

Forty-five New Records of Moths (Lepidoptera) from Tobago, W.I., Increase the Total Species Known to 400

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ABSTRACT

Details of 45 new moth records from Tobago are presented, including species of Cossidae (1), Crambidae (14), Dalceridae (1), Erebidae (7), Geometridae (9), Limacodidae (3), Megalopygidae (1), Noctuidae (1), Nolidae (1), Notodontidae (1), Oecophoridae (1), Pyralidae (2), Sphingidae (2), and Uraniidae (1). All records are based solely on photographs, and representative images are included as vouchers. Forty-two species were identified as adults and three as caterpillars. The total number of moth species known from Tobago is now 400. All reported species are also known from Trinidad (although some records represent the first notification for Trinidad), apart from *Trocodima lenistriata* (Dognin) (Erebidae, Arctiinae, Phaegopterini) and *Eulepidotis* sp. (Erebidae, Eulepidotinae), which are not so far known from Trinidad.

Key words: biology, citizen science, Trinidad, Bombycoidea, Gelechioidea, Noctuoidea, Pyraloidea, Zygaenoidea.

INTRODUCTION

The two main islands of Trinidad & Tobago provide a zoogeographical contrast in terms of size and distance from the mainland (Starr 2009, Wikipedia 2020). Trinidad has an area of 4,768 km²; the south-west peninsula is 11km from Venezuela and while the north-west peninsula is 20km from the mainland, the widest gap is 11.5 km, thanks to the intervening Bocas Islands. Tobago, on the other hand, has an area of about 300km², and is separated from Trinidad by 36km, and from the mainland by about 125km. They are both continental islands and Trinidad's Northern Range and Tobago's Main Ridge are extensions of Venezuela's coastal range. Trinidad was probably last joined to the mainland 10,000 years ago, and Tobago 14,000 years ago. This combination of land area, distance from the mainland, and time since the land masses were last joined, means that Trinidad's biodiversity is a subset of that of the mainland, and in turn, Tobago biodiversity is almost entirely a subset of Trinidad's. Very few species from Tobago are either known from the Lesser Antilles, but not Trinidad or the mainland, or known from Venezuela but not (as yet) from Trinidad.

The moths of Tobago are not well known and only in 2017 was the first checklist of 355 species published (Cock 2017). This is a small total compared to the more than 742 species extrapolated by Cock (2003), and many more species are expected to occur in Tobago, particular those of smaller size. With no active collectors or entomologists currently involved in surveying the Tobago moth fauna, progress is limited to observations and images shared by resident and visiting naturalists and observers. Fortunately, the identification of photos of most species of Tobago moths is relatively straightforward given that (1) digital cameras or phones make taking identifiable images

increasingly straightforward; (2) the Lepidoptera fauna of Tobago is, with very few exceptions, a subset of the fauna of Trinidad (Cock 2017); (3) the moth fauna of Trinidad is now reasonably well known to the first author, based on extensive collecting and museum work (Cock 2003). Furthermore, digital images are easily shared, facilitating rapid identification and feedback. Using this approach, we report here on 45 additions to the moth fauna of Tobago based solely on images, including a voucher image for each record.

METHODS

The great majority of these records are based on photographs taken by the second author at his house at about 130m altitude above Englishman's Bay, on the north coast of Tobago in a mixed habitat of former cocoa estate, disturbed scrub including bamboo, and forest. Moths were attracted to the house lights during the evening and photographed in situ. In the following account, records are based on the second author's photographs from Englishman's Bay unless indicated otherwise.

We refer to material examined in the following collections:

- MJWC Matthew J.W. Cock, private research collection, Dolgellau, UK
NHMUK The Natural History Museum, London, UK
NMS National Museums of Scotland, Edinburgh, UK
OUNHM Oxford University Natural History Museum, Oxford, UK
USNM United States National Museum, Washington, D.C., USA
UWIZM University of the West Indies Zoology Museum, St. Augustine, Trinidad & Tobago

As discussed in Cock (2017) identifications were made by comparison with the first author's collection of Trinidad moths (MJWC), which have been named primarily in the context of the collections of NHMUK and USNM. Species are arranged by family alphabetically, and alphabetically within families; subfamilies are included in parentheses after each. The figures show photographs taken in Tobago, except as indicated. Comments on the status of each species in Trinidad are based on the first author's unpublished records; these give an indication of what the status of these species may be in Tobago. As the Tobago moths were photographed without any indication of scale, the forewing length (F: base of forewing – wing tip) is provided in the figure legends based on Trinidad material in MJWC, except as indicated.

RESULTS

COSSIDAE

Inguromorpha polybia (Schaus, 1892) (Hypoptinae) (Fig. 1)

This is the species recorded from Trinidad as *Zeuzera inguromorpha* (Schaus) by Kaye and Lamont (1927). The first author compared Trinidad material with the labelled types of *I. polybia* (USNM, ♂ Brazil) and of *I. inguromorpha* (USNM, ♂ French Guiana), which is a synonym. In Trinidad this is a widespread occasional species, found in forested and suburban areas.



Fig. 1. Male *Inguromorpha polybia* (Schaus), at light, Englishman's Bay, 11 March 2020. F 14mm.

CRAMBIDAE

Asturodes bioalfae Solis, 2020 (Spilomelinae) (Fig. 2)

Trinidad specimens of this distinctive appearance were initially identified as *Spilomela fimbriauralis* by comparison with the NHMUK series (as they were by Kaye and Lamont 1927). They were reidentified, alongside the second author's image (Fig. 2) using Solis *et al.* (2020) in which *A. bioalfae* was described, and recorded from Trinidad. The identification of the Tobago image (Fig. 2) was confirmed by M.A. Solis (pers. comm.). This is an occasional species in Trinidad, widespread in forested areas.



Fig. 2. Male *Asturodes bioalfae*, at light, Englishman's Bay, 13 December 2019. F 9mm.

Asturodes junkoshimurae Solis, 2020 (Spilomelinae) (Fig. 3)

See comments under the previous species. Trinidad specimens, along with the second author's image (Fig. 3) were identified as this species from Solis *et al.* (2020), and the Tobago identification confirmed by M.A. Solis (pers. comm.). In Trinidad, this species is recorded from Morne Bleu and Point Gourde, where it co-occurs with *A. bioalfae*, as is also the case at Englishman's Bay.



Fig. 3. Female *Asturodes junkoshimurae*, at light, Englishman's Bay, 13 December 2019. F 9mm.

***Blepharomastix lacertalis* (Guenée, 1854) (Spilomelinae) (Fig. 4)**

The second author photographed a male of this species at light above Englishman's Bay on 23 November 2019 and a female 19 March 2020. They match Trinidad specimens identified by comparison with the specimen labelled as type in NHMUK. It has been recorded from Trinidad as *Lamprosema lacertalis* (Kaye and Lamont 1927), and seems to be quite common in forested areas of Trinidad.



Fig. 4. Male *Blepharomastix lacertalis*, at light, Englishman's Bay, 23 November 2019. F 9mm.

***Ceratocilia damonalis* (Walker, 1859) (Spilomelinae) (Fig. 5)**

This species is included on the basis of a dead specimen in poor condition which the second author found in his house at Englishman's Bay (Fig. 5). Trinidad material was identified by comparison with a syntype in NHMUK. In Trinidad this is an uncommon species associated with forest habitat. In the limited material to hand, the pale markings of the forewing are stronger in the female as here, than in the male.



Fig. 5. Female(?) *Ceratocilia damonalis*, dead in house, Englishman's Bay, 28 February 2019. F 18mm.

***Gonocausta zephyralis* (Lederer, 1863) (Spilomelinae) (Fig. 6)**

Trinidad material was identified by comparison with the lectotype (NHMUK ♀), NHMUK series and USNM series. This is an uncommon species in Trinidad, apparently associated with forested areas.



Fig. 6. Female *Gonocausta zephyralis*, at light, Englishman's Bay, 20 March 2020. F 8mm.

***Hileithia approprialis* (Dyar, 1914) (Spilomelinae) (Fig. 7)**

The second author photographed this species at Englishman's Bay on 13 December 2019 (Fig. 7) and 29 January 2020. Trinidad material has been identified by comparison with a cotype (USNM ♀ Panama), originally described as *Bocchoris approprialis*. *Samea delicata* Kaye was described from Trinidad (Kaye 1923); the first author has examined the holotype collected by Sir Norman Lamont (NMS, ♂ Trinidad), and the two species appear identical. Although *Samea delicata* Kaye, 1923 is anticipated to be a synonym of *Bocchoris approprialis* Dyar, 1914, no formal action is taken at this time. This species is widespread in diverse habitats in Trinidad, and commonly found in suburban areas.



Fig. 7. Male *Hileithia approprialis*, at light, Englishman's Bay, 13 December 2019. F 7mm.

***Hyalorista taeniolalis* (Guenée, 1854) (Pyraustinae) (Fig. 8)**

A Trinidad specimen of this species was identified by M. Shaffer in 1980, and the first author subsequently compared it with the NHMUK series. Longstaff (1912) recorded this species from Tobago in the combination *Pionea taeniolalis*, but his specimen was a misidentification of *H. exuvialis* (Guenée) as noted by Cock (2017). *Hyalorista taeniolalis* is an occasional species in Trinidad found in disturbed areas.



Fig. 8. *Hyalorista taeniolalis*, at light, Englishman's Bay, 17 March 2020. F 6mm.

***Lamprosema canacealis* (Walker, 1859) (Spilomelinae) (Fig. 9)**

Trinidad material was identified by comparison with the specimen labelled as type (Brazil, Pernambuco) in NHMUK and the NHMUK series. This species seems uncommon in Trinidad, but recorded from diverse habitats.



Fig. 9. Female(?) *Lamprosema canacealis*, at light, Englishman's Bay, 22 January 2020. F 8mm.

***Massepha lupa* (Druce, 1899) (Spilomelinae) (Fig. 10)**

This species was described from Trinidad as *Pilocrocis plumbilinea* Kaye in 1901, but this is now considered to be a synonym of *M. lupa* described from Guatemala (Kaye and Lamont 1927). Trinidad material was identified by comparison with the specimens labelled as type for both taxa in NHMUK. It is a common and widespread species in Trinidad, primarily associated with forested areas



Fig. 10. *Massepha lupa*, Englishman's Bay, 17 March 2020. F 11mm.

***Palpita flegia* (Cramer, 1777) (Spilomelinae) (Fig. 11)**

Identified by comparison of specimens collected by Sir Norman Lamont in Trinidad (Lamont and Callan 1950) with the USNM series. A further Tobago specimen was photographed near Black Rock, 9 August 2020 by figtree (<https://www.inaturalist.org/observations/60005769>). Lamont's two specimens from Palmiste are the only Trinidad records known to us.

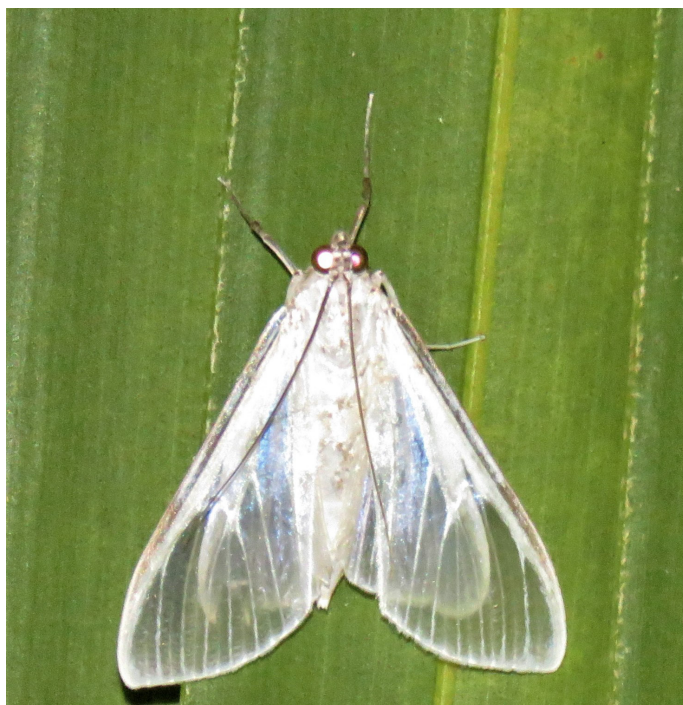


Fig. 11. Female *Palpita flegia*, Englishman's Bay, 14 February 2020. F 23mm (from Lamont's specimens).

***Palpusia ptyonota* (Hampson, 1912) (Spilomelinae)
(Fig. 12)**

Trinidad material was identified by comparison with the specimen from Peru labelled as type in NHMUK. Although this species has not been reported from Trinidad before, it appeared in Kaye and Lamont's (1927) catalogue as *P. glaucusalis* (Walker) (in the combination *Pilocrocis glaucusalis*). This record was based on a misidentification of a specimen collected by Sir Norman Lamont at Palmiste, 18 December 1921, which is now in RSM, where the first author examined it. In Trinidad this species is occasionally encountered in forested areas, with records from the Arima Valley, Cumaca Road, and St. Benedict's.



Fig. 12. Female *Palpusia ptyonota*, at light, Englishman's Bay, 13 January 2020. F 11mm.

***Palpusia terminalis* (Dognin, 1910) male (Spilomelinae)
(Fig. 13)**

Trinidad material was identified by comparison with the USNM series. The wing margins of specimens from Trinidad are comparable with those of the Tobago specimen shown here (Fig. 13) but darker than most of the USNM series, matching a Guyana specimen in this regard. This is an occasional species in forested areas of Trinidad, and is also a new record for Trinidad, with records from the top of Arima Valley, Cumaca Road, Morne Bleu Textel, Point Gourde and Valencia Forest (off the Long Stretch).



Fig. 13. Male *Palpusia terminalis*, at light, Englishman's Bay, 31 January 2020. F 10mm.

***Salbia pachyceralis* (Hampson, 1917) (Spilomelinae)
(Fig. 14)**

Trinidad specimens were identified by comparison with the specimen labelled as type (a male from Panama) and the NHMUK series. This species has not previously been recorded from Tobago, but the first author has records from Arima Valley (Simla, 15 February 1980), Parrylands (13 November 1980) and Penal (K. Sookdeo photo 9 April 2011).



Fig. 14. Female *Salbia pachyceralis*, at light, Englishman's Bay, 29 January 2020. F 10mm.

DALCERIDAE

***Acraga infusa* complex (Dalceridae) (Fig. 15)**

This record is based on an image taken by the second author of a plain orange dalcerid attracted to light above Englishman's Bay (Fig. 15). The Dalceridae of Trinidad were treated by Miller (1994) in his account of the systematics of the Dalceridae, for which he examined material of all known Trinidad species from the collections of MJWC, USNM, UWIZM, etc. Miller treated the only plain orange species from Trinidad as '*Acraga infusa* complex' - a single variable species or a complex of similar species.



Fig. 15. Female *Acraga infusa* complex, at light, Englishman's Bay, 23 November 2019. F male 10mm, female 13mm.

EREBIDAE

Epeirumulona hamata hamata Field, 1952 (Arctiinae, Lithosiini) (Fig. 16)

The second author's image from Englishman's Bay (Fig. 16) is the first time this species has been identified from Tobago. However, having established that this species is present on Tobago, the first author was able to confirm a previously unreported provisional identification of a specimen in poor condition collected at light by Roger Hammond at Charlotteville in June 1999. This species was described from French Guiana and Trinidad (Field 1952), and Trinidad material in MJWC was identified by comparison with paratype material in NHMUK. The hindwings, which are not visible in Fig. 16, are pale orange. In Trinidad, records are mostly from forested areas of the Northern Range and Caparo.



Fig. 16. *Epeirumulona hamata hamata*, at light, Englishman's Bay, 30.xii.2019. F 8mm.

Eulepidotis sp. (Eulepidotinae) (Figs. 17-18)

This species was photographed by the second author at light above Englishman's Bay on five occasions: 18 November 2019, 5 December 2019, 6 January 2020, 12 February 2020 and 24 February 2020 (Figs. 17-18). It has not been identified to species as yet. There are three other bright green species of *Eulepidotis* known from Trinidad: *E. viridissima* (Bar), *E. schedoglauca* Dyar and *E. croceipars* Dyar (Fig. 19). Although the dorsal forewing is similar in all four species, there are obvious differences in size (the Tobago species is comparable to *E. viridissima*) and the markings of the dorsal hindwing and ventral surface.



Fig. 17. *Eulepidotis* sp. at light, Englishman's Bay, 18 November 2019. F 12mm.



Fig. 18. *Eulepidotis* sp. at light, Englishman's Bay, 17 March 2020. F 12mm.

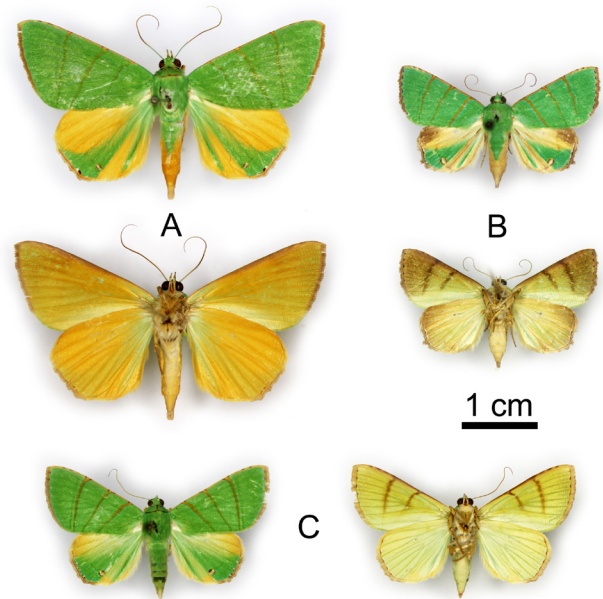


Fig. 19. Green *Eulepidotis* spp. of Trinidad [MJWC]. A, *E. croceipars*, Morne Bleu Textel Installation, at light, 4 February 1979. B, *E. viridissima*, Cumberland Hill, 7 August 1982. C, *E. schedoglauca*, Curepe, MV light trap, June 1979.

***Ilsea* sp. (Calpinae) (Fig. 20)**

The second author's photograph (Fig. 20) matches one of the three species of *Ilsea* found in Trinidad (Fig. 21). Poole (1989) lists five species of *Ilsea* in total, but the species considered here does not match any of these and is probably undescribed.



Fig. 20. Female *Ilsea* sp. at light, Englishman's Bay, 7 January 2020. F 12mm.

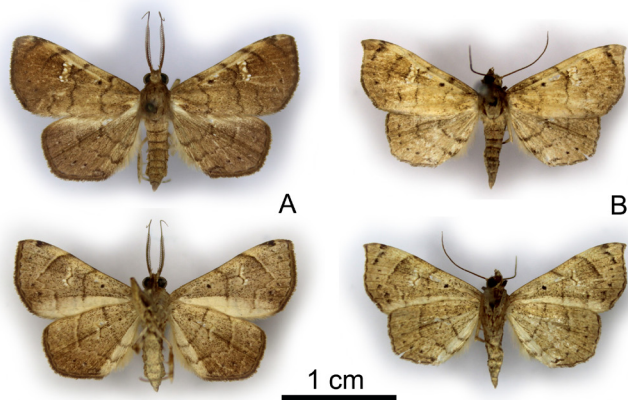


Fig. 21. Trinidad specimens of *Ilsea* sp., dorsal view above, ventral view below; M.J.W. Cock [MJWC]. A, male, Hollis Reservoir, at pump house lights, 17 October 1978. B, female, Parrylands Oilfield, at UV light, 13 November 1980.

***Metalectra praecisalis* Hübner, 1823 (Erebidae, Boletobinae) (Fig. 22)**

The second author photographed this species twice at Englishman's Bay: 13 January 2020 (Fig. 22) and 7 March 2020. Trinidad material in MJWC was identified by comparison with the NHMUK series. This is a common and widespread species in Trinidad in both forested and suburban habitats. *Metalectra carneomacula* (Guenée, 1852) (Fig. 23) is a similar but larger species with some pale markings, which is also found in Tobago (Cock 2017).



Fig. 22. Male *Metalectra praecisalis*, at light, Englishman's Bay, 13 January 2020. F 13mm.



Fig. 23. Male(?) *Metalectra carneomacula*, at light, Englishman's Bay, 3 January 2020. F 16mm.

***Renodes croceiceps* (Walker, 1865) (Eulepidotinae) (Fig. 24)**

Trinidad material was identified by comparison with the NHMUK series. While a good match to material from Colombia, Trinidad specimens are not an exact match to the specimen labelled as type from Guatemala, so it may be that South American material represents a different, closely related species. *Renodes liturata* (Walker, 1865) has also been recorded from Tobago (Cock 2017); it can be distinguished most easily by the dark brown, rather than yellow brown, head (Fig. 25).



Fig. 24. *Renodes croceiceps* at light, Englishman's Bay, 15.xii.2019. F 11mm.



Fig. 25. *Renodes liturata* at light, Englishman's Bay, 2.xii.2019. F 11mm.

***Trocodima lenistriata* (Dognin, 1906) (Arctiinae, Phaegopterini) (Fig. 26)**

Identified with the assistance of Michel Laguerre by comparison with an image of the lectotype of *T. pellucida* (Rothschild) from Venezuela (NHMUK). *Trocodima pellucida* is currently considered a synonym of *T. lenistriata* (Vincent and Laguerre 2014), but may prove to be a valid species in its own right, in which case *T. pellucida* would be the better name to use for this record. No *Trocodima* spp. from Trinidad or Tobago have been recorded or are known to the authors, so this is a new country record, which would be expected to occur in Trinidad.



Fig. 26. Male *Trocodima lenistriata* at light, Englishman's Bay, 24 January 2020.

***Zale strigimacula* (Guenée, 1852) (Erebinae) (Fig. 27)**

This species was found in Plymouth, 12 July 2015 by Aaron Wheeler and an image posted on iNaturalist (Fig. 27). Zagatti *et al.* (1995-2006) was used to identify Trinidad material. In Trinidad, this species was recorded as *Z. lunata* (Drury) by Kaye and Lamont (1927), but this is a misidentification of a North American species. *Zale strigimacula* occurs in Brazil, the Guianas and north into the Lesser Antilles (Zagatti *et al.* 1995-2006), so its presence in Tobago is to be expected. In Trinidad, it is an occasional species in suburban areas. *Zale fictilis* (Guenée, 1852) is also known from Tobago (Cock 2017). It is a slightly smaller, greyer, more uniformly marked species (Fig. 28), whereas *Z. strigimacula* although varied, is larger, usually more colourful, and more contrasting and more granular in its markings (Fig. 27).



Fig. 27. *Zale strigimacula*, Plymouth, 12.vii.2015. © figtree, edited from <https://www.inaturalist.org/observations/36635554>, under Creative Commons License CC-BY-NC. F 28mm.



Fig. 28. *Zale fictilis*, Trinidad, Arima Valley, Simla, at light, January 2012, D.J. Stradling. F 24mm.

GEOMETRIDAE

Chloropteryx opalaria (Guenée, [1858]) (Geometrinae) (Fig. 29)

The second author photographed this species coming to light at Englishman's Bay on 22 January and 17 March 2020. Material from Trinidad was identified by comparison with the specimen labelled as type (NHMUK, Brazil) and NHMUK series. Although not recorded from Trinidad by Kaye and Lamont (1927), it was recorded (with a ?) from the island by Pitkin (1996). This is an occasional species in Trinidad, mainly found in forested areas.



Fig. 29. Female *Chloropteryx opalaria*, at light, Englishman's Bay, 17 March 2020. F 10mm.

Dithecodes deaurata (Warren, 1904) (Sterrhinae) (Fig. 30)

Material from Trinidad was identified by comparison with the specimen from Ecuador labelled as type and the NHMUK series. It was recorded from Trinidad by Kaye and Lamont (1927) as *Mnesithetis olivaria* Snellen (which is actually a synonym of a similar species, *D. distracta* Walker), based on a specimen collected at San Hilario in August 1917 by Agnes Lickfold. The first author has reidentified this specimen (in OUNHM), as *D. deaurata*. This is a common and widespread species in Trinidad.



Fig. 30. *Dithecodes deaurata* (Warren), at light, Englishman's Bay, 18.xi.2019. F 10mm.

Parilexia nicetaria (Guenée, [1858]) (Ennominae) (Fig. 31)

This species was recorded from Trinidad as *Casbia nicetaria* by Kaye and Lamont (1927), and is a variable, fairly common, widespread species in forested areas of Trinidad, readily attracted to light.



Fig. 31. Male *Parilexia nicetaria*, at light, Englishman's Bay, 28 November 2019. F 14mm.

Pero amanda (Druce, 1898) (Ennominae) (Fig. 32)

Trinidad material was identified by comparison with the holotype (NHMUK, ♂, Mexico) and Poole (1987). This is an occasional species restricted to forested areas in Trinidad.



Fig. 32. Female *Pero amanda*, at light, Englishman's Bay, 26 February 2020. F 20mm.

Semiothisa arenisca (Dognin, 1898) (Ennominae) (Fig. 33)

Trinidad material was identified by comparison with the NHMUK series. Public DNA barcodes in BOLD indicate that more than one species is probably grouped under this name, but until this is clarified and published, this name will be used for Trinidad and Tobago material. Kaye and Lamont (1927) record this species from Trinidad, where it is widespread and quite common, but more frequent in forested areas.



Fig. 33. Male *Semiothisa arenisca*, at light, Englishman's Bay, 2 December 2019. F 14mm.

***Synchlora expulsata expulsata* (Walker, 1861) (Geometrinae) (Fig. 34)**

Trinidad material was identified by comparison with the specimen from Tefé, Amazonas, Brazil labelled as type (NHMUK) and the NHMUK series. It is a widespread and occasional species of forested areas in Trinidad.



Fig. 34. Male *Synchlora expulsata expulsata*, at light, Englishman's Bay, 8 December 2019. F 7mm.

***Tachyphyle allineata* (Warren, 1900) (Geometrinae) (Fig. 35)**

Trinidad material was identified by comparison with the specimen labelled as type (NHMUK, ♂ Venezuela) and NHMUK series. This species is widespread in lowland areas of Trinidad, in both forested and suburban areas.



Fig. 35. Female *Tachyphyle allineata*, at light, Englishman's Bay, 26 February 2020. F 12mm.

***Tricentrogyna colligata* (Warren, 1906) (Sterrhinae) (Fig. 36)**

This tiny species (wingspan 11 mm) was photographed by the second author at light above Englishman's Bay. It has not previously been recorded from Trinidad or Tobago, but there are several specimens from Trinidad in MJWC and UWIZM, which were identified by comparison with the male type (USNM, French Guiana) and NHMUK series. In Trinidad, it is an occasional species, primarily associated with forested habitats.



Fig. 36. *Tricentrogyna colligata*, at light, Englishman's Bay, 19 November 2019. F 5mm.

***Zanclopteryx subsimilis* Warren, 1897 (Desmobathrinae) (Fig. 37)**

Identified by comparison with the specimen labelled as type (NHMUK, Venezuela) and NHMUK series, which includes Trinidad material. The diagnostic very faint forewing subdiscal line is visible in the figure. Prout (1910) records this species from Trinidad, although it does not appear in Kaye and Lamont's (1927) catalogue. An uncommon species in lowland forested areas of Trinidad.



Fig. 37. *Zanclopteryx subsimilis*, at light, Englishman's Bay, 27 January 2020. F 10mm.

LIMACODIDAE

Miresa clarissa (Stoll, 1790) (Fig. 38)

This species was identified by the comparison of Trinidad material with the NHMUK series. This is an occasional species in Trinidad, widespread in forested areas to 700m.



Fig. 38. Male *Miresa clarissa*, at light, Englishman's Bay, 20 February 2020. F 15mm.

Semyra coarctata Walker, 1855 (Fig. 39)

The second author photographed males of this species at light at Englishman's Bay on 12 February and 19 March 2020. This name is based on a visual comparison of Trinidad material with the NHMUK series. However, this is part of a species complex needing revision (M.E. Epstein pers. com.) and so this name should be considered provisional at this time. In Trinidad, most records of this species have been from a suburban area (Curepe).



Fig. 39. Male *Semyra coarctata*, at light, Englishman's Bay, 12 February 2020. F 11mm.

Tanadema mas Dyar, 1905 (Fig. 40)

The second author photographed this species twice at light at Englishman's Bay: 29 January and 26 March 2020. *Tanadema mas* was described from French Guiana, Suriname and Guyana; Trinidad material was identified by comparison with a paratype from Guyana in NHMUK and the NHMUK series. Compared to Trinidad specimens, the male photographed by the second author at Englishman's Bay (Fig. 40) appears to have darker forewing markings and the thorax is more orange, but this is a variable species (M.E. Epstein pers. comm.) and so we use this name for Tobago – at least pending availability of specimens for a more detailed study. In Trinidad, *T. mas* is not uncommon and widespread in forested habitats.



Fig. 40. Male *Tanadema mas*, at light, Englishman's Bay, 29 January 2020. F 10mm.

MEGALOPYGIDAE

Thoscera brucea Schaus, 1904 (Trosiinae) (Fig. 41)

This record is based on a photograph taken by Chris Harrison at the Cuffie River Nature Retreat in January 2019. It has not previously been recorded from Trinidad, but there are specimens from Arima Valley (Simla), Curepe and Morne Bleu in MJWC and UWIZM. Trinidad specimens were compared with the male specimen from Venezuela labelled as type in USNM. This is a rare species in Trinidad with no obvious habitat association.



Fig. 41. Male *Thoscera brucea*, Cuffie Nature Resort, 1 January 2019, C. Harrison. © C. Harrison, edited from <https://www.inaturalist.org/observations/19364420> under Creative Commons License CC-BY-NC. F 20mm.

NOCTUIDAE

Callopietria floridensis (Guenée, 1852) (Eriopinae) (Fig. 42)

This record is based on an image of a caterpillar (Fig. 42) found feeding on a fern in the Mount Pleasant – Golden Grove area of Tobago by Aaron Wheeler, and posted on iNaturalist (<https://www.inaturalist.org/observations/31320559>). Following a suggestion by Oswaldo Hernández, identification was based on Valerie G. Bugh's image in MPG (2019). *Callopietria floridensis* is known from Trinidad (Kaye and Lamont 1927), where it is a common and widespread species. It also occurs in the Lesser Antilles (Zagatti *et al.* 1995-2006), so would be expected in Tobago. *Callopietria* spp., including *C. floridensis*, are known to feed on ferns, which are unusual food plants for most Lepidoptera groups (Hendrix 1980). Recorded food plants of *C. floridensis* in North America include species of the fern genera *Adiantum*, *Blechnum*, *Cyrtomium*, *Nephrolepis*, *Polypodium* and *Pteris* (Tietz 1972). The fern species shown here was subsequently identified from additional images as an exotic garden ornamental, *Nephrolepis exaltata* (L.) Schott., by Yasmin Baksh-Comeau of the National Herbarium.



Fig. 42. Final instar caterpillar of *Callopietria floridensis*, on *Nephrolepis exaltata*, Mount Pleasant–Golden Grove, 26 November 2018, A. Wheeler. © figtree, edited from <https://www.inaturalist.org/observations/31320559> under Creative Commons License, CC-BY-NC.

NOLIDAE

Nola pernitens (Schaus, 1911) (Nolinae) (Fig. 43)

This species has not previously been reported from Trinidad or Tobago. Material in MJWC was identified by comparison with the specimen labelled as type in USNM, a male from Costa Rica. Trinidad specimens in MJWC and UWIZM are from Arima Valley (Simla 3♂) and Morne Bleu Textel (1♂).



Fig. 43. *Nola pernitens* at light, Englishman's Bay, 7 January 2020. F 6mm.

NOTODONTIDAE

Tachuda discreta Schaus, 1905 (Nystaleinae) (Fig. 44)

Trinidad material was included in the type series (Schaus 1905), although more recent captures are consistently darker than the lectotype (USNM, French Guiana, ♂) and NHMUK series, raising the possibility that it may represent a different taxon. This is an uncommon species in Trinidad, found in forested areas.



Fig. 44. *Tachuda discreta* at light, Englishman's Bay, 18 February 2020. F 18mm.

OECOPHORIDAE

Stenoma leucaniella (Walker, 1864) (Stenomatinae) (Fig. 45)

Trinidad material was identified by comparison with the USNM series, which includes specimens from the Arima Valley. In Trinidad, this is an occasional species, mostly recorded from forested areas.



Fig. 45. Male *Stenoma leucaniella*, at light, Englishman's Bay, 29 March 2020. M 11mm, F 12mm.

PYRALIDAE

Cacozelia elegans (Schaus, 1912) (Epipaschiinae) (Fig. 46)

There is a single female Trinidad specimen known from Palmiste, 30 December 1931, collected by Sir Norman Lamont (Lamont and Callan 1950), which the first author has examined in RSM and confirmed the identification by comparison with the USNM series. Apparently rare in both Trinidad and Tobago.



Fig. 46. *Cacozelia elegans*, at light, Englishman's Bay, 15 December 2019. F 11mm (estimated).

***Dasyncnemia naparimalis* (Kaye, 1924) (Chrysauginae)
(Fig. 47)**

The second author photographed this species at Englishman's Bay on 5 December 2019, 24 February, 14 and 17 March 2020 (all males). Trinidad material in MJWC was identified by comparison with the type material from Trinidad (Palmiste and Port of Spain) in Sir Norman Lamont's collection in NMS. It is possible that *D. naparimalis* is a synonym of *D. obliquialis* Hampson described from Brazil, but this has not been critically evaluated. This species is widespread in diverse habitats in Trinidad, but most commonly found in forested areas.



Fig. 47. Male *Dasyncnemia naparimalis*, at light, Englishman's Bay, 24 February 2020. F male 8mm, F 12mm.

***Hypocosmia floralis* (Stoll, 1782) (Chrysauginae) (Fig. 48)**

Trinidad material was identified by comparison with the USNM series. An occasional species in Trinidad, mostly encountered in forested areas.



Fig. 48. *Hypocosmia floralis*, at light, Englishman's Bay, 27 January 2020. F 9mm.

SPHINGIDAE

***Eumorpha labruscae labruscae* (Linnaeus, 1758)
(Macroglossinae)**

Anushka Ramsden photographed a caterpillar in her yard in Scarborough, and posted it on iNaturalist (<https://www.inaturalist.org/observations/40688145>) on 25 March 2020. It was identified by comparison with the images in Hossie *et al.* (2013). This species used to be common in suburban areas of Trinidad, but seems less so in recent decades (Cock 2018). It is widespread throughout tropical America, including the Caribbean, so its presence in Tobago is expected.

***Xylophanes chiron nechus* (Cramer, 1777)
(Macroglossinae) (Fig. 49)**

Mike G. Rutherford photographed a *Xylophanes* sp. caterpillar near Hermitage, eastern Tobago in July 2016. Three species of *Xylophanes* are recorded from Tobago: *X. pluto* (Fabricius), *X. tersa* (Linnaeus) and *X. tyndarus* (Boisduval) (Cock 2017). The caterpillars of all three are known and they do not match this species; *X. pluto* and *X. tyndarus* have a single pair of eye spots on the thorax, and *X. tersa* has a row of eye spots extending almost the length of the body. Of the nine other species of *Xylophanes* known from Trinidad (Cock 2018), only *X. chiron* has two pairs of eye spots on the thorax (e.g. Janzen and Hallwachs 2020, Oelkhe 2020), although I have not located images of two of the Trinidad species, *X. neoptolemus* (Cramer) and *X. thyelia* (Linnaeus). However, while *X. chiron nechus* also occurs in the Lesser Antilles and so should be expected to occur in Tobago, these other two species do not extend that far north (Zagatti *et al.* 1995-2006), and are less likely to occur in Tobago. Nevertheless, confirmation that this is a Tobago species is desirable.



Fig. 49. Full grown caterpillar deduced to be *Xylophanes chiron nechus*, Hermitage, 8 July 2016, M.G. Rutherford. © Mike G. Rutherford <https://www.inaturalist.org/observations/12144889>, Creative Commons Licence, CC-BY-NC.

URANIIDAE

Syngria druidaria Guenée, 1857 (Epipleminae) (Fig. 50)

This species was described from Guyana, Tefé (Brazil), and Venezuela. It was identified by comparison with the specimen labelled as type in NHMUK and the NHMUK series. It is a variable species, and may represent a species complex. In Trinidad it is widespread and common in forested areas, often encountered by day as well as being attracted to light at night.



Fig. 50. Female *Syngria druidaria*, at light, Englishman's Bay, 16 December 2019. F 25mm.

DISCUSSION

Cock (2017) considered his checklist of 355 species of Tobago moths to be provisional, as the island has only been casually and locally surveyed by visiting collectors and naturalists. This is especially true for the smaller species that are less likely to be collected or observed by many short-term visitors, and this is reflected in the new records reported here. However, the increase in the number of species of moths known from Tobago, although more than 12%, still leaves the total far short of that expected. The new records reported here are based entirely on images taken by interested observers in Tobago, particularly the second author, and are a clear demonstration of how such images taken by citizen scientists can be used to add to our knowledge of the biodiversity of under-recorded areas. The fact that the first author is already familiar with the Lepidoptera fauna of Trinidad, of which the Tobago Lepidoptera make up a subset, has made their identification practical and reasonably reliable. Two species, *Trocodima lenistriata* (Erebidae, Arctiinae, Phaegopterini) and *Eulepidotis* sp. (Erebidae, Eulepidotinae) are not so far known from Trinidad. Although the former is known from the mainland, e.g. Venezuela, the distribution of the latter cannot be assessed until it is identified. Several other species had not previously been recorded from Trinidad, although the first author was aware that they occurred there. Most of the species reported here are not uncommon in Trinidad and their occurrence in Tobago is not unexpected.

Photographs taken by the second author of about

20 other species of mainly Crambidae, Pyralidae and Geometridae could not be fully identified at this time and are not reported here. Bearing in mind that the second author's photographic record was primarily during the dry season when moths are less common, it seems clear that there are many more species still to be recorded from Tobago. As shown here, citizen scientists can play a significant role in filling this gap.

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REFERENCES

- Cock, M.J.W.** 2017. A preliminary catalogue of the moths (Lepidoptera except Papilionoidea) of Tobago, West Indies. *Insecta Mundi*, 0585: 1-58.
- Cock, M.J.W.** 2018. Hawk-moths (Sphingidae) of Trinidad, West Indies: an illustrated and annotated catalogue. *Living World, Journal of the Trinidad and Tobago Field Naturalists' Club*, 2018: 10-81.
- Field, W.D.** 1952. Moths of the genus *Epepiromulona*, a new genus of Lepidoptera. *Proceedings of the United States National Museum*, 102: 455-469.
- Hendrix, S.D.** 1980. An evolutionary and ecological perspective of the insect fauna of ferns. *American Naturalist*, 115(2): 171-196.
- Hossie, T.J., Sherratt, T.N., Janzen, D.H. and Hallwachs, W.** 2013. An eyespot that "blinks": an open and shut case of eye mimicry in *Eumorphia* caterpillars (Lepidoptera: Sphingidae). *Journal of Natural History*, 47(45-46): 2915-2926.
- Janzen, D.H. and Hallwachs, W.** 2020. Dynamic database for an inventory of the macrocaterpillar fauna, and its food plants and parasitoids, of Area de Conservacion Guanacaste

- (ACG), northwestern Costa Rica. [Online]. Available at: <http://janzen.sas.upenn.edu> (Accessed 8 January, 2020)
- Kaye, W.J.** 1923. New species of Trinidad moths. *Proceedings of the Zoological Society*, 1922, 991-998, plate 1.
- Kaye, W. J.** and **Lamont, N.** 1927. A catalogue of the Trinidad Lepidoptera Heterocera (moths). *Memoirs of the Department of Agriculture, Trinidad and Tobago*, 3: 1-144.
- Lamont, N.** and **Callan, E. McC.** 1950. Moths new to Trinidad, B.W.I. *Zoologica*, 35: 197-207.
- Longstaff, G.B.** 1912. Butterfly-hunting in many lands. Notes of a field naturalist. London, UK: Longmans, Green & Co. 728 p.
- Miller, S.E.** 1994. Systematics of the Neotropical moth family Dalceridae (Lepidoptera). *Bulletin of the Museum of Comparative Zoology*, 153(4): 301-495.
- MPG (Moth Photographers Group)** 2019. [Online]. Available at <http://mothphotographersgroup.msstate.edu> (Accessed 21 Nov 2019). Specifically: <http://mothphotographersgroup.msstate.edu/species.php?hodges=9630>
- Oehlke, B.** 2020. Sphingidae of the Americas. [Online]. Available at <http://www.silkmoths.bizland.com/Sphinx/danjansphinx.htm> (Accessed 1 January 2020)
- Pitkin, L.M.** 1996. Neotropical emerald moths: a review of the genera (Lepidoptera: Geometridae, Geometrinae). *Zoological Journal of the Linnean Society*, 118: 309-440.
- Poole, R.W.** 1987. A taxonomic revision of the New World genus *Pero* (Lepidoptera: Geometridae). *United States Department of Agriculture, Technical Bulletin* 1698, 257 p.
- Poole, R.W.** 1989. Noctuidae. Lepidopterorum catalogus. (New Series, edited by J. B. Heppner, Fasc. 118, 3 vols). Leiden, Netherlands: E.J. Brill. 1314 p.
- Prout, L.B.** 1910. Lepidoptera Heterocera Fam. Geometridae: Subfam. Oenochrominae. *Genera Insectorum*, 104: 120 p., 2 pl.
- Tietz, H.M.** 1972. An index to the described life histories, early stages and hosts of the macro-lepidoptera of the continental United States and Canada. Sarasota, Florida, USA: Allyn Museum of Entomology. 2 vols. 1041 pp.
- Schaus, W.** 1905. Descriptions of new South American Moths. *Proceedings of the United States National Museum*, 29(1420): 179-345.
- Solis, M.A., Phillips-Rodríguez, E., Hallwachs, W., Dapkey, T.** and **Janzen, D.H.** 2020. *Asturodes* Amsel (Lepidoptera: Crambidae: Spilomelinae): three new species from the Western Hemisphere and food plant records from Area de Conservación Guanacaste, Costa Rica. *Proceedings of the Entomological Society of Washington*, 122(1): 147-171.
- Starr, C.K.** 2009. Trinidad and Tobago. p. 926-929. In: **Gillespie, R.** and **Clague, D.**, eds. The Encyclopedia of Islands. Berkeley, California, USA: University of California Press.
- Vincent, B.** and **Laguerre, M.** 2014. Catalogue of the Neotropical Arctiini Leach, [1815] (except *Ctenuchina* Kirby, 1837 and *Euchromiina* Butler, 1876) (Insecta, Lepidoptera, Erebidae, Arctiinae). *Zoosystema*, 36: 137-533.
- Wikipedia** 2020. Trinidad and Tobago. [Online]. Available at https://en.wikipedia.org/wiki/Trinidad_and_Tobago (Accessed 25 September 2020)
- Zagatti, P., Lalanne-Cassou, B.** and **Duchât d'Aubigny, J. le** (1995-2006) Catalogue of the Lepidoptera of the French Antilles. [Online]. Available at <http://www7.inra.fr/papillon/indexeng.html> (Accessed 14 December 2020). Specifically: http://www7.inra.fr/papillon/noctuid/catocali/texteng/z_strigi.htm.