, Valencia Forest, MVL, 5.viii.1981.

Fig. 29. Female *Motya mythias*, Valencia Forest, MVL, iv.1980.

***Neostictoptera* Druce 1900**
Type species: *Neostictoptera nigropuncta* Druce. Males have a distorted hindwing, almost square in shape, with three parallel androconia brands near the apex. Janzen and Hallwachs (2022) include a *Neostictoptera* sp. reared on Myrtaceae with a plain green caterpillar with yellow speckles.

***Neostictoptera melanographa* (Hampson, 1912)**
Fig. 30.
OD: Hampson (1912): *Casandria melanographa*, TL Guyana.
Historical notes. Identified by comparison with type (NHMUK ♀, Guyana) and NHMUK series.
Taxonomic issues. No public DNA barcodes are available in BOLD.
Identification. Spread male specimens with three parallel orange-brown androconia brands near the apex of the hindwing are easy to ecognizes. I have not seen the female from Trinidad, but it only lacks the androconia brands (Hampson 1912). Live individuals with the hindwing hidden can be recognized by the size, pattern of black lines, and extensive white areas on the costal area. In contrast, the dorsal forewings of *N. nigropuncta* are uniformly grey with less obvious black line markings (Figs. 31-32).
Status in Trinidad. Rare, only one record from Morne Bleu.
Morne Bleu, Textel Installation, at light: ♂ 11.x.1978 (M.J.W. Cock) [MJWC] (Fig. 30)

***Neostictoptera nigropuncta* Druce, 1900**
Figs. 31–32.
OD: Druce (1900): *Neostictoptera nigropuncta*, TL Colombia.
TT: *Neostictoptera nigropuncta* Druce: Cock *et al*. (2023)
Historical notes. Cock *et al*. (2023) reported this species from Trinidad and Tobago for the first time. The Trinidad specimen was identified by comparison with the type (NMHUK ♀, Colombia) and NHMUK series.
Taxonomic issues. In BOLD, this species appears as BOLD:AAD0397 from Costa Rica.
Identification. As for the last, the black hindwing androconia brands make pinned males (Fig. 31) easy to recognise. Druce (1900) describes the female as similar but without the androconia brands. Living moths are not so obvious (Fig. 32), but the size, uniform grey ground colour, and black line markings will distinguish this species from the last.
Status in Trinidad and Tobago. One record from Trinidad (Fig. 31) and several photographic records from Tobago (e.g. Fig. 32).
Morne Bleu, Textel Installation, at light: ♂ 29.iii.1979

Fig. 30. Male *Neostictoptera melanographa*, Morne Bleu, Textel Installation, at light, 11.x.1978.

Fig. 31. Male *Neostictoptera nigropuncta*, Morne Bleu, Textel Installation, at light, 29.iii.1979.

Fig. 32. Male *Neostictoptera nigropuncta*, nr. Mason Hall, 23.vii.2023, C. Mejias [iNaturalist 174609667]; ©, under CC-BY-NC.

(M.J.W. Cock) [MJWC] (Fig. 31)
TOBAGO, Cuffie River Nature Resort: ? 29.viii.2023 (R. Deo photo) [iNaturalist 180896852]
TOBAGO, Englishman's Bay, at light: ? 3.vii.2022 (M. Gibson photo) [iNaturalist 124669073]
TOBAGO, nr. Mason Hall, 11.23 –60.70, at light: ?♂ 23.vii.2023 (C. Mejias photo) [iNaturalist 174609667] (Fig. 32); ? 25.vii.2023 (C. Meijias photo) [iNaturalist 174960885]; ? 16.viii.2023 (C. Mejias photo) [iNaturalist 178774140]

***Rhabdotina* Hampson 1926**

Type species: *Rhabdotina vittifera* Hampson, 1926, a synonym of *R. phoenicias* (Hampson, 1918). The family and subfamily placement of this genus does not seem to have been addressed since Zahiri *et al*. (2011) restructured the Noctuoidea. There are no public DNA barcode sequences of this genus in BOLD. Hampson (1918) originally described *R. phoenicias* in the genus *Casandria*. Poole (1989) transferred most members of this genus to *Collomena*. Accordingly, pending formal investigation, I treat this genus as belonging in Collomeninae. I have located no food plant records for this genus.

***Rhabdotina phoenicias* Hampson, 1918**

Fig. 33.
OD: Hampson 1918: *Cassandria* [sic] *phoenicias*, TL Panama
Historical notes. Identified by comparison with type (NHMUK, ♀ Panama) and type of *vittifera* Hampson (NHMUK, ♂ Venezuela, a synonym) and NHMUK series.
Taxonomic issues. There are no public DNA barcodes in BOLD.
Identification. I have seen no females from Trinidad. Within the Nolidae of Trinidad, this is a distinctive species, with relatively short, dark, broad wings. However, there are superficially similar species of Noctuidae and Erebidae which can be distinguished by comparing the detailed markings: dark colouring and obscure markings of the dorsal forewing, including the paler basal area and postmedial areas, paler line on dorsum just distal to basal area, white triangle on the costa before apex; uniformly brown dorsal hindwing with paler cilia; ventral forewing uniformly brown apart from a pale arc on costa at the apex and two pale notches basal to this, ventral hindwing with costa and cilia pale.
Status in Trinidad. A rare species with three scattered records.
Caparo: ?♂ xii.1905 (S.M. Klages) [NHMUK]
Curepe, BLT: ♂ 23.1-10.ii.1982 (F.D. Bennett) [MJWC]
St Benedict's, MVL: ♂ 26.v.1981 (M.J.W. Cock) [MJWC] (Fig. 33)

Subfamily Eligminae Mell, 1943

Hampson (1912) treated this subfamily as part of Sarrothripinae (Noctuidae). The long, thin, forward-directed labial palps are characteristic of this subfamily and should provide a useful pointer for its recognition. At rest, the wings are held more or less flat against the substrate, but covering the abdomen (Figs. 36, 41, 43, 46).

Fig. 33. Male *Rhabdotina phoenicias*, St Benedict's, MVL, 26.v.1981.

***Elaeognatha* Hampson**
Type species: *Elaeognatha argyritis* Hampson, TL Panama. Janzen and Hallwachs (2022) include food plant records for this genus from Clusiaceae and Ericaceae.

***Elaeognatha cacaonis* Druce, 1910**
Fig. 34.
OD: Druce (1910): *Elaeognatha cacaonis*, TL Trinidad.
TT: *Elaeognatha cacaonis* Druce: Druce (1910)
Historical notes. Although this species was described from Trinidad, it was not included in Kaye and Lamont's (1927) catalogue. Identified by comparison with type (NHMUK ♀, Trinidad), which is the only specimen seen in NHMUK.
Taxonomic issues. No public DNA barcodes in BOLD.
Identification. This is a mottled and lined dark species, with patches of yellowish green basally and at about midway in space 1B (Cu_2-2A). *Iscadia producta* (Fig5. 47–48) is similar, but there is a pale basal patch, a pale < on the dorsum at about three-quarters and an irregular pale subterminal line. The sexes are similar.
Status in Trinidad. Rare, only in forested areas.
Arima Valley, Simla, MVL: ♂ 6.viii.1982 (M.J.W. Cock) [MJWC, genitalia 1172]
Caparo: ♀ (type) (F. Birch) [NHMUK]
Morne Bleu, Textel Installation, at light: ♂ 3.vii.1978 (M.J.W. Cock) [MJWC] (Fig. 34)

***Iscadia* Walker 1857**
Type species: *Iscadia aperta* Walker, TL Dominican Republic. As set out by Poole (1989) this genus now includes disparate elements, such that the genus will almost certainly need to be split up. *Gadirtha* Walker, 1858 and *Sebagena* Walker, 1865, amongst others are currently synonyms that appear in the Trinidad literature, which may merit revalidation.

***Iscadia aperta* Walker, 1857 complex**
Figs. 35–36.
Walker (1857): *Iscadia aperta*, TL Dominican Republic.
Historical notes. Identified by comparison with NHMUK series.
Taxonomic issues. There are several BINs in BOLD identified as, or resembling *I. aperta*: BOLD:AAE1952 (USA, Texas), BOLD:AAH5623 (USA, Arizona), BOLD:AAE1951 (Costa Rica) and as *Iscadia* sp. BOLD:AAI2783 (Costa Rica), and BOLD:ACY7495 (French Guiana, unspread). More work is needed to clarify these and establish which if any is the true *I. aperta* from the Dominican Republic.
Identification. The forewing of this species somewhat resembles those of *Collomena chirica* (Figs. 11–12) and *C. metaphaea* (Figs. 13–16), but this is a larger species, with narrower wings and the hindwing is pearly white apart from the dark margin. I have not seen the male from Trinidad for

Fig. 34. Male *Elaeognatha cacaonis*, Morne Bleu, Textel Installation, at light, 3.vii.1978.

Fig. 35. Female *Iscadia aperta* complex, Curepe, MVL, 22–31.v.1982.

Fig. 36. Male(?) *Iscadia aperta* complex, South Oropouche, 23.xi.2022, T.P. Maharaj [iNaturalist 142711371]; ©, under CC-BY-NC.

certain, but judging from photos in BOLD it is darker, but still with the pearly hindwing, thus suggesting that Tarran Maharaj's photo (Fig. 36) is of a male.

Status in Trinidad. Rare – just four records from Curepe, and one from South Oropouche.

Curepe, MVL: ? 17.ix.1978 (M.J.W. Cock) [NHMUK, TL-799]; ♀ 20.i.1980 (M.J.W. Cock) [MJWC]; ♀ 5.ii.1980 (M.J.W. Cock) [UWIZM CABI.3477]; ♀ 22-31.v.1982 (M.J.W. Cock) [MJWC, TL-799] (Fig. 35)

South Oropouche, Mon Desir, at light: ?♂ 23.xi.2022 (T.P. Maharaj) [iNaturalist 142711371, 142737917] (Fig. 36)

***Iscadia argentea* (Walker, 1869)**

Figs. 37–38.

OD: Walker (1869): *Libunca argentea*, TL Honduras.

TT: *Sebagena argentea* (Walker): Kaye and Lamont (1927).

Historical notes. Kaye and Lamont (1927) recorded this species from Trinidad as *Sebagena argentea*, based on a specimen collected by F.W. Jackson. This specimen was examined in NHMUK. My identification is based on a comparison with the type (NHMUK ♀, Honduras) and NHMUK series.

Taxonomic issues. Material identified as *I. argentea* appears in two BINs in BOLD: BOLD:AAI2764 from Costa Rica and French Guiana and BOLD:ABZ0458 from French Guiana. The former probably represents the true *I. argentea* given the Honduras type locality. Trinidad material may belong to either BIN (or both), so is provisionally referred to as *I. argentea*, pending the availability of DNA barcodes from Trinidad and further research.

Identification. This is a distinctive species, grey-brown with green tints on the dorsum half of the forewing and variably dark brown on the costa half. The most distinctive feature is the heavy black streak from the base of the costa to midway in space 1B (Cu_2-2A). The sexes are similar.

Biology in Trinidad. No information for Trinidad, but Janzen and Hallwachs (2022) reared this species (BOLD:AAI2764) from Clusiaceae (*Clusia*).

Status in Trinidad. An occasional species in forested areas.

Arima Blanchisseuse Road, milestone 9.75, MVL: ♂ 21.ix.1982 (M.J.W. Cock) [MJWC] (Fig. 37)

Fig. 37. Male *Iscadia argentea*, Arima Blanchisseuse Road, milestone 9.75, MVL, 21.ix.1982.

Fig. 38. Female *Iscadia argentea*, Arima Valley, Simla, MVL, 28.i.1981.

Arima Blanchisseuse Road, milestone 10.5, MVL: ♂ 6.ix.1982 (M.J.W. Cock) [MJWC]
Arima Valley, Simla, MVL: ♀ 28.i.1981 (M.J.W. Cock) [MJWC] (Fig. 38); 2♂ 18.x.1982 (M.J.W. Cock) [UWIZM CABI.7283, 7284]
Caparo: ♂ xii.1905 (S.M. Klages) [NHMUK]
Trinidad: ♀ (F.W. Jackson) [NHMUK]

***Iscadia candezei* (Druce, 1898)**
Figs. 39–41.
OD: Druce (1898): *Gadirtha candezei*, TL Guatemala.
Historical notes. Identified by comparison with the NHMUK series.
Taxonomic issues. Druce (1881–1900) described this species in *Gadirtha*, which is currently a synonym of *Iscadia*, but likely to be a valid genus. This species seems to be BOLD:ABZ6209 with sequences from Costa Rica and French Guiana.
Identification. This is the largest member of the subfamily in Trinidad. It is striated ochreous brown with a dark basal patch and variably overlaid with light grey. The sexes are similar, although the female is larger.
Status in Trinidad. An uncommon species from both forested and suburban habitats.
Arima Valley, Simla, MVL: ♀ 6.viii.1982 (M.J.W. Cock) [MJWC] (Fig. 40)
Curepe, at light: ♂ 15.i.1980 (M.J.W. Cock) [MJWC] (Fig. 39)
Curepe, MVL: ?♂ 11.viii.1978 (M.J.W. Cock) [NHMUK, TL-797]; ♂ 19.x.1979 (M.J.W. Cock) [MJWC, TL-797]
Guayaguayare, Rushville: ? 21.iii.2023 (R. Deo photo)

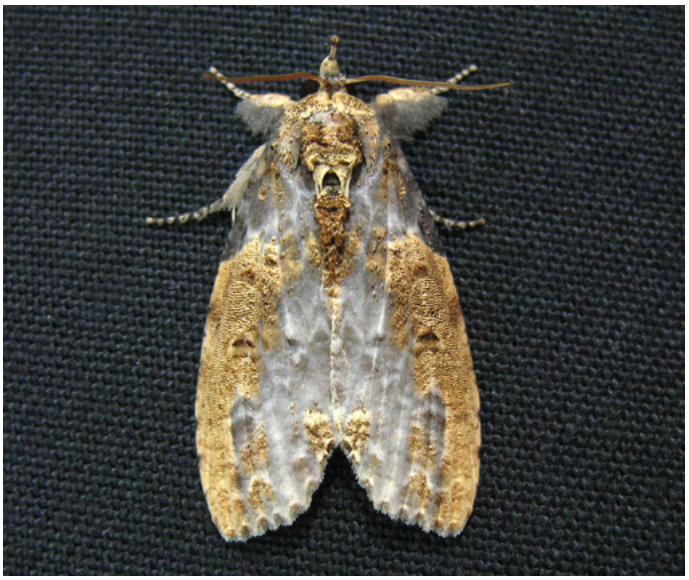

Fig. 41. *Iscadia candezei*, Penal, at light, 31.x.2010, K. Sookdeo; ©, with permission.

[iNaturalist 152122547]
Penal: ? 31.x.2010 (K. Sookdeo photo, moths 18) (Fig. 41)

***Iscadia diopis* Hampson, 1905**
Figs. 42–43.
OD: Hampson (1905): *Iscadia diopis*, TL Costa Rica.
TT: *Iscadia diopis* Hampson: Hampson (1912)
Historical notes. Hampson (1912) listed a specimen from Caparo (=Cuparo) in NHMUK. I identified my specimen by comparison with type (NHMUK, ♀ Costa Rica) and NHMUK series.

Fig. 39. Male *Iscadia candezei*, Curepe, at light, 15.i.1980.

Fig. 40. Female *Iscadia candezei*, Arima Valley, Simla, MVL, 6.viii.1982.

Fig. 42. Male *Iscadia diopis*, Cumaca Road, 4.6 miles, MVL, 21 x. 1982.

Fig. 43. *Iscadia diopis*, Asa Wright Nature Centre, 22.iii.2015, S. Nanz; ©, with permission.

Taxonomic issues. This species is BOLD:AAI2767, based on material from Costa Rica (the type locality) and Panama. A DNA barcode from Trinidad would be useful to compare.
Identification. The markings in my only specimen are difficult to make out (Fig. 42), but those of a photograph by Steve Nanz (Fig. 43) are much clearer. Judging by the material in BOLD:AAI2767, this is a variable species, but note the angled grey basal area, dark submedial spot, undulating double postmedial line, submarginal streaks, etc. Sexes are similar.
Biology in Trinidad. There are no records from Trinidad, but Janzen and Hallwachs (2022) reared this species from Myristaceae (*Virola*).
Status in Trinidad. A rare species in forested areas.
Asa Wright Nature Centre: ? 22.iii.2015 (S. Nanz, photo 3223) (Fig. 43)
Caparo: ♀ xii.1905 (S.M. Klages) [NHMUK]; (S.M. Klages) [NHMUK]
Cumaca Road, 4.6 miles, MVL: ♂ 21 x. 1982 (M.J.W. Cock) [MJWC] (Fig. 42)

***Iscadia furcifera* (Walker, 1865)**
Figs. 44–46.
OD: Walker (1865): *Sebagena furcifera*, TL Colombia.
TT: *Iscadia variegata* Druce: Druce (1910) TL Trinidad, Hampson (1912) [synonym]
Sebagena furcifera Walker: Kaye and Lamont (1927)
Historical notes. Druce (1910) described *Iscadia variegata* from Trinidad (Caparo), Colombia and Peru, but the specimen treated as 'type' in NHMUK is the first of these, and should be designated as the lectotype. Poole (1989) made *I. variegata* a synonym of *I. furcifera*. Kaye and Lamont (1927) did not include *I. variegata* in their catalogue, but they did include a female specimen collected by F.W. Jackson as *I. furcifera*; this specimen is now in NHMUK. Trinidad specimens were identified by comparison with the type of *I. furcifera* (NHMUK ♀, Colombia), type of *I. variegata* Druce (NHMUK ♂, Trinidad) and NHMUK series. The first records from Tobago are reported here.
Taxonomic issues. Material identified as *I. variegata* appears in three BINs in BOLD: BOLD:ACE4375 (Costa Rica), BOLD:AAB3432 (Costa Rica, Panama), BOLD:ACE4374 (French Guiana, Venezuela). It is not clear which of these is likely to be the true *I. furcifera* described from Colombia. None of this material is a very close match to my Trinidad male specimens (Fig. 44), so it is possible that *I. variegata* may prove to be a valid name for the Trinidad population. A DNA barcode from Trinidad or Tobago would be helpful to clarify the situation.
Identification. This species is sexually dimorphic. The contrasting dark and pale markings of the dorsal forewing of the male are distinctive (Fig. 44). The details of the

Fig. 44. Male *Iscadia furcifera*, Morne Bleu, Textel Installation, at light, 20.ix.1978.

Fig. 45. Female *Iscadia furcifera*, Trinidad (F.W. Jackson) [NHMUK]; ©, The Trustees of the Natural History Museum, London, made available under Creative Commons License 4.0 https://creativecommons.org/licenses/by/4.0/.

Fig. 46. Female *Iscadia furcifera*, Grand Riviere, at light, 7.ii.2016, K. Sookdeo; ©, with permission.

female markings are similar, but they lack the extensive dark areas (Fig. 45).

Biology in Trinidad. In Costa Rica, Janzen and Hallwachs (2022) have reared members of this complex from Clusiaceae (*Clusia*, *Chrysochlamys*, *Garcinia*).

Status in Trinidad & Tobago. An uncommon species in Trinidad found principally in forested areas, but newly recorded from Tobago, based on several photographic records.

Caparo: ♂ (type) [NHMUK]

Curepe, MVL: ♂ 24.x.1978 (M.J.W. Cock) [NHMUK, TL-297]

Grand Riviere, at light: ♀ 7.ii.2016 (K. Sookdeo photo, moths 84) (Fig. 45)

Morne Bleu, Textel Installation, at light: ♂ 20.ix.1978 (M.J.W. Cock) [MJWC, genitalia 1173] (Fig. 44); ♂ 20.xii.1978 (M.J.W. Cock) [MJWC, TL-297]

Trinidad: ♀ (F.W. Jackson) [NHMUK]

TOBAGO, Cuffie River Nature Resort: ♂ 29.viii.2023 (R. Deo photo) [iNaturalist 180896697]

TOBAGO, Englishman's Bay, at light: ♀ 8.xii.2023 (M. Kelly photo 4535)

TOBAGO, nr. Mason Hall, 11.23 –60.70, at light: ♂ 25.vii.2023 (C. Meijias photo) [iNaturalist 174974410]; ♂ 1.viii.2023 (C. Meijias photo) [iNaturalist 176215510]; ♀ 13.viii.2023 (C. Meijias photo) [iNaturalist 178288845]; ♂ 14.viii.2023 (C. Mejias photo) [iNaturalist 178479259]; ♂ 9.ix.2023 (C. Mejias photo) [iNaturalist 182578600]; ♂ 16.xii.2023 (C. Mejias photo) [iNaturalist 194158201]

***Iscadia producta* (Dognin, 1900) complex**

Figs. 47–48.

OD: Dognin (1900): ?*Simplicia producta*, TL Colombia.

Historical notes. I initially identified this species as *I. producta* by comparison with the NHMUK series. Examination of a photo of the type (USNM, ♂ Colombia, Popayan) shows this is a species with the basal area of the hindwing extensively pale, unlike Trinidad specimens.

Taxonomic issues. This seems to be a complex of species. BOLD:AAA8510 from Costa Rica, Venezuela, and French Guiana comprises mostly unidentified material, although two are identified as *I. producta*, but it does closely resemble this species. Further, the BIN comprises two very distinct clusters, one with sequences from Costa Rica, Venezuela

Fig. 47. Male *Iscadia producta* complex, Parrylands Oilfield, MVL, 13.xi.1980.

Fig. 48. Female *Iscadia producta* complex, Parrylands Oilfield, MVL, 25.vii.1981.

and French Guiana (*Iscadia* Poole02DHJ02), and the other with many sequences from Costa Rica only (*Iscadia* Poole02DHJ03). The Trinidad population is likely to belong to the first cluster, and DNA barcodes from Trinidad would be useful to test this. Both clusters of BOLD:AAA8510 and the nearest neighbour (*Iscadia* Poole01, BOLD:AAD4393, Costa Rica only) are similar, and have uniformly dark hindwings, as opposed to the type of *I. producta* which as noted has the basal area of the hindwing pale, a character also seen in other species of this group (H. Thony pers. comm.). Hence, for now, I refer to this species as *I. producta* complex.

Biology in Trinidad. Janzen and Hallwachs (2022) reared '*I. producta*' more than 100 times from Hypericaceae (*Vismia* spp.), although I am not clear how this identification relates to the two clusters in BOLD:AAA8510. This is a likely food plant in Trinidad.

Status in Trinidad. An uncommon species from forested areas.

Cumaca Road, 0.5 miles, MVL: ♂ 27.x.1980 (M.J.W. Cock) [MJWC, TL-955, genitalia 1171]

Parrylands Oilfield, MVL: ♂ 13.xi.1980 (M.J.W. Cock) [MJWC] (Fig. 47); 2♀, ? 25.vii.1981 (M.J.W. Cock) [2♀ MJWC, ? NHMUK, TL-955] (Fig. 48)

Subfamily Nolinae Bruand, 1846

In UK usage, species of Nolinae are mostly referred to as different types of 'black arches', but this is not ideal since the 'black arches' moth itself is *Lymantria monacha* L. (Erebidae, Lymantriinae). Accordingly, the North American term tuft moths is more appropriate as indeed Trinidad species do have scale tufts on their forewings.

Hampson (1900), in his global treatment, and Draudt (1918–1919), in his treatment of the America fauna, included Nolinae as a subfamily of Arctiinae, but neither included any records from Trinidad. Kaye and Lamont (1927) included one misidentified species of Nolinae from Trinidad (see *Nola mesographa*). Cock and Kelly (2020), Cock *et al*. (2022) and Cock *et al*. (2023) added four species from both Trinidad and Tobago, but the remaining seven species treated here are all new records for Trinidad.

The Trinidad species of Nolinae are currently treated in two genera *Meganola* and *Nola*. Hampson (1900) divided the genera of Nolinae mostly based on forewing venation. Thus, *Nola* was in a group with forewing vein 9 absent, and 10 stalked with 7 and 8, whereas *Meganola* (Hampson's *Roeselia*) has veins 9 and 10 present. For our purposes, the division is perhaps not useful. All Trinidad Nolinae are small and predominantly white and/or grey with dark markings. They rest with their wings flat and the dorsum of the forewings adjacent to each other so as to form a triangular shape (Figs. 51, 58, 63, 66, 73, 74). There is little sexual dimorphism, but females are slightly larger and have simple antennae, while those of males are pectinate, sometimes with very long pectens (plumose), apart from *N. cereella* which has simple ciliated antennae.

***Meganola* Dyar, 1898**
Type species: *Meganola conspicua* Dyar, TL USA. Although most species placed in *Meganola* here were formerly placed in *Roeselia*, the generic placement follows Poole (1989).

***Meganola bifiliferata* (Walker, 1862)**
Figs. 49–51.
OD: Walker 1862: *Lobophora bifiliferata*, TL Brazil.
TT: *Meganola bifiliferata* (Walker): Cock *et al*. (2022)

Historical notes. Cock *et al*. (2022) recorded this species from Tobago, indicating that it also occurs in Trinidad.
Taxonomic issues. Walker (1862) described this species from Brazil 'In Mr. Saunders' collection', which usually means in NHMUK. However, Hampson (1900) indicated that the type is in OUMNH (2023b). Material from French Guiana identified as this species comprises BIN BOLD:AAA0848.
Identification. This whitish species has dark lines and

Fig. 49. Male *Meganola bifiliferata*, Arima Valley, Simla, MVL, 9.x.1982.

Fig. 50. Female *Meganola bifiliferata*, Arima Valley, Simla, MVL, 6.viii.1982.

Fig. 51. *Meganola bifiliferata*, Grand Riviere, 16.v.2015 , K. Sookdeo; ©, with permission.

is distinctive due to a broad, irregular dark brown border on the forewing costa from the base to about three-fifths, widest distally. The male has strongly pectinate antennae.
Biology in Trinidad. There are several food plant records from *Solanum hayesii* (Solanaceae) in Costa Rica (Janzen and Hallwachs 2022), but no information from Trinidad.
Status in Trinidad & Tobago. An occasional and widespread species, almost entirely recorded from forested areas.
Arima Blanchisseuse Road, milestone 9.75, MVL: ♂ 21.ix.1982 (M.J.W. Cock) [MJWC]
Arima Valley, Simla, MVL: ♀ 6.viii.1982 (M.J.W. Cock) [MJWC] (Fig. 50); ♂ 9.x.1982 (M.J.W. Cock) [MJWC] (Fig. 49)
Brigand Hill, lighthouse security MVL lights: ♀ 17.i.2004 (M.J.W. Cock) [MJWC

Caparo: ♀ xii.1905 (S.M. Klages) [NHMUK]
Curepe, MVL: ♂ 23-28.ix.1989 (M.J.W. Cock) [MJWC]
Grand Riviere: ? 16.v.2015 (K. Sookdeo photo, moths 81) (Fig. 51)
Morne Bleu Ridge, 10.73 -61.26: ? 13.v.2023 (R. Deo photo) [iNaturalist 161716588]
Rio Claro-Guayaguayare Road, milestone 6.5, MVL: ♀ 30.ix.1978 (M.J.W. Cock) [MJWC]
TOBAGO, above Englishman's Bay, at light: ? 14.i.2022 (M. Kelly photo 0960)
TOBAGO, nr. Mason Hall, 11.23 –60.70, at light: ? 22.vii.2023 (C. Mejias photo) [iNaturalist 174385715]; ? 3.xii.2023 (C. Mejias photo) [iNaturalist 192996907]

***Meganola deglupta* (Draudt, 1918)**
Fig. 52.
OD: Draudt 1918: *Roeselia deglupta*, TL Bolivia.
Historical notes. Identified by comparison with the unique type (♀ Bolivia) in NHMUK.
Taxonomic issues. No public DNA barcodes in BOLD. Given that the type locality is Bolivia, this identification may be regarded as provisional.
Identification. This is a smaller species, with the forewing white in the dorsum third and brown in the costal two-thirds, a post medial curved white band and an oblique pale line before the apex. The male has pectinate antennae.
Status in Trinidad. Just one record from Lalaja Ridge.
Lalaja Ridge, MVL: ♂ 3.ix.1982 (M.J.W. Cock) [MJWC] (Fig. 52)

***Meganola leucogramma* (Dognin, 1912)**
Figs. 53–54.
OD: Dognin 1912: *Roeselia leucogramma*, TL French Guiana
Historical notes. Identified by comparison with the type (USNM, ♂ French Guiana) and allotype (USNM, ♀ French Guiana).
Taxonomic issues. No public DNA barcodes in BOLD.
Identification. This is one of the larger species, the forewing pale with irregular blackish and brown bands, unlike any other Trinidad Nolinae. Males have strongly pectinate antennae.
Status in Trinidad. A rare species with just three records, which suggest this species is more likely to be encountered in forested areas.
Cumaca Road, 4.6 miles, MVL: ♂ 18.x.1982 (M.J.W. Cock) [MJWC] Fig. 53)
Curepe, MVL: ♂ 22-25.i.1981 (M.J.W. Cock) [MJWC]
Valencia Forest, MVL: ♀ 5.viii.1981 (M.J.W. Cock) [MJWC] (Fig. 54)

Fig. 52. Male *Meganola deglupta*, Lalaja Ridge, MVL, 3.ix.1982.

Fig. 53. Male *Meganola leucogramma*, Cumaca Road, 4.6 miles, MVL, 18.x.1982.

Fig. 54. Female *Meganola leucogramma*, Valencia Forest, MVL, 5.viii.1981.

***Meganola perangulata* (Hampson, 1900)**
Figs. 55–56.
OD: Hampson 1900: *Roeselia perangulata*, TL Brazil, RJ.
Historical notes. Identified by comparison with the type (♀ Rio de Janeiro) and NHMUK series.
Taxonomic issues. No public DNA barcodes in BOLD. Given that the type locality is southern Brazil, this identification may be considered provisional.
Identification. This is a larger species, grey-white with a strongly angled post medial band, sharply defined distally, an irregular subterminal line and the termen with dark shading. The male antennae are pectinate.
Status in Trinidad. An uncommon species from forested areas.
Arima Valley, Simla, MVL: ♂ 29.i.1981 (M.J.W. Cock) [MJWC] (Fig. 55); ♀ 18.x.1982 (M.J.W. Cock) [UWIZM CABI.8040]
Cumaca Road, 4.6 miles, MVL: ♀ 21.x.1982 (M.J.W. Cock) [MJWC]
Lalaja Ridge, MVL: ♀ 3.ix.1982 (M.J.W. Cock) [MJWC]
Sangre Grande, Sans Souci Estate, MVL: ♀ 8.viii.1982 (M.J.W. Cock) [MJWC] (Fig. 56)

Fig. 55. Male *Meganola perangulata*, Arima Valley, Simla, MVL, 29.i.1981.

Fig. 56. Female *Meganola perangulata*, Sangre Grande, Sans Souci Estate, MVL, 8.viii.1982.

***Meganola pernitens* (Schaus, 1911)**
Figs. 57–58.
OD: Schaus 1911: *Roeselia pernitens*, TL Costa Rica.
TT: *Meganola pernitens* (Schaus): Cock and Kelly (2020)
Historical notes. Cock and Kelly (2020) reported this species from Tobago, stating that it also occurs in Trinidad. Identified by comparison with the type (USNM, ♂ Costa Rica).
Taxonomic issues. Material from Costa Rica identified as *M. pernitens* appears as BOLD:ADA3995. When available, DNA barcodes from Trinidad should be used to test this identification.
Identification. A smaller species, forewing white, with distinctive black spots on the costa at the base and at mid costa, and the termen shaded brown-grey. Male antennae pectinate.

Fig. 57. Male *Meganola pernitens*, Arima Valley, Simla, MVL, 7.viii.1981.

Fig. 58. *Meganola pernitens*, Inniss Field, at light, 21.v.2022, R. Deo (iNaturalist observation c); ©, with permission. The scale tufts on the wings are visible as slight bumps.

Status in Trinidad & Tobago. An occasional species in forested areas.
Arima Valley, Simla, MVL: ♂ 7.viii.1981 (M.J.W. Cock) [MJWC] (Fig. 57); ♂ 12.ii.1982 (M.J.W. Cock) [MJWC]; ♂ 6.viii.1982 (M.J.W. Cock) [UWIZM CABI.8040]
Arima Valley, Verdant Vale, at light: ? 21.ix.2022 (S. Tran photo) [iNaturalist 135999481]
Inniss Field, 10.1687 -61.264, at light: ? 21.v.2022 (R. Deo photo) [iNaturalist 118270624] (Fig. 58)
Morne Bleu, Textel Installation, at light: ♂ 5.ix.1978 (M.J.W. Cock) [MJWC]
TOBAGO, Englishman's Bay, 11.28 -60.68: ? 11.i.2022 (A. Deacon photo) [iNaturalist 104824781]
TOBAGO, Englishman's Bay, at light: ? 7.i.2020 (M. Kelly photo 0798); ? 22.vii.2022 (M. Gibson photo) [iNaturalist 127440706]; ? 17.xi.2022 (M. Kelly photo 5485)
TOBAGO, nr. Mason Hall, 11.23 –60.70, at light: ? 6.viii.2023 (C. Mejias photo) [iNaturalist 177106656]; ? 11.viii.2023 (C. Mejias photo) [iNaturalist 177915211

***Meganola polyodonta* Schaus, 1905**
Figs. 59–60.
OD: Schaus 1905: *Nola polyodonta*, TL. French Guiana, Mexico.
Historical notes. Identified by comparison with the type (USNM, ♂ French Guiana) and USNM series.
Taxonomic issues. No public barcodes in BOLD. As this species was described from French Guiana and Mexico, a lectotype should be designated.
Identification. A larger species, grey-white with black line markings, but unlike *M. bifiliferata*, no dark brown area on the costa. Male antennae are strongly pectinate.
Status in Trinidad. An occasional species in forested areas.
Arima Blanchisseuse Road, milestone 5, at light: ♂ 2.xi.1978 (M.J.W. Cock) [MJWC]
Arima Valley, Simla, MVL: 2♂, ♀ 30.vii.1981 (M.J.W. Cock) [♀ MJWC; 2♂ UWIZM CABI.8045, 8047] (Fig. 60); 5♂ 18.x.1982 (M.J.W. Cock) [2♂ MJWC; 3♂ UWIZM CABI.8046, 8048, 8049] (Fig. 59)
Parrylands Oilfield, MVL: ♀ 13.xi.1980 (M.J.W. Cock) [MJWC]
Rio Claro-Guayaguayare Road, milestone 6.5, MVL: ♂ 30.ix.1978 (M.J.W. Cock) [MJWC]

Fig. 59. Male *Meganola polyodonta*, Arima Valley, Simla, MVL, 18.x.1982.

Fig. 60. Female *Meganola polyodonta*, Arima Valley, Simla, MVL, 30.vii.1981.

***Nola* Leach, 1815**

Type species *palliola* Denis & Schiffermüller, TL Austria. *Roeselia* Hübner 1825 is a junior synonym, having the same type species. Poole (1989) transfers the species that had been placed in *Roeselia* to *Meganola*.

***Nola apera* Druce, 1897**

Figs. 61–63.

OD: Druce 1897: *Nola apera*, TL Mexico.

Historical notes. Identified by comparison with the type (♀ Jalapa) and NHMUK series.

Taxonomic issues. No public barcodes in BOLD. The type is not in very good condition and this identification is questionable, especially given the distance from the type locality, Mexico. However, Trinidad material is a good match with some of the NHMUK series, although this could prove to be a mixture of species. Given that the type locality is Mexico, confirmation based on genitalia and/or DNA barcodes is needed since this is a widely distributed species.

Identification. This is a small species, grey-white with premedial, postmedial and subterminal rows of dark dots. The costa is narrowly and irregularly darker in the basal two-thirds and there is a spot in the cell. A rather worn living specimen tentatively identified as this species is shown as Fig. 63. Male antennae with extremely long pectens (plumose).

Status in Trinidad. An occasional species in forested and suburban areas.

Arima Valley, Asa Wright Nature Centre, at light: ? 20.iii.2007 (S. Daniel photo) [iNaturalist 70125462]

Fig. 61. Male *Nola apera*, Curepe, MVL, 2-8.xi.1981.

Fig. 62. Female *Nola apera*, Morne Bleu, Textel Installation, at light, 7.i.1979.

Fig. 63. Male *Nola apera* (?), Asa Wright Nature Centre, 22.iii.2015, S. Nanz; © with permission).

Arima Valley, Simla, MVL: ♀ 6.viii.1982 (M.J.W. Cock) [UWIZM CABI.8044]
Curepe, MVL: ♀ 2.i.1979 (M.J.W. Cock) [UWIZM CABI.8043]; ♂ 2-8.xi.1981 (M.J.W. Cock) [MJWC] (Fig. 61)
Morne Bleu, Textel Installation, at light: 2♀ 7.i.1979 (M.J.W. Cock) [MJWC] (Fig. 62); 2♀ 2.iii.1981 (M.J.W. Cock) [MJWC]
Provisionally: Arima Valley, Asa Wright Nature Centre: ? 22.iii.2015 (S. Nanz photo 3442) (Fig. 63)

***Nola biconica* Hampson, 1907**
Fig. 64.
OD: Hampson 1907: *Nola biconica*, TL Brazil (Organ Mts, Tijuca)
Historical notes. Identified by comparison with the type (♀ Rio de Janeiro) and NHMUK series.
Taxonomic issues. No public barcodes in BOLD. Hampson (1907) described this species from Panama, Guyana and Brazil, but designated a female from near Rio de Janeiro as the type.
Identification. This species is similar to *N. apera*, but distinguished by a strong triangular mark on the forewing costa just over midway. Male antennae strongly pectinate, but less obviously so than *N. apera*.
Status in Trinidad. An occasional species in forested areas.
Arima Valley, Verdant Vale, at light: ? 1.v.2022 (S. Tran photo) [iNaturalist 114521939]
Brigand Hill, lighthouse security MVL lights: ♂ 28.iii.2003 (M.J.W. Cock) [MJWC]
Morne Bleu, Textel Installation, at light: ♂ 5.ix.1978 (M.J.W. Cock) [MJWC]
South Oropouche, Mon Desir, at light: ? 1.ii.2023 (T.P. Maharaj photo) [iNaturalist 147878403]
Valencia Forest, MVL: ♂ 5.viii.1981 (M.J.W. Cock) [MJWC] (Fig. 64)

Fig. 64. Male *Nola biconica*, Valencia Forest, MVL, 5.viii.1981.

***Nola cereella* (Bosc, [1800])**
Figs. 65–66.
OD: Bosc [1800]: *Alucita cereella*, TL USA, 'Caroline'
Riley 1882: *Nola sorghiella*, TL USA, Alabama and Florida [synonym]
TT: *Nola cereella* (Bosc): Cock *et al*. (2023)
Historical notes. This species was recorded from Trinidad and Tobago by Cock *et al* (2023). My Trinidad specimen was identified as *Celama sorghiella* by comparison with the NHMUK series. Miller and Becker (1989) made *sorghiella* a synonym of *cereella*, and transferred *cereella* to *Nola*.
Taxonomic issues. BOLD:AAA0295 contains material identified as this species from USA and Costa Rica.
Identification. A small species, whitish with the costa irregularly brown, three irregular medial bands, the termen irregularly brown and three dark subterminal spots in spaces 2-4 (Cu_1-Cu_2– M_2-M_3). Male antennae simple, ciliate.
Biology in Trinidad. This species is a known pest of sorghum and other grasses (Reinhard 1937, Hobbs *et al*. 1979) but there is no information on its biology in Trinidad.
Status in Trinidad. Just one record each from Trinidad and Tobago.
Curepe, MVL: ♂ 2.ix.1978 (M.J.W. Cock) [MJWC]
TOBAGO, Englishman's Bay, at light: ? 3.xii.2022 (A. Deacon photo) [iNaturalist 143615149]
Provisional identification: South Oropouche, Mon Desir, at light: ? 1.i..2023 (T.P. Maharaj photo) [iNaturalist 145570508]

***Nola contorta* Dyar, 1914**
Figs. 67–68.
OD: Dyar 1914: *Nola contorta*, TL Panama, Trinidad River.
Historical notes. Identified by comparison with the type (USNM, ♀ Panama).
Taxonomic issues. No public barcodes in BOLD
Identification. This medium-sized species is grey-white with a strong post-medial band marked distally with black dots. The costa has a dark border in the basal quarter, followed by two dark triangular marks mid-costa, which will separate this species from others. Male antennae strongly pectinate.
Status in Trinidad. An uncommon species in forested areas.
Arima Valley, Simla, MVL: ♂ 18.x.1982 (M.J.W. Cock) [MJWC] (Fig. 67)
Cumaca Road, 4.6 miles, MVL: 2♀ 21.x.1982 (M.J.W. Cock) [MJWC] (Fig. 68)

Fig. 65. Male *Nola cereella*, Curepe, MVL, 2.ix.1978.

Fig. 66. *Nola cereella*, Tobago, Englishman's Bay, at light, 3.xii.2022, A. Deacon (iNaturalist observation 143615149); ©, under CC-BY-NC.

***Nola mesographa* Schaus, 1905**
Figs. 69–70.
OD: Schaus 1905: *Nola mesographa*, TL French Guiana.
TT: *Roeselia medioscripta* Schaus: Kaye and Lamont (1927) [misidentification]
Historical notes. Kaye and Lamont (1927) recorded *Meganola medioscruipta* (Schaus) (= *Roeselia medioscripta*) from Trinidad based on a specimen collected at Palmiste by Sir N. Lamont, 27 January 1921. This specimen is a female in NMS, which I have reidentified as *Nola mesographa*. My identification was based on a comparison with the type (USNM, ♂ French Guiana), USNM series and NHMUK series.
Taxonomic issues. There are two BINs in BOLD containing material from French Guiana identified as this species:

Fig. 67. Male *Nola contorta*, Arima Valley, Simla, MVL, 18.x.1982.

Fig. 68. Female *Nola contorta*, Cumaca Road, 4.6 miles, MVL, 21.x.1982.

Fig. 69. Male *Nola mesographa*, Curepe, MVL, 18–22.i.1981.

Fig. 70. Female *Nola mesographa*, Curepe, MVL, 30.viii.1978.

BOLD:AAM8822 and BOLD:ABZ8148. However, the second contains only one unspread specimen which does not appear to match the species treated here as *N. mesographa*, so provisionally this species is expected to align with BOLD:AAM8822.

Identification. A medium sized species, whitish with a dark mark at the base of the costa and a dark medial band, wider on the costa than the dorsum. Male antennae are strongly pectinate.

Status in Trinidad. There have been several records from Curepe, in addition to the original capture at Palmiste.

Curepe, MVL: ♂ 27.viii.1978 (M.J.W. Cock) [UWIZM CABI.8042]; ♀ 30.viii.1978 (M.J.W. Cock) [MJWC] (Fig. 70); ♂ 26.xii.1978 (M.J.W. Cock) [MJWC]; ♂ 20.xii.1979 (M.J.W. Cock) [MJWC]; ♂ 18-22.i.1981 (M.J.W. Cock) [MJWC] (Fig. 69)

Palmiste: ♀ 27.i.1921 [N. Lamont] [NMS, originally curated as *Roeselia medioscripta*]

***Nola perluta* Draudt, 1918**

Figs. 71–73

OD: Draudt 1918: *Nola perluta*, TL Colombia.

TT: *Nola perluta* Draudt: Cock *et al*. (2023).

Historical notes. Cock *et al*. (2023) recorded this species from Trinidad and Tobago. Trinidad specimens were identified by comparison with the type (NHMUK ♂, Colombia) and NHMUK series.

Taxonomic issues. No public DNA barcodes in BOLD.

Fig. 73. Female *Nola perluta*, Tobago, Englishman's Bay, at light, 2.vii.2022, M. Gibson (iNaturalist observation 124491350); ©, after Cock *et al*. (2023). The scale tufts on the wings are visible as slight bumps.

The type lacks the distinctive F spot present in most of the NHMUK series and Trinidad & Tobago material, so it may be that more than one species is involved.

Identification. A small species, whitish, with a dark triangular mark on the costa at about three-fifths, and an adjacent black spot in the cell. This black spot is present in all Trinidad specimens seen, but not in the type, as noted in the last paragraph. Male antennae pectinate.

Status in Trinidad. An uncommon species in forested areas.

Arima Valley, Simla, MVL: ♀ 15.ii.1981 (M.J.W. Cock)

Fig. 71. Male *Nola perluta*, Lalaja Ridge, MVL, 3.ix.1982.

Fig. 72. Female *Nola perluta*, Arima Valley, Simla, MVL, 15.ii.1981.

[MJWC] (Fig. 72); ♀ 7.viii.1981 (M.J.W. Cock) [MJWC] Lalaja Ridge, MVL: ♂ 3.ix.1982 (M.J.W. Cock) [MJWC] (Fig. 71)
TOBAGO, Englishman's Bay, at light: ♀ 2.vii.2022 (M. Gibson photo) [iNaturalist 124491350] (Fig. 72)

***Nola* or *Meganola* sp.**
Fig. 74.
A photograph by Tarran P. Maharaj at South Oropouche shows a Nolinae species, that doesn't match any of those treated above, having three black notches on the forewing costa and a diffuse brown postmedial line (Fig. 74). Draudt (1918–1919) does not appear to treat this species, and at this time I have not been able to compare this photo with a major collection.

Fig. 74. Unidentified Nolinae, South Oropouche, Mon Desir, at light, 2.i.2022, T.P. Maharaj (iNaturalist observation 104238876); ©, under CC-BY-NC.

Subfamily Chloephorinae Stainton, 1859
There are no published records of Chloephorinae from Trinidad or Tobago, but *Garella nilotica* (Rogenhofer) (Tribe Sarrothripini Hampson, 1894) may occur.

***Garella nilotica* (Rogenhofer, 1881)**
OD: Rogenhofer (1881): *Sarothripa nilotica*, TL Egypt.
Historical Notes. The highly variable *Garella nilotica* (= *Characoma nilotica*) is now reported to be pantropical (Becker and Miller 2002), and its range extends across much of North America to the Lesser Antilles, south to Brazil (NAMPG 2022, Zagatti *et al*. 1995–2001). Furthermore, reviewing the old CABI files of insect identifications, I found that in 1962 a specimen stated to be from Trinidad was identified under reference code B367 from ICTA (The Imperial College of Tropical Agriculture) (CABI Collection No. 18144, List No. 1081 (America)). However, although this specimen appears to have been sent back to Trinidad, I have not located it (or two other Lepidoptera identified in the same list) in the ICTA collection now in UWIZM. The implication is that either the material failed to arrive safely in Trinidad, or that the scientist or student who submitted this material retained it rather than deposited it in the ICTA collection. Thus, there is a strong indication that this species occurs in Trinidad, but this needs confirmation with specimens. Figures of the adult moth can be seen in Becker and Miller (2002), NAMPG (2022), and Zagatti *et al*. (1995–2001).

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The fate of primary-dispersed *Mauritia flexuosa* L.f. fruit in different microhabitats in the Aripo Savanna Environmentally Sensitive Area, Trinidad, West Indies

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ABSTRACT

The fate of 1,500 *Mauritia flexuosa* L.f. fruit was observed between three distinct microhabitats of the Aripo Savanna Environmentally Sensitive Area, in Trinidad, by situating fruit stations and monitoring fruit fortnightly. Most fruit were used as a food source, with the most common fruit fate in all microhabitats being seeds remaining with the mesocarp partially or totally removed. Seed dispersal mainly occurred in the closed canopy of eastern forest margins and was negligible in island microhabitats (where stands of trees are surrounded by savanna). A lack of seed dispersers does not seem to be an immediate concern; however, ecological managers should closely monitor dispersers and their scatter-hoarding activities.

Key words: ecology, frugivores; Moriche Palm; post-seed dispersal; post-seed predation.

INTRODUCTION

In tropical rainforests, inter-species interactions are common and important for effective ecological functioning (Ghazoul and Sheil 2010, Lüttge 1997). Seed dispersal and seed predation are important biotic interactions that can determine the spatial distribution and population demography of many plant species in tropical rainforests (Beckman and Rogers 2013). Seed dispersal is broadly identified as the movement of seeds away from parents (Nathan and Muller-Landau 2000), whereas seed predation is the death of a seed as a result of the complete or partial consumption of the seed by some animal predator (Forget *et al.* 2005). Seeds are often (but not always) packaged in a fleshy pulp or mesocarp which acts as an enticement for animals to disperse the seeds (Ghazoul and Sheil 2010). The entire structure is commonly known as a fruit and animals eat just the fleshy mesocarp, just the seeds, or both (Vander Wall, Kuhn, and Gworek 2005). Different animals eat different parts of the fruit and disperse the seeds depending on the availability of food and the environmental conditions (Vander Wall, Kuhn, and Gworek 2005). Seed dispersal serves several important ecological functions for the plant, one of which is escaping seed predation/parasitism, which can lead to a very high or total loss of seeds that fall close to the parent (Beckman and Rogers 2013). Tropical trees with large seeds (> 10 g) (Jansen *et al.* 2002; Westoby, Leishman, and Lord 1996) tend to be at greater risk of predation or parasitism, as they are easier to find by seed predators and are thus more likely to benefit from dispersal away from the parent tree canopy (Vander Wall, Kuhn, and Gworek 2005). Tropical trees benefit from having large seeds because seedlings germinated from large seeds have more resources and are more likely to survive in closed canopy forests where competition for resources is highest. However, there is a trade-off in that larger seeds require larger seed dispersers to carry them away from the parent tree – even when the fleshy mesocarp is stripped from the seeds (Westoby, Leishman, and Lord 1996). Primary dispersal (or the initial dispersal of large-seeded trees from the canopy) often happens through gravity pulling the seeds to the forest floor under the canopy of the parent tree. Additionally, terrestrial mammals commonly play the role of dispersers for large-seeded tree species in tropical forests once the seeds have reached the ground and are available to these mammals. Indeed, seed dispersers that can disperse large seeds are often limited to terrestrial mammals, such as large rodents, primates, or ungulates (Westoby, Leishman, and Lord 1996). The agouti (*Dasyprocta* sp.), a scatter-hoarding rodent, is a common disperser of medium-to-large seeds of tropical rainforest trees in the neotropics (Godó *et al.* 2022), including in Trinidad and Tobago (Rostant *et al.* 2021). Other terrestrial mammals that have been reported to disperse medium-to-large seeds in the neotropics are lappes (*Cuniculus paca* Linnaeus) (Mittelman *et al.* 2020), tapirs (*Tapirus terrestris* Linnaeus) (Virapongse *et al.* 2017), and primates (Hanya *et al.* 2011). Rats and smaller mammals have also been recorded dispersing larger seeds in some situations (Lim *et al.* 2020). Agouti and other rodent seed dispersers have been shown to be both dispersers and predators of tropical tree seeds (Jansen *et al.* 2002). During times of fruit abundance, they act as frugivores (fruit eaters) and feed on the fleshy mesocarp of the fruit, leaving the seeds intact and undispersed. At other times, when the fruit is no longer abundant, they may disperse the seeds away from the parent tree and cache them for future consumption (Mittelman *et al.* 2020). Some of the cached seeds are redispersed and may eventually be circulated hundreds of metres because of several different agoutis stealing from one another (Jansen *et al.* 2012).

To attract large mammals to disperse their seeds, plants must offer a reward. Scatter-hoarding is a model of seed dispersal through which an animal may act as a disperser

of a seed or fruit in one instance and as a predator of the same seed or fruit in another instance (Jansen *et al.* 2002). In this situation, the seeds themselves act as a food enticement to the disperser, where some seeds are sacrificed to allow others to be dispersed. Such scatter-hoarding relationships are relatively common between trees and vertebrate dispersers, particularly large-seeded tree species in both temperate and tropical forests (Forget *et al.* 2005; Vander Wall, Kuhn, and Gworek 2005). In some cases, dispersal via scatter-hoarding rodents is almost obligatory for the reproduction of the tree species (Connell 1971), such as in the relationship between the agouti and the tropical tree *Carapa guianensis* Aubl. (Forget *et al.* 2005). In other cases, the relationship seems to be more facultative with seed dispersal occurring in the absence of the scatter-hoarding partners but in a way that results in a more clumped distribution of seedlings (Westco *et al.* 2009).

The tropical palm *Mauritia flexuosa* Lf. has relatively large seeds (size: 2 to 4 cm diameter; dry weight: 4 to 16 g) (Virapongse *et al.* 2017; Khorsand Rosa, Barbosa, and Koptur 2014; Hernández-Valencia, Guitián, and González 2017) and is widespread in the Amazon basin and Guiana Shield regions of tropical America (Arneaud 2021). Dispersers of *Mauritia flexuosa* (*M. flexuosa*) seeds have been observed and recorded in Brazil, the Guianas, Venezuela, and Colombia (da Silva *et al.* 2011; Zona and Henderson 1989; Mendieta-Aguilar, Pacheco, and Roldans 2015; Jansen *et al.* 2002; Calderon 2002). The agouti (*Dasyprocta* sp.) is the most widespread species recorded dispersing seeds of *M. flexuosa* (da Silva *et al.* 2011; Mendieta-Aguilar, Pacheco, and Roldans 2015; Calderon 2002). Mendieta-Aguilar, Pacheco, and Roldan (2015) noted that the main dispersers of *M. flexuosa* in Laguna Azul, Beni, Bolivia were *D. punctata* and *C. paca*. However, they did not scatter-hoard or recache seeds due to the high abundance of fallen fruit. Agoutis can detect large numbers of de-fleshed (i.e. mesocarp removed) seeds and will pilfer them to eat and to re-cache for themselves (da Silva *et al.* 2011). This activity promotes the secondary movement of cached seeds and further increases dispersal distance (Jansen *et al.* 2012; Perea, Miguel, and Gil 2011). Additionally, Calderon (2002) recorded *D. leporina* removing *M. flexuosa* seeds from perimeter traps and Sherman traps that were set during seed removal studies in the southeast of Guárico State, Zaraza District, Venezuela.

Besides agoutis, other species have also been shown to disperse or predate *M. flexuosa* seeds or to eat the fleshy mesocarp of the fruit. In the Aripo Savannas Environmentally Sensitive Area (ASESA), ad-hoc trapping by motion-sensing camera traps baited with *M. flexuosa* fruit have recorded agoutis, galaps (turtles), and tegus (lizards) eating the flesh of the fruit, but only agouti was recorded predating the seeds. Remains of eaten *M. flexuosa* seeds (with the endosperms destroyed) with teeth marks from agoutis and maybe rats have been observed in the ASESA. However, of Trinidad and Tobago's large terrestrial fauna likely only the agouti and the lappe frequently disperse *M. flexuosa* seeds (Arneaud, Farrell, and Oatham 2017).

Spatial distribution patterns of adult *M. flexuosa* on a landscape scale are likely determined by both the availability of dispersal vectors to transport seeds to potential establishment sites and the location of suitable microhabitats for germination and subsequent growth (Beckman and Rogers 2013). In ASESA, *M. flexuosa* trees tend to reveal clumped distributions in fire-dominated open canopy sites with high densities of individuals at the scale of one hectare. However, they reveal more dispersed distributions at closed canopy sites with significantly lower densities of individuals at the hectare scale (Arneaud, Farrell, and Oatham 2017). In open canopy sites, plentiful resources usually exist for seedling establishment and growth. In closed canopy sites, suitable habitats with gaps in the canopy are patchy and tend to be concentrated closer to the margin between the forest and savanna ecosystems (Arneaud, Farrell, and Oatham 2017). It has also been found that in open and closed habitats, *M. flexuosa* female trees show differences in fruit size and the number of fruit produced. They produce fewer but larger fruit in closed canopy habitats and smaller but more numerous fruit in open canopy habitats (Arneaud, Farrell, and Oatham 2017). In the open canopy environment, the uniform availability of light likely allows for a clumped distribution of *M. flexuosa* palms by allowing seedlings to establish themselves close to the parent trees. Moreover, seed dispersal presumably does not play as significant a role in determining the spatial patterning of adult trees in such a habitat. Conversely, in the closed canopy habitat, *M. flexuosa* seedlings are typically able to establish themselves. Nonetheless, they may be restricted based on the availability of seed dispersers to move the seeds into patches of suitable microhabitat.

This study investigates the differences in dispersal and predation patterns between the different microhabitats (i.e. open and closed margin environments) of the ASESA in Trinidad. The aim is to determine the probability of different fates for the fruit and seeds of *M. flexuosa* after primary dispersal in different microhabitats.

METHODOLOGY

The study site

The white-sand savanna habitats of the Aripo Savanna (Strict Nature Reserve) Environmentally Sensitive Area (10°35′30′′N, 61°12′0′′W) form the only remaining intact savannas in Trinidad (EMA 2007; John-Bejai *et al.* 2013). The ecosystem is a series of open, treeless areas of grass and sedge marshland within an extensive area of swamp forest.

Rainfall in the savannas is approximately 2,500 mm per annum, with a dry season of two to three months where the rainfall can fall below 50 mm for the month (TTMS 2016; Richardson 1963). The open savannas are characterised by an impermeable hardpan layer at a 20 to 30 cm depth that restricts primary productivity in the dry season because of drought and in the wet season because of waterlogging. *M. flexuosa* palms are located in the ecotone between the savannas and swamp forests. Palm marsh communities form where the impermeable hardpan layer is greater than 50 to 100 cm beneath the surface (Richardson 1963). The palm marsh forests can be classified into three microhabitats or margins: eastern, western, and palm islands (Figure 1). The western microhabitat of the savannas and the palm island microhabitat are classified as fire-impacted microhabitats (FIM) because fires are driven by trade winds that blow consistently in an east-to-west direction during the dry season. This leads to sparser vegetation in the western and island plots, resulting in reduced canopy coverage. The eastern microhabitats of the savannas are not exposed to substantial burning, as they are sheltered from trade wind-driven fires and are classified as non-fire-impacted microhabitats (NFIM), having dense vegetation with closed canopies (Arneaud, Farrell, and Oatham 2017).

Data collection

A map of the area was created using the QGIS Geographical Information System software (v3.16.12 LTR/PR). A stratified random sampling design was used to select 10 sample plots at random in the three different savanna microhabitats (eastern, western, and palm islands). These plots were positioned within five different patches of savanna (Fig. 1) and were located in the field using a portable global positioning system (GPSMAP v64s device, Garmin ®, USA) with the datum set to WGS84. Circular quadrats (20 m in diameter; 314.29 m^2 in area) were then established for each plot. Within each plot, 10 fruit stations (i.e. white disposable polystyrene pour boats chosen for high visibility), each containing five fruit, were placed in the field. Two fruit stations were placed at the centre of the sample plot, while the other eight fruit stations were placed equidistantly along two 20-metre perpendicular transect lines, which crossed at the centre point (Arneaud 2020). The fruit stations were visited every 14 days (fortnightly) to record if any fruit/seeds were damaged, destroyed in situ, or removed. The data from the fortnightly visits were used to calculate the probability of four fates for fruit: i. untouched, ii. fleshy mesocarp damaged and/or removed, iii. mesocarp removed and endosperm consumed in situ (with remains evident), and iv. fruit completely removed (with no remains evident). The final category of 'fruit completely removed' is assumed to represent seed dispersal (i.e. the movement of the seed away from the parent tree after primary dispersal). These fruit fate estimates were made from November 2012 to March 2013 and from October 2013 to January 2014 with a total of 1,500 fruit situated in 30 sample plots: 10 on island microhabitats, 10 on western microhabitats (open canopies), and 10 on eastern microhabitats (closed canopies). Only mature fruit at stage 4, as defined by Arneaud (2020) were used in this study. On average, it takes approximately 2 months for Stage 4 mesocarp to decompose, and approximately 1 year for the epicarp and endosperm to decompose. This timeframe assumes no post-harvest consumption by invertebrates or vertebrates, and that the fruit are not submersed. Most interactions with the fruit epicarp and mesocarp are expected to occur during the earlier stages of the study (Arneaud 2020).

Data analyses

Data analysis was conducted in IBM SPSS Statistics v. 27.0.0 using the generalised linear model (GLiM) [GENLIN] (SPSS Software 2020). The reliability level (confidence interval) during these statistical tests was 95%.

The fate of fruit (i.e. the number of fruit untouched, mesocarp removed, mesocarp and endosperm removed, and whole fruit removed as the dependent variables) was tested using GLiM between the three microhabitats (as the independent variable). The analysis utilised a linear distribution and an identity-linked function. Fisher's least significant difference (LSD) tests were conducted whenever significant differences occurred during statistical analyses.

RESULTS

From the fruit fate plots, it was determined that 68% of the situated fruit revealed evidence of animal interference (Fig. 2). The majority of the fruit that revealed interference had all or part of the mesocarp removed. The fruit fate category that was least observed is the one where both the mesocarp and the endosperm were consumed (with fragments of both left in situ). There were no statistical differences in the number of untouched fruit between the three microhabitats (GLiM, $x^2 = 1.33$, df = 2, $P > 0.05$). There were statistical differences in the presence of fruit with the mesocarp removed between microhabitats (GLiM, $x^2 = 12.62$, df = 2, $P < 0.001$; Fisher's LSD test, $P<0.05$, island and eastern microhabitats). Fruit that had their mesocarp removed were most common in the island microhabitats (33.20 ± 10.50 fruit) and least common within the eastern microhabitats (20.50 ± 6.48 fruit) (Fig. 2). There were statistical differences between fruit with the mesocarp and endosperm removed between microhabitats (GLiM, $x^2 = 16.52$, df = 2, $P < 0.001$; Fisher's LSD test, $P<0.05$, island and eastern microhabitats). Fruit that were totally destroyed but with fragments (mesocarp and endosperm) left behind were most common in the eastern microhabitats (6.90 ± 2.18 fruit) and least common in the island microhabitats (1.10 ± 0.35

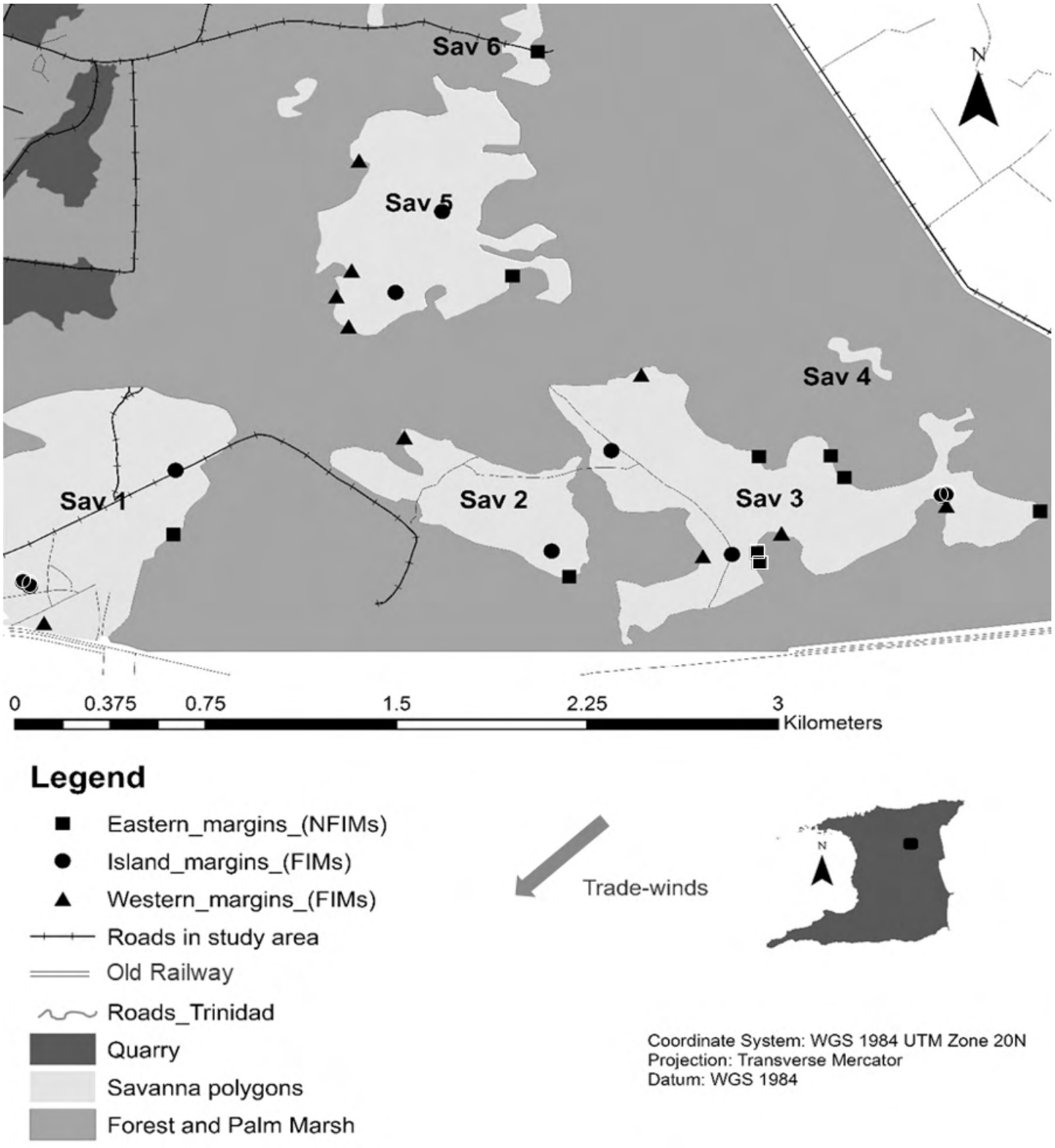

Fig. 1. Sample site locations within Savannas 1–6 in the Aripo Savannas Environmentally Sensitive Area showing the three different microhabitats or margin environments. Map modified from Arneaud, Farrell, and Oatham (2017). FIMs -Fire-impacted microhabitats), NFIMs -Non-fire-impacted microhabitats.

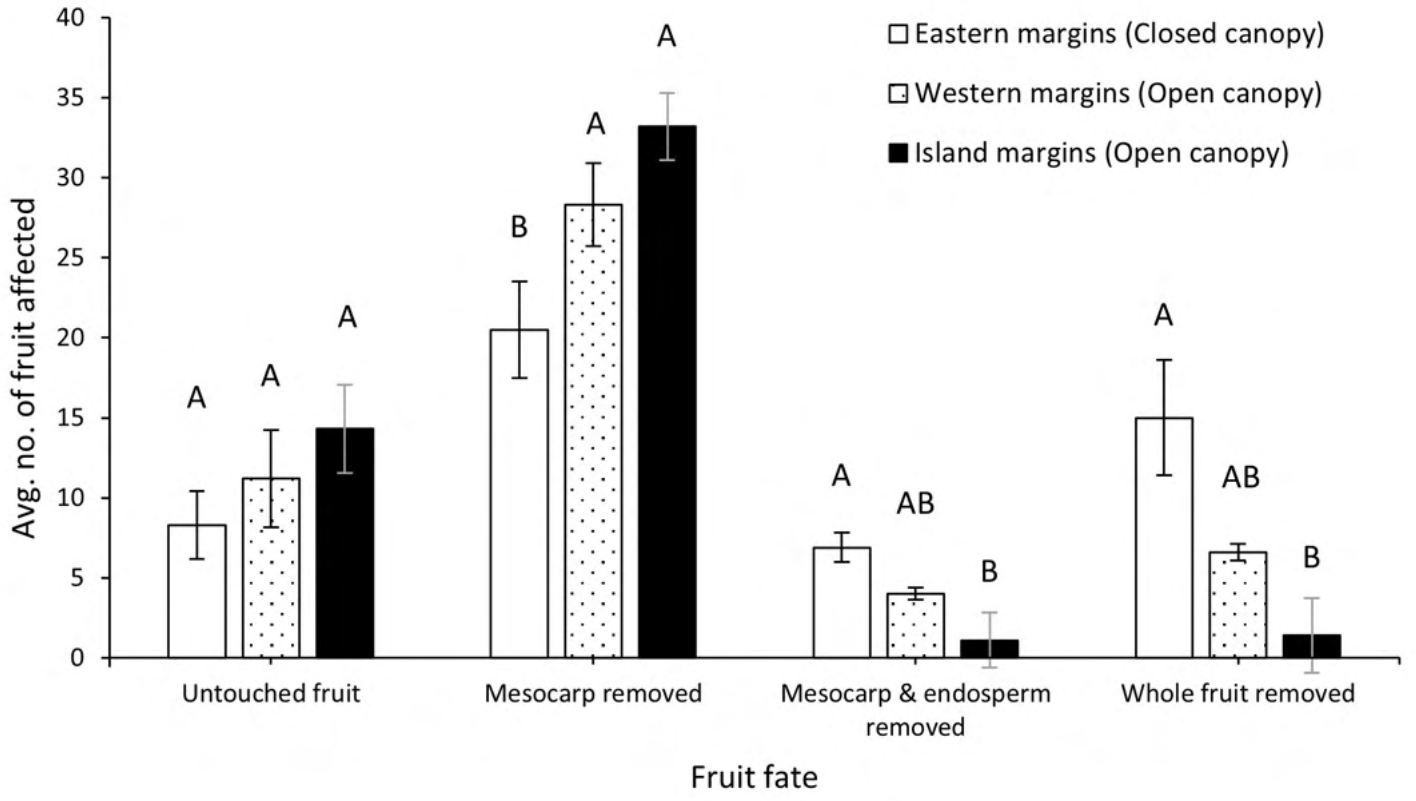

Fig. 2. Post-dispersal fates of *Mauritia flexuosa* fruit in the different microhabitats of the ASESA. Within a fruit class, means that do not share a same letter are significantly different (Least Significant Difference Test, p< 0.05): bars represent the SE of the mean (n = 10).

fruit). There were statistical differences between whole fruit removed between the microhabitats (GLiM, $x^2 = 16.05$, df = 2, $P < 0.001$; Fisher's LSD test, $P<0.05$, island and eastern microhabitats). Whole fruit that were removed were most common within the eastern microhabitats (15.00 ± 4.74 fruit) and least common within the island microhabitats (1.40 ± 0.44 fruit). Overall, most of the seeds were not dispersed, with 'mesocarp removed' being the most common fruit fate in all microhabitats. The dispersal of seeds occurred most often in the closed canopy eastern microhabitats and least often in the open canopy island margins (where dispersal was negligible). The open canopy western margins were intermediate between the two other margin types for all fruit fates (Figure 2).

DISCUSSION

Within the present study, differences in dispersal and predation between the different microhabitats (margin environments) of the ASESA were observed. The most common fate of *M. flexuosa* fruit was to have the mesocarp (i.e. the fleshy part of the fruit) partially or totally stripped from the seeds and left under the parent tree. This was the most likely fate in all microhabitats: open, closed, or island.

In this study, it was not determined which animal species was responsible for consuming the fruit mesocarp. Several species have been identified feeding on the mesocarp through use of camera traps in the past (Arneaud 2020), where only larger mammals are known to remove the whole fruit (Virapongse *et al.* 2017; Khorsand Rosa, Barbosa, and Koptur 2014). A possible reason for this pattern is that many smaller species have been reported to eat the mesocarp of *M. flexuosa* fruit in the ASESA – from rodents to lizards and turtles (Arneaud 2020) – leading to greater utilisation of fruit mesocarps because there are greater numbers of animals that feed on the mesocarp alone. This suggests that *M. flexuosa* fruit is an important food source for many animal species, most of which are not dispersers of the seeds (Villalobos and Bagno 2011; Parolin, Wittmann, and Ferreira 2013). Known seed dispersers (e.g. agoutis and lappes) may also feed on mesocarps and leave the seeds when the supply of fruits is high and they are satiated on the mesocarps of the fruit alone (Mendieta-Aguilar, Pacheco, and Roldan 2015).

It seems that when seed dispersers are present and not satiated by the fleshy mesocarp, there is often evidence of seeds being used as a food source, sometimes with entire seeds or fruit being removed (Jansen *et al.* 2002). In the island microhabitats, very low rates of seed removal were observed. This indicates that large seed-dispersing

rodents, such as the agouti, were absent or that they were present but fully satiated by feeding on the fruit mesocarps alone. It cannot be determined which of these processes was dominant with the methodology used in this study, but this research does indicate that the dispersal of *M. flexuosa* seeds in the island habitats is very low, which is expected to result in a clumped distribution of seedlings and adult palms as fallen fruit/seeds remain beneath the parent tree (Beckman and Rogers 2013). It could be that seed predators and dispersers, like the agouti, are only present in the eastern or western habitats, as they do not cross the open savannas to the island habitats (Andreazzi, Pires, and Fernandez 2009).

The results indicate that seed dispersal does happen in the eastern and western microhabitats, which means that seedling and adult palms will be less clumped and more widely dispersed than in the island habitats (Beckman and Rogers 2013; Arneaud 2021). The total removal of fruit (probable dispersal) was observed predominantly in the closed eastern microhabitats (and to a lesser degree in the open western microhabitats). Seed dispersers were present in the western (open) and eastern (closed) microhabitats, and it seems that their satiation on fruit mesocarps alone was not achieved because the seeds were predated and/or dispersed (Jansen *et al.* 2002). Possible reasons for the lack of mesocarp satiation in eastern and western microhabitats could be that animals utilising fruit mesocarps in these microhabitats exist at a higher density than in island microhabitats. Therefore, more fruit mesocarp are consumed, leaving potential seed predators and dispersers hungry and inclined to utilise the seeds. Another possibility is that there is less fruit in the eastern and western habitats. Arneaud (2020) determined that the *M. flexuosa* produces less fruit in the closed canopy environment and that adult trees exist at lower densities, which could decrease the number of fruit available to animals and trigger predation and dispersal of seeds by the agouti population.

Considerable research has been conducted regarding the possible impacts of overhunting of seed dispersers and how this can negatively influence the dispersal and regeneration of tropical trees (Beckman and Rogers 2013; Federman *et al.* 2014). The results of this study indicate that a loss of seed dispersers through overhunting in the ASESA is likely to impact the *M. flexuosa* in closed canopy sites rather than in open canopy sites. This is because dispersal is more common in closed canopy sites and more likely to be required for the establishment and survival of seedlings. It does not seem to be the case that current hunting pressures in and around the ASESA are causing depression in the agouti population, as studies have shown healthy agouti numbers in the ASESA (Rostant *et al.* 2021; Ganpat, Giordano, and Rostant 2021). Therefore, a lack of seed dispersers may not be a problem for *M. flexuosa* population demographics at present – but should be closely monitored.

CONCLUSION

Utilisation of *M. flexuosa* fruit by animals in the ASESA varies by microhabitat. The use of the mesocarp of the fallen fruit is most common in all microhabitats, and many different smaller animals likely utilise this as a food source. The utilisation of the *M. flexuosa* seeds was more common in eastern (closed canopy) microhabitats and scarcely occurred in island microhabitats. This indicates that seed dispersal within the ASESA mainly occurs in forest margin habitats and not in island habitats. At present, a lack of seed dispersers does not seem to be an immediate concern; however, ecological managers should closely monitor dispersers and their scatter-hoarding activities.

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Fruit baits at night attract unusual erebid moths (Lepidoptera) in Trinidad, West Indies, with two taxonomic changes in Erebidae, Herminiinae

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ABSTRACT

Several different fruit baits that were ripened, rotting or fermenting were used to attract moth species belonging to the family Erebidae. Several of these species are considered rare or had not been previously reported for Trinidad. *Rejectaria olivenca* Goldstein has not previously been recorded for the island. *Gigia stenogaster* (R. Felder & Rogenhofer) and *Hemeroblemma mexicana* (Guenée) had previously been observed but their presence on Trinidad had not yet been reported in the literature. The first female specimens of *Argania pilosa* (Druce), *Hemeroblemma dolon* (Cramer) and *Hemeroblemma helima* (Stoll) are reported for Trinidad. The first male specimen of *Gigia obliqua* (Walker) is reported for Trinidad. *Bleptina aeatusalis* Walker, 1859 is transferred to the previously unpublished **new combination** *Oidemastis aeatusalis* (Walker), which is already in use on the internet. *Sitophora totafusca* Kaye, 1901 **reinstated species** is removed from the synonymy of *S. vesiculalis* Guenée, 1854.

Key words: Fruit baits, moths, *Gigia stenogaster, Hemeroblemma mexicana, Rejectaria olivenca,* guava, mango, rollinia, Herminiinae, Thermesiini

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INTRODUCTION

Butterfly collectors use baiting with fermenting fruit to attract various groups of Nymphalidae which specialize on this food source – see for example the description in Barcant (1970). Specially designed butterfly fruit traps are used to collect quantitative data on the species occurring in an area. However, these traps are not normally monitored at night, and it has been MJWC's experience that they rarely capture moths, probably because the trap design relies on the butterflies moving upwards after feeding, towards the light.

In temperate regions, moth collectors have long used a technique known as sugaring – a concoction of sugar, fruit extracts and alcohol smeared on trees or pests – to attract moths at night (*e.g.* Dickson 1992). This technique became less popular as the use of lights to attract moths and the development of light traps became common. Nevertheless, sugaring is known to be more effective than light for attracting some groups such as Erebinae (Norris 1936). In the tropics, there is even less tradition of using this collecting method. However, based on observations during night walks in Trinidad, Deo *et al.* (2020) reported several attractants for moths including water, fruits (on the plant and fallen), plant exudates and disease-infected grass inflorescences.

Thus, the idea of using naturally ripened, rotting or fermenting fruits to attract moths (Lepidoptera) occurred to RND when he observed an unidentified fruit bat (Chiroptera) feeding on a rollinia fruit (*Annona mucosa*) while the fruit was still on the tree. Pieces of the fruit and the pulp had dropped onto the leaves of small plants growing below the fruiting tree. The fallen fruit pulp attracted more than 15 species belonging to the family Erebidae (Lepidoptera, Noctuoidea). RND began artificially replicating the phenomenon with various fruits, photographing and uploading images of the moths attracted and observed to (www.inaturalist.org), where they were identified by MJWC. This method of attracting moths is not well known in the Neotropics including Trinidad and Tobago. In this paper, we elaborate on the method used and document some of the more interesting observations made.

METHODS

Fruits used separately included guava (*Psidium guajava*), mango (*Mangifera indica*) and rollinia (*Annona mucosa*). The fruits were ripened, rotting or fermenting. The pulp of fruits with large seeds (e.g. mango) was scraped off the seed and skin of the fruit and collected in a plastic bag. Fruits with small seeds (e.g. guava) were collected whole. The top of the bag was tied and the fruits in the bag were crushed until their consistency resembled that of a purée. If the bait seemed too dry, water was added and mixed until the fruit purée could be applied easily from the bag. Wet bait was noted to be more fragrant than dry bait and more effective at attracting moths. A hole was then punctured at one corner of the bag and the fruit spread on leaves approximately 50-150 cm off

the ground (a height where the observer can comfortably photograph the moths attracted). The amount of fruit bait spread on a leaf depended on the size and sturdiness of the leaf, as it should not cause the leaf to hang down so that the bait slides off. The bait was usually set along the forest's edge or open trails within the forest. Distances between the fruit bait stations varied depending on the availability of appropriate leaves but typically they were set 3–10 m apart. On an open trail, stations would be set on the side that was closer to a flat area or sloping downwards since it is easier for the observer to see and photograph the moths from above, rather than setting the bait on an upward slope where the photographer would be below the bait stations. Fruit bait was set up 1–2 hours before dark (typically 17.00h). Bait set out for more than 2 hours may dry out or be completely consumed by other insects, arachnids (George and Deo 2022) and small mammals. Surveying started at 1900 h and baits were checked approximately every hour until as late as 0200 h on the following morning.

Photographs were taken of the moths using a phone with manual settings. The light sensitivity used ranges between 50-200 ISO depending on the distance from the subject as well as the colors of the subject since lighter colored moths reflect more light than darker colored moths. The white balance was set at 4000k (fluorescent lamp spectrum) to capture the most accurate colors. Shutter speed was set at 1/250 of a second, fast enough to compensate for any shake from the photographer. Aperture was set at F 2.0. The phone camera's flash was used. The photographs metadata included the exact date and time but not GPS data. The GPS data were taken from Google Maps, based on the first author's knowledge of the locations and trails, and uploaded to iNaturalist. A table of the locations, dates and times is given (Table 1).

The moth fauna of Trinidad is now reasonably well known to MJWC, based on extensive collecting and museum work (Cock 2003). Most of the species treated here have been identified by comparison with the collection of MJWC, which has been identified primarily by comparison with specimens in the Natural History Museum, London (NHMUK) and United States National Museum, as set out under each species. Comparison here means a visual comparison of size, shape, colour and markings of the pinned adult specimens, with no consideration of internal morphology (genitalia) or genetics unless explicitly stated. The historical collection of Sir Norman Lamont in the National Museums of Scotland (NMS) and University of the West Indies Zoology Museum was also examined.

Table 1. Details of locations used for fruit baiting (including the coordinates) and corresponding dates and times.

Location name used	Details of location	Dates and end time at location (Start time 19.00h)
Brasso Seco	Approximately 3 km Northeast of Brasso Seco Village, 10.756, -61.255	14-15 August 2021 (until 2.00 h) 25-26 December 2021 (until 1.00 h)
Bush Bush	Bush Bush Game Sanctuary, Kernaham Road, Nariva, 10.378, -61.032	07 April 2022 (until 22.00 h)
Caura	End of Caura Royal Road, Caura, trail to Lopinot, 10.728, -61.344	25 November 2022 (until 21.00 h) 22 April 2023 (until 22.00h)
Inniss Fields	Inniss Fields, Saunder's Trace, Moruga, 10.166, -61.264	01-02 August 2021 (until 2.00 h) 02 April 2023 (until 22.00h) 09-10 April 2023 (until 1.00 h)
Madamas Rd. Ext.	End of the Madamas Road extension, east of Brasso Seco, 10.739, -61.257	24-25 July 2021 (until 3.00 h) 24-25 August 2021 until 1.00 h) 26 September 2021 (until 21.00 h) 13 November 2021 (until 23.00 h) 25 February 2023 (until 23.00 h)
Temple Village	Guppy House, Temple Village, Arima Valley, 10.685, -61.291	05 November 2022 (until 23.00 h)
Wa Samaki Estate	Wa Samaki Ecosystems Estate, Corner La Cuesa and Freeport Todds Road, Freeport, 10.444, -61.375	21 November 2020 (until 23.00 h) 02 December 2020 (until 23.00 h) 16 January 2021 (until 23.00 h) 30 November 2022 (until 22.00 h) 01 April 2023 (until 23.00h)

RESULTS

Moths were attracted to the fruit baits as early as 18.30 h. However, moths that were recently attracted to the bait were more likely to fly off if the observer approached with a headlamp, compared to moths that were settled and already feeding on the bait. Therefore, 30-60 minutes were given for the moths to settle down to prevent them from flying off when approached by the photographer. Based on initial observations, it appeared that guava was more successful at attracting unusual moths than other fruit baits. Thus, most of the photographs taken were of moths attracted by guava bait. Guava was also used more frequently than the other fruit baits to yield the most productive results – hence a numerical comparison of the different fruit baits used and the moths they attracted would not give an accurate representation of how efficient the fruit baits were at attracting moths. This may be attempted in a future study.

New or noteworthy records for Trinidad

The following were new or noteworthy records of moths attracted to fruit bait for Trinidad. Included also are two previously unpublished taxonomic changes. More than 18 additional species yet to be identified are not presented.

***Antiblemma spectanda* (Moschler, 1880) (Eulepidotinae)**

This species has not previously been reported from Trinidad, but MJWC caught a female at Morne Bleu (7 January 1979), which he identified by comparison with the NHMUK series. RND observed a specimen feeding on guava fruit bait near Brasso Seco on 15 August 2021 at 01.39 h (Fig. 1). This species is considered rare in Trinidad as this observation is only the second record for the island.

Fig. 1. *Antiblemma spectanda* observed feeding on guava fruit bait, near Brasso Seco [iNaturalist 91331738].

***Argania pilosa* (Druce, 1891) (Herminiinae)**

Lamont and Callan (1950) reported a specimen of this species from Palmiste, 9 February 1928 collected by Sir Norman Lamont. MJWC has not located this specimen but did find male specimens collected by Lamont at Palmiste (2 December 1933) and St. Patrick's, Arima Valley (20 April 1930), both in NMS. MJWC caught similar specimens at MV light, at Simla, Arima Valley (30 July 1981) and on Lalaja Ridge (3 September 1982), which he compared with the NHMUK series. Hitherto, all records from Trinidad have been of males. RND observed a female feeding on guava fruit bait in Madamas Rd. Ext., Brasso Seco on 13 November 2021 at 23.12 h (Fig. 2 (above)). The male which was also seen by RND in the same location on 25 July 2021 at 03:23 h (Fig. 2 (below)) has a strong hair tuft on the basal half of the forewing costa, which is part of a large bulge on the costa. The male also has a knot or node at about half the length of the antennae, and the labial palpi are long and recurved back over the thorax. Females show none of these characters.

Fig. 2. Above- Female *Argania pilosa* observed feeding on guava fruit bait, Madamas Rd. Ext., Brasso Seco (iNaturalist observation 101053991), Below- Male *Argania pilosa*, Madamas Rd. Ext., Brasso Seco [iNaturalist 88667558].

Table 2. Checklist of species of Erebidae moths attracted to fruit baits showing the species (categorized by subfamilies), fruit bait used, location/date and iNaturalist observation numbers.

Species attracted (by subfamily)	Fruit bait			Location/ date	iNaturalist observation number
	Guava	Rollinia	Mango		
Calpinae:					
Coenobela paucula (Walker)		x		Wa Samaki Estate16 January 2021	68210548
Gigia obliqua Walker	x			Inniss Field 1-2 August 2021	89629707
Gigia stenogaster (R. Felder & Rogenhofer)	x			Inniss Field 1-2 August 2021	89629570
Glenopteris herbidalis Guenée	x			Inniss Fields 01-02 August 2021	89630671
Gonodonta aequalis Walker	x			Wa Samaki Estate 30 November 2022	143393604
Gonodonta immacula Guenée	x			Wa Samaki Estate 1 April 2023	153115397
Gorgone augusta (Stoll)	x			Bush Bush 07 April 2022	110744743
Gorgone fellearis (Hübner)	x			Wa Samaki Estate 30 November 2022	143398579
Gorgone ortilia (Stoll)		x		Wa Samaki Estate 21 November 2020	65497240
Macrodes columbalis Guenée	x			Temple Village 05 November 2022	141227135
Macrodes cynara (Cramer)	x			Madamas Rd. Ext. 24-25 July 2021	138581533
Phaeoblemma dares (Stoll)	x			Wa Samaki Estate 30 November 2022	143402004
Erebinae:					
Amabela carsinodes Hampson	x			Caura 25 November 2022	142900895
Argidia tarchon (Cramer)	x			Inniss Fields 1-2 August 2021	89628282
Celiptera levina (Stoll)	x			Inniss Fields 01-02 August 2021	90083251
Ctypansa inconstans Walker	x			Inniss Field 2 April 2023	153317856
Erebostrota stenelea (Stoll)	x			Bush Bush 7 April 2022	110745774
Feigeria herilia (Stoll)	x			Caura 25 November 2022	142900681
Hemeroblemma dolon (Cramer)	x			Brasso Seco 14-15 August 2021	91331325
Hemeroblemma helima (Stoll)	x			Brasso Seco 14-15 August 2021	91331115
Hemeroblemma leontia (Stoll)	x			Madamas Rd. Ext. 24-25 July 2021	138582852
Hemeroblemma malitiosa (Guenée)	x			Inniss Field 09-10 April 2023	154292842
Hemeroblemma mexicana (Guenée)	x			Inniss Field 01-02 August 2021	89627921
Hemeroblemma opigena (Drury)	x			Inniss Field 01-02 August 2021	89630005
Letis doliaris (Guenée)	x			Inniss Field 02 April 2023	153317473
Letis iphianasse (Cramer)	x			Inniss Field 02 April 2023	153317583
Mocis diffluens (Guenée)	x			Wa Samaki Estate 30 November 2022	143401894
Mocis latipes (Guenée)		x		Madamas Rd. Ext. 26 September 2021	96317104
Perasia ora (Cramer)	x			Wa Samaki Estate 30 November 2022	143393283
Ramphia albizona (Latreille)	x			Inniss Field 01-02 August 2021	89628094

Table 2. Continued. Checklist of species of Erebidae moths attracted to fruit baits showing the species (categorized by subfamilies), fruit bait used, location/date and iNaturalist observation numbers.

Species attracted (by subfamily)	Fruit bait			Location/ date	iNaturalist observation number
	Guava	Rollinia	Mango		
Eulepidotinae:					
Antiblemma juruana (Butler)	x			Wa Samaki Estate 30 November 2022	143395463
Antiblemma lola (Schaus)			x	Brasso Seco 25-26 December 2021	103748416
Antiblemma nitidaria (Stoll)		x		Wa Samaki Estate 21 November 2020	65498431
Antiblemma spectanda (Moschler)	x			Brasso Seco 14-15 August 2021	91331738
Syllectra congemmalis Hübner	x			Inniss Field 01-02 August 2021	89630195
Herminiinae:					
Argania pilosa Druce	x			Madamas Rd. Ext. 13 September 2021	101053991
Aristaria theroalis (Walker)	x			Madamas Rd. Ext. 24-25 July 2021	88667402
Coremagnatha cyanocraspis Hampson	x			Caura 25 November 2022	142901908
Coremagnatha orionalis (Walker)			x	Brasso Seco 25-26 December 2021	103748935
Heterogramma circumflexalis Guenée	x			Wa Samaki Estate 01 April 2023	153125750
Lascoria phormisalis Walker	x			Madamas Rd. Ext. 24-25 August 2021	96314553
Lascoria purpurascens (Kaye)		x		Wa Samaki Estate 21 November 2020	65496781
Lophodelta goniograpta Hampson	x			Inniss Field 02 April 2023	153314813
Mastigophorus augustus Schaus	x			Madamas Rd. Ext. 24-25 July 2021	88703861
Mastixis lysaniax (Druce)	x			Madamas Rd. Ext. 24-25 July 2021	155487926
Micramma croceicosta Schaus	x			Madamas Rd. Ext 25 March 2023	149707503
Oidemastis aeatusalis (Walker)	x			Caura 25 November 2022	142901068
Palthis bizialis (Walker)	x			Madamas Rd. Ext. 24-25 August 2021	96313358
Physula limonalis (Schaus)	x			Inniss Field 01-02 August 2021	89633272
Physula migralis (Guenée)	x			Inniss Field 09-10 April 2023	154301798
Rejectaria barbuti Goldstein			x	Brasso Seco 25-26 December 2021	103748515
Rejectaria olivenca Goldstein	x			Caura 22 April 2023	156209443
Rejectaria funebris (Schaus)	x			Caura 25 November 2022	142901840
Rejectaria pharusalis (Walker)	x			Inniss Field 01-02 August 2021	89631836
Rejectaria theclalis (Walker)	x			Temple Village 05 November 2022	141238258
Renia bipunctata (Kaye)	x			Temple Village 05 November 2022	141238221
Salia albivia (Hampson)	x			Caura 25 November 2022	142900596
Salia anna (Druce)		x		Wa Samaki Estate 16 January 2021	68136666
Sitophora totafusca (Kaye)	x			Madamas Rd. Ext. 24-25 July 2021	88705027
Strathocles parvipulla Dognin	x			Madamas Rd. Ext. 24-25 August 2021	96312298
Scoliopteryginae					
Anomis illita Guenée		x		Wa Samaki Estate 02 December 20	68210055
Anomis properans (Walker)		x		Wa Samaki Estate 16 January 2021	66049953

***Gigia obliqua* (Walker, 1865) (Calpinae)**

Kaye and Lamont (1927) recorded this species (as *Dochmiogramma filamentosa* Felder, a synonym) based on a female from Caparo (October 1904, F. Birch) in NHMUK. MJWC examined this specimen, and compared it with the type (male, no locality) and the rest of the NHMUK series. There have been no further records since then. RND observed the first male (Fig. 3 (above)) and another female feeding on guava fruit bait in Inniss Field, Moruga on 2 August 2021 at 01.13 h (Fig. 3 (below)). This species displays strong sexual dimorphism.

Fig. 3. *Gigia obliqua* feeding on guava fruit bait, Inniss Fields, Moruga. Above- Male (iNaturalist observation 89629815); Below- Female [iNaturalist 89629707].

***Gigia stenogaster* (Felder, 1874) (Calpinae)**

There have been no previous records of this species from Trinidad. MJWC identified RND's photos from authoritative images on the internet (INPN 2022). RND observed a male feeding on an unknown fermenting fruit in Inniss Field, Moruga on 24 December 2020 at 00.53 h (Fig. 4 (above)). Subsequently, the first female specimen was observed feeding on guava fruit bait set out by RND in the same area on 2 August 2021 at 01.13 h (Fig. 4 (below)). Males and females display strong sexual dimorphism.

Fig. 4. Above- Male *Gigia stenogaster* feeding on an unknown fermenting fruit, Inniss Field, Moruga (iNaturalist observation 67114631), Below- Female *Gigia stenogaster* attracted to guava fruit bait, Iniss Field, Moruga [iNaturalist 89629570].

***Hemeroblemma dolon* (Cramer, 1777) (Erebinae, Thermesiini)**

Cock (2020) reported several males of this sexually dimorphic species from Trinidad, but until now, the female has not been known from the island. RND's photograph of a female was identified by comparison with images of females in NHMUK and Barbut and Lalanne-Cassou (2005). RND observed the first female specimen of this species for the island feeding on guava fruit bait near Brasso Seco on 15 August 2021 at 00.25 h (Fig. 5).

Fig. 5. Female *Hemeroblemma dolon* observed feeding on guava fruit bait, near Brass Seco [iNaturalist 91331325].

***Hemeroblemma helima* (Stoll, 1782) (Erebinae, Thermesiini)**

Cock (2020) reported several males from Trinidad, and included a figure of the female from the original description, which was used to identify the female when it was found in Trinidad. RND observed the first female specimen of this species for the island feeding on guava fruit bait near Brasso Seco on 15 August 2021 at 04.22 h (Fig. 6), the same night that the first female *H. dolon* was also observed.

***Hemeroblemma mexicana* (Guenée, 1852) (Erebinae, Thermesiini)**

This species has not previously been recorded for Trinidad. It was identified from images on the internet, including BOLD (2022). Although *H. mexicana* was described from Mexico, DNA barcodes show that it is a widespread species, found from Mexico to Colombia (BOLD 2022). Apparently identical observations in iNaturalist indicate that the range of this species extends south to include most of Brazil. RND observed the first female specimen on the underside of a leaf in Inniss Field, Moruga on 31 October 2020 at 00.37 h. Subsequently, another female specimen was observed feeding on guava fruit bait set out by RND in the same area on 2 August 2021 at 01.41 h (Fig. 7).

Fig. 6. Female *Hemeroblemma helima* observed feeding on guava fruit bait, near Brasso Seco [iNaturalist 91331115].

Fig. 7. Female *Hemeroblemma mexicana* observed feeding on guava fruit bait, Inniss Field, Moruga [iNaturalist 89627921].

***Oidemastis aeatusalis* (Walker) (Herminiinae)**

This species was described as *Bleptina aeatusalis* Walker, 1859, and appears in Poole's (1989) catalogue in this combination. However, it also appears on the internet as *Oidemastis aeatusalis* (Walker), an unpublished combination in LepIndex (Beccaloni et al. 2003) and in on-line reference sites that use the nomenclature from LepIndex. Noting that *Bleptina aeatusalis* differs substantially from *B. caradrinalis* Guenée, 1854 (the type species of *Bleptina* Guenée, 1854) in wing shape and markings, we accept the conclusion of the unattributed NHMUK curator in Lepindex

who treated this species as *Oidemastis aeatusalis* (Walker) **new combination**, so as to make this combination available going forwards, RND photographed a specimen feeding on guava fruit bait in Caura valley, along a trail to Lopinot on 25 November 2022 (Fig. 8)

Fig. 8. *Oidemastis aeatusalis* observed feeding on guava fruit bait, Caura Valley [iNaturalist 142901068].

***Rejectaria olivenca* Goldstein, 2021 (Herminiinae)**

This species has not previously been reported for Trinidad. RND observed two specimens feeding on guava fruit bait and one attracted to light in Caura Valley, along a trail to Lopinot on 22 April 2023 and photographed a male specimen at 20.36 h (Fig. 9). The images were identified from Goldstein (2021), but voucher specimens should be obtained to confirm this.

***Sitophora totafusca* Kaye (Herminiinae)**

Kaye (1901) described *Sitophora totafusca* Kaye from Trinidad, but Kaye and Lamont (1927) treated it as a synonym of *S. vesiculalis* Guenée, 1854, described from Brazil. MJWC has examined both holotypes in NHMUK and more recent material of both sexes from Trinidad (Fig. 10). Neither holotype is in good condition. Comparing females from Trinidad with the female holotype of *S. totafusca* provides a good match. However, comparing the associated males from Trinidad with the male holotype of *S. vesiculalis* indicates that although they are similar, differences in colour and markings suggest they are unlikely to be conspecific. We therefore use *Sitophora totafusca* Kaye **reinstated species**, noting that dissections will be needed to test this treatment. RND photographed a female feeding on guava fruit bait in Madamas Rd. Ext., Brasso Seco on 25 July 2021 (Fig. 11).

Fig. 9. Male *Rejectaria olivenca* observed feeding on guava fruit bait, Caura Valley [iNaturalist 156209443].

Discussion

Using naturally fermented and rotting fruit baits proved to be an efficient method of attracting certain species of moths from the family Erebidae, some of which are rarely observed or collected and some of which are yet to be identified.

Species from a total of five subfamilies were attracted to the fruit baits. The results suggest that certain subfamilies of erebid moths such as Calpinae, Erebinae and Herminiinae are attracted to the baits more often than the other subfamilies. From the subfamily, Calpinae, 12 species were observed. Both *Gigia obliqua* and *G. stenogaster* were previously thought to be rare in Trinidad but the first author observed both sexes of each species several times on the fruit baits in South Trinidad.

From the subfamily Erebinae, 18 species were attracted to the fruit baits. Cock (2020) listed six Trinidad species of *Hemeroblemma*, five of which were attracted to the fruit baits and with *H. mexicana* being a new island record. Female specimens of both *H. dolon* and *H. helima* had not been recorded by Cock (2020) and the first author has since made other observations of the latter on fruit baits. Both male and female specimens of *H. opigena* and *H. malitiosa* were observed on the baits but only females of the other four species were noted.

Ascalapha odorata (Linnaeus) (Erebidae, Thermesiini) has been observed by the author feeding on a ripe rollinia fruit while it was still on the tree [iNaturalist 65748798] and on another occasion feeding on rotting bananas on the ground but it has not been observed on any fruit baits as yet.

Most species attracted to the fruit baits were from the subfamily Herminiinae with a total of 24 species. Several specimens of *Rejectaria olivenca* reported here are the

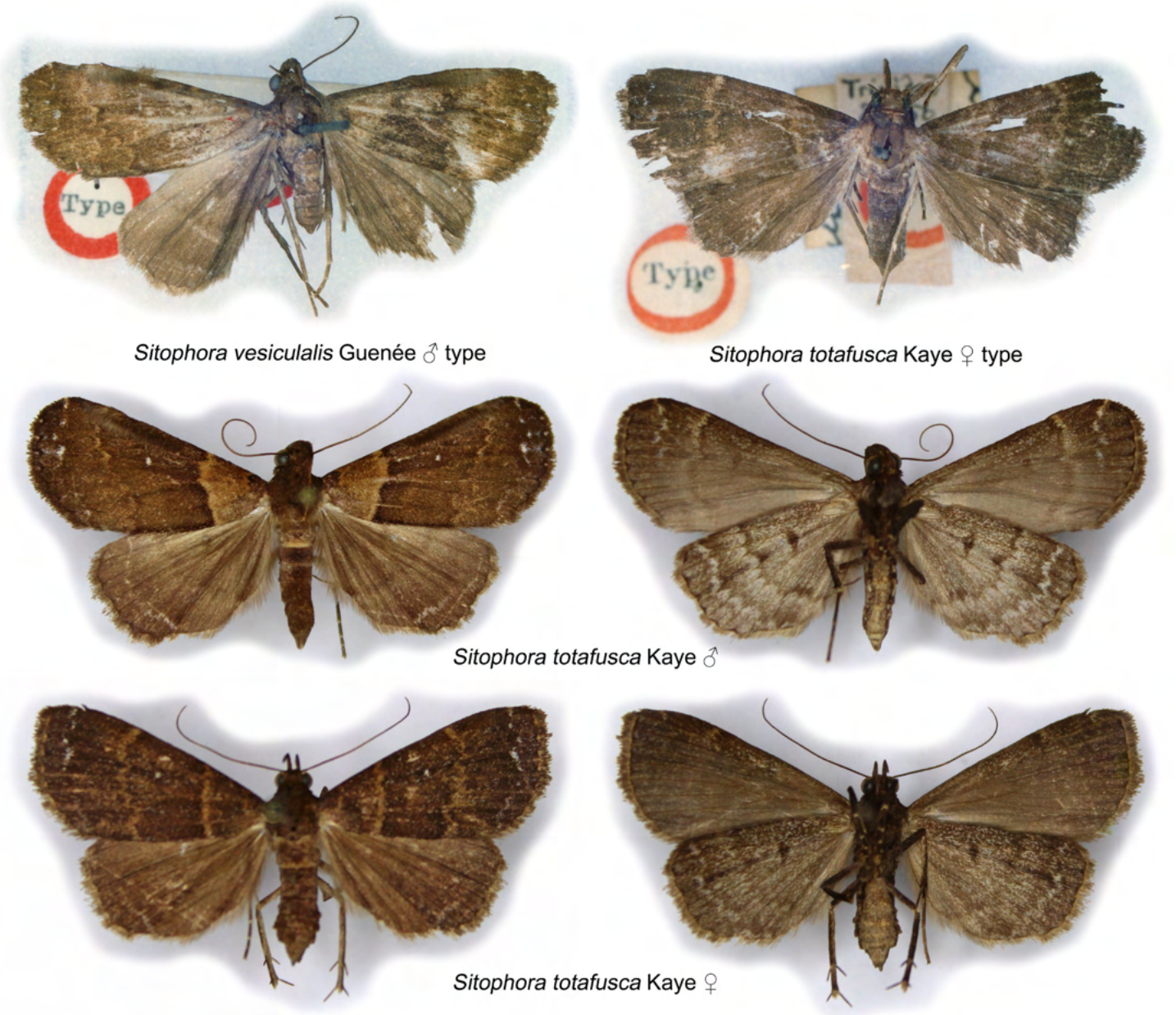

Fig. 10. *Sitophora* spp. **Top left**, male holotype *S. vesiculalis* Guenée, Brazil, NHMUK; **top right**, female holotype *S. totafusca* Kaye, Trinidad, NHMUK; ©, The Trustees of the Natural History Museum, London, made available under Creative Commons License 4.0 https://creativecommons.org/licenses/by/4.0/. **Middle**, male *S. totafusca*, Trinidad, Morne Bleu, Textel Installation, at light, 29 March 1979, M.J.W. Cock [MJWC]; wingspan 32 mm. **Bottom**, female *S. totafusca*, as middle, 2 March 1981; wingspan 29 mm.

first records from Trinidad. MJWC was unable to identify a number of species belonging to this subfamily that are not shown here – some because they are species that he recognized but had failed to find a name for when checking the NHMUK and USNM collections and some because they are new to him and Trinidad.

From the subfamily Eulepidotinae, only five species were observed on the fruit baits and four of them belonged to the species-rich genus *Antiblemma*.

Aside from species belonging to the family Erebidae, *Pararcte schneideriana* (Stoll) (Noctuidae) was observed feeding on a rollinia fruit that was still on the tree [iNaturalist 66048901].

This study reflects preliminary qualitative data of erebid moths attracted to three particular fruit baits and shows the scope for future research topics such as a quantitative and more in-depth qualitative representation of species attracted to different fruit baits, species richness at a location, species density at a location and an analysis of the species richness and density during different times of the year.

Fig. 11. Female *Sitophora totafusca* observed feeding on guava fruit bait, Madamas Rd. Ext., Brasso Seco [iNaturalist 88705027].

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More than 100 new records of moths and butterflies (Lepidoptera) from Tobago, West Indies, with a new synonym in Crambidae

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ABSTRACT

Details of six new butterfly and 128 new moth records from Tobago are presented, including species of Batrachedridae (1), Castniidae (1), Crambidae (20), Erebidae (49), Euteliidae (1), Geometridae (15), Hesperiidae (2), Immidae (2), Lasiocampidae (1), Lycaenidae (2), Noctuidae (12), Notodontidae (11), Nymphalidae (1), Oecophoridae (3), Pyralidae (7), Riodinidae (1), Sesiidae (2), Sphingidae (1), Tineidae (1) and Uraniidae (1). Three of the new butterfly records are based on voucher specimens, but the other three and all the moths are based solely on photographs from life, and representative images are included as vouchers. A duplicate record of Hedylidae is pointed out, previously overlooked records of Gelechiidae and Saturniidae are added, the previously unrecognized female of *Metria* sp. nr. *demera* Schaus (Erebidae) is associated with the male, and *Hemiceras egregia* Dognin (Notodontidae) is newly identified. The total number of Lepidoptera species known from Tobago is now 653 moths and 165 butterflies. All newly reported species except four are also known from Trinidad (although some have not been previously published as from Trinidad). Species associated with economic crops include *Batrachedra nuciferae* Hodges (Batrachedridae), *Haritalodes pharaxalis* (Druce), *Maruca vitrata* (Fabricius) and *Palpita persimilis* Munroe (Crambidae), *Cerconota anonella* (Sepp) (Oecophoridae), *Rupela albina* Becker & Solis (Pyralidae), and *Eichlinia pulchripes* (Walker) (Sesiidae), while *Achroia grisella* (Fabricius) (Crambidae) and *Galleria mellonella* (Linnaeus) (Pyralidae) are pests of honeybee hives. *Leucochroma analytica* Dyar, 1914 is a **new synonym** of *Leucochroma trinitensis* Rothschild, 1912.

Key words: Trinidad, Tobago, butterflies, moths, Lepidoptera, new records, *Leucochroma*

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INRODUCTION

Trinidad and Tobago are two small islands off the northeast coast of South America with a combined land area of about 5100 km^2 and a maximum elevation slightly below 1000 m. Together with some smaller associated islands, they make up the country Trinidad & Tobago. As continental islands, they have a biota that is a subset of that of the nearby South American mainland. The fauna of Trinidad is the better known of the two, and Tobago being further offshore has a biota that is largely a subset of that of Trinidad (Starr 2009, Cock 2017a, 2017b). Here, we use Trinidad & Tobago to refer to the country, whereas Trinidad and Tobago refer to the two separate islands.

The butterflies of Tobago are relatively well known, and an updated checklist of 150 species was quite recently published (Cock 2017a). Since then, nine species have been added to this total (Cock 2021b, Cock *et al*. 2022, 2023), and six more recorded in 2023 are added here. In contrast, the moths of Tobago are not so well known, and only in 2017 was a preliminary checklist of 355 species published (Cock 2017b). Cock and Kelly (2020) added 45 new records, Deo *et al*. (2020) pointed out an old literature record, Cock (2021b) added a further 11 moths based on images posted on iNaturalist (www.iNaturalist.org), Cock *et al*. (2022) added a further 49 moths and removed one misidentified species, and Cock *et al*. (2023) added 66 records. Here we add new records of 128 moths recorded up to the end of 2023, add previously overlooked literature records (Gelechiidae and Saturniidae), remove a duplicate record (Hedylidae), identify the previously unrecognized female of *Metria* sp. nr. *demera* Schaus (Erebidae), and *Hemiceras egregia* Dognin (Notodontidae), previously reported from Tobago as *H. rufula* Dognin (Cock 2017b) is reidentified. The total number of Lepidoptera species now known from Tobago is 653 moths and 165 butterflies. Thus, the number of species of moths known from Tobago has almost doubled from 355 in 2017 to 653, approaching the 742 species of

moths extrapolated by Cock (2003), whereas the number of butterflies shows only a 10% increase compared to the 2017 total. Many more moth species are expected to occur in Tobago, particularly those of smaller size, and we have images representing about 100 species that are yet to be authoritatively identified.

Nearly all the new records reported here are based on the photographs of the coauthors CM, AED, RND, MK and DRWP, together with a small number of observations by citizen scientists on iNaturalist (www.iNaturalist.org; as noted in text and acknowledgements). Since July 2023, CM has been documenting the moths attracted to external fluorescent tubes left on by night at his house near Mason Hall, in an area of the Courland River watershed at about 170m. The house is within an old estate with cacao, coffee, mahogany, cypre and immortelle trees. This half-year of observations has yielded by far the largest proportion of the new records reported here. AED and MK photographed moths attracted to house lights while they were staying near Englishman's Bay. RND made observations as part of the TTFNC Buccoo Bioblitz 2023 (Deacon 2023), using light to attract moths, as well as making night walks (Deo *et al*. 2020) and using drying uprooted *Heliotropium indicum* L. (Heliotropiaceae) as an attractant for some Arctiinae (Beebe 1955). DRWP photographed his observations at Corbin Local Wildlife, a nature reserve and rehabilitation centre near Mason Hall, Tobago, where significant effort has been made to increase Lepidoptera biodiversity on the site by establishing native wildflower-rich pasture and planting food plants. As a result, 80 butterfly species have been recorded from the reserve, including species that have not been recorded for many years and new island records, some of which are documented below. Almost all species newly recorded here from Tobago are also known to occur in Trinidad, although not all have been previously published as occurring in Trinidad. However, four species reported here are not known from Trinidad at this time: *Coxina cinctipalpis* (Smith), *Dyomyx egista* Bar, *D. ocala* Schaus, and *Eulepidotis persimilis* (Guenée).

We refer to material examined in the following collections: Matthew J.W. Cock research collection (MJWC), The Natural History Museum, London, UK (NHMUK), National Museums of Scotland (NMS), Oxford University Museum of Natural History (OUMNH), United States National Museum (USNM), and the University of the West Indies Zoology Museum, St. Augustine, Trinidad and Tobago (UWIZM). Identifications were made by comparison with the first author's collection of Trinidad Lepidoptera (MJWC), which have been named primarily in the context of the collections of NHMUK and USNM. In selected cases, we also refer to species' barcode index numbers (BINs) (Ratnasingham and Hebert 2013) as used in the Barcode of Life database (Hebert *et al.* 2003, https://www.boldsystems.org/).

Species are arranged by family alphabetically, and alphabetically within families; subfamilies (where used) are included in parentheses after each species heading. To facilitate navigation each entry is numbered and lists of entries by numbers, genera and species appear at the end of the article. The taxonomy and basis of identification of each species are the work of the first author. Similarly, comments on the status of each species in Trinidad are based on the first author's unpublished compilation of records; these indicate how commonly and in which habitats these species may occur in Tobago. Trinidad records were collected by the first author and the specimens are in his collection (MJWC) except when otherwise stated. The figures show photographs taken in Tobago, except as indicated. © in the figure legend refers to the photographer. Abbreviations include MVL = mercury vapour light; TL = type locality. As the photographs are without any indication of scale, the forewing length (F = base of forewing – wing tip) is provided in the figure legends based on photographs taken with a scale, Trinidad material in MJWC, or estimated from published descriptions or images.

BATRACHEDRIDAE

1. *Batrachedra nuciferae* Hodges, 1966

Cock and Burris (2013) and Cock (2013) studied this species in Trinidad, where they considered it an indigenous minor pest of palm inflorescences, including coconut (*Cocos nucifera* L.) and palmiste, *Roystonea oleracea* (Jacq.) O.F. Cook (Arecaceae). Trinidad material was identified by comparison of the genitalia with those of the type series, and Trinidad specimens have since been sequenced for their DNA barcodes, which form BIN BOLD:ACR6105. CM's photograph from Mason Hall (Fig. 1) was identified by comparison with the material studied from Trinidad.

Fig. 1. *Batrachedra nuciferae*, Mason Hall, 28 July 2023, C. Mejias [iNaturalist 175467103]; F 4-5 mm.

CASTNIIDAE

2. *Castnia invaria* Walker, 1854 ssp. *trinitatis* Lathy 1925 (Castniinae)

In their synopsis of the Castniidae of Trinidad, Gonzalez and Cock (2004) were aware of only two records of this species from Trinidad, dating back to 1925. We are not aware of any subsequent records, so the photograph by DRWP (as corbinlocalwildlife) from Corbin Local Wildlife (Fig. 2), is an unexpected first record for Tobago.

Fig. 2. *Castnia invaria trinitatis*, Corbin Local Wildlife, 14 March 2023, Pandey D.R.W. [iNaturalist 152836985]; F 40 mm.

CRAMBIDAE

3. *Apilocrocis cephalis* (Walker, 1859) (Spilomelinae)

This is a new record for both Trinidad and Tobago, identified by comparison with the NHMUK series. Trinidad records are from Asa Wright Nature Centre, Curepe, Morne Bleu, Parrylands, and Port of Spain (NHMUK, MJWC, iNaturalist). CM photographed one at Mason Hall (Fig. 3), and Mark Hulme photographed one at Englishman's Bay on 15 December 2023 [iNaturalist 194112484].

Fig. 3. Female *Apilocrocis cephalis*, Mason Hall, at light, 6 December 2023, C. Mejias [iNaturalist 193267123]; F 12–13 mm.

4. *Desmia ploralis* (Guenée, 1854) (Spilomelinae)

As pointed out by Landry (2016) *Desmia* is a complicated, mostly Neotropical, sometimes sexually dimorphic genus, with many species described and undescribed. Trinidad specimens from the Arima Valley and Parrylands were identified as this species by comparison with the lectotype (NHMUK, ♂ French Guiana) and NHMUK series. Kaye and Lamont (1927) recorded *D. ploralis* from Trinidad, based on a specimen from Palmiste, 12 February 1921 (N. Lamont). This specimen is in NMS; it resembles the Trinidad specimens MJWC identified as *D. ploralis*, but the white hindwing spot has a distal lobe and the lobe of the hindwing tornus is stronger; it may be *D. clarkei* Amsel, described from Venezuela (Amsel 1956) or some other species. Based on the specimens in MJWC, the male photographed by AED (Fig. 4) is *D. ploralis*, but this should be considered a provisional identification until the genus is better understood and Tobago specimens have been examined in the context of genitalia diagnostics and DNA barcodes.

Fig. 4. Male *Desmia ploralis*, Englishman's Bay, at light, 9 April 2023, A. Deacon [iNaturalist 154217800]; F 11 mm.

5. *Desmia tages* (Cramer, 1777) (Spilomelinae)

Desmia tages was described from Surinam (Cramer 1777-1779) and has been reported from Trinidad by Kaye (1901) and Kaye and Lamont (1927), the latter referring to specimens from Tabaquite (W.J. Kaye) and without locality (F.W. Jackson). The former has not been located in NHMUK, but there are two females collected by F.W. Jackson in NHMUK and OUMNH which may represent this record. Trinidad specimens were compared to Cramer's plate (Cramer 1777-1779, pl. 97D, ♀) and the NHMUK series based on habitus. This material is also compatible with BIN BOLD:AAA0433 identified as *D. tages* in BOLD, with sequences from USA (5), Mexico (1), Costa Rica (61), and Argentina (1). However, until the genus is revised based on genitalia and genetics and a neotype designated for *D. tages*, this identification cannot be rigorously confirmed. *Desmia tages* is a common and widespread species in

Trinidad, and CM has photographed males (20 July 2023 [iNaturalist 174193155]; Fig. 5) and a female (Fig. 6) at Mason Hall.

Fig. 5. Male *Desmia tages*, Mason Hall, at light, 13 January 2024, C. Mejias [iNaturalist 196629977]; F 12 mm.

Fig. 6. Female *Desmia tages*, Mason Hall, at light, 22 September 2023, C. Mejias [iNaturalist 184473048]; F 12 mm.

6. *Goniorhynchus salaconalis* (Druce, 1895) (Spilomelinae) This identification was suggested by alexandre_laporte on iNaturalist. *Goniorhynchus salaconalis* was described from Panama by Druce (1881–1900); his figure (Plate 62, Fig. 16) is similar to the Tobago moths shown here (Figs. 7, 8) but the costa is only narrowly dark, and the hindwing has no discal spot. Accordingly, this name is used provisionally, pending further study. There are photographic records from Trinidad (Bush Bush, 18 October 2014, K. Sookdeo; South Oropouche, Mon Desir, 1 February 2022, T.P. Maharaj [iNaturalist 106013567]) and Chacachacare (18 February 2023, R. Deo [iNaturalist 149304223]), as well as photographs of two males and a female from Tobago, at Englishman's Bay (Figs. 7, 8; ♂ 1 December 2021, M. Kelly).

7. *Haritalodes pharaxalis* (Druce, 1895) (Spilomelinae) This species is a minor leaf-eating pest of cacao, known as the cacao leaf tier in Trinidad. Until recently, it was referred to as *Sylepta prorogata* Hampson (Lamont and Callan 1950, Kirkpatrick 1953, Laurence 2000, Robinson *et al*. 2023), but Becker (2023) showed that this is a synonym of

Fig. 7. Male *Goniorhynchus salaconalis*, Englishman's Bay, at light, 10 April 2023, A. Deacon [iNaturalist 1544056120]; F 11 mm (estimate).

Fig. 8. Female *Goniorhynchus salaconalis*, Englishman's Bay, at light, 15 July 2022, M. Gibson [iNaturalist 126414497]; ©, with permission.

Haritalodes pharaxalis. Trinidad specimens were identified by comparison with the holotype of *S. prorogata* (NHMUK, ♂ Surinam) and the NHMUK series. CM's photographs from Mason Hall (Fig. 9; ♂ 3.xii.2023 [iNaturalist 192997542]) are the first records of this pest from Tobago.

Fig. 9. Male *Haritalodes pharaxalis*, Mason Hall, at light, 9 September 2023, C. Mejias [iNaturalist 182579379]; F 13 mm.

8. *Hoterodes ausonia* (Cramer, 1777) (Spilomelinae)
Trinidad material of this distinctive species was identified by comparison with the NHMUK and USNM series. It superficially resembles *Syllepte laticalis* (Lederer) (Fig. 24), but that species is more robust and has an extensive white area on the hindwing. This new record for Tobago is based on three photographic records from Idlewild Recreation Ground, above Scarborough (♂ 27 August 2023, N. Vaughan [iNaturalist 180791130]), near Mason Hall (♂, 10 September 2023, C. Mejias [iNaturalist 182745113]), and Black Rock (Fig. 10).

Fig. 10. Male *Hoterodes ausonia*, Black Rock, 23 September 2023, L. Wheeler [iNaturalist 184638748]; F 18 mm.

9. *Lamprosema lunulalis* Hübner, 1823 (Spilomelinae)
Like *Desmia*, this is another difficult genus with many similar described and undescribed species. Kaye and Lamont (1927) recorded *L. lunulalis* from St. Joseph, in March 1922 (F.W. Jackson). This specimen was examined in NHMUK and other Trinidad specimens were identified as this species based on the NHMUK series. Nevertheless, the genus needs revision before this name can be used with confidence. This seems to be an occasional and widespread species in Trinidad. CM photographed two females at Mason Hall (22 July 2023 [iNaturalist 174383583] and 10 September 2023, Fig. 11), and AED photographed a possible male in poor condition at Englishman's Bay (8 April 2023 [iNaturalist 154045219]).

10. *Leucochromodes trinitensis* (Hampson, 1912) (Spilomelinae)
Hampson (1912) described *Leucochroma trinitensis* from Trinidad (♀ type examined in NHMUK). Two years later, Dyar (1914) described the same species as *Leucochroma analytica* (♀ type examined in USNM) also from Trinidad. Munroe (1995) transferred both species to *Leucochromodes*. Based on MJWC's examination of the types, *Leucochroma analytica* Dyar, 1914 is a **new synonym** of *Leucochroma trinitensis* Rothschild, 1912.

Kaye (1901) identified this species as *Leucochroma*

Fig. 11. Female *Lamprosema lunulalis*, Mason Hall, at light, 10 September 2023, C. Mejias [iNaturalist 182739951]; F 10 mm.

melusinalis Walker, referring to a specimen that he collected at Tabaquite. Kaye and Lamont (1927) referred to it as *L. trinitatis* and reported 'Type only in NHM. Tabaquite (W.J. Kaye)'; the type is only labelled 'Trinidad', but it is almost certainly the Tabaquite specimen referred to. The only specimen seen with location data more detailed than 'Trinidad' is a female that MJWC collected at Morne Bleu Textel Installation, on 4 February 1979. AED photographed a female at Englishman's Bay (Fig. 12).

Fig. 12. Female *Leucochromodes trinitensis* , Englishman's Bay, at light, 10 April 2023, A. Deacon [iNaturalist 154405631]; F 9 mm.

11. *Maruca vitrata* (Fabricius, 1787) (Spilomelinae)
Maruca vitrata is a pantropical pest of the flowers and pods of Fabaceae, including pigeon pea (*Cajanus cajan* L.) (Sharma 1998). It has been reported from 'Trinidad & Tobago', but although Kaye and Lamont (1927) and IIE (1996) reported it from Trinidad, no sources specifically refer to it being present in Tobago. As it also occurs through the Lesser and Greater Antilles (IIE 1996), its presence in Tobago might be assumed, but CM's photographic record (Fig. 13) is the first clear confirmation of the presence of the species in Tobago.

Fig. 13. *Maruca vitrata*, nr. Mason Hall, 5 August 2023, C. Mejias [iNaturalist 176871420]; F 11 mm.

12. *Mesocondyla dardusalis* (Walker, 1859) (Spilomelinae) Trinidad specimens were identified by comparison with the NHMUK and USNM series and confirmed by comparison with an image of the type in OUMNH (2023a). Although it has not previously been reported from Trinidad, this is an occasional species with records from Morne Bleu, Arima Valley, Manzanilla, Freeport (Wa Samaki Ecosystems), Pepper Village, South Oropouche, and Inniss Field (MJWC, OUMNH, UWIZM, iNaturalist). A photograph by CM (Fig. 14) shows that it also occurs in Tobago.

Fig. 14. Male *Mesocondyla dardusalis*, Mason Hall, at light, 17 September 2023, C. Mejias [iNaturalist 183789480]; F 16 mm.

13. *Neoleucinodes alegralis* (Schaus, 1920) (Spilomelinae) Schaus (1920) described this species (as *Lipocosma alegralis*) from French Guiana (TL Cayenne), Panama, and Guatemala. This is a new record for both Trinidad and Tobago. Trinidad records from Morne Bleu, Upper Guanapo Valley, Brasso Seco and Parrylands (MJWC, iNaturalist) were identified from an initial suggestion by alexandre_laporte on iNaturalist, and supported by examination of material from Costa Rica posted on BOLD forming BIN BOLD:AAK7892. RD's photograph on the Main Ridge (Fig. 15) and CM's from near Mason Hall (15 September 2023 [iNaturalist 183442419]) are the first observations from Tobago.

Fig. 15. *Neoleucinodes alegralis*, Main Ridge, 11.29 -60.61, 30 August 2023, R. Deo [iNaturalist 181251678]; F 8 mm.

14. *Omiodes humeralis* Guenée, 1854 (Spilomelinae) Specimens of this species from Trinidad were initially identified by M. Shaffer (NHMUK) and subsequently confirmed using the key in Gentili and Solis (1998). It has not previously been reported from Trinidad, but there are records from Grand Riviere, Santa Cruz Valley, Caura, Morne Bleu, Arima Valley, Upper Guanapo Valley, Cumaca Road, Valencia Forest, Brasso, South Oropouche and Concord (MJWC, NHMUK, UWIZM, K. Sookdeo photo, iNaturalist). CM has photographed this species several times near Mason Hall (21 July 2023, Fig. 16; 28 July 2023 [iNaturalist 175456286]; 9 September 2023 [iNaturalist 182579756]).

Fig. 16. Male *Omiodes humeralis*, Mason Hall, 21 July 2023, C. Meijas [iNaturalist 174196895]; F 14 mm.

15. *Palpita persimilis* Munroe, 1959 (Spilomelinae)
This is the species that Kaye and Lamont (1927) reported from Trinidad as *Margaronia quadristigmalis*, referring to a specimen from St. Ann's (W.J. Kaye), which MJWC examined in NHMUK. Munroe (1959) described *Palpita persimilis* from Brazil (TL Sta. Catharina), Venezuela and Guadeloupe, so its presence in Trinidad and Tobago is not unexpected. MJWC identified a dissected Trinidad male from Munroe (1959), and there are records from Point Gourde, Port of Spain (St. Ann's – the specimen referred to by Kaye and Lamont (1927)), Morne Bleu, Arima Valley, Cumaca Road, Curepe, Brigand Hill, Point Fortin, South Oropuche and Inniss Field (MJWC, NHMUK, UWIZM, iNaturalist). A DNA barcode from a Trinidad specimen (Point Fortin, MC_364) forms part of BIN BOLD:AAF2122, together with material from Costa Rica, Puerto Rico, and Panama, although none of these are identified to species. Given this lack of precision, the Trinidad and Tobago records for this species should be considered provisional. The caterpillars are reported to be pests of olive trees in Brazil, feeding on shoots and leaves (Chiaradia and Croce 2008). CM photographed this species near Mason Hall (Fig. 17).

Fig. 17. Female *Palpita persimilis*, Mason Hall, 2 August 2023, C. Mejias [iNaturalist 176363465]; F 13 mm.

16. *Phaedropsis fuscicostalis* (Hampson, 1895) (Spilomelinae)
This species has not previously been reported from Trinidad or Tobago. Trinidad material (Curepe, 19-22 October 1980; St. Benedict's, 16 January 2004) was identified by comparison with the type (NHMUK, ♀ Grenada). Having been recorded from Grenada and Trinidad it was expected to occur in Tobago, and CM's photograph (Fig. 18) confirms this.

17. *Phostria metalobalis* (Hampson, 1912) (Spilomelinae)
This species was described from Fort George, Trinidad (Hampson 1912), and Trinidad specimens were identified by comparison with the holotype in NHMUK. It is an uncommon species in Trinidad with further records from Curepe (MJWC, UWIZM) and Wa Samaki Ecosystems

Fig. 18. Female *Phaedropsis fuscicostalis*, nr. Mason Hall, 20 July 2023, C. Mejias [iNaturalist 174033836]; F 8 mm.

(iNaturalist). The male has a distinctive concave margin to the hindwing, but in the female, this is only slightly sinuous (Fig. 19), so images of the female might be confused with other similar species. RND photographed a male on the Main Ridge of Tobago (Fig. 20).

Fig. 19. Male (below) and female *Phostria metalobalis*, Wa Samaki Ecosystems, by night, 2 May 2021, R. Deo [iNaturalist 76514809]; F ♂ 19 mm.

Fig. 20. Male *Phostria metalobalis*, Main Ridge, 11.29 -60.61, 30 August 2023, R. Deo [iNaturalist 181252421]; F 19 mm.

18. *Piletosoma novalis* (Walker, [1866]) (Spilomelinae)
Lamont and Callan (1950) listed this species from Trinidad, but any without comment on the source of this record. Trinidad specimens were identified by comparison with the type (NHMUK, ♂ Brazil), NHMUK series and USNM series. However, this is a rather undistinguished species and there are other similar species, e.g. *P. guianalis* Schaus, 1924 (TL Guyana), so this identification should be considered provisional. In addition to its size (F 13 mm), note that in the male the antennae are slightly thickened in the third quarter, the tegulae extend to the back of the thorax, there are tufts of hair-like setae laterally on the abdomen, a purple sheen to the dorsal forewings at certain light angles, a slightly concave area on the costa at two-thirds, and a dense group of black hairs at the tornus of the hindwing. There are Trinidad records from Port of Spain (< 15 miles), St. Benedicts, Morne Bleu and Palmiste (MJWC, NMS, OUMNH), but AED's photograph from Englishman's Bay (♂, at light, 9 April 2023 [iNaturalist 154217837]), RND's from the Main Ridge (at light, 30 August 2023 [iNaturalist 181255240]) and CM's from Mason Hall (Fig. 21) are the first from Tobago.

Fig. 21. Male *Piletosoma novalis*, Mason Hall, at light, 8 September 2023, C. Mejias [iNaturalist 182409710]; F 13 mm.

19. *Portentomorpha xanthialis* (Guenée, 1854) (Pyraustinae)
Kaye and Lamont (1927) Reported this species from Trinidad (as *Lamprosema xanthialis*), listing a specimen from Port of Spain (1889, J.H. Hart). This is most likely an old female specimen in NHMUK labelled 'Trinidad'. Other Trinidad specimens were identified by comparison with the cotypes (NHMUK, Cuba) and NHM series. CM photographed one at Mason Hall (Fig. 22).

20. *Rupela albina* Becker & Solis, 1990 (Schoenobiinae)
Kaye (1901) and Kaye and Lamont (1927) recorded this species from Trinidad as *Rupela albinella* (Cramer). However, this is an unavailable preoccupied name, and the replacement name *Rupela albina* Becker and Solis (1990) should be used. Kaye and Lamont (1927) recorded it from

Fig. 22. *Portentomorpha xanthialis*, Mason Hall, 1 August 2023, C. Mejias [iNaturalist 176214762]; F 12 mm.

Tabaquite (W.J. Kaye), Guaico (18 April 1915, N. Lamont) and Palmiste (25 November 1915, 25 October 1918, 27 December 1921, N. Lamont). Lamont's specimens in RSM were examined and their identity was confirmed by comparison with the NHMUK series. For his Diploma in Tropical Agriculture, Harris (1956) made a detailed study of the rice stem borers, *R. albina* (as *R. albinella*) and *Diatraea saccharalis* (Fabricius) (Crambidae) in Trinidad, but unfortunately, this does not seem to have been published in a journal. CPPC (1972) listed *R. albina* (= *R. albinella*) as a rice pest present in Trinidad & Tobago, but this refers to the country as a whole and not to the two islands and so, until now there have been no records of this species from Tobago. *Rupela albina* is widespread in lowland areas of Trinidad, but apart from the report in CPPC (1972) does not seem to have entered the applied entomology literature for the island. There are several superficially similar species present in Trinidad & Tobago, such as *Agylla* spp. (Erebidae, Arctiinae, Lithosiini), but *R. albina* has longer legs which are normally obvious in images of the living moth, and a tuft of long white hairs at the base of the forewing (also seen in *Norape plumosa* (Butler) (Megalapygidae), but that is a more robust species with broader wings). CM photographed a specimen of this rice pest at Mason Hall (Fig. 23).

21. *Syllepte laticalis* (Lederer, 1863) mispl. (Spilomelinae)
Munroe (1995) lists this species in *Syllepte* but points out that it is misplaced in that genus, which Becker (2023) and Solis *et al*. (2023) confirm. Kaye and Lamont (1927) recorded a specimen from Palmiste (July 1915, N. Lamont), which was examined in RSM. The identity of Trinidad specimens was confirmed by comparison with the NHMUK series. This is a fairly common and widespread species in Trinidad (MJWC, RSM, USNM, UWIZM, iNaturalist), but CM's photograph at Mason Hall (Fig. 24) is the first record from Tobago.

Fig. 23. *Rupela albina*, Mason Hall, at light, 14 August 2023, C. Mejias [iNaturalist 178479355]; F ♂ 11-16 mm, ♀ 14-23 mm.

Fig. 24. Female *Syllepte laticalis*, Mason Hall, at light, 19 September 2023, C. Mejias [iNaturalist 184073978]; F 17 mm.

22. *Symphysa amoenalis* (Walker, 1862) (Evergestiinae)
This is a new record for Trinidad and Tobago, which was identified by comparing Trinidad specimens with the USNM series. Trinidad records are from Curepe [MJWC] and South Oropouche (1 February 2023, T.P. Maharaj [iNaturalist 147878234]), and now CM has photographed one at Mason Hall (Fig. 25).

EREBIDAE

23. *Amabela carsinodes* Hampson, 1924 (Erebinae)
Hampson (1924) described this species from Trinidad (Port of Spain). Further Trinidad specimens were identified by comparison with the male type in NHMUK; it is an occasional species, widespread in forested areas. CM photographed one at Mason Hall (Fig. 26).

Fig. 25. *Symphysa amoenalis*, Mason Hall, at light, 4 September 2023, C. Mejias [iNaturalist 181848545]; F ♂ 5 mm, ♀ 6 mm.

Fig. 26. Female *Amabela carsinodes*, Mason Hall, at light, 17 August 2023, C. Mejias [iNaturalist 178935996]; F 14 mm.

24. *Anomis editrix* (Guenée, 1852) (Scoliopteryginae)
Kaye and Lamont (1927) recorded this species from Trinidad based on specimens from Palmiste (28 December 1917, N. Lamont) and without locality (1922, F.W. Jackson). Lamont's specimen in NMS was examined and its identity was confirmed by comparison with the type (NHMUK, Haiti) and NHMUK series. MJWC considered this a rare species in Trinidad, until Tarran P. Maharaj photographed several at Mon Desir, South Oropouche, suggesting it may be a local species with particular requirements. CM photographed one at Mason Hall (Fig. 27).

Fig. 27. *Anomis editrix*, Mason Hall, at light, 5 August 2023, C. Mejias [iNaturalist 176879342]; F 15 mm (estimate).

25. *Antiblemma mundicola* (Walker, 1865) (Eulepidotinae) A new record for both Trinidad and Tobago. Trinidad specimens were identified by comparison with the type (OUMNH 2023b), but there are several similar species, so this identification should be considered provisional until the group is revised using genitalia and genetics. In Trinidad, this seems to be a fairly common and widespread species, with records from Curepe, St Benedict's, Arima Valley, Morne Bleu, Las Lappas Lookout, Brasso Seco, Grande Riviere, Cumaca Road, Parrylands, Inniss Field (MJWC, UWIZM, iNaturalist). CM photographed one at Mason Hall (Fig. 28), and MK one at Englishman's Bay (4 December 2023).

Fig. 28. *Antiblemma mundicola*, Mason Hall, at light, 4 September 2023, C. Mejias [iNaturalist 181848708]; F ♂9 mm, ♀ 10 mm.

26. *Antiblemma patifaciens* (Walker, 1858) (Eulepidotinae) Kaye and Lamont (1927) recorded a specimen from Caparo (October 1904, F. Birch), which was examined in NHMUK and compared with the type (NHMUK, ♀, Brazil). There are three more specimens from Caparo in NHMUK from 1906, but since then the only Trinidad observation has been near Rushville, Guayaguayare (14 March 2023, R. Deo [iNaturalist 151262007]). Recently, CM photographed three individuals at Mason Hall (5 August 2023, Fig. 29; 11 August 2023 [iNaturalist 177921212]; 12 August 2023 [iNaturalist 178104377]).

Fig. 29. *Antiblemma patifaciens*, Mason Hall, at light, 5 August 2023, C. Mejias [iNaturalist 176891316]; F 16 mm (estimate).

27. *Antiblemma rufinans* (Guenée, 1852) (Eulepidotinae) This species was recorded from Trinidad based on a specimen from Palmiste (14 April 1921, N. Lamont) (Kaye and Lamont 1927), which MJWC examined in UWIZM, and confirmed the identification by comparison with the NHMUK series. There are additional records from Arima Valley and Morne Bleu (MJWC), and now CM has photographed this species at Mason Hall (Fig. 30).

Fig. 30. *Antiblemma rufinans*, Mason Hall, 15 August 2023, C. Mejias [iNaturalist 178671953]; F 15 mm.

28. *Antiblemma sufficiens* (Walker, 1858) (Eulepidotinae) A specimen from Caparo, October 1904 (F. Birch) was the basis for Kaye and Lamont (1927) to include this species in their catalogue of Trinidad moths. This specimen was examined in NHMUK and other Trinidad specimens

identified by comparison with the NHMUK series. At this time, all Trinidad specimens that MJWC has examined are female. There are scattered records from lowland forested areas in Trinidad (Fort George, Port of Spain, Maraval, Rampanalgas, Caparo, Parrylands, Guayaguayare (MJWC, NHMUK, RSM, iNaturalist), and now from Tobago (Mason Hall, Fig. 31).

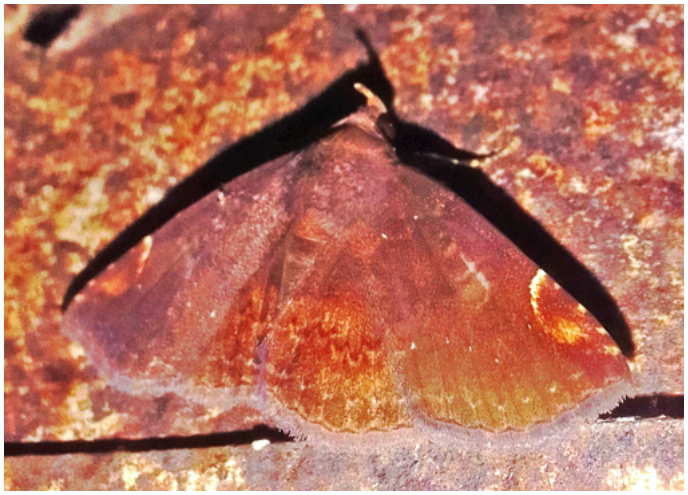

Fig. 31. *Antiblemma sufficiens*, Mason Hall, 4 August 2023, C. Mejias [iNaturalist 176796577]; F 16 mm.

29. *Athyrma adjutrix* (Cramer, 1780) (Erebinae)
This is a widespread but occasional species in Trinidad. Kaye and Lamont (1927) reported specimens from St. Ann's and Caparo, but there are two very similar species in Trinidad, *A. adjutrix* and *A. dormitrix* Guenée (Adams and McCabe 2022), so these specimens will need to be re-examined to check their identity. AED's photograph from Englishman's Bay (Fig. 32) is the first record of the genus from Tobago and was identified using Adams and McCabe (2022).

Fig. 32. Female *Athyrma adjutrix*, Englishman's Bay, at light, 9 April 2023, A. Deacon [iNaturalist 154217840]; F 21 mm.

30. *Carteris lineata* (Druce, 1898) (Herminiinae)
Lamont and Callan (1950) reported Trinidad specimens from Palmiste (9 February 1932, 27 February, N. Lamont). These two specimens were examined in NMS and their identity was confirmed by comparison with the type (NHMUK, Mexico) and NHMUK series. This is an occasional species in Trinidad, mostly in forested areas. CM has photographed this species several times at Mason Hall (♂ 23 July 2023, Fig. 33); ♂ 5 August 2023 [iNaturalist 176890067]); ♂ 13 August 2023 [iNaturalist 178288503]; ♂16 August 2023 [iNaturalist 178768295]).

Fig. 33. Male *Carteris lineata*, Mason Hall, 23 July 2023, C. Mejias [iNaturalist 174589356]; F 11 mm.

31. *Chamyna homichlodes* Hübner, 91821] (Calpinae)
Kaye and Lamont (1927) reported a specimen of this species from Caigual (9 September 1917, A. Lickfold), which was examined in OUMNH, and confirmed by comparison with the NHMUK series. This is an occasional species in Trinidad, primarily in forested areas. CM photographed one at Mason Hall (Fig. 34).

Fig. 34. *Chamyna homichlodes*, Mason Hall, at light, 2 October 2023, C. Mejias [iNaturalist 186077971]; F 20 mm.

32. *Clemensia trinotata* Gibeaux, 1988 (Arctiinae, Lithosiini)
A male Trinidad specimen from Simla (MVL, 12 February 1982) was identified by comparison with the type (MNHN 2023). There are no other Trinidad records. CM's photograph from Mason Hall (Fig. 35) is the only record from Tobago.

Fig. 35. *Clemensia trinotata*, Mason Hall, 24 July 2023, C. Mejias [iNaturalist 174787994]; F 6 mm.

33. *Coenipeta bibitrix* (Hübner, 1823) (Erebinae)
Kaye and Lamont (1927) recorded this species (as *Acolasis bibitrix*) from Trinidad based on specimens collected at Palmiste, on 24 March 1918 and 3 May 1919 by Sir Norman Lamont. The first of these was examined in RSM. This is a common and variable species in Trinidad, particularly in disturbed and suburban habitats. Observations in Trinidad by V.S. Gosula (pers. comm. and iNaturalist) indicate that saman tree, *Samanea saman* (Jacq.) Merr. (Fabaceae) is probably a food plant. RND photographed this species on a night walk near Patience Hill (Fig. 36) (Deacon 2023). As *C. bibitrix* also occurs through the Lesser Antilles (e.g. Silva and Horrocks 2022), it was expected to occur in Tobago.

Fig. 36. *Coenipeta bibitrix*, Patience Hill, by night, 2 June 2023, R. Deo [iNaturalist 165689387]; F 13–15 mm.

34. *Coeriana funerea* (Warren, 1889) (Erebinae)
Specimens from Caparo (October 1904, F. Birch), Palmiste (23 February 1921, 29 December 1921, 23 April 1922, N. Lamont) and 'Trinidad' (W.J. Kaye) were the basis for Kaye and Lamont (1927) recording this species from Trinidad. The specimens collected by F. Birch and N. Lamont were examined in NHMUK, RSM and UWIZM, and the identity of this variable species was confirmed by comparison with the type (NHMUK, Panama). The forewing length of *C. funerea* is typically about 14 mm. There is a very similar, but smaller, and as yet unidentified species also found in Trinidad, with a forewing length typically of 9 mm, which means that photographs without scale or other means of estimating size cannot be reliably separated. This smaller species has been collected in Tobago (♂ Charlotteville, at light, 15-19.vi.1998, Roger Hammond and Piers Meynell [MJWC]). Now *C. funerea* has been photographed in Tobago with a scale: Mason Hall, at light, 9 August 2023, C. Mejias (iNaturalist 182560422), and on the Main Ridge (Fig. 37).

Fig. 37. *Coeriana funerea*, Main Ridge, 11.29 -60.61, 30 August 2023, R. Deo [iNaturalist 181255240]; F 14 mm.

35. *Coxina cinctipalpis* (Smith, 1899) (Erebinae)
This species is not known from Trinidad. Images from Tobago were identified from the plates in Bernal and Martinez (2023) and MPG (2023). Tobago seems to be a significant expansion of the known range of this species, which is variable in the development of the white spots on the medial forewing and posterior thorax (MPG 2023; Figs. 38, 39). This new record is based on photographs from Englishman's Bay (Fig. 38), Black Rock (Fig. 39) and Coral Gardens (12 April 2023, T. Lennard [iNaturalist 154556501]).

Fig. 38. *Coxina cinctipalpis*, Englishman's Bay, at light, 19 June 2022, M. Gibson [iNaturalist 122582596]; F 13 mm (estimate); © with permission.

Fig. 39. *Coxina cinctipalpis*, Black Rock, 19 November 2022, A. Wheeler [iNaturalist 142483305]; F 13 mm (estimate); ©, under CC-BY-NC.

36. *Diagrapta lignaria* (Felder & Rogenhofer, 1874) (Calpinae)

This species has not previously been recorded from Trinidad or Tobago. A male from Curepe (3 March 1979) was identified by comparison with the type (NHMUK, ♀ Brazil). There have been two subsequent photographic records from the Arima Valley: Asa Wright Nature Centre (22 July 2019, R.J. Auguste [iNaturalist 29930452]), and Temple Village (30 June 2022, S. Tran [iNaturalist 119578464]). AED photographed a male at Englishman's Bay (Fig. 40), and Mark Hulme photographed another nearby the following night (iNaturalist 154643461]).

37. *Dyomyx egista* Bar, 1876 (Erebinae)

This species is not known from Trinidad, and CM's photographs at Mason Hall (Fig. 41, and 12 September 2023 [iNaturalist 183021231]) are the only Tobago records. They were identified by comparison with the NHMUK series and the original description (Bar 1875-1876). In the NHMUK, this species is treated as *Eulepidotis egista* (Eulepidotinae) (Beccaloni *et al*. 2003), but while this combination is probably correct, it has not been published, and has not been investigated here. There is a similar species in Trinidad, currently unidentified, but closely resembling *E. merricki* Holland (described from Pennsylvania, USA). In this species, the white dash on the forewing dorsum is against the outer edge of the medial line, whereas in *D. egista* there is a clear gap between the two.

Fig. 40. Male *Diagrapta lignaria*, Englishman's Bay, at light, 10 April 2023, A. Deacon [iNaturalist 154405659]; F 14 mm.

Fig. 41. *Dyomyx egista*, Mason Hall, at light, 15 August 2023, C. Mejias [iNaturalist 178616111]; F 15–17 mm (Bar 1875-1876).

38. *Dyomyx ocala* Schaus, 1911 (Erebinae)

This species is not known from Trinidad, although expected to occur there. It is a distinctive species (note for example, the white spot near the dorsum at one-third). It was identified from internet images (e.g. Cahurel 2023) but has not yet been compared with the type (USNM, Costa Rica) or a major reference collection. Beccaloni *et al*. (2003) listed this species as a synonym of *D. megalops* Guenée, described from Brazil, Pernambuco, but this change has not been published and may be incorrect, since the species treated

here does not seem to be *D. megalops*. CM photographed it at Mason Hall on 30 July 2023 (Fig. 42) and 2 August 2023 (iNaturalist 17635911).

Fig. 42. *Dyomyx ocala*, Mason Hall, at light, 30 July 2023, C. Mejias [iNaturalist 175865056).

39. *Dyomyx ora* Dyar, 1914 (Eulepidotinae)

This is a new record for both Trinidad and Tobago. It was identified by comparison with the NHMUK series (Amazonas – Fonte Boa, Peru, Bolivia), although given that the type locality is Mexico, the possibility of cryptic species exists. The NHMUK series includes specimens both with and without a white spot before the premedial line. RND photographed one at light on the Caura to Lopinot trail, Trinidad, 12 March 2023 (iNaturalist 151023988), and another on the Tobago Main Ridge (Fig. 43).

Fig. 43. *Dyomyx ora*, Main Ridge, 11.29 -60.61, 30 August 2023, R. Deo [iNaturalist 181246407]; F 17 mm.

40. *Eugoniella sapota* (Felder & Rogenhofer, 1874) (Herminiinae)

Kaye and Lamont (1927) recorded a specimen of this species from Trinidad collected by F.W. Urich, which was examined in NHMUK. Since then, we are aware of only two further records from Trinidad: Caura Valley (24 September 1978) and Brasso Seco (9 January 2022, R. Deo [iNaturalist 104676109]). Now CM has photographed a specimen at Mason Hall (Fig. 44).

Fig. 44. *Eugoniella sapota*, Mason Hall, at light, 5 August 2023, C. Mejias [iNaturalist 176898041]; F 9 mm.

41. *Eulepidotis addens* (Walker, 1858) (Eulepidotinae)

Although this species has not previously been reported from Trinidad, it is an occasional species with records from Curepe and Morne Bleu [MJWC, NHMUK, UWIZM], which were identified by comparison with the NHMUK series. This species was described from the Dominican Republic and also occurs in the Lesser Antilles (Zagatti *et al*. 1995-2001, Silva and Horrocks 2022), so it was no surprise when CM photographed it at Mason Hall (Fig. 45).

Fig. 45. *Eulepidotis addens*, Mason Hall, at light, 20 August 2023, C. Mejias [iNaturalist 179481525]; F 13 mm.

42. *Eulepidotis ezra* (Druce, 1898) (Eulepidotinae)

Lamont and Callan (1950) recorded this species from Trinidad based on a specimen from Palmiste, 5 March 1930, collected by Sir Norman Lamont. This specimen was examined in NMS and the identity was confirmed by comparison with the NHMUK series. This is an occasional species in Trinidad, most often seen in forested areas but

also found in suburban areas. RND photographed one on a night walk near Patience Hill (Fig. 46) (Deacon 2023).

Fig. 46. *Eulepidotis ezra*, Patience Hill, by night, 2 June 2023, R. Deo [iNaturalist 165640341]; F 12 mm.

43. *Eulepidotis persimilis* (Guenée, 1852) (Eulepidotinae)
The only Tobago record is CM's photograph from Mason Hall (Fig. 47), which was identified by comparison with the type (NHMUK, Brazil). This species has not been reported from Trinidad, although it might have been overlooked for the fairly common and similar species *E. santarema* (Walker) (Fig. 48). They can be separated by the brown forewing margin in *E. persimilis*, which is narrowly white in *E. santarema*, as well as the wider medial bar and narrower marginal brown in *E. santarema*.

Fig. 47. *Eulepidotis persimilis*, Mason Hall, 6 August 2023, C. Mejias [iNaturalist 177110972]; F 16 mm (estimate).

44. *Glenopteris oculifera* Hübner, 1821 (Calpinae)
There are two similar species of *Glenopteris* found in Trinidad: *G. herbidalis* Guenée and *G. oculifera.* In *G. herbidalis* the forewing ocellus is partly green, but in *G.*

Fig. 48. *Eulepidotis santarema*, Trinidad, Brasso Seco, 7 January 2022, R. Deo [iNaturalist 116209267]; F 16 mm.

oculifera it is entirely black (based on NHMUK specimens). Kaye and Lamont (1927) reported *G. oculata* (Stoll) from Trinidad from a specimen in NHMUK and one collected at Palmiste (7 January 1922, N. Lamont). *Glenopteris oculata* is an unavailable synonym of *G. oculifera* (Poole 1989), but these two specimens, in NHMUK and RSM respectively, are actually *G. herbidalis*. However, there is a further Lamont specimen in UWIZM, which Lamont identified as *G. oculata* (Palmiste 17 March 1930), and is indeed this species – i.e. *G. oculifera*. There is one further Trinidad record from Mt. St Benedict (26 May 1981) and here we report a photographic record from Tobago, Mason Hall, by CM (Fig. 49).

Fig. 49. *Glenopteris oculifera*, Mason Hall, 27 July 2023, C. Mejias [iNaturalist 175303183]; F 17 mm.

45. *Goniapteryx servia* (Stoll, 1782) (Hypocalinae)
Kaye and Lamont (1927) recorded this species (as *Rhescipha servia*) from Palmiste (30 September 1917, 31 May 1921, N. Lamont). The first of these is in UWIZM, but the second has not been located. The identity of Trinidad specimens was confirmed by comparison with the NHMUK series.

In Trinidad, this is an occasional species mostly found in forested areas. RND photographed a specimen on a night walk near Patience Hill (Fig. 50) (Deacon 2023), and CM photographed another at Mason Hall (9 December 2023 [iNaturalist 193560594]), as well as one more grey in colour (Fig. 51).

Fig. 50. *Goniapteryx servia*, Patience Hill, by night, 2 June 2023, R. Deo [iNaturalist 165638739]; F 19 mm.

Fig. 51. *Goniapteryx servia*, nr. Mason Hall, 21 July 2023, C. Mejias [iNaturalist 174196051]; F 19 mm

46. *Gonodonta aequalis* Walker, [1858] (Calpinae)

Todd (1959) revised this genus and recorded *G. aequalis* from 'Trinidad'. Trinidad specimens were identified by comparison with the NHMUK series and using Todd (1959). It is a common and widespread species in Trinidad, but CM's photographs from Mason Hall (4 August 2023, Fig. 52; 6 August 2023 [iNaturalist 177087108]) are the first records from Tobago.

Fig. 52. *Gonodonta aequalis*, Mason Hall, at light, 4 August 2023, C. Mejias (Naturalist 176699891); F 16 mm.

47. *Gonodonta bidens* (Geyer, 1832) *tenebrosa* Todd, 1959 (Calpinae)

This species was identified using Todd (1959) and by comparison with the type (USNM, ♂ Costa Rica). It is a new record for Trinidad with specimens from Arima-Blanchisseuse Road (milestone 9.75), Cumaca Road (4.6 miles), Morne Bleu Textel Installation (MJWC, UWIZM). CM has photographed it at Mason Hall at light (27 July 2023, Fig. 53, [iNaturalist 175305349]; 2 August 2023 [iNaturalist 176361180]).

Fig. 53. *Gonodonta bidens*, Mason Hall, 27 July 2023, C. Mejias [iNaturalist 175288806]; F 18 mm.

48. *Gonodonta latimacula* Guenée, 1852 (Calpinae)

Todd (1959) recorded this species from 'Trinidad', and MJWC has noted a female specimen in UWIZM: Arima-Blanchisseuse Road, mile 11, 21 December 1950 E. McC.

Callan (UWIZM.2014.9.268 (ICTA 14831), as *G. amianta*). This is the only Trinidad record apart from two males from 'Trinidad' in USNM. CM has photographed it at Mason Hall: 20 July 2023 (Fig. 54), 18 August 2023 (Fig. 55); 19 August 2023 [iNaturalist 179255407]); 5 December 2023 [iNaturalist 193172785]. The first of these (Fig. 54) had the dorsal areas noticeably darker.

Fig. 54. *Gonodonta latimacula* dark form, Mason Hall, 20 July 2023, C. Mejias [iNaturalist 174036748]; F 17-21 mm (Todd 1959).

Fig. 55. *Gonodonta latimacula*, Mason Hall, 18 August 2023, C. Mejias [iNaturalist 179065258]; F 17-21 mm (Todd 1959).

49. *Gorgone ortilia* (Stoll, 1781) (Calpinae)

Kaye (1901) listed a specimen of '*Apistis eulalia* Stoll' from Trinidad in NHMUK. Subsequently, Kaye and Lamont (1927) treated *eulalia* as a synonym of *G. ortilia*, and added a record from Caparo (1904, F. Birch). Both specimens are in the NHMUK series of *G. ortilia* and are the basis of the identification of other specimens from Trinidad and now photographs from Tobago at Mason Hall (Fig. 56) and Englishman's Bay (20 December 2023, M. Kelly).

Fig. 56. *Gorgone ortilia*, Mason Hall, 3 August 2023, C. Mejias, [iNaturalist 176524618]; F 23 mm.

50. *Hypena broda* (Schaus, 1904) (Hypeninae)

Schaus (1904) described *Boana broda* from Trinidad, and further Trinidad specimens were identified by comparison with the type (USNM, ♂ Trinidad) and USNM series. This species was placed in *Ogoas* Druce by Poole (1989), but that genus is now a synonym of *Hypena* (Lödl 2000). It is an occasional species in Trinidad, mainly from forested areas. CM photographed it at Mason Hall on 21 August 2023 (iNaturalist 179623763), 6 September 2023 (iNaturalist 182136801), and 7 September 2023 (Fig. 57).

Fig. 57. *Hypena broda*, Mason Hall, at light, 7 September 2023, C. Mejias [iNaturalist 179623763]; F 14 mm.

51. *Hypena fufialis* Schaus, 1913 (Hypeninae)

This is a new record for both Trinidad and Tobago. Trinidad specimens were identified by comparison with the type (USNM, ♂ Costa Rica) and USNM series. Although the type is darker than Trinidad material, the USNM series includes specimens which match the Trinidad ones. A

specimen from Trinidad has been DNA barcoded and is the only member of BIN BOLD:AFJ0586. This is an occasional species in forested areas of the Northern Range of Trinidad. CM photographed one at Mason Hall (Fig. 58).

Fig. 58. *Hypena fufialis*, Mason Hall, 2 September 2023, C. Mejias, [iNaturalist 181498973]; F 12 mm.

52. *Hypena glumalis* Schaus, 1904 (Hypeninae)
This is a new record for both Trinidad and Tobago. There is a Trinidad male with no further data in USNM, MJWC collected a male at Morne Bleu Textel (30 August 1978) which he compared with the type (USNM, ♂ Venezuela, rubbed) and USNM series (males only). More recently, Scott Alston-Smith collected a female at Point Gourde (December 2022) and RND has photographed a specimen at Morne Catherine (5 May 2022 [iNaturalist 115727477]). New Tobago records are RND's photograph from a night walk near Patience Hill (Fig. 59) (Deacon 2023), and CM's of a male and two females at light at Mason Hall, 6 September 2023 (iNaturalist 182120327; 182136695, Fig. 60; 182136747).

Fig. 59. Male *Hypena glumalis*, Patience Hill, by night, 3 June 2023, R. Deo [iNaturalist 165689521]; F 14 mm.

Fig. 60. Female *Hypena glumalis*, Mason Hall, 6 September 2023, C. Mejias [iNaturalist 182136695]; F 13 mm.

53. *Hypena mactatalis* Walker, [1859] (Hypeninae)
Kaye and Lamont (1927) recorded this species from Trinidad as *Phanaspa philomedia* Druce, based on a record from Caparo, December 1904 (F. Birch). *Phanaspa philomedia* is a synonym of *H. mactatalis* (Schaus 1916). Birch's specimen was examined in NHMUK. Lamont and Callan (1950) recorded the same specimen as *Ophiuche mactatalis*, but do not mention that this is the senior name for the species recorded by Kaye and Lamont (1927). This is an occasional species in forested areas of Trinidad, which CM photographed at Mason Hall (Fig. 61).

Fig. 61. Male *Hypena mactatalis*, Mason Hall, at light, 21 August 2023, C. Mejias [iNaturalist 179627001]; F 16 mm.

54. *Massala abdara* (Herrich-Schäffer, [1869]) (Eulepidotinae)
Although this species has not been recorded from Trinidad or Tobago before, MJWC has a Trinidad specimen (Morne Bleu, 29 March 1979) which was identified by comparison with the USNM series. Recently, there have been eight records

of this moderately variable species from Tobago: Cuffie River Nature Resort, at guava bait, 29 August 2023, R. Deo (Fig. 62); Englishman's Bay, at light, 29 November 2022, A. Deacon (iNaturalist 143320847, 143469858); Mason Hall, at light, 31 July 2023, C. Mejias (iNaturalist 176033482); 8 August 2023, C. Mejias (iNaturalist 177447031); ♂ 14 August 2023, C. Mejias (iNaturalist 178479084); ♂ 18 August 2023, C. Mejias (iNaturalist 179083034); ♂ 23 August 2023, C. Mejias (iNaturalist 179919756); 6 September 2023, C. Mejias (iNaturalist 182135191); 8 December 2023, C. Mejias (iNaturalist 193452801).

Fig. 62. Male *Massala abdara*, Cuffie River Nature Resort, at guava bait, 29 August 2023, R. Deo [iNaturalist 180868609]; F 17 mm.

55. *Melipotis januaris* (Guenée, 1852) (Erebinae)

Kaye and Lamont (1927) recorded this species (as *Gerespa januaris*) from Caparo, Guaico and Palmiste, and Cock (2017c) recorded it from the Five Islands. It is a common and widespread species in Trinidad, but although it is widespread in the Caribbean, CM's photograph (Fig. 63) is the first record for Tobago.

Fig. 63. Female, *Melipotis januaris*, Mason Hall, 3 August 2023, C. Mejias [iNaturalist 176538563]; F 19-22 mm.

56. *Metria bidens* (Kaye, 1901) (Erebinae)

Kaye (1901) described this species from Tabaquite, Trinidad, and the holotype is in the NHMUK. It is an occasional and widespread species in Trinidad. Recent photographs by MK (above Englishman's Bay, 26 February 2023) and CM (Mason Hall, Fig. 64 and 13 December 2023 [iNaturalist 193921375]) are the first records from Tobago.

Fig. 64. Male *Metria bidens*, Mason Hall, 21 July 2023, C. Mejias [iNaturalist 174195509]; F 18 mm.

57. *Metria* sp. nr. *demera* Schaus (Erebinae)

This is the name used by Cock (2017b) for this species from Tobago, Trinidad and French Guiana, known to him only from the male. RND photographed a mating pair near Patience Hill (Fig. 65), which reveals that this is a sexually dimorphic species. Photographs from Tobago by Aaron Wheeler (Black Rock, 8.vi.2021 [iNaturalist 83033552]), RND (Arnos Vale, 11 June 2022 [iNaturalist 121387485]) and CM (Mason Hall, 1 September 2023 [iNaturalist 183788492]) can now be recognized as the female of this as yet unidentified species.

58. *Mursa phtisialis* (Guenée, 1854) (Herminiinae)

Kaye (1901) and Kaye and Lamont (1927) recorded this species from Trinidad based on a specimen from Tabaquite (W.J. Kaye). Further specimens from northern Trinidad were identified by comparison with the NHMUK series, but CM's photograph (Fig. 66) is the first record from Tobago.

Fig. 65. Mating *Metria* sp. (female at top), Patience Hill, by night, 2 June 2023, R. Deo [iNaturalist 165769060]; ♂ F 22 mm.

Fig. 66. *Mursa phtisialis*, Mason Hall, 4 August 2023, C. Mejias [iNaturalist 176819096]; F 8-9 mm.

59. *Napata terminalis* (Walker, 1854) (Arctiinae, Arctiini, Ctenuchina)

This species is well documented from Trinidad (Kaye and Lamont 1927, Fleming 1959), and recently Chin *et al*. (2023) documented aspects of the adult biology, and early stages on sedges, *Kyllinga pumila* and *Cyperus laxus* (Cyperaceae). Here we report the first record from Tobago, photographed near Mason Hall (Fig. 67).

60. *Nelphe setosa* (Sepp, 1830) (Arctiinae, Arctiini, Ctenuchina)

Fleming (1959) first recorded this species from Trinidad (as *Eucereon setosa*), based on a male from Simla. Trinidad material was subsequently identified by comparison with the NHMUK series; Cock and Laguerre (in prep.) will treat the issues regarding the identity of this species in their account of the Trinidad Ctenuchina. In Trinidad, this is an uncommon species found in forested areas, and all records have been at light. There are two specimens in USNM from Roxborough, 6.5 miles North on Bloody Bay Road (at UV light, 21 March 1979, D. Hardy & W. Rowe), which were overlooked in Cock's (2017b) preliminary catalogue

Fig. 67. *Napata terminalis*, Mason Hall, 3 August 2023, C. Mejias [iNaturalist 176523783]; F 12 mm.

of Tobago moths. Recently, RND photographed a male attracted to drying *Heliotropium indicum* by night near Patience Hill (Fig. 68). That this is the first record from *H. indicum* bait for Trinidad & Tobago may reflect that this species is seldom attracted, or that the bait has been little used in forested areas of Trinidad by night in the past.

Fig. 68. Male *Nelphe setosa*, Patience Hill, to *Heliotropium indicum* by night, 2 June 2023, R. Deo [iNaturalist 165639453]; F 17–19 mm.

61. *Obroatis ocellata* (Butler, 1879) (Calpinae)

This is a new record for both Trinidad and Tobago. A specimen from Curepe (♂, MVL, 4 August 1978) was compared with the type (NHMUK, ♂ Amazons) and NHMUK series. The only other Trinidad record is RND's photograph from near Rushville, Guayaguayare (21 March 2023 [iNaturalist 152121057]). The only Tobago record is CM's at Mason Hall (Fig. 69).

Fig. 69. Male *Obroatis ocellata*, Mason Hall, at light, 11 August 2023, C. Mejias [iNaturalist 177926630]; F 18 mm.

62. *Phycoma marcellina* (Stoll, 1780) (insertae sedis, probably Calpinae)

The only Trinidad records of this species are two males that MJWC collected at Parrylands, 25 July 1981, and compared with the NHMUK series (a variable species) and the type of *retardens* Walker, which is treated as a synonym in NHMUK, but not in Poole (1989). At this time, we cannot trace that this monotypic genus has been placed in a modern subfamily, although it appears to belong in Calpinae). CM photographed a male at Mason Hall (Fig. 70).

Fig. 70. Male *Phycoma marcellina*, Mason Hall, at light, 15 September 2023, C. Mejias [iNaturalist 183442938]; F 17 mm.

63. *Physula limonalis* (Schaus, 1913) (Herminiinae)

Kaye and Lamont (1927) recorded this species from Trinidad based on a F.W. Urich specimen, which was examined in NHMUK. Trinidad specimens were identified by comparison with the type (USNM, ♀ Costa Rica). It is an occasional species in lowland forested areas of Trinidad. CM's photograph at Mason Hall (Fig. 71) is the first observation from Tobago.

64. *Pseudbarydia japeta* (Stoll, 1782) (Calpinae)

Kaye and Lamont (1927) reported this species from Trinidad based on a specimen from Caparo in NHMUK.

Fig. 71. *Physula limonalis*, Mason Hall, at light, 3 September 2023, C. Mejias [iNaturalist 181681239]; F 13 mm.

This specimen was examined in NHMUK, and additional Trinidad material was identified by comparison with the NHMUK series. It is an uncommon species in Trinidad, widespread in forested areas. CM photographed one near Mason Hall (Fig. 72).

Fig. 72. *Pseudbarydia japeta*, Mason Hall, at light, 4 August 2023, C. Mejias [iNaturalist 176691413]; F 29 mm.

65. *Purius pilumnia* (Stoll, [1780]) (Arctiinae, Arctiini, Phaegopterina)

Kaye and Lamont (1927) listed this species from Trinidad only on the basis of a male and a female in the 'Miller collection'. There are a male and a female with no locality or collector data from the Sir Norman Lamont collection in NMS, which we assume are these two specimens. We are not aware of any other records from Trinidad, but given its wide distribution on the mainland, there seems no reason why it should not occur. RND photographed a male attracted to drying *Heliotropium indicum* bait by night near Patience Hill (Fig. 73) during the TTFNC Buccoo Bioblitz 2023.

Fig. 73. Male *Purius pilumnia*, Patience Hill, at *Heliotropium indicum* by night, 3 June 2023, R. Deo [iNaturalist 165454835]; F 18 mm (estimate).

66. *Schiraces mopsus* Schaus, 1916 (Herminiinae)

This is a fairly common and widespread species in Trinidad but has not previously been reported, perhaps because it is small and easily overlooked. It was identified by comparison with the type (USNM, ♂ French Guiana) and USNM series, and there are records from Curepe, Arima Valley (Simla, Temple Village), Cumaca Road, Valencia Forest (Long Stretch), Wa Samaki Ecosystems, and Parrylands (MJWC, NHMUK, UWIZM, iNaturalist). CM's photograph (Fig. 74) is the first record from Tobago.

Fig. 74. *Schiraces mopsus*, Mason Hall, 22 July 2023, C. Mejias [iNaturalist 174384642]; F 8 mm.

67. *Scolecocampa atrosignata* (Walker, 1858) (Scolecocampinae)

Kaye and Lamont (1927) reported this species as *Herminodes atrosignata* from Tabaquite (W.J. Kaye) and Palmiste (27 February 1921, 12 March 1921, 13 March 1921, N. Lamont). Two of Lamont's specimens were examined in RSM and the identification confirmed by comparison with the NHMUK series. This is a common and widespread species in Trinidad, but CM's photographs from Mason Hall (7 August 2023 [iNaturalist 177309998]; 9 August 2023, Fig. 75) are the first records from Tobago. Subsequently, Mark Hulme has photographed one at Englishman's Bay (15 December 2023 [iNaturalist 194112484]).

Fig. 75. *Scolecocampa atrosignata*, Mason Hall, at light, 9 August 2023, C. Mejias [iNaturalist 177605460]; F 17 mm.

68. *Selenisa lanipes* Guenée, 1777 (Erebinae)

There are three species of *Selenisa* known from Trinidad: *S. suero* (Cramer), *S. sueroides* Guenée and *S. lanipes* Guenée. The last named differs from the other two in being larger, the forewing costa is yellow-brown with a dark basal mark and a white arc towards the end of the cell, as opposed to smaller, with the costa whitish grey-brown, no dark basal mark, and the small white arc does not contrast with the pale costa. Kaye and Lamont (1927) reported a specimen of *S. lanipes* from Caparo (xi.1904, F. Birch), which was examined in NHMUK. Additional Trinidad specimens were identified by comparison with the NHMUK series, showing that this is an occasional species in forested areas of Trinidad. Although *S. lanipes* has not previously been reported from Tobago, we are aware of a male collected at Parlatuvier, January 2009, by Zheludev (2023) and photographs at Englishman's Bay (1 July 2022, Mark Gibson [iNaturalist 180895279]), Cuffie River Nature Resort (Fig. 76) and Mason Hall (at light, 14 September 2023, C. Meijias [iNaturalist 183302355]).

Fig. 76. Male *Selenisa lanipes*, Cuffie River Nature Resort, 29 August 2023, R. Deo [iNaturalist 180895279]; F 16 mm.

69. *Selenisa suero* (Cramer, 1777) (Erebinae)
This species might be confused with *S. sueroides* (see also comments under the last species). Both species are known from Trinidad, but hitherto neither has been reported from Tobago. The pale area of the forewing costa of *S. sueroides* has a more pronounced bulge at the end of the cell than *S. suero* (Figs. 77, 78). Furthermore, *S. sueroides* has dark premedial and postmedial lines on the dorsal hindwing, whereas in *S. suero* these lines are present as short contrasting streaks on the veins. Kaye and Lamont (1927) reported *Selenis suero* from Trinidad based on one or more specimens in NHMUK collected by F.W. Jackson in NHMUK. The NHMUK collection includes three F.W. Jackson specimens of *S. suero* with no further data (as well as one of *S. sueroides*). Kaye and Lamont (1927) also recorded *S. sueroides* from Palmiste (common, 16.iv.1922, N. Lamont), and there is a specimen with this date in RSM. Both species are occasional and widespread in suburban and forested habitats in Trinidad. CM's photographs from Mason Hall (Fig. 77; 30 November 2023 [iNaturalist 192685233]; 28 December 2023 [iNaturalist 195133872]) are the first records of *S. suero* from Tobago.

Fig. 77. *Selenisa suero*, Mason Hall, at light, 20 November 2023, C. Meijias [iNaturalist 191633019]; F 13 mm.

Fig. 78. *Selenisa sueroides*, Brigand Hill, at light, 28 December 2022, R. Deo, [iNaturalist 145313773]; F 13 mm.

70. *Strathocles parvipulla* Dognin, 1914 (Herminiinae)
This species has not previously been reported from Trinidad or Tobago. Specimens from Morne Bleu, Textel Installation (♂, at light, 9 November 1978) and Lalaja Ridge (♀, MVL, 3 September 1982) were identified by comparison with the type (USNM, ♀ French Guyana). More recently, RND photographed a male attracted to guava bait at Brasso Seco (Deo and Cock 2024). Now CM has photographed a female at Mason Hall (Fig. 79). The metallic purple sheen is variable depending upon the lighting.

Fig. 79. Female *Strathocles parvipulla*, Mason Hall, at light, 11 eptember 2023, C. Mejias [iNaturalist 182897282]; F 15 mm.

71. *Thursania grandirenalis* Schaus, 1916 (Herminiinae)
Kaye and Lamont (1927) did not list this species from Trinidad, although there is a male from Palmiste (3 March 1919, N. Lamont) in RSM, which Lamont had misidentified as *Phlyctaina irrigualis* Möschler. Trinidad specimens (Simla, Parrylands) were identified by comparison with the type (USNM, ♂ Venezuela) and USNM series. CM's photograph of a male at Mason Hall (Fig. 80) is the only Tobago record to date.

Fig. 80. Male *Thursania grandirenalis*, Mason Hall, 22 July 2023, C. Mejias [iNaturalist 174377761]; F 12 mm.

72. *Veraneacerea discalis* (Druce, 1905) (Arctiinae, Arctiini, Ctenuchina)

Fleming (1959) recorded 13 males as *Delphyre discalis* from Simla, Trinidad. Further Trinidad specimens were identified from Fleming (1959) and by comparison with the type (NHMUK, Venezuela) and NHMUK series. Cerda (2020) transferred it to his new genus *Veraneacerea* and illustrated the male genitalia. It is an occasional species in Trinidad, all records so far being from the north, with none from south of Bush Bush; most records are at light, but it may also be attracted to drying *Heliotropium indicum*. MK photographed a male at Englishman's Bay (Fig. 81).

Fig. 81. Male *Veraneacerea discalis*, above Englishman's Bay, 26 February 2023, M. Kelly; F 16 mm.

EUTELIIDAE

73. *Paectes lunodes* (Guenée, 1852) (Euteliinae)

Cock (2023) provided a recent overview of this family in Trinidad and Tobago. This is a rare species in Trinidad with only two records: Caparo (October 1904, F. Birch) and Palmiste (4 November, N. Lamont, UWIZM), so CM's photograph from Mason Hall (Fig. 82) is an interesting addition to the Tobago fauna.

GELECHIIDAE

74. *Mesophleps adustipennis* (Walsingham, 1897) (Anacampsinae)

Li and Sattler (2012) reported this species as widespread

Fig. 82. *Paectes lunodes*, Mason Hall, 22 July 2023, C. Mejias [iNaturalist 174381956]; F 13 mm.

in the Americas from southern USA to southern Brazil, including both Trinidad and Tobago, the later based on a specimen MJWC collected at Marden House (9 January 1982). This record was overlooked in Cock's (2017b) checklist of Tobago moths, but came to light when AED photographed a specimen at Englishman's Bay (Fig. 83). Subsequently, CM photographed specimens at Mason Hall 2 August 2023 (iNaturalist 176361123) and 16 August 2023 (iNaturalist 178775093). Our identification was initially made from Silva and Horrocks (2022) and confirmed from Li and Sattler (2012). The caterpillars feed on seeds in pods of Fabaceae, for example MJWC reared it from pods of *Dioclea guianensis* Benth. in Trinidad (Maracas Valley, March 1979). F.W. Urich reared it in Trinidad from pods of *Crotalaria* (adults 21 May 1910) and based on these specimens, Busck (1910) described *Lipatia crotalariella*, which Li and Sattler (2012) made a synonym of *M. adustipennis*.

Fig. 83. *Mesophleps adustipennis*, Englishman's Bay, at light, 10 April 2023, A. Deacon [iNaturalist 154405648]; F 6 mm.

GEOMETRIDAE

75. *Bagodares rectisignaria* (Herrich-Schäffer, 1870)
Lamont and Callan (1950) first recorded this species from Trinidad as *B. pallidicosta* Guenée (Tl Amazons), based on a specimen that Lamont collected at St. Patricks [Estate], Arima [Valley], 26 January 1930. This specimen is in UWIZM, and the identification was confirmed by comparison with the type (NHMUK, ♂, Ecuador) and NHMUK series. However, Pitkin (2002) made *pallidicosta* a synonym of *B. trilva* (Schaus, 1901) (TL Mexico) and Becker (2002) made *B. trilva* a synonym of *B. rectisignaria* (Herrich-Schaffer, 1893) (TL Cuba), so this name should be used now. This is an occasional species in Trinidad, mainly from forested areas. CM photographed one near Mason Hall (Fig. 84). This observation is of a female; males are similar but have strongly bipectinate antennae.

Fig. 84. Female *Bagodares rectisignaria*, Mason Hall, at light, 30 December 2023, C. Mejias [iNaturalist 195333021]; F 14 mm.

76. *Eois apyraria* (Guenée, [1858]) (Larentiinae)
Kaye and Lamont (1927) listed this species from Trinidad (as *Cambogia apyraria*), referring to specimens from Palmiste (21 February 1921, 15 December 1921, N. Lamont). We have not located either of these specimens but were able to identify Trinidad specimens by comparison with the type (NHMUK French Guyana) and NHMUK series. This is a common and widespread species in lowland areas of Trinidad, but rarely recorded from forests. CM photographed one at Mason Hall (Fig. 85).

77. *Epimecis matronaria* (Guenée, [1858]) (Ennominae)
Kaye and Lamont (1927) stated that there is a specimen of this species in NHMUK, but we failed to locate it there. Trinidad specimens were identified by comparison with the type (NHMUK, ♀ Cayenne) and NHMUK series. A DNA barcode from Trinidad (EJS-TRIN-008) forms part of BIN BOLD:AAA6719, which occurs from USA to Argentina, but shows a high degree of internal variability. This is a common

Fig. 85. Male *Eois apyraria*, Mason Hall, 5 August 2023, C. Mejias [iNaturalist 176879044]; F 8 mm.

and widespread species in Trinidad, more commonly seen in forested areas. CM photographed a female at Mason Hall on 13 August 2023 (Fig. 86) and a male 20 September 2023 (iNaturalist 184208892).

Fig. 86. Female *Epimecis matronaria*, Mason Hall, 13 August 2023. C. Mejias [iNaturalist 178279261]; F 35 mm.

78. *Hydata translucidaria* (Herrich-Schäffer) (Geometrinae)
Kaye and Lamont (1927) recorded a specimen of this species captured at Caigual (13 September 1917, A. Lickfold), which was examined in OUMNH. This and other Trinidad specimens were identified by comparison with the type of its synonym *H. sordida* Schaus (USNM, ♂ Brazil), and the USNM and NHMUK series. This seems to be an uncommon species in Trinidad, with scattered records showing no clear habitat association. A photograph by CM at Mason Hall (Fig. 87) is the first Tobago observation.

79. *Macaria carpo* (Druce, 1893) (Ennominae)
This species has not previously been reported from Trinidad, but material from Arima Valley (Simla) and Curepe has been identified by comparison with the lectotype (Mexico, NHMUK) and NHMUK series. Based on this MJWC

Fig. 87. Female *Hydata translucidaria*, Mason Hall, 13 August 2023, C. Mejias [iNaturalist 178289933]; F 10 mm.

identified iNaturalist images from Arima Valley (Temple Village), Maracas Valley, Mt. Hope, Penal, South Oropouche (Mon Desir), St Augustine (UWI) and St Joseph. However, given that *M. carpo* was described from Central America, dissections or DNA barcodes are needed to confirm just one species is involved. RND photographed one on a night walk near Patience Hill (Fig. 88) during the TTFNC Buccoo Bioblitz 2023 (Deacon 2023).

Fig. 88. Male *Macaria carpo*, Patience Hill, by night, 3 June 2023, R. Deo [iNaturalist 165461618]; F. 9–11 mm.

80. *Leptostales terminata terminata* (Guenée, [1858]) (Sterrhinae)

This small species has not previously been recorded from Trinidad or Tobago, and MJWC found no examples in the historical collections examined. However, MJWC found it fairly common coming to light in his garden in Curepe and identified specimens by comparison with the type (NHMUK, ♂ Colombia) and NHMUK series. Prout (1933-1938) treated this species as widespread from Central America to Brazil and the West Indies, in several subspecies. Photographic records on iNaturalist etc. have shown that this is a common and widespread species in disturbed areas of Trinidad. Apart from the dark costa and narrowly dark wing margins, the thickening of the very diffuse postmedian band into a small postmedian spot is often distinctive and helpful for recognition. Kris Parag's photograph from near Speyside (Fig. 89) is the first we have seen from Tobago.

Fig. 89. *Leptostales terminata*, near Speyside, Balteaux Bay, 5 January 2023, K. Parag [iNaturalist 146009005]; F 8 mm; ©, with permission.

81. *Obila ruptiferata* (Walker, 1862) (Larentiinae)

Kaye and Lamont (1927) reported three species of *Obila* from Trinidad (as *Pterocypha* spp.): *O. celerata* (Walker) from Palmiste (N. Lamont), *O. pannosata* (Guenée) from Trinidad (NHMUK) and *O. albifasciata* (Dognin) from Palmiste (26 June 1918, N. Lamont). *Obila albifasciata* is currently considered to be a synonym of *O. celerata* (Scoble 1999). Unfortunately, we have failed to locate specimens that are unequivocally vouchers for any of these records. There is a male from Trinidad (F.W. Jackson) in NHMUK, curated as *O. ruptiferata*, which may represent the record of *O. pannosata*, and there is a female from Palmiste (21 May 1936) in UWIZM which Lamont identified as *P. albifasciata*. These two specimens, two females collected by MJWC (Curepe, MVL, 18 December 1979; Mt. St. Benedict, at light 10-16 July 1996) and a specimen photographed by CM at Mason Hall (Fig. 90) all appear to represent a single

Fig. 90. Female *Obila ruptiferata*, Mason Hall, 23 July 2023, C. Mejias [iNaturalist 174587711]; F 17-19 mm.

variable species. Provisionally, this is referred to as *O. ruptiferata*, to reflect the curation of the Trinidad specimen in NHMUK. We suggest that all three species reported by Kaye and Lamont (1927) may be the same entity, but further research is needed to better understand this genus.

82. *Patalene acuta* Kaye, 1901 (Ennominae)

This is a sexually dimorphic, variable species, which has probably been described several times, but also comprises at least two BINs in BOLD: BOLD:AAA7956 found from Mexico to Argentina to French Guiana, Jamaica, Puerto Rico; and 2.08% different BOLD:ABY9807 from French Guiana, Brazil (Para, Rio Grande do Sul), and Argentina. *A priori*, Trinidad and Tobago specimens are more likely to belong to the first common and widespread BIN, BOLD:AAA7956, but this cannot be assumed, and the possibility of two species in Trinidad cannot be ruled out. There are several names available which match forms from one or both BINs, including *P. quatuormacula* (Verloren, 1837) (TL Surinam, = *maculata* Stoll, [1790]), *P. hamulata* (Guenée, [1858]) (TL Brazil), *P. abbrasiata* (Guenée, [1858]) (TL Amazonas), *P. inunculata* Guenée[1858] (TL Brazil?, currently a synonym of *P. quatuormaculata*), *P. impensata* Walker (♂ type Venezuela), and *P. acuta* (Kaye, 1901) (TL Trinidad). Clearly this group needs a comprehensive revision before any names can be authoritatively applied. As an interim measure, we use the name *P. acuta* as it was described from Trinidad, and we assume until we know otherwise that only one species of this appearance is present in Trinidad. Nevertheless, we expect that *P. acuta* will prove to be a synonym of one of the above-mentioned taxa when this group is properly worked out. This is a common and widespread species in Trinidad, and now MK and CM have taken the first photographs of this species in Tobago, the former at Englishman's Bay (Fig. 91), and the latter at Mason Hall: ♀ 3 August 2023 (Fig. 92); ♀ 7 August 2023 (iNaturalist 177310027); ♀ 8 August 2023 (iNaturalist 177439589); ♂ 20 August 2023, (iNaturalist 179481939).

Fig. 91. Male *Patalene acuta*, Englishman's Bay, at light, 19 February 2023, M. Kelly; F 18 mm.

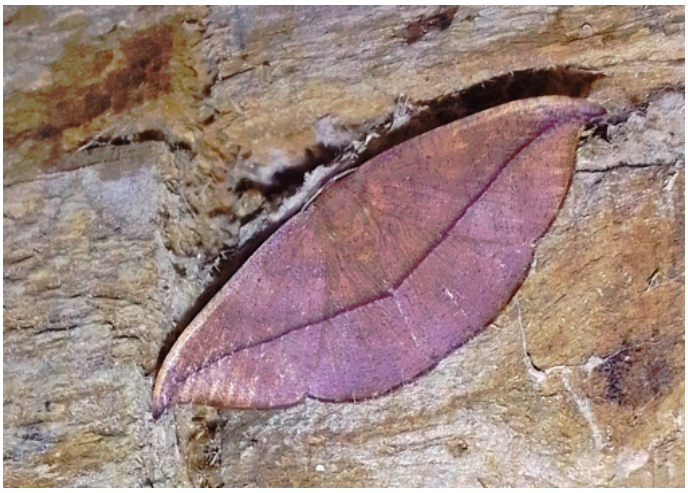

Fig. 92. Female *Patalene acuta*, Mason Hall, at light, 3 August 2023, C. Mejias [iNaturalist 176538400]; F 19 mm.

83. *Pero fusaria* (Walker, 1860) (Ennominae)

This is an occasional species in Trinidad (Poole 1987), associated with forested areas. It was treated as *P. egens* Dognin (a synonym of *P. fusaria*) by Kaye and Lamont (1927) and misidentified as *P. stolidata* (Guenée) by Lamont and Callan (1950) based on Lamont's voucher specimen (St. Patrick's, Arima, 27 January 1938) in NMS. MK's photograph from Englishman's Bay (Fig. 93) is the first record from Tobago. It is of a female, which in Trinidad is infrequently encountered at light compared to males.

Fig. 93. Female *Pero fusaria*, Englishman's Bay, at light, 6 March 2022, M. Kelly; F 20 mm (estimate).

84. *Phrudocentra pupillata* Warren, 1897 (Geometrinae)

This species has been reported from Trinidad (Kaye and Lamont 1927, Pitkin 1996). Trinidad specimens were identified by comparison with the type (NHMUK, ♂ Guyana) and NHMUK series. It is a fairly common species in forested areas of Trinidad. AED's photograph at Englishman's Bay (Fig. 94) is the first Tobago record.

Fig. 94. Male *Phrudocentra pupillata*, Englishman's Bay, at light, 10 April 2023, A. Deacon [iNaturalist 154405657]; F 14 mm.

85. *Phrygionis polita* (Cramer, 1780) (Ennominae)

The first published record of this species from Trinidad was by Scoble (1994), which included a Trinidad record from Guiaco (April 1915, NHMUK). This is part of a series that Lamont collected at Guiaco, on 15 April 1915, and Kaye and Lamont (1927) misidentified as *P. privignaria* (Guenée). However, *P. privignaria* is also a Trinidad species, based on a male from Palmiste (July 1915) which Kaye and Lamont (1927) also listed, and it has also recently been recorded from Tobago (Cock *et al*. 2023). There have been no further records of *P. polita* from Trinidad since Lamont's 1915 collection, but CM photographed two individuals at Mason Hall (Fig. 95; 21 July 2023 [iNaturalist 174197705]).

Fig. 95. *Phrygionis polita*, Mason Hall, 21 July 2023, C. Mejias [iNaturalist 174197640]; F 17 mm (estimate).

86. *Prochoerodes tetragonata tetragonata* (Guenée, [1858]) (Ennominae)

Kaye and Lamont (1927) recorded this species (as *Choerodes tetragonata*) from Trinidad, based on a specimen collected by W.E. Broadway, which has not been located. Kirkpatrick (1954) found the caterpillars of what he referred to as *Aeschropteryx sectata* (Guenée) feeding on cacao. *Aeschropteryx sectata* is treated as a synonym of *P. tetragonata* by Scoble (1999). There is a series of Kirkpatrick specimens reared on cocoa in UWIZM as *Aeschropteryx sectata*. They match Trinidad material identified as *P. tetragonata* by comparison with the type (NHMUK, ♂, Brazil). In BOLD, a DNA barcode from Trinidad (MJC_SMT-022) forms part of the widespread BIN BOLD:AAB6010 found from Costa Rica to the Guianas to Argentina. This species is variable in colour and the strength of the lines on the wings; it is common and widespread in old cocoa plantations and forested areas of Trinidad. CM's photograph at Mason Hall (Fig. 96) is the first observation from Tobago.

Fig. 96. Male *Prochoerodes tetragonata*, Mason Hall, 17 August 2023, C. Mejias [iNaturalist 178881814]; F 26 mm.

87. *Scopula apparitaria apparitaria* (Walker, 1861) (Sterrhinae)

Sookdeo and Cock (2017) reported this species from Huevos Island, documenting that it is also present in Trinidad, where it is common and widespread. CM's photograph at Mason Hall (Fig. 97) is the first record for Tobago, and Mark Hulme's at Englishman's Bay is the second (17 December 2023 [iNaturalist 194112484]).

Fig. 97. *Scopula apparitaria*, Mason Hall, 23 July 2023, C. Mejias [iNaturalist 174593868]; F 9 mm.

88. *Synchlora pulchrifimbria* (Warren, 1907) (Geometrinae)

Pitkin (1996) reported this species from Trinidad, and there are records from Caura Valley, Arima Valley and Penal (MJWC, NHMUK, K. Sookdeo photo, iNaturalist), the first of which was identified by comparison with the type (NHMUK, ♂ Surinam) and NHMUK series. AED's photograph from Englishman's Bay (Fig. 98) is the first record from Tobago.

Fig. 98. Female *Synchlora pulchrifimbria*, Englishman's Bay, 8 April 2023, A. Deacon [iNaturalist 154045218]; F 6 mm.

89. *Tachyphyle undilineata* Warren, 1900 (Geometrinae)
This species was identified by comparison with the type (NHMUK, ♀ Guyana) and NHMUK series. It seems to be a rare species in Trinidad, with only three records: Cumaca Road, 4.6 miles, MVL, 18 July 1981; Curepe, MVL, 1-8 January 1982; Asa Wright Nature Centre, 19 December 2018, N. Norman (iNaturalist 19098985). RND photographed a male attracted to light on the Main Ridge of Tobago (Fig. 99).

Fig. 99. Male *Tachyphyle undilineata*, Main Ridge, 30 August 2023, R. Deo [iNaturalist 181249677]; F 14 mm.

HEDYLIDAE

90. *Macrosoma rubedinaria* (Walker, 1862)
Cock (2017b) first reported this species from Tobago, but Cock *et al*. (2022) overlooked this when they reported it again as a new record from Tobago.

HESPERIIDAE

91. *Artonia artona* (Hewitson, 1868) (Hesperiinae)
Cock (2009) treated this species in Trinidad under the name *Vettius artona*, but the present combination is taken from Cong *et al*. (2019). In Trinidad, it is a widespread and regularly encountered species in forests. DRWP (as wildlife_tobago) photographed the first Tobago record near Mason Hall (Fig. 100).

Fig. 100. *Artonia artona*, Mason Hall, 68 Belmont Farm Road, 10 August 2023, Pandey D.R.W. [iNaturalist 1777585670; F 16 mm.

92. *Naevolus orius orius* (Mabille, 1883) (Hesperiinae)
Cock (2009) treated this species in Trinidad, where it is common and widespread in lowland forests, disturbed situations and gardens. Fig. 101 shows one photographed at Argyle Falls by DRWP (as wildlife_tobago), who has also photographed this species near Mason Hall (16 August 2023 [iNaturalist 178781034, 178784584]).

Fig. 101. *Naevolus orius*, Roxborough, Argyle Falls, 14 August 2023, Pandey D.R.W. [iNaturalist 178453865]; F 20 mm.

IMMIDAE

93. *Imma* sp. nr. *confluens* Meyrick, 1932
This name is based on a comparison of Trinidad specimens with a short series in USNM thus labeled. MJWC collected males in Trinidad, at Simla (18 April 1981) and St. Benedicts (25 March 2003). MK (8 March 2022) and AED (Fig. 102) photographed what appears to be the same species at Englishman's Bay, and CM photographed it at Mason Hall (20 July 2023 [iNaturalist 174140578]).

Fig. 102. *Imma* sp. nr. *confluens*, Englishman's Bay, at light, 10 April 2023, A. Deacon [iNaturalist 154405632]; F 9 mm.

94. *Moca aphrodora* (Meyrick, 1922)

This is a new record for both Trinidad and Tobago. Specimens from Curepe, were compared with the type (NHMUK, ♂ Brazil, Parana). A female from Curepe (November 1980) was reared from a pupa on a leaf of *Piper marginatum* Jacq. (Piperaceae), which may be a food plant. An individual photographed by Bryan Ramdeen at Buccoo (Fig. 103) during the TTFNC Buccoo Bioblitz 2023 (Deacon 2023) matches the Trinidad examples and is the first record from Tobago. This identification is considered provisional until male genitalia dissections can be compared with the type.

Fig. 103. *Moca aphrodora*, Buccoo, 3 June 2022, B. Ramdeen [iNaturalist 165390994]; F 6–8 mm; ©, under CC-BY-NC.

LASIOCAMPIDAE

95. *Euglyphis larunda* (Druce, 1887) complex (Poecilocampinae)

Kaye and Lamont (1927) recorded this species from Trinidad (as *Claphe larunda*) based on a male from Verdant Vale (19 April 1919, N. L[amont]) and a female from Manzanilla (1922, F.W. Jackson). The former is in NMS, but the latter has not been located. Lamont's specimen falls within the range of material that MJWC has collected in Trinidad and treats as this species. This species was identified by comparison with the type (NHMUK, ♂ Costa Rica) and NHMUK series. However, as Forbes (1942) pointed out, there are several extremely close species in this group. Hence, the use of the name *E. larunda* at this time is provisional, pending further research, but provides continuity with Kaye and Lamont's (1927) record. It occurs in two male forms in Trinidad, one with a pale brown patch in the basal area of the forewing, and the other without. It is widespread and not uncommon in both forested and suburban areas of Trinidad. CM has photographed males twice at Mason Hall (Fig 104; 13 August 2023 [iNaturalist 178289626]), both are the form with a pale brown patch in the basal area of the forewing.

Fig. 104. Male *Euglyphis larunda*, Mason Hall, at light, 12 August 2023, C. Mejias [iNaturalist 178109123]; F 15 mm.

LYCAENIDAE

96. *Allosmaitia strophius* (Godart, [1824]) (Theclinae, Eumaeini)

This species is known from Trinidad (Cock and Robbins 2016) but has not previously been reported from Tobago. John Morrall caught a male at Bloody Bay, on 6 October 2018, which is now in his collection.

97. *Hemiargus huntingtoni huntingtoni* (Rindge and Comstock, 1953) (Polyommatinae)

This inconspicuous small butterfly was described from Trinidad (Cock and Robbins 2016), where it seems less common and more localized than the common and widespread *Hemiargus hanno hanno* (Stoll, 1790), which also occurs in Tobago (Cock 2017a). In ventral view, the two are not readily distinguishable, but in dorsal view, the pale hindwing margin and more developed spots of the hindwing submargin, especially in the female, are diagnostic for *H. huntingdoni* (Fig. 105). John Morrall caught a female *H. huntingdoni* at Lowlands, on 19 June 2016; the specimen is in his collection.

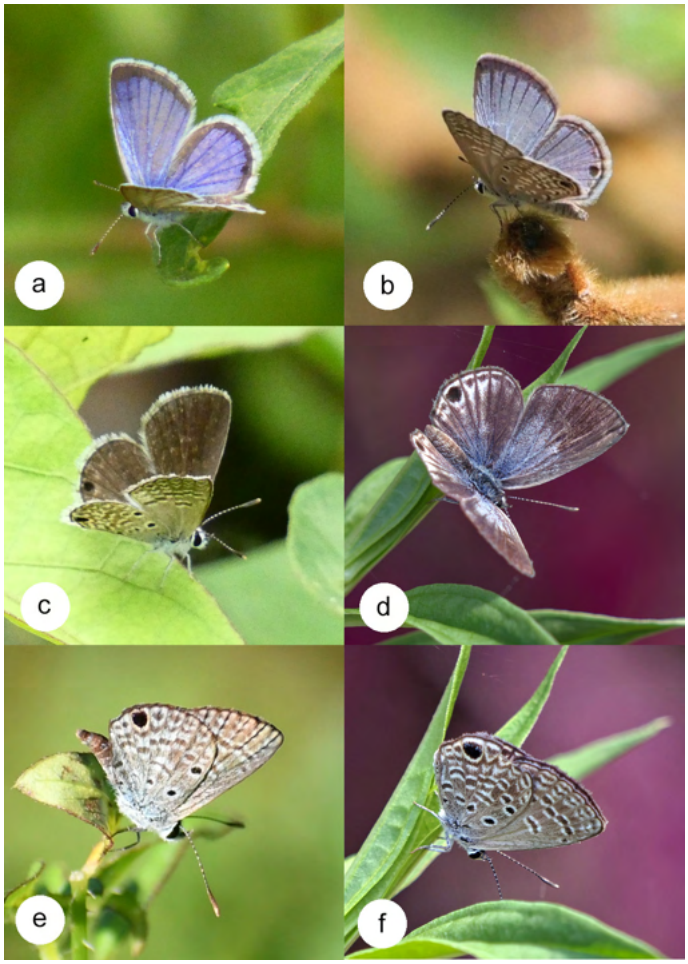

Fig. 105. *Hemiargus* spp., Trinidad. Left *H. hanno*, right, *H. huntingtoni*. Top row, males; middle row, females; bottom row ventral views. **a**, South Oropouche, 12 June 2021, T.P. Maharaj [iNaturalist 82700687]; ©, under CC-BY-NC. **b**, Haleland Park, 17 February 2013, R. Ali [iNaturalist 149000607]; ©, with permission. **c**, as a, 20 January 2023 [iNaturalist 146980159]. **d**, as b, 21 March 2023 [iNaturalist 151836631]. **e**, ♂, Crescent Gardens, 23 December 2022, W.P. Griffith [iNaturalist 144942806]; ©, with permission. **f**, ♀, as d; F *H. hanno* ♂ 7-9 mm, ♀ 8-10 mm; *H. huntingtoni* ♂ 8-10 mm, ♀ 7.5-10 mm.

NOCTUIDAE

MJWC is preparing an account of the Noctuidae of Trinidad and Tobago, which should be published soon and may usefully be read in conjunction with the following treatment.

98. *Agrapha ahenea* Hübner, [1821] (Plusiinae)

Kaye and Lamont (1927) listed *Phytometra longicornis* (Druce) from Trinidad based on a specimen from Palmiste, in July 1915 (N. Lamont). This specimen is in NMS and was misidentified by Lamont; it matches material identified as *A. ahenea* by comparison with the NHMUK series. In Trinidad, this is an occasional species, mostly found in forested areas. CM photographed one near Mason Hall in Tobago (Fig. 106).

Fig. 106. *Agrapha ahenea*, Mason Hall, 20 July 2023, C. Mejias [iNaturalist 174032997]; F 17 mm.

99. *Condica abida* (Felder & Rogenhofer, 1874) (Condicinae)

Hampson (1908) noted a specimen from 'Cuparo (Kaye)' (as *Perigea abida*) in NHMUK. The only specimen from Caparo in NHMUK was collected in November 1904 by F. Birch, and Kaye and Lamont (1927) cited this data. Kaye and Lamont (1927) also reported C. *subornata* (Walker) (as *P. subornata*) from Trinidad based on a specimen from Caigual, collected 22 August 1917 (A. Lickfold). This specimen, a male in OUMNH, is *C. abida*. Finally, Lamont and Callan (1950) reported *C. albolades* (Grote) (as *P. albolabes*, TL USA, Arizona) from Palmiste, 12 March 1930 (N. Lamont). This specimen is a male *C. abida*, which was examined in NMS. This identification is based on a comparison with the NHMUK series (including the Trinidad specimen reported by Hampson (1908). This is the only member of this genus from Trinidad & Tobago with purple-brown forewings and pale yellow markings. It is an occasional species from scattered localities in Trinidad. CM photographed one at Mason Hall (Fig. 107).

Fig. 107. *Condica abida*, Mason Hall, at light, 8 August 2023, C. Mejias [iNaturalist 177451316]; F 14 mm.

100. *Condica albigera* (Guenée, 1852) (Condicinae)
Kaye and Lamont (1927) recorded this species from Trinidad based on one or more specimens from Palmiste without date (N. Lamont) and specimens from 'Trinidad' collected by F.W. Jackson and A. Lickfold. Lamont's specimen is a male in NMS, Jackson's is a male in NHMUK and Lickfold's are a male and two females from Caigual in OUMNH, one of which bears Kaye and Lamont's identification label. All these specimens are comparable with the NHMUK series. This is an occasional species in disturbed habitats of Trinidad, and here reported from Tobago (Fig. 108).

Fig. 108. *Condica albigera*, Mason Hall, at light, 9 August 2023, C. Mejias [iNaturalist 177608776]; F 12 mm.

101. *Condica cupentia* (Cramer, 1780) (Condicinae)
This is one of four species of similar appearance from Trinidad: *C. cupentia*, *C. imitata* (Druce), *C. mimica* (Hampson) and *C. simulatrix* (Hampson). Kaye and Lamont (1927) recorded it from Trinidad (as *Perigea cupentia*) based on specimens from Caparo (October 1904, F. Birch) and Arima Valley, Verdant Vale (31 December 1921, N. Lamont), but we have not located either of these specimens in NHMUK, NMS or UWIZM. Two specimens in Lamont's collection (UWIZM) as this species are *C. imitata* and *C. simulatrix*, so Kaye and Lamont may have misinterpreted this species. However, Lamont did later collect a specimen at Palmiste (17 February 1930, in NMS), and MJWC collected specimens which he confirmed by comparison with the NHMUK series. This is a fairly common and widespread species in Trinidad. Deo *et al*. (2020) documented adults attracted to a flowering jamoon tree, *Syzygium cumini* (L.) Skeels (Myrtaceae) near the Caroni Swamp Visitor Centre. A female photographed by CM at Mason Hall (Fig. 109) is the first record from Tobago.

102. *Deltote minuta* (Druce, 1889) (Eustrotiinae)
A specimen from Curepe is the only record of this small but distinctive species from Trinidad. It was identified by comparison with the type (NHMUK, Guatemala). CM has twice photographed it at Mason Hall (Fig. 110; 2 October 2012 [iNaturalist 181480878]).

Fig. 109. Female *Condica cupentia*, Mason Hall, at light, 9 August 2023, C. Mejias [iNaturalist 177604108]; F 16 mm.

Fig. 110. *Lithacodia minuta*, Mason Hall, 24 July 2023, C. Mejias [iNaturalist 174788730]; F 9 mm.

103. *Dyops chromatophila* (Walker, 1858) (Dyopsinae)
Kaye and Lamont (1927) reported *Dyops ocellata* (Stoll) from Trinidad referring to a specimen from Caparo, November 1904, F. Birch, in NHMUK. *Dyops ocellata* is an unavailable synonym of *D. chromatophila*. This specimen was examined in NHMUK and the identification of additional specimens was confirmed by comparison with the type (NHMUK, ♂ Brazil) and NHMUK series. *Dyops chlorargyra* Hampson is a similar species found in Trinidad (Cock 2017c), easily separated in ventral view, which has yet to be reported from Tobago. *Dyops chromatophila* is an occasional and widespread species in Trinidad and is now recorded from Tobago (Fig. 111).

Fig. 111. *Dyops chromatophila*, Mason Hall, at light, 14 August 2023, C. Mejias [iNaturalist 178464598]; F 16-18 mm.

104. *Elaphria isse* (Schaus, 1914) (Noctuinae)
MJWC identified his only Trinidad specimen by comparison with the type (USNM, ♂ Surinam), but considered this provisional because his specimen was in poor condition. However, RND photographed one in Trinidad (iNaturalist 84821253) which is a good match to the type, and more recently CM photographed three in Tobago at Mason Hall (Fig. 112; 16 August 2023 [iNaturalist 178773339]; 30 August 2023 [iNaturalist 180986570]), and MK photographed another at Englishman's Bay (30 December 2023).

Fig. 112. *Elaphria isse*, Mason Hall, 26 July 2023, C. Mejias, [iNaturalist 175128593]; F 8 mm.

105. *Heterodelta nea* Druce, 1898 (Noctuinae)
Cock (2021a) included a figure of this species from Trinidad as an example of a moth that might be mistaken for a Notodontidae. It was identified by comparison with the NHMUK series. This is an occasional species from diverse habitats in Trinidad, and now recorded from Mason Hall by CM (Fig. 113; 28 September 2023 [iNaturalist 185367743]).

Fig. 113. *Heterocampa nea*, Mason Hall, at light, 8 August 2023, C. Mejias [iNaturalist 177452225]; F 19 mm.

106. *Leucania senescens* Möschler, 1890 (Noctuinae)
Leucania is a difficult genus that still needs to be worked out for the Trinidad fauna. *Leucania senescens* has not been documented from Trinidad or Tobago before although it is common 'over much of its range from north-eastern South America … and the Antilles' (Adams 2001). Our identification of Trinidad specimens (Morne Bleu Textel, ♀ 3 August 1978, ♂ 9 November 1978) is based on Adams' (2001) revision of the *Leucania* of the West Indies, and Zagatti *et al*. (1995–2001). The latter emphasized the presence of small black tufts on the dorsal surface of the first abdominal segments; this seems to be the only species in Trinidad with this feature, and clearly visible in Aaron Wheeler's photograph from Black Rock (Fig. 114).

Fig. 114. *Leucania senescens*, Black Rock, 10 July 2023, A. Wheeler [iNaturalist 172252758]; F 14-15 mm; ©, under CC-BY-NC.

107. *Ozarba melanodonta* Hampson, 1910 (Eustrotiinae)
This species was described from Trinidad (Hampson 1910), based on a specimen in NHMUK collected by W.J. Kaye (Kaye and Lamont 1927). Trinidad specimens were identified by comparison with the unique type in NHMUK (Trinidad). This is a common and widespread species in Trinidad, and here we report the first two Tobago records, photographed at Mason Hall by CM (Fig. 115; 3 August 2023 [iNaturalist 176538099]).

Fig. 115. *Ozarba melanodonta*, Mason Hall, 21 July 2023, C. Mejias [iNaturalist 174189866]; F 8.5-10 mm.

108. *Pararcte schneideriana* (Stoll, 1782) (Dyopsinae)
Kaye and Lamont (1927) recorded a male from St. Joseph, i.1922 (F.W. Jackson), and at least one more specimen in NHMUK. We have not specifically examined these specimens but identified Trinidad material of this large distinctive species by comparison with the NHMUK series. CM photographed one at Mason Hall (Fig. 116).

Fig. 116. *Pararcte schneideriana*, Mason Hall, 6 December 2023, C. Mejias [iNaturalist 193266880]; F 35 mm.

109. *Spragueia apicalis* (Herrich-Schäffer, 1868) (Acontiinae)
This species is here newly recorded from both Trinidad and Tobago. Male specimens from Curepe (MJWC, NHMUK) were identified by comparison with the NHMUK series of *Heliocontia apicella* (Grote), which is a synonym (Lafontaine and Poole 2010). CM photographed another male at Mason Hall (Fig. 117).

Fig. 117. Male *Spragueia apicalis*, Mason Hall, at light, 14 August 2023, C. Mejias [iNaturalist 178451538]; F 7 mm.

NOLIDAE

110. *Iscadia furcifera* (Walker, 1865) (Eligminae)
Cock (2024) treated this family from Trinidad and Tobago, and included this species as a new record from Tobago, photographed at Mason Hall by CM several times (e.g. Fig. 118) and once by RND at Cuffie River Nature Resort (♂ 29 August 2023 [iNaturalist 180896697]).

Fig. 118. Male *Iscadia furcifera*, Mason Hall, 25 July 2023, C. Mejias [iNaturalist 174974410]; F 18 mm.

NOTODONTIDAE

Cock (2021a) treated the Notodontidae of Trinidad and Tobago, and here we document eleven additional records for Tobago:

- **111. *Apela divisa* Walker, 1855 (Hemiceratinae)** (Fig. 119);
- **112. *Calledema jocasta* Schaus, 1901 (Nystaleinae)** (Fig. 120); a second by CM at Mason Hall (4 August 2023 [iNaturalist 178478084]);
- **113. *Calledema plusia* (Felder, 1874) (Nystaleinae)** (Fig. 121);
- **114. *Elasmia pronax* Dognin, 1908 (Nystaleinae)** (Fig. 122); a second by CM at Mason Hall (26 December 2023 [iNaturalist 194944457]);
- **115. *Hemiceras sabis* Guenée, 1862 (Hemiceratinae)** (Fig. 123);
- **116. *Nystalea marmorea* Schaus, 1901 (Nystaleinae)** (Fig. 124);
- **117. *Nystalea nyseus* (Cramer, 1777) (Nystaleinae)** (Fig. 125);
- **118. *Rifargia xylinoides* Walker, 1862 (Heterocampinae)** (Fig. 126);
- **119. *Rosema demorsa* C. Felder and R. Felder, 1874 ssp. *aruga* Schintlmeister, 2019 (Hemiceratinae)** (Fig. 127);
- **120. *Rosema intermedia* Thiaucourt, 2015 (Hemiceratinae)** (Fig. 128); a second by MK at Englishman's Bay (28 December 2023); and
- **121. *Skaphita cubana* (Grote, 1865) (Heterocampinae)** (Fig. 129)
- **122. *Hemiceras egregia* Dognin, 1901 (Hemiceratinae).**

Further, the species listed from Tobago as *Hemiceras rufula* Dognin in Cock (2017b) and as *H.* sp. not *rufula* in Cock (2021a) is now identified as *H. egregia* Dognin, 1901 from Schintlmeister (2022).

Fig. 119. *Apela divisa*, Mason Hall, at light, 14 August 2023, C. Mejias [iNaturalist 178479127]; F 15-17 mm.

Fig. 120. *Calledema jocasta*, Englishman's Bay, 10 April 2022, A. Deacon [iNaturalist 154257179, 154405660]; F 21 mm.

Fig. 121. Male *Calledema plusia*, Mason Hall, at light, 13 August 2023. C. Mejias [iNaturalist 178302512]; F 18-19 mm.

Fig. 122. Female *Elasmia pronax*, Mason Hall, at light, 12 October 2023, C. Mejias [iNaturalist 187321350]; F 22 mm.

Fig. 123. *Hemiceras sabis*, Mason Hall, at light, 23 August 2023, C. Mejias [iNaturalist 179763818]; F 19-21 mm.

Fig. 124. Female *Nystalea marmorea*, Mason Hall, at light, 17 August 2023, C. Mejias [iNaturalist 178931235]; F 25 mm.

Fig. 125. Male *Nystalea nyseus*, Mason Hall, at light, 7 October 2023, C. Mejias [iNaturalist 186634327]; F 21-23 mm.

Fig. 126. Female *Rifargia xylinoides*, Mason Hall, at light, 6 September 2023, C. Mejias [iNaturalist 182117095]; F 18 mm.

Fig. 127. *Rosema demorsa aruga*, Mason Hall, 22 Jul 2023. C. Mejias [iNaturalist 174399209]; F ♂ 14-17 mm, ♀ 16-18 mm (Schintlmeister 2019).

Fig. 128. Male *Rosema intermedia*, Mason Hall, 22 Jul 2023, C. Mejias [iNaturalist 174378529]; F 15 mm.

Fig. 129. Female *Skaphita cubana*, Mason Hall, at light, 11 August 2023, C. Mejias [iNaturalist 177918304]; F 23-24 mm.

NYMPHALIDAE

123. *Opsiphanes merianae merianae* Stichel, 1902 (Satyrinae, Brassolini)

This species has been known from Trinidad as *Opsiphanes cassina merianae* (Barcant 1970, Cock 2014, Cock 2020), but in their recent revision of the genus, Piovesan *et al*. (2022) raised *merianae* to species level. No *Opsiphanes* species have been recorded from Tobago until now. Cock (2020) sets out how to separate the two species of *Opsiphanes* found in Trinidad, which in ventral view are confusingly similar. However, the photographs by DRWP (as corbinlocalwildlife) at Corbin Local Wildlife (Fig. 130) include dorsal views, which are easily identifiable due to the orange medial line being divided at the forewing costa.

OECOPHORIDAE

124. *Antaeotricha tremulella* (Walker, 1864) (Stenomatinae)

This species has not previously been reported from Trinidad, but S.S. & W.D. Duckworth collected five males from Simla that are now in USNM. Based on these, a further specimen from Curepe (♂ 4 January 1980) and CM's photograph from Mason Hall (Fig. 131) were identified.

125. *Cerconota anonella* (Sepp, 1830) (Stenomatinae)

Fennah (1937) recorded this species as a pest of soursop (*Annona muricata* L. Annonaceae) in Trinidad, and some of his specimens are in USNM. This was the basis for identifying additional Trinidad specimens and CM's photograph from Mason Hall (Fig. 132). However, given that this is a pest species, confirmation based on voucher specimens would be desirable.

Fig. 130. Male *Opsiphanes merianae merianae*, Corbin Local Wildlife, 31 March 2023, Pandey D.R.W. [iNaturalist 152945288]; F 32–37 mm.

Fig. 131. *Antaeotricha tremulella*, Mason Hall, at light, 4 September 2023, C. Mejias [iNaturalist 181850783]; F 9 mm.

Fig. 132. *Cerconota anonella*, Mason Hall, at light, 14 August 2023, C. Mejias [iNaturalist 178463596]; F 10-11 mm.

126. *Stenoma consociella* (Walker, 1864) (Stenomatinae)
S.S. & W.D. Duckworth collected five specimens of this species at Simla, which are now in USNM. Based on these, photographs were identified from Brasso Seco, Wa Samaki Ecosystems, and now AED's from Englishman's Bay (7 April 2023 [iNaturalist 153929926]; ♀ 9 April 2023 [iNaturalist 154217878]) and CM's from Mason Hall (Fig. 133). AED collected the second moth observed; it is now in MJWC and a DNA barcode has been obtained (MJC_693), which forms part of BIN BOLD:ACO1113).

Fig. 133. *Stenoma consociella*, Mason Hall, 31 July 2023, C. Mejias [iNaturalist 176029897]; F 10 mm.

PYRALIDAE

127. *Achroia grisella* (Fabricius, 1794) (Galleriinae)
The lesser wax moth, *Achroia grisella*, occurs more or less throughout the World (Clarke 1986), and is a minor pest of honeybee hives in Trinidad (Adamson 1943). Some of Adamson's specimens were examined in USNM. We do not know of any previous records from Tobago, but AED photographed one at Englishman's Bay (Fig. 134).

128. *Galleria mellonella* (Linnaeus, 1758) (Galleriinae)
This species is known as the greater wax moth as it is the larger of several species whose caterpillars feed on honeybee wax. It is widespread globally (Kwadha *et al*. 2017). Adamson (1943) discussed this species as a pest of honeybee hives in Trinidad, and there are scattered records from Trinidad of this occasional species. CM's photograph from Mason Hall (Fig. 135) is the first observation that we know of from Tobago.

129. *Megarthria peterseni* (Zeller, 1881) (Phycitinae)
This is a new record for both Trinidad and Tobago. Specimens from Curepe and Nariva Swamp, Manzanilla-Mayaro Road, milestone 46.5 were identified by comparison with the types (NHMUK, Colombia) and NHMUK series. A photograph at Mason Hall by CM (Fig. 136) shows that this is also a Tobago species.

Fig. 134. *Achroia grisella*, Englishman's Bay, 8 January 2022, A. Deacon [iNaturalist 104618817]; F 10 mm.

Fig. 135. *Galleria mellonella*, Mason Hall, at light, 11 September 2023, C. Mejias [iNaturalist 182898049]; F ♂ 13 mm, ♀ 17 mm.

Fig. 136. *Megarthria peterseni*, Mason Hall, 25 July 2023, C. Mejias [iNaturalist 174976475]; F ♂ 6 mm, ♀ 8 mm.

130. *Pseudodivona cispha* Dyar, 1919 (Phycitinae)
Trinidad specimens from Curepe (♂ 19-22 November 1980, ♂ 6-11 December 1980) were identified by comparison with the NHMUK series. This is a new record for Trinidad and CM's photograph at Mason Hall (Fig. 137) is a new record for Tobago.

Fig. 137. *Pseudodivona cispha*, Mason Hall, 21 July 2023, C. Mejias [iNaturalist 174196973]; F 8 mm.

131. *Pyralis manihotalis* Guenée, 1854 (Pyralinae)
Kaye and Lamont (1927) recorded this species from Trinidad based on one or more specimens collected by F.W. Urich. A female in USNM collected at light in Port of Spain by F.W. Urich, 27 August 1922 may be considered a voucher for this record. Trinidad material was compared with the NHMUK and USNM series. This is a common species, widespread in lowland areas of Trinidad, but CM's photograph from Mason Hall (Fig. 138) is the first from Tobago.

Fig. 138. Male *Pyralis manihotalis*, Mason Hall, at light, 1 September 2023, C. Mejias [iNaturalist 181301718]; F ♂ 8 mm, ♀ 10 mm.

132. *Ungulopsis jubatalis* Amsel, 1956 (Chrysauginae)
This species was described from Venezuela (Amsel 1956) but has not been reported from Trinidad or Tobago before. MJWC has Trinidad specimens from Point Gourde (♂, 2♀ 16 May 1999) and St. Benedict's (♂, ♀ 25 March 2003), which were identified by comparison with the NHMUK series. Based on these, AED's photographs at Englishman's Bay (Fig. 139 were identified. Further specimens were collected (♂ 9 April 2023 [MJWC, DNA MJWC-694]; ♂ 10 April 2023 [MJWC, DNA MJWC-696]).

Fig. 139. Male *Ungulopsis jubatalis*, Englishman's Bay, at light, 7 April 2023, A. Deacon [iNaturalist 153929915]; F 7 mm.

133. *Zamagiria arctella* (Ragonot, 1887) (Phycitinae)
A female specimen from Trinidad (Point Gourde, MVL, 16 May 1999) was identified by comparison with the NHMUK series and subsequently from Neunzig (2003). It is known from southern Florida, the Bahamas, and 'several islands in the Caribbean' (Neunzig 2003). Confirmation by examination of the male genitalia or DNA barcoding would be useful. MK's photograph from Englishman's Bay (Fig. 140) is the first from Tobago.

Fig. 140. *Zamagiria arctella*, Englishman's Bay, at light, 12 March 2023. M. Kelly; F 8.5 mm.

RIODINIDAE

134. *Emesis ocypore* (Geyer, 1837)

This species is known as the black emesis in Trinidad, where it is rare (Barcant 1970). MJWC has been aware that it is probably a Tobago species, having seen a specimen in a collection being accessioned by the Allyn Museum (now incorporated into the MacGuire Center for Lepidoptera and Biodiversity, Florida), but having no details did not include it in his checklist of Tobago butterflies (Cock 2017a). John Morrall advises that he caught a specimen at Bloody Bay, on 6 October 2018, which is now in his collection.

SATURNIIDAE

135. *Gamelia bennetti* Cock & Rougerie, 2021 (Hemiileucinae)

Cock and Rougerie (2021) described this species from Trinidad and Tobago, but Cock *et al*. (2023) did not include this species in their total for the moths of Tobago. There was an additional photographic record in 2023 from Mason Hall (Fig. 141).

Fig. 141. Male *Gamelia bennetti*, Mason Hall, at light, 20 December 2023, C. Meijias [iNaturalist 194463435]; F 30 mm.

SESIIDAE

136. *Eichlinia pulchripes* (Walker, 1856) (Sesiinae)

MJWC collected two males of this species at light at Curepe (21 June 1979; 7 January 1980 [NHMUK]), which were initially identified as *Melittia cucurbitae* (Harris) by comparison with the NHMUK series. Becker and Eichlin (1984) discussed the composition of the *M. cucurbitae* complex; *M. cucurbitae* is considered to be a North American species, and only *M. pulchripes* (TL Venezuela) is widespread in Central and South America and likely to be present in Trinidad. Gorbunov (2020) described *Eichlinia* as a new genus for *M. cucurbitae* and related species. The food plant(s) of *E. pulchripes* have not been documented, but they are expected to be Cucurbitaceae such as pumpkins and squash (*Cucurbita* spp., especially *C. maxima* Duschene and *C. pepo* L.), on which *E. cucurbitae* caterpillars are known stem-boring pests (Middleton 2018). Recently, a further Trinidad male was photographed near South Oropouche (2 July 2021, T.P. Maharaj [iNaturalist 85354864]), and now J.M. Fernández has photographed one at Canaan in Tobago (Fig. 142).

Fig. 142. *Eichlinia pulchripes*, Canaan, 17 September 2023, J.M. Fernández [iNaturalist 184291806]; F ♂ 13.5 mm; © with permission.

137. *Melittia cyaneifera* Walker, 1856 or near (Sesiinae)

This species has not been reported from Trinidad or Tobago before. MJWC collected specimens at Curepe (♂, MVL, 13 June 1981) and Mt. Tabor (♀, 1500 ft., 2 July 1978), which he compared with the type (NHMUK, ♀ Brazil) and NHMUK series. However, this identification should be considered provisional given our poor knowledge of this family, abraded condition of the type, and the probably distant type locality. Further, the generic placement is expected to be incorrect, given that *Melittia* seems to be an Old World genus (Gorbunov 2020). RND photographed a specimen at light near Patience Hill (Fig. 143) (Deacon 2023).

SPHINGIDAE

138. *Cocytius antaeus* (Drury, 1773) (Sphinginae)

Cock (2018) treated this species as part of the Trinidad fauna. It has not hitherto been reported from Tobago (Cock 2017b), although it was expected to occur as it is also found through the Lesser Antilles (Schreiber 1978). Jan Marie Fernández photographed a caterpillar on sugar apple, *Annona squamosa* L. (Annonaceae) at Canaan (Fig. 144). The caterpillar was identified from Montagna *et al* (2023).

TINEIDAE

139. *Erechthias zebrina* (Butler, 1881) (Erechthiinae)

Although first described from Hawai'i, this seems to be a pantropical species including records from Brazil and the

Fig. 143. *Melittia cyaneifera*, Patience Hill, at light, 3 June 2023, R. Deo [iNaturalist 165689882]; F 17–18 mm.

Fig. 144. Final instar caterpillar of *Cocytius antaeus* on *Annona squamosa*, Canaan, 8 July 2023, J.M. Fernández [iNaturalist 171828435]; ©, with permission.

West Indies, that is thought to feed on detritus (Zimmermann 1978), and which has not previously been reported from Trinidad or Tobago. Following a suggestion by Guilherme A. Fischer on iNaturalist, images of living moths were identified from Zimmermann (1978) and De Prins and De Prins (2023). Two observations from Trinidad (Curepe, 29 March 2021, B. Ramdeen [iNaturalist 72406368]; Brasso Seco, 15 April 2022, M. Hulme [iNaturalist 112137941]) and one from Tobago (Fig. 145) indicate that this species occurs on both islands.

Fig. 145. *Erechthias zebrina*, Mason Hall, at light, 21 September 2023, C. Mejias [iNaturalist 184334737]; F 3.5 mm (Zimmermann 1978).

URANIIDAE

140. *Molybdophora concinnaria* (Hübner, 1818) (Epipleminae)

Lamont and Callan (1950) recorded a specimen of this species at St. Patrick's [Estate], Arima [Valley], 24 November 1929 (N. Lamont), which was examined in NMS, and confirmed by comparison with the NHMUK series. In Trinidad, this is an occasional species mainly seen in forested areas and quite often encountered by day as well as being attracted to light by night. The DNA barcodes from two Trinidad specimens (MC_359, MJC_540) show that this species is part of BIN BOLD:AEC4346, along with specimens from French Guiana and Brazil. CM's photograph at light at Mason Hall (Fig. 146) is the first for Tobago.

Fig. 146. Male *Molybdophora concinnaria*, Mason Hall, 12 August 2023, C. Mejias [iNaturalist 178110955]; F 12 mm.

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List of records by numbers, genera and species.

Numbered sequence	Alphabetical by genera	Alphabetical by species
1 *Batrachedra nuciferae*	*Achroia grisella* 127	*abdara*, *Massala* 54
2 *Castnia invaria*	*Agrapha ahenea* 98	*abida*, *Condica* 99
3 *Apilocrocis cephalis*	*Allosmaitia strophius* 96	*acuta*, *Patalene* 82
4 *Desmia ploralis*	*Amabela carsinodes* 23	*addens*, *Eulepidotis* 41
5 *Desmia tages*	*Anomis editrix* 24	*adjutrix, Athyrma* 29
6 *Goniorhynchus salaconalis*	*Antaeotricha tremulella* 124	*adustipennis*, *Mesophleps* 74
7 *Haritalodes pharaxalis*	*Antiblemma mundicola* 25	*aequalis*, *Gonodonta* 46
8 *Hoterodes ausonia*	*Antiblemma patifaciens* 26	*ahenea*, *Agrapha* 98
9 *Lamprosema lunulalis*	*Antiblemma rufinans* 27	*albigera*, *Condica* 100
10 *Leucochromodes trinitensis*	*Antiblemma sufficiens* 28	*albina, Rupela* 20
11 *Maruca vitrata*	*Apela divisa* 111	*alegralis, Neoleucinodes* 13
12 *Mesocondyla dardusalis*	*Apilocrocis cephalis* 3	*amoenalis, Symphysa* 22
13 *Neoleucinodes alegralis*	*Artonia artona* 91	*anonella, Cerconota* 125
14 *Omiodes humeralis*	*Athyrma adjutrix* 29	*antaeus*, *Cocytius* 138
15 *Palpita persimilis*	*Bagodares rectisignaria* 75	*aphrodora*, *Moca* 94
16 *Phaedropsis fuscicostalis*	*Batrachedra nuciferae* 1	*apicalis*, *Spragueia* 109
17 *Phostria metalobalis*	*Calledema jocasta* 112	*apparitaria*, *Scopula* 87
18 *Piletosoma novalis*	*Calledema plusia* 113	*apyraria*, *Eois* 76
19 *Portentomorpha xanthialis*	*Carteris lineata* 30	*arctella, Zamagiria* 133
20 *Rupela albina*	*Castnia invaria* 2	*artona*, *Artonia* 91
21 *Syllepte laticalis*	*Cerconota anonella* 125	*atrosignata*, *Scolecocampa* 67
22 *Symphysa amoenalis*	*Chamyna homichlodes* 31	*ausonia, Hoterodes* 8
23 *Amabela carsinodes*	*Clemensia trinotata* 32	*bennetti*, *Gamelia* 135
24 *Anomis editrix*	*Cocytius antaeus* 139	*bibitrix, Coenipeta* 33
25 *Antiblemma mundicola*	*Coenipeta bibitrix* 33	*bicristata*, *Pseudbarydia* 64
26 *Antiblemma patifaciens*	*Coeriana funerea* 34	*bidens*, *Gonodonta* 47
27 *Antiblemma rufinans*	*Condica abida* 99	*bidens*, *Metria* 56
28 *Antiblemma sufficiens*	*Condica albigera* 100	*broda*, *Hypena* 50
29 *Athyrma adjutrix*	*Condica cupentia* 101	*carpo*, *Macaria* 79
30 *Carteris lineata*	*Coxina cinctipalpis* 35	*carsinodes, Amabela* 23
31 *Chamyna homichlodes*	*Deltote minuta* 102	*cephalis, Apilocrocis* 3
32 *Clemensia trinotata*	*Desmia ploralis* 4	*chromatophila*, *Dyops* 103
33 *Coenipeta bibitrix*	*Desmia tages* 5	*cinctipalpis*, *Coxina* 35
34 *Coeriana funerea*	*Diagrapta lignaria* 36	*cispha, Pseudodivona* 130
35 *Coxina cinctipalpis*	*Dyomyx egista* 37	*concinnaria, Molybdophora* 140
36 *Diagrapta lignaria*	*Dyomyx ocala* 38	*confluens*, Imma sp. nr. 93
37 *Dyomyx egista*	*Dyomyx ora* 39	*consociella, Stenoma* 126
38 *Dyomyx ocala*	*Dyops chromatophila* 103	*cubana, Skaphita* 121
39 *Dyomyx ora*	*Eichlinia pulchripes* 136	*cupentia*, *Condica* 101
40 *Eugoniella sapota*	*Elaphria isse* 104	*cyaneifera*, *Melittia* 137
41 *Eulepidotis addens*	*Elasmia pronax* 114	*dardusalis, Mesocondyla* 12
42 *Eulepidotis ezra*	*Emesis ocypore* 134	*demera*, *Metria* sp. nr. 57

List of records by numbers, genera and species. Continued.

Numbered sequence	Alphabetical by genera	Alphabetical by species
43 *Eulepidotis persimilis*	*Eois apyraria* 76	*demorsa, Rosema* 119
44 *Glenopteris oculifera*	*Epimecis matronaria* 77	*discalis*, *Veraneacerea* 72
45 *Goniapteryx servia*	*Erechthias zebrina* 139	*divisa*, *Apela* 111
46 *Gonodonta aequalis*	*Euglyphis larunda* 95	*editrix, Anomis* 24
47 *Gonodonta bidens*	*Eugoniella sapota* 40	*egista*, *Dyomyx* 37
48 *Gonodonta latimacula*	*Eulepidotis addens* 41	*egregia, Hemiceras* 122
49 *Gorgone ortilia*	*Eulepidotis ezra* 42	*ezra*, *Eulepidotis* 42
50 *Hypena broda*	*Eulepidotis persimilis* 43	*fufialis, Hypena* 51
51 *Hypena fufialis*	*Galleria mellonella* 128	*funerea, Coeriana* 34
52 *Hypena glumalis*	*Gamelia bennetti* 135	*furcifera*, *Iscadia* 110
53 *Hypena mactatalis*	*Glenopteris oculifera* 44	*fusaria*, *Pero* 83
54 *Massala abdara*	*Goniapteryx servia* 45	*fuscicostalis, Phaedropsis* 16
55 *Melipotis januaris*	*Goniorhynchus salaconalis* 6	*glumalis*, *Hypena* 52
56 *Metria bidens*	*Gonodonta aequalis* 46	*grandirenalis*, *Thursania* 71
57 *Metria* sp. nr. *demera*	*Gonodonta bidens* 47	*grisella, Achroia* 127
58 *Mursa phtisialis*	*Gonodonta latimacula* 48	*homichlodes, Chamyna* 31
59 *Napata terminalis*	*Gorgone ortilia* 49	*humeralis, Omiodes* 14
60 *Nelphe setosa*	*Haritalodes pharaxalis* 7	*huntingtoni*, *Hemiargus* 97
61 *Obroatis ocellata*	*Hemiargus huntingtoni* 97	*intermedia, Rosema* 120
62 *Phycoma marcellina*	*Hemiceras egregia* 122	*invaria, Castnia* 2
63 *Physula limonalis*	*Hemiceras sabis* 115	*isse*, *Elaphria* 104
64 *Pseudbarydia bicristata*	*Heterodelta nea* 105	*januaris*, *Melipotis* 55
65 *Purius pilumnia*	*Hoterodes ausonia* 8	*jocasta*, *Calledema* 112
66 *Schiraces mopsus*	*Hydata translucidaria* 78	*jubatalis, Ungulopsis* 132
67 *Scolecocampa atrosignata*	*Hypena broda* 50	*lanipes*, *Selenisa* 68
68 *Selenisa lanipes*	*Hypena fufialis* 51	*larunda*, *Euglyphis* 95
69 *Selenisa suero*	*Hypena glumalis* 52	*laticalis, Syllepte* 21
70 *Strathocles parvipulla*	*Hypena mactatalis* 53	*latimacula*, *Gonodonta* 48
71 *Thursania grandirenalis*	*Imma* sp. nr. *confluens* 93	*lignaria*, *Diagrapta* 36
72 *Veraneacerea discalis*	*Iscadia furcifera* 110	*limonalis*, *Physula* 63
73 *Paectes lunodes*	*Lamprosema lunulalis* 9	*lineata, Carteris* 30
74 *Mesophleps adustipennis*	*Leptostales terminata* 80	*lunodes*, *Paectes* 73
75 *Bagodares rectisignaria*	*Leucania senescens* 106	*lunulalis, Lamprosema* 9
76 *Eois apyraria*	*Leucochromodes trinitensis* 10	*mactatalis*, *Hypena* 53
77 *Epimecis matronaria*	*Macaria carpo* 79	*manihotalis, Pyralis* 131
78 *Hydata translucidaria*	***Macrosoma rubedinaria* 90**	*marcellina*, *Phycoma* 62
79 *Macaria carpo*	*Maruca vitrata* 11	*marmorea, Nystalea* 116
80 *Leptostales terminata*	*Massala abdara* 54	*matronaria*, *Epimecis* 77
81 *Obila ruptiferata*	*Megarthria peterseni* 129	*melanodonta*, *Ozarba* 107
82 *Patalene acuta*	*Melipotis januaris* 55	*mellonella, Galleria* 128
83 *Pero fusaria*	*Melittia cyaneifera* 137	*merianae, Opsiphanes* 123
84 *Phrudocentra pupillata*	*Mesocondyla dardusalis* 12	*metalobalis, Phostria* 17

List of records by numbers, genera and species. Continued.

Numbered sequence	Alphabetical by genera	Alphabetical by species
85 *Phrygionis polita*	*Mesophleps adustipennis* 74	*minuta*, *Deltote* 102
86 *Prochoerodes tetragonata*	*Metria bidens* 56	*mopsus*, *Schiraces* 66
87 *Scopula apparitaria*	*Metria* sp. nr. *demera* 57	*mundicola, Antiblemma* 25
88 *Synchlora pulchrifimbria*	*Moca aphrodora* 94	*nea*, *Heterodelta* 105
89 *Tachyphyle undilineata*	*Molybdophora concinnaria* 140	*novalis, Piletosoma* 18
90 *Macrosoma rubedinaria*	*Mursa phtisialis* 58	*nuciferae, Batrachedra* 1
91 *Artonia artona*	*Naevolus orius* 92	*nyseus, Nystalea* 117
92 *Naevolus orius*	*Napata terminalis* 59	*ocala*, *Dyomyx* 38
93 *Imma* sp. nr. *confluens*	*Nelphe setosa* 60	*ocellata*, *Obroatis* 61
94 *Moca aphrodora*	*Neoleucinodes alegralis* 13	*oculifera*, *Glenopteris* 44
95 *Euglyphis larunda*	*Nystalea marmorea* 116	*ocypore, Emesis* 134
96 *Allosmaitia strophius*	*Nystalea nyseus* 117	*ora*, *Dyomyx* 39
97 *Hemiargus huntingtoni*	*Obila ruptiferata* 81	*orius*, *Naevolus* 92
98 *Agrapha ahenea*	*Obroatis ocellata* 61	*ortilia*, *Gorgone* 49
99 *Condica abida*	*Omiodes humeralis* 14	*parvipulla*, *Strathocles* 70
100 *Condica albigera*	*Opsiphanes merianae* 123	*patifaciens, Antiblemma* 26
101 *Condica cupentia*	*Ozarba melanodonta* 107	*persimilis, Palpita* 15
102 *Deltote minuta*	*Paectes lunodes* 73	*persimilis*, *Eulepidotis* 43
103 *Dyops chromatophila*	*Palpita persimilis* 15	*peterseni, Megarthria* 129
104 *Elaphria isse*	*Pararcte schneideriana* 108	*pharaxalis, Haritalodes* 7
105 *Heterodelta nea*	*Patalene acuta* 82	*phtisialis*, *Mursa* 58
106 *Leucania senescens*	*Pero fusaria* 83	*pilumnia*, *Purius* 65
107 *Ozarba melanodonta*	*Phaedropsis fuscicostalis* 16	*ploralis, Desmia* 4
108 *Pararcte schneideriana*	*Phostria metalobalis* 17	*plusia*, *Calledema* 113
109 *Spragueia apicalis*	*Phrudocentra pupillata* 84	*polita*, *Phrygionis* 85
110 *Iscadia furcifera*	*Phrygionis polita* 85	*pronax*, *Elasmia* 114
111 *Apela divisa*	*Phycoma marcellina* 62	*pulchrifimbria*, *Synchlora* 88
112 *Calledema jocasta*	*Physula limonalis* 63	*pulchripes*, *Eichlinia* 136
113 *Calledema plusia*	*Piletosoma novalis* 18	*pupillata*, *Phrudocentra* 84
114 *Elasmia pronax*	*Portentomorpha xanthialis* 19	*rectisignaria*, *Bagodares* 75
115 *Hemiceras sabis*	*Prochoerodes tetragonata* 86	***rubedinaria*, *Macrosoma* 90**
116 *Nystalea marmorea*	*Pseudbarydia bicristata* 64	*rufinans, Antiblemma* 27
117 *Nystalea nyseus*	*Pseudodivona cispha* 130	*ruptiferata*, *Obila* 81
118 *Rifargia xylinoides*	*Purius pilumnia* 65	*sabis, Hemiceras* 115
119 *Rosema demorsa*	*Pyralis manihotalis* 131	*salaconalis, Goniorhynchus* 6
120 *Rosema intermedia*	*Rifargia xylinoides* 118	*sapota*, *Eugoniella* 40
121 *Skaphita cubana*	*Rosema demorsa* 119	*schneideriana*, *Pararcte* 108
122 *Hemiceras egregia*	*Rosema intermedia* 120	*senescens*, *Leucania* 106
123 *Opsiphanes merianae*	*Rupela albina* 20	*servia*, *Goniapteryx* 45
124 *Antaeotricha tremulella*	*Schiraces mopsus* 66	*setosa*, *Nelphe* 60
125 *Cerconota anonella*	*Scolecocampa atrosignata* 67	*strophius*, *Allosmaitia* 96
126 *Stenoma consociella*	*Scopula apparitaria* 87	*suero*, *Selenisa* 69

List of records by numbers, genera and species. Continued.

Numbered sequence	Alphabetical by genera	Alphabetical by species
127 *Achroia grisella*	*Selenisa lanipes* 68	*sufficiens, Antiblemma* 28
128 *Galleria mellonella*	*Selenisa suero* 69	*tages, Desmia* 5
129 *Megarthria peterseni*	*Skaphita cubana* 121	*terminalis*, *Napata* 59
130 *Pseudodivona cispha*	*Spragueia apicalis* 109	*terminata*, *Leptostales* 80
131 *Pyralis manihotalis*	*Stenoma consociella* 126	*tetragonata*, *Prochoerodes* 86
132 *Ungulopsis jubatalis*	*Strathocles parvipulla* 70	*translucidaria*, *Hydata* 78
133 *Zamagiria arctella*	*Syllepte laticalis* 21	*tremulella, Antaeotricha* 124
134 *Emesis ocypore*	*Symphysa amoenalis* 22	*trinitensis, Leucochromodes* 10
135 *Gamelia bennetti*	*Synchlora pulchrifimbria* 88	*trinotata, Clemensia* 32
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Aquatic invertebrates of epiphytic tank bromeliads on the island of Trinidad, W.I.: an illustrated checklist

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ABSTRACT

Tank bromeliads are common epiphytes throughout the Neotropics. Their leaf rosettes store rainwater and debris, creating detrital-based aquatic ecosystems with a rich fauna. In this paper, we provide the first illustrated checklist of the aquatic bromeliad invertebrates of Trinidad, based on a sample of ~150 plants from the Northern Range. Using a combination of morphological identification and DNA barcoding, we found 48 different invertebrates, distributed across 21 families from four classes, with many rare species. We also include the complete dataset associated with this species guide, in the hope of supporting future research aimed to resolve important biogeographical and ecological questions around this system.

Key words: phytotelmata; bromeliads; aquatic invertebrates; checklist; biogeography

INTRODUCTION

Bromeliads (Poales: Bromeliaceae Juss.) represent a speciose group of approximately 3,400 herbaceous plants, with a distribution spanning from northern Argentina to southern Florida, USA, and from the summits of the Andes to the Amazonian lowlands (Givnish *et al.* 2014, Zizka *et al.* 2020). The family includes a diversity of growth forms, including epiphytic tank bromeliads, which show unique features, such as their interlocking leaves which form a rosette that is able to capture rainwater and falling debris from vegetal and animal sources (Benzing 2000). These plants usually do not use their roots to extract nutrients, except at very young stages or under very dry circumstances (Leroy *et al.* 2019, Takahashi *et al.* 2022), or for the so-called 'ant gardens' (Leroy *et al.* 2012). Instead, they primarily use their roots to secure a footing on a diversity of surfaces, from trees to rocks. Epiphytic tank bromeliads typically live from a few months to a few years, and can reach very high densities of several thousand individuals (Jocque *et al.* 2010) and impound up to 50,000 L of water per hectare (Williams 2006). Therefore, epiphytic tank bromeliads represent a widespread lentic environment in tropical and subtropical forests, and provide environments that are occupied by specific communities of organisms, including those of conservation interest (Ladino *et al.* 2019).

Although bromeliads may be best known for harbouring habitat specialist species of amphibian, such as the dwarf marsupial frog *Flectonotus fitzgeraldi* Parker 1934 (Smith *et al.* 2021), they also harbour diverse invertebrate communities. These invertebrates represent a range of specialisation to the bromeliad habitat, with some species being obligate specialists (e.g., Young 1981, Dupont *et al.* 2023), while others use the habitat more opportunistically (Benzing 2000). Nonetheless, these invertebrate communities are surprisingly diverse, with 852 taxa identified in over 10 countries (Céréghino *et al.* 2018). These taxa encompass a diversity of taxonomic and functional groups, principally revolving around the processing of leaf litter decomposing in the rosette (Cummins *et al.* 2005, Leroy *et al.* 2017, Céréghino *et al.* 2018, Dézerald *et al.* 2018). Even if algae can reach measurable densities within bromeliads, autochthonous production derived from these organisms remains minor (Brouard *et al.* 2011, Farjalla *et al.* 2016), in particular due to strong competition with bromeliads for nutrients (Rogy and Srivastava 2023). Because of the broad geographic distribution of tank bromeliads, and the simple yet diverse food webs they harbour in their phytotelmata, these plants have been a strong model system to develop and test ecological theory (Srivastava *et al.* 2004).

Despite Trinidad and Tobago being a country with well-documented biodiversity and the site of much field research, we could only find one account of a complete census of these communities, a census that was conducted on just a few bromeliads more than a century ago (Scott 1912). More precisely, research on bromeliads in Trinidad and Tobago tends to focus on the plants themselves (e.g., Broadway and Smith 1933, Males *et al.* 2023), on terrestrial insects that

use the plants as food sources (González and Cock 2004), or on endangered endemic species associated with the plants, such the golden tree frog *P. auratus* (Torresdal *et al.* 2017) or the piping-guan *Pipile pipile* Jacquin 1784 (Hayes *et al.* 2009). There are a few accounts of bromeliad-harboured invertebrates in the country, but these primarily concern specific groups such as mosquitoes Culicidae (Downs and Pittendrigh 1946, Aitken 1967), copelatine dytiscids (Balke *et al.* 2008), *Copestylum* syrphids (Rotheray *et al.* 2007) or *Phaenostoma* hydrophilids (Clarkson *et al.* 2014). Given the unique biogeography of Trinidad and Tobago and its rich bromeliad fauna of more than 50 species (Baksh-Comeau *et al.* 2016), the country is likely to be the home of a unique bromeliad fauna, allowing researchers to improve our understanding of ecological systems in general. In this paper, we provide an illustrated checklist of bromeliad-inhabiting aquatic invertebrates. We have made the data from the survey openly accessible on an online repository, and hope it will be of use to future researchers choosing to work on this system.

MATERIAL and METHODS

Sampling locations

In September and October 2022, we collected live bromeliads from six different sites across the north of the island of Trinidad, Trinidad & Tobago (Fig. 1): Arima Valley (UTM 20P 687093E, 1182499N elevation: 282m a.s.l.), Brasso Seco (690372E, 1189043N 137m a.s.l.), La Laja (687899E, 1184151N 588m a.s.l), Las Lapas (684477E, 1186610N 601m a.s.l.), Marianne River (685482E, 1190444N, 39m a.s.l.), and Morne Bleu (685447E, 1186370N 631m a.s.l .).

Moreover, on specific occasions, we opportunistically collected bromeliads that had recently fallen from nearby trees, thus still holding a portion of their phytotelma, from five different locations along roads: F1 (686783E, 1184829N, 304m a.s.l.), F2 (686028E, 1185718N, 390m a.s.l.), F3-F5 (684822E, 1186366N, 571m a.s.l.), F6 (685668E, 1186870N, 511m a.s.l.), and F7 (686615E, 1184949N, 383 m a.s.l.).

Sampling protocol

At each site, we followed the same sampling protocol. First, we identified the focal bromeliad to the genus level, and carefully removed it from its support tree to avoid damaging the root system. During this procedure, we placed a large plastic container under the plant to collect any water that could fall from the bromeliad rosette. We then turned the plant upside-down to pour any leftover water it contained into the same container, measured the resulting water volume as a proxy of the realised size of the aquatic habitat, and brought the plant back to the William Beebe Tropical Research Station (Simla). Once at the field station, we carefully washed each leaf well of the bromeliad with a water hose, using pincers to extract large detritus or detritus that adhered to the wall of the bromeliad wells. After thoroughly washing the bromeliad, we measured the maximum amount of water it could contain, as well as the height of the central well and the width of the plant with its longest leaves extended, all representing proxies for the maximum size of the bromeliad habitat. We carefully inspected the collected water and detritus to extract any live invertebrate that we found, and separated water from detritus through a series of three mesh sieves (2 mm, 1 mm and 0.53 mm), each representing a resource for different functional groups of aquatic invertebrates (respectively loose, coarse and fine detritus). In short, in addition to the bromeliad communities, we collected different variables related to the size of the habitat, and the basal resources available to the invertebrate communities. At the end of the sampling protocol, we replanted all collected bromeliads near the station, in accordance with guidance from the Forestry Division (Trinidad).

Identification of specimens

We separated collected insects into morphospecies and preserved one to ten individuals of each, depending on natural abundances, in 95% ethanol for later identification through DNA barcoding. Using our expertise of bromeliad communities and field observations, we excluded organisms that were using bromeliads as freshwater refugia more than a permanent habitat, such as the common planarian *Dolichoplana striata* Moseley 1877 (Tricladida, Geoplanidae) and the invasive nemertean *Geonemertes pelaensis* Semper 1863 (Hoplonemertea, Prosorochmidae). We also attempted to raise, when possible, larvae to adult stages, in order to obtain information on the morphospecies throughout its life cycle.

In addition to morphological identification, we were able to extract DNA from 46 individuals belonging to 32 morphospecies, and photographed all individuals before processing. We performed DNA extraction using the DNeasy Blood & Tissue Kit (Qiagen, Venlo, the Netherlands). To amplify the barcoding region of the COI, we used the universal primers LCO-1490 (5'-GGTCAACAAATCATAAAGATATTGG-3') and HCO-2198 (5'- TAAACTTCAGGGTGACCAAAAAATCA -3'), which targets a 758 bp sequence, or RON (5'-GGATCACCTGATATAGCATTCCC-3') and NANCY (5'-CCCGGTAAAATTAAAATATAAACTTC-3'), targeting a 439 bp segment, as an alternative when the former pair failed. We set the thermocycler to 94˚C for 3 minutes for initial denaturation, followed by 35 amplification cycles (denaturation at 94˚C for 30 sec, annealing at 50˚C for 30 sec, and elongation at 72˚C for 45 sec), and a final elongation

period of 72˚C for 10 min. Finally, we visualised the PCR products through gel electrophoresis and sent them to Psomagen (Rockville, MD, USA) for Sanger sequencing.

RESULTS & DISCUSSION

We found 48 different bromeliad-inhabiting invertebrates from approximately 150 bromeliads over six different sites in the Northern Range (Table 1, Figure 1). These spanned 4 classes of invertebrates: Clitellata, Turbellaria, Crustacea and Hexapoda. Based on prior knowledge of the morphology of the bromeliad fauna from nine different countries, spanning Puerto Rico to Argentina, combined with DNA barcoding, we were able to identify three species to the species level, seven to the genus level, eight to the subfamily level, twenty to the family level and ten to the order or class level. Even though our sampling was restricted to a few sites in Trinidad's Northern Range, the invertebrate fauna of Trinidadian bromeliads revealed interesting patterns.

Several species that we collected are of scientific interest, informing for example biogeography, biodiversity and public health. First, we found that the COI sequence of our morphospecies Crassiclitellata *sp. 1* (Fig. 2b) matched with another bromeliad-associated species that has only previously been reported from the island of Martinique, while the COI

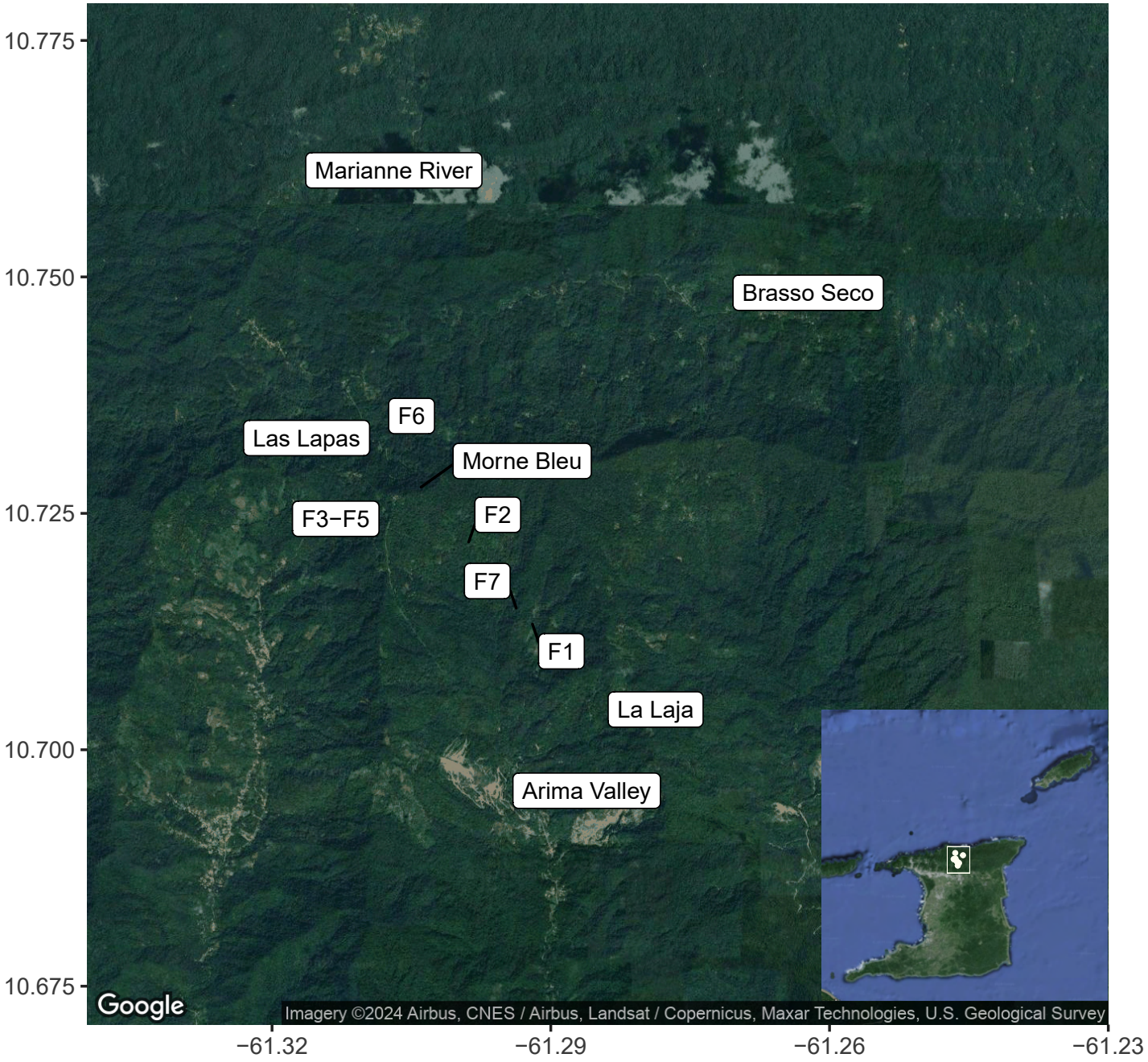

Fig. 1. Map of sites within the island of Trinidad. Sites starting with "F" represent opportunistic collection of recently fallen bromeliads on roadsides, while the other sites underwent more systematic sampling.

Table 1. Summary of collected species and morphospecies in classes (a) Clitellata and (b) Turbellaria, and subphyla (c) Crustacea, and (d) Hexapoda. Specimen ID =if applicable, identifier of the amplified sequence of specimens belonging to the species/morphospecies in the BOLD system (Ratnasingham and Hebert 2007). Empty rows mean that the morphospecies was only identified to the class level.

A.

Order	Family	Subfamily	Genus	Species(naming authority)	Specimen ID
				sp. 1	
Crassiclitellata				*sp. 1*	BIBAR-T004 T005
	Acanthodrilidae		*Dichogaster*	*andina* (Cognetti1904)	BIBAR-T009
Haplotaxida	Enchytraeidae			*sp. 1*	BIBAR-T003

B.

Order	Family	Subfamily	Genus	Species (naming authority)	Specimen ID
Tricladida				sp. 1	
				sp. 2	
				sp. 3	

C.

Class	Order	Family	Subfamily	Genus	Species	Specimen ID
Copepoda					sp. 1	
Ostracoda	Podocopa				sp. 1	

D

Order	Family	Subfamily	Genus	Species(naming authority)	Specimen ID
Coleoptera	Curculionidae			sp. 1	BIBAR-T034
	Dytiscidae			sp. 1	BIBAR-T026-T030
			Desmopachria	sp. 1	
	Elateridae		*Pyrophorus*	sp. 1	BIBAR-T035
	Hydrophilidae			sp. 1	BIBAR-T036
				sp. 2	BIBAR-T033
				sp. 3	BIBAR-T037
	Scirtidae			sp. 1	BIBAR-T024
Diptera	Schizophora			sp. 1	BIBAR-T043
	Cecidomyiidae			sp. 1	BIBAR-T092
Ceratopogoninae	Ceratopogonidae			sp. 1	BIBAR-T047 T048
				sp. 2	BIBAR-T044 T046
				sp. 3	BIBAR-T050 T051
	Forcipomyiinae			sp. 1	BIBAR-T078 T079
				sp. 2	
				sp. 3	
				sp. 4	
Chironomidae	Chironominae			*Polypedilum* sp. 1	BIBAR-T053 T054
				sp. 2	BIBAR-T057
		Tanypodinae		sp. 1	
Corethrellidae				sp. 1	BIBAR-T063 T064

Table 1. Continued. Summary of collected species and morphospecies in classes (a) Clitellata and (b) Turbellaria, and subphyla (c) Crustacea, and (d) Hexapoda.

D

Order	Family	Subfamily	Genus	Species(naming authority)	Specimen ID
Culicinae	Culicidae	Anophelinae	*Anopheles*	*homunculus* (Komp 1937)	BIBAR-T073
			Culiseta	sp. 1	BIBAR-T067
			Wyeomyia	sp. 1	
			Toxorhynchites	*haemorrhoidalis* (Fabricius 1787)	BIBAR-T074 T076
	Dolichopodidae			sp. 1	BIBAR-T042
	Drosophilidae			sp. 1	BIBAR-T102
				sp. 2	BIBAR-T103
	Lauxaniidae			sp. 1	BIBAR-T100
	Limoniidae			sp. 1	BIBAR-T089
	Psychodidae			sp. 1	
				sp. 2	BIBAR-T083
	Stratomyiidae			sp. 1	BIBAR-T084
				sp. 2	
				sp. 3	BIBAR-T085
	Syrphidae		*Copestylum*	sp. 1	
			Quichuana	sp. 1	BIBAR-T087
	Tabanidae		*Stibasoma*	*fulvohirtum* (Wiedemann 1828)	BIBAR-T095
Odonata	Suborder Anisoptera			sp. 1	BIBAR-T019
	Coenagrionidae			sp. 1	BIBAR-T020

sequence of another Clitellata morphospecies matched with *Dichogaster andina* Cognetti 1904, a widespread peregrine species thought to be invasive in the region (Dupont *et al.* 2023). Second, we found one specimen of *Desmopachria* (Fig. 3d, Coleoptera: Dytiscidae), of which only one species has previously been found in Jamaican bromeliads (Young 1981), while another, undescribed specimen of the genus has been collected in a bromeliad from southern Brazil (Albertoni *et al.* 2016). Third, we found specimens of the malaria vector *Anopheles homunculus* Komp 1937 (Fig. 5a) in three of our six sites. Although this species displayed relatively low densities compared to other mosquito species (12/179 mosquito individuals overall, in eight bromeliads), further research should examine which factors determine the abundance of this vector, in particular relating to natural predators such as larval *Toxorynchites haemorrhoidalis* Fabricius 1787 (Fig. 5d) and odonate nymphs (Fig. 3j-l). Despite our attempts to raise larvae to from larval stages to adulthood, we were only able to do so successfully for a handful of specimens (Fig. 6).

Our survey was restricted to six sites in a narrow part of the Northern Range, yet the communities of these different sites varied widely. For example, top predators like odonates and dytiscids were not present at the Marianne River site, and co-occurred at Brasso Seco, La Laja and Las Lapas. While these predators usually displace each other at site and bromeliad levels (Atwood *et al.* 2014, Amundrud and Srivastava 2020), we found one instance of a bromeliad in Brasso Seco where the two predators co-occurred in the same bromeliad. Moreover, the relative abundances of the detritivore functional groups (*sensu* Cummins *et al.* 2005) shifted considerably across our sites. This difference is almost akin to those seen across countries (e.g. Trzcinski *et al.* 2016, Srivastava *et al.* 2023), with some Trinidadian sites being more similar to Caribbean communities like Puerto Rico, and others to continental communities such as French Guiana or Costa Rica. This substantial variation in a restricted geographical extent warrants further research on its drivers, and the expansion of surveys to other areas of the country. We hope that the dataset associated with this illustrated checklist will support this research effort, and will spark interest in using bromeliads as model ecosystems to answer important questions in biogeography and ecology (Srivastava *et al.* 2004).

Tank bromeliads, being aquatic ecosystems in a forest matrix, are ecologically equivalent to island or patch habitats. As such, dispersal plays an important role, revealing intricate patterns of speciation for species with within-bromeliad reproduction and dispersal relying on phoresy, such as ostracods (Little and Hebert 1996, Lopez *et al.* 1999).

Moreover, the system has been used as a model system to develop the new field of trophic metacommunities (Guzman *et al.* 2018, Guzman *et al.* 2019), and the new concept of the multidimensional stoichiometric niche (González *et al.* 2017). In terms of functional traits (McGill *et al.* 2006), bromeliads have helped researchers to fill important knowledge gaps around constraints surrounding the functional trait space (Céréghino *et al.* 2018) and trait-based assembly patterns (Srivastava *et al.* 2023) of ecological communities. Moreover, bromeliad communities have also been used to study the effects of climate change, particularly around altered precipitation patterns (Trzcinski *et al.* 2016, Romero *et al.* 2020, Srivastava *et al.* 2020) and increased temperatures (Antiqueira *et al.* 2018). Therefore, bromeliads represent an ideal system to advance ecological research and better understand the future impacts of climate change.

In conclusion, epiphytic tank bromeliads of the island of Trinidad harbour a diverse invertebrate community. Our survey only covered a relatively small area of the island, which suggests that extending sampling efforts to other regions may uncover considerable additional diversity. We hope that the illustrated checklist presented here and

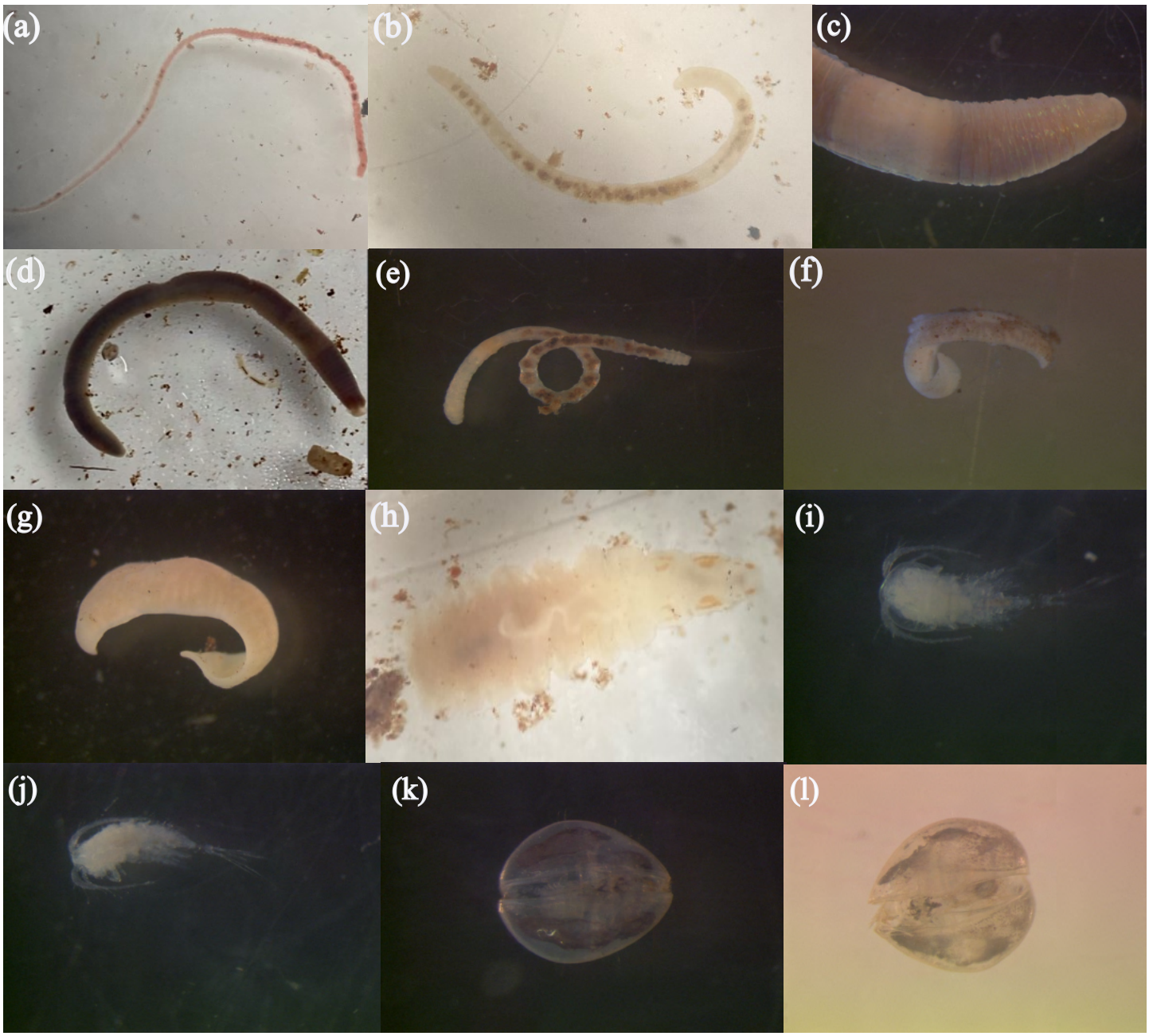

Fig. 2. Pictures of species and morphospecies in classes Clitellata and Turbellaria, and subphylum Crustacea. Class Clitellata: **(a)** Clitellata *sp. 1*, **(b)** Crassiclitellata *sp. 1*, **(c)** and **(d)** *Dichogaster andina* (Cognetti 1904), **(e)** Enchytraeidae *sp. 1*, **(f)** Tricladidae *sp. 1*, **(g)** Tricladidae *sp. 2*, **(h)** Tricladidae *sp. 3*, **(i)** and **(j)** Copepoda *sp. 1*, and **(k)** and **(l)** Podocopa *sp. 1*.

the associated data will assist further research on the biogeography of bromeliads, and on the main questions challenging the field of ecology today.

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We are immensely indebted to Dan Jaggernauth for guiding us through the different sites with his truly amazing knowledge of the Trinidadian ecosystems. We would also like to thank David Mahabir and Rainer Deo for their help in obtaining a Special Game License (Conservation of Wildlife Act, Chapter 67:01 (Section 10)) issued to Pierre Rogy. Lastly, we would like to thank Rupert Radix, Delezia Shivani Singh and Analissa Rasheed for their logistical help.

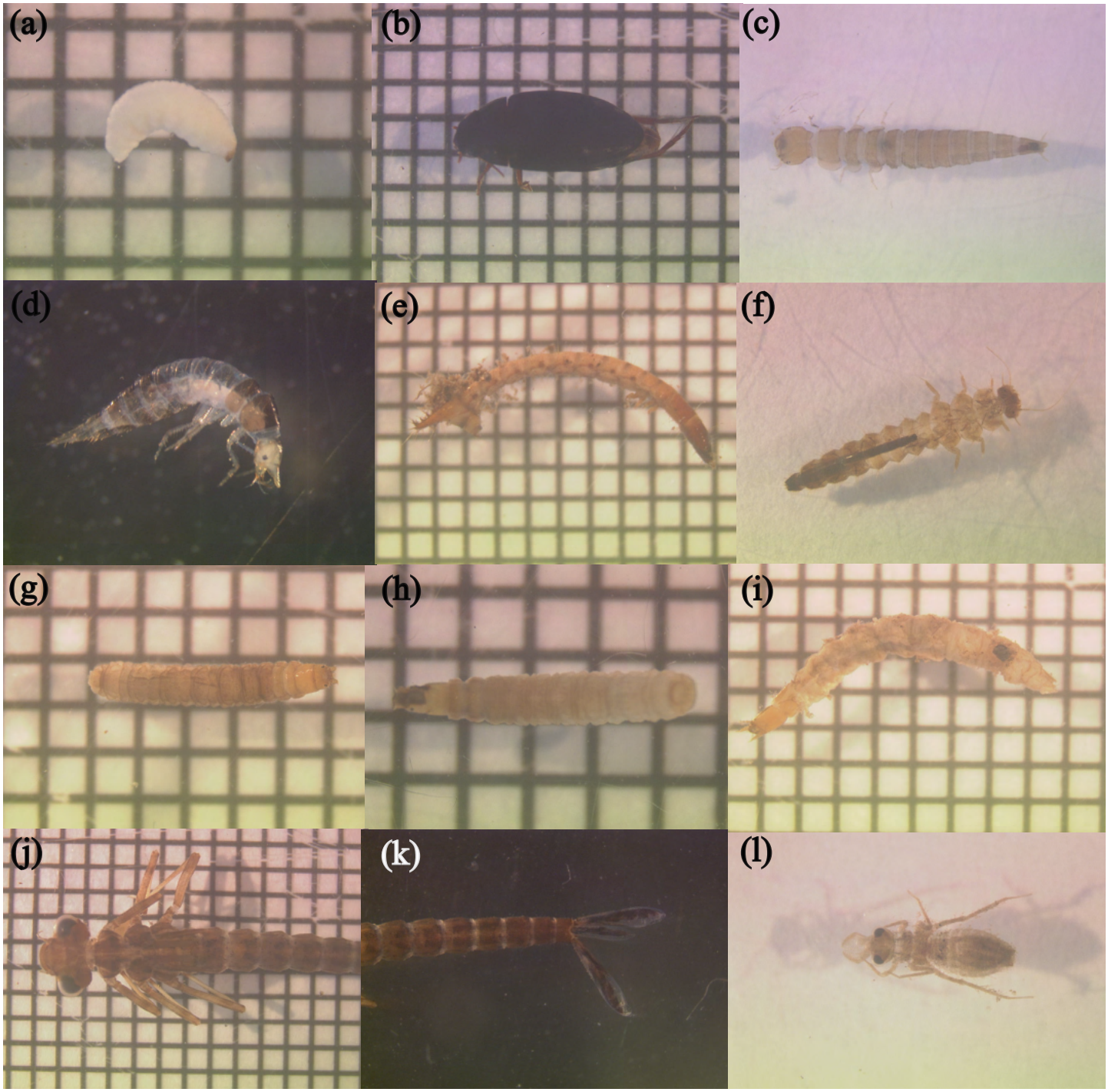

Fig. 3. Pictures of morphospecies in subphylum Hexapoda, orders Coleoptera and Odonata. Order Coleoptera: **(a)** Curculionidae sp. 1, Dytiscidae sp. 1 **(b**) adult and **(c**) larva, **(d)** *Desmopachria* sp. 1, **(e)** *Pyrophorus* sp. 1, **(f)** Scirtidae sp. 1, Hydrophilidae **(g)** sp. 1, **(h)** sp. 2 and **(i)** sp. 3. Order Odonata: **(j)** and **(k)** Coenagrionidae sp. 1, and **(l)** Anisoptera sp. 1. On pictures with gridlines, each grid represents 1x1mm.

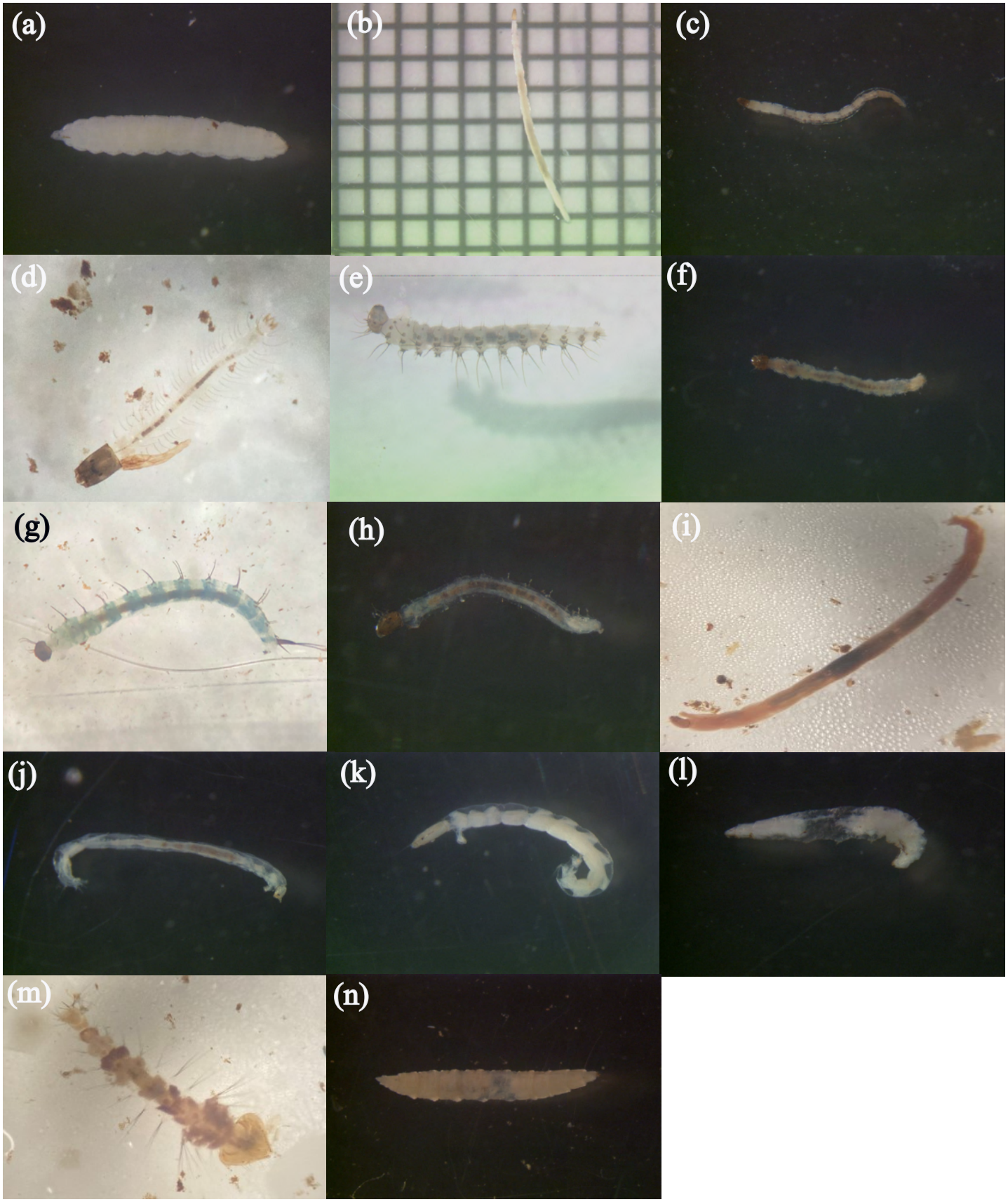

Fig. 4. Pictures of species and morphospecies in subphylum Hexapoda, order Diptera. (a) Cecidomyiidae sp. 1**,** Ceratopogoninae **(b)** sp 1., **(c)** sp. 2 and **(d)** sp. 3, Forcipomyiinae **(e)** sp. 1, **(f)** sp. 2, **(g)** sp. 3 and **(h)** sp. 4, **(i)** *Polypedilum* sp. 1, **(j)** *Polypedilum* sp. 2, **(k)** Tanypodinae sp. 1, **(l)** Schizophora sp. 1, **(m)** Corethrellidae sp. 1, and **(n)** *Stibasoma fulvohirtum* (Wiedemann, 1828). On pictures with gridlines, each grid represents 1x1mm.

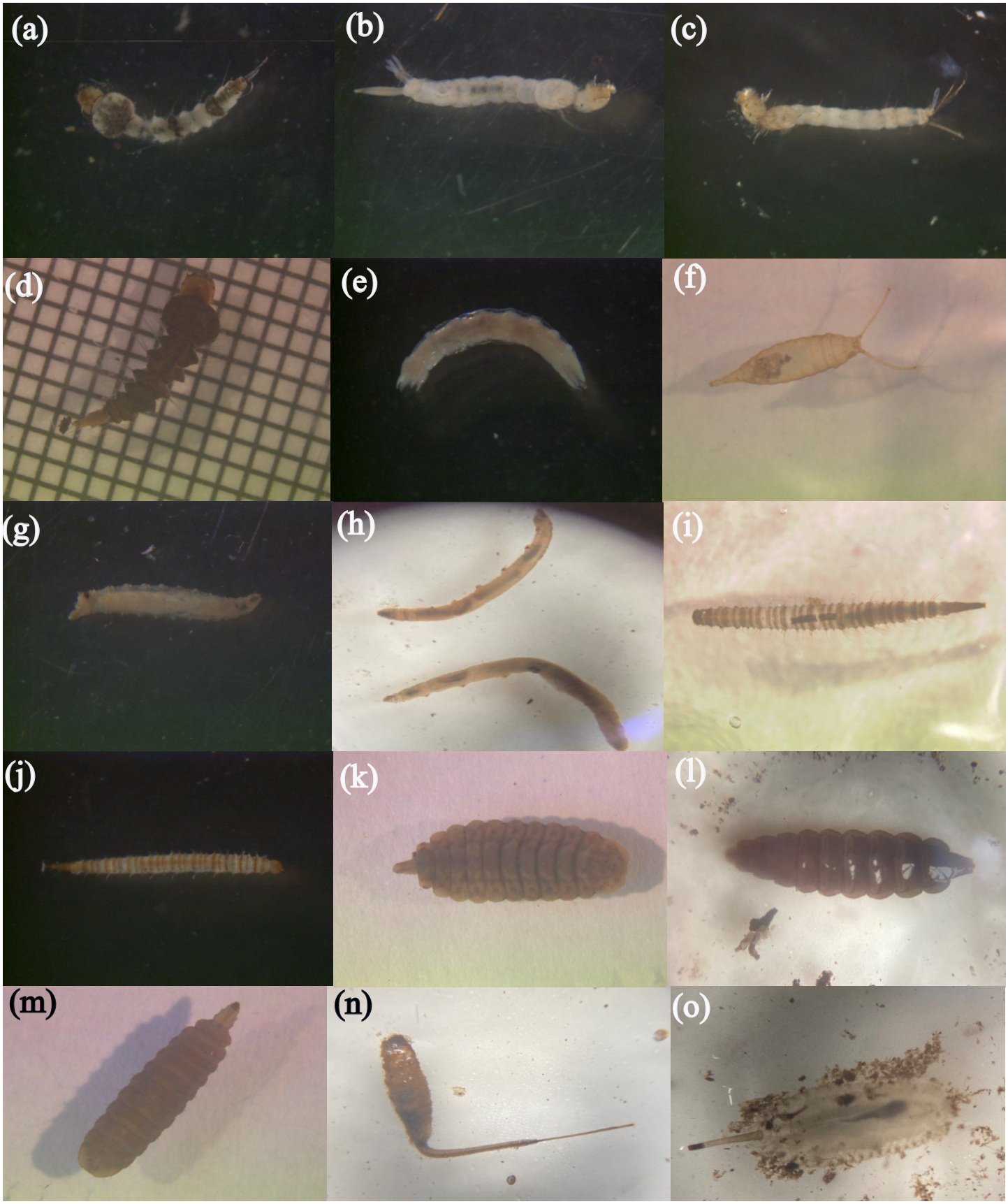

Fig. 5. Pictures of species and morphospecies in subphylum Hexapoda, order Diptera. (a) Anopheles homunculus (Komp 1937), (b) Culiseta sp. 1, (c) Wyeomyia sp. 1, (d) Toxorhynchites haemorroidalis (Fabricius 1787), (e) Dolichopodidae sp. 1, Drosophilidae (f) sp. 1 and (g) sp. 2, (h) Limoniidae sp. 1, Psychodidae sp. 1 (i) and (j) sp. 2, Stratomyiidae (k) sp.1, (l) sp. 2 and (m) sp. 3, (n) Quichuana sp. 1, and (o) Copestylum sp. 1. On pictures with gridlines, each grid represents 1x1mm.

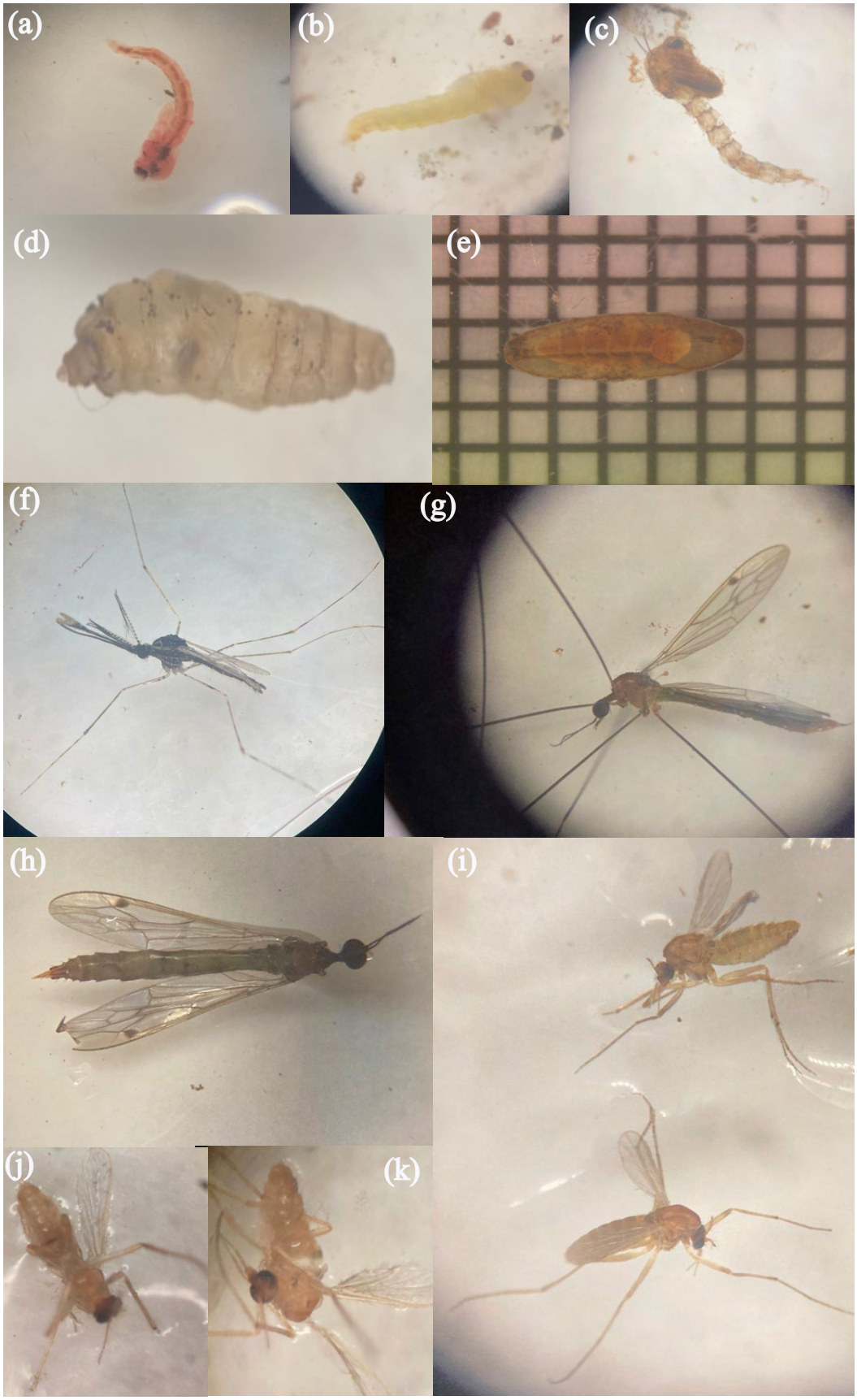

Fig. 6. Pictures of pupae and terrestrial adults of species and morphospecies. Pupae of Polypedilum (a) sp. 1 and (b) sp. 2, (c) Tanypodinae sp.1, (d) Psychodidae sp. 1, and (e) Lauxaniidae sp. 1. Terrestrial adults of (f) *Anopheles homunculus* (Komp 1937), (g) and (h) Limoniidae sp. 1, (i) *Polypedilum* sp. 2, and (j) and (k) Tanypodinae sp. 1. On pictures with gridlines, each grid represents 1x1mm.

Open data statement

All data from the survey of the six sites, including additional pictures for all species and morphospecies, is on https://knb.ecoinformatics.org/view/doi%3A10.5063%2FF11J9874 and all code is available on https://github.com/pierrerogy/trinidad_species_checklist. Finally, species barcodes are available on BOLD (Ratnasingham and Hebert 2007): dx.doi.org/10.5883/DS-BIBART.

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Nature Notes

First record of an albino Lowland Paca *Cuniculus paca* in Trinidad, West Indies

In natural environments, animals displaying abnormal coloration, such as albinism, often have a lower survival rate compared to animals with typical colouring due to increased vulnerability to predation and decreased efficiency in capturing prey (Miller 2005; Silva-Caballero *et al.* 2014; Espinal *et al.* 2016). Albinism is characterized by a complete absence of melanin pigment resulting in white hair, skin, and frequently in pink eyes (Fertl and Rosel 2009). Additionally, reduced pigmentation can manifest in two other conditions: leucism, characterized by white or pale patches alongside normal eye colour, and piebaldism, body pigmentation missing in only some areas (Fertl and Rosel 2009). A decrease in pigmentation, as observed in prey species such as the *Cuniculus paca* (Linnaeus. 1766) reported here, is considered a disadvantage because it heightens the probability of detection by potential predators (Nedyalkov *et al.* 2014; Sobroza *et al.* 2016). While colour abnormalities can be associated with diseases such as sensory or nerve defects, anaemia, low fertility, increased susceptibility to disease, and impaired vision (Acevedo and Aguayo 2008), individuals with varying colour abnormalities have been documented in adult animals (Espinal *et al.* 2016).

This paper presents the first documented case of albinism in paca *Cuniculus paca* in Trinidad and Tobago's forests, although local hunters have previously shared anecdotal accounts with the authors. Notably, García-Casimiro and Santos-Moreno (2020) highlighted the first-ever documented case of albinism in pacas, making this Trinidadian account the second documented case globally. The first fully documented case was reported in southeast Mexico, despite earlier mentions of albino pacas in Brazil by Oliveira (2009).

The paca, a caviomorph rodent found in neotropical regions, is known for its solitary, territorial and nocturnal behaviour (Pérez 1992). With a robust and heavy physique, its upper coat varies in colour from reddish-brown to dark brown or smoke-grey, marked by irregular white or pale-yellowish spots along the lateral flanks. These spots, usually forming about four longitudinal rows, extend from the neck to the ventral area (Pérez 1992).

During a five-month biodiversity survey from 9 April to 12 August 2023, on a property near Mount Harris located in the Sangre Grande district of Trinidad, an albino paca was recorded on one of our camera traps on 30 April 2023, at 2105hr (Fig 1). This albino paca had a completely white body. We were unable to obtain pictures of its eyes and flanks, and based on the the single grayscale photo we cannot be certain which form of albinism is being exhibited. The albino individual in Fig 1 can be compared to Fig 2 of an adult female paca, showcasing typical colouring, captured on a different camera at the same survey site location on 18 April 2023.

The sex and current status of this albino paca remain uncertain. Its subsequent presence was not observed during the rest of the survey period.

Fig. 1. Albino *Cuniculus paca* walking through a forested area. Photo captured on a Reconyx HC600 camera trap 30 April 2023 at 2105h.

Fig. 2. Female *Cuniculus paca* exiting her hole into a stream. Photo captured on a Reconyx HC600 camera trap 18 April 2023 at 1514h.

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First Records of Four Species of Tarantulas (Araneae: Theraphosidae) from Chacachacare, Trinidad & Tobago

Chacachacare is the westernmost island belonging to Trinidad and Tobago. It is separated from Venezuela to the west by the Grand Boca, and from Huevos Island to the east by the Third Boca, also known as the Ship's Mouth (Boos 1983). It is located at 10.41° N, 61.45° W and is approximately 360 hectares in area. The vegetation on the island was classified as "Deciduous Seasonal Forest" by Helmer *et al.* (2012).

During February, July and November 2023 I made three trips to the island to survey terrestrial herpetofauna. During these surveys, I inadvertently observed four species of tarantula not previously reported from the island. During February 2024 I made a fourth trip to the island specifically to search for and photograph tarantulas.

Surveys were made during the day and night. Night surveys were made with the assistance of a LED headlight. A hand-held shovel and rake were used to dig through leaf litter and to turn over logs, rocks and debris from abandoned buildings. The species recorded are as follows:

Holothele longipes (L. Koch 1875)– This species has a wide distribution across South and Central America, and is found in Panama, Colombia, Venezuela, Guyana, French Guiana, Suriname, Brazil, Ecuador, Peru and Trinidad and Tobago (Peñaherrera-R 2023). This species displays significant ecological plasticity. It inhabits humid, Andean forests and grasslands, coastal savannahs and caves within a wide altitudinal gradient. It is commonly found under rocks and logs, and also within human constructions (Guadanucci 2017). During my surveys on Chacachacare, specimens were found under debris from buildings, rotting wood, rocks, leaf litter and one inhabiting a leaf cutter ant nest. All were located between 1 and 175 m above sea level. Specimens under objects often had the floor lined with a blanket of silk.

Neoholothele incei (F.O.Pickard-Cambridge, 1899)– This species is known from mainland Venezuela, Margarita Island, Trinidad, Tobago and Soldado Rock (Guadannucci and Weinmann 2015; Sherwood *et al*. 2022). During my surveys on Chacachacare, 26 specimens were found under debris from buildings, rotting wood, and leaf litter usually in silk tubes, all between 1 and 35 m above sea level.

Cyriocosmus elegans (Simon, 1889)– This species is known from Trinidad, Tobago, Venezuela and Guyana (Fukushima 2005; Sherwood and Gabriel 2023). During my surveys on Chacachacare, 50 specimens were found under debris from buildings, rotting wood, leaf litter and at the entrance of burrows dug into soil, all between 1 and 150 m above sea level.

Psalmopoeus cambridgei Pocock, 1895– This species is endemic to Trinidad and Tobago. During my surveys on Chacachacare, 2 specimens were found at night, just over 1 m apart. One was found outside its dwelling in the brick of a broken building 1.5 m off the ground and the other on a tree trunk 2 m off the ground. Both were seen at approximately 25 m above sea level.

In addition to my sightings, there are two photographic voucher records of tarantulas from Chacachacare on iNaturalist (inaturalist.org). The first is an observation of H. longipes on 29 September 2012 (Rutherford 2018a). The second is an observation of C. elegans on 18 May 2013 (Rutherford 2018b).

The only tarantula previously reported from the Bocas Islands in the published literature has been *Avicularia avicularia* which was reported from Monos Island and Chacachacare Island by West (1984). However, I did not see *A. avicularia* on any of my 4 visits. It seems likely that *A. avicularia* was still present but not observed due to their arboreal nature. The lack of previous records for the other species may be due to the paucity of surveys on these islands as well as the secretive and nocturnal nature of tarantulas.

This note represents the first records of *H. longipes, N. incei, C. elegans* and *P. cambridgei* from Chacachacare Island, increasing the number of tarantula species known from the island from one to five. The two other species known from the main island of Trinidad that have not yet been recorded on Chacachacare are *Spinosatibiapalpus trinitatis* and *Trichopelma coenobita.* These species seem to prefer wetter, rainforest habitat from my personal observation and thus Chacachacare may be too dry for them to inhabit, although wetter habitat does exist at higher altitudes on the island. Future surveys may reveal the presence of the

Fig. 1. Tarantulas from Chacachacare Island (a) *Holothele longipes*, (b) *Neoholothele incei*, (c) *Cyriocosmus elegans*, (d) *Psalmopoeus cambridgei.*

four species reported here on other islands of the Bocas archipelago, as well as potentially reconfirming the presence of *A. avicularia* on Chacachacare.

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Partial life history of *Lophocampa walkeri* (Rothschild, 1910) (Lepidoptera, Erebidae, Arctiinae) in Trinidad, West Indies

Here we document the colourful and regularly photographed caterpillar of *Lophocampa walkeri* from Trinidad. *Lophocampa walkeri* is a common and widespread moth in Trinidad, particularly in suburban and disturbed areas (M.J.W. Cock unpublished data; MJWC). It has been reared several times in Trinidad, but the early stages have not hitherto been documented. MJWC has examined adults in the University of the West Indies Zoology Museum (UWIZM) reared from the following food plants: *Ipomoea* sp. (Convolvulaceae), *Cordia* sp. (probably *Varronia curassavica* Jacq.) (Cordiaceae), *Passiflora* sp. (Passifloraceae), and mountain immortelle (*Erythrina poeppigiana* (Walp.) O.F. Cook) (Fabaceae). Here we document the caterpillar, cocoon and additional food plants from Trinidad. However, first, it is necessary to explain why the name *L. walkeri* is used rather than *L. catenulata* Hübner, [1812] (=*Halisidota catenulata*), which has been used in Trinidad for this moth in the past (Kaye and Lamont 1927).

Taxonomy

For the Trinidad fauna, *Lophocampa* is one of the more challenging genera in the subtribe Phaegopterina, tribe Arctiini, due to several very similar species, confusion about names applied in the past, and lost type material. Preparing a study of the Phaegopterina of Trinidad, MJWC has recognised six *Lophocampa* species, but another three species that have been reported from the island are probably misidentifications. Rothschild (1910) described *Halisidota walkeri* Rothschild, 1910 based on 71 male and 15 female specimens from Caura Valley, Venezuela, but when he later published the plates to go with the paper (Rothschild 1911), he indicated that *H. walkeri* is a synonym of *H. catenulata* Hübner, [1812]. Watson & Goodger (1986) treated *H. walkeri* as a form of *L. catenulata*, i.e. a synonym, whereas Vincent and Laguerre (2014) treated *L. walkeri* as a separate species, and designated a lectotype. A male and female from this type series have been dissected in The Natural History Museum, London (NHMUK). MJWC has compared the dissected genitalia of two comparable Trinidad males in his collection with those of the dissected male syntype and found them the same.

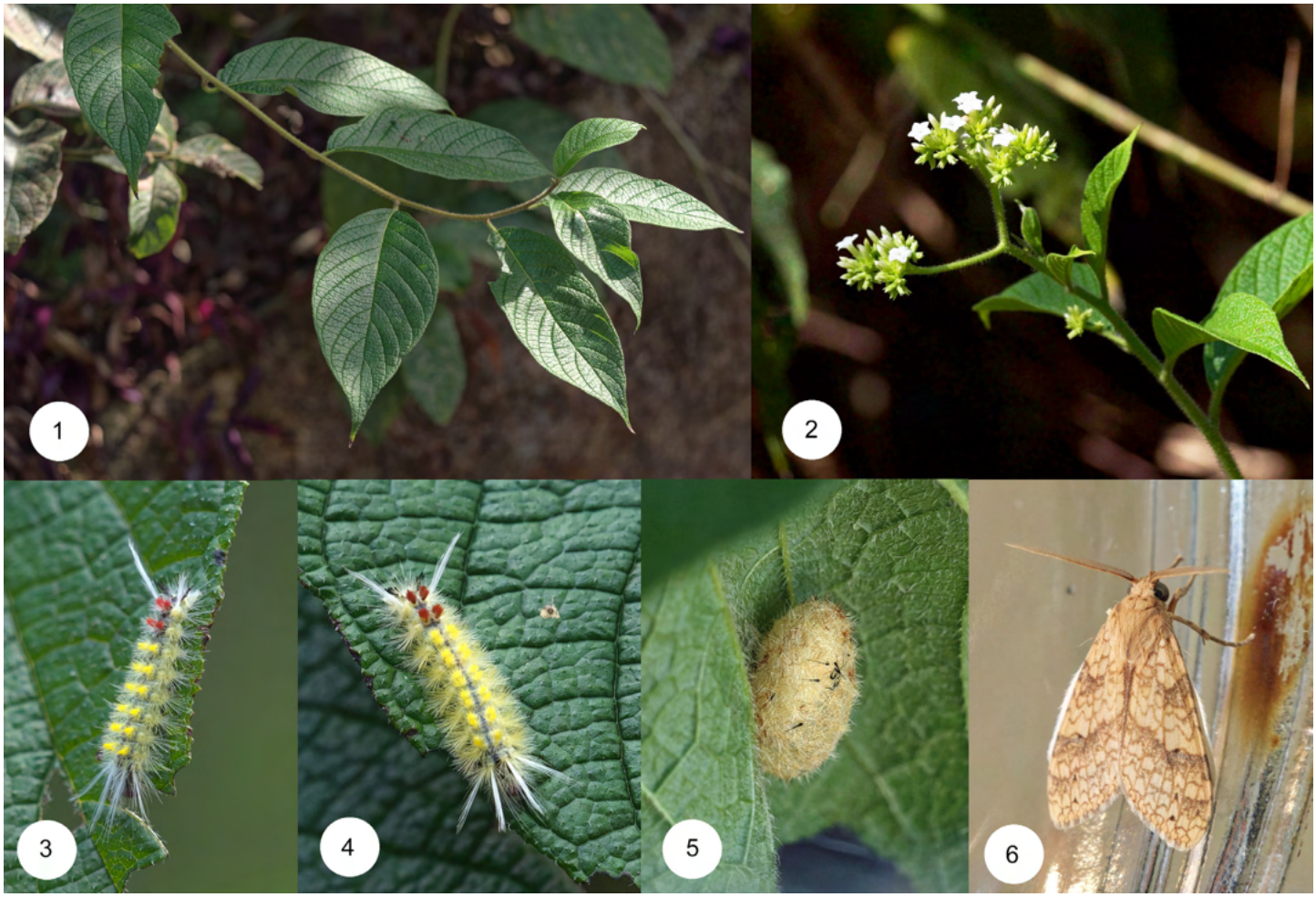
DNA barcodes based on a section of the cox1 mitochondrial gene have proved useful in differentiating closely related forms and species (Hebert et al. 2003), and the Barcode of Life Data System (BOLD, https://v4.boldsystems.org/) provides a global repository for these sequences with analytic tools. One of these, the Barcode Index Number (BIN), uses algorithms to group similar barcode units together at a level that frequently corresponds with species (Ratnasingham and Hebert 2013). Three DNA barcodes (MJWC-516, MJWC-611, MJWC-624) were obtained from Trinidad specimens collected at South Oropouche by T.P. Maharaj (TPM). They form part of BIN BOLD:AEW4841, which is in a cluster of three BINS mostly identified as *L. catenulata*: BIN BOLD:AEW4841 from Trinidad, French Guiana and Peru, which is 1% different from BOLD:AAA1447 from Mexico to Panama and Colombia, and 1.37% different from BOLD:ACE7424 from coastal Ecuador and Costa Rica. These three BINs are considered potential separate species or subspecies, but information on life histories, ecology, genitalia structure and other gene sequences will be required to test this.

Hübner [1812] (in Hübner 1806–[1819]) described *L. catenulata* (as *Hypocrita catenulata*) without giving a locality, but moths of this appearance are recognised from Central and South America, and in BOLD correspond to the three BINs just mentioned. Although it is plausible that *L. walkeri* is a junior synonym of *L. catenulata*, it is equally possible that the Central American taxon is *L. catenulata*, and *L. walkeri* is a separate, valid, South American taxon. We are not aware of any type material for *L. catenulata*, so until type material is found (which seems unlikely) or a neotype is designated, we do not consider the taxon *L. catenulata* adequately defined to use for Trinidad, and therefore prefer the name *L. walkeri* which is defined by a lectotype and characterized by a dissected syntype. Given the Caura Valley, Venezuela, type locality, this name can also be reasonably applied to BIN BOLD:AEW4841, which includes the Trinidad DNA barcodes.

Observations

R.K. Ali (RKA) photographed two caterpillars feeding on cattle tongue (*Heliotropium verdcourtii* Craven, Heliotropiaceae; = *Tournefortia hirsutissima* L.) (Figs. 1-2) at Haleland Park on 6 March 2023 (Fig. 3) and 11 March 2023 (Fig. 4), the second of which he reared. A cocoon (Fig. 5) was formed on 13 March and a male moth (Fig. 6) emerged on 23 March.

The mature caterpillar (Figs. 3-4) was estimated to be about 20-25 mm long (without projecting setae). The head is not clearly visible in the photographs but appears to be dark brown. An image by skemmanuel that we identify as *L. walkeri* (Fig. 7) shows that the head is unmarked red-brown. In our images each of the discernible segments

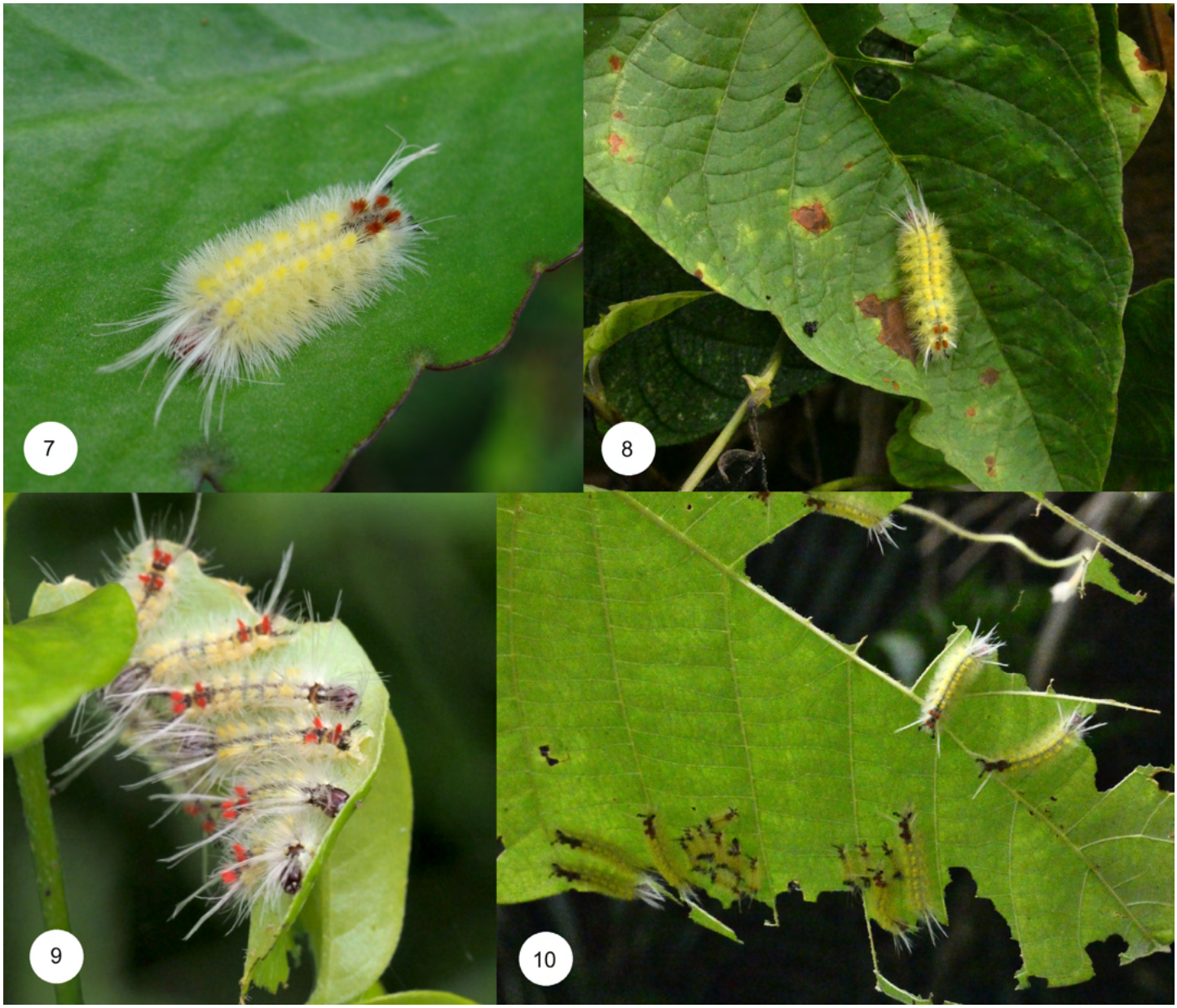


Figs. 1-6. Life history of *Lophocampa walkeri*, Haleland Park, R.K. Ali. **1-2**, the food plant, cattle tongue, *Heliotropium verdcourtii* [iNaturalist 150517376]. **3**, final instar caterpillar (not reared), 6 March 2023 [iNaturalist 150494110]. **4**, final instar caterpillar (reared), 11 March 2023 [iNaturalist 150861209]. **5**, cocoon, 14 March 2023. **6**, adult male 23 March 2023.

of the thorax (T1-3) and abdomen (A1-9) has two pale, subdorsal scoli, one behind the other, and four pale scoli on each side, all with radiating, pale, spine-like setae. T2 has a tuft of long white hairs on each scolus, pointing forwards above and beside the head. The subdorsal scoli of T3 to A5 are surmounted with a 'brush' of yellow hair-like setae. The subdorsal scoli of A6 and A7, have a similar brush of red setae, while the dorsolateral scolus of A7 has a tuft of long, white setae directed slightly upwards, and backwards at an angle of 45° to the body. A8 bears a tuft of black spatulate setae ventral to the white tufts on A7. The body is not clearly visible below the scoli but is generally pale, with a dark dorsal line. True legs are not visible in the available images; prolegs and claspers concolorous with body.

The cocoon (Fig. 5) is oval, 16 mm long x 7 mm wide; dull yellow due to the incorporation of the yellow hair-like setae from the subdorsal T3-A5 scoli, with scattered red-brown setae from the subdorsal scoli of A6-A7 and a few contrasting black spatulate setae from the tufts on A8. It was formed resting on a leaf in the rearing container. The cocoon is similar to those of other *Lophocampa* species (Janzen and Hallwachs 2023).

Based on these photographs of a successfully reared caterpillar, we were able to identify other images of caterpillars of this species on iNaturalist (www.inaturalist.org/). A solitary caterpillar, apparently in the final instar, was photographed by skemmanuel on wonder of the world, *Kalanchoe pinnata* (Lam.) Pers. (Crassulaceae) (Fig. 7) but there was no sign of feeding and this ornamental succulent is considered unlikely to be a food plant. Another was photographed by TPM on what appears to be *Ipomoea squamosa* Choisy at South Oropouche (Fig. 8). Other images of mature caterpillars were on unidentified plants or not associated with plants. Several observations of caterpillars off plants suggest that mature caterpillars may disperse from their food plant to find a suitable location for cocoon formation. RKA photographed a group of smaller caterpillars (probably in the penultimate instar moulting to the final instar) on Barbados cherry or West Indian cherry, *Malpighia coccigera* L. (see Baksh-Comeau et al. 2016;



Figs. 7-10. Caterpillars of *Lophocampa walkeri* (not reared). **7**, final instar on wonder of the world, *Kalanchoe pinnata*, 22 November 2009, skemmanuel [iNaturalist 83964608]; © under CC-BY-NC. **8**, final instar on *Ipomoea* sp., 6.i.2023, T.P. Maharaj [iNaturalist 145965783]. **9**, ?penultimate instar on Barbados cherry, *Malpighia coccigera*, 9 December 2022, R.K. Ali [iNaturalist 144008378]. **10**, ?penultimate instar on bois canot, *Cecropia peltata*, 13.i.2023, T.P. Maharaj [iNaturalist 146520436].

Malpighiaceae) (Fig. 9), and TPM a similar group on bois canot, *Cecropia peltata* L. (Urticaceae) (Fig. 10). It seems that the younger larvae feed in small groups of 8–10, and probably only disperse to feed individually in the final instar. Clearly, this is a polyphagous species that will feed on a variety of diverse dicotyledonous plants.

Other species of *Lophocampa* have caterpillars similar in morphology to those documented here (Janzen and Hallwachs 2023; MJWC unpublished), and at least two more species from Trinidad appear in iNaturalist. Hopefully, in the future these will be reared and documented to help elucidate the *Lophocampa* species found in Trinidad.

MJWC thanks the museums (and their curators who have facilitated access) consulted in the course of his studies contributing to this work: NHMUK (Martin Honey, Alberto Zilli), UWIZM (Mike G. Rutherford, and other members of the Department of Zoology over the years); Michel Laguerre for valuable discussion regarding the taxonomy and sharing an image of the syntype dissection (NHMUK); and those who have deposited public DNA barcodes of *Lophocampa* spp. in BOLD, which are reflected in this analysis. We also thank Dan Janzen and Winnie Hallwachs for sharing life history information (via their website: Janzen and Hallwachs (2023)), and skemmanuel for making her caterpillar image (Fig. 7) available under a CC-BY-NC license. CABI is an international intergovernmental organisation, and MJWC

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Plant selection by the leafcutter ant *Atta cephalotes* (Hymenoptera: Formicidae) in a lowland forest of Trinidad, West Indies

Most ants feed their colonies with animal prey, extrafloral nectar and/or honeydew from sap-feeding insects. The fungus-farming ants of the tribe Attini have made a radical shift to subsisting on fungi that they cultivate inside the nest in a manner analogous to crop-farming by humans. Among these is a monophyletic group of 52 known species (Schultz 2022) whose workers almost exclusively grow their mutualistic fungi on leaves and other fragments of living plants. These are the leafcutter ants, which also stand out for their extremely large colonies, conspicuous worker polymorphism and often impressive mound nests (Hölldobler and Wilson 2011, Mehdiabadi and Schultz 2010, Schultz 2021, 2022). Their foraging activities are on such a scale that they have often been characterized as the dominant herbivores of the New World tropics. This has especially been noted in agricultural areas, where they are recorded as pests of about 50 crops (Cherrett and Jutsum 1983, García-Cárdenas *et al.* 2022). As stated by Hölldobler and Wilson (2011 p. 3), "Through much of tropical America and wherever the ants invade gardens and cropland, they are the principal insect pests of agriculture."

Almost all leafcutter ants are in the genera *Acromyrmex* and *Atta.* The different species have an overall biological similarity. However, while recorded mature colony sizes in *Acromyrmex* are between 17 and 270 thousand, those of *Atta* are estimated at one to eight million. Accordingly, where members of both genera co-occur *Atta* tend to be much more apparent and presumably much more abundant. The two species present on the island of Trinidad, West Indies are *Acromyrmex octospinosus* and *Atta cephalotes* (Starr and Hook 2003).

A notable feature of leafcutter ants is that colonies harvest from a great variety of available plants. As an example, Wirth *et al.* (2003: Table 15) recorded 126 plant species from 40 families harvested by one *A. colombica* colony in Panama over one year. What is much less studied is those accessible plants that the ants do not attack. In this study, we recorded which plants in a lowland tropical forest showed evidence of attention from leafcutter ants and which did not.

Our study site was the Arena Forest Reserve (UTM 20P 691478E, 1168600N in central Trinidad, in December 2021 and June 2023. This is an area of rolling hills with numerous streams in an extensive closed-canopy evergreen forest over a relatively open understorey on sandy soil (Tudor *et al.* 2016). Our search areas showed evidence (trails, sometimes nest mounds) of the presence of active leafcutter colonies, although with little above-ground activity during the daylight hours of the study.

While previous studies of plant choice by leafcutter ants relied on direct observation of foraging, our approach was to look for after-the-fact evidence of their attention. We sought out common understorey plants in an effort to find at least 50 individuals of each species, recording which showed signs of leafcutter-ant damage. Where a cluster of stems arose together, we treated this as a single individual. Leafcutter damage is almost always readily distinguishable from cutting by other insects. As illustrated in Fig. 1, most insect herbivory (e.g. by caterpillars or grasshoppers) on leaves is irregular and often away from the leaf edge. That of leafcutter bees (Hymenoptera: Megachilidae) consists of individual neat crescents or spheroids at the leaf edges. In contrast, leafcutter ants cut a series of crescents or disks at the leaf edges, often so intensively as to reduce a leaf to little more than its main vein.

Of the two leafcutter ants known from our study site, it was our observation that *Atta cephalotes* predominated. Its foragers and often very large nest mounds are much more in evidence than those of *Acromyrmex octospinosus*. Accordingly, we assume that most or all instances of recorded leafcutter-ant damage were from *Atta*, rather than *Acromyrmex*.

We collected data from 15 species from eight families of flowering plants (Table 1). Of these, seven showed signs of leafcutter-ant cutting in at least one individual, although the fraction of plants affected was small in most species.

Our results are consistent with the general conclusion that *Atta* spp. harvest from a broad taxonomic range of available plants in the colony's habitat. Unlike earlier studies, we noted not only the plants that were harvested but those that were not. We found eight plant species that were accessible to the ants but not harvested. It is beyond the modest scope of our study to suggest what these plants have in common. At another site we observed no harvesting from two common palms (Palmae), presumably in large part due to the toughness of the leaves.

At the same time, two notes of caution are called for. First, it would be a mistake to make too much of the higher incidence of cutting of some species than others, and certainly our data cannot be taken as proportional. For example, in our study only one individual out of more than 100 of *Heliconia bihai* showed signs of harvesting, while a

Fig. 1. Manifestations of peripheral leaf damage by three kinds of insects. Clockwise from upper left: Irregular cutting, as by grasshoppers or caterpillars; disks cut by leafcutter bees (Megachilidae); *Heliconia bihai* cut by leafcutter ants, presumably *Atta cephalotes*; and *Costus* sp. prob. *scaber* cut by leafcutter ants, presumably *Atta cephalotes*.

Table 1. Incidence of various plants showing evidence of cutting by presumed *Atta cephalotes*. The + column

Species (Family)	Number of plants surveyed	Number of plants (%) with Leafcutting damage
Costus prob. *scaber* (Costaceae)	66	6 (9%)
Heliconia bihai (Heliconiiaceae)	111	1 (1%)
Heliconia hirsuta (Heliconiiaceae)	67	0
Heliconia psittacorum (Heliconiiaceae)	36	4 (11%)
Ischnosiphon arouma (Marantaceae)	90	0
Monotagma spicatum (Marantaceae)	111	13 (12%)
Pentaclethra macroloba (Leguminosae)	50	0
Philodendron sp. (Araceae)	53	0
Piper sp. A (Piperaceae)	62	0
Piper sp. B (Piperaceae)	51	0
Protium cf. *guianense* (Burseraceae)	50	0
Psychotria uligonosa (Rubiaceae)	50	8 (16%)
Spathiphyllum cannifolium (Araceae)	50	2 (4%)
Warszewiczia coccinea (Rubiaceae)	66	0
Unidentified (Araceae)	50	12(24%)

substantially larger fraction of *H. psittacorum* individuals were cut. It has been our experience from outside this study that *H. bihai* in some habitats is a favoured target of *A. cephalotes*, while *H. psittacorum* is seldom cut. It would be best just to take our data as presence/absence indicators. Second, they provide only minimum indicators of which plants are harvested. Again, *H. bihai* provides a case in point. We knew in advance that it is cut by the ants, yet in our study we very nearly recorded no harvesting at all. While much is made of leafcutter ants as voracious harvesters of vegetation in many neotropical habitats, our observations do not suggest any major impact on overall forest structure at our study sites. The ants are very much in evidence, yet we found no significant swaths of defoliated plants. Their reputation may be mainly due to their role as crop pests.

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Notes on the Life History of *Euclea cippus* (Cramer) (Lepidoptera, Limacodidae) in Trinidad, West Indies

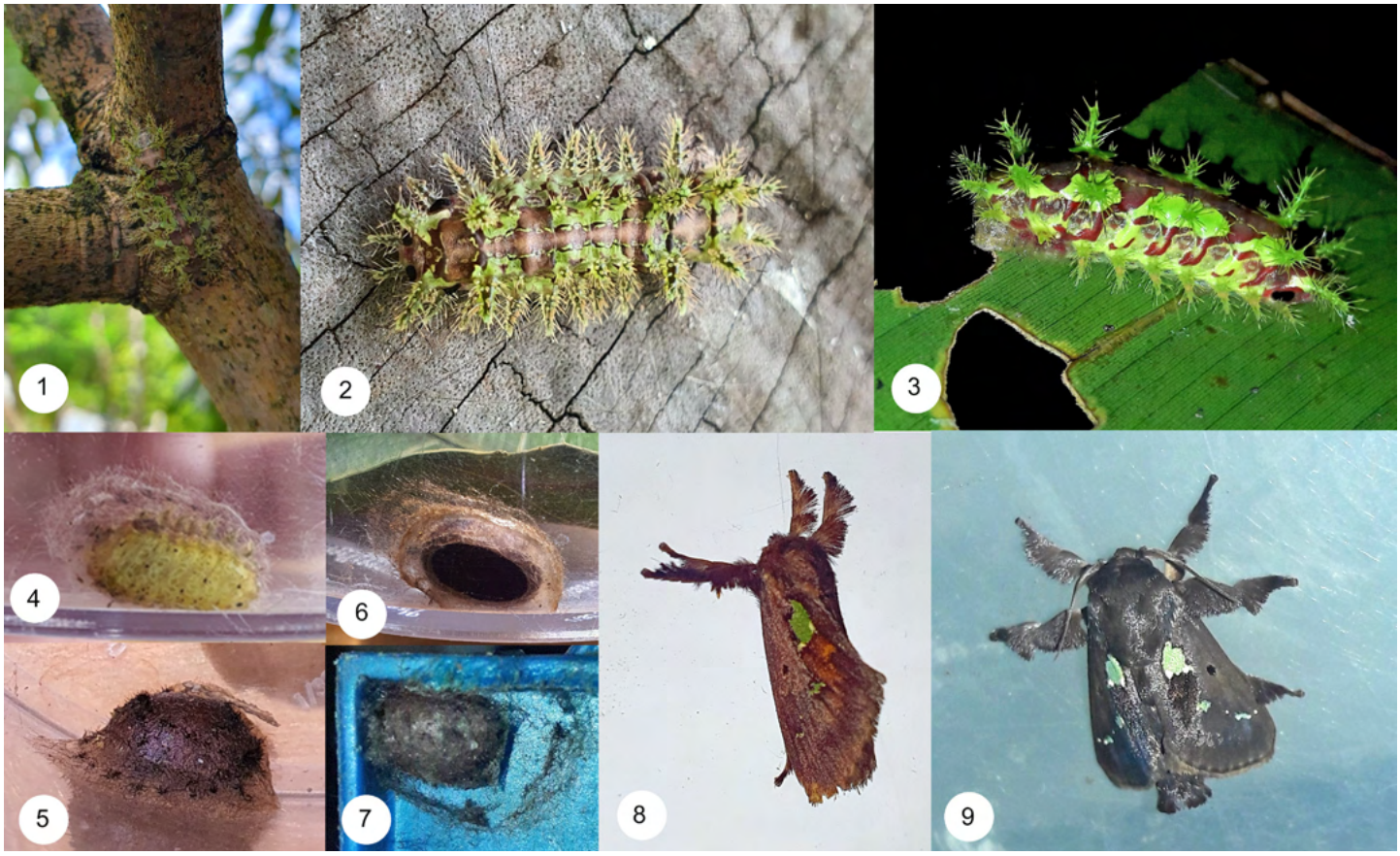
Limacodidae is a globally distributed family, often referred to as nettle caterpillars due to their mostly spiny urticating larvae. Many species are polyphagous on both monocotyledons and dicotyledons, including economically important tree and palm crops, and outbreaks occur occasionally, which can cause significant defoliation (Genty *et al*. 1978). *Euclea cippus* (Cramer) was described from Suriname, and first reported from Trinidad by Dyar (1905) and subsequently by Kaye and Lamont (1927) on the basis of a specimen collected by F.W. Jackson at Manzanilla in 1922. This specimen, a female, is in Lamont's collection in the University of the West Indies Zoology Museum (UWIZM). Prior to the work by Epstein and Corrales (2004), the distribution of *E. cippus* was reported as from Mexico to Paraguay (Dyar 1935). However, they found it to be restricted to the Guianas and Trinidad, with the outwardly similar species *Euclea mesoamericana* (Epstein and Corrales) occurring in the Mesoamerica where *E. cippus* purportedly occurred.

This is the only limacodid with small green spots on the forewings in Trinidad, where it is an occasional species, primarily associated with forested areas (specimens in M.J.W. Cock collection, The Natural History Museum (London), UWIZM, and images on iNaturalist). Genty *et al*. (1978) reported *E. cippus* as an oil palm pest widespread in South America including Trinidad and illustrated a caterpillar in monochrome, however, according to Epstein (pers. comm.) this illustration probably is of a closely related species (note: the location in Genty *et al.* is not indicated but Epstein received the same photograph from Genty labelled as from San Alberto, Cesar, Colombia). Nothing has previously been reported specifically from Trinidad regarding the early stages and food plants of this species. Here we report on caterpillars reared on mango (*Mangifera indica* L., Anacardiaceae) by Alexander Sean Barkley (ASB; Figs 1,2, 4-6, 8) (https://www.inaturalist.org/observations/170175794) and balisier (*Heliconia bihai* (L.) L., Heliconiaceae) by Rainer Nrshima Deo (RND; Figs. 3, 7, 9) (https://www.inaturalist.org/observations/65487927).

On 30 June 2023, at approximately 1600h, a spiny, green and brown caterpillar approximately 13-15 mm in length was observed by ASB on a starch mango tree at ABC Homestead (UTM 20P 683880E, 1156761N) (Fig. 1). The caterpillar (Fig. 2) was collected to be reared along with some leaves from the mango tree for food. The caterpillar was kept in a small plastic viewing container under ambient conditions. A fresh mango leaf was added into the container once the first leaf was almost consumed or began to show signs of withering. The caterpillar ate for the following three days, producing copious brown frass pellets. On 4 July 2023 the caterpillar started to make its cocoon at the bottom of the circular container. It was silky and "clear" at first (Fig. 4), but then it turned brown after 24 hours (Figs. 5 and 6). The cocoon, measuring approximately 10 mm in length and 4 mm in width was observed to have deciduous spines from the caterpillar arranged in the outer cocoon (Fig. 5). On 25 July 2023, the adult female moth emerged after 21 days (Fig. 8) and was released that night.

On 21 November 2020 at 2224h, RND observed a spiny and primarily green and red caterpillar (Fig. 3), measuring approximately 15 mm in length, feeding on a leaf of *Heliconia bihai* at Wa Samaki Ecosystems Estate (UTM 20P 677870E, 11549610N) during the 2020 Trinidad and Tobago Backyard Bioblitz. The caterpillar and the portion of leaf that it was found on were collected for rearing. The caterpillar and leaf were kept in a small plastic container under ambient conditions. A fresh piece of the balisier leaf was added once the first leaf began to show signs of withering. On 3 December 2020, the caterpillar was observed wandering around the container before eventually settling down at the corner of the container's lid. The next day, 4 December 2020, a brown, silk cocoon (Fig. 7) measuring approximately 10 mm in length and 4 mm in width was observed at the corner where the caterpillar was last seen. Deciduous spines were observed in an outer ring around the cocoon. On the morning of 14 December 2020, the adult moth (Fig. 9) was observed on the side of the container, the cocoon stage having lasted 10-11 days, and the moth was released that same day.

The disparate food plants (mango and balisier) indicate that this species is likely to have a wide range of food plants and could turn up on a variety of fruit and ornamental plants, and indigenous plant species with relatively stiff leaves. The two caterpillars (Figs. 2 and 3) are superficially different, but this is accentuated by the lighting and different angles of the photographs. The pattern and arrangement of spined scoli are the same, but the colouring of the balisier caterpillar (Fig. 3) is more intense green and reddish brown. The similarity to the caterpillar illustrated by Genty *et al*. (1978) is more evident



Figs. 1-9. Developmental stages of *Euclea cippus*, Trinidad; 1, 2, 4-6, 8 on mango (ASB); 3, 7, 9 on balisier (RND). 1, final instar caterpillar in situ on mango branch. 2-3, final instar caterpillars. 4, caterpillar forming cocoon. 5, cocoon lateral view. 6, cocoon photographed through transparent rearing container. 7, cocoon with most of outer envelope missing. 8, adult female. 9, adult male.

in the balisier caterpillar (Fig. 3), however, as stated above, previous illustration is likely of a related species. As seen in some Limacodidae, the cocoon has a flimsy, see-through outer envelope (best seen in Fig 6, and mostly lost in Fig. 7), which incorporates clusters of the dark deciduous spines from the caterpillar (Figs. 5 and 7). The adult male of the balisier moth has bipectinate antennae in the basal third (Fig. 9), but the antennae are not visible in the mango moth (Fig. 8). The sexes are similar, but the more elongate wings show it to be a female. This may be the explanation of the difference in time from formation of the cocoon to emergence of the adult (10-11 days for the male and 21 days for the female). The resting position of the mango moth, and many other limacodids, with forelegs and midlegs projecting and curved forwards (Fig. 8) gives them purchase on various surfaces, including vertical ones, or is perhaps a mechanism to disguise the typical moth shape from predators hunting by sight.

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First record of folivory in *Artibeus planirostris trinitatis* Andersen, 1906

First described as an anomaly, leaf eating or folivory is nowadays thought to be a common behaviour in certain Neotropical fruit-eating bats (Kunz and Diaz 1995, Duque-Márquez *et al.* 2019, Rodrigues Jorge *et al.* 2023). Folivory evolved independently in both New World (fam. Phyllostomidae) and Old World (fam. Pteropodidae) fruit-eating bats, probably to overcome the lack of certain nutrients (such as proteins or minerals) in a fruit dominated diet (Kunz and Ingalls 1994). There are nine confirmed neotropical bat species that include leaves in their diet, from the genera: *Artibeus* (7 species), *Platyrrhinus* (1 species) and *Carollia* (1 species) (Arias Arone and Aguirre Quispe 2022, Rodrigues Jorge *et al.* 2023). However, the knowledge about the importance of leaves in the diets of these species is still poor with only 26 published research articles on the matter during the last 65 years, most of them being occasional records (Arias Arone and Aguirre Quispe 2022, Rodrigues Jorge *et al.* 2023, and references therein).

Around 70 species of bats occur in Trinidad and Tobago, of which more than half belong to the Phyllostomidae family (Gomes and Reid 2015). Three of these species, *Artibeus lituratus* (Olfers 1818), *A. planirostris* (Spix 1823) and *Carollia perspicillata* (Linnaeus 1758) have been recorded to use leaves in their diets in different parts of the neotropics (Rodrigues Jorge *et al.* 2023 and references therein). However, in Trinidad and Tobago, only *A. lituratus* has ever been recorded to use leaves as part of their diet (Greenhall 1957).

Artibeus planirostris trinitatis Andersen, 1906 is the subspecies of the Flat-faced Fruit-eating Bat, *A. planirostris*, inhabiting Northern Venezuela and the islands of Trinidad and Tobago (Wilson and Mittermeier 2019). Previously included as a subspecies of the Jamaican Fruit-eating Bat, *A. jamaicensis* Leach, 1821, recent studies have included the subspecies *trinitatis* as part of *A. planirostris* based on molecular and dental characters (Larsen *et al.* 2007, 2010a, 2010b). Most references on the bats of Trinidad and Tobago still include the names Jamaican Fruit-eating Bat or *A. jamaicensis* to refer to the individuals of the species (Gomes and Reid 2015, Trinibats 2023, iNaturalist 2023). Nevertheless, as there is only one species of the *A. jamaicensis* species group inhabiting these islands (*sensu* Simmons 2005), all the information published about the species for this geographical region should be accepted as true for *A. p. trinitatis*, since this is just a new denomination.

On the island of Trinidad this species is one of the most abundant fruit-eating bats (Gomes and Reid 2015). It is known to roost both in leaf-made tents, trees, and buildings, where it lives in groups normally formed by a dominant male and a harem of females and their pups. It feeds mainly on fruits, with figs being their favourite food source. Bats leave the day-roost at nighttime to go foraging. Once they find fruit, they carry it in their mouth to a feeding roost where they consume it. In addition to fruits, *Artibeus planirostris* is known to complement its diet with pollen and insects (Hollis 2005, Teixeira *et al.* 2009). Moreover, recent publications from Peru and Brazil have reported that some subspecies of *A. planirostris* include leaves in their diet (Arias Arone and Aguirre Quispe 2022, Cordero-Schmidt *et al.* 2016, Teixeira *et al.* 2009). Yet, to my knowledge, there is no previous record of folivory in populations of *A. p. trinitatis*.

The night of the 8 February 2023 an individual of *A. p. trinitatis* was observed consuming a leaf of the Immortelle tree, *Erythrina poeppigiana* (Walp.) O.F.Cook, in a known feeding roost under the roof of a house in the Arima Valley, Trinidad and Tobago, West Indies (UTM 20P, 687087E, 1181635N). The observation was made after hearing a social call coming from one of the corners of the house roof where a usual feeding roost of the bat species is located. Individuals of *A. p. trinitatis* had been observed eating fruits in that same location on several occasions. When checking the location, a male bat of the species was observed holding and eating a leaf (see Fig. 1 left). After, some seconds the bat released the leaf, which showed signs of bites (see Fig. 1 right). This observation is to my knowledge the first report of folivory for the subspecies *A. p. trinitatis* as a whole, and the second record of bat folivory for Trinidad and Tobago since Greenhall (1957) described this behaviour in neotropical bats for the first time.

Although scarce, previous records of folivory by *Artibeus planirostris* suggest that this behaviour might be common and widespread (Arias Arone and Aguirre Quispe 2022, Cordero-Schmidt *et al.* 2016, Teixeira *et al.* 2009). For example, in the dry forests of the Brazilian Caatinga, *A. planirostris* was found to consume the leaves of up to 16 different species of plants (Cordero-Schmidt *et al.* 2016). However, the consumption of leaves of *E. poeppigiana* by the Flat-faced Fruit-eating Bat has never been reported. The leaves of this tree have been reported as a common item on the diets of congeneric bat species like *A. amplus* and *A. lituratus* in Venezuela (Duque-Márquez *et al.* 2019, Muñoz-Romo and Ramoni-Perazzi 2020, Ruiz-Ramoni *et al.* 2011)

Fig. 1. Evidence of folivory in *Artibeus planirostris trinitatis*: left – the observed male holding a leaf of *Erythrina poeppigiana* in a feeding roost; right – leaf of *E. poeppigiana* on the ground showing signs of consumption.

and by *A. jamaicensis* in Puerto Rico (Rodríguez-Durán and Vázquez 2001). Introduced in Trinidad from the slopes of the Venezuelan Andes in the 19th century as cacao shade, *E. poeppigiana* has become the most common large tree in disturbed habitats (Feinsinger *et al.* 1979). Thus, although previously unreported, the leaves of this species might be a common item in the diets of *A. p. trinitatis.*

The chewed leaf showed signs of consumption in the basal or proximate area of the leaf (see Fig. 1 right). This is consistent with previous studies that showed this behaviour in different species of *Artibeus* (Cordero-Schmidt *et al.* 2016, Duque-Márquez *et al.* 2019). This behaviour is not well understood, and it may simply be a mechanical consequence of the way fruit-eating bats handle food items (Duque-Márquez *et al.* 2019). However, some authors indicate that the base of the leaves might have a higher concentration of nutrients and water (Cordero-Schmidt *et al.* 2016).

As a whole, folivory is still a poorly understood behaviour in bats and basic questions such as the main reasons for its evolution, its benefits or its relation to the phenology of reproduction, are still unanswered and most explanations are untested hypotheses (Duque-Márquez *et al.* 2019). Leaves offer a wide array of nutrients and chemical compounds, such as secondary metabolites, that might be important additions to the diet of fruit-eating bats in the form of proteins and minerals, as a hormone precursor source, or even for pharmacological use. Testing these hypotheses will shed light on the evolution and importance of folivorous behaviour in fruit-eating bats.

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Predation of a Greater Windward Skink *Copeoglossum aurae* by a Great Egret *Ardea alba* in Trinidad, Trinidad & Tobago, W.I.

On 20 February 2024, at 0846h, we were driving along the Kernaham Road in Kernaham Village, Manzanilla (approximate location UTM 20P 717642E, 1145519N) when we observed an adult Great Egret *Ardea alba* (Linnaeus, 1758) standing with a dark and slender prey in its bill. The egret was approximately 4 m away from the road and 1 m away from a ravine. It was identified by its all white plumage, yellow bill, black legs and large size (102 cm as adults) (ffrench 2012). Initially, we thought that the prey was a Zangee *Synbranchus marmoratus,* a slender and eel-like fish, but upon further investigation with the use of binoculars and a camera equipped with a zoom lens (Nikon D500, AF-S Nikkor 200-500 mm, f/5.6E ED VR), it was identified as a Greater Windward Skink *Copeoglossum aurae* Hedges and Conn, 2012. Although it is not clearly visible in Fig. 1 (Above), the skink was identified by its heavily spotted dorsum, a characteristic which helps distinguish the species from the only other skink on the island, *Marisora aurulae* (Murphy *et al*. 2018). Blood was observed on the bill of the egret as well as on the body of the skink. The skink appeared to have an injury diagonally across the midsection of its body with red, fleshy tissue protruding on both ends of the wound. This led us to believe the skink was impaled by the egret's bill during the encounter. The skink was still alive and twisted its body from side-to-side in an attempt to escape Fig. 1 (Below) but the egret eventually repositioned the skink's body in its bill and swallowed it whole and headfirst. The encounter, from the moment that we first observed the egret to the moment that the skink was swallowed, was brief and lasted less than 1 minute.

The Greater Windward Skink averages 98.5 mm SVL in males and 109 mm SVL in females. It is diurnal, has a wide distribution throughout the islands of Trinidad and Tobago and is also found on Huevos Island (Trinidad), Grenada, St. Vincent and the Grenadines (Bequia, Carriacou, Mustique, Petit Martinique, and Union Islands) (Murphy *et al.* 2018). RND has observed this species on tree trunks, shrubs, rafters of wooden sheds, banana plants, amongst pilings of building materials, short grass and leaf litter. Murphy *et al* (2013) described the skink as being semi-arboreal and documented the only other predation event by a Rutherford's Vine Snake *Oxybelis rutherfordi*. Harrison *et al* (2019) interpreted an observation of the skink being found asleep on an exposed branch to support their arboreality. However, no trees, shrubs, debris or anthropogenic structures were observed near the egret suggesting that in this instance the skink may have been on the ground amongst the short grass and leaf litter between the side of the road and the ravine. Photographs of the species in similar habitats in Trinidad & Tobago have been recorded previously on iNaturalist (Jameer 2022, wildlife_tobago 2022, Ramdeen 2022).

Miranda and Collazo (1997) documented fish and crustaceans as main prey items for Great Egrets in Puerto Rico, and listed insects as less important prey items. Other predation reports for this species are relatively common and include observations of them feeding on a wide diversity of small animals such as lizards, birds and frogs (Pommer-Barbosa *et al.* 2021, Kelly 2023, Oliveira-Souza *et al*. 2020). To our knowledge however, this appears to be the first record of a Great Egret predating on a Greater Windward Skink and is an important contribution to the scarce life history

Fig. 1 Above- Greater Windward Skink grasped near the hind limbs in the bill of the Great Egret. Below- Greater Windward Skink twisting its body to the side in an attempt to escape.

information for the skink in the literature. We'd like to thank John C. Murphy for his confirmation on the identification of the skink.

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Theope spp. butterflies (Lepidoptera, Riodinidae) mating at night

Observations of butterflies mating by night are infrequent and this behaviour is poorly understood. For example, Cannon (2020) does not mention it in his book *Courtship and Mating in Butterflies*, and there is very little literature addressing this topic. Accordingly, we report four observations from Trinidad and Tobago inolving *Theope* spp. (Riodinidae).

Butterflies *in copula* are much less mobile than individual butterflies, and any camouflage patterns are likely to be disrupted, so that they must be more vulnerable to predation, for example by birds. Hence, mating by day will normally be as quick a process as practical unless there are other significant advantages to prolonged mating. Shields and Emmel (1973) summarised observations on butterfly mating duration, which may be extended due to lowered temperatures. They mentioned that *Danaus* may pair overnight, and species of several genera of Nymphalidae and Lycaenidae mate in the late afternoon to early evening. Scott (1973) also summarised information on the duration of mating in butterflies, most species taking 10 minutes to several hours, and some Papilionidae, Pieridae and Nymphalidae noted as occasionally or frequently (*Pontia protodice* (Boisduval & Leconte) Pieridae) mating overnight. Laboratory studies by Svärd and Wiklund (1988) showed that mating in *Danaus plexippus* (Linnaeus) (Nymphalidae) started by day, but sperm transfer did not happen until nightfall, the pair sometimes remaining *in copula* until daylight. They discussed the potential importance to the male of mate guarding by prolonged mating in order to prevent other males from mating with the same female (see also Cannon 2024). The only recent study we found was that of Molleman *et al.* (2020) who studied mating of the Old World tropical satyrine, *Melanitis leda* (Linnaeus) in captivity. They found that mating was initiated around either dawn or dusk. Although the dawn matings usually lasted an hour or more, and not more than three hours, 42% of the dusk matings lasted overnight. They were unable to establish why mating might last all night, or what advantages there might be in this specific case, but they discounted mate guarding by night as an explanation since there is no mate competition by night. They went on to suggest that the butterflies may have simply followed their normal daily behaviour and fallen asleep at night while still *in copula*.

During the course of night walks (Deo *et al*. 2020), Rainer N. Deo photographed mating *Theope* butterflies at rest in Tobago at 2314h (Fig. 1) and Trinidad at 0316h (Fig. 2) and 2016h (Fig. 3). While making observations in his yard in Trinidad at dusk, Tarran P. Maharaj observed and photographed a pair of a different species of *Theope* at 1816h (Fig. 4).

The pair in Fig. 1 was photographed in Tobago, where the only known Tobago species of *Theope* with a plain yellow ventral surface is *T. eudocia* Westwood (Barcant 1970, Cock 2017). *Theope eudocia* shows sexual dimorphism, with the male usually larger and with more pointed wings, as here, so that we are confident of the identity of this species. In contrast, in Trinidad, where Fig. 2 was taken, *T. pedias* Herrich-Schäffer, *T. excelsa* Bates, and *T. aureonitens* Bates, as well as *T. eudocia*, all have the ventral surface plain yellow or yellow-orange. *Theope pedias* shows only very slight sexual dimorphism in wing shape; this is a little more pronounced in *T. aureonitens*, and more so in *T. excelsa*, comparable to *T. eudocia*. *Theope excelsa* is larger than the other species, but this cannot be judged from a photograph. However, these three species are considerably less common than *T. eudocia* in Trinidad (Barcant 1970), so it is likely that Fig. 2. also represents *T. eudocia*.

Unlike the other two species treated here, this pair of *T. phaeo* Prittwitz (Fig. 3) is immediately recognizable by the distinctive wing shape and markings. In Trinidad, only *T.*

Fig. 1. Mating pair (female on left) of *Theope eudocia*, Tobago, Main Ridge Forest Reserve, 7 August 2020 at 2314h. Photo R.N. Deo.

Fig. 2. Mating pair (female on right) of *Theope* ?*eudocia*, Trinidad, Brasso Seco, 24 July 2021 at 0316h. Photo R.N. Deo.

Fig. 3. Mating pair (female above left) of *Theope phaeo*, Trinidad, Arima Valley, entry road to Asa Wright Nature Centre, 14 May 2024 at 2016h. Photo R.N. Deo.

Fig. 4. Mating pair (female on right) of *Theope* sp. *foliorum* or *lycaenina*, Trinidad, South Oropouche, Mon Desir, 23 February 2010 at 1816h. Photo T.P. Maharaj.

terambus (Godart) (misidentified as *T. syngenes* Bates in Barcant (1970)) has a similar wing shape, but that species is larger and has a dark, diffuse medial line across both wings, and a small, black-centred white spot at the hindwing tornus. Barcant (1970) misidentified the male of *T. phaeo* as *T. apheles* Bates and the female as *T. thootes* Hewitson, but neither of these species is found in Trinidad (M.J.W. Cock and J.P.W. Hall unpublished).

The pair photographed in Trinidad in Fig. 4 have plain grey ventral wings, which indicates one of three species: *T. foliorum* Bates, *T. lycaenina* Bates or *T. leucanthe* Bates (Barcant 1970, M.J.W. Cock and J.P.W. Hall unpublished). *Theope foliorum* and *T. lycaenina* have a row of three to six black dots on the ventral hindwing margin, the two nearest the tornus being more pronounced, and those towards the apex increasingly faint. Hence, in ventral view, the two species cannot be reliably separated. In contrast, *T. leucanthe* has a row of black dots on the margins of both ventral wings. Based on these characters, we consider Fig. 4 to be either *T. foliorum* or *T. lycaenina*.

These are the first observations we have found of Riodinidae butterflies mating by night. In isolation, they tell us little about the mating systems of these species, and the behaviour of the three species of *Theope* is not necessarily the same, although observations of three different species of *Theope* mating at night may indicate a common pattern. The timing suggests that courtship and the initiation of mating occurs late afternoon and may continue until the butterflies are disturbed or until dawn. Mate guarding is a potential explanation for continuing mating into the late afternoon, but as these butterflies are not believed to be active at night, the advantages of remaining *in copula* after dark are not obvious. Perhaps the transfer of sperm is more effective if carried out over a prolonged period, and this can be safely done under the cover of darkness.

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An inter-species mating of *Melanis* spp. (Lepidoptera, Riodinidae)

Observations of mating insects are useful to provide information regarding mating behaviour. These observations are especially useful when the two partners do not resemble each other. This may reflect intraspecific variation and help define the limits of variability of a species. Alternatively, it may reflect sexual dimorphism and enable males and females to be associated, sometimes for the first time. Much less commonly, it may be an example of inter-species mating, indicating the possibility of hybridization. Here we report an example of the last situation.

Mark Hulme observed and photographed a mating pair of *Melanis* spp. (Lepidoptera, Riodinidae) at St. Augustine on 29 June 2023 at 1334h and posted the image on iNaturalist (Fig. 1). The male on the left (two pairs of walking legs) is the Orange-tipped Underleaf *Melanis smithiae xarifa* (Hewitson) (= *Lymnas xarifa*), whereas the female on the right (three pairs of walking legs) is the Underleaf *M. electron electron* (Fabricius) (= *Lymnas iarbas*).

Melanis electron is an occasional and widespread species in Trinidad & Tobago, whereas *M. smithiae* is much less common and predominantly found in forested areas (Kaye 1921, Barcant 1970). The recorded food plants of *Melanis* spp. are almost entirely Mimosoideae (Fabaceae) (Beccaloni *et al*. 2008). The Saman tree *Samanea saman* (Jacq.) Merr. (Fabaceae, Mimosoideae) is a food plant of *M. electron* in Trinidad (P.L. Guppy in Kaye (1921)), which may explain why it is commonly seen in parkland areas with Saman trees. DeVries (1997) cited Kaye (1921) as giving the food plant of *M. smithiae* as *Inga* sp. (Fabaceae, Mimosoideae). However, Kaye stated that he found this species 'on *Inga*' which is more likely to be a reference to an adult nectar source or resting site, since Kaye did not rear caterpillars during his visits to Trinidad. Hence, the food plants of *M. xarifa* appear to be unknown (Beccaloni *et al*. 2008), albeit most likely one or more species of Mimosoideae are used.

Very little has been published regarding mate location and courtship of Riodinidae, and we have not been able to locate any published descriptions of such behaviour for any *Melanis* species. Males of this genus do not have secondary sexual characters such as androconial scales or

Fig. 1. Mating pair of *Melanis* spp., male *M. smithiae xarifa* on the left and female *M. electron electron* on the right (https://www.inaturalist.org/observations/170287534).

hair tufts on the hind wings or abdomen (DeVries 1997, Hall and Harvey 2002) so these cannot be involved. However, in Costa Rica adult *M. pixie* (Boisduval) are observed to congregate around the food plant trees, especially when flowering, as well as nearby nectar sources (DeVries 1997); this may provide a mechanism to facilitate mate location for *Melanis* spp. It also seems likely that prospective mates are at least partially recognised by their black and orange markings and relatively weak flight. Beyond this, it is not possible to suggest what factors may facilitate or impede intra-species and inter-species mating in these two species.

It is possible that rather than an inter-species mating, this observation could indicate that these are two different colour forms of one species. Both 'forms' occur in both sexes in collections of Trinidad butterflies. To test this possibility, John Morrall provided leg samples from recent specimens from his collection, which Yuen Ting Yeap sequenced to obtain DNA barcodes. DNA barcoding, sequences of a defined section of the CO1 mitochondrial gene (Hebert *et al*. 2003), provides a tool that can be used to help clarify the status of different populations of taxa. Barcode Index Numbers (BINs) have been introduced to provide a permanent numbering system for clusters of similar barcodes (haplotypes) normally separated from others by at least 2% base pairs substituted, which in a high percentage of cases correspond to known taxonomic species (Ratnasingham and Hebert 2013).

Three sequences from *M. smithiae* (MJC_710, MJC_711, MJC_712) form part of BIN BOLD:ADN0446, whereas two from *M. electron* (MJW_713, MJC_714) form part of BIN BOLD:AEF9100, the two BINs being 1.87% different (BOLD Barcode Gap Analysis on Trinidad barcodes only). We conclude that the current treatment as two separate species is valid, although the two species are very close, and that this is an example of inter-species mating. The results of such a mating are unknown, but it raises the possibility of hybridization between the two species. Since, as noted above, most food plant records for the genus are Mimosoideae, food plant compatibility need not be a barrier to hybrid viability. However, there is no evidence that hybridization occurs between the two species in Trinidad, as no intermediate forms have been documented.

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The life history of *Quadrus tetrastigma* (Sepp) (Lepidoptera, Hesperiidae, Pyrginae) in Trinidad, West Indies

This skipper butterfly has long been known from Trinidad as *Zera tetrastigma tetrastigma* (Sepp) (Cock 2014 and references cited therein). However, based on genomic data, Zhang *et al.* (2023) made *Zera* a subgenus of *Quadrus*, and by raising the other subspecies to species level, made *tetrastigma* monotypic, so the current name is *Quadrus tetrastigma* (Sepp, [1847]). It is a member of the subtribe Pythonidini (eight other Trinidad species), tribe Achlyodini, subfamily Pyrginae, family Hesperiidae (Cock 2014). The available information on this species in Trinidad was presented in Cock (1996). Although adults are only occasionally seen in Trinidad, the caterpillars have been recorded to feed on avocado *Persea americana* Mill., *Ocotea* sp. and Laurier Black Mattack *Damburneya martinicensis* (Mez) Trofimov (all Lauraceae) (Cock 1996, Beccaloni *et al.* 2008). Cock (1996) included notes on the caterpillar and diagrams of two leaf shelters. Rashid K. Ali reared this species from a field-collected egg and posted his images on iNaturalist (www.inaturalist.org) as observations 169254512, 169254515 and 176326434. Based on these, we report and illustrate the life history of *Q. tetrastigma* on *D. martinicensis*. Terminology used to describe the early stages follows Cock *et al.* (2017).

The food plant was a sapling of *D. martinicensis* (previously known as *Nectandra martinicensis*, but see Trofimov *et al.* 2016) growing in Haleland Park, near Port of Spain (Figs. 1-2). This was matched to a nearby adult tree of the same species. In the absence of reproductive structures, particularly flowers and fruits, which are typically diagnostic for accurate plant determination, Linton Arneaud used a multi-faceted approach to ensure taxonomic certainty. Firstly, a meticulous examination of the sapling and adult vegetative features, including leaf morphology, volatization of secondary metabolites, bark texture, and branching patterns, was conducted (Figs. 3-7). These observations were then compared to a comprehensive collection of reference materials and high-resolution images depicting mature *D. martinicensis* trees. A voucher for the food plant has been lodged at the National Herbarium of Trinidad and Tobago under voucher #26653. *Damburneya martinicensis* is a widespread species of evergreen and semi-evergreen seasonal forest in Trinidad and Tobago (Baksh-Comeau *et al.* 2016).

The egg (Figs. 8-9) was found on 24 June 2023 laid at the margin of the uppersurface of a red, flush leaf (Fig. 2). It was dome-shaped, with 12 vertical ribs between which the surface was smooth and concave. The eggshell was transparent, and when collected the contents were translucent. The egg hatched on 26 June 2023, two days after collection, when the caterpillar consumed the dorsal egg surface (Fig. 10). The newly hatched caterpillar (Figs. 11-12) had a dark brown and shiny head, a pale and translucent body and an inconspicuous pale brown dorsal plate on thoracic segment 1 (T1). The first instar caterpillar immediately made a two-cut shelter (Greeney 2009) from the edge of the leaf on which it was laid (Fig. 14) and pulled shut with two ropes of silk (Fig. 13). The subsequent instars were not followed as the caterpillar was left undisturbed in its shelter. However, in the penultimate instar (Figs. 15-16), the head was brown, with the frons dark brown, but not sharply demarcated; the body translucent, with the trachea clearly visible against the dark dull green body contents; the dorsal plate on T1 concolorous; the dorsal line slightly darker, and whitish developing gonads visible subdorsally on abdominal segment 6. The final instar (Fig. 17) was similar, apart from the head: the epicrania were bright chestnut brown, the frons contrasting dark brown, and the epicranial and adfrontal sutures (maybe also adfrontals) separating them were pale.

On 14 July 2023, the caterpillar pupated in a leaf shelter. The pupal exoskeleton was translucent and flimsy, initially showing the white body contents (Figs. 18-19), but later showing the adult colouring as it formed up, starting with the red eyes (Fig. 20), then the dark wings (Fig. 21). When newly formed, the pupa was shiny and smooth (Fig. 18), but it soon acquired a patina of white waxy powder (Figs. 19-21). The adult (Fig. 23) emerged on 25 July 2023, and after being photographed was released. The flimsy pupal exuvium collapsed during emergence (Fig. 22).

Sepp (1843-1848, pl. 95) first described and illustrated *Q. tetrastigma* from Suriname. He illustrated a food plant but did not name it. The plant in Sepp's figure closely resembles *D. martinicensis* (Fig. 2). Sepp's figures of the caterpillar and pupa closely resemble the final instar caterpillar (Fig. 17) and pupa (Figs. 18-20) documented here. In contrast, Moss (1949) noted that the caterpillar is "light green with a brown head, the pupa milk white". It seems possible that his characterisation of the head as light brown was not well observed, perhaps based on the penultimate instar.

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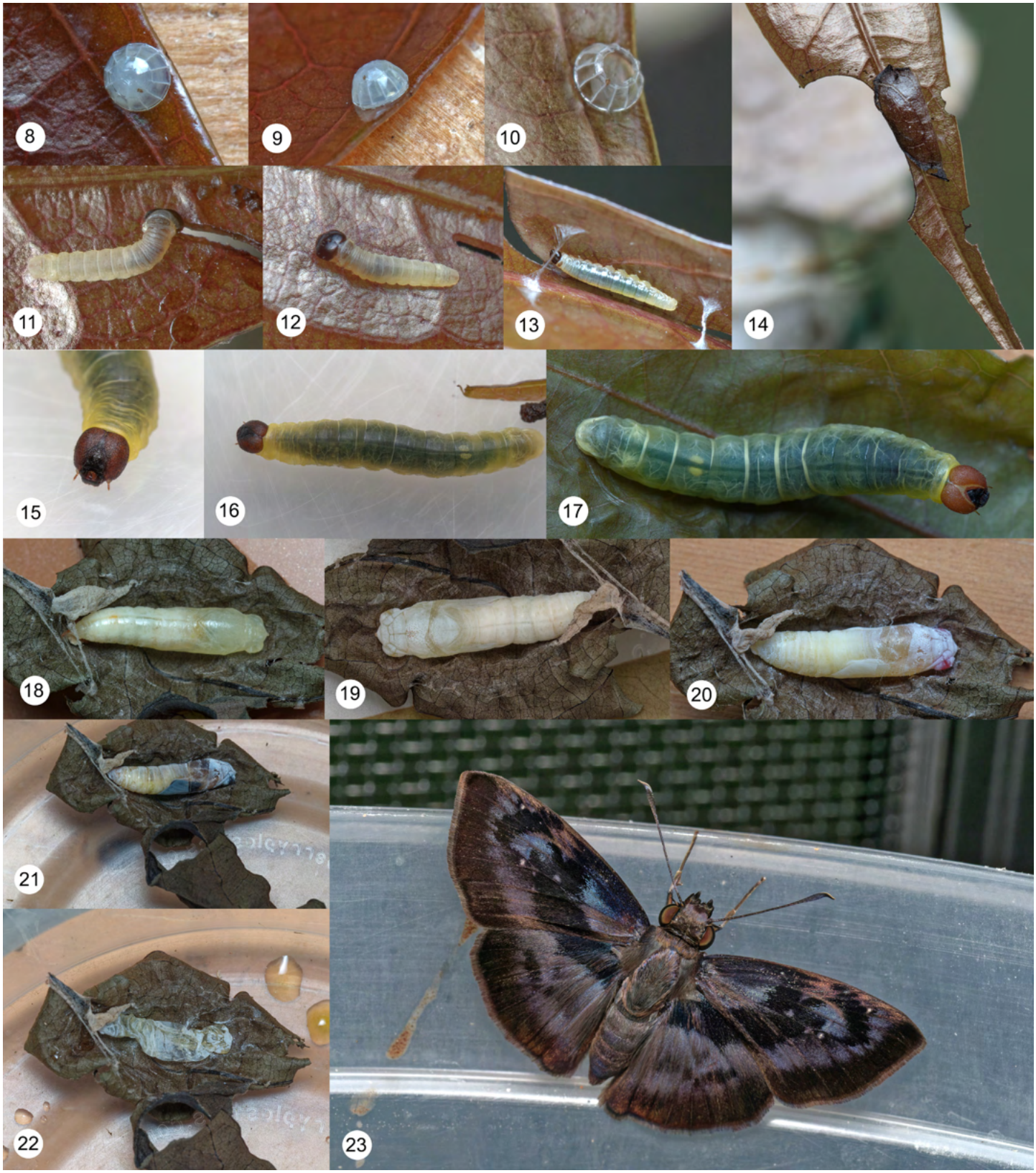
Figs. 1-7. Vegetative morphology of *Damburneya martinicensis*, food plant of *Quadrus tetrastigma*, Haleland Park. **1-2**, original sapling, 24 June 2023, R.K. Ali; **3-4**, regrowth of original sapling, 29 May 2024, L. Arneaud; **5-8**, matched adult tree, 29 May 2024, L. Arneaud. **1**, architecture of sapling plant. **2**, flushing leaves (young brownish leaves at the tip). **3**, adaxial leaf surfaces. **4**, abaxial leaf surfaces. **5-6**, trunk dimensions and bark characteristics. **7**, mature tree branching pattern and leaf arrangement.



Figs. 8-23. Life history of *Quadrus tetrastigma* on *Damburneya martinicensis*, Haleland Park, June-July 2023, R.K. Ali. **8-9**, egg, 24 June 2023. **10**, eclosed egg, 27 June 2023. **11-12**, neonate first instar caterpillar cutting leaf to make shelter, 26 June 2023. **13**, first instar caterpillar in leaf shelter, 28 June 2023. **14**, first leaf shelter, 27 June 2023. **15-16**, penultimate instar caterpillar, 06 July 2023. **17**, final instar caterpillar, 09 July 2023. **18**, newly formed pupa, 14 July 2023. **19**, pupa with patina of white wax, 15 July 2023. **20**, pupa starting to form up, 22 July 2023. **21**, pupa, one day before emergence, 24 July 2023. **22**, pupal remains, 25 July 2023. **23**, newly emerged adult, 25 July 2023.

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An Active Anti-Predator Strategy Observed in the Land Snail *Plekocheilus glaber*

This note provides information on the defensive behaviour of the land snail *Plekocheilus glaber*, as observed by the author. Although information on this species seems scarce, *P. glaber* is not uncommon on the islands of Trinidad and Tobago. Its distribution also includes Grenada, Suriname and Guyana (Rutherford 2011).

Snails are typically known to use their shells for protection, retracting into them for refuge from outside threats (Edgell *et al.* 2008, Morii *et al.* 2016, Le Ferrand and Morii 2020). Some snails have even evolved sculptured shells to protect against shell-swallowing, shell-crushing or shell-entering predation (Edgell *et al.* 2008). However, some snails use their shells offensively as a defence mechanism, when approached by predators (Morii *et al.* 2016, Niwa *et al.* 2023, Sato and Yoshikawa 2024).

Ezohelix gainesi, a Japanese snail, and *Karaftohelix selskii*, a snail found in far eastern Russia, are just two of several species known to utilize their shells in this way (Morii *et al.* 2016, Niwa *et al.* 2023). I present here a record of *P. glaber* using its shell offensively. As far as I can ascertain, this is the first time such behaviour has been documented in this species.

While walking up a a river through the forest near Brasso Seco village at approximately 0900 hrs on 2 January 2021, I observed a snail *P. glaber* executing a swing-shell active defence strategy in response to disturbance by an unidentified black wasp. The snail was moving up a *Heliconia* leaf protruding over the river's edge. The wasp repeatedly flew over the snail, seemingly attempting to attack its exposed body. In retaliation, the snail swung its shell every time the wasp came close, effectively fending off the attack.

The snail's shell would swing to one side of its body until it reached a perpendicular position (Fig. 1 left), then rotate back through to the opposite side of its body (Fig. 1 right) achieving the same perpendicular height. This routine continued for about five seconds until the wasp flew away upon my approach to document the phenomenon. While I did not capture footage of the wasp, I was fortunate to capture footage of the snail swinging its shell before it repositioned it in the usual position – parallel to its body (Fig. 2). The recording of this incident can be viewed on the TTFNC's youtube channel at: https://www.youtube.com/shorts/KmNwk3xZZ-k.

I observed the snail for about three more minutes, hoping the occurrence would repeat, but the wasp did not return, and the snail did not continue swinging its shell. I left the snail to carry on along its path.

Fig. 1. *Plekocheilus glaber* swinging its shell in order to fend of the wasp predator, before repositioning its shell to its usual parallel position.

Fig.2. Image of *Plekocheilus glaber* with its shell in its usual parallel position.

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Insomniacs: displays of nocturnal activity by three predominantly diurnal snake species in Trinidad, Trinidad & Tobago, W.I.

Erythrolamprus melanotus nesos, *Erythrolamprus zweifeli* and *Phrynonax sexcarinatus*, previously known as *P. polylepis*, are all described as being diurnal with *P. sexcarinatus* also being described as crepuscular (Murphy *et al*. 2018; Boos 2001). However, De Gregorio *et al*. (2014) and Abom *et al*. (2012) demonstrated that some species of snakes show plasticity in their diel activity based on factors such as temperatures and seasonality. Furthermore, Dutta *et al*. (2017) and Ghosh *et al*. (2020) reported instances of snakes, generally considered to be diurnal, showing foraging activity at night after rainfall while Mukherjee and Mohan (2022) reported nocturnal activity of seven snakes in proximity to artificial light. Here, I report similar cases of nocturnal activity in the species mentioned above.

Erythrolamprus melanotus nesos

The Trinidad Black-backed Snake (*E. m. nesos*), locally known as the "beauty of the road" (Beh Belle Chemin) or the "doctor snake" is a small (604 mm) black and yellow or black and orange snake with a large and distinctive black stripe going along the dorsal length of its body. It's known to prey on small vertebrates including frogs (eggs and tadpoles), lizards and other snakes (Murphy *et al*. 2018; George, 2023). It has a wide distribution throughout Trinidad and Tobago and amongst the three species mentioned in this note, is the species that I have encountered the most with over 20 observations being made during the day. These include a predation attempt on a *Leptodactylus fuscus* and being predated on by a Western Cattle Egret (*Bubulcus ibis*). However, I have only ever encountered one at night. On 4 July 2019, at approximately 2243 h, a group of fellow naturalists and I encountered an *E. m. nesos* (Fig. 1.) on the edge of a dirt road in Caura Valley, (approximate location UTM 20P 680122E, 1184671N). The snake assumed a defensive coil and remained still as if attempting to avoid detection by us. The dirt road had puddles of water due to prior heavy rainfall and Tungara Frogs (*Engystomops pustulosus*) were heard calling. The frogs, which are known prey items for *E. m. nesos* (Murphy *et al*. 2018), were also observed in amplexus and building their foam nests in the puddles. It is presumed that the snake was active on the road due to the heightened activity of the Tungara Frogs following the rainfall.

Erythrolamprus zweifeli

The High Woods Snake (*E. zweifeli*) is a small (800 mm) snake that can be found in two colour morphs in Trinidad: the highly contrasting salt and pepper morph and the olive or brown morph. Both morphs have orange inter-scales and a bright red and black venter. Its diet is similar to *E. m. nesos* with the inclusion of birds, however, species of frogs vary due to their preference of montane and heavily forested habitats (Murphy *et al.* 2018). I have encountered three individuals during the day and equally as much at night. All night observations were made within the flooded forests in the Inniss Fields, Moruga (approximate location UTM 20P 690408E 1124191N) over the course of two nights. On 14 November 2020, at approximately 2345 h, a salt and pepper morphed *E. zweifeli* was found active on the forest floor. The specimen was photographed and released. Almost exactly a year later on 11 December 2021, at approximately 2211 h, two other salt and pepper morphed specimens were found active. However, only one was photographed (Fig. 2.) as the first one observed, quickly escaped under a rotting log. Conditions were similar on both nights; lower parts of the undulating forest floor were flooded and frog activity was heightened due to the occasional rainfall in the area. All three specimens were found in the forest only less than 10 m away from a dirt road. Frogs on the road included the Tungara Frog and Amazon River Frog (*Lithobates palmipes*) and frogs in the forest were mainly *Leptodactylus validus*. Species of *Leptodactylus* are known prey items for *E. zweifeli* (Murphy *et* al. 2018) and it is suspected that their large numbers and heightened activity prompted the snakes to also become active. Given that these observations were made a year apart but around the same date suggests that *E. zweifeli* at this location frequently become active at night during the period in which the conditions are favorable.

Phrynonax sexcarinatus

The Cutlah (*P. sexcarinatus*) locally known as the Dos cocorite, is a medium sized snake (2135 mm) that is cryptically colored in light browns, greens, and grays, and patterned in brown, crescent-shaped blotches that may form irregular cross bands on the dorsum, as a juvenile and uniformly olive-green as an adult. Considered a possible bird nest specialist, it mostly forages for eggs and nestlings but will also prey on mammals and lizards (Murphy *et al*. 2018). It has a wide distribution throughout the heavily forested areas in Trinidad. I have observed three specimens active during the day. All three adapted their defensive kinking or liana behaviour. This is a behaviour that some believe is used as a form of cryptic camouflage (Abuys, 1986) and others as a form of predator signaling display (Duarte, 2012). At night I observed four specimens in a coiled resting position on plants and small trees, all more than 3 m above ground level and one that was active for more than 1 h. On 7 June, 2024 at approximately 2015 h, I

observed a *P. sexcarinatus* approximately 1600 mm in length on a fruiting Pommerac Tree (*Syzygium malaccense*) near Madamas ext. Rd. (approximate location UTM 20P 690586E 1187708N)). Initially, I thought the snake had been disturbed by falling fruit, but it was consistently on the move until 2100 h, frequently flicking its tongue, exploring bromeliads, and even displaying kinking behaviour as I got near. It made its way from the Pommerac Tree to a Cacao Tree (*Theobroma cacao*) and finally disappeared in the canopy of a Ceries Tree (*Flacourtia indica*). The only possible prey item observed were bats feeding on the Pommerac fruit, however the snake's foraging behaviour didn't suggest that it was hunting for bats but more likely searching for resting birds, their nests or eggs. The observation was made near two houses with artificial light sources but it's difficult to determine if this factor influenced the snake's activity.

This note reports that all three species may be observed active at night even though they are described as being primarily active during the day, along with evidence to suggest that *E. zweifeli* becomes seasonally nocturnal. It is important to monitor and report these seemingly abnormal activity patterns as these could be in response to increased anthropogenic activity and possibly climate change.

Fig. 1. *Erythrolamprus melanotus nesos* observed active at night in Trinidad, Caura Valley, 4 July 2019 at 2243 h. Photo R. N. Deo [iNaturalist observation 29108953]

Fig. 2. *Erythrolamprus zweifeli* observed active at night in Trinidad, Moruga, Inniss Fields, 11 December 2021 at 2211 h. Photo by Hukaymah T. Ali [iNaturalist observation 102938097 with permission].

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Report of the Trinidad and Tobago Birds Status and Distribution Committee, Records Submitted during 2023

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The Trinidad and Tobago Birds Status and Distribution Committee (TTBSDC) was established in 1996 as the official adjudicator of rare bird records in Trinidad and Tobago. The list of species considered by the committee, together with the Official List of the Birds of Trinidad and Tobago can be accessed from our website at http://ttbsdc.ttfnc.org. The TTBSDC publishes annual reports containing details of all accepted records by the Committee, in Living World, the Journal of the Trinidad and Tobago Field Naturalists' Club.

The committee has assessed all records submitted during 2023. In all, 109 records were adjudged, representing 61 species. One species was recorded in the country for the first time. Additionally, the committee is satisfied that there now exists a sustainable feral population of Red-and-green Macaws in Trinidad and this species has been added to the Official Checklist of Trinidad & Tobago. This brings the current list to 496 species.

Highlights from 2023 included Trinidad's first Eastern Wood Pewee; a male Indigo Bunting, a Crested Doradito, the first Orange-breasted Falcon since 1975 and record numbers of Upland and Buff-breasted Sandpipers. Of the submissions assessed, in only three cases did we find the identification inconclusive. Most of the records are accompanied by high quality photographs and the committee commends the photographers.

Records presented below follow the revised nomenclature and taxonomic order of the South American Classification Committee (SACC) as of December 2023 (Remsen *et al.* 2024).

The Committee comprises the following members: Martyn Kenefick (Secretary), Faraaz Abdool, Geoffrey Gomes, Nigel Lallsingh, Bill Murphy, Kris Sookdeo and Graham White. Again, there are instances where we have benefited from supporting international expert knowledge to assist us with certain identification issues. We wish to acknowledge with thanks the valuable assistance provided by Bill Clark and James Smith.

Archived records including photographic submissions number 1,958 at the end of 2023. This report is the twenty-first report of this committee. All reports were published in Living World and are available at ttps://ttfnc.org/livingworld/index.php/lwj/issue/archive.

Records accepted

On 8 June, three **White-faced Whistling-Ducks** ***Dendrocygna viduata*** were found on Caroni Rice Project (NL); two remaining until 1 September 2023. This austral duck appears annually on inland wetlands and meadows, almost all from mid May to mid October.

An eclipsed-plumaged drake **Northern Shoveler** ***Spatula clypeata*** was photographed in a flooded field within Caroni Rice Project on 20 December 2023 (NL). Historically a very rare winter migrant duck from continental North America, there have now been six documented sightings in the last nine years.

Four **American Wigeon** ***Mareca americana,*** including a male in eclipse plumage were found on the eastern lagoon on Caroni Rice Project closest to the highway on 28 December 2023 (NL, RJ, LJ), three of which remained until the year's end. There have now been fourteen sightings of these wintering ducks in the last 28 years, however these are the first since 2017.

An immature or female plumaged **Northern Pintail** ***Anas acuta*** was photographed on Centre Street ponds, Canaan, Tobago on 24 November 2023, remaining until 2 December at least (MKe). This remains a rare wintering visitor to T&T with just seven bird sightings in the last 28 years, including a group of three in 2003.

An adult male **Green-winged Teal** ***Anas crecca*** was photographed on Centre Street ponds, Canaan, Tobago on 27 March 2023 (JR *et al.*). Another male appeared at the same site on 27 December and remained until the year's end. (MKe). There have now been documented sightings of this North American migrant duck in six of the last eleven years.

An immature or female plumaged **Ring-necked Duck** ***Aythya collaris*** was found on Centre Street ponds, Canaan, Tobago on 8 December (JC, BJS, HS) and remained until the year's end. Despite sightings in five of the last 10 years, this winter duck remains an uncommon visitor to Tobago. There have been no documented sightings in Trinidad.

Of the group of **Lesser Scaup** ***Aythya affinis*** found at Centre Street ponds, Canaan, Tobago on 9 December 2022, two birds remained until 11 March 2023 with one female still present until at least 6 July (many obs). Southbound migration brought up to 10 birds arriving on 13 November 2023 varyingly located between Centre Street ponds and Lowlands (MKe , JD *et al.*) remaining until the year's end.

Pied-billed Grebe ***Podilymbus podiceps*** is a scarce winter visitor to both islands and very localised rare resident in Trinidad. During the last week of the year, single birds were found at La Vega (MK) and Centre Street ponds, Canaan, Tobago (MKe) whilst a party of eight were on Caroni Rice Project (NL), this latter sighting being the largest grouping recorded.

Just one **Dark-billed Cuckoo** ***Coccyzus melacoryphus*** was documented this year from Orange Grove farmland on 8 August 2023 (JF). All sightings of this wanderer from mainland South America are within the window of 12 July to 11 October.

Three **Yellow-billed Cuckoo** ***Coccyzus americanus*** were seen and photographed along Innis Road, Moruga on 2 May 2023 (FA). Additionally, there is anecdotal evidence of several small groups of this species in the vicinity during the preceding few days. Whilst this is a scarce southbound migrant mainly found in T&T during October-December, sightings of northbound birds are extremely infrequent.

A moulting male **Amethyst Woodstar** ***Calliphlox amethystine*** briefly fed on vervain flowers at Bajnath Estate on 15 March 2023 (JB). There have now been 14 documented sightings of this tiny hummingbird since first being found in 2015. This is by far the earliest record with all others occurring between 19 April and 26 July.

An **American Coot** ***Fulica americana*** was photographed at Bon Accord lagoons on 14 May 2023 (RJ, PW), and was present until 27 May at least. All but two of the 13 documented sightings of this species since 1995 have occurred in south-west Tobago wetlands.

A female **Sungrebe** ***Heliornis fulica*** was found at La Vega on 14 October 2023 (DG, CS) (Fig.1). It remained until 11 November at least being regularly seen in the early morning but becoming very elusive as the day heated up. This is the first documented sighting of this, generally secretive, member of the finfoot family for at least 32 years.

For the seventh consecutive year, a **Double-striped Thick-knee** ***Hesperoburhinus bistriatus*** appeared on the Queens

Fig. 1. Sungrebe, La Vega, October 2023. Photo Nigel Lallsingh.

Park Savannah, Port of Spain on 8 July 2023 (Bd'A) and still present the following day. Elsewhere two birds were photographed on Millennium golf course on 28 August (BR, CR). There have now been 20 documented sightings in the last 16 years, all but two occurring between 28 June and 7 September.

A total of seven **Upland Sandpipers** ***Bartramia longicauda*** were recorded during southbound migration as follows: one in farmland at Orange Grove on 3 September 2023 (JF); up to five birds on Caroni Rice Project intermittently between 16 September and 15 October 2023 (NL, MH, AS *et al.*) (Fig.2.) with two birds seen again on 4 November. Elsewhere, one flushed from fields at Waterloo Secondary School on 21 October 2023 (NL).

Fig.2. Upland Sandpiper, Caroni Rice Project, September 2023. Photo Nigel Lallsingh

At least 15 **Buff-breasted Sandpipers *Calidris subruficollis*** were found in wet, short grassy fields on Caroni Rice Project between 18 and 25 September 2023 (NL *et al.*) (Fig. 3.). In addition, six birds were seen on Waterloo Secondary School fields on 21 October 2023 (NL). September and October remain key months for seeing this delightful "grasspiper".

Fig. 3. Buff-breasted Sandpiper, Caroni Rice Project, September 2023. Photo Nigel Lallsingh.

A recent re-examination of historical photos of *Tringa* shorebirds has revealed the second documented sighting of a **Wood Sandpiper *Tringa glareola*** for Tobago, photographed at Centre Street ponds, Canaan on 17 February 2020 (MKe) (Fig. 4).

Fig. 4. Wood Sandpiper, Canaan, February 2020, Photo Matt Kelly.

Careful scanning of the gull flock on the Waterloo mudflats produced Trinidad's second ever **Audouin's Gull *Ichthyaetus audouinii*** on 9 December 2023 (NL) (Fig. 5).

In recent years, there have been several sightings along the coast of both Suriname and French Guiana. Nevertheless, the species is still regarded as Vulnerable by IUCN with its breeding population restricted to islands in the Mediterranean Sea and wintering off of coastal north-west Africa.

Fig. 5. Audouin's Gull, Waterloo mudflats, December 2023. Photo Nigel Lallsingh

Two first-winter plumaged **Lesser Black-backed Gulls *Larus fuscus*** were found at Milford Bay, Tobago on 26 January 2023 and another at the same location on 2 December 2023 (both MKe). Whilst birds of all ages are regularly found on the tidal mudflats on the west coast of Trinidad, we are yet to understand why each of the seven birds documented from Tobago in the last 10 years have been juveniles.

A moribund **Great Shearwater *Ardenna gravis*** was photographed on the coastline at Mayaro on 27 June 2023 (AR). All four previous records this century have been in June and July. This species breeds on the South Atlantic islands and undergoes a huge circular post-breeding migration up each coast of the ocean.

An adult **Striated Heron *Butorides striata*** was photographed at Bon Accord lagoons on 12 September 2023 (Bd'A). Whilst abundant in Trinidad, this species is only very occasionally sighted in Tobago.

Adult **Cocoi Herons *Ardea cocoi*** were photographed at Bon Accord sewage lagoons on 4 June 2023 (JF) and along the river at Plymouth on 2 December 2023 (MKe). Whilst this species is a regular visitor to Trinidad from mainland South America, there have only been six documented sightings for Tobago in the last 10 years.

A juvenile dark morph **Reddish Egret** ***Egretta rufescens*** was found at Otaheite Fish Market on 22 November 2023 (SS) (Fig. 6.) where it remained until the year's end. It was extremely confiding and anecdotally had been present for "several months". Whilst an uncommon resident to both the northern coast of South America and off-shore islands, this is just the seventh documented sighting for T&T in the last 28 years and the first since 2011.

Fig. 6. Reddish Egret, Otaheite, November 2023. Photo Vishal Rangersammy.

Two **Plumbeous Kites** ***Ictinia plumbea*** were seen soaring and gliding over Englishman's Bay, Tobago on 9 January 2023 (MKe). This is a common breeding visitor to Trinidad from mainland South America with most birds arriving from mid-February and returning south during September. Three of the four documented records for Tobago have occurred between 12 December and 9 January.

A **Savanna Hawk** ***Buteogallus meridionalis*** was photographed on the golf course at Lowlands, Tobago on 15 December 2023 (MKe *et al.*). The absence of any bands eliminates the possibility of it being a "release" from a resident falconer on the island. This constitutes the first documented record of this species for Tobago.

An **Orange-breasted Falcon** ***Falco deiroleucus*** was photographed close to Las Lapas on 14 August 2023 (HF). What is likely to be the same bird was seen perched in the same general area on 30 December (MK *et al.*) (Fig. 7.). This is the first documented sighting of this scarce and very localised resident of Central and South America since 1975 although it's visible similarity to resident Bat Falcon *F. rufigularis* may obscure its occurrence in Trinidad. It is categorised as "Near Threatened" by IUCN.

Two **Brown-throated Parakeets** ***Eupsittula pertinax*** were found at Moruga on 26 February 2023 (JF). Whilst the species has occasionally bred in Trinidad, most sighting

Fig. 7. Orange-breasted Falcon, Las Lapas Trace, December 2023. Photo Nigel Lallsingh.

are considered to be occasional wanderers from mainland South America.

For the seventh year in a row there have seen multiple sightings of **Small-billed Elaenias** ***Elaenia parvirostris*** within the black sage bushes along the southern border of Caroni Rice Project. A minimum of 12 birds were seen feeding between 27 May and 4 June 2023 (NL, MK) and at least two birds remaining until 9 July at least. Elsewhere two birds were photographed along Sumaria Trace on 24 September 2023 (JF).

A **Lesser Elaenia** ***Elaenia chiriquensis*** was photographed in suitable habitat along Sumaria Trace on 24 September 2023 (JF). Whilst still considered a scarce resident species, the close plumage similarity with the very common Yellow-bellied Elaenia, *E. flavogaster*, may mask its true abundance.

An adult female **Crested Doradito *Pseudocolopteryx sclateri*** was studied and photographed along Rahamut Trace on 3 April 2023 (SA, TA)(Fig. 8.). This is just the fourth documented sighting of this wanderer from mainland South America in the last 30 years, three of which have been from the same location.

Fig. 8. Crested Doradito, Rahanut Trace, April 2023. Photo Steve Aversa.

An immature **Eastern Kingbird *Tyrannus tyrannus*** was photographed along Pond Road, Aripero on 22 October 2023 (JF, VR, BW). This is the second documented record for Trinidad of this migrant North American flycatcher and the first for 39 years.

An **Eastern Wood-Pewee *Contopus virens*** was found within the cocoa plantation along Tortuga Shortcut Road on 4 January 2023, remaining until 27 March at least (NL) (Fig. 9.). What is assumed to be the same individual returned to exactly the same trees on 29 October and certainly still present up to 19 December (NL *et al.*). Whilst visually extremely similar to Western Wood Pewee *C sordidulus*, identity was confirmed by comparing the vocalisation of the two species. This is the first documented sighting for T&T of this migrant from continental North America.

Fig. 9. Eastern Wood Pewee, Tortuga Shortcut Road, January 2023. Photo Nigel Lallsingh,

A **Yellow-throated Vireo *Vireo flavifrons*** was photographed at Las Lapas on 9 April 2023 (FM). This is just the fourth documented sighting in T&T of this migrant vireo.

A **Black-whiskered Vireo *Vireo altiloquus*** was photographed in the cocoa plantations off of Tortuga Shortcut Road on 12 March 2023 (NL).

Single **Cliff Swallows *Petrochelidon pyrrhonota*** were documented from Centre Street ponds, Canaan on 8 April 2023 (JCu) and feeding over Caroni Rice Project on 10 September 2023 (NL), the latter still present on 17 September. This species is predominantly a passage migrant through T&T although a few over winter. Indeed 72% of all documented sightings occur during March and October.

October and November are very much the key months to find **Bobolink *Dolichonyx oryzivorus*** in T&T. Two birds were photographed inside Caroni Rice Project on 14 October 2023 (NL) and five birds were seen along Rahamut Trace on 12 November 2023 (DH, RJ) (Fig, 10), four of which remained until 19 November at least.

Fig. 10. Bobolink, Rahamut Trace, November 2023. Photo Jerome Foster.

A female **Great-tailed Grackle *Quiscalus mexicanus*** was photographed at La Brea on 17 September 2023 (BW). This sighting may well refer to the same individual photographed at the same site back in December 2020.

An **Ovenbird *Seiurus aurocapilla*** was found amongst a loose feeding flock along the Blanchisseuse Road on 14 November 2023 (RZE, CR). This is just the third documented sighting of this rare passage migrant in the last 28 years with records in both November and March.

An alternate plumaged **Tennessee Warbler *Leiothlypis peregrina*** was photographed along Tortuga Shortcut Road on 4 February 2023 (NL). Elsewhere, a basic plumaged bird appeared at the feeders at Asa Wright Nature Centre on 29 November 2023 (CW). This latter sighting is the first

documented record of this migrant warbler from continental North America at this well-watched site and the tenth ever record for Trinidad.

The adult male **Cerulean Warbler** ***Setophaga cerulea*** recorded from Tortuga Shortcut Road on 22 October 2022 remained in the same general area until 17 January 2023 at least (MK). What is likely the same individual returned for its third winter to the same line of mango trees. It was first seen on 19 December 2023 (NJ, JF) and remained present until 23 December at least.

A female **Blackburnian Warbler** ***Setophaga fusca*** was photographed along Tortuga Shortcut Road on 4 February 2023 (NL) and a male on Blanchisseuse Road on 3 April 2023 (FA). Once deemed to be an exceedingly rare passage migrant through Trinidad, there have now been 12 birds found in the last 10 years.

Summer Tanager ***Piranga rubra*** is an annual, yet uncommon winter visitor to T&T. Documented sightings during the review period are as follows:- immature male along St Michael Road on 26 February 2023 (MK, RJ); adult female at Las Lapas on 9 April 2023 (FM) and another female along Tortuga Shortcut Road on 29 October 2023 (NL).

A moulting male **Indigo Bunting** ***Passerina cyanea*** was found in wet agricultural fields at Aranguez on 2 February 2023 (Bd'A) (Fig. 11.). It remained faithful to the same small area until the 26 February, during which it slowly attained alternate plumage. There are two "historic" sight records of this migrant from continental North America accepted by Richard ffrench in March 1977 and April 1994 (ffrench 2011). Since the formation of TTBSDC in 1996, the only previous documented sighting was a female in March 2020.

A **Dickcissel** ***Spiza americana*** was photographed at Bon Accord, Tobago on 12 March 2023 (RJ). Whilst large flocks are annually found in Trinidad, this remains an extremely rare wanderer to Tobago with only three documented sightings in the last 25 years.

Escaped cage and aviary species

We are aware of a reintroduction project involving **Muscovy Ducks** *Cairina moschata* from Point-a-Pierre Wildfowl Trust. Sightings of this species from the south-west peninsula of Trinidad may involve birds from this scheme. **Blue-and-yellow Macaws** *Ara ararauna* frequently seen around the Queen's Park Savanna, Port of Spain and **Festive Parrots** *Amazona festiva* seen in Port of Spain and Champs Fleurs are assumed to be escapees from captivity. **Village Weavers** *Ploceus cucullatus* are frequently seen inside Caroni Rice Project but there are as yet no records to suggest that the population is expanding. **Red-and-green Macaws** *Ara chloropterus* continue to be regularly reported from several areas of Trinidad. All evidence suggests that this population originated from individuals which escaped or were released from captivity. However, over the past 15 years there have been 108 records of this species on eBird, with numbers as high as 14 and 12 respectively at La Brea and along the North coast between Las Cuevas and Blanchisseuse, and indications of nesting at four locations at least. Based on these records the Committee believes that the population of Red-and-Green Macaws is self-sustaining and as such has been added to the official list of birds of T&T, but not on the review list. The provenance of seedeater and seed-finch sightings continue to be uncertain due to individuals which have escaped or been released from captivity, often after being illegally imported from the continent. This is particularly so for **Chestnut-bellied Seed-Finch** *Sporophila angolensis* and **Gray Seedeater** *Sporophila intermedia* for which the committee's assessment will be based on identification alone.

Fig. 11. Indigo Bunting, Aranguez, February 2023. Photo Nigel Lallsingh.

Additional records

Acceptable records were also received or submitted to Ebird for a further 40 sightings of the following species whose status has been established but who's distribution continues to be monitored by the Committee: **Trinidad**

Piping-Guan *Pipile pipile*, **Scaled Dove** *Columbina squammata*, **Rufescent Tiger-Heron** *Tigrisoma lineatum*, **Little Egret** *Egretta garzetta*, **Glossy Ibis** *Plegadis falcinellus*, **Hook-billed Kite** *Chondrohierax uncinatus*, **Snail Kite** *Rostrhamus sociabilis*, **Double-toothed Kite** *Harpagus bidentatus*, **Black Hawk-Eagle** *Spizaetus tyrannus*, **Crane Hawk** *Geranospiza caerulescens*, **Rufous Crab Hawk** *Buteogallus aequinoctialis*, **Great Black Hawk** *Buteogallus urubitinga*, **Crested Caracara** *Caracara plancus*, **Aplomado Falcon** *Falco femoralis*, **Variegated Flycatcher** *Empidonomus varius* and **Yellow-bellied Seedeater** *Sporophila nigricollis.*

Inconclusive records

Submissions of the following species were deemed inconclusive :- **White-tailed Tropicbird** *Phaethon lepturus*, **Scarlet Tanager** *Piranga olivacea* and **Black-faced Grassquit** *Melanospiza bicolor*.

The Committee is to undertake a review of all current and, where possible, historic submissions of **Gray Heron** *Ardea cinerea* and immature **Cocoi Heron** *Ardea cocoi.* A report will follow in due course.

Nomenclature changes

Part of the mission statement of the SACC is to create a standard classification, with English names, for the birds of South America. This is subject to constant revision by the proposal system to allow incorporation of new data. The following change were made in 2023:

- The scientific name for Double-striped Thick-knee is now *Hesperoburhinus bistriatus*.
- The scientific name for Leach's Storm-Petrel is now *Hydrobates leucorhous*.
- The scientific name for Mouse-colored Tyrannulet is now *Nesotriccus murina*.
- The scientific name for Golden-rumped Euphonia is now *Chlorophonia cyanocephala*.
- The common name for Yellow-breasted Flycatcher, *Tolmomyias flaviventris* has now changed to Yellow-breasted Flatbill.
- The common name for Yellow-olive Flycatcher, *Tolmomyias sulphurescens* has now changed to Yellow-olive Flatbill.
- The common name for Guianan Trogon, *Trogon violaceus* has now changed to Guianan-Violaceous Trogon.
- The common name for Trilling Gnatwren, *Ramphocaenus melanurus* has now reverted back to Long-billed Gnatwren.

Additions to the SACC List of Species

The following documented sightings from Trinidad have been accepted by SACC as "firsts" for the South America region:

- Eurasian Collared Dove *Streptopelia decaocto*
- Spotted Redshank *Tringa erythropus*

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AUTHOR GUIDELINES

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