

Euchromiina wasp moths (Lepidoptera, Erebidae, Arctiinae, Arctiini) of Trinidad & Tobago

Matthew J.W. Cock¹ and Michel Laguerre²

1. CABI, Bakeham Lane, Egham, Surrey TW20 9TY, UK.

m.cock@cabi.org / mjwcock@btinternet.com

2. 31, rue de la Haute-Lande, 33850 Léognan, France

mlaguerre@wanadoo.fr

ABSTRACT

An illustrated and annotated catalogue is presented of 28 genera and 61 species of Euchromiina (Erebidae, Arctiinae, Arctiini) confirmed to occur in Trinidad and seven species in Tobago. Of these, nine are new records for Trinidad. Images of 34 species of living adults are included. Very little has been recorded regarding food plants and early stages of Euchromiina in Trinidad, but what is known is reported. A supplementary appendix includes all records from Trinidad & Tobago, and figures showing details of the body and male genitalia for selected species.

Key words: food plants, distribution, checklist, inventory, new records, DNA barcodes, iNaturalist

INTRODUCTION

Trinidad and Tobago are two small islands off the north-east coast of South America with a combined land area of about 5100 km² and maximum elevation slightly below 1000 m. Together with some very small 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 by far the better known of the two, and Tobago being further from the South American mainland has a biota that is largely a subset of that of Trinidad (Starr 2009, Cock 2021).

We consider the term ‘wasp moths’ to cover two closely-related subtribes Euchromiina and Ctenuchina of the tribe Arctiini, subfamily Arctiinae, family Erebidae. In the last 20 years, regional lists of Euchromiina and Ctenuchina have started to appear (e.g. Piñas and Manzano 2003, Hernández-Baz and Grados 2004, Hernández-Baz and Bailey 2006, Hernández-Baz *et al.* 2013, Hernández-Baz *et al.* 2017), and it seems likely that these two subfamilies will be useful flagship groups for the assessment and monitoring of biodiversity. Wasp moths are small to medium sized moths (Figs. 1–2), often brightly coloured, and many having transparent areas on the wings. Most (but not all) have a general wasp-like appearance (Figs. 1–2), and may move and fly in a wasp-like way. Many species are thought to be distasteful and they mimic each other as well as stinging wasps, distasteful beetles, etc. Sexual dimorphism is usually, but not always, slight; some cases of strong sexual dimorphism have led to the two sexes being described as separate species, which may only recently have been detected. It is becoming apparent that some species are polymorphic – the different morphs often having been described as separate species. *Phoenicoprocta vacillans* below is a striking example of strong sexual dimorphism,

combined with substantial continuous variability in the male and polymorphism in the female (Fleming 1957).

There is no recent catalogue of Euchromiina or Ctenuchina. The most recent comprehensive treatments were Hampson’s (1898, 1914) review of the collection in the Natural History Museum, London (NHMUK) and Draudt’s (1915–1917) treatment in Seitz’ *Macrolepidoptera of the World*, both more than 100 years ago. In the introductory remarks to the family, Seitz (1915) indicated that more than 2000 species of Syntomidae (i.e. Syntomini, Euchromiina and Ctenuchina) were known, of which 1800 were American, all belonging to the Euchromiina and Ctenuchina. However, documentation and voucher material of these two tribes from Trinidad & Tobago are relatively rich. The subtribe has been documented alongside other Trinidad moths in a preliminary catalogue (Kaye 1901), a catalogue (Kaye and Lamont 1927) and additions (Lamont and Callan 1950), including 12, 39 and 42 Euchromiina respectively. Some of W.J. Kaye’s material of Euchromiina was deposited in the NHMUK, but his collection was acquired by the Allyn Museum of Entomology, Sarasota, Florida, which is now integrated into the McGuire Center for Lepidoptera and Biodiversity, Gainesville (MGCL). Sir Norman Lamont’s collection is divided between The National Museums of Scotland, Edinburgh (NMS) and the University of the West Indies Zoology Museum, St. Augustine, Trinidad & Tobago (UWIZM). Based on the locality and date information in Kaye and Lamont (1927) compared to actual specimens in these two collections, specimens of Lamont’s material collected before 1915 were all collected at Palmiste but incorporated into his collection with no data labels.

In the 1950s, William Beebe and colleagues Henry Fleming and Rosemarie Kenedy worked inter alia on

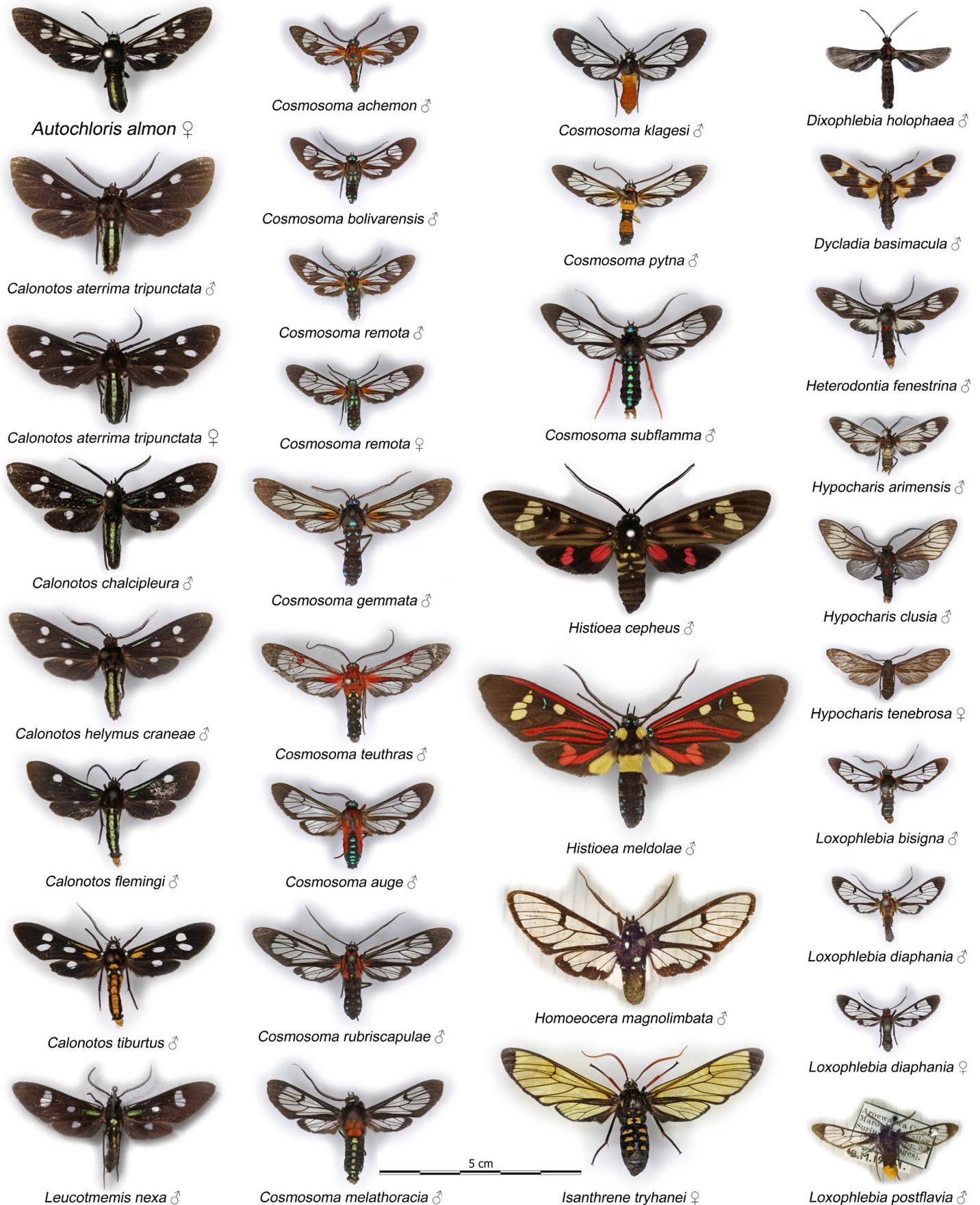


Fig. 1. Trinidad & Tobago Euchromiina 1, genera A–L. Life size; all images appear enlarged in the species accounts below, together with any photo credits. Note *Cosmosoma hypocheilus* (Fig. 27) is not included here.

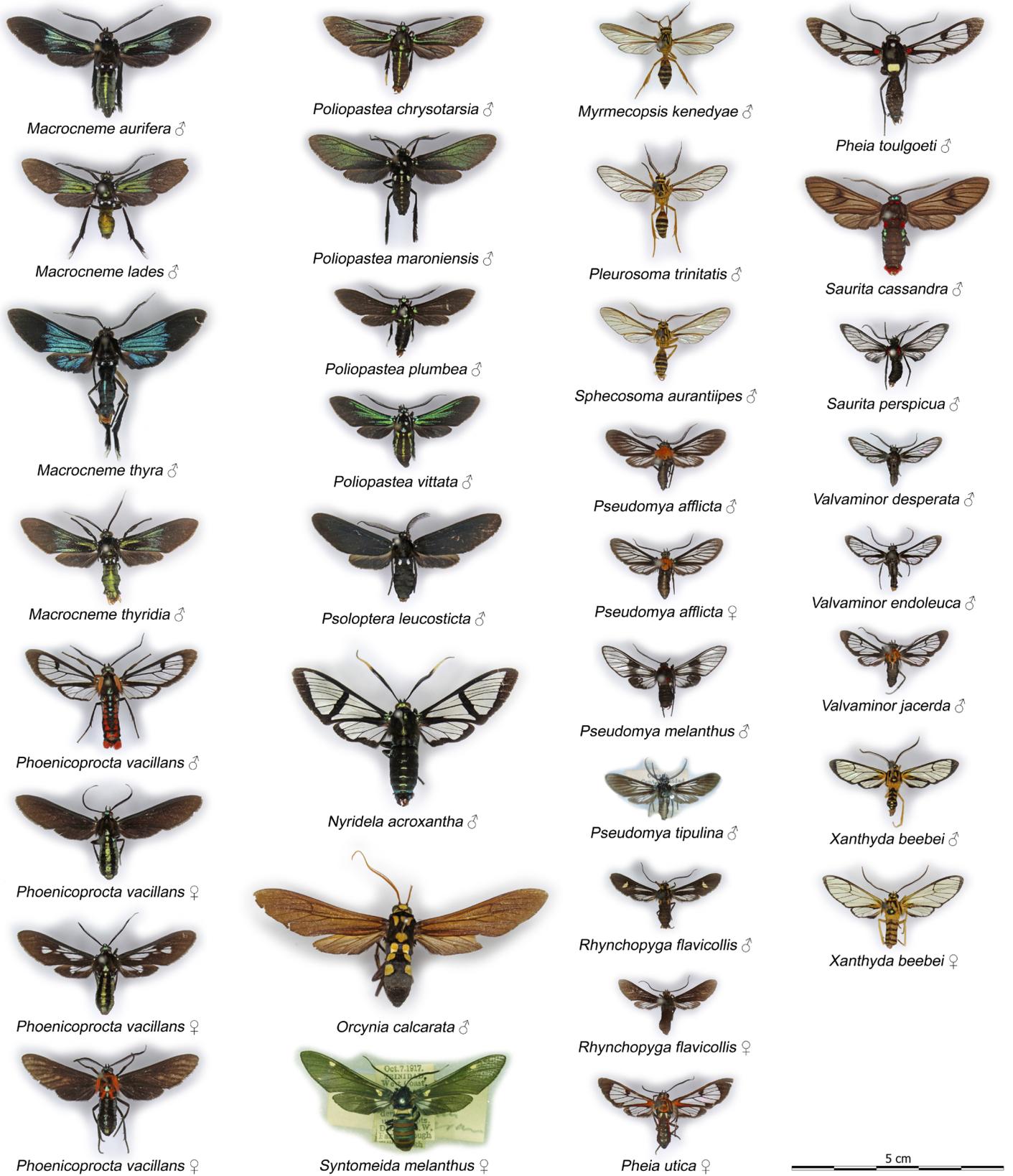


Fig. 2. Trinidad & Tobago Euechroina 2, genera M–X. Life size; all images appear enlarged in the species accounts below, together with applicable photo credits.

Euchromiina and Ctenuchina at Simla, the tropical field station of the New York Zoological Society (NYZS) in the Arima Valley. Based on this, Fleming (1957, 1959) monographed the two subtribes for Trinidad, which provided a valuable start for our work, and included 52 species of Euchromiina. Fleming (1957, 1959) refers to their material deposited in the Department of Tropical Research, NYZC. Holotypes and some paratypes were deposited in The American Museum of Natural History, New York (AMNH), and some paratypes in NHMUK, but the remainder stayed with NYZC. The NYZS (now Wildlife Conservation Society) collections were subsequently transferred to AMNH, although some duplicates went to the National Museum of Natural History, Washington (USNM) (S. Miller pers. comm.). We have not examined Fleming's material, and in the following refer to Fleming's material from NYZS as in AMNH without allowing for some being in USNM.

This earlier work included several examples of sexually dimorphic or polymorphic species being counted more than once, although Fleming (1957) clarified most of these. Building on this earlier work, we now treat 61 species from Trinidad, and seven from Tobago. Of these, nine are newly recorded from Trinidad. This is based on examination of historical collections (NHMUK, USNM, NMS and UWIZM) and the collection of the first author (MJWC) (Cock 2003), which is divided between his collection (MJWC), UWIZM and NHMUK. At this time, three species of Trinidad Euchromiina are known from single records, and another three from just two records. Given a total of 61 species now known, this suggests that more species are yet to be recorded, although perhaps not a great many more.

Cock (2017) recorded six species of Euchromiina from Tobago, and Cock and Laguerre (2022) add one further species. Remarkably, two of the seven Tobago species, *Cosmosoma gemmata* (Butler, 1876) and *Pheia utica* (Druce, 1889), have not as yet been recorded from Trinidad (29%). In contrast, Cock (2017) noted that 17 out of 355 total moth species (4.7%) recorded from Tobago were species not known from Trinidad. These numbers are now 15 out of 466 (3.2%) (Cock *et al.* 2022, M.J.W. Cock unpublished data). Here we treat the subtribe Euchromiina from Trinidad & Tobago, and will address the Ctenuchina in a follow-on publication.

Classification

In the past, the two subtribes Euchromiina and Ctenuchina have been variously treated as part of the families Syntomidae (now Syntomini a separate and distantly related Old World tribe of Arctiinae), and as Euchromiidae or Ctenuchidae. The present arrangement follows Zahiri

et al.'s (2011) phylogeny of the Erebiidae, and is supported by the recent study by Dowdy *et al.* (2020), who consider Euchromiina and Ctenuchina as valid sister sub-tribes within Arctiini.

Although Hampson (1898) recognized that what we now refer to as Euchromiina and Ctenuchina were separated by their hindwing venation, Forbes (1939) seems to have been the first to separate them as named groups: Euchromiinae and Ctenuchinae, which he treated as subfamilies of Euchromiidae. He states that '*In the Euchromiinae M2 of the hind wing is rudimentary or absent, being represented by a faint vein or line of scales from the angle of the discocellular; and Cu1 and Cu2 are stalked or united; while in the Ctenuchinae M2 is fully developed and curved, arising from below the angle of the discocellulars, and Cu1 and Cu2 are widely separated except in the Horama group. A few aberrant genera also have M2 obsolescent from the angle but Cu2 well separated.*' Fleming (1957, 1959) treated the two subtribes as subfamilies, Euchromiinae and Ctenuchinae, of Ctenuchidae, stating '*The absence of vein Sc in the hindwing separates the Euchromiinae from other families of Trinidad moths. In this subfamily vein M2 of the hindwing is rudimentary or absent but often represented by a vein-like line of scales. Whereas in the subsequent subfamily, Ctenuchinae, vein M2 of the hindwing is present. Veins Cu1 and Cu2 are stalked or united in the Euchromiinae, but in the Ctenuchinae, with the exception of the Horama and related genera, they are widely separated.*' (Fleming 1957).

Within the Trinidad fauna, the two subfamilies are confusingly similar. Some distinctive genera and habitus types (external appearance) are restricted to one or other, but others are not so easily allocated on sight. *Calonotos*, *Cosmosoma*, *Histioea*, and the polybiine wasp mimics are examples of distinctive Euchromiina genera, and *Agyrta*, *Aclytia*, *Episcepsis*, and *Eucereon* are examples of distinctive Ctenuchina genera. Other forms such as genera with transparent wing areas, species with all metallic or black wings, and yellow banded lycid beetle mimics occur in both subtribes. In practice, familiarity with both subtribes obviates the need to classify them by subtribe before identification to genus or species. Where it would be easy to confuse a Euchromiina species with a superficially similar Ctenuchina species, we have included diagnostic features to separate them.

Biology and collecting

Adult Euchromiina may fly by day or night, or both. Those that are in mimicry groups with wasps and other diurnal species, may be predominantly day-flying. Euchromiina have a functioning proboscis, and several species have been observed feeding at flowers such as eupatorium (*Chromolaena odorata* and *Austroeupatorium inulaefolium*)

and black sage (*Varronia curassavica*) by day. Adults probably also feed at flowers by night, but this has not been documented.

Many Euchromiina, along with many Ctenuchina, some Phaegopterini and Pericopini (Arctiinae) and the butterfly tribes Danaini and Ithomiini (Nymphalidae, Danainae) are attracted by pyrrolizidine alkaloids (PAs), which they imbibe and sequester for use as a chemical defence against predation and as precursors for synthesis of mating pheromones (Pliske 1975, Nishida 2002). Pyrrolizidine alkaloids are found in a wide variety of plants, including *Heliotropium* and some other Boraginaceae, Eupatoriae (Asteraceae), and several other families. Beebe (1955) described how *Heliotropium indicum* L. (Boraginaceae) can be hung up to dry and over ten days or so would attract these groups of butterflies and moths (e.g. Fig. 93). MJWC used this method widely in Trinidad to collect Euchromiina and Ctenuchina. Those species which fly by night are readily attracted to lights, particularly those with a strong ultra violet component which can be used for collecting (MVL – mercury vapour light and BLT – black light trap).

Beebe and Kenedy (1957) reported their behavioural observations on 13 species of ‘Ctenuchidae’ of which five are Euchromiina and eight Ctenuchina. Almost nothing has been recorded regarding the life histories and food plants of the Trinidad & Tobago species, and little elsewhere, so that the only substantive information source is the Janzen and Hallwachs (2022) database of Costa Rican rearing.

Effectively almost all collecting of Euchromiina (and Ctenuchina) in Trinidad has been based on one of these three attractants: light (especially UV light), PAs (particularly as drying *Heliotropium indicum*, referred to as heliotrope hereafter in the text) and flowers (particularly eupatorium and black sage). Any species that is not attracted to one of these three is likely to have been rarely collected; the large day-flying wasp mimic *Isanthrene tryhanei* may be such a case. The practice of night walks (Deo *et al.* 2021) is starting to generate records of Euchromiina, and it will be interesting to see if this leads to observations of newly recorded or rarely seen species.

Nomenclature

Noting that there is no recent catalogue of Euchromiina or Ctenuchina, for nomenclature we have depended on Cerda’s (2008) work on the Euchromiina of French Guiana and LepIndex, the on-line database of the old NHMUK card index (Beccaloni *et al.* 2003). The later must be used with caution as on the one hand it is now out of date, and on the other it includes many unpublished new combinations used by the curators of the collection. Accordingly, we have made every effort not to use unpublished new combinations by checking back to Hampson (1898, 1914) and reviewing

subsequent literature, e.g. Fleming (1957), to locate where name changes have been made.

Identification

When working with pinned specimens in good condition, almost all of the Trinidad species can be identified by careful examination and comparison with the images provided here, although some, in particular *Macrocneme* spp., may still require examination of the genitalia or DNA barcoding. Figs. 1–2 show all species life size for initial identification, but this should be followed up by comparison with the enlarged images under each species account. Diagnostic features are pointed out in the text which should help separate similar species. Many naturalists are now taking photographs rather than specimens in support of their observations. With experience, images of living moths can also be readily identified, and we have included such images as available to facilitate this. In the case of Euchromiina, the best diagnostic features are often on the dorsal surface of the forewing, but characters of the hindwing, body and legs are also often helpful. For some species, multiple views of the body and legs are included in a supplementary Appendix.

The terminalia comprise the genitalia and associated sternite and tergite of abdominal segment 8 (A8). They require dissection to see the full structure, but sometimes diagnostic features, particularly the apex of the valves can be examined by carefully brushing off the scales of the ventral abdomen tip. The male and female genitalia structures often provide good diagnostic features to distinguish species that otherwise have a similar external appearance (habitus). We include figures of 17 Euchromiina dissections in a supplementary Appendix, which demonstrate characters used to help define species treated. Ideally, such figures would have been compared with those of type specimens, but most Euchromiina types have not been dissected and for those that have, few good figures are currently available.

There is not a great deal of individual variation in most species of Euchromiina found in Trinidad, but examples have been illustrated in a few cases, e.g. *Autochloris almon* (Figs. 3–4), while a small number are polymorphic, e.g. *Phoenicoprocta vacillans* (Figs. 101–102). Sexual dimorphism may be restricted to the female being slightly larger, with less strongly pectinated antennae, but can be marked or extreme, e.g. *P. vacillans*.

DNA barcoding based on 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 in the future, based on the increasing numbers of publicly available DNA barcodes in BOLD (Barcode of Life Database, <http://www.boldsystems.org/>) and GenBank (<http://www.ncbi.nlm.nih.gov/genbank>). Barcode Index Numbers (BINs) have been introduced

to provide a permanent numbering system for barcode clusters normally separated from others by at least 2% base pairs substituted, which in a high percentage of cases correspond to known taxonomic species and can also help flag species complexes or clusters needing taxonomic research (Ratnasingham and Hebert 2013, Miller *et al.* 2016). MJWC checked all Trinidad genera of Euchromiina against BOLD in January 2020 and constructed BOLD TaxonID Trees using public DNA barcodes in BOLD and the standard BOLD function for the genera thus far recognized from Trinidad. In most cases, there were very few DNA barcodes from South America, but often a large sample from Costa Rica based on the work of Dan Janzen and Winnie Hallwachs' inventory programme (Janzen and Hallwachs 2022). It was quite common to find that one phenotypic species in Costa Rica comprised more than one BIN in BOLD, and when DNA barcodes were available from South America, they did not necessarily match those from Costa Rica and appeared as different BINs. This is an indication of changes that are coming to our understanding of the Neotropical moths and the names which should be applied. However, a significant number of the Euchromiina recorded from Trinidad were described from the island, and others were described from the Guianas or Venezuela, both of which have a high affinity with the Trinidad Lepidoptera fauna (e.g. Cock and Robbins 2016), and so these names are likely to be reliable for Trinidad. On the other hand, many Euchromiina recorded from Trinidad, but described from further south, e.g. southern Brazil or from Central America could well prove to be part of a species complex, for which the current name will not be applied to the Trinidad population in the future. The BOLD database does not have adequate coverage yet to resolve these questions, so there would be value to building up a library of DNA barcodes for the Trinidad & Tobago fauna, which in due course can help solve some of these questions, resolve which species do occur in Trinidad & Tobago, and as the technology becomes more accessible, facilitate rapid identification. For the taxa that have been described from Trinidad, characterisation by their DNA barcodes will be an important contribution, to stabilise and define the use of these names. The following 23 taxa of Euchromiina have been described from Trinidad [with their current status]:

- *Antichloris trinitatis* Rothschild, 1912 [synonym of *Phoenicoprocta vacillans* (Walker, 1856)]
- *Calonotos craneae* Fleming, 1957 [valid subspecies *Calonotos helymus* (Cramer, 1775)]
- *Calonotos flemingi* Cock and Laguerre, 2022 [valid species]
- *Calonotos tiburtus* form *trinidadensis* Strand, 1915 [synonym of *Calonotos aterrima* (Sepp, 1847) ssp. *tripunctata* Druce, 1898]
- *Calonotos tripunctata* Druce, 1898 [valid subspecies of *Calonotos aterrima* (Sepp, 1847)]
- *Cosmosoma klagesi* Rothschild, 1910 [valid species]
- *Cosmosoma melathoracia* Kaye, 1901 [valid species]
- *Cosmosoma pytna* Druce, 1906 [valid species]
- *Cosmosoma rubriscapulae* Kaye, 1901 [valid species]
- *Histiaea* [sic] *meldolae* Butler, 1876 [valid species]
- *Isanthrene tryhanei* Rothschild, 1911 [valid species]
- *Macrocneme nigritarsia* ab. *trinitatensis* Strand, 1917 [synonym of *Poliopastea vittata* (Walker, 1854)]
- *Macrocneme spinivalva* Fleming, 1957 [synonym of *Macrocneme aurifera* Hampson, 1914]
- *Macrocneme thyra intacta* Draudt, 1915 [synonym of *Macrocneme thyra* Möschler, 1883]
- *Mydropastea disparata* Kaye, 1920 [synonym of *Phoenicoprocta vacillans*]
- *Pheia beebei* Fleming, 1957 [valid species, now placed in *Xanthyda*]
- *Phoenicoprocta trinitatis* Strand, 1915 [synonym of *Phoenicoprocta vacillans*]
- *Phoenicoprocta vacillans* ab. *nigropeltata* Strand, 1915 [synonym of *Phoenicoprocta vacillans*]
- *Pseudosphex kenedyae* Fleming, 1957 [valid species, now placed in *Myrmecopsis*]
- *Saurita arimensis* Fleming, 1957 [valid species, now placed in *Hypocharis*]
- *Saurita perspicua* Schaus, 1905 [valid species temporarily retained in *Saurita*]
- *Sphecosoma trinitatis* Rothschild, 1911 [valid species now placed in *Pleurosoma*]
- *Valvaminor jacerda* Cock and Laguerre, 2022 [valid species]

Layout of species entries

In the treatment that follows, genera and species are presented in alphabetical order. This inevitably means that closely related genera may be widely separated, and this is partially addressed in the combined plates (Figs. 1–2), where similar genera and species are placed together to some extent. As for Cock's (2021) recent treatment of Trinidad & Tobago Notodontidae, under each species, the presentation follows a standardised sequence:

The **currently accepted name** for that species, and subspecies where used. The author and year of publication for each name are included, in parentheses where the species or subspecies were originally described in a different genus. This is followed by references to the figures illustrating the species in this paper, and where known, the BIN in BOLD. Immediately below this is the original description(s), preceded by 'OD: '; author and year of publication for the species is repeated, followed by the original combination, and the type locality (TL). The original publications of

descriptions are not included in the references unless they are specifically referred to in the text; if needed, this information is available in Beccaloni *et al.* (2003). Below this, and preceded by ‘TT:’, are entries for this and any other names or combinations for this species that have appeared in the literature and refer explicitly to its presence in Trinidad or Tobago, i.e. these do not include generalised statements, e.g. that a particular species occurs throughout the Caribbean, or throughout the Neotropical Region. We have listed taxonomic papers where Trinidad or Tobago are included in the material examined section; doubtless we have missed some of these but should have located and referred to all those papers dealing with Trinidad or Tobago specifically.

Historical notes. The key published records are presented, and in many cases, the location of specimens referred to in the original publications has been established, to confirm these early identifications. We also explain the basis of our identification and use of the name. In preparing this account, we have checked all species in the NHMUK collection, although MJWC did much of this last century and the curation has been further developed since then. We have also examined the main collection and type collection in USNM. In some cases, MJWC has dissected the male terminalia of specimens in MJWC to compare with Cerda (2008) and unpublished images of ML’s dissections from French Guiana and elsewhere.

Taxonomic issues. Here, concerns regarding the identity of the species in Trinidad & Tobago are outlined, particularly where examination of DNA barcodes in BOLD (<http://www.boldsystems.org/>) suggests greater diversity than is evident in the described species, or recent work has revealed some of this complexity.

Identification. Notes and pointers are provided to facilitate the identification of each species in Trinidad (or Tobago), paying particular attention to the features visible in images of live moths in the resting position. These diagnostic features are not intended to be used for the richer continental fauna of South America, where in many cases they will not be adequate. Comments on polymorphism, variation, and sexual dimorphism are included here.

Biology in Trinidad. In this section, comments and illustrations regarding the life history and adult habits are restricted to observations from Trinidad & Tobago (unless specifically stated otherwise). Where nothing is known from Trinidad & Tobago, this section is omitted.

Status in Trinidad. This is a brief statement regarding the frequency with which each species has been encountered, where, and in what habitats, broadly categorized as forested or suburban.

Figures. The pinned specimens shown in the plates are shown life-size in Figs. 1–2, and enlarged to a standard

column width elsewhere; the specimens were collected by MJWC and are held in his collection except where otherwise stated. Whenever possible a male and female in dorsal view and ventral view are shown, and additional specimens may be included to indicate morphs and variation. © in the figure legend refers to the photographer unless indicated otherwise. **Supplementary Appendix.** The appendix, available at https://ttfnc.org/livingworld/index.php/lwj/article/view/cock_laguerre2023/appendix, includes a listing of all records compiled from the sources listed below, following a standard format: locality, means of capture, sex of specimen if known (a ‘?’ indicates uncertainty, e.g. in a photograph, or the sex was not noted at the time of examination), date of capture, (collector/photographer), [collection holding the specimen (if any), and any comments regarding curation or identification from the time MJWC examined the collection]. ‘MVL’ is used to indicate captures made using a mercury vapour light and ‘BLT’ for black light trap – both having a strong ultra-violet component to attract the adults by night, whereas ‘at light’ normally refers to other lights, e.g. domestic lighting.

This includes a listing of all material from Trinidad & Tobago reported by Fleming (1957) or examined by one of the authors. In preparing this work, we consulted the following collections, either in person or from images shared by their staff (see acknowledgements):

- MGCL McGuire Center for Lepidoptera & Biodiversity, Gainesville FL, USA;
- MJWC the private research collection of M.J.W. Cock, UK (records from all specimens and unpublished notes compiled and collated);
- MNB Museum für Naturkunde Berlin, Germany;
- NHMUK Natural History Museum, London, UK, which contains much historical material collected by F. Birch, S.M. Klages, W.J. Kaye, and others (the main sequence was checked and records included, but accessions were not reviewed systematically);
- NMS National Museum of Scotland, Edinburgh, UK, which includes part of the collections of Sir Norman Lamont and D.J. Stradling (records from both compiled and collated);
- OUMNH Oxford University Museum of Natural History, which includes material collected by R.M. Farmborough, F. W. Jackson and others (records from many, but perhaps not all, specimens from both the main sequence and accessions compiled and collated);
- SDEI Senckenberg Deutsches Entomologisches Institut, Müncheberg, Germany
- USNM National Museum of Natural History (formerly

United States National Museum), Washington DC, USA (type material examined, but only selected species in the main collection);

UWIZM University of the West Indies Zoology Museum, St. Augustine, Trinidad & Tobago, which includes part of the collections of Sir Norman Lamont and D.J. Stradling as well as the former CABI collection containing material collected by the author, F.D. Bennett, R.E. Cruttwell (now McFadyen), R. Brown and T. Cassie, M. Morais, and others (records from all specimens compiled and collated).

While MJWC was resident in Trinidad, he sent a large number of specimens to the NHMUK for identification by CABI and NHMUK staff and retention in the NHMUK collection. For each morphospecies sent, a duplicate specimen was retained, and these pairs of duplicates were numbered sequentially TL-001, TL-002, etc. Hence for each TL- number there will normally be one duplicate in NHMUK (many are held in the accessions) and the other in either MJWC or UWIZM; these specimens are indicated by the TL- number which is given together with the holding collection in square brackets. MJWC recorded the locality and date of capture of specimens sent to NHMUK, but not

the sex. Hence, in compiling this data here, he has often not located his specimens in NHMUK, and so many are listed with '?' for the sex. In the case of *Euchromiina*, identifications were made at NHMUK by Alan Watson. We have revisited all these early identifications, and with the benefit of having examined types in the USNM have often improved on them; accordingly, we do not discuss Watson's early identifications in our treatment. MJWC has also examined and included images of live material from various contacts (see Appendix listings and acknowledgements) as well as reviewing the records on iNaturalist (<https://www.inaturalist.org/>).

EUCHROMIINA OF TRINIDAD & TOBAGO: SYSTEMATIC ACCOUNT

Abrochia Herrich-Schäffer, 1855 (see *Pseudosphex* Hübner, 1818) (Ctenuchina)

AUTOCHLORIS HÜBNER, [1819]

Type species: *Sphinx almon* Cramer, 1779, TL Suriname.

Autochloris almon (Cramer, 1779)

Figs. 3–4. BIN BOLD:ACV3136

OD: Cramer 1779: *Sphinx Adscites almon*, TL Suriname.



Fig. 3. Male *Autochloris almon*. **Above**, Inniss Field, eupatorium flowers, in copulo, 2.x.1994; 37 mm. **Below**, Parrylands, eupatorium flowers, 29.ix.2019 (J. Morrall); 39 mm.



Fig. 4. Female *Autochloris almon*. **Above**, Cat's Hill, eupatorium flowers, 24.ix.2017 (John Morrall); 39 mm. **Middle**, Cat's Hill, eupatorium flowers, 24.ix.2017 (John Morrall); 39 mm. **Below**, Inniss Field, eupatorium flowers, in copulo 2.x.1994; 38 mm.

Historical notes. This species has not previously been recorded from Trinidad. Identified by comparison with the NHMUK series, most of which have extensive hyaline markings (Figs. 3–4), as does Cramer's (1777–1782, pl. 224F) image.

Taxonomic issues. Given that this species was described from Suriname, the use of this name should be correct. In NMS, there is a male of this species labelled as a cotype of *Mydropastea disparata* Kaye, 1920 (see under *Phoenicoprocta vacillans* below). DNA barcodes of Trinidad material form part of BIN BOLD:ACV3136 which includes material identified as *A. cincta* Schaus, 1905 (TL French Guiana) and *A. completa* Walker, 1854 (TL Brazil, Pará). It seems this may be a polymorphic species on the mainland, but *C. almon* should be the oldest name.

Identification. The black wings with transparent hyaline spots (Figs. 3–4) are quite distinctive in Trinidad, and might only be confused with the female *chrysonota* morph of *P. vacillans*. However, in that species the dorsal green line of the abdomen extends onto the posterior part of the thorax, whereas in *A. almon* it stops on abdominal segment 2. This species is variable in the extent of the transparent hyaline areas of both wings (Figs. 3–4). The antennae of males have longer pectinations, but otherwise the sexes are similar.

Biology in Trinidad. Adults fly by day, but have not been recorded attracted to heliotrope. Almost all records are of adults attracted to flowers of *Austroeupatorium inulaefolium*; both males and females are attracted, and one mating pair has been taken on these flowers.

Status in Trinidad. An uncommon species, thus far only

recorded from the south of the island.

CALONOTOS HÜBNER, [1819]

Type species: *Sphinx phlegmon* Cramer, 1775, TL Suriname. Incorrectly spelt as *Calonotus* in much of the literature (Watson *et al.* 1980), including that for Trinidad. The Trinidad *Calonotos* fauna includes five species with black wings and solid white spots on both wings, a feature only shared by *Leucotmemis nexa* in the Trinidad fauna. The latter species is readily separated by the post-medial white marking being a bar rather than a spot, and having four dark veins crossing it. *Calonotos tiburtus* has orange stripes on the abdomen rather than metallic green stripes of the other four species. *Calonotos flemingi* has no sub-medial white spot on the forewing, and typically just a white post medial spot. The male of *C. aterrima tripunctata* normally has just one post-medial white spot, while the female, *C. chalcipleura* and *C. helymus craneae* have two. In *C. aterrima tripunctata* and *C. flemingi* the dorsal green line on the abdomen extends across abdominal segment 1, but not in *C. chalcipleura* and *C. helymus craneae*. In *C. aterrima tripunctata* and *C. helymus craneae* there is a green streak on the basal costa, but in *C. chalcipleura* and *C. flemingi*

there is a second basal green streak.

***Calonotos aterrima* (Sepp, 1847) ssp. *tripunctata* Druce, 1898**

Figs. 5–7. BIN: BOLD:AAK1644.

OD: Sepp 1847 (in Sepp 1843–1847): *Glaucopis aterrima*, TL Suriname.

Druce 1898: *Calonotos tripunctata*, TL Trinidad.

TT: *Calonotos tripunctata* Druce: Druce (1898), Kaye (1901), Kaye and Lamont (1927), Fleming (1957)

Calonotos tripunctatus [sic] Druce: Zerny (1912), Draudt (1915–1917), Fleming (1950)

Calonotos tiburtus trinidadensis Strand: Strand (1915) TL, Strand (1927), Fleming (1957) [synonym]

Calonotos tiburtus trinitatis [sic] Strand: Draudt (1915–1917) [synonym]

Calonotos aterrima tripunctata Druce: Cock and Laguerre (2022)

Historical notes. Sepp (1843–1848, pl. 97) illustrated the biology and adults when describing *C. aterrima*; the adult has a plain black forewing. As also reported below for *C. helymus*, the Trinidad population differs from those of the Guianas in that it has white spots on the forewing. Druce (1898) described *C. tripunctata* from Trinidad,



Fig. 5. Male *Calonotos aterrima tripunctata*, Cumaca Road, 4.6 miles, MVL, 21.x.1982; 40 mm.



Fig. 6. Female *Calonotos aterrima tripunctata*, Curepe, at light, 24.vi.1978; 42 mm.



Fig. 7. Male *Calonotos aterrima tripunctata*, St. Augustine, UWI, 11.ii.2021, nandani_bridglal (iNaturalist observation 69700815); ©, with permission.

based on a male with two white forewing spots (♂ type, NHMUK). This record was repeated in Kaye (1901). Kaye and Lamont (1927) listed four specimens from Palmiste 31.v.1917, 25.v.1917, 4.iv.1921, 30.iv.1921 (N. Lamont). The second of these is a correctly identified female now in NMS. The fourth is a male *C. helymus*, also in NMS, but the other two specimens have not been located. There are five other specimens in Lamont's collection in UWIZM as *C. tripunctata*, but they are a male *C. aterrima tripunctata* and four female *C. helymus craneae*. Clearly early collectors treated the two species as one.

Strand (1915) described form *trinidadensis* of *C. tiburtus* from Caparo, Trinidad. Cock and Laguerre (2022) examined images of the type series and found it comprised a female *C. aterrima tripunctata*, and a male and female *C. helymus craneae*. They designated the female *C. aterrima tripunctata* as lectotype, and hence *C. tiburtus trinidadensis* is a synonym of *C. aterrima tripunctata*.

Fleming (1957) recorded seven males and 14 females from Simla. MJWC initially identified this species as *C. tripunctata* by comparison with the type (NHMUK, ♂

with two forewing spots, Trinidad); at that time (1980s), the NHMUK series of *C. tripunctata* was a mixture of what MJWC considered *C. tripunctata* and *C. craneae*.

Taxonomic issues. Kaye and Lamont (1927) stated that *C. tripunctata* and *C. chalcipleura* 'merge into one another and they are clearly one species'. Fleming (1957), in contrast considered that *C. chalcipleura* 'appears to be a valid species', although he does not formally change its status. Specimens from the Kaye collection in MGCL and the Lamont collection in NMS are a mixture of *C. helymus craneae* and *C. aterrima tripunctata*.

DNA barcodes of two Trinidad specimens show that the Trinidad population is in fact the species treated as *C. aterrima* in French Guiana (BOLD:AAK1644), and we found that the male genitalia are also the same. However, the French Guiana population has the forewing plain black, whereas it always has white spots in Trinidad, and accordingly, Cock and Laguerre (2022) treated *C. tripunctata* as a subspecies of *C. aterrima*.

Identification. Separation from *C. helymus* is discussed under that species; see also under *Calonotos* above. The antennae of males are noticeably more strongly bipectinate than those of females. In the material examined, males have two white forewing spots, whereas females have three.

Biology in Trinidad. The early stages have not been reported from Trinidad. Sepp (1843–1847, pl. 97) illustrated the biology of what appears to be this species on 'caféyer' (i.e. caféier, the coffee tree, *Coffea* sp. Rubiaceae).

Status in Trinidad. A common and widespread species, more prevalent in lowland areas.

Calonotos chalcipleura Hampson, 1898

Figs. 8–9, Appendix Figs. 1, 25. BIN BOLD:AAG6310.

OD: Hampson 1898: *Calonotos chalcipleura*, TL Venezuela, Aroa

Historical notes. This species has not previously been recorded from Trinidad, although it may easily have been overlooked.

Taxonomic issues. Kaye and Lamont (1927) stated that



Fig. 8. Male *Calonotos chalcipleura*, Morne Bleu Ridge, Textel Road, ix.2021, S. Alston-Smith; 42 mm.



Fig. 9. Male *Calonotos chalcipleura*, Inniss Field, by night, 21.v.2022, R. Deo (iNaturalist observation 118264188); ©, with permission.

C. tripunctata and *C. chalcipleura* ‘merge into one another and they are clearly one species’. Zerny (1931a, 1931b) probably overlooked Kaye and Lamont’s (1927) statement when he maintained *C. chalcipleura* as a valid species. Fleming (1957) specifically stated that *C. chalcipleura* ‘appears to be a valid species’. A Trinidad specimen was DNA barcoded and forms part of BIN BOLD:AAG6310, together with specimens from Colombia (2) and Peru (14).

Identification. This species could be mistaken for *C. helymus craneae*, as the diagnostic markings on the anterior abdomen are similar. However, *C. chalcipleura* has a green patch in space 1 (Cu_2-2A) at the base of the wing, which

is not present in *C. helymus craneae*, and the white spot on the hindwing is present across two spaces, divided by the black nerve (like *C. aterrima tripunctata*), and not just in the upper space, and the ventral abdomen has a weak, partial white line rather than a solid one. The female resembles the male, but the antennae are not as broadly pectinate.

Biology in Trinidad. One Trinidad capture was at flowers and another was seen on a night walk. It is not clear from the specimen data that any have been caught at light in Trinidad.

Status in Trinidad. Several records from the Northern Range and around Port of Spain, as well as one in lowland forest of south Trinidad.

Calonotos flemingi Cock and Laguerre, 2022

Figs. 10–11. For figures of the details of body and male genitalia, see Cock and Laguerre (2022).

OD: Cock and Laguerre 2022: *Calonotos flemingi*, TL Trinidad.

TT: *Calonotos flemingi* Cock and Laguerre: Cock and Laguerre (2022) TL

Historical notes. This is a species recently described from Trinidad (Cock and Laguerre 2022). Although W.J. Kaye probably saw one or more specimens in OUMNH, he did not separate them from other Trinidad *Calonotos* species.

Identification. This seems to be the only Trinidad species of the genus consistently with a single white spot on the dorsal forewing. Heavily marked females may have traces of small extra spots in spaces 2 and 3 (Cu_1-Cu_2 and M_3-Cu_1)



Fig. 10. Female *Calonotos flemingi*. **Above**, Trinidad, iv-v.1902 (E. Bourke) [OUMNH]. **Below**, Fondes Amandes, 200 ft., 19.iii.1922 (F.W. Jackson) [OUMNH]



Fig. 11. Male *Calonotos flemingi*, Curepe, MVL, 15-22.iv.1982; 34 mm.

(Fig. 11 below), but the pair of small spots in outer space 3 (M_3-Cu_1) is not seen in any other Trinidad species.

Status in Trinidad. An uncommon species from lowland areas.

***Calonotos helymus* (Cramer, 1775) ssp. *craneae* Fleming, 1957**

Figs. 12–15. BIN: BOLD:AAK1636.

OD: Cramer 1775: *Sphinx Adscita helymus*, TL Suriname.
Fleming 1957: *Calonotos craneae*, TL Trinidad.

TT: *Calonotos craneae* Fleming: Fleming (1957), Beebe and Kenedy (1957), Blest (1964), Cock (2003)
Calonotos helymus craneae Fleming: Cock and Laguerre (2022)

Historical notes. Cramer (1775–1782) described this species from Suriname, illustrating dorsal and ventral views. This form with plain black forewings has not been seen from Trinidad, where all material has three, or sometimes two, white forewing spots.

Kaye and Lamont (1927) recorded *C. helymus* from Trinidad on the basis of an undated Lamont specimen from Palmiste; this specimen is in NMS, and is a female of *Phoenicoprocta vacillans* (Walker, 1856) form *trinitatis* Strand, with plain dark forewings (and is treated under that species).

Fleming (1957) described *C. craneae* from Trinidad, based on a type series of 30 males and 24 females. MJWC identified Trinidad material as this species by comparison with the paratypes (♂, ♀ Trinidad) in NHMUK, and from Fleming (1957). An image of the holotype is available on-line (AMNH 2022).

Taxonomic issues. Although the plain black forewing form is not found in Trinidad, and the white spotted form is not found in French Guiana, DNA barcodes and the male genitalia of Trinidad material show that *C. craneae* is the same as *C. helymus* as found in French Guiana (Cerde 2008). Accordingly, Cock and Laguerre (2022) placed *C. craneae* as a subspecies of *C. helymus*.

Identification. In Trinidad, *C. helymus craneae*, *C. chalcipleura* and *C. aterrima tripunctata* (below) can be easily confused. However, as Fleming (1957) pointed out, *C. aterrima tripunctata* can be separated from the other two by the green markings on the dorsal abdomen. The dorsal green band starts on the anterior margin of A1 in *C. aterrima*, but on the anterior margin of A2 in *C. chalcipleura* and *C. helymus*; further *C. helymus* has a white spot on either side of this line on A1, not present in *C. aterrima*. The separation of *C. chalcipleura* and *C. helymus craneae* is discussed under the former species.

Males have longer pectinations on the antennae than



Fig. 12. Male *Calonotos helymus craneae* with two forewing spots, above Mt. St Benedict's, MVL, 26.v.1981; 42 mm.



Fig. 13. Male *Calonotos helymus craneae* with three forewing spots, Curepe, MVL, 5.i.1980; 40 mm.



Fig. 14. Female *Calonotos helymus craneae*, Cat's Hill, on flowers of *Austroeupatorium inulaefolium*, 24.ix.2019 (J. Morrall); 40 mm.



Fig. 15. Male *Calonotos helymus craneae*, Port of Spain, Lady Chancellor Road, 8.ii.2010, M. Gibson (iNaturalist observation 38419929); ©, with permission.

do females, but this is not easy to interpret in photographs. Based on the material examined, females typically have three forewing spots, whereas the spot in space 3 (M_3-Cu_1) is typically reduced or sometimes absent in males.

Biology in Trinidad. The early stages have not been reported from Trinidad. Sepp (1843–1848, pl. 59) illustrated the biology of what appears to be this species on an unidentified ?Apocynaceae. Adults are distasteful (Beebe and Kenedy 1957). They occasionally fly by day (females have been found feeding at flowers of *Austroeupatorium*

inulaefolium), and by night when both sexes are attracted to light (Beebe and Kenedy 1957, author's observations).

Status in Trinidad. This is a widespread and common species, most frequently found in disturbed and suburban areas.

Calonotos tiburtus (Cramer, 1780)

Figs. 16–18, Appendix Fig. 2.

OD: Cramer 1780: *Sphinx tiburtus*, TL Suriname.

TT: *Calonotos tiburtus* (Cramer): Kaye and Lamont (1927), Fleming (1957)

Calonotos tiburtus trinidadensis Strand: Strand (1915)
TL, Strand (1927), Fleming (1957) [misidentification]

Calonotos tiburtus trinitatis [sic] Strand: Draudt (1915–1917) [misidentification]

Historical notes. Kaye and Lamont (1927) listed this species from Trinidad without comment. This could have been based on the specimen in the Admiral Bourke collection in OUMNH, which W.J. Kaye examined. Identified by comparison with the NHMUK series.

Taxonomic issues. This species is not covered by Cerda (2008), and the externally visible genitalia of a Trinidad specimen do not match any of the species from French Guiana that he treated. Hampson (1898) treated this species from Costa Rica, Panama, Guyana and Suriname; he indicates that the spot in space 2 (Cu_1-Cu_2) is only present in the female, but it is present in all Trinidad specimens examined.

As noted under *C. aterrima tripunctata*, Strand (1915)



Fig. 16. Male *Calonotos tiburtus*, Morne Bleu, Textel Installation, at light, 10.vii.1978; 39 mm.



Fig. 17. Female *Calonotos tiburtus*, Curepe, MVL, (F.D. Bennett); 38 mm.



Fig. 18. Male(?) *Calonotos tiburtus*, Bush Bush Island, 8.iv.2022, R. Deo (iNaturalist observation 110744526); ©, with permission.

described specimens of *C. aterrima tripunctata* and *C. helymus craneae* as form *trinidadensis* of *C. tiburtus*. Cock and Laguerre (2022) designated a lectotype, making *C. tiburtus trinidadensis* a synonym of *C. aterrima tripunctata*.

Identification. This is the only Trinidad species of this appearance with golden orange stripes on the abdomen. The sexes are similar.

Biology in Trinidad. Most captures have been at light.

Status in Trinidad. Fleming (1957) recorded two specimens from Simla and notes that it is quite common in Nariva Swamp. This is a widespread but uncommon species recorded from both forest and suburban habitats. There have been a few observations by day, but most records are of moths attracted to light by night.

Chrostosoma guianensis Kaye (see *Saurita perspicua*)
Chrostosoma viridipunctatum Rothschild (see *Heterodontia fenestrina*).

COSMOSOMA HÜBNER, [1823]

Type species *Cosmosoma omphale* Hübner, 1823, TL not stated, a junior subjective synonym of *Sphinx auge* Linnaeus, 1767. The genus is known to be polyphyletic (Simmons *et al.* 2012, Laguerre 2014). *Cosmosoma* spp. all have transparent wings, with a sharply defined black border of variable width, sometimes a dark bar across the end of the forewing cell, and the head, thorax and abdomen variably marked in bright colours. This is also true of *Loxophlebia* spp., *Pheia toulgoeti*, male *Phoenicoprocta vacillans*, *Valvaminor jacerda* and *Xanthya beebei* (Euchromiina), as well as *Aethria*, *Dinia*, *Diptilon*, *Trichura* and *Urolasia*

(Ctenuchina).

***Cosmosoma achemon* (Fabricius, 1781)**

Figs. 19–20.

OD: Fabricius 1781: *Zygaena achemon*, TL Jamaica

TT: *Cosmosoma achemon* (Fabricius): Fleming (1957)

Historical notes. Fleming (1957) recorded a male from St. Augustine. Identified by comparison with the NHMUK series.

Taxonomic issues. Some males in the NHMUK series have red marking on the bar of cell of the dorsal forewing. Cerda's (2008) figure of the male is more extensively red than that shown here from Trinidad (Fig. 19), whereas that of the female (not seen from Trinidad) has red confined to the shoulders. *Cosmosoma achemon* is represented in BOLD by BIN BOLD:ACF3243 (Paraguay (1), Peru (1), Costa Rica (37), Guatemala (1), Jamaica (1), Dominican Republic (1)) as a sequence from the type locality, Jamaica is included. The females have no forewing bar, and match Trinidad material in habitus.

Identification. This is one of four relatively small *Cosmosoma* spp., the other three being *C. bolivarensis*, *C. hypocheilus* and *C. remota*. *Cosmosoma achemon* has more extensive red markings on the dorsal forewing, extending nearly the length of the dorsum, the dorsal thorax is mostly red, and a solid red dorsal line on the abdomen; *C. bolivarensis* has minimal or no red markings on the dorsal forewing, only a red line each side of the dorsal thorax, and no red dorsal line on the abdomen; *C. hypocheilus* has extensive red markings on the base and costa of the dorsal forewing, red dorsal thorax and a brown-red stripe on the dorsal abdomen, narrowed at each end; *C. remota* has intermediate red markings on the dorsal forewing, just a red line on each side of the dorsal thorax, and the red dorsal line of the abdomen reduced or fragmented. The male of *C. remota*, and both sexes of *C. bolivarensis* and *C. remota* have a black bar on the forewing from the tornus to the cell, although more material may show this character



Fig. 20. Female *Cosmosoma achemon*, Penal, 4.iii.2014, K. Sookdeo; ©, with permission.

to be more variable than this. *Cosmosoma hypocheilus* has this bar in the male, but not in the individual we identify below as female (Fig. 27); both sexes have a dark bar from the costa across the end of the cell.

Biology in Trinidad. Males have been attracted to light.

Status in Trinidad. Rare; records restricted to Curepe, St. Augustine and Penal suggest this is not a forest species.

***Cosmosoma auge* Linnaeus, 1767**

Figs. 21–22.

OD: Linnaeus 1767: *Sphinx auge*, TL 'America'.

Historical notes. This species has not been reported from Trinidad before. Although there are two identified specimens from the 1940s in Sir Norman Lamont's collection in UWIZM, Lamont and Callan (1950) did not include this species. Identified from Cerda (2008).

Taxonomic issues. *Cosmosoma auge* is included in BOLD as BOLD:AAE4005 (Argentina (6), Paraguay (1), Brazil: Parana (1), Jamaica (2), Puerto Rico (1), Dominican Republic (1), Florida (3, as *C. myrodora*), Costa Rica (10)) and ABZ2089 (Brazil: Parana). Linnaeus (1767,



Fig. 19. Male *Cosmosoma achemon*, Curepe, BLT, 26.v-11.vi.1981 (F.D. Bennett); 25 mm.



Fig. 21. Male *Cosmosoma auge*, Morne Bleu, Textel Installation, at light, 29.ix.1978; 32 mm.



Fig. 22. Male *Cosmosoma auge*, Penal, at light, 3.iii.2014 (K. Sookdeo); ©, with permission.

p.807) gave the type locality as ‘America’ and one or more specimens in the collection of Lorenze Spengler. There is what appears to be a type specimen in The Linnean Collections (2022), which although in poor condition, is compatible with the species we treat here. Hence, it seems appropriate to treat BOLD:AAE4005 as *C. auge* and apply this name to Trinidad material.

Identification. The predominantly red thorax, broad dorsolateral red stripes on the abdomen, and dorsal row of blue iridescent spots on the abdomen should serve to distinguish this species. The sexes are similar.

Biology in Trinidad. Most specimens were captured at light.

Status in Trinidad. An uncommon species, mostly from forested areas.

Cosmosoma bolivarensis Klages, 1906

Figs. 23–25. For figures of the details of body and male genitalia, see Cock and Laguerre (2022).

OD: Klages 1906: *Cosmosoma achemon* var. *bolivarensis*, TL Venezuela, Ciudad Bolivar

TT: *Cosmosoma anoxanthia* (Druce): Kaye and Lamont

(1927), Fleming (1957) [misidentification]

Cosmosoma bolivarensis Klages: Cock and Laguerre (2022)

Historical notes. Druce (1905) described *Cosmosoma anoxanthia* from the Caura Valley, Venezuela, and Hampson (1914, pl. 8.25) provides an illustration. Kaye and Lamont (1927) recorded a capture of *C. anoxanthia* at Palmiste by Sir Norman Lamont. There is a Lamont specimen with no data label in NMS, which is considered to represent this specimen. Fleming (1957) recorded six males and three females from Simla. Cock and Laguerre (2022) explained that the species treated as *C. anoxanthia* in Trinidad is actually *C. bolivarensis*, which they raised to species status from being a synonym of *C. anoxanthia*.

Taxonomic issues. Klages (1906) and Fleming (1957) stated that the female lacks the tornal bar of the forewing found in the male, but this seems not to be consistently the case in Trinidad (Fig. 24), so we consider this character variable.

Identification. This species may be compared with the other two relatively small *Cosmosoma* spp: *C. achemon* and *C. remota*, as discussed above under the first of these. The sexes are similar.

Biology in Trinidad. Males of this species have been occasionally attracted to *Heliotropium*. Both sexes have been attracted to light.

Status in Trinidad. An occasional and widespread species.

Cosmosoma gemmata (Butler, 1876)

Fig. 26.

OD: Butler 1876: *Pheia gemmata*, TL Santa Marta, Colombia.

TT: *Cosmosoma gemmata* (Butler): Cock (2017)

Historical notes. Cock (2017) recorded this species from Tobago, but it is not known from Trinidad.

Taxonomic issues. Identified by comparison with the type (NHMUK, ♀ Colombia, St Marta) and NHMUK series. Cerda (2008) treated *C. gemmata* and its morph *xanthocera* Hampson, 1898, which has extensive orange



Fig. 23. Male *Cosmosoma bolivarensis*. **Above**, Curepe, to *Heliotropium*, 7-13.xi.1980; 25 mm. **Below**, Curepe, MVL, 30.viii.1978; 24 mm.



Fig. 24. Female *Cosmosoma bolivarensis*, Curepe, MVL, 14.ix.1979; 27 mm.



Fig. 25. Male *Cosmosoma bolivarensis*, Penal, 19.iv.2014, K. Sookdeo; ©, with permission.

areas on the forewing costa and base, and parts of the dorsal body. The form *xanthocera* is the only one that occurs in French Guiana, and although both forms occur in Venezuela (Klages 1906), the *xanthocera* morph has not been seen from Trinidad or Tobago. There are no DNA barcodes available to help understand this better. A specimen labelled as *C. xanthocera* in Lamont's collection in UWIZM is actually *C. pytna* Druce (below).

Identification. This species can be recognized by the red streaks on the basal forewing, the absence of red markings on the body, and the dorso-lateral row of blue metallic spots on the abdomen. It is closest in appearance to *C. rubriscapulae*, but that species has minimal red markings at the base of the dorsal forewing, and is extensively red on the dorsal thorax. The female has not been recorded from



Fig. 26. Male, *Cosmosoma gemmata*, Tobago, nr. Speyside, MVL, 14-17.v.1982; 38 mm.

Tobago, but is similar to the male.

Biology in Trinidad and Tobago. The only known Tobago adult was attracted to MV light.

Status in Trinidad. No Trinidad records; only one record from Tobago, in disturbed forest above Speyside (Cock 2017).

Cosmosoma hypocheilus Hampson, 1898

Fig. 27.

OD: Hampson 1898: *Cosmosoma hypocheilus*, TL St. Vincent.

Historical notes. This is a new record for Trinidad based on a photograph only (Fig. 27). It was identified from Hampson (1898), and is almost an exact match to Hampson's figure, except for the absence of a dark bar from the end of the cell to the tornus, which is a male character.

Taxonomic issues. Not in BOLD.

Identification. This is a relatively small species, comparable to *C. achemon*. It can be recognized by the extensive red markings at the base of the dorsal forewing and extending along most of the costa, the red dorsal thorax, the red dorsal line on the abdomen, narrowing at each end, and the black bar across the end of the cell of the forewing. Hampson (1898) notes that in the female, the dark bar from the end



Fig. 27. Female *Cosmosoma hypocheilus*, South Oropouche, Mon Desir, on flowers of *Austro eupatorium inulaefolium*, 28.ix.2020, T.P. Maharaj; ©, with permission.

of the cell to the tornus is very much reduced or absent, as is the case in Fig. 27.

Biology in Trinidad. The only record was photographed feeding at flowers of *Austro eupatorium inulaefolium*.

Status in Trinidad. Just one record from South Oropouche. It is expected to occur in Tobago, given that it was described from St. Vincent.

Cosmosoma klagesi Rothschild, 1910

Figs. 28–30, Appendix Figs. 3, 26. BIN BOLD:ABZ0274.

OD: Rothschild 1910: *Cosmosoma klagesi*, TL Trinidad.

TT: *Cosmosoma klagesi* Rothschild: Rothschild (1910), Zerny (1912), Rothschild (1913), Draudt (1915–1917), Kaye and Lamont (1927), Zerny (1931a), Fleming (1957), Blest (1964), Cerda (2008)

Historical notes. Rothschild (1910) described and illustrated (Rothschild 1913) this species from Trinidad, based on what he reported as a female from Caparo, Trinidad, November 1905 (S.M. Klages). This specimen in NHMUK is actually a male.

Kaye and Lamont (1927) noted that this species was described from a Trinidad specimen, and added records from Guaico, 18.iv.1915 (N. Lamont), and Manzanilla, 1922 (F.W. Jackson); both these specimens have been examined in NMS. Fleming (1957) recorded 51 males and 20 females from Simla. Identified by comparison with the type (NHMUK, ♂ Trinidad).

Taxonomic issues. In BOLD, material identified as *C. stilbosticta* (Butler, 1876), *C. klagesi*, *C. braconoides* (Walker, 1854) and *C. thiacia* Hampson are grouped in BIN BOLD:ABZ0274 from Costa Rica, Guatemala, Ecuador, Brazil (Parana), French Guiana, Colombia and Peru. At present, we consider this a group of closely related species with a common BIN, and retain the name *C. klagesi* here as it was described from Trinidad. The male genitalia of a Trinidad specimen are shown in Appendix Fig. 26, and match those shown by Cerda (2008) from French Guiana.

Identification. A very distinctive species in Trinidad as it is the only one that is black with a plain orange abdomen.



Fig. 28. Male *Cosmosoma klagesi* ♂, Cumaca Road, 4.6 miles, MVL, 21.x.1982; 30 mm.



Fig. 29. Female *Cosmosoma klagesi*, Sangre Grande, Sans Souci Estate, MVL, 8.viii.1982; 31 mm.

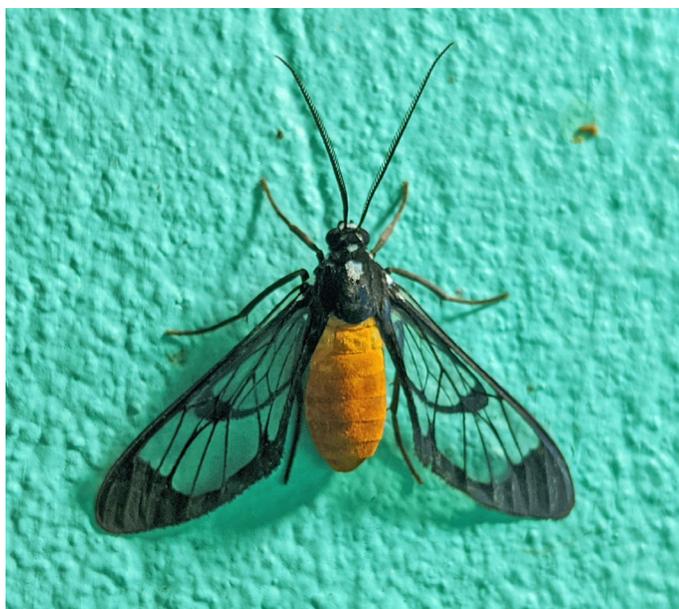


Fig. 30. Female *Cosmosoma klagesi*, Arima Valley, Asa Wright Nature Centre, 7.xii.2019, S.L. Williamson (iNaturalist observation 36484831); © with permission.

The sexes are similar.

Biology in Trinidad. All records which record the method of capture were of specimens attracted to light. The adults show some resemblance to the night-flying social wasps of the genus *Apoica*, which have a nasty sting (speaking from personal experience).

Status in Trinidad. An occasional and widespread species.

***Cosmosoma melathoracia* Kaye, 1901**

Figs. 31–34, Appendix Figs. 4, 27.

OD: Kaye 1901: *Cosmosoma melathoracia*, TL Trinidad.

TT: *Cosmosoma melathoracia* Kaye: Kaye (1901), Hampson (1914), Draudt (1915–1917), Kaye and Lamont (1927), Fleming (1957)

Cosmosoma melathoracea [sic] Kaye: Kaye and Lamont (1927)

Cosmosoma melathoracium [sic] Kaye: Zerny (1912), Zerny (1931a)

Historical notes. Kaye (1901) described and illustrated this species from a specimen captured in May 1898 at Tabaquite, Trinidad; the female holotype is in NHMUK. Kaye and Lamont (1927) noted an additional specimen from Palmiste,

8.ix.1917 (N. Lamont); this specimen, a female, is in NMS. Fleming (1957) recorded six males from Simla. Identified by comparison with the type and NHMUK series.

Taxonomic issues. Not in BOLD, but DNA barcodes would be useful to assess the affinities of this species. We include figures of the body details (Appendix Fig. 4) and male genitalia (Appendix Fig. 27) for this species described

from Trinidad.

Identification. The distinctive brown dorsal thorax is variable in colour and intensity (Figs. 31–34). When this brown area is not evident, the red spot or pair of spots dorsally on abdominal segment one and the row of metallic green dorsal spots on the abdomen will characterize this



Fig. 31. Male *Cosmosoma melathoracia*, Sangre Grande, Sans Souci Estate, MVL, 8.viii.1982; 34 mm.



Fig. 32. Male *Cosmosoma melathoracia* (orange dorsal thorax), Rio Claro-Guayaguayare Road, milestone 6.5, MVL, 30.ix.1978; 33 mm



Fig. 33. Female *Cosmosoma melathoracia*, Cumaca Road, 4.6 miles, MVL, 18.vii.1981; 37 mm.

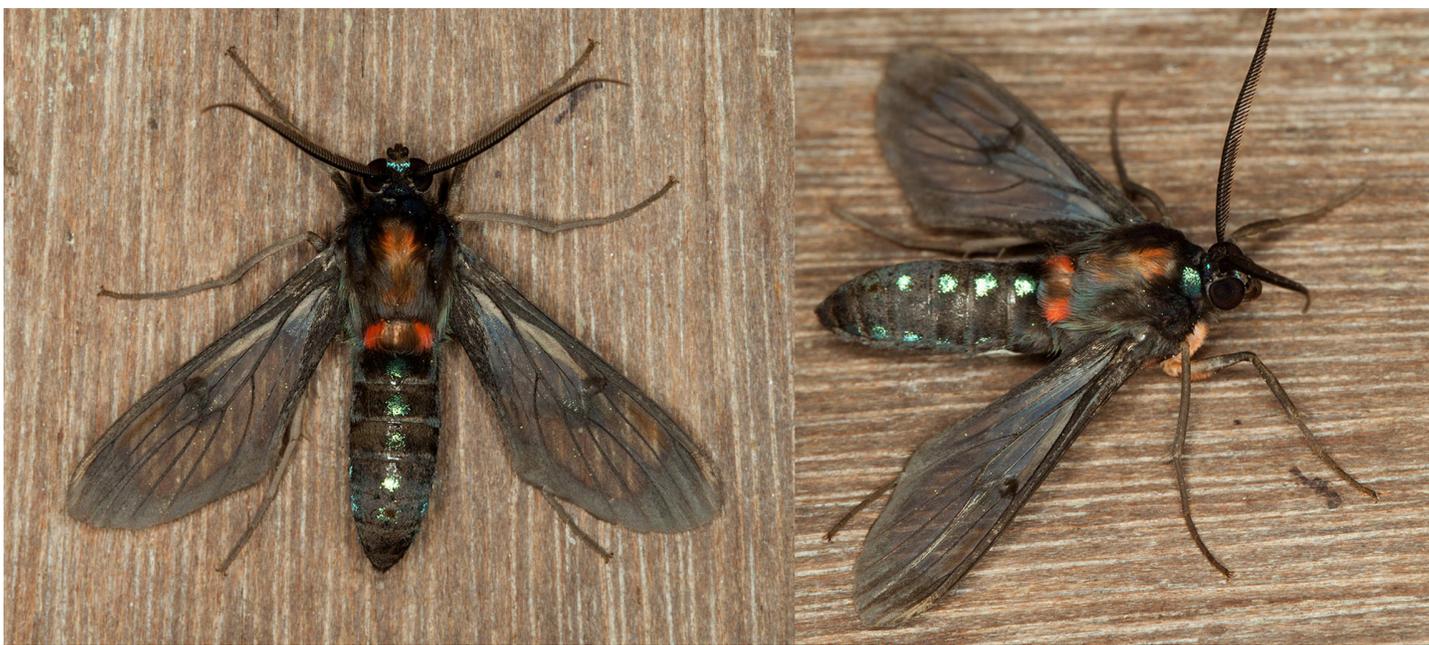


Fig. 34. Male *Cosmosoma melathoracia*, Arima Valley, Asa Wright Nature Centre, 23.iii.2015, S. Nanz; ©, with permission.

species. The sexes are similar.

Biology in Trinidad. Most specimens with the method of capture recorded were taken at light, but it has also been attracted to heliotrope at night.

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

Cosmosoma pytna Druce, 1906

Fig. 35, Appendix Fig. 5.

OD: Druce 1906: *Cosmosoma pytna*, TL Trinidad.

TT: *Cosmosoma pytna* Druce: Druce (1906), Zerny (1912), Hampson (1914), Draudt (1915–1917), Kaye and Lamont (1927), Fleming (1957)

Historical notes. This species was described from Trinidad (Druce 1906) and the male holotype is in NHMUK. There do not seem to have been any further published records since the original description (Kaye and Lamont 1927, Fleming 1957), but Lamont captured a female at Palmiste in 1947 and MJWC caught two males on the Rio Claro-

Guayaguayare Road in 1978. Identified by comparison with the holotype.

Taxonomic issues. There are no sequences identified as *C. pytna* in BOLD. Sequences from the type locality Trinidad would be valuable to help characterize this name.

Identification. This is a distinctive species in Trinidad, due to the orange streaks on the base of the dorsal forewing, orange patagia, yellow-orange abdominal segment 1 and brown-orange abdominal segments 5–6. The sexes are similar.

Biology in Trinidad. The two recent captures were at MV light.

Status in Trinidad. A rare species, with no records from the North of Trinidad.

Cosmosoma remota (Walker, 1854)

Figs. 36–38.

OD: Walker 1854: *Glaucoptis remota*, TL Venezuela, Brazil, Pernambuco.

TT: *Cosmosoma remota* (Walker): Kaye and Lamont



Fig. 35. Male *Cosmosoma pytna*, Rio Claro-Guayaguayare Road, milestone 6.5, MVL, 30.ix.1978; 30 mm.

(1927), Fleming (1957), Cock (2017b)

Historical notes. Kaye and Lamont (1927) noted a record from Tobago, but do not explicitly mention this species as occurring in Trinidad. Fleming (1957) stated that there are Trinidad males in Kaye's collection. MJWC examined a male from Trinidad and a pair from Tobago from Kaye's collection, now in MGCL (see Appendix). Identified by comparison with the type (♀ with discal bar on forewing, Venezuela) and NHMUK series (including ♀ specimens

with no discal bar).

Taxonomic issues. BIN BOLD:ACF3637 of specimens from Panama and Colombia identified as *C. remota*, is likely to represent this species, but sequences from Trinidad and the type localities would be needed to confirm this association. The specimen from Venezuela in NHMUK labelled as type is a female with a dark discal bar from the tornus to the cell; this bar is absent thus far in females examined from Trinidad and Tobago.



Fig. 36. Male *Cosmosoma remota*, Curepe, MVL, 22.viii.1978; 24 mm.



Fig. 37. Female *Cosmosoma remota*, Curepe, MVL, 26.viii.1978; 27 mm.



Fig. 38. *Cosmosoma remota*. **Left**, male, Port of Spain, Hololo Mountain Road, 18.xi.2018, bushmountainTT (iNaturalist observation 18483478); ©, under CC-BY-NC. **Centre**, female, Penal, at light, 7.xi.2013, K. Sookdeo; ©, with permission. **Right**, female, Tobago, south of Black Rock, 31.vii.2020, figtree (iNaturalist observation 60005380); ©, under CC-BY-NC.

Identification. This species has red streaks on the dorsal forewing, just a red line on each side of the dorsal thorax, and the red dorsal line of the abdomen reduced or fragmented. The differences to separate this species from the other relatively small *Cosmosoma* spp., *C. achemon*, *C. hypocheilus* and *C. bolivarensis* are discussed under *C. achemon* above. Based on material to hand, the female of *C. remota* lacks the black bar on the forewing from the tornus to the cell, unlike the male, *C. achemon* and *C. bolivarensis*.
Biology in Trinidad. Adults may be attracted to heliotrope,

but the majority have been collected at light.

Status in Trinidad and Tobago. A common species, mainly found in suburban areas.

***Cosmosoma rubriscapulae* Kaye, 1901**

Figs. 39–41, Appendix Figs. 6, 28.

OD: Kaye 1901: *Cosmosoma rubriscapulae*, TL Trinidad.

TT: *Cosmosoma rubriscapulae* Kaye: Kaye (1901), Hampson (1914), Draudt (1915–1917), Kaye and Lamont (1927), Fleming (1957)



Fig. 39. Male *Cosmosoma rubriscapulae*, Curepe, MVL, 16.viii.1978; 39 mm.



Fig. 40. Female *Cosmosoma rubriscapulae*, Morne Bleu, Textel Installation, at light, 29.iii.1979; 40 mm.



Fig. 41. *Cosmosoma rubriscapulae*, Morne Catherine, at light, 5.v.2022, R. Deo (iNaturalist observation 115722850); ©, with permission.

Cosmosoma rubriscapulum [sic] Kaye: Zerny (1912)

Historical notes. Kaye (1901) described and illustrated this species based on a specimen ‘flying gently by day in Morrison Valley, beginning of July 1898 (W.J. Kaye)’, and the same information is repeated in Kaye and Lamont (1927). This female holotype, labelled Trinidad but without further location, is in NHMUK. Fleming (1957) recorded three males and three females from Simla. Identified by comparison with the type (NHMUK, ♀ Trinidad) and NHMUK series.

Taxonomic issues. Not in BOLD. We include figures of the body details (Appendix Fig. 6) and male genitalia (Appendix Fig. 28) for this species described from Trinidad.

Identification. This species has short red streaks on the base of the dorsal forewing, is extensively red on the thorax and dorso-laterally on abdominal segment 1, and dorso-lateral rows of metallic blue spots on the abdomen. The

sexes are similar.

Biology in Trinidad. Life history unknown. Most specimens were captured attracted to light.

Status in Trinidad. An occasional species in both forested and suburban habitats.

***Cosmosoma subflamma* (Walker, 1854)**

Figs. 42–43, Appendix Figs. 7, 29.

OD: Walker 1854: *Glaucopis subflamma*, TL Brazil.

TT: *Cosmosoma subflamma subflamma* (Walker):

Kaye and Lamont (1927), Fleming (1957)

Historical notes. Kaye and Lamont (1927) listed this species based on specimens from Verdant Vale, x.1918, at light (F.W. Urich) and Palmiste, 28.v.1921 (N.L.). The latter has been examined in NMS. The former has not been located, although it may well be the damaged female from Kaye's collection in MGCL. Fleming (1957) recorded a male from Simla. Identified by comparison with the NHMUK series and Cerda (2008).

Taxonomic issues. We have examined an image of the holotype of *C. subflamma* (NHMUK, ♀ Brazil); it is dark, with the blue metallic spots of the dorsal abdomen hardly apparent, and the hind legs appear to be dark. Walker (1854) stated that the 'femora towards the base and coxae [are] red; hind tibiae and hind tarsi red above'. Hampson (1898) only knew the holotype and described the legs as 'black, the femora and hind tibiae and tarsi striped with scarlet'.

Herrich-Schäffer [1854] (in Herrich-Schäffer 1850–[1858]) named *Laemocharis panopes* from Venezuela based upon an illustration – his fig. 243, which resembles *C. subflamma* except that the hind legs (the only ones shown) are uniformly pale orange. However, the holotype (MNB, ♀ Venezuela) appears to have dark hind legs. Zerny (1931b) treated *L. panopes* a synonym of *C. subflamma*.

Schaus (1896) described *C. lucia* from St. Lucia and stated that the legs are red. Hampson (1898) examined the type and described the 'mid and hind femora, tibiae and tarsi' as black (in error for red), 'the hind femora and at



Fig. 42. Male *Cosmosoma subflamma*, Curepe, to *Heliotropium* by night, 29.viii.1981; 35 mm.



Fig. 43. Male *Cosmosoma subflamma*, Penal, 24.ix.2014, K. Sookdeo; ©, with permission.

extremity and tibiae at base black'. Hampson (1898) and Draudt (1915–1917) treated *C. lucia* as a subspecies of *C. subflamma*, while Zerny (1912) considered it a variety of *C. subflamma*, based on which Cerda (2008) treated it as a synonym of *C. subflamma*.

Compared to material from Trinidad in MJWC (Fig. 42), Cerda's (2008) figure has the iridescent blue of the dorsal abdomen reduced and the legs more yellow, but the genitalia (Appendix Fig. 29) appear the same. At this stage, we are uncertain as to the status of the three names. Material from Trinidad is closest in appearance to *lucia*, but whether *lucia* is a separate valid species is not clear. Unfortunately, the holotypes of *subflamma* and *panopes* are both female, and the type localities (Brazil and Venezuela) are vague, so resolving this will not be straightforward. Accordingly, we refer to this species from Trinidad as *C. subflamma*, in line

with the treatment of Cerda (2008).

Identification. The bright red hind legs and basal parts of the other legs are distinctive, but note also the dorsal row of iridescent blue spots on the abdomen, posterior margin of thorax and head. The sexes are similar.

Biology in Trinidad. One male was attracted to heliotrope by night, but most records have been of individuals attracted to light. The sexes are similar.

Status in Trinidad. An uncommon species in Trinidad, mostly recorded from forested areas.

Cosmosoma teuthras Walker, 1854

Fig. 44.

OD: Walker 1854: *Glaucopis teuthras*, TL Venezuela (and Brazil).

Historical notes. A new record for Trinidad, identified by comparison with the type (NHMUK, ♂ Venezuela) and NHMUK series.

Taxonomic issues. This species appears in BOLD as BOLD:AAA1312, incorporating several distinct separately named subclusters. The largest of these includes material from Central America south to Paraguay is mostly identified as *C. teuthras*; and given the Venezuela type locality is probably correctly associated with this name, which can be applied to the Trinidad population.

Identification. This species is extensively red on the dorsal head, thorax and dorsal forewing, including a bar across the end of the cell, which is not seen in any other Trinidad species. The female has not been documented from Trinidad, but the sexes are similar.

Biology in Trinidad. The only Trinidad male was attracted to MV light.

Status in Trinidad. Just one record from the forest of Inniss Field.

DIXOPHLEBIA BUTLER, 1876

Type species: *Pseudomya quadristrigata* Walker, 1865, TL



Fig. 44. Male *Cosmosoma teuthras*, Inniss Field, MVL, 17.v.1999; 37 mm.

Brazil, Ega.

Dixophlebia holophaea Hampson, 1909

Fig. 45.

OD: Hampson 1909: *Dixophlebia holophaea*, TL Guyana.

TT: *Dixophlebia holophaea* Hampson: Fleming (1957)

Historical notes. Fleming (1957) recorded two males from Simla. Identified by comparison with the type (NHMUK, ♂ Guyana, photo) and NHMUK series (none from Trinidad).

Taxonomic issues. There are no public sequences in BOLD. **Identification.** This species has a disproportionately heavy and long abdomen compared to other *Euchromiina* and *Ctenuchina*, although this habitus may initially suggest this species belongs to some other family. We are not familiar with the female.

Biology in Trinidad. One record at light.

Status in Trinidad. A rare species recorded from the forested Northern Range.

DYCLADIA FELDER 1874

Type species: *Dycladia correbioides* Felder, 1874, TL



Fig. 45. Male *Dixophlebia holophaea*, Grand Tacarib, at light, 29 August 2015, K. Sookdeo; ©, with permission.



Colombia, Bogota.

***Dycladia basimacula* Schaus, 1924**

Figs. 46–48.

OD: Schaus 1924: *Dycladia basimacula*, TL Caura Valley, Venezuela (also from Trinidad).

TT: *Dycladia correbioides* Felder: Kaye and Lamont (1927) [misidentification]

Dycladia basimacula Schaus: Schaus (1924), Fleming (1957)

Historical notes. Kaye and Lamont (1927) recorded *Dycladia correbioides* from Trinidad, based on specimens from Palmiste, collected 7.i.1921 and 25.iv.1921 by Sir Norman Lamont. We have not located these specimens, but there are two specimens of *D. basimacula* from the Lamont collection in RSM, which he had identified as *D. correbioides*. We therefore agree with Fleming (1957) who suggested Kaye and Lamont (1927) had misidentified this species, and that *D. correbioides* (described from Central America, Colombia) is not a Trinidad species. Five specimens in Lamont's collection in UWIZM are curated as *D. correbioides*, but these all are *Lycomorphodes tortricina* Rothschild (Arctiinae, Lithosiini). Fleming

(1957) reported four male *D. basimacula* from Simla. MJWC identified this species from the type (USNM, ♂ Venezuela) and Fleming (1957).

Taxonomic issues. The type has a yellow lateral stripe on the abdomen that is not always present on Trinidad specimens. No sequences in BOLD.

Identification. This species shares its colouring and general pattern with three species of Ctenuchina (*Correbidia assimilis* (Rothschild), *Pionia lycoides* (Walker) and an unnamed species of *Pionea*) and two of Lithosiini (*Lycomorphodes bipartita* (Walker) and *L. tortricina*), and all are involved in a mimicry ring with *Calopteron* spp. (Lycidae) beetles. *Dycladia basimacula* rests with its wings held at an angle rather than with the costa of each forewing parallel, or nearly so. Furthermore, the distal yellow band of the forewing of *D. basimacula* is angled, turning to meet the termen in the middle rather than continuing to the dorsum as in the other mentioned species. The sexes are similar.

Biology in Trinidad. All captures that include details were taken at light.

Status in Trinidad. An uncommon species found in both



Fig. 46. Male *Dycladia basimacula*, Curepe, MVL, 19–25.x.1981; 26 mm.



Fig. 47. Female *Dycladia basimacula*, Curepe, MVL, 21–31.i.1982; 27 mm.



Fig. 48. *Dycladia basimacula*, Mt. Hope, 5.v.2021, bellbird20 (iNaturalist observation 77557912); ©, with permission.

forested and suburban areas.

Dycladia correbioides Felder (see *D. basimacula* Schaus)

HETERODONTIA FELDER, 1874

Type species: *Heterodontia tricolor* Felder, 1874, TL Brazil, Amazon River. Kirby (1892) listed this as a valid genus, with just the one species, but Hampson (1898) placed *Heterodontia* as a synonym of *Chrostosoma* Hübner, 1821 (type species *Sphinx echemus* Stoll, 1781). Subsequent authors followed Hampson, until Grados (1999) reintroduced *Heterodontia* as a separate genus without comment, making several new combinations in the process. Cerda (2008) accepted Grados' action as re-establishing the genus and perpetuated the situation. The available sequences in BOLD do not offer much support for this split.

***Heterodontia fenestrina* (Butler, 1876)**

Figs. 49–52.

OD: Butler 1876: *Pseudomya fenestrina*, TL Brazil, Pará, Rio Trombetas.

TT: *Chrostosoma viridipunctatum* Rothschild: Fleming (1957) [misidentification]

Heterodontia fenestrina (Butler): Cerda (2008)

Historical notes. Fleming (1957) recorded 5♂ and 4♀ from Simla, Arima Valley as *C. viridipunctatum*. MJWC initially identified this species as *C. viridipunctatum* by comparison with the type (NHMUK, ♀ Bolivia) and NHMUK series, but noted that it might prove to be *C. fenestrina* Butler (type, NHMUK, ♂ Brazil). Cerda (2008) transferred *C. fenestrina* from *Chrostosoma* to *Heterodontia*, listed a record of *H. fenestrina* from Arima (May) and suggested that Fleming's (1957) records of *C. viridipunctatum* are misidentifications for this species. We follow this treatment here.

Taxonomic issues. It is anticipated that this species will fall within BOLD:AAJ5313 (*H. fenestrina* from French Guiana). One female in NHMUK has metallic green spots on the dorsolateral abdomen (Fig. 51), but does not otherwise appear to differ.

Identification. This species has translucent rather than transparent areas on the wings, which extend nearly three-quarters of the length of the forewing, and are interrupted by a dark bar from the tornus to the end of the cell. These features, in combination with a red spot at the anterior base of each forewing and a dorsal red spot on abdominal segment 1 should serve to recognize this species. The sexes are similar, except the female has less pointed wings, and the form with green spots on the abdomen has only been observed in a female.

Biology in Trinidad. Adults are attracted to light.

Status in Trinidad. An occasional species in forested areas



Fig. 49. Male *Heterodontia fenestrina*, Cumaca Road, 4.6 miles, MVL, 18.vii.1981; 28 mm.



Fig. 50. Female *Heterodontia fenestrina*, Morne Bleu, Textel Installation, at light, 3.vii.1978; 30 mm.



Fig. 51. Female *Heterodontia fenestrina* (green metallic markings dorso-laterally on abdomen), Tabaquite [NHMUK]; ©, The Trustees of the Natural History Museum, London, made available under Creative Commons License 4.0 <https://creativecommons.org/licenses/by/4.0/>

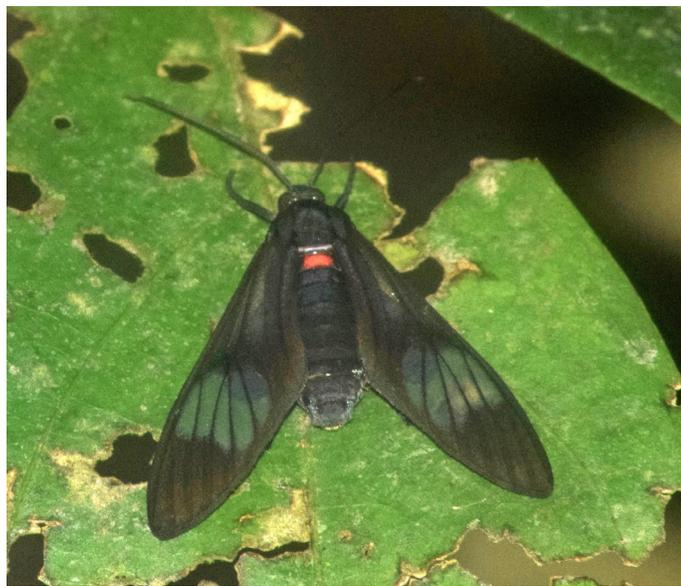


Fig. 52. Male *Heterodontia fenestrina*, Inniss Field, by night, 18.vii.2021, R. Deo (iNaturalist observation 87936944); ©, with permission.

HISTIOEA WALKER, 1854

Type species: *Euchromia proserpina* Hübner, 1823, TL Brazil. This genus has been misspelt as *Histiaea* (Watson *et al.* 1980).

***Histioea cepheus* (Cramer, 1780)**

Figs. 53–56. BIN: BOLD:ABZ8247.

OD: Cramer 1780: *Sphinx cepheus*, TL Suriname.

TT: *Histiaea* [sic] *cephus* (Cramer): Hampson (1898), Zerny (1912), Draudt (1915–1917), Beebe and Kenedy (1957), Dunning (1968)

Histiaea [sic] *cephus* [sic] (Cramer): Fleming (1950)

Histioea cepheus (Cramer): Kaye (1901), Cerda (2008)

Histaeta [sic] *cephus* (Cramer): Blest (1964)

Historical notes. A specimen captured by W.E. Broadway at the Botanic Gardens, Port of Spain, is referred to by Hampson (1898), Kaye (1901) and Kaye and Lamont (1927). This specimen is in NHMUK, although the data label does not mention the Botanic Gardens. Kaye and Lamont (1927) also listed a specimen from the edge of the Queen's Park Savannah, Port of Spain, 21.xi.1920 (W.J. Kaye); this specimen is in MGCL from the W.J. Kaye collection. Fleming (1957) recorded 46 males and 17 females from Simla. Identified by comparison with the NHMUK series.

Taxonomic issues. Cramer (1777–1782, plate 197E) shows the dorsal forewing of this species with the basal streak, postdiscal line in space 1 (Cu_2-2A) and the spot at the end of the cell all pink, and two distinct blue spots beyond the end of the cell. Gernaat *et al.* (2018) designated a lectotype from Suriname for *H. cepheus*. It differs from Cramer's figure in that the forewing blue spots are smaller, the pink medial streak in space 1 (Cu_2-2A) is more diffuse, and there are diffuse pink streaks in space 1 (Cu_2-2A) from near the base to the distal end of the medial streak, and in the cell against the cubitus from near the base to the basal end of the



Fig. 53. Male *Histioea cepheus* (BIN BOLD:ABZ8247), Arima Valley, Simla, xii.2020 (S. Alston-Smith) [DNA MJWC-499]; 56 mm.



Fig. 54. Female *Histioea cepheus*(?) (BIN BOLD:AAF0772, i.e. *H. proserpina*), Arima Valley, Simla, at light, xii.2020 (S. Alston-Smith) [DNA MJWC-498]; 65 mm.



Fig. 55. Female *Histioea cepheus* (no DNA barcode), Arima Valley, Simla, at light, xii.2020 (S. Alston-Smith); 66 mm.



Fig. 56. Male *Histioea cepheus* (no DNA barcode), Arima Valley, Asa Wright, 7.xi.2016, P. Sullivan (iNaturalist observation 19677104); ©, under CC-BY-NC.

medial streak; the dorsal hindwing markings are pink rather than red, but this may reflect that the lectotype has faded; the distal spots of the ventral hindwing of the lectotype are pinkish yellow. Trinidad specimens (Figs. 53, 55) resemble this lectotype. Sequences in BOLD as *H. cepheus* from Venezuela and French Guiana appear in BOLD:ABZ8247. These specimens from French Guiana differ from Trinidad material in that (1) on the dorsal forewing, the basal streak, postdiscal spot in space 1 (Cu_2-2A) and the spot at the end of the cell are more clearly delineated and red not pink, and (2) the distal spot on the ventral hindwing is red rather than yellow. One specimen from Venezuela in BOLD:ABZ8247 is identified as *H. monticola* Klages and resembles the Trinidad material. *Histioea monticola* was described from the Suapure Mountains, Venezuela (Klages 1906) and

the type is in the USNM (examined), but this taxon has been treated as a synonym of *H. cepheus* since Hampson (1914). Given that BOLD:ABZ8247 occurs East and West of the Suriname type locality, we suggest that the French Guiana population represents a geographically separated, phenotypically distinct form of *H. cepheus*.

Three DNA barcodes were obtained from Trinidad material. Two (MJWC-493 and MJWC-499) formed part of BIN BOLD:ABZ8247 from French Guiana and Venezuela, i.e. *H. cepheus*, but a third (MJWC-498) formed part of BIN BOLD:AAF0772, i.e. *H. proserpina* (Hübner, 1827) (TL Brazil), which has a very different habitus and is known from the Amazon. We have no immediate explanation for this anomaly; there may have been some hybridization in the past, which has persisted genetically in the female mitochondria of *H. cepheus*, or perhaps *C. proserpina* has a *cepheus* morph which occurs sympatrically with *H. cepheus*.

Identification. The large size, sullied white forewing spots and diffuse pinkish markings on the forewing should make this species easy to recognise. The sexes are similar, although the female is a little larger.

Biology in Trinidad. R. Kenedy reared this species, but unfortunately provided no information on the food plant or early stages (Beebe and Kenedy 1957). Gernaat *et al.* (2018) found eggs of *H. cepheus* on *Olyra latifolia* (Poaceae), but the neonate caterpillars would not accept this food plant, although they were successfully reared on a non-flowering *Mikania* sp. comparable to *M. micrantha* (Asteraceae), one of eight plant species growing nearby which were offered. For three years, Cock (1981, 1982) studied the herbivorous insects associated with *M. micrantha* in Trinidad and the Neotropics, but did not encounter this caterpillar, indicating that *M. micrantha* is unlikely to be a normal food plant in the wild.

The moths are nocturnal; they are not attracted to heliotrope, and most records are at light, where males make up about two-thirds of the records (Beebe and Kenedy 1957, author's observations). Beebe and Kenedy (1957)

considered the moths to be unpalatable, and note that ‘*when a specimen is immobilized suddenly, ... it has been seen in many cases to exude droplets of thick yellow fluid from the thorax. Sometimes the droplets are bubbly and almost completely cover the dorsal thorax. This seems to serve as an effective defense against at least some predators.*’

Status in Trinidad. A common species in forested areas but uncommon in suburban areas. It is the most commonly photographed species of Euchromiina at the Asa Wright Nature Centre. Hence, Beebe and Kenedy (1957), Blest (1964) and Dunning (1968) used them in their behavioural studies.

***Histioea meldolae meldolae* Butler, 1876**

Figs. 57–58.

OD: Butler 1876: *Histiaea* [sic] *meldolae*, TL Trinidad, Venezuela.

TT: *Histiaea* [sic] *meldolae* Butler: Butler (1876), Hampson (1898), Zerny (1912), Draudt (1915–1917), Fleming (1950), Fleming (1957)

Histioea meldolae Butler: Waterhouse (1881), Druce (1881–1900), Kirby (1892), Kaye (1901), Kaye and Lamont (1927)

Historical notes. Kaye (1901) included this species based on the original description. Kaye and Lamont (1927) listed five specimens from Palmiste, collected by Sir Norman Lamont (iii.1915, viii.1915, 11.xii.1916, 22.x.1918, 22.i.1922), several of which are listed in the Appendix. Identified by comparison with the type (NHMUK, ?♀ Trinidad) and NHMUK series.

Taxonomic issues. Walker (1854) described *H. bellatrix* (as *Euchromia bellatrix*) referring to ‘an abbreviated yellow band beyond, the blue dots in the disk’ and two un-named varieties, one (implicitly var. β) with the yellow band comprising four yellow spots and the other (var. γ) with three yellow spots. It is not clear how the five specimens listed from Venezuela (three from Mr. Dyson’s collection and two from M. Becker’s collection) relate to the three different forms. Butler (1876) described *H. meldolae*



Fig. 57. Male *Histioea meldolae meldolae*, Hollis Reservoir, 2.ix.1978; 60 mm.



Fig. 58. Female *Histioea meldolae meldolae*, Parrylands Oilfield, MVL, 25.vii.1981; 60 mm.

referring to Walker's var. with three yellow spots (i.e. var. γ), and based on specimens from Trinidad (coll. Meldola) and Venezuela (colls. Dyson & Becker). By implication the specimens from the Dyson and Becker collections are some of the five to which Walker referred. Raphael Meldola (1849–1915) was a chemist and biologist who wrote on mimicry and evolution, but we have found no information to suggest he ever visited Trinidad himself (Marchant 1916), although four collections that included Meldola Trinidad Lepidoptera were donated to OUMNH in 1897 and 1901 (OUMNH 2022). Given that Butler named the species after Meldola, whose specimen(s) were from Trinidad, this should be taken as the primary type locality, and Hampson (1898) explicitly referred to the type being from Trinidad, effectively designating the Trinidad specimen curated as type in NHMUK to be the lectotype. Lesieur and Lévêque (2017) described *H. meldolae hoyasensis* Lesieur from Panama, and so the trinomial is used for the Trinidad population.

Identification. The large size, yellow-white spots and long red streaks on the forewing make this species unmistakable. The sexes are similar.

Biology in Trinidad. Not attracted to drying heliotrope. Where recorded, adults were captured at light.

Status in Trinidad. An occasional species, mostly from forested areas.

HOMEOCERA FELDER, 1874

Type species: *Homoeocera crassa* Felder, 1874, TL Colombia, Bogota. Laguerre (2014) treated some parts of this paraphyletic genus.

***Homoeocera magnolimbata* Dognin, 1911**

Fig. 59.

OD: Dognin 1911: *Homoeocera magnolimbata*, TL French Guiana

TT: *Homoeocera magnolimbata* Dognin: Kaye and Lamont (1927), Fleming (1957)

Historical notes. First recorded from Trinidad by Kaye and Lamont (1927), referring to a specimen from St. Ann's, 21.x.1899, collected by F.W. Urich. This male specimen was in W.J. Kaye's collection, and is now in MGCBL. Identified by comparison with the type (USNM, ♀ French Guyana) and NHMUK series.

Taxonomic issues. No sequences in BOLD. Cerda (2008) was uncertain about the identity of Trinidad records of this species. Figures of Trinidad specimens (Figs. 59) are a good match to Cerda's (2008, Fig. 016) and to the type, so there seems no reason to question this identification.

Identification. This is a large species, with transparent wings and a mostly even narrow black margin, and a dark bar at the end of the forewing cell. It is comparable to



Fig. 59. *Homoeocera magnolimbata*. **Left**, male, Trinidad, 1909 [NHMUK]; ©, The Trustees of the Natural History Museum, London, made available under Creative Commons License 4.0 <https://creativecommons.org/licenses/by/4.0/>. **Right**, female, Moreau, 2.iii.1938 [N. Lamont] [NMS]; 40 mm; photo V. Blagoderov; © NMS, with permission.

Nyridela acroxantha, but in that species the dark bar across the end of the forewing cell runs across the wing to the tornus. The sexes are similar.

Biology in Trinidad. Nothing reported. Sir Norman Lamont captured a specimen at Moreau in March (location uncertain, but a forested area in the South of Trinidad where Lamont collected butterflies) and R.W. Farmborough collected one at forest roadside in the Rock-Penal Moruga area in September, which suggests this is a day-flying species captured feeding at flowers such as eupatorium.

Status in Trinidad. A rare species from forested areas, and no records since 1938.

HYPOCHARIS HAMPSON, 1898

Type species: *Laemocharis clusia* Druce, 1897, TL Brazil, Amazon River. Cerda (2008) moved several species from *Saurita* into *Hypocharis*, taking into consideration similarities in the male genitalia.

***Hypocharis arimensis* (Fleming, 1957)**

Figs. 60–62, Appendix Figs. 8, 30.

OD: Fleming 1957: *Saurita arimensis*, TL Trinidad.

TT: *Saurita lacteata* (Butler): Kaye (1901), Zerny (1912), Draudt (1915–1917), Kaye and Lamont (1927) [misidentification]

Saurita arimensis Fleming: Fleming (1957)

Hypocharis arimensis (Fleming): Cerda (2008)

Historical notes. Fleming (1957) described *Hypocharis arimensis* (as *Saurita arimensis*) based on seven males from the Arima Valley, Trinidad, pointing out that it is not the same as *H. lacteata* Butler, 1877 (TL Amazons). Earlier authors had reported this species from Trinidad as *lacteata* (Kaye 1901, Kaye and Lamont 1927). Identified by comparison with a paratype (NHMUK, ♂ Trinidad) and from Fleming (1957).

Taxonomic issues. No public sequences in BOLD. An image of the holotype is available online (AMNH 2022). Cerda (2008) transferred this species from *Saurita* to *Hypocharis*. Dissection of a Trinidad male (Appendix Fig. 30) confirmed that this is the species that Cerda (2008) treated and illustrated under this name.

Identification. This species has translucent areas on both wings; the forewing with the apex, a patch at the end of the cell and a rectangle at the tornus black. When combined with the red lines on the tegulae and the white patch on the basal dorsal abdomen, it is distinctive.

Biology in Trinidad. This species seems to fly by night only, when it is attracted to light.

Status in Trinidad. A fairly common, widespread species, mainly in forested areas.



Fig. 60. Male *Hypocharis arimensis*, Inniss Field, MVL, 17.v.1999; 23 mm.



Fig. 61. Female *Hypocharis arimensis*, Rio Claro-Guayaguayare Road, milestone 6.5, MVL, 30.ix.1978; 27 mm.



Fig. 62. Male *Hypocharis arimensis*, Penal, at light, 24.i.2014, K. Sookdeo; ©, with permission.

***Hypocharis clusia* (Druce, 1897)**

Figs. 63–65.

OD: Druce 1897: *Laemocharis clusia*, TL Amazons, Maranhão [Maranhão]

TT: *Hypocharis clusia* (Druce): Kaye and Lamont (1927)
Saurita clusia (Druce): Beebe and Kenedy (1957),
 Fleming (1957), Blest (1964)

Historical notes. Kaye and Lamont (1927) recorded this species from Sangre Grande (25.viii.1917, Turner), St. Ann's (i.1922), Manzanilla (22.iii.1922, F.W. Jackson) and Palmiste (23.iii.1922, N. Lamont). MJWC examined all except the last of these in OUMNH and MGCL (ex. W.J. Kaye collection) as listed in the Appendix. Identified by comparison with the type (NHMUK, ♂) and NHMUK series.

Taxonomic issues. Fleming (1957) considered *Hypocharis* to be a synonym of *Saurita*. Betz (1972) either ignored this or reverted to *Hypocharis* without a formal taxonomic act, and this has been followed by subsequent authors (Cerda 2008). Fleming (1957) discussed the identity of this species in relation to material of a smaller species from Panama that Forbes (1939) identified as *H. clusia*. Cerda (2008) concludes that Forbes' material was misidentified. In BOLD, there are sequences of material that appears to be *H. clusia* from Costa Rica and Guatemala in BOLD:AAX2185, from French Guiana in BOLD:ADZ2339, and from Peru in BOLD:AAG6272. Provisionally we anticipate that BOLD:AAX2185 is the species that Forbes treated from Panama, and that Trinidad sequences when available will form part of BOLD:ADZ2339, which may be the BIN for which the name *H. clusia* is appropriate.



Fig. 63. Male *Hypocharis clusia*, Brigand Hill, MVL, 28.iii.2003; 27 mm.



Fig. 64. Female *Hypocharis clusia*, Valencia Forest, MVL, 5.viii.1981; 32 mm.



Fig. 65. Male *Hypocharis clusia*, Arima Valley, Asa Wright Nature Centre, 5.iii.2018, G. Barrett (iNaturalist observation 107614385); ©, under CC-BY-NC.

Identification. A large part of the distal forewing is slightly translucent, almost opaque, sullied white with dark veins, although less extensive in the female. This combined with red lines on the tegulae and red spots at the anterior base of the forewings and dorsally on abdominal segment 1 should serve to recognize this species.

Biology in Trinidad. The moths are nocturnal; they are not attracted to heliotrope and almost all captures are at light, the great majority being males (Beebe and Kenedy 1957, author's observations).

Status in Trinidad. Kaye and Lamont (1927) considered this species 'apparently widely spread but never common'. The records available suggest it occurs in diverse disturbed habitats.

Hypocharis tenebrosa Cerda, 2017

Figs. 66–67.

OD: Cerda 2017: *Hypocharis tenebrosa*, TL French Guiana.

Historical notes. This is a new record for Trinidad.



Fig. 66. Female *Hypocharis tenebrosa*, Arima Valley, Simla, MVL, 6.viii.1982; 24 mm.

Taxonomic issues. What appears to be this species appears in the USNM main collection as *Psilopleura sanguipuncta* Hampson but the wings look smokier than that species (type examined, NHMUK ♂, Brazil, Rio Grande do Sul). It may also be in NHMUK, where an all-male series from the Guianas is over a blank label. Visually, it is a good match to *H. tenebrosa*, which Cerda (2017) recently described from French Guiana, based on males only. The male is unknown from Trinidad, but the male type material of *H. tenebrosa* from French Guiana is very similar to the Trinidad female (Fig. 66). Males from Trinidad need to be obtained, dissected and compared with the figures in Cerda (2017), to test this provisional identification.

Identification. This is a small species with uniformly smoky wings, a red spot at the anterior base of the forewing and a red line on each tegula.

Biology in Trinidad. One capture at Simla at light and a photographic record from Brasso Seco.

Status in Trinidad. A rare species, but it could be easily overlooked.

ISANTHRENE HÜBNER, [1819]

Type species: *Glaucopis incendiaria* Hübner, 1809, TL not stated.



Fig. 67. Female *Hypocharis tenebrosa*, Brasso Seco, 16.iv.2022, A. Deacon (iNaturalist observation 111996965); ©, under CC-BY-NC.



***Isanthrene tryhanei* Rothschild, 1911**

Figs. 68–69.

OD: Rothschild 1911: *Isanthrene tryhanei*, TL Trinidad, St Ann's, ♀.**TT:** *Isanthrene tryhanei* Rothschild: Rothschild (1911), Zerny (1912), Hampson (1914), Draudt (1915–1917), Kaye and Lamont (1927)*Isanthrene tryphanei* [sic] Rothschild: Rothschild (1913)**Historical notes.** This species was described and illustrated from a female from St. Ann's, Port of Spain (Rothschild 1911, 1913) and the holotype is the only specimen in NHMUK. Identified by comparison with the type (NHMUK, ♀ Trinidad).**Taxonomic issues.** No public sequences in BOLD. The male is unknown. Only the first pair of sub-dorsal yellow abdominal spots are clear on the type, compared to three in the specimen in MJWC (Fig. 68). In this regard, the MJWC specimen resembles the species treated as *I. melas* (Cramer) by Cerda (2008, Fig. 017), although the thorax of *I. melas* is more extensively marked in yellow, and the hindwings of *I. melas* are almost colourless, unlike those of *I. tryhanei* which are yellow, matching the forewings. It seems possible that if genitalia and/or DNA barcodes were compared, *I. tryhanei* would be found to be a synonym of *I. melas*.**Identification.** This large wasp mimic is the only Trinidad species with transparent yellow wings. Only two female specimens are known. The dorso-lateral yellow marks on abdominal segments 3 and 4 are minimal in the holotype.**Biology in Trinidad.** MJWC's specimen was captured on a sunny day on Lalaja Ridge using a net; it was in flight, resembling a large wasp, but fortunately he caught it 'just to make sure'. Bryan Ramdeen photographed an adult moth trapped in a web of the golden silk orb-weaver spider, *Trichonephila clavipes* (Linnaeus) (Araneidae) in Tucker Valley (Fig. 69).**Status in Trinidad.** A very rarely seen species, probably associated with forest areas.**Fig. 69.** *Isanthrene tryhanei*, caught by *Trichonephila clavipes* spider, Tucker Valley, 20 August 2022, B. Ramdeen (iNaturalist observation 131662148); ©, with permission.**Fig. 68.** Female *Isanthrene tryhanei*. **Above**, holotype, St. Ann's (F.E. Tryhane) [NHMUK]; ©, The Trustees of the Natural History Museum, London, made available under Creative Commons License 4.0 <https://creativecommons.org/licenses/by/4.0/> **Below**, Lalaja Ridge, 5.iii.1979; 51 mm.

LEUCOTMEMIS BUTLER, 1876

Type species: *Glaucopis latilinea* Walker, 1854, TL Brazil.

***Leucotmemis nexa* (Herrich-Schäffer, 1854)**

Fig. 70.

OD: Herrich-Schäffer 1854, p. 73: *Glaucopis nexa*, TL Brazil, Santarem.

TT: *Leucotmemis nexa* (Herrich-Schäffer): Kaye and Lamont (1927)

Historical notes. Kaye and Lamont (1927) listed records from St. Ann's, 18.ix.1899 (F.W. Urich); Palmiste, 9.ix.1917 (N. Lamont); Rock-Penal Road 1.i.1918 (N. Lamont), 14.i.1921 (W.J. Kaye). Of these, MJWC located the two Lamont specimens (in NMS), and the last, which is in MGCL (ex W.J. Kaye coll.). *Leucotmemis nexa* was identified by comparison with the NHMUK series.

Taxonomic issues. Herrich-Schäffer (1850–1858, fig. 254, p. 73), referred to this species as *Glaucopis nexa*, but treated it as a synonym of *G. phlegmon* Cramer, 1775 (although Herrich-Schäffer incorrectly refers to Walker as the author of *phlegmon*). The species Herrich-Schäffer illustrated as *nexa* is not the same as Cramer's *phlegmon*, but at this point, the name was not validly published (ICZN Article 11.6: A name which when first published in an available work was treated as a junior synonym of a name then used as valid is not thereby made available). However, Kirby (1892) treated both names as separate valid species making the name available with the original authorship (ICZN Article 11.6.1: However, if such a name published as a junior synonym had been treated before 1961 as an available name and either adopted as the name of a taxon or treated as a senior homonym, it is made available thereby but dates from its first publication as a synonym.). Fleming (1957) suggested this species is probably misplaced in *Leucotmemis*. Many sequences in BOLD from Costa Rica form BIN BOLD:AAA1328, and a small number of additional sequences from Mexico, Peru and Bolivia are grouped in the same BIN, suggesting this

will prove to be a single, widespread Neotropical species. **Identification.** This species superficially resembles the *Calonotos* spp. with green metallic stripes on the abdomen. However, rather than a single post-medial white spot it has an extended bar, crossed by four dark veins.

Biology in Trinidad. Nothing known from Trinidad.

Status in Trinidad. A rare species in Trinidad, with only four records from more than 100 years ago in forested areas of the south.

LOXOPHLEBIA BUTLER, 1876

Type species: *Poecilosoma vesparis* Butler, TL Peru.

***Loxophlebia bisigna* (Kaye, 1911)**

Figs. 71–73.

OD: Kaye 1911: *Pheia bisigna*, TL Guyana.

TT: *Loxophlebia bisigna* (Kaye): Kaye and Lamont (1927), Fleming (1957)

Loxophlebia klagesi Rothschild: Rothschild (1911), Zerny (1912), Draudt (1915–1917) [?synonym]

Loxophlebia clagesi [sic] Rothschild: Hampson (1914) [?synonym]

Historical notes. Kaye and Lamont (1927) included *L. bisigna* from Trinidad based only on Rothschild's (1911) type series of *L. klagesi*, which they treat as a synonym. Fleming (1957) mentioned three specimens from Simla. MJWC examined the NHMUK series of *L. bisigna* and type of *L. klagesi* (NHMUK ♂ Suriname); see comments in next section.

Taxonomic issues. Kaye (1911) described *L. bisigna* from British Guiana (type in MGCL, ex coll. W.J. Kaye, not examined). Two months later, Rothschild (1911) described *L. klagesi* from Suriname (TL), Venezuela and Trinidad (♂ 'Caporo', i.e. Caparo). Rothschild (1911) noted that the Trinidad male has a scarlet lateral dot on A4, and two Venezuelan males have subdorsal scarlet patches on A3–A4, which are absent in the Suriname material, and in *L. bisigna*.



Fig. 70. *Leucotmemis nexa* ♂. Left, male, Penal-Rock Road, 14.i.1921 (W.J. Kaye) [MGCL, ex coll. Kaye]. Right, female, Siparia, Palo Seco, mostly cacao, 14.i.1917 (R.W. Farmborough) [OUMNH]

Draudt (1915–1917, pp. 61, 63) suggested that *L. klagesi* may be a synonym of *L. bisigna*, but in the corrections (p. 199) seems to have decided otherwise. Nevertheless, Draudt's original suggestion has been accepted by subsequent authors (Kaye and Lamont 1927, Fleming 1957, Cerda 2008). *Loxophlebia bisigna* has red markings at the base of the dorsal forewing which are absent in the NHMUK series of *L. klagesi*, and *L. klagesi* has red spots on the abdomen as stated by Rothschild (1911), but absent in *L. bisigna*. *Loxophlebia crummatica* Dognin (type USNM, ♂ French Guiana) appears identical but does have red spots on the abdomen; Cerda (2008) made it a synonym of *L. bisigna*.

Fleming's three Trinidad specimens as well as those that we have examined from Trinidad consistently have a red lateral dot on A4, as noted by Rothschild (1911). MJWC compared the externally visible genitalia of two Trinidad males with those illustrated by Cerda (2008) from French Guiana, and could see no difference. We conclude that the red spots lateral on A4 represent a local form of *L. bisigna*. Sequences in BOLD from French Guiana form BIN BOLD:ACF1201, but see comments under *L. postflavia* below.

Identification. This species superficially resembles some *Cosmosoma* spp. and other genera with transparent wings. It is the only Trinidad species with white subdorsal markings on the posterior margin of the thorax and abdominal segments 1 and 2. It is perhaps most similar to *Pheia utica*, but that species (currently known from Tobago, but not Trinidad) has the white subdorsal markings restricted to abdominal segment 1, red streaks on the base of the dorsal forewing and small metallic blue subdorsal spots on the abdomen.

Biology in Trinidad. Adults of this species are attracted to heliotrope by day, and light by night.

Status in Trinidad. An uncommon species mainly from forested areas.

***Loxophlebia diaphana* (Sepp, 1848)**

Figs. 74–76.

OD: Sepp 1848: *Glaucopis diaphana*, TL Suriname.

TT: *Loxophlebia diaphana* (Sepp): Kaye and Lamont (1927), Fleming (1957), Cock (2017)

Mesotheron aurantegula Jones: Kaye and Lamont (1927), Fleming (1957) [misidentification]



Fig. 71. Male *Loxophlebia bisigna*, Parrylands Oilfield, to *Heliotropium*, 7.xi.1980; 23 mm.



Fig. 72. Female *Loxophlebia bisigna*, Parrylands Oilfield, MVL, 25.vii.1981; 26 mm.



Fig. 73. Male *Loxophlebia bisigna*, Penal, at light, 18.iv.2014, K. Sookdeo; ©, with permission.

Historical notes. Kaye and Lamont (1927) listed a specimen of *L. diaphana* from Palmiste, 12.i.1921 (N. Lamont); this specimen is a male, now in NMS. Kaye and Lamont (1927)

also listed a specimen of *Mesotheron aurantegula* Jones from Palmiste, 17.i.1922 (N. Lamont). This specimen is a female *L. diaphana* in NMS, labelled as *M. aurantegula* by Sir Norman Lamont. *Mesotheron aurantegula*, identified by comparison with the type (NHMUK, ♀ Brazil, São Paulo) and NHMUK series, resembles the female of *L. diaphana* and does not occur in Trinidad. Curiously, there are four male and three female *Valvaminor jacerda* which Kaye identified as *L. diaphana*, and are now in MGCL from Kaye's collection (see Appendix listings under *V. jacerda*). Fleming (1957) did not record *L. diaphana* (or *M. aurantegula*) from Simla. Identified by comparison with the type of *discifera* Walker (NHMUK, ♂ Para), a synonym, and NHMUK series.

Taxonomic issues. The NHMUK series comprises males only. The orange lateral stripes on most of this material is wider than in Trinidad specimens, and the spots on the patagia are less red. Cerda (2008) associated males and females, when he made the female *L. geminata* Schaus (TL French Guiana) a synonym of *L. diaphana*. It is possible that *M. aurantegula* is also the female of *L. diaphana*, the



Fig. 74. Male *Loxophlebia diaphana*, Maracas Bay, to *Heliotropium* by day, 29.iii.2003, 22 mm.



Fig. 75. Female *Loxophlebia diaphana*, Parrylands Oilfield, to *Heliotropium*, 7.xi.1980, 20 mm.



Fig. 76. Male *Loxophlebia diaphana*, Carapachaima, at light, 6.ix.2020, R. Deo (iNaturalist observation 58837939); ©, with permission.

range of which extends to Paraguay according to Cerda (2008). However, this does not need to be resolved here as the name *L. diaphana* is senior and can be used for Trinidad material. A specimen from Suriname is in BIN BOLD:AAX6550, along with two others identified as *L. imitata* from Panama.

Identification. This small Euechmiina shows strong sexual dimorphism. The male has an unusual orange line from the red patagia across the thorax and laterally on the abdomen, not seen in any other Trinidad species. The female has the patagia red, but no orange line. It superficially resembles *Valvaminor* species but none have red patagia.

Biology in Trinidad. Kaye and Lamont (1927) included a brief description of the caterpillar on *Serjania* sp. or *Paullinia* sp. (Sapindaceae), but this is not based on observations in Trinidad, but rather is copied from Hampson (1898), which was probably based on Sepp (1843–1848). This is a day-flying species, mostly captured when attracted to heliotrope.

Status in Trinidad and Tobago. An uncommon but widespread species.

Loxophlebia postflavia Druce, 1898

Fig. 77.

OD: Druce 1898: *Loxophlebia postflavia*, TL French Guyana [OUMNH].

Historical notes. The only records of this species from Trinidad are two specimens reported by Fleming (1957). Fleming refers to the NHMUK collection containing material from the Guianas, one of which is illustrated here (Fig. 77).

Taxonomic issues. Sequences from French Guiana (the type locality) form part of BOLD:ACF1201, along with



Fig. 77. Male *Loxophlebia postflavia*, Suriname, S.M. Klages [NHMUK]; ©, The Trustees of the Natural History Museum, London, made available under Creative Commons License 4.0 <https://creativecommons.org/licenses/by/4.0/>.

sequences for *L. bisigna* (above), suggesting that the two could be forms of the same species. If that is confirmed, *L. postflavia* would be the older name and have precedence.

Identification. This distinctive species is the only one from Trinidad that is black with mostly transparent wings and the apex of the abdomen yellow-orange. Cerda (2008) saw 28 specimens from French Guiana, and since he does not mention sexual dimorphism, we assume there is none. Alternatively, if *L. postflavia* and *L. bisigna* are forms of the same species, *postflavia* may be restricted to the male.

Biology in Trinidad. Nothing known.

Status in Trinidad. Although Fleming (1957) did not state this, by implication, his two specimens were collected at Simla.

MACROCNEME HÜBNER 1818

Type species: *Zygaena maja* Fabricius, 1787, TL 'America'. Our treatment is based on the revision of the genus by Dietz (1994). As Dietz (1994) stated: 'The phenotype is essentially the same for every species. The ground colour is brownish black, the hind legs are long and plumose, the wings are variously patterned with blue and/or green iridescence. All species possess white spots on the tips of the antennae, on the frons, at the base of the labial palpi, at the base of the wings (above and below), on the abdominal venter and pleura, and on the first abdominal tergite.'

As noted by Kaye (1913), members of the genus *Macrocneme* seem to be excellent mimics of fossorial or pompilid wasps, especially the genera *Salix* and *Pepsis*. *Macrocneme thyra* is wasp-like both in facies and in behaviour. The wings and abdomen possess a metallic blue-green sheen; the long hindlegs, more heavily scaled than is usual in ctenuchids, are extended downward and backward in flight. Kaye also noted that they wave their antennae and vibrate their wings rapidly when alighted, and that they

settle usually, like fossorial wasps, on ground, bank or leaf.

Kaye and Lamont (1927) recognized three species of *Macrocneme* from Trinidad: *M. lades* (Cramer), *M. thyra* Möschler and *M. eacus* (Stoll) (an unavailable name, see under *Poliopastea errans*). However, it is clear that they were mixing species up, and none of their records can be accepted at face value except by examination of voucher material. Fleming (1957) recognized two species of *Macrocneme*: *M. thyra*, and *M. spinivalva* Fleming and three species which he placed in *Macrocneme*, which are now placed in *Poliopastea*. Dietz (1994) revised the genus and recognized *M. aurifera* Hampson (= *M. spinivalva*), *M. lades* (= *M. aurata*), *M. thyra* (= *M. thyra intacta*) and *M. thyridia* Hampson from Trinidad. Cerda (2008) only examined Trinidad material of *M. thyra*. The treatment here follows that of Dietz (1994). It should be noted that the following are recorded from nearby in Venezuela or Guyana by Dietz (1994): *M. adonis* Druce, *M. semiviridis* Druce, *M. coerulescens* Dognin, *M. durcata* Dietz, and *M. orichalcea* Dietz, and could occur in Trinidad.

Macrocneme thyra is the most common *Macrocneme* species in Trinidad, *M. lades* is also frequent, but *M. thyridia* and *M. aurifera* are at best occasional. The first two are regularly found at flowers by day and attracted to lights at night, and probably the same is true for the other two, although there are not enough records with details to assess this.

Identification. This is a challenging genus, and dissection of the genitalia is necessary to confirm identifications. At this time, we are uncertain as to how the DNA barcodes will reflect our treatment, so more sequences, particularly of the less common species would help. We worked from the material in MJWC, comprising males of all four species confirmed by examination of the genitalia, three females of *M. thyra* confirmed by DNA barcodes (Fig. 79), and additional females provisionally associated with three of the four species. The following comments are considered robust for *M. thyra* and *M. lades* in Trinidad (but not elsewhere) but less so for *M. thyridia* and *M. aurifera*.

There is little sexual dimorphism in the four Trinidad species, mostly the ventral surface of the abdomen being more extensively white in males. The sexes cannot be reliably separated in images of living moths, although the pectinations of the female antennae are slightly shorter.

Both sexes of *M. lades* have a uniform green-bronze dorsal and lateral abdomen, the ground colour of the wings is browner than in the other species, and the metallic markings on the wings are consistently green-bronze. *Macrocneme thyridia* has a uniformly blue-bronze dorsal and lateral abdomen, and the metallic wing markings are blue-green. *Macrocneme thyra* and *M. aurifera* both have

the abdomen black with contrasting blue-bronze dorsal and lateral lines, and the wing markings metallic blue or green. The ventral abdomen is extensively white in male *M. thyra* making them relatively easy to recognise. However, this is reduced to a narrow ventral line in female *M. thyra* and male *M. aurifera* – as it is in *M. thyridia* and *M. lades*. We have not identified any females from Trinidad as *M. aurifera*, so hesitate to suggest how the females of *M. thyra* and *M. aurifera* may be separated, but it may be that they cannot be separated on habitus. We are not confident that our treatment represents the final word on this challenging genus in Trinidad, so user beware!

Macrocneme albitarsia Hampson (see *Poliopastea plumbea*)

***Macrocneme aurifera* Hampson, 1914**

Fig. 78, 80, Appendix Fig. 9.

OD: Hampson 1914: *Macrocneme aurifera*, TL Peru.

TT: *Macrocneme spinivalva* Fleming: Fleming (1957) [synonym]

Macrocneme aurifera Hampson: Dietz (1994)

Historical notes. Fleming (1957) described *M. spinivalva* from Trinidad, but Dietz (1994) synonymized it with *M. aurifera* Hampson (type NMHUK, ♀ Peru), although he used the name *spinivalva* to label material in NHMUK. Dietz (1994) listed *M. aurifera* material from Arima Valley (USNM), Ariapite Valley (NHMUK, USNM); Hololo Mt. Road (Carnegie Museum); Maracas Valley, 150 ft (NHMUK); Mt. Tucuche, 2-3000 ft (NHMUK); St. Ann's Valley (NHMUK); Tabaquite (NHMUK); and Trinidad (NHMUK) (NHMUK material is included in the Appendix listing). W.J. Kaye must have seen specimens of this species as it is represented with contemporary material in NHMUK, but they would have been understandably misidentified. MJWC's material was identified from Dietz (1994).

Taxonomic issues. Fleming (1957) described *M. spinivalva* from Trinidad based on six males and 14 females; he indicates that the holotype and paratype are in AMNH, and three male and nine female paratypes were returned to NHMUK. When Dietz (1994) synonymized *M. spinivalva* with *M. aurifera*, no males of *M. aurifera* from Peru were available to him, but he was able to associate the sexes based on a mating pair in Fleming's type series. Dietz (1994) also noted that the females in Fleming's type series were a mixed series: the allotype appears to be *M. lades*, three others are either *M. thyra* or *M. thyridia* (listed separately in Annex).

Identification. See under *Macrocneme* above.

Biology in Trinidad. It is expected that this species will be found to fly both by day and by night, when more information is available.

Status in Trinidad. An occasional species, with no records as yet from the south of the island.

***Macrocneme lades* (Cramer, 1776)**

Figs. 78, 79, 81–84, Appendix Figs. 10, 31.

OD: Cramer 1776: *Sphinx lades*, TL Suriname.

Walker 1854: *Euchromia aurata*, TL ? [synonym according to Dietz (1994)]

TT: *Macrocneme lades* (Cramer): Kaye (1901) [misidentification], Kaye and Lamont (1927) [mixed species], Dietz (1994)

Historical notes. Kaye (1901) recorded this species based on specimens in NHMUK taken by C.W. Ellacombe; the only *Macrocneme* sp. in NHMUK taken by C.W. Ellacombe is *M. thyra*. Kaye and Lamont (1927) listed several specimens and considered this 'a most variable species', but

their material is a mixture of species including *M. lades* (e.g. four specimens in coll. Lamont, UWIZM, as this species appear to be a mixture of species). Fleming (1957) did not recognize *M. lades*, but it seems likely that it was present amongst his material of other species. Dietz (1994) listed material from Manzanilla, Caparo, Ariapite, Port of Spain, and Cedros. MJWC's material (genitalia, Appendix Fig. 31) was identified from Dietz (1994).

Taxonomic issues. Dietz (1994) found that a distinctive 'brown' phenotype occurs in eastern Venezuela and the Guianas, and by implication in Trinidad. He added 'In this brown phenotype, the apex of wings is slightly pallescent. Iridescence is usually bronze or sometimes green, but



Fig. 78. Male abdomens of the Trinidad *Macrocneme* spp., above in dorso-lateral view, below in ventral view; from left to right *M. lades*, *M. thyra*, *M. aurifera*, *M. thyridia*. For other views and specimen details see Appendix Figs. 9–13.

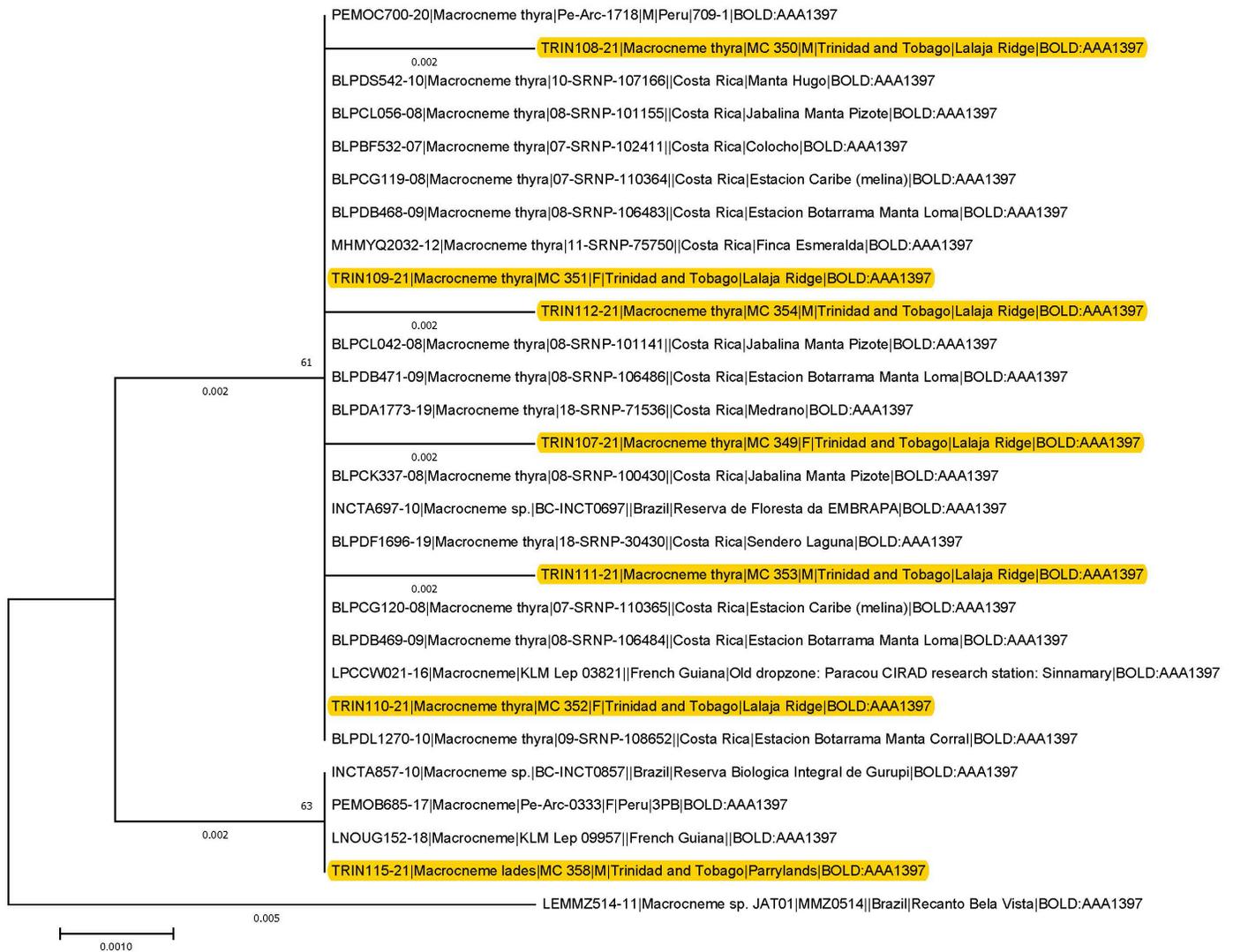


Fig. 79. Similarity tree for BOLD:AAA1397, including all available Trinidad sequences (highlighted). The main cluster, including TRIN108-21 to TRIN112-21 and probably TRIN107-21, is considered to represent *T. thyra* and the smaller cluster at the bottom including TRIN115-21 is considered to represent *T. lades*. The tree was inferred using the Neighbor-Joining method (Saitou and Nei 1987). The optimal tree is shown. The percentage of replicate trees in which the associated taxa clustered together in the bootstrap test (500 replicates) are shown next to the branches (Felsenstein 1985). The tree is drawn to scale, with branch lengths (next to the branches) in the same units as those of the evolutionary distances used to infer the phylogenetic tree. The evolutionary distances were computed using the Maximum Composite Likelihood method (Tamura et al. 2004) and are in the units of the number of base substitutions per site. This analysis involved 28 nucleotide sequences. Codon positions included were 1st+2nd+3rd+Noncoding. All positions containing gaps and missing data were eliminated (complete deletion option). There was a total of 545 positions in the final dataset. Evolutionary analyses were conducted in MEGA X (Kumar et al. 2018).



Fig. 80. Male *Macrocneme aurifera*, Port of Spain, Upper Lady Chancellor Road, by day, 28.i.1979; 38 mm.

seldom blue. There is a large range in reduction of wing iridescence, with transverse median fascia sometimes completely absent.' This brown phenotype had been named *M. aurata* Walker, but Dietz (1994) concluded that this is a synonym of *M. lades*, although he did use the name *M. aurata* for material he labelled in British collections. Although Dietz (1994) was not explicit, our treatment is

based on all Trinidad material of *M. lades* being of this brown phenotype, with the dorsal and lateral abdomen a distinctive uniform green-bronze. This assumption should be tested based on dissections and DNA barcodes from additional material.

One Trinidad male was sequenced (MJWC-358) and is included in the same BIN as Trinidad specimens of *M. thyra*



Fig. 81. Male *Macrocneme lades*, Curepe, MVL, 1.x.1979; 32 mm.



Fig. 82. Female *Macrocneme lades* (assumed), Parrylands Oilfield, MVL, eupatorium flowers, 16.x.1980; 33 mm.



Fig. 83. Male *Macrocneme lades* (assumed), Penal, at light, 13.xii.2014, K. Sookdeo; ©, with permission.



Fig. 84. Mating *Macrocneme lades* (assumed), female above, Blanchisseuse, 20.xi.2021, G. White; ©, with permission.

(BOLD:AAA1397) but in a separate cluster within the BIN (Fig. 79). This subcluster includes material from Argentina, Brazil (Sao Paulo and Maranhão), Peru, Venezuela and French Guiana, i.e. most of South America.

Identification. See under *Macrocneme* above.

Biology in Trinidad. Adults are attracted to flowers by day and to light by night. Mating has been observed by day (Fig. 84).

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

Macrocneme eacus (Stoll) (see *Poliopastea plumbea*)

Macrocneme plumbea Hampson (see *Poliopastea plumbea*)

Macrocneme spinivalva Fleming (see *Macrocneme aurifera*)

***Macrocneme thyra* Möschler, 1883**

Figs. 78, 79, 85–87, Appendix Figs. 11, 32.

OD: Möschler 1883: *Macrocneme thyra*, TL Suriname

Draudt 1915: *Macrocneme thyra intacta*, TL Trinidad [synonym]

TT: *Macrocneme thyra* Möschler: Kaye (1901), Zerny (1912), Blest (1964), Dietz (1994), Cerda (2008), Cock (2017)

Macrocneme thyra Möschler subsp. 1: Hampson (1898)

Macrocneme guyanensis Dognin: Hampson (1914) [misidentification]

Macrocneme thyra intacta Draudt: Draudt (1915–1917), Beebe and Kenedy (1957) [synonym]

Historical notes. Hampson (1898) treated *M. thyra* as having subspecies: subsp. 1 was noted to have the forewing

with the blue-green at base entire, and very little white on inner area of fore wing below or on base of hind wing, and was based on a male in NHMUK from Trinidad collected by [H.] Caracciolo, and another from Colombia. Kaye (1901) referred to Hampson (1898) and mentioned ‘specimens’ (in error for one male) in NHMUK collected by Caracciolo. There is only one specimen of *Macrocneme* collected by Caracciolo in NHMUK, and it is a male *M. thyra*. Draudt (1915–1917) introduced the name *intacta* as a form of *M. thyra*, based on Hampson’s (1898) *M. thyra* subsp. 1, and hence, Caracciolo’s specimen from Trinidad in NHMUK is the type of this subspecies name.

Kaye and Lamont (1927) repeated the information in Kaye (1901), added a record from Guaico (18.iv.1915, N. Lamont) and noted that there are specimens in Kaye’s collection. The Guaico specimen is in NMS and appears to be a male *M. thyra*. The Kaye material may be the two males in NHMUK mentioned in the last paragraph, or the six males and six females in MGCL from his collection.

Fleming (1957) recognized one male from Tabaquite in NHMUK as *M. thyra thyra*, and 137 males and seven females from Simla as *M. thyra intacta*, although he is clear that he could see no difference in the male genitalia between the two subspecies. Fleming (1957) referred to an additional six male and three females in NHMUK from Port of Spain, Guaico, Ariapite Valley, and St. Ann’s (see Appendix listing). Dietz (1994) made *M. thyra intacta* a synonym of *M. thyra*, noting that it was within the range of variation of this species and the male genitalia are essentially identical. He listed material from Guaico; Ariapite Valley; Simla; Upper Arima Valley; Carenage; Heights of Aripo; Guanapo Road; Hololo Mountain Road; Maraval; Mt Tucuche; Port of Spain; St Ann’s; St Ann’s Valley; St Augustine, and Tobago. MJWC’s material was identified from Dietz (1994).

Hampson (1914) recorded *M. guyanensis* Dognin from Trinidad, listing two males in NHMUK collected by [W.J.] Kaye. These two males were identified by Dietz as *M. thyra*, although *M. guyanensis* itself was made a synonym of *M. thyridia* (Dietz 1994).

Taxonomic issues. Six DNA barcodes from Trinidad and identified as *M. thyra* are part of BOLD:AAA1397, a wide-ranging BIN. The BIN has several clusters within it (see *M. lades* above and Fig. 79). We consider the large cluster within BOLD:AAA1397 to be *M. thyra*; in addition to the six Trinidad sequences, it includes material mostly identified as *M. thyra* from Costa Rica (15), Colombia (1), French Guiana (1), Peru (1), and Brazil, Pará (1).

Identification. See under *Macrocneme* above. Dietz (1994) wrote ‘*The colour of the wing iridescence is usually consistent within a population, but may vary between populations from golden-green, to green, to blue-green,*



Fig. 85. Male *Macrocneme thyra*; **top**, Cumaca Road, 4.6 miles, MVL, 18.vii.1981, 37 mm; **middle**, Lalaja, on eupatorium flowers, 28.ix.2019 (J. Morrall) [DNA MJWC-350], 37 mm; **bottom**, as middle [DNA MJWC-353], 38 mm.



Fig. 86. Female *Macrocneme thyra*; **top**, Lalaja, on eupatorium flowers, 28.ix.2019 (J. Morrall) [DNA MJWC-349], 37 mm; **middle**, as top [DNA MJWC-351], 37 mm; **bottom**, as top [DNA MJWC-352], 37 mm.

to deep blue. Sometimes, within a single population, combinations of colours occur, as in three specimens with similar data from Simla, Arima Valley, Trinidad. In one both wings are green, in a second they are blue, and in the third the forewing is green and the hindwing blue. Most examples of *thyra* have a patch of metallic scales in the discal area of the hindwings, but in specimens from the Guianas and eastern Venezuela this iridescence is absent, or occasionally

present only as a few scattered scales. The dorsum [of the abdomen] can be either iridescent green or have the metallic scales restricted to three longitudinal striae. There are two sublateral lines extending the length of the abdomen which are broader than the thin mid-dorsal line that may obsolesce beyond the middle. In the females the abdominal iridescence is often duller and darker than in males, making the striae appear faint or absent. These striae are particularly notable



Fig. 87. Female *Macrocneme thyra* (assumed), Arima Valley, Asa Wright Nature Centre, at light, 6.iii.2007, S. Daniel (iNaturalist observation 69962122); ©, with permission.

in the Trinidad populations (=intacta) and in individuals from the Guianas and Venezuela. Where thyra occurs sympatrically with lades, the two species share similar patterns in variation. Both are browner in ground color in the Orinoco and Guiana drainages than in other parts of their range. In the Guianas and eastern Venezuela, where thyra is heavily white on the underside, lades has the white on the venter attenuating caudally.'

Fig. 85 shows three males from Trinidad (confirmed by genitalia or DNA barcode) and Fig. 86 shows three females (confirmed by DNA barcode). The sequenced specimens all fall within the cluster of BOLD:AAA1397 referred to under 'Taxonomic issues' above. It is clear that the metallic colouring can be blue or green, and the extent and degree of interruption on both wings is variable. However, although Dietz wrote 'Where *thyra* occurs sympatrically with *lades*, the two species share similar patterns in variation' we have separated *M. thyra* and *M. lades* on habitus, as described under the heading *Macrocneme* above, and supported by

limited male dissections. This treatment certainly merits further investigation based on genitalia and DNA barcodes, and voucher specimens should be kept for all observations. **Biology in Trinidad.** This species flies both by day and by night (Beebe and Kenedy 1957, author's observations). By night, males are readily attracted to light, particularly in the early evening before 22.00 h, but females are more frequently seen by day than by night (Beebe and Kenedy 1957, author's observations).

Status in Trinidad. A common and widespread species.

***Macrocneme thyridia* Hampson, 1898**

Figs. 78, 88–89, Appendix Fig. 12.

OD: Hampson 1898: *Macrocneme thyridia*, TL Suriname [♀ NHMUK]

TT: *Macrocneme thyridia* Hampson: Dietz (1994)

Historical notes. This species was first recorded from Trinidad when Dietz (1994) listed material from Ariapite Valley [NHMUK]; Fondes Amandes [NHMUK]; Port of Spain, Emperor Valley [OUMNH]; St Ann's Valley [NHMUK, USNM]; Trinidad (Kaye) [NHMUK]. MJWC did not locate this material in NHMUK, and although he did locate the OUMNH specimen, Dietz had not labelled it. Earlier authors would have seen some of this material which would have been lumped with *M. thyra* or another of the species treated above. MJWC's material was identified from Dietz (1994).

Taxonomic issues. According to Dietz (1994), this species may be easily confused with *M. lades* and *M. thyra*. They occur sympatrically and are similarly variable in colour and pattern of the wing iridescence. Usually the forewing in *M. thyridia* has a concentration of green scales (sometimes blue) at the base of the wing accompanied by a similar concentration on the inner margin. The only dependable method to diagnose *M. thyridia* is to examine the genitalia. More material and DNA barcodes from Trinidad are needed to better understand this species, and whether there are



Fig. 88. Male *Macrocneme thyridia*, Curepe, MVL, 2.xi.1979; 33 mm.



Fig. 89. Female *Macrocneme thyridia* (assumed), Arima Valley, Simla, MVL, 28.ix.1981; 37 mm.

useful diagnostic features.

Identification. See under *Macrocneme* above.

Biology in Trinidad. It is anticipated that this species flies by day and night, like other members of the genus.

Status in Trinidad. An uncommon species, with most records from the north-west of the island.

Macrocneme vittata (Walker) (see *Poliopastea vittata*)

Mesotheren aurantegula Jones (see *Loxophlebia diaphana*)

Metaloba nona Druce (see *Calonotos aterrma tripunctata* and *C. helymus craneae*)

Mydropastea chrysonota Hampson (see *Phoenicoprocta vacillans* ♀)

***Myrmecopsis* Newman, 1850**

Type species: *Myrmecopsis eumenides* Newman, 1850

(TL Brazil, Amazon, Ega) by monotypy. *Myrmecopsis eumenides* is a junior subjective synonym of *Pseudosphex polistes* Hübner, 1818 (Kirby 1892, Watson *et al.* 1980). Cerda (2008) treats *M. eumenides* from French Guiana and illustrates the male genitalia.

***Myrmecopsis kenedyae* (Fleming, 1957)**

Figs. 90–93. For figures of the details of body and male genitalia, see Cock and Laguerre (2022).

OD: Fleming 1957: *Pseudosphex kenedyae* Fleming, TL Trinidad.

TT: *Pseudosphex kenedyae* Fleming: Fleming (1957), Beebe and Kenedy (1957)

Myrmecopsis kenedyae (Fleming): Cock and Laguerre (2022).

Historical notes. Fleming (1957) described this species



Fig. 90. Dorsal view of male *Euchromiina* that mimic *Agelaii* spp. wasps (Polybiinae); **left**, *Myrmecopsis kenedyae*; **centre**, *Pleurosoma trinitatis*; **right**, *Sphecosoma aurantiipes*.



Fig. 91. Male *Myrmecopsis kenedyae*, Arima Blanchisseuse Road, milestone 9.75, Textel Road, eupatorium flowers, 11.x.1979; 25 mm.



Fig. 92. Female *Myrmecopsis kenedyae*, Lalaja Ridge, to *Heliotropium*, 6.v.1995; 25 mm.



Fig. 93. *Myrmecopsis kenedyae*, Lalaja Ridge, to *Heliotropium*, 6.v.1995, M.J.W. Cock.

from Trinidad, and the holotype can be seen at AMNH (2022). Identified by comparison with the two paratypes (♂ Trinidad) in NHMUK.

Taxonomic issues. No public sequences in BOLD. Cock and Laguerre (2022) transferred this species from *Pseudosphex* (Ctenuchina) to *Myrmecopsis*.

Identification. This is one of three yellow-brown and black mimics of *Agelaia polybiine* wasps in Trinidad, the other two being *Pleurosoma trinitatis* and *Sphecosoma aurantiipes* (Fig. 90). *Myrmecopsis kenedyae* is the only one of the three with the end of the forewing cell and cells distal to this with a strong dusky tint (Figs. 91–92). Sexes almost identical.

Biology in Trinidad. The type series of 15 males and one female was collected at heliotrope at Simla, mainly in the dry season: January (4), February (6), April (3), June (1), and December (2), and an image of the holotype is available online (AMNH 2022). The individuals attracted

to heliotrope are almost entirely male, flying from 0600h to 1815h (Beebe and Kenedy 1957). MJWC has also captured one male at eupatorium flowers. This distasteful moth is a Müllerian mimic of the stinging Polybiinae social wasp '*Stelopolybia pallipes* var. *anceps* (Saussure)' according to Beebe and Kenedy (1957), who detailed morphological and behavioural similarities. *Angelaia pallipes* (Olivier) and *A. multipicta* (Haliday) (= *anceps* Saussure) are two different wasp species, but probably they were referring to the latter. **Status in Trinidad.** A fairly common and widespread species in forested areas, but normally only seen when attracted to heliotrope.

NYRIDELA LUCAS 1857

Type species *Isanthrene chalciope* Hübner, 1831, TL Cuba.

***Nyridela acroxantha* (Perty, 1833)**

Fig. 94.

OD: Perty 1833: *Glaucopsis acroxantha*, TL Tropical Brazil.

TT: *Nyridela chalciope* (Hübner): Kaye and Lamont (1927), Fleming (1957) [misidentification]

Historical notes. Kaye and Lamont (1927) recorded a specimen as *N. chalciope* from St. Ann's Valley, which MJWC examined in MGCL. Fleming (1957) had no additional records. Identified by comparison with the NHMUK series.

Taxonomic issues. *Nyridela acroxantha* (Perty, 1833) was described from tropical Brazil, *N. chalciope* (Hübner, [1831]) from Cuba, and *N. xanthocera* (Walker, 1856) from Brazil. *Nyridela acroxantha* is described as having black antennae, although Hampson (1898) described them as yellow distally, while the other two have yellow antennae. Druce (1881–1890) pointed out that the type in OUMNH has no locality data, and treats it as the Central American species. Hampson (1898) treated *N. acroxantha*

as a synonym of *N. chalciope*, apparently overlooking the difference in antennae colour, but Zerny (1931a) and more recently Cerda (2008) treated both as valid. Kaye and Lamont (1927) and Fleming (1957) followed Hampson (1898) regarding this synonymy.

Cerda (2008) was unable to distinguish the three species based on the male genitalia. Public sequences in BOLD are predominantly from Costa Rica and cluster in two BINs. BOLD:AAA1414 has yellow antennae and includes a specimen from Jamaica, and so should be representative of *N. chalciope*. BOLD:ABY8418 has brown antennae, yellow distally and includes a specimen from French Guiana with black antennae, yellow distally, suggesting this BIN could be treated as *N. acroxantha*, leaving the status of *N. xanthocera* unresolved, but probably a synonym of *N. chalciope*, given that they both have yellow antennae. We therefore follow Cerda (2008) and treat the species in Trinidad as *N. acroxantha*. However, ML notes two DNA barcode species in French Guiana, 1.9% apart, so the situation can be expected to change again.

Identification. This is a large species with transparent wings with black margins. There is a distinctive black bar running from the costa across the end of the cell to the tornus. The sexes are similar.

Biology in Trinidad. MJWC's only specimen was attracted to heliotrope.

Status in Trinidad. A rare species in Trinidad, with two records from the Northern Range. There is a further specimen in UWIZM, but details are not to hand.

ORCYNIA WALKER 1854

Type species: *Euchromia calcarata* Walker, 1854, TL Brazil, Santarem.



Fig. 94. Male *Nyridela acroxantha*, Morne Bleu, Textel Installation, to *Heliotropium*, 9.x.1980; 42 mm.

***Orcynia calcarata* (Walker, 1854)**

Figs. 95–97.

OD: Walker 1854: *Euchromia calcarata*, TL Brazil, Santarem.**Historical notes.** A new record for Trinidad. Identified by comparison with the type (NHMUK, Brazil, Santarem) and NHMUK series.**Taxonomic issues.** Sequences from French Guiana and Peru form BOLD:AAU7938.**Identification.** No sexual dimorphism. This large species appears to be a wasp mimic, like no other Trinidad species,

with uniformly brown wings and large yellow spots on the body.

Biology in Trinidad. Julius Boos gave MJWC two males that he caught at lights in Parrylands, and Tarran Maharaj photographed an active individual by day, noting the resemblance to a Jack Spaniard wasp (*Polistes* spp., Vespidae) (Fig. 97).**Status in Trinidad.** A rare species in Trinidad, with three records from Parrylands Oilfield, and one from South Oropouche.**Fig. 95.** Male *Orcynia calcarata*, Parrylands Oilfield, at light, ii.1980 (J.O. Boos); 55 mm.**Fig. 96.** Female *Orcynia calcarata*, Parrylands Oilfield, 13.ix.1980; 54 mm.**Fig. 97.** *Orcynia calcarata*, South Oropouche, Mon Desir, 28.vii.2021, T.P. Maharaj (iNaturalist observation 88958328); ©, under CC-BY-NC.***PHEIA* WALKER 1854**Type species: *Glaucoptis albisigna* Walker, 1854, TL Honduras.*Pheia beebei* Fleming (see *Xanthya beebei*)***Pheia toulgoeti* Cerda, 2008**

Fig. 98.

OD: Cerda 2008: *Pheia toulgoeti*, TL French Guiana.**Historical notes.** A new record for Trinidad. MJWC initially identified this species as *P. albisigna* (Walker, 1854) by comparison with the type (Honduras) and NHMUK series. However, although *P. toulgoeti* is very similar, it has the ventral abdominal segment 1 black with a white border, whereas in *P. albisigna* this area is pure white (Cerda 2008). On this basis, all Trinidad material is *P. toulgoeti*.



Fig. 98. Male *Pheia toulgoeti*, Parrylands Oilfield, MVL, 25.vii.1981; 33 mm.

Taxonomic issues. A sequence from French Guiana in BOLD indicates this species should be BIN ACN8935.

Identification. This species has transparent wings with broad black forewing margins and bar at the end of the cell. The conspicuous red spot at the base of the dorsal forewing, the white rectangle on the posterior margin of the thorax and the wasp-like constriction of the abdomen at segments 2–4, accentuated by a white ventro-lateral spot, will facilitate recognition of this species.

Biology in Trinidad. All four Trinidad specimens were attracted to light.

Status in Trinidad. A rare species with records from forested areas in the north (Cumaca Road) and south (Parrylands Oilfield).

Pheia utica (Druce, 1889)

Figs. 99–100.

OD: Druce 1889: *Dycladia utica*, TL Guerro, Mexico.

Pheia utica (Druce): Cock (2017)

Historical notes. There are two Tobago specimens from W.J. Kaye's collection in MGCL, but Kaye and Lamont (1927) did not record this species from Trinidad. Cock (2017) recorded this species from Tobago. There are still no Trinidad records. Identified by comparison with the type (NHMUK, ♂ Mexico) and NHMUK series.

Taxonomic issues. Cerda (2008) treated this species as occurring south to the Amazon. His figure of the female has orange colouring, where MJWC's Tobago specimen (Fig. 100) has red colouring. In both sexes the subdorsal metallic blue markings are paler / more developed in the Tobago examples. There is only one available DNA barcode sequence identified as *P. utica*, MILA 2078 from Brazil, Maranhão, BIN BOLD:ACV3367, so DNA barcodes cannot be used to address this yet. The closest species



Fig. 99. Male *Pheia utica*, Tobago, 16.viii.1924 (C.L. Withycombe) [NHMUK]; ©, The Trustees of the Natural History Museum, London, made available under Creative Commons License 4.0 <https://creativecommons.org/licenses/by/4.0/>

is *P. daphaena* Hampson (TL Dominica, St. Lucia), from Martinique (3.8% different), BOLD:ACV3242.

Identification. Of the Trinidad fauna, this species comes closest to *Loxophlebia bisigna*, but differs from that species in that the bar at the end of the forewing cell is wider, there are obvious red basal markings on the dorsal forewing, the paired white subdorsal marks are restricted to the first abdominal segment, and there is a row of subdorsal metallic blue spots in line with these.

Biology in Trinidad. MJWC's only specimen was taken at mercury vapour light.

Status in Trinidad. None of the Tobago specimens are clearly associated with forest, suggesting this species may be associated with suburban or disturbed areas

PHOENICOPROCTA DRUCE, 1898

Type species *Phoenicoprocta metachrysea* Druce, 1898, TL French Guiana, by monotypy. Dyar (1915) made *P. metachrysea* a synonym of *P. vacillans*, based on 'a



Fig. 100. Female *Pheia utica*, Tobago, Scarborough, Marden House, MVL, 9.i.1982; 25 mm.

remarkably variable series bred from larvae by Mr. H.W.B. Moore in British Guiana'. Unfortunately, no details of the life history were recorded. This genus has also been referred to as *Phoenicoprocta* Hampson, 1898 but Druce used Hampson's name prematurely, and so has precedence (Watson *et al.* 1980).

***Phoenicoprocta vacillans* (Walker, 1856)**

Figs. 101–103.

OD: Walker 1856: *Eunonia vacillans*, TL Valley of the Amazon.

Rothschild 1912: *Antichloris trinitatis*, TL Trinidad [synonym]

Strand 1915: *Phoenicoprocta trinitatis*, TL Trinidad [synonym]

Strand 1915: *Phoenicoprocta vacillans ab. nigropeltata*, TL Trinidad [synonym]

Kaye 1920: *Mydropastea disparata*, TL Trinidad [synonym]

TT: *Antichloris trinitatis* Rothschild: Rothschild (1912) TL, Draudt (1915–1917 pp. 136, 197), Kaye and Lamont (1927) [synonym]

Autochloris trinitatis (Rothschild): Hampson (1914) [synonym]

Phoenicoprocta trinitatis Strand: Strand (1915) TL, Draudt (1915–1917), Strand (1927), Kaye and Lamont (1927) [homonym and synonym]

Phoenicoprocta vacillans ab. nigropeltata Strand: Strand (1915) TL, Strand (1927) [synonym]

Phoenicoprocta vacillans nigropeltata Strand: Draudt (1915–1917) [synonym]

Mydropastea disparata Kaye: Kaye (1920), Bland (2010) [synonym]

Mydropastea chrysonota Hampson: Kaye and Lamont (1927) [synonym]

Phoenicoprocta rubiventer Hampson: Kaye and Lamont (1927) [misidentification / possible synonym]

Calonotos helymus (Cramer): Kaye and Lamont

(1927), Laurence (2000) [misidentification]

Phoenicoprocta vacillans (Walker): Kaye and Lamont (1927), Fleming (1957), Blest (1964), Bland (2010)

Historical notes. This is a sexually dimorphic and variable species (Figs. 101–102), which has caused considerable confusion in the literature, until Fleming (1957) recognized the problems and created several synonyms, some of which are used here to refer to sex-specific forms. Males (Figs. 101) have hyaline wings with a black border and black bar at the end of the cell; the patagia are usually orange or orange and red, but sometimes black; the dorsal abdomen has metallic blue spots on the dorsum, while the remainder varies from all red to all black with just the anal tuft red; the ventral valve is usually a shade of red, but can be black, and always has a pale margin. Females (Figs. 102) are black with dorsal and lateral metallic green stripes on the abdomen reminiscent of *Calonotos helymus* and *C. aterrima*; the thorax is normally black, but can be extensively red; the wings are black or variably endowed with transparent areas.

Rothschild (1912) described *Antichloris trinitatis* Rothschild from a female collected at Caparo in January 1906 by S.M. Klages. The type is now in NHMUK. Kaye and Lamont (1927) repeated this information. Fleming (1957) recognized this species as a female form of *P. vacillans* (his form 1).

Strand (1915) described *P. trinitatis* Strand from a Caparo male and *P. vacillans ab. nigropeltata* Strand from two Caparo males. Kaye and Lamont (1927) repeated this information. Once it became clear that Rothschild's *trinitatis* was a *Phoenicoprocta*, Strand's *trinitatis* became an unavailable homonym, and in any case, the two are both synonyms of *P. vacillans* (Fleming 1957). The original description of *nigropeltata* was as an aberration, so it was not an available name until Draudt (1915–1917) used it as a form (equivalent to subspecies in that work) that it became an available name. Nevertheless, it too is synonymous with *P. vacillans* (Fleming 1957). Fleming (1957) treated Trinidad males with extensive red on the abdomen as form *trinitatis*

Strand, and those without as form *nigropeltata* Strand.

Kaye (1920) described *Mydropastea disparata* Kaye based on a male and two females from Trinidad: Rock 1.i.1918 and Palmiste 9.ix.1917. The specimen from Rock is labelled type in NMS and treated as the holotype by Bland (2010). It is a female *P. vacillans* form *chrysonota* (Fig. 102 B–D). A further female *P. vacillans* form *chrysonota* in NMS is labelled as co-type. A male with no data label from the Lamont collection labelled as cotype in NMS is a male *Autochloris almon* (see above). Based on the information in Kaye and Lamont (1927), specimens of Lamont's material collected before 1915 were all collected at Palmiste but incorporated into his collection with no data labels. Bland (2010) stated that Kaye and Lamont (1927) synonymized *M. disparata* with *M. chrysonota*, but this was not done explicitly, although that was presumably their intention as the data of the type series of *M. disparata* was included under *M. chrysonota*. In any case, Bland (2010) listed *M. disparata* as a junior subjective synonym of *P. vacillans* form *chrysonota* based on MJWC's identification. Hampson (1898) described and illustrated *Paramya chrysonota* from the Amazon (Itaituba); he referred to the type in NHMUK as a male, but it is a female. Fleming (1957) recognized *chrysonota* as a female form of *P. vacillans* and made it a junior synonym.

In all, Kaye and Lamont (1927) recorded this species from Trinidad under no less than six different names. Their inclusion of *P. vacillans* itself was based on specimens from Palmiste (7.x.1918, 12.ii.1921, N. Lamont) and San Fernando (i.1922, N. Lamont). The first of these is a male in NMS, the second has not been located and the third is a male in UWIZM. There are five males in coll. Lamont (UWIZM) as *P. vacillans*; all have a blue dorsal stripe on the abdomen and the red reduced to the caudal tuft, and represent form *nigropeltata*.

Kaye and Lamont (1927) also listed *P. rubiventer* Hampson, referring to a specimen from Palmiste (1913, N. Lamont). We have not located a specimen likely to represent this record. However, there are four males of form *trinitatis* Strand in Lamont's collection (UWIZM) labelled as *P. rubiventer*, which suggests this is how Kaye and Lamont (1927) applied the name. Druce (1881-1900) misidentified *P. sanguinea* (Walker, 1854) and the species he treated under this name was renamed *P. rubiventer* Hampson, 1898 (♂ type NHMUK, Panama). Butler (1877) illustrated Druce's species; it resembles form *trinitatis* Strand. Fleming (1957) suggested *P. rubiventer* was likely to be a synonym of *P. vacillans*, but took no taxonomic action on this. LepIndex (Beccaloni *et al.* 2018) treats *P. sanguinea* Druce (nec Walker) as a synonym of *P. insperata* (Walker, 1856) (♀ type, OUMNH, Brazil, Para), but this seems to be an unpublished synonymy. Further, Cerda

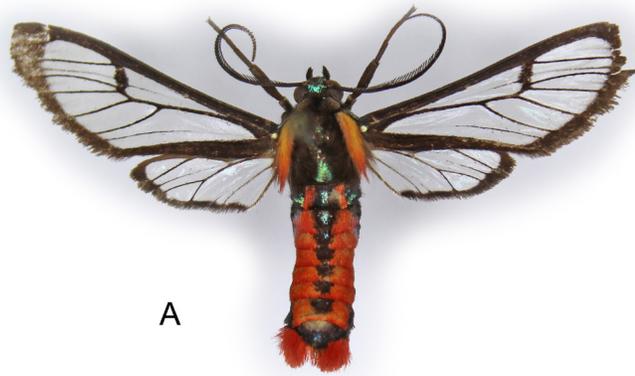
(2008) made *P. insperata*, but not *P. sanguinea*, a synonym of *P. vacillans*. For the purposes of treating the Trinidad fauna, we consider the use of the name *P. rubiventer* by Kaye and Lamont (1927) to be a misidentification for *P. vacillans* form *trinitatis* Strand, and do not attempt to resolve its taxonomic status.

One further name listed by Kaye and Lamont (1927) is considered to refer to *P. vacillans*, i.e. their record of *Calonotos helymus* which they report without data from Palmiste (N. Lamont). As discussed under *C. helymus craneae* above, *C. helymus* only occurs in Trinidad as ssp. *craneae* with white spots on the wings (Figs. 10–13). There is a female *P. vacillans* form *trinitatis* Rothschild with an identification label as *C. helymus* from Lamont's collection in NMS, and we accept this as the basis for Kaye and Lamont's (1927) record of *C. helymus* from Trinidad. Kaye and Lamont (1927) included Hampson's (1898) brief description of the larva of *C. helymus* which feeds on coffee, but this refers to *C. aterrima*, which Hampson treated as a synonym. Laurence's (2000) record of *C. helymus* as an occasional pest of coffee in Trinidad is likely to be based on this as we have seen no voucher material for this record.

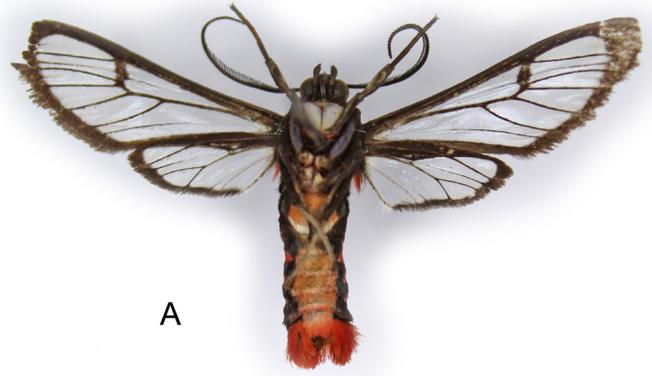
There is a male of *P. vacillans* form *trinitatis* Strand from W.J. Kaye's collection in MGCL, which Kaye had labelled as *P. sanguinea*, although this name was not used in Kaye and Lamont (1927). We believe this was based on Druce's misinterpretation of *P. sanguinea* which was subsequently named *P. rubiventer* (see above). *Phoenicoprocta sanguinea* is not considered to be a Trinidad species as discussed under taxonomic issues below.

In Lamont's collection in UWIZM, there are 5♂ with predominantly red UPS abdomen as *Phoenicoprocta rubiventer*; 5♂ with blue dorsal stripe on abdomen and red caudal tuft as *Phoenicoprocta vacillans*; and 3♀ with varying development of hyaline markings as *Mydropastea chrysonota*. Fleming (1957) recognized three male forms and four females in Trinidad, and recorded his captures at Simla as: 19♂ form *nigropeltata* Strand; 10♂ form *trinitatis* Strand; 1♂ un-named form darker than form *trinitatis*; 2♀ form I (*trinitatis* Rothschild), 3♀ form II (*chrysonota*), one with crimson patagia; an unspecified number of ♀ form III with more extensive hyaline areas; and 3♀ form IV with the most extensive hyaline areas.

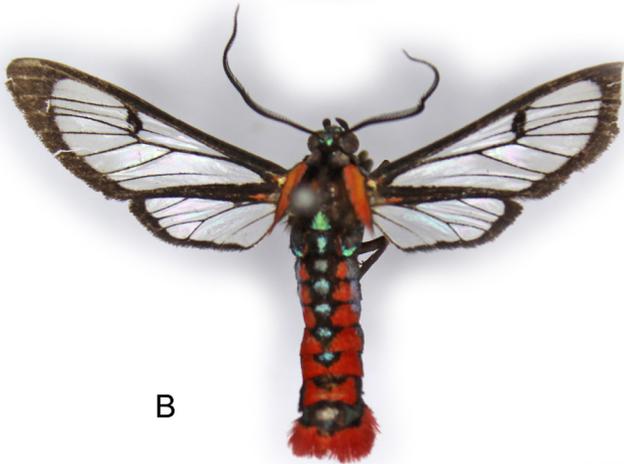
Taxonomic issues. Walker (1856) described *Eunonia vacillans* from the 'Valley of the Amazon' and the male holotype is in NHMUK. Hampson (1898) referred to the type locality as São Paulo (presumably São Paulo de Olivença as Walker referred to the valley of the Amazon), and transferred the species to *Phoenicoprocta*. Fleming (1957) recognized that although *P. vacillans* is a sexually dimorphic variable species, it is also part of a complex which he could only separate based on male genitalia. Thus, all



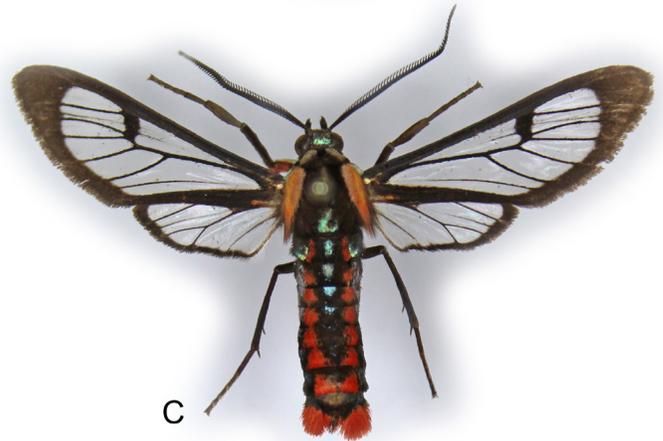
A



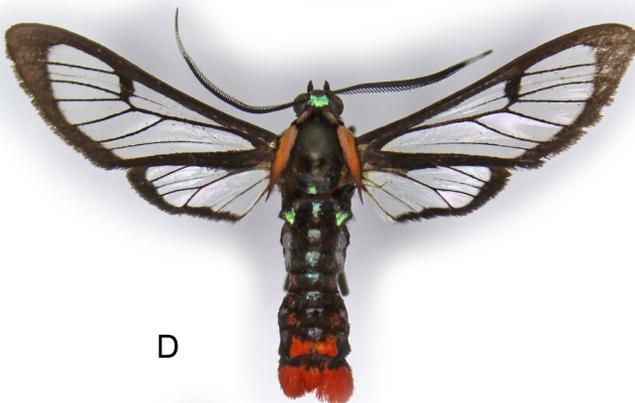
A



B



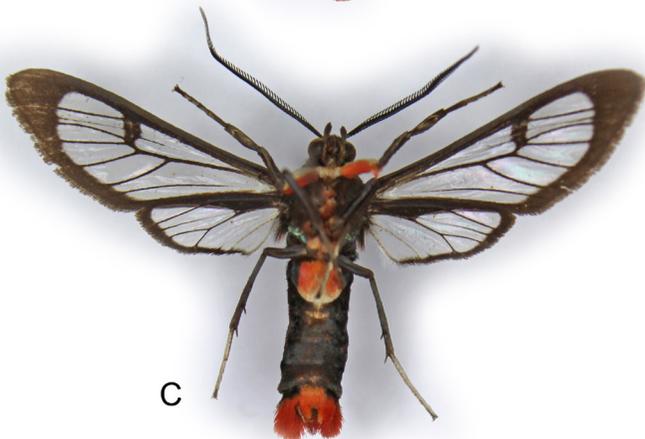
C



D



E



C



E

Fig. 101. Male *Phoenixoprocta vacillans*. **A**, Curepe, MVL, 13.xi.1978; 30 mm. **B**, Curepe, MVL, 13.ix.1979; 30 mm. **C**, f. *trinitatis* Strand, Curepe, at light, 8.ix.1978; 32 mm. **D**, Valencia Forest, MVL, 5.viii.1981; 30 mm. **E**, Caura Valley, Nr. Caura, MVL, 24.ix.1978; 33 mm.

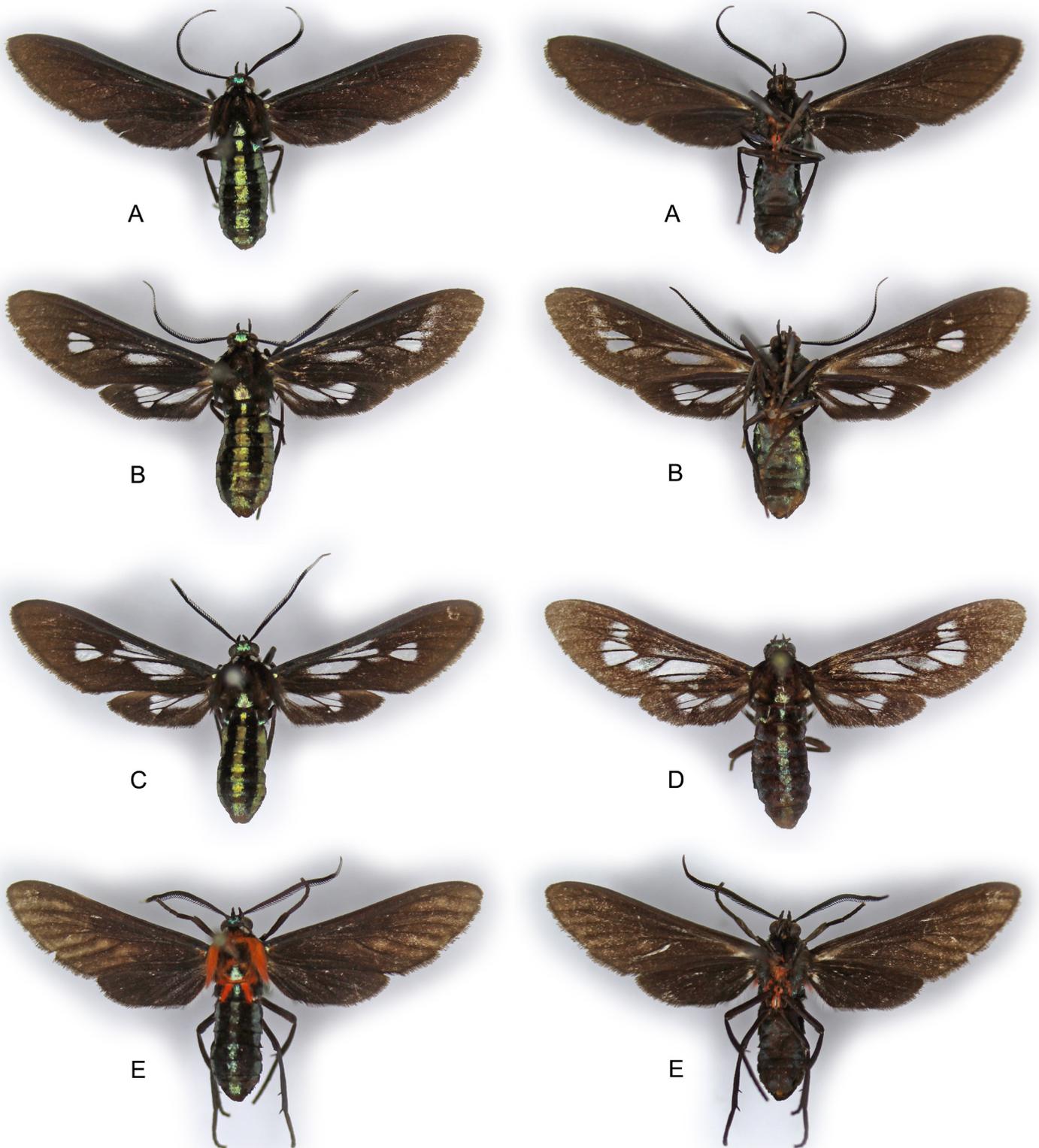


Fig. 102. Female *Phoenicoprocta vacillans*.. **A**, f. *trinitatis* Rothschild, Curepe, MVL, 13–20.ix.1981; 35 mm. **B**, f. *chrysonota*, Curepe, MVL, 1–10.ii.1982; 35 mm. **C**, f. *chrysonota*, Curepe, ix.1979; 33 mm. **D**, f. *chrysonota*, Curepe, MVL, 24.x.1978; 31 mm. **E**, un-named form, Curepe, MVL, 27.viii.1978; 33 mm.



Fig. 103. Male *Phoenicoprocta vacillans*, Penal, at light, 18.iv.2014 (left) and 25.i.2014 (right), K. Sookdeo; ©, with permission.

material from Trinidad, Venezuela (Carapito) and Guyana had similar genitalia, but differed from specimens from Peru (Candelopa) and Bolivia (Pitaguaya), which ‘*have a distinctly different pair of protuberances on either side of the base of the uncus. They are rounded and bulbous in the latter specimens and pointed in our vacillans*’.

In BOLD, *P. vacillans* appears as one BIN, BOLD:AAG9068 from Peru (17), Brazil (7), French Guiana (4), Argentina (1), Venezuela (3), Ecuador (1), Guyana (1), Suriname (3), and Colombia (1). It is 3.21 p-distance from its nearest neighbour, BOLD:ACE8772, which is restricted to Argentina, based on BOLD sequences. The Brazilian specimens of BOLD:AAG9068 are from Pará and Maranhão, but given that the range of this BIN extends to Argentina, it seems safe to say that it includes the type locality ‘Valley of the Amazon’ and until the complex is better understood, *P. vacillans* (including Trinidad material) may be interpreted as this BIN.

Phoenicoprocta sanguinea (Walker, 1854) (BOLD:AAA1390) is a separate BIN in BOLD, with sequences from Costa Rica (37), Guatemala (1) and a genetically rather distant member from Sucre, Venezuela (1). If this species occurs in Sucre, it could well also occur in Trinidad. Males resemble the reddest forms of Trinidad males (e.g. Fig. 101 A), but females have the wings always extensively hyaline, and have red and blue body markings. This female form has not been seen from Trinidad, so for now, it is assumed that this is not a Trinidad species. Walker (1854) described *P. sanguinea* with unknown origin, but Hampson (1898) referred to the holotype as from Honduras. Fleming (1957) pointed out that the handprinted label on the holotype stating Honduras is not in Walker’s nor Hampson’s writing.

Fleming (1957) questioned whether *P. capistrata* (Fabricius, 1775) (TL ‘America’) may be a female form of *P. vacillans*, in which case it would have priority. The focus

of his concern is that *P. capistrata* as currently treated is a species restricted to the Greater Antilles, whereas Fabricius (1775) gave the type locality as ‘America’, implying the mainland. Fabricius’ (1775) description of *P. capistrata* was based on one or more specimens in ‘Mus. Tottianum’. Otto Thott was a Count in the Danish Government, and Fabricius used his entomological collection to describe several dozen new species indicated by “Mus. Tottianum” (Zimzen 1964). After Thott’s death in 1785 his collection was sold by auction, and parts ended up in at least three museums, but no types of *capistrata* have been located in any of these, and the type material of this species is now assumed to be lost (Zimzen 1964). Pinheiro and Duarte (2010) treated this species as illustrated by Draudt (1915–1917), and commented ‘*neither in this nor any other work ... or collection consulted did we find a similar species that could put its identification in doubt. The fact that P. capistrata has at least three female phenotypes differing from males does not cast doubt on the identification of the species, since laboratory rearings have shown that they are indeed the same species (Rodríguez-Loeches and Barro 2009). This is why we decided not to designate a neotype for this species as well.*’ Given Fleming’s concerns, perhaps it would have been better if they had designated a neotype to match current use. Nevertheless, we follow this currently accepted treatment here.

Identification. As will be clear from the discussion in the preceding sections, this is a complex species. Males have transparent sections, this is a complex species. Males have transparent wings with a black border and bar across the end of the forewing cell; they may or may not have red streaks at the base of the dorsal forewing. The dorsal surface of the head, always has a metallic blue spot, as does the dorsal posterior margin of the thorax and at least the first five abdominal segments; the tegulae are usually brown or orange, but may be black; the dorso-lateral area of the

abdomen varies from black to completely red; and the distal end of the abdomen has red hair tufts giving it a truncate appearance (Figs. 101). Several different names have been applied to this continuous variation in the male.

The female occurs in (at least) three morphs, but all have black wings with or without transparent areas, the dorsal head metallic blue-green and the abdomen with dorsal and lateral metallic green stripes reminiscent of *Calonotus* spp., the dorsal stripe extending onto the posterior margin of the thorax, with the section on abdominal segment 1 being narrower than the others. Female form *trinitatis* Rothschild has the wings and thorax black (Fig. 102 A), resembling *C. helymus helymus* which is not known from Trinidad. Form *chrysonota* resembles form *trinitatis* except there are transparent windows of variable extent on both wings (Figs. 102 B–D), resembling *Autochloris almon* (Figs. 3–4). There is an unnamed form which is also similar to form *trinitatis*, but the dorsal thorax is mostly red, extending to subdorsal patches on abdominal segment 1 (Fig. 102E).

Biology in Trinidad. There are no observations at heliotrope or flowers, and almost all captures have been at light by night, suggesting a nocturnal species.

Status in Trinidad. A common and widespread species, particularly in disturbed habitats.

PLEUROSOMA ORFILA 1935

Type species *Sphecosoma angustatum* Möschler, 1878, TL Suriname.

***Pleurosoma trinitatis* (Rothschild, 1911)**

Figs. 90, 104–105, Appendix Figs. 13, 33.

OD: Rothschild 1911: *Sphecosoma trinitatis*, TL Trinidad, Caparo, 4♂.

TT: *Sphecosoma trinitatis* Rothschild: Rothschild (1911), Zerny (1912), Hampson (1914), Draudt (1915–1917), Kaye and Lamont (1927)

Pleurosoma trinitatis (Rothschild): Orfila (1935), Fleming (1957)

Historical notes. Rothschild (1911) described *Sphecosoma trinitatis* from Trinidad, based on four males collected at Caparo, December 1905 by S.M. Klages. When MJWC examined the type series in NHMUK, he found a male curated as the holotype and three females. Kaye and Lamont (1927) included this species based on the type locality. Orfila (1935) created the new genus *Pleurosoma* to include *P. trinitatis*. Fleming (1957) recorded 15 males and eight females from Simla. Identified by comparison with the type (NHMUK, ♂ Trinidad) and NHMUK series.

Taxonomic issues. No public sequences in BOLD. A dissection of the male genitalia (Appendix Fig. 33) resembles that shown by Cerda (2008) for the similar

species, *P. angustatum* (Möschler, 1878). Clearly the two are congeneric, but different species.

Identification. This is one of the three *Euchromiina* that closely mimic the two *Agelaia* sp. wasps known from Trinidad (Vespidae, Polybiinae) (C.K. Starr, pers. comm.). It lacks the sullied brown area on the outer half of the costal area which distinguishes *Myrmecopsis kenedyae* (Fig. 91–92). *Pleurosoma trinitatis* and *Sphecosoma aurantiipes* are very similar and perhaps most easily distinguished by the markings of the dorsal thorax. In *P. trinitatis* the patagia are yellow-brown with a diffuse transverse bar, whereas in *S. aurantiipes* the posterior third is black; the tegulae of *P. trinitatis* are yellow-brown with a central, dark, longitudinal stripe, whereas in *S. aurantiipes* they are yellow-brown with the margins narrowly black; and there is a black dorsal line in *P. trinitatis*, but a pair of subdorsal lines in *S. aurantiipes* (Fig. 78).

Biology in Trinidad. Rothschild (1931) suggested ‘a species of *Polybia* near *P. fasciata* Saussure’ is the wasp model for this species, and the two were collected together in Trinidad by S.M. Klages. We cannot trace the wasp species he mentions, and suspect he meant *P. bifasciata* Saussure, a widespread species in South America. As noted in the last paragraph, C.K. Starr (pers. comm.) suggests the models are *Agelaia* spp. wasps. All MJWC’s records were of adults of both sexes attracted to heliotrope by day.

Status in Trinidad. A fairly common and widespread species in Trinidad, but more frequently attracted to heliotrope in forested areas.

POLIOPASTEIA HAMPSON, 1898

Type species *Poliopasteia plumbea* Hampson, 1898, TL Brazil, Amazon. Kaye and Lamont (1927) treated *P. plumbea* as a synonym of *Macrocneme eacus*, along with *M. vittata* (i.e. *P. vittata*) and *M. nigritarsia* (a misidentification of *P. vittata*). *Macrocneme eacus* is an unavailable name for which the replacement name is *P. errans* (see below under *P. maroniensis*). Since *P. plumbea* is the type species of *Poliopasteia*, they concluded that *Poliopasteia* must be a synonym of *Macrocneme*. Fleming (1957) maintained this arrangement, but Dietz and Duckworth (1976) re-established *Poliopasteia* and listed its species. They noted that ‘the markings of the head, patagia, tegulae, and first abdominal tergite are often metallic blue or blue white ... In the genus *Macrocneme* (sensu stricto) these markings are characteristically white with little or no iridescence.’ Moreover, the genitalia are completely different.

Hampson (1914) listed three females of *P. cyllarus* (Druce) (as *Macrocneme cyllarus*) from ‘Tobago I.’ in NHMUK; this is an error for Taboga Island (Panama), which Druce (1881–1900) mis-spelt Tobago Isl.’ in the original



Fig. 104. Male *Pleurosoma trinitatis*, Lower Morne Catharine, to *Heliotropium*, 21.v.1982; 24 mm.

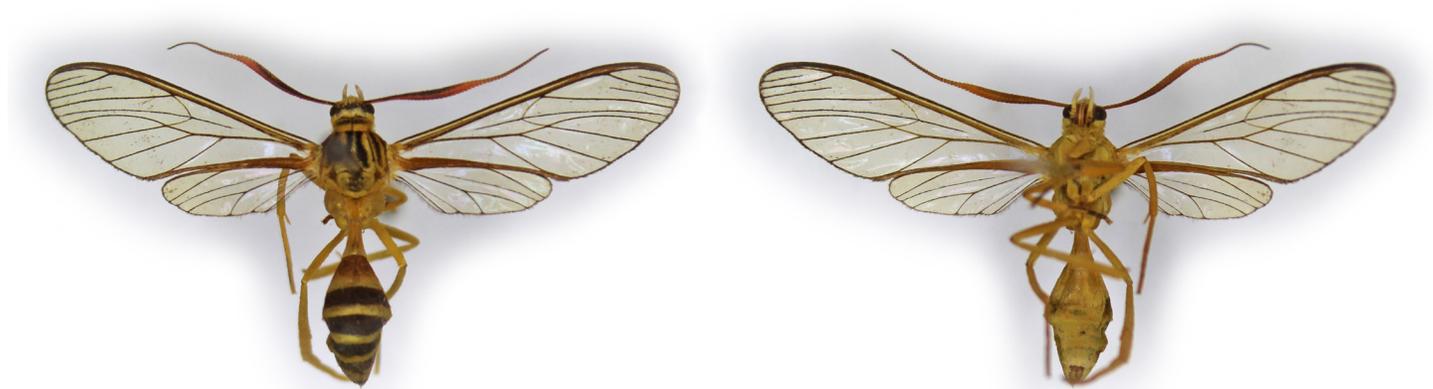


Fig. 105. Female *Pleurosoma trinitatis*, Parrylands Oilfield, to *Heliotropium*, 25.vii.1981; 27 mm.

description.

***Poliopastea chrysotarsia* (Hampson, 1898)**

Fig. 106.

OD: Hampson 1898: *Macrocneme chrysotarsia*, TL
Panama, Taboga Is.

Historical notes. A new record for Trinidad. Identified by comparison with the type (NHMUK, ♂ Panama, Taboga Is.) and NHMUK series.

Taxonomic issues. There are only two short sequences in BOLD from Venezuela and Panama. Dietz and Duckworth



Fig. 106. Male *Poliopastea chrysotarsia*, Curepe, BLT, 6–11.xii.1981 (F.D. Bennett); 30 mm.

(1976) transferred this species to *Poliopastea*.

Identification. The orange tarsi of the hindlegs are very distinctive amongst Trinidad species, but we have not recognised the female, and do not know if it also shows this feature.

Biology in Trinidad. The only known Trinidad specimen was caught in a black light trap (BLT).

Status in Trinidad. A rare species with just one record from Curepe.

***Poliopastea maroniensis* (Schaus, 1905)**

Fig. 107, Appendix Figs. 14, 34.

OD: Schaus 1905: *Macrocneme maroniensis*, TL French Guiana.

Historical notes. This species has not previously been identified from Trinidad. Dissection of a Trinidad male (Appendix Fig. 34) showed it to be identical to *P. maroniensis* as treated by Cerda (2008). Accordingly, we use this name here.

Taxonomic issues. No public sequences in BOLD. Dietz and Duckworth (1976) transferred this species to *Poliopastea*.

Stoll (1782 in Stoll 1780–1782) described *Sphinx eacus* from Suriname, but it is an unavailable homonym of *Sphinx eacus* Cramer, 1780 (replacement name *Eumorpha megaeacus* (Hübner [1819]), Sphingidae) and *Sphinx aeacus* [Denis and Schiffermüller], 1775 (synonym of *Zygaena ephialtes coronillae* [Denis and Schiffermüller], 1775, Zygaenidae) (Dietz and Duckworth 1976, Kitching and Cadiou 2000). The unavailable name *P. eacus* (Stoll) still appears on the internet (e.g. LepIndex). The replacement name for Stoll's *Sphinx eacus* is *P. errans* (Hübner, [1819]), and MJWC had provisionally identified the Trinidad species as *P. errans* by comparison with the NHMUK series. However, Stoll's type material is believed lost, and the identity of this species should be considered uncertain (Dietz and Duckworth 1976), unless and until a neotype is designated.

Identification. At first sight, this species resembles one of the *Macrocneme* spp. However, all Trinidad *Macrocneme* spp. have the tarsi of the hind legs white, whereas in *Macrocneme maroniensis* they are black. The metallic green sheen to the dorsal forewings distinguishes this species from *P. vittata* which has bright iridescent green streaks in the basal two-thirds of the forewing.

Biology in Trinidad. The only Trinidad specimens were captured at light.

Status in Trinidad. A rare species with only two records revealing no particular habitat association.

***Poliopastea plumbea* Hampson, 1898**

Figs. 108–110, Appendix Figs. 15, 35.

OD: Hampson 1898: *Poliopastea plumbea*, TL Brazil, Parantins (Lower Amazons).

TT: *Poliopastea plumbea* (Hampson): Kaye (1901), Zerny (1912)

Macrocneme eacus (Stoll): Kaye and Lamont (1927)

[misidentification; unavailable homonym]

Macrocneme albitarsia Hampson: Lamont and Callan (1950) [synonym]

Macrocneme plumbea (Hampson): Fleming (1957)

Historical notes. Identified by comparison with the type of *P. plumbea* (NHMUK, ♂ Brazil) and NHMUK series. Kaye (1901) recorded this species from Maraval Valley (C.W. Ellacombe); there is a specimen from Maraval Valley (no date or collector) in MGCL from W.J. Kaye's collection, which may be the basis of this record. Kaye and Lamont (1927) treated *P. plumbea* as a synonym of *Macrocneme eacus*. In addition to the Maraval specimen, they refer to specimens from Palmiste (14.vii.1917, 9.ix.1917, 5.iv.1921, N. Lamont); these specimens are in Lamont's collection in NMS – the first is *P. vittata* and labelled by Lamont as such, the other two are *P. plumbea* and were labelled by Lamont as *M. eacus*. Seven specimens in Lamont's collection in UWIZM as *M. eacus* appear to be a mixture of *Macrocneme* spp.



Fig. 107. Male *Poliopastea maroniensis*, Curepe, MVL, 31.viii.1978; 35 mm.

Macrocneme albitarsia (Hampson, 1898) (Type NHMUK, ♀ TL Brazil, Amazons, Tabatinga) is a synonym (Dietz and Duckworth 1976). Lamont and Callan (1950) listed *M. albitarsia* from Trinidad, referring to specimens from Palmiste (26.ii.1926, 2.ii.1936, N. Lamont). Neither of these specimens has been located, but four specimens in Lamont's collection in UWIZM as *M. albitarsia* are all

P. plumbea.

Fleming (1957) considered *P. plumbea*, *P. vittata* and *P. nigratarsia* to all be distinct species, although he maintained *Poliopastea* as a synonym of *Macrocneme*. He recorded four male *P. plumbea* from Simla and reported males from Caparo and San Fernando in NHMUK, although we have not located these two specimens.



Fig. 108. Male *Poliopastea plumbea*, Curepe, MVL, 12-15.xii.1980; 26 mm.



Fig. 109. Female *Poliopastea plumbea*, Palmiste, 9.ix.1917 [N. Lamont] [NMS as *Macrocneme eacus*]; 28 mm; photo V. Blagoderov; © NMS, with permission.

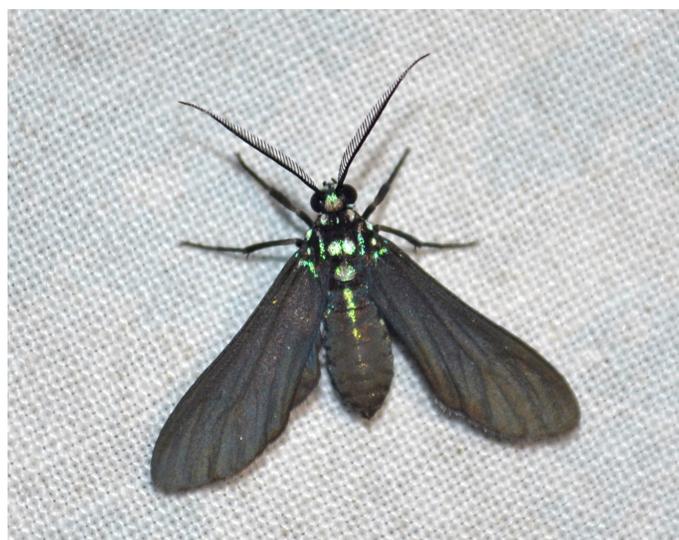


Fig. 110. Male *Poliopastea plumbea*, Penal, 18.iv.2014, K. Sookdeo; ©, with permission.

Taxonomic issues. Dissection of a Trinidad male (Appendix Fig. 35) shows the genitalia do not match Cerda's (2008) *P. plumbea*, or any other species he treated. The genitalia do match those of a male in the collection of M. Laguerre from El Dorado, Bolivar, Venezuela. Cerda's (2008) *P. plumbea* is the species we treat below as *P. vittata*. The Trinidad species treated here as *P. plumbea* appears to match BIN BOLD:AAN5470 from Peru (6) and Guyana (1), the latter having been dissected and identified as *P. plumbea* by R.E. Dietz.

Identification. This species is distinctive by its smaller size, and the uniform blackish tone of the wings.

Biology in Trinidad. Attracted to light by night, but no observations at heliotrope.

Status in Trinidad. A fairly common and widespread species in disturbed areas.

Poliopastea vittata (Walker, 1854)

Figs. 111–113, Appendix Figs. 16, 36.

OD: Walker 1854: *Euchromia vittata*, TL Brazil.

Strand 1917: *Macrocneme nigratarsia* ab. *trinitatensis*, TL Trinidad [unavailable infraspecific name]

TT: *Macrocneme nigratarsia* Hampson ab. 1: Hampson (1898) [synonym]

Macrocneme nigratarsia Hampson: Zerny (1912), Draudt (1915–1917) [misidentification]

Macrocneme nigratarsia ab. *trinitatensis* (Strand): Strand (1917) [unavailable infraspecific name]

Macrocneme nigrotarsia [sic] Hampson: Fleming (1950) [misidentification]

Macrocneme vittata Walker: Fleming (1957)

Historical notes. Hampson (1898) described *Macrocneme*



Fig. 111. Male *Poliopastea vittata*, Curepe, MVL, 23.i.1979; 28 mm.



Fig. 112. Female *Poliopastea vittata*, Bordenal Savana, MVL, 20.ix.1979 (F.D. Bennett & R.M. Baranowski); 30 mm.



Fig. 113. Female *Poliopastea vittata*, Penal, 28.i.2014, K. Sookdeo; ©, with permission.

nigritarsia from Mexico, Guatemala (TL) and Trinidad. He segregated the Trinidad specimen as 'Ab. 1' noting 'white sublateral spots on the four medial segments of abdomen'. Strand (1917) named Hampson's Ab. 1 as 'ab.' *trinitatensis*, but as an infraspecific name that has not subsequently been used as a species or subspecies, it is an unavailable name. Kaye (1901) recorded *Macrocneme nigritarsia* from Trinidad, based on Hampson (1898). As noted above, Kaye and Lamont (1927) treated *M. nigritarsia* as a synonym of *Macrocneme eacus*. Dietz and Duckworth (1976) transferred *nigritarsia* to *Poliopastea* and designated a lectotype in NHMUK.

Walker (1854) described *Euchromia* (section

Macrocneme) *vittata* from Para, Brazil (type NHMUK). Fleming (1957) recognized ab. *trinitatensis* as a normal female of *M. vittata* and recorded five males and four females from Simla, as well as 14 males and 16 females in NHMUK (Caparo (1), Ariapite Valley (4) and 'Trinidad' (25)), but MJWC failed to locate these specimens in NHMUK. Dietz and Duckworth (1976) confirmed this synonymy and designated a female lectotype for *M. vittata* (NHMUK). Identified by comparison with the type (now lectotype, NHMUK, ♀ Brazil, Para) and type of *trinitatensis* Strand. **Taxonomic issues.** Dietz and Duckworth (1976) transferred this species to *Poliopastea*. The genitalia of a Trinidad specimen are a very close match to those illustrated by Cerda (2008) for *P. plumbea*.

BOLD includes specimen from Colombia and Ecuador identified as *P. vittata* by Dietz. The former is in BIN BOLD:AAD1862 which includes material with partially yellow hindleg tarsi identified as *P. auripes* (Walker). The latter has no sequence. More work is needed.

Identification. The most distal tarsi of the hind legs are white, so that this species resembles a small *Macrocneme* species. However, the uninterrupted, distinct bright metallic streaks in the basal two-thirds of the forewing distinguish it.

Biology in Trinidad. MJWC reared two specimens from caterpillars collected at Macoya Gardens on 'a vine' but recorded no details.

Status in Trinidad. A fairly common species in disturbed situations.

PSEUDOMYA HÜBNER, [1819]

Type species: *Glaucoptis tipulina* Hübner, [1812], TL not stated (Butler 1876). Hampson (1898) overlooked Butler's type species designation, when he treated *P. melanthus* as the type species. Cerda (2008) recognized three groups within this genus. Of the Trinidad species, *P. tipulina* and *P. afflicta* are in the first group, while *P. melanthus* is in the third (second on genitalia CD). It seems plausible that these groups will be found to represent distinct genera.

***Pseudomya afflicta* (Walker, 1854)**

Figs. 114–117.

OD: Walker 1854: *Glaucoptis (Pseudomya) afflicta*, TL Amazons, Para.

TT: *Saurita temenus* (Cramer): Kaye (1901), Zerny (1912), Draudt (1915–1917), Kaye and Lamont (1927) [misidentification]

Saurita salta (Schaus): Kaye and Lamont (1927), Fleming (1957) [misidentification]

Saurita concisa (Walker): Kaye and Lamont (1927), Fleming (1957) [misidentification]

Saurita afflicta (Walker): Fleming (1957), Blest (1964)

Pseudomya afflicta (Walker): Cerda (2008)

Historical notes. Hampson (1898) treated *afflicta* as a synonym of *Saurita temenus* (Stoll) (TL Suriname). Forbes (1939) separated them and Fleming (1957) pointed out that several authors have incorrectly followed Hampson and treated *afflicta* as a synonym of *temenus*. Cerda (2008) confirmed this position. Thus, Kaye (1901) and Kaye and Lamont (1927) recorded *S. temenus* from Trinidad based on 'several specimens in May at Tabaquite (W.J. Kaye)'. We have not located any specimens labelled from Tabaquite in NHMUK, but there are three specimens of *P. afflicta* labelled as *S. temenus* in MGCL from W.J. Kaye's collection, which may be taken as representative. Fleming (1957) suggested that Kaye and Lamont's (1927) records of *S. temenus* refer to *P. afflicta* and the specimens in MGCL confirm this view. Fleming (1957) recorded 12 males and five females from Simla. Cerda (2008) moved this species from *Saurita*

to *Pseudomya*, and reports a specimen from Chaguanas, Trinidad. This species was identified by comparison with the type of *afflicta* (NHMUK, ♀ Para, Brazil) and NHMUK series (over the name *S. temenus*).

Saurita salta (Schaus, 1905) (TL Venezuela) superficially resembles the male of *P. afflicta*. *Saurita salta* was recorded from Trinidad by Kaye and Lamont (1927) without comment, but this seems to have been a misidentification. *Saurita salta* is identified by comparison with the type (USNM, ♂ Venezuela) and NHMUK series (Venezuela to Ecuador); there are no specimens from Trinidad in NHMUK or USNM, and we know of no records. There is a male *P. afflicta* in OUMNH labelled by W.J. Kaye as *S. salta*; this may well be the basis of Kaye and Lamont's (1927) record and supports the view that this was a misidentification. According to Hampson (1898), Druce (1881–1900) treated *S. salta* as *S. afflicta*, which suggests the source of the error.

Kaye and Lamont (1927) also recorded *Sauritinia concisa* (Walker) from Trinidad (as *Saurita concisa*), referring to specimens from Palmiste (24.xi.1917, 10.iii.1918, 13.i.1921, N. Lamont), the first two of which are in Lamont's collection in NMS and are *S. afflicta*. There are two males and two females in Lamont's UWIZM collection as *S. concisa*, including the third of those referred to by Kaye and Lamont (1927); all are *P. afflicta*. MJWC examined the type of *S. concisa* (NHMUK, ♂ Para, Brazil) and NHMUK series, and did not recognize this as a Trinidad species. Kaye and Lamont's (1927) record is therefore considered to be a misidentification for *P. afflicta*. Hampson (1898) placed *concisa* in *Saurita*, but Cerda (2008) transferred it to *Sauritinia*.

Taxonomic issues. Sequenced specimens from Costa Rica currently identified as *Pseudomya afflicta* form BIN BOLD:AAA1455 are not this species, but probably *Pseudosphex leovazquezae* (Pérez and Sánchez).

Identification. This is the only Trinidad species with extensive translucent areas on the wings and a dark margin that is diffuse rather than sharply defined, combined with a red dorsal thorax. The translucent areas are more extensive



Fig. 114. Male *Pseudomya afflicta*, Curepe, to *Heliotropium*, 28.ix.1980; 22 mm



Fig. 115. Female *Pseudomya afflictata*, Parrylands Oilfield, to *Heliotropium*, 7.xi.1980; 21 mm.



Fig. 116. Male *Pseudomya afflictata*, La Vega Estate, at *Chromolaena* flowers, 13.i.2020, D. Gunn (iNaturalist observation 37571413); ©, under CC-BY-NC.



Fig. 117. Female *Pseudomya afflictata*, South Oropouche, Mon Desir, at eupatorium flowers, 2.x.2020, T.P. Maharaj (iNaturalist observation 91874904); ©, under CC-BY-NC.

in the female, coming closer to the margin (Figs. 114–117).

Biology in Trinidad. Attracted to heliotrope and flowers by day and light by night.

Status in Trinidad. A common and widespread species.

***Pseudomya melanthus* (Stoll, 1782)**

Figs. 118–121, Appendix Figs. 17, 37.

OD: Stoll 1782: *Sphinx melanthus*, TL Suriname.

TT: *Pseudomya melanthus* (Stoll): Hampson (1914), Draudt (1915–1917), Kaye and Lamont (1927), Fleming (1957)

Historical notes. Hampson (1914) listed a specimen from Ariapite Valley in the Rothschild collection. Kaye and Lamont (1927) recorded this species from Maraval Valley, flying in sunshine viii.1917 (W. Buthn). Buthn's specimen was examined in MGCL (ex. W.J. Kaye coll.). Fleming (1957) recorded one male and one female from Simla. Identified by comparison with the NHMUK series.

Taxonomic issues. No public sequences in BOLD. This species is close to *P. nigrozona* Schaus (TL French Guiana)

as treated by Cerda (2008), the main difference being the red dots on the thorax of *P. melanthus*. The male genitalia (Appendix Fig. 37) are also similar, but different enough to indicate that they are separate species.

Identification. This species has transparent wings with dark veins, a narrowly black margin, and broad bars from the costa across the distal one third of the forewing cell to the dorsum and across the apex of the hindwing. It also has red spots on the thorax and a white spot dorso-laterally on abdominal segment 1. No other Trinidad species has this combination of characters. The sexes are similar but the female is less heavily marked.

Biology in Trinidad. Elizabeth Rankin reared this species from citrus (Rutaceae) in 1968, as did Rachel Cruttwell in 1971. The latter, who was studying Psychinae (Tineidae) at the time, including epiphyte-feeding species, added a note ‘?feeds on lichens’. Sattvika Ragoonanan reared a female from a cocoon found on *Spondias dulcis* Parkinson (golden apple, Anacardiaceae) in San Francique (Fig. 121), but there was no evidence to show what the caterpillar had fed upon.



Fig. 118. Male *Pseudomya melanthus*, Curepe, 19.ix.1980; 23 mm.



Fig. 119. Female *Pseudomya melanthus*, Curepe, MVL, 3.i.1980; 23 mm.

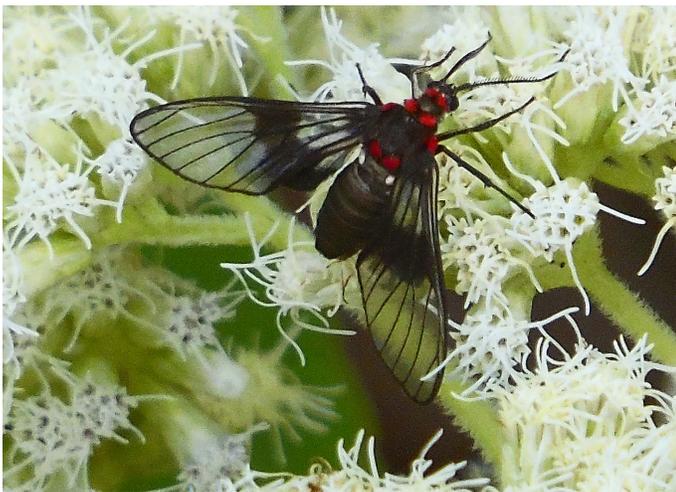


Fig. 120. Male *Pseudomya melanthus*, South Oropouche, Mon Desir, on flowers of *Austro eupatorium inulaefolium*, 1.x.2020, T.P. Maharaj (iNaturalist observation 91860995); ©, under CC-BY-NC.

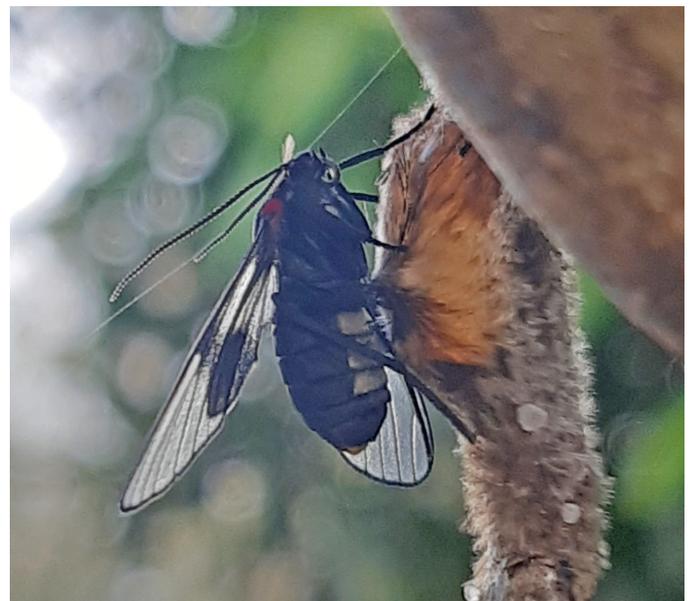


Fig. 121. Female *Pseudomya melanthus* newly emerged with cocoon on *Spondias dulcis*, San Francique, 29.i.2022, S. Ragoonanan (iNaturalist observation 105776698); ©, with permission.

There are records of adults at euphorbia and eupatorium flowers by day (Fig. 120), and they are also attracted to lights by night.

Status in Trinidad. An occasional species in disturbed areas.

***Pseudomya tipulina* (Hübner, [1812]) complex**

Fig. 122.

OD: Hübner [1812] (in Hübner 1806–[1819]): *Glaucopis tipulina*, TL not stated.

Historical notes. This species has not previously been reported from Trinidad, and MJWC has not collected it himself. Hence, he was surprised to find a series in the NHMUK supplementary material collected at Caparo by F. Birch and S.M. Klages early last century. Identified by comparison with the NHMUK series including the type of *P. bibia* Walker, 1854 (NHMUK, ♂ Brazil, Para), a synonym according to Butler (1877).

Taxonomic issues. Sequences in BOLD from Mexico to Peru as *P. tipulina* form BIN BOLD:ABZ3603, but this material lacks the blue-green markings on the thorax and base of the forewing seen in Trinidad material, and the forewings of the Trinidad specimens are more evenly smoky (Fig. 122). This group is badly in need of revision and an identification is presently very difficult, especially based on images only. The specimens comprising BOLD:ABZ3603 resemble Hübner's figures (Hübner 1806–[1819], pl. [163]). Given that the Trinidad material was compared with the type of *P. bibia*, it may be that this is a separate valid species, and potentially the correct name for the material from Trinidad.

Identification. Like *P. afflictata*, this species has extensive translucent areas on both wings, with a diffuse margin. Unlike *P. afflictata*, the thorax is black with a dorsal metallic blue-green spot posteriorly and similar spots on the head and base of the dorsal forewings. Like *P. afflictata*, the translucent areas are less extensive in the male (Figs. 122).

Biology in Trinidad. Nothing known.

Status in Trinidad. Only known from an old series collected at Caparo, when the area was probably still well forested.

***PSOLOPTERA* BUTLER 1876**

Type species: *Euchromia thoracica* Walker, 1854, TL Brazil, Amazon. Simmons (2006) revised this genus and illustrated the male and female genitalia.

***Psoloptera leucosticta* (Hübner, 1827)**

Figs. 123–124, Appendix Figs. 18, 38.

OD: Hübner 1827: *Glaucopis leucosticta*, TL Venezuela.

TT: *Psoloptera leucosticta* (Hübner): Strand (1915), Draudt (1915–1917), Kaye and Lamont (1927), Fleming (1950), Fleming (1957), Cerda (2008)

Historical notes. Strand (1915) recorded three examples from Caparo in German museums. Kaye and Lamont (1927) listed specimens from Guaico (18.iv.1915, N. Lamont) and Palmiste (22.v.1917, 30.ix.1917, N. Lamont), all three of which MJWC have examined in NMS. Fleming (1957) had no records, but Cerda (2008) had seen one from Arima. Identified by comparison with the NHMUK series.

Taxonomic issues. As the type is apparently lost, Simmons (2006) designated a lectotype (USNM, ♂ Venezuela, Maroni River), but clearly this is not part of the original material described by Hübner, so it is potentially a neotype designation. However, Simmons' action does not meet the qualifying conditions for designation of a neotype (ICZN Article 75.3) and is therefore invalid.

Two Trinidad females have been sequenced and the DNA barcodes placed in BOLD, forming part of BIN BOLD:AAA1364. There is significant variation within this BIN (average distance 0.85%, maximum distance 2.44%), which includes material resembling *P. thoracica* with a rufous thorax. BOLD:AAA1364 is 4.43% distant from its nearest neighbour (*P. basifulva*, BOLD:AAX7536). Within BOLD:AAA1364, there at least five groups, including



Fig. 122. Male (left) and female (right) *Pseudomya tipulina*, Caparo (F. Birch) [NHMUK supplementary]; ©, The Trustees of the Natural History Museum, London, made available under Creative Commons License 4.0 <https://creativecommons.org/licenses/by/4.0/>



Fig. 123. Male *Psoloptera leucosticta*, Inniss Field, MVL, 17.v.1999; 35 mm.



Fig. 124. Female *Psoloptera leucosticta*, Inniss Field, MVL, 17.v.1999; 35 mm.

(1) a large group of identical DNA barcodes, comprising material identified as *P. thoracica* DHJ03 from Costa Rica (many), *P. thoracica* from Panama, French Guiana, Brazil (Para), and the two Trinidad samples. Other clusters within BOLD:AAA1364 suggest additional taxa, including (2) *P. thoracica* DHJ01 from Costa Rica, Peru and French Guiana, (3) *P. thoracica* DHJ02 from Costa Rica, (4) *P. thoracica* from Peru, and (5) *P. thoracica* from Peru and French Guiana. The first cluster (1) including *P. thoracica* DHJ03, comprises material from Central America that resembles *P. thoracica* and material from South America (including Trinidad and Tobago) which resembles *P. leucosticta*. In view of this complexity, it will be necessary to dissect males from the different groups to assess potential species level differences. Furthermore, at this point it cannot be certain which groups within BOLD:AAA1364 can be associated with the genitalia which Simmons (2006) figured for *P. leucosticta* and *P. thoracica*.

MJWC dissected a Trinidad male (Appendix Fig. 38) which is a reasonable match to the genitalia for *P. leucosticta* illustrated by Simmons (2006, Figs. 9-10), but as only Trinidad females have been sequenced, to match Appendix Fig. 38 with the group of sequences that includes *P. thoracica* DHJ03 requires the assumption that only one DNA cluster occurs in Trinidad. Pending further work we consider it appropriate to refer to the material from Trinidad as *P. leucosticta*, in line with the treatment of Simmons (2006).

Identification. This species is black with a blue tone. At least five Trinidad species of Ctenuchina are superficially similar, with plain black forewings, but in *P. leucosticta* the small white spots at the base of the dorsal forewings, anterior to the forewing base, subdorsally and subventrally on abdominal segment 1, and in a ventral row on abdominal segments 2–6 are distinctive. The male has very broad bipectinate antennae.

Biology in Trinidad. Adults have been captured on flowers by day and at light by night.

Status in Trinidad. An uncommon species primarily from forested areas.

RHYNCHOPYGA FELDER 1874

Type species: *Rhynchopyga ichneumonea* Felder, 1874, TL Colombia, Bogota.

***Rhynchopyga flavicollis* (Druce, 1884)**

Figs. 125–128, Appendix Figs. 19, 39.

OD: Druce 1884: *Amycles flavicollis*, TL Guatemala

TT: *Rhynchopyga flavicollis* (Druce): Fleming (1957)

Historical notes. Fleming (1957) introduced *R. flavicollis* to the Trinidad list, based on a single male from Simla.

Taxonomic issues. Fleming (1957) commented that his 'male specimen lacks the orange streak on the patagia present on the holotype' and 'also has less orange on the tegulae'. The holotype (Fig. 125) does not have an orange

streak on the patagia, although it does have some orange on the tegulae, so it is not clear how to interpret Fleming's comment. Provisionally, we accept Fleming's identification, and add a female from Parrylands that closely resembles the male holotype.

There is a second morph in Trinidad, with a white discal spot, quite similar to *R. discalba* Kaye (type NHMUK, ♂ Panama); the male and female both have the white spot



Fig. 125. Male type of *Rhynchopyga flavicollis*, Guatemala [NHMUK]; ©, The Trustees of the Natural History Museum, London, made available under Creative Commons License 4.0 <https://creativecommons.org/licenses/by/4.0/>

on the forewing, but coming closer to the costa than in Trinidad specimens. However; the distal half of the ventral abdomen is orange in *R. discalba*, but white in Trinidad material. *Rhynchopyga albigutta* Draudt (1915–1917, pl. 15e) (type MNHM, ♀ Peru) is similar and may prove to be the female of *R. discalba*. Here we treat the morph with a white forewing spot as a morph of *R. flavicollis*, as follows.

ML dissected a DNA barcoded male of *R. flavicollis* from Guatemala (BIN BOLD:AAA1305), and MJWC dissected a Trinidad male with a white spot on the forewing (Appendix Fig. 39). No Trinidad males without a white spot were available for dissection. There is little difference between the two dissections, so for now we treat the two Trinidad forms as morphs of *R. flavicollis* pending further study. DNA barcodes of the two forms from Trinidad should be compared with those for *R. flavicollis* from Guatemala.

Identification. This is one of the smallest Trinidad Euchromiina. Both morphs have mostly dark wings and body apart from an orange-brown patagia. The morph with a white forewing spot also has a translucent pale streak basal to this, mostly in space 2 (Cu_1-Cu_2); no other Trinidad species has such markings. The morph without a white forewing spot (*flavicollis* habitus) has faint slightly translucent areas



Fig. 126. Female *Rhynchopyga flavicollis* (morph with no white forewing spot), Parrylands Oilfield, to *Heliotropium*, 7.xi.1980; 18 mm.



Fig. 127. Male *Rhynchopyga flavicollis* (morph with white forewing spot), Curepe, to *Heliotropium*, 21.v.1981; 21 mm.



Fig. 128. Female *Rhynchopyga flavicollis* (morph with white forewing spot), Curepe, MVL, ii.1973 [R.E. Cruttwell]; 18 mm.

in space 2 (Cu_1-Cu_2) and cell; which combined with the small size and orange-brown colour make it distinctive.

Biology in Trinidad. Most records are of specimens of both sexes attracted to heliotrope.

Status in Trinidad. An uncommon species from diverse habitats.

SAURITA HERRICH-SCHÄFFER 1855

Type species: *Sphinx cassandra* Linnaeus, 1758, TL America.

***Saurita cassandra* (Linnaeus, 1758)**

Figs. 129–132.

OD: Linnaeus 1758: *Sphinx cassandra*, TL America.

TT: *Saurita cassandra* (Linnaeus): Hampson (1898), Kaye (1901), Zerny (1912), Strand (1915), Draudt (1915–1917), Kaye and Lamont (1927), Fleming (1950), Fleming (1957), Cerda (2008)

Historical notes. Hampson (1898) first recorded this species from Trinidad collected by Capt. Clark; presumably this specimen was in NHMUK, but we have not located it



Fig. 129. Male *Saurita cassandra*, Curepe, MVL, 6–11.xii.1980; 34 mm.



Fig. 130. Female *Saurita cassandra*, Curepe, BLT, 23.i-10.ii.1982 (F.D. Bennett); 34 mm.



Fig. 131. Female *Saurita cassandra*, Penal, 29.xi.2014, K. Sookdeo; ©, with permission.



Fig. 132. Mating pair of *Saurita cassandra*, Union to Carital, 18.i.2022, S. Ramsaroop (iNaturalist observation 105154325); ©, under CC-BY-NC.

there. Kaye (1901) collected it at flowers and at light in July 1898. Kaye and Lamont (1927) added records from Palmiste (3.ii.1921, 11.iii.1921, 27.xii.1921, 19.iii.1922, N. Lamont) and Morne Diabie (1.v.1921, N. Lamont); three of the Palmiste specimens are in NMS and the Morne Diabie specimen is in NHMUK. Fleming (1957) recorded just one male from Simla, and Cerda (2008) one specimen from Chaguanas. Identified by comparison with the NHMUK series.

Taxonomic issues. A series from French Guiana and Brazil (Para) constitute BIN BOLD:AAM8412, which is expected to be where Trinidad sequences will cluster when available.

Identification. The brown forewings with black veins are similar to some *Episcepsis* spp. (Ctenuchina), but the red spots on the patagia and laterally on abdominal segment 1, and the metallic blue spots on the dorsal head and laterally on abdominal segments 2–4 are distinctive. Sexes similar, the female a little darker.

Biology in Trinidad. This species is most frequently found attracted to lights by night, but also flies by day when it is attracted to flowers, but not to heliotrope.

Status in Trinidad. A common and widespread species, primarily in open disturbed areas.

Saurita concisa Walker (see *Pseudomya afflictata*)

Saurita lacteata Schaus (see *Hypocharis arimensis*)

Saurita perspicua Schaus, 1905

Figs. 133–136, Appendix Figs. 20–21, 40.

OD: Schaus 1905: *Saurita perspicua*, TL Trinidad.

TT: *Saurita perspicua* Schaus: Schaus (1905), Hampson (1914), Zerny (1912), Draudt (1915–1917), Kaye and Lamont (1927), Fleming (1957)

Historical notes. *Saurita perspicua* was described from Trinidad (Schaus 1905) and included in Kaye and Lamont (1927) and Fleming (1957) based on the original description, without further records.

Taxonomic issues. No public sequences in BOLD. MJWC initially identified this species as *Chrostosoma guianensis* Kaye by comparison with the types (NHMUK, ♂, ♀ Guyana). However, he subsequently examined the type of *S. perspicua* (USNM, ♀ Trinidad), and concluded that they are probably synonyms. Either way, *S. perspicua* is the older name and appropriate to use for Trinidad.

The male genitalia (Appendix Fig. 40) show little resemblance to those of *S. cassandra* as illustrated by Cerda (2008), which is the type species of *Saurita*. The two species should not be considered congeneric, but at this stage we cannot suggest an appropriate genus for *S. perspicua*.

Identification. This small species has smoky transparent wings with black veins and margins, resembling species of *Valvaminor*. However, unlike any Trinidad species of *Valvaminor*, *S. perspicua* has a red spot anterior to the base of the forewing, a red streak on the tegulae. The wings of the female are more smoky, and in the male only, the femora of the fore and mid legs are white.

Biology in Trinidad. All adults for which information is available seem to have been attracted to light.



Fig. 133. Male *Saurita perspicua*, Inniss Field, MVL, 17.v.1999; 20 mm.



Fig. 134. Female *Saurita perspicua*, Inniss Field, MVL: ♀ 17.v.1999; 25 mm.



Fig. 135. Female holotype *Saurita perspicua*, Trinidad [USNM].

Status in Trinidad. Usually an uncommon species in forested areas, mostly recorded from the South.

Saurita salta (Schaus) (see *Pseudomya afflictata*)

Saurita temenus (Stoll) (see *Pseudomya afflictata*)

SPHECOSOMA BUTLER, 1876

Type species *Sphecosoma fasciolatum* Butler, 1876, TL, Brazil, Matto Grosso, by original designation. Synonyms

include *Sphecos* Orfila, 1935 (Simmons and Weller 2006 [as stated by Cerda 2008]). *Pleurosoma trinitatis* was previously in the combination *Sphecosoma trinitatis*.

***Sphecosoma aurantiipes* Rothschild, 1911**

Figs. 90, 137, Appendix Figs. 22, 41.

OD: Rothschild 1911: *Sphecosoma aurantiipes*, TL San Esteban, Venezuela.

TT: *Sphecos* *aurantiipes* (Rothschild): Fleming (1957)



Fig. 136. Male *Saurita perspicua*, Penal, at light, 15.iii.2014, K. Sookdeo; ©, with permission.

Historical notes. The first Trinidad record was by Fleming (1957), who recorded seven males from Simla. Identified by comparison with the type (NHMUK, ♂ San Esteban, Venezuela) and NHMUK series.

Taxonomic issues. Rothschild (1911) described *S. aurantiipes* from Venezuela, Paraguay and Bolivia, designating a male from San Esteban, Venezuela the holotype. He notes that the material from Paraguay and Bolivia is much smaller, the forewing being 10 mm compared to the 14 mm of the type. Fleming (1957) identified this species by comparison with the holotype in NHMUK. He indicated that the forewing length of the holotype is actually 12.5 mm, whereas Trinidad specimens have a forewing length of 10–11 mm. Trinidad specimens in MJWC measure 10–12 mm. Given that Trinidad material is comparable with the type in size, there seems no reason to doubt this identification. However, dissection of a Trinidad male shows the genitalia (Appendix Fig. 41) to be more or less identical with those illustrated by Cerda (2008) for *S. testaceum* (Walker, 1854), which

was described from Demerara, Guyana. As illustrated by Cerda (2008), the habitus of *S. testaceum* is similar to that of *S. aurantiipes*, but the thorax is more heavily marked in black, and the abdomen banded in brown with less contrasting pale rings. Neither type has been dissected. There are no sequences available in BOLD to help clarify this, so we do not resolve this issue at this time, but retain the existing names.

Identification. See under *Pleurosoma trinitatis* above. The female of *S. aurantiipes* is not known to us, but is expected to resemble the male closely.

Biology in Trinidad. All Trinidad records are of males flying by day, and all except one were attracted to heliotrope.

Status in Trinidad. An occasional species, mostly in forested areas.

Sphecosoma trinitatis (see *Pleurosoma trinitatis*)

SYNTOMEIDA HARRIS, 1839

Type species: *Glaucopis ipomoeae* Harris, 1839, TL USA, Georgia.

***Syntomeida melanthus* (Cramer, 1779)**

Figs. 138–139.

OD: Cramer 1779: *Sphinx melanthus*, TL Suriname.

TT: *Syntomeida melanthus* (Cramer): Kaye and Lamont (1927), Fleming (1957).

Historical notes. Kaye and Lamont (1927) recorded a specimen from San Fernando (7.x.1917, R.M. Farmborough), which MJWC examined in OUMNH (Fig. 139). Fleming (1957) had no records. Identified by comparison with the NHMUK series.

Taxonomic issues. In BOLD, material identified as *S. melanthus* from Costa Rica and USA forms BIN BOLD:AAA1416. As this species was described from Suriname, sequences from South America would be useful to confirm that just one species is present, and this is the correct BIN for this species. Based on BOLD:AAA1416,



Fig. 137. Male *Sphecosoma aurantiipes*, Chaguaramas, to *Heliotropium*, 24.iii.1982; 24 mm.



Fig. 138. Male *Syntomeida melanthus*, Curepe, MVL, 1971 (R.E. Cruttwell); 38 mm.



Fig. 139. Female *Syntomeida melanthus* (basal and apical spots F only), San Fernando, mostly on hill, 7.x.1917 (R.W. Farmborough) [OUMNH].

this species is highly variable in the extent of the yellow spotting on the wings.

Identification. The wings are dark with yellow spotting. The two specimens from Trinidad indicate that the forewing spotting is variable, but both have spots near the base of the wing and on the costa at about two-thirds to apex. This combined with white bands on abdominal segments 1 and 2, and red bands on segments 3–5 make this species readily recognizable. *Napata broadwayi* (Schaus) (Ctenuchina) has a superficially similar habitus, but the abdomen is bronzy green, and the spotting of the wings and body is differently arranged. The male of *S. melanthus* has strongly bipectinate antennae, the female less so. The single male from Trinidad (Fig. 138) is slightly more heavily spotted than Cramer's original illustration of a male (Cramer 1777–1782, pl. 248C), whereas the female has much reduced spotting in comparison (Fig. 139). We anticipate that this species is very variable in Trinidad, as noted for BOLD:AAA1416 in Costa Rica and USA.

Biology in Trinidad. The San Fernando female specimen appears to have been captured by day, whereas the male Curepe specimen was caught in a mercury vapour light trap.

Status in Trinidad. Two Trinidad records: the original female from San Fernando (Fig. 139), and a male in poor condition from Curepe (Fig. 138).

VALVAMINOR CERDA, 2020

Type species *Laemocharis masa* Druce, 1889, TL Mexico. Cerda (2020) established this genus for a group of species previously placed in *Mesothen* Druce – the first species complex of *Mesothen* in Cerda (2008). *Mesothen* has also been referred to as *Mesothen* Hampson, but Druce has accidental precedence (Watson *et al.* 1980). Based on previous definitions, *Mesothen* and *Loxophlebia* DNA barcodes intermingle. *Valvaminor* is the branch that groups material identified as *Valvaminor* sp. (Panama) (BOLD:ADS3115), *desperata* (BOLD:AAU3098), *davisi* (BOLD:AAE9322), and *masa* (BOLD:AAE4864).

Valvaminor desperata (Walker, 1856)

Figs. 140–141.

OD: Walker 1856: *Pseudomya desperata*, TL Amazon [OUMNH].

TT: *Mesothen desperata* (Walker): Lamont and Callan (1950), Fleming (1957)

Historical notes. Lamont and Callan (1950) recorded one specimen on Asteraceae (= Compositae) by day at Palmiste, 20.iv.1926. This specimen was examined in NMS. Fleming (1957) had no additional records. Identified by comparison with the holotype (OUMNH, ♀ 'Amaz'), NHMUK series, and Cerda (2008).

Taxonomic issues. Cerda (2020) transferred this species to *Valvaminor* and illustrated the genitalia. BINs BOLD:AAA1393 and BOLD:AAU3098 from Brazil, Parana are identified as *M. desperata*. The images are inadequate to say, but our impression is that neither is *M. desperata*. ML suggests that BIN BOLD:ADS3115 currently identified as *Valvaminor* sp. is the true *V. desperata*.

Identification. Like *Saurita perspicua* and *V. endoleuca*, this small species has smoky transparent wings, black veins and wing margins. *Valvaminor desperata* and *V. endoleuca* do not have the red spots on the thorax seen in *S. perspicua*. *Valvaminor desperata* and *V. endoleuca* are very similar, but whereas the forewing termen margin of *V. desperata* is of



Fig. 140. Male *Valvaminor desperata*, Arima Valley, Simla, MVL, 30.vii.1981; 17 mm.



Fig. 141. Female *Valvaminor desperata*, Arima Valley, Simla, to *Heliotropium*, 28.i.1981; 19 mm.

even width to the apex, in *V. endoleuca* the apical margin is distinctly wider. Sexes similar apart from the strongly bipectinate antennae of the male.

Biology in Trinidad. Adults are attracted to heliotrope by day and to light by night.

Status in Trinidad. Uncommon; it is curious that Fleming (1957) did not record this species from Simla, as all MJWC's specimens were collected there.

Valvaminor endoleuca (Druce, 1905)

Figs. 142–143. For figures of the details of body and male genitalia, see Cock and Laguerre (2022).

OD: Druce 1905: *Mesothen endoleuca*, TL Venezuela.

TT: *Mesothen endoleuca* Druce: Fleming (1957)

Valvaminor endoleuca (Druce): Cock and Laguerre (2022)

Historical notes. Fleming (1957) recorded six males and 5 females from Simla. Identified by comparison with the type (NHMUK, ♂ Venezuela) and NHMUK series. Cock and Laguerre (2022) transferred this species to *Valvaminor* having documented the male genitalia.

Taxonomic issues. No public DNA barcodes in BOLD.

Identification. As discussed under *V. desperata* above. Sexes similar apart from the strongly bipectinate antennae of the male.

Biology in Trinidad. Adults are attracted to heliotrope by day and to light by night.

Status in Trinidad. An uncommon, but widespread species, mainly in forested areas.

Valvaminor jacerda Cock and Laguerre, 2022

Figs. 144–147. For figures of the details of body and male genitalia, see Cock and Laguerre (2022).

OD: Cock and Laguerre 2022: *Valvaminor jacerda*, TL Trinidad.

TT: *Mesothen pyrrha* (Schaus): Kaye and Lamont (1927), Fleming (1957)

Valvaminor jacerda Cock and Laguerre: Cock and Laguerre (2022)

Historical notes. Kaye and Lamont (1927) recorded *Mesothen pyrrha* from Palmiste (22.ix.1916, 16.i.1921, 23.ii.1921, 5.iv.1921, N. Lamont), noting that it is a common



Fig. 142. Male *Valvaminor endoleuca* ♂, Parrylands Oilfield, to *Heliotropium*, 25.vii.1981; 18 mm.



Fig. 143. Female *Valvaminor endoleuca*, Parrylands Oilfield, to *Heliotropium*: ♀ 25.vii.1981; 19 mm.



Fig. 144. Male *Valvaminor jacerda*, Las Lomas, Spanish Farm, to *Heliotropium*, 12.x.1980; 20 mm.



Fig. 145. Female *Valvaminor jacerda*, Curepe, v–vi.1979; 20 mm.



Fig. 146. Male *Valvaminor jacerda*, Penal, at light, 18.iv.2014, K. Sookdeo; ©, with permission.



Fig. 147. Male *Valvaminor ?jacerda*, Tobago, Arnos Vale, at light, 11.vi.2022 R. Deo (iNaturalist observation 121361203) ©, with permission.

species. Fleming (1957) recorded four males and a female from Simla. Building on the work of Cerda (2008, 2020), Cock and Laguerre (2022) described this species from Trinidad and Venezuela as *Valvaminor jacerda*. A 2022 photographic record from Arnos Vale (Fig. 147) is the first from Tobago, but needs confirmation.

Taxonomic issues. No DNA barcodes available.

Identification. A small species with transparent wings, black veins and sharply defined black margin. The orange-red thorax distinguishes it from other small Eucharomina, apart from *Pseudomya afflictata*. The latter species has a diffuse edge to the black wing margins, whereas in *V. jacerda* it is sharply defined. Sexes similar apart from the strongly bipectinate antennae and grey or whitish ventral flap of the male.

Biology in Trinidad. Adults are attracted to heliotrope by day and to light by night.

Status in Trinidad. A common species and widespread in lowland areas.

XANTHYDA DOGNIN, 1919

Type species *Xanthya anaxantha* Dognin, 1919, TL French Guiana, which is now a synonym of *X. chalcosticta* Butler, 1876, TL Brazil, Pará (Cerda 2008). This was to be a Hampson genus with a different type species that Dognin accidentally published prematurely (Cerda 2008).

Xanthya beebei (Fleming, 1957)

Figs. 148–149, Appendix Figs. 23–24.

OD: Fleming 1957: *Pheia beebei*, TL Trinidad

TT: *Pheia beebei* Fleming: Fleming (1957)

Xanthya beebei (Fleming): Cock and Laguerre (2022)

Historical notes. Fleming (1957) described and illustrated *Pheia beebei* based on three males from Simla. MJWC's material was identified from Fleming (1957) and subsequently by comparison with an image of the holotype (AMNH 2022).

Taxonomic issues. No public sequences in BOLD. As Fleming (1957) stated, this species is close to *P. gaudens*



Fig. 148. Male *Xanthyda beebei*, Parrylands Oilfield, to *Heliotropium*, 25.vii.1981; 24 mm.



Fig. 149. Female *Xanthyda beebei*, Lalaja South Road, eupatorium flowers, 25.ix.1982; 26 mm.

Walker, 1856 (♂ type in OUMNH, TL Brazil, Para). Cerda (2008) transferred *P. gaudens* to the combination *Xanthyda gaudens* based on the male genitalia. Noting that the two species are congeneric, Cock and Laguerre (2022) transferred *P. beebei* to the combination *Xanthyda beebei*. **Identification.** This small wasp mimic superficially resembles the three *Agelaia* wasp mimics treated above (*Myrmecopsis kenedyae*, *Pleurosoma trinitatis* and *Sphecosoma aurantiipes*, Fig. 78), but both sexes of *X. beebei* have a black margin to the wings – narrow in the female, broader in the male. With the extensive yellow markings on the body, they also superficially resemble three *Pseudosphex* species (Ctenuchina): *P. fulvisphex* (Druce), *P. nigricornis* (Fabricius) and an unidentified species, but *X. beebei* differs in having black transverse bands the length of the abdomen.

Biology in Trinidad. Both Trinidad records were by day, the female at eupatorium flowers and the male to heliotrope. Cerda (2008) stated that *X. gaudens* is attracted to light.

Status in Trinidad. A rare species in Trinidad; both records are from forested areas, one in the Northern Range and the other in the south.

Xanthyda sp.

Fig. 150.

Historical notes. This record is based on a single specimen in Sir Norman Lamont's collection in UWIZM from 1947 (Fig. 150), labelled as *Cosmosoma gemmata* (Butler, 1875). Kaye would not have seen this specimen and Lamont and Callan (1950) did not include this name in their paper of new records.

Taxonomic issues. This is not *C. gemmata*, and seems closest to *C. elegans* (Butler, 1876). However, having examined the type of *C. elegans* (NHMUK, ♂ Brazil, Espiritu Santo) and NHMUK series, we conclude that this Brazilian species is not the same as Lamont's specimen. Based purely on superficial habitus, Lamont's specimen may be a *Xanthyda* sp. (as may *C. elegans*), but we have not found any comparable species of *Xanthyda* or indeed Euechroina with the rather distinctive bowed margin to the dark apical area of the forewing, combined with the dark notch at the end of veins 1 and 2, yellowish transparent areas, thickened basal dorsum of forewing (and/or basal costa of hindwing), even narrow hindwing margin, and metallic blue-green spots on head, thorax, abdomen and



Fig. 150. Male ?*Xanthyda* sp., Palmiste, 16.v.1947, [N. Lamont] [UWIZM].

base of dorsal forewings. It will be necessary to dissect this specimen to try and establish its affinities, and more material and DNA barcodes will help to characterise it better.

Identification. See characters highlighted in last paragraph.

Biology in Trinidad. Nothing known.

Status in Trinidad. Just one 1947 record from Palmiste.

ACKNOWLEDGMENTS

We thank the curators of the museums who have facilitated our visits over the years to examine and photograph material referred to in this study, including Lee and Jackie Miller (Alleyn Museum, now incorporated into MGCL), Alan Watson, Martin Honey, Geoff Martin and Alberto Zilli (NHMUK), Mark Shaw, Keith Bland, Ashleigh Whiffen and Vladimir Blagoderov (NMS), George McGavin, and James Hogan (OUMNH), Scott Miller, Marc Epstein and Don Harvey (USNM), Gene Pollard, Chris Starr, Mike G. Rutherford and Jenna Ramnarine (UWIZM) and Wolfram May (MNB). In particular, Jose I. Martinez (MGCL), James Hogan (OUMNH) and Vladimir Blagoderov (NMS) took photographs of specimens at our request, some of which are included here. We include some images of important pinned specimens from NHMUK, and thank The Trustees of the Natural History Museum, London, for allowing us to do so under Creative Commons License 4.0 <https://creativecommons.org/licenses/by/4.0/>. Images from other museums (NMS, OUMNH, USNM, UWIZM) are also included with permission.

We thank Kris Sookdeo, Tarran P. Maharaj, Steve Nanz, and Graham White who kindly allowed us to use their images of living *Euchromiina* from Trinidad & Tobago. We thank the following who shared their images through iNaturalist under a CC-BY-NC license: Glen Barrett, bellbird20, bushmountaintt, Steven Daniel, Amy E. Deacon, figtree, Davis Gunn, Tarran P. Maharaj, Sanjay Ramsarop, and Paul Sullivan. We also thank Nandani Bridglal, Rainer Deo, Mark Gibson, and Sattvika Ragoonan for permission to use their © images from iNaturalist.

The Barcode of Life Database (<http://www.boldsystems.org/>) has been used to store and manage our DNA barcode sequences, and the Biodiversity Heritage Library in particular amongst online repositories has made it simple to examine key taxonomic works, enabling us to provide a more complete and comprehensive treatment. MJWC also thanks CABI (www.cabi.org, donors - cabi.org) which has provided him with logistic and laboratory support over the years, including generating the DNA barcodes of some Trinidad material by the CABI Bioscience group (Alan Buddie, Giovanni Cafra and Yuen Ting Yeap).

REFERENCES

- AMNH (American Museum of Natural History) 2022. Invertebrate Zoology [Online database]. Available at: <https://emu-prod.amnh.org/imulive/iz.html> (Accessed 14 June 2022).
- Beccaloni, G., Scoble, M., Kitching, I., Simonsen, T., Robinson, G., Pitkin, B., Hine, A. and Lyal, C. (eds) 2018. The Global Lepidoptera Names Index (LepIndex). [Online]. Available at: <https://www.nhm.ac.uk/our-science/data/lepindex/lepindex/> (Accessed 11 August 2021).
- Beebe, W. 1955. Two little-known selective insect attractants. *Zoologica* 40: 27-32, pl. 1-4.
- Beebe, W. and Kenedy, R. 1957. Habits, palatability and mimicry in thirteen ctenuchid moth species from Trinidad, B.W.I. *Zoologica* 42: 147-158, plates I-II.
- Betz, J.T. 1972. Contribution a la connaissance des lépidoptères Amatidae del la Guyane française (1). *Annales de la Société entomologique de France* 8(2): 397-407.
- Bland, K.P. 2010. Name-bearing types of Lepidoptera (Insecta), excluding Rhopalocera, in the National Museums of Scotland, Edinburgh. *Zootaxa* 2394: 1-22.
- Blest, A.D. 1964. Protective display and sound production in some new world arctiid and ctenuchid moths. *Zoologica* 49: 161-181.
- Butler, A.G. 1876. Notes on the Lepidoptera of the family Zygaenidae, with descriptions of new genera and species. *Journal of the Linnean Society, Zoology* 12: 342-407, pl. XXVII-XXVIII.
- Butler, A.G. 1877. Illustrations of typical specimens of Lepidoptera Heterocera in the collection of the British Museum. Part I. London: British Museum (Natural History). xiii, 62 p., 20 pl.
- Cerda, J.-A. [2008]. *Euchromiini de Guyane française Lepidoptera: Arctiidae, Arctiinae*. [Luxembourg]: The author. [iv], 172 p., IV (index).
- Cerda, J.-A. 2017. Addenda à la monographie « *Euchromiini de Guyane française* » (Cerda, 2008) (2e partie) (Noctuoidea Erebidae Arctiinae Arctiini *Euchromiina*). *Antenor* 4(2): 158-163.
- Cerda, J.-A. 2020. Descriptions d'un nouveau genre :

Valvaminor gen. nov. et d'une nouvelle espèce de Bolivie : *Valvaminor bleuzeni* sp. nov. (Lepidoptera, Noctuoidea, Erebiidae, Arctiinae, Arctiini, Euchromiina). Septième note. *Bulletin Mensuel de la Société Linnéenne de Lyon* 89(7-8): 205-212.

Cock, M.J.W. 1981. An assessment of the occurrence and potential of natural enemies of *Mikania* spp. in the Neotropics. Final report (May 1978 - March 1981). Unpublished report. Curepe, Trinidad and Tobago: Commonwealth Institute of Biological Control. 64 p.

Cock, M.J.W. 1982. Potential biological control agents for *Mikania micrantha* HBK from the Neotropical Region. *Tropical Pest Management* 28: 242-254.

Cock, M.J.W. 2003. On the number of species of moths (Lepidoptera) in Trinidad and Tobago. *Living World, Journal of the Trinidad and Tobago Field Naturalists' Club* 2003: 49-58.

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. 2021. The prominent moths (Lepidoptera, Notodontidae) of Trinidad and Tobago. *Living World, Journal of the Trinidad and Tobago Field Naturalists' Club* 2021: 1-102, Appendix 1-50.

Cock, M.J.W. and **Laguerre, M.** 2022. Taxonomic changes in the Neotropical wasp moths, *Euchromiina* and *Ctenuchina* (Lepidoptera, Erebiidae, Arctiinae, Arctiini) relating to the fauna of Trinidad & Tobago, with descriptions of new species. *Zootaxa* 5222(2): 101–132.

Cock, M.J.W. and **Robbins, R.K.** 2016. Annotated checklist and biogeographic composition of the Lycaenidae (Lepidoptera) of Trinidad, West Indies. *Insecta Mundi* 0506: 1-33.

Cock, M.J.W., Kelly, M., Deacon, A. and **Gibson, M.** 2022. New records and identifications of butterflies and moths (Lepidoptera) from Tobago, West Indies. *Living World, Journal of the Trinidad and Tobago Field Naturalists' Club* 2022: 00-00.

Cramer, P. 1775–1782. De uitlandsche Kapellen voorkomende in de drie Waereld-Deelen Asia, Africa en America. Papillons exotiques des trois parties du monde l'Asie, l'Afrique et l'Amérique. Vol. 1. Amsteldam: S. J. Baalde; Utrecht, Barthelemy Wild and J. Van Schoonhoven & Comp. frontispiece (1782), title-page (1779), xxx, p. 1-16, 1-132, pls. 1-84 (1775); p. 133-155, pls. 85-96 (1776).

Cramer, P. 1777–1782. De uitlandsche Kapellen voorkomende in de drie Waereld-Deelen Asia, Africa en America. Papillons exotiques des trois parties du monde l'Asie, l'Afrique et l'Amérique. Vol. 3. Amsteldam: S. J. Baalde; Utrecht: Barthelemy Wild and J. Van Schoonhoven & Comp., title-page (1782), p. 1-128, pls. 193-264 (1779), p. 129-176, pls. 265-288 (1780).

Deo, R.N., Ali, H. and **Cock, M.J.W.** (2020) Night walks generate unexpected new observations of moths (Lepidoptera) from Trinidad, West Indies. *Living World, Journal of the Trinidad and Tobago Field Naturalists' Club* 2020: 72-79.

Dietz, R.E., IV 1994. Systematics and biology of the genus *Macrocneme* Hübner (Lepidoptera: Ctenuchidae). *University of California Publications in Entomology* 113: 121 p. + figures.

Dietz, R.E., IV and **Duckworth, W.D.** 1976. A review of the genus *Horama* Hübner and the reestablishment of the genus *Poliopastea* Hampson (Lepidoptera: Ctenuchidae). *Smithsonian Contributions to Zoology* 215: 53 p.

Dowdy, N.J., Keating, S., Lemmon, A.R., Lemmon, E.M., Conner, W.E., Scott Chialvo, C.H., Weller, S., Simmons, R.B., Sisson, M.S. and **Zaspel, J.M.** 2020. A deeper meaning for shallow-level phylogenomic studies: nested anchored hybrid enrichment offers great promise for resolving the tiger moth tree of life (Lepidoptera: Erebiidae: Arctiinae). *Systematic Entomology* 45(4): 874-893.

Draudt, M. 1915–1917. 3. Family Syntomidae. p. 37-230, pl. 9-31. In: Seitz, A., ed. 1913-1939. II. Division: The Macrolepidoptera of the American Region. 6. Volume The American Bombyces and Sphingines. Stuttgart: A. Kernan. 1327 p., 185 pl.

Druce, H. 1881-1900. Insecta. Lepidoptera-Heterocera. Biologia Centrali-Americana. London: The Editors. Vol. I. (Text.) xxxii, 490 p.; Vol II. (Text), 622 p.; Vol III (Plates), 101 pl.

Druce, H. 1896. Descriptions of some new genera and species of Heterocera from Central and tropical South America. *Annals & Magazine of Natural History, Series 6* 18: 103-108.

Druce, H. 1898. Descriptions of some new species of Syntomidae, chiefly in the Oxford Museum. *Annals & Magazine of Natural History, Series 7* 1: 401-408.

Druce, H. 1905. Descriptions of some new species of Syntomidae and Arctiidae from Tropical South America. *Annals & Magazine of Natural History, Series 7* 15: 460-467.

Druce, H. 1906. Descriptions of some new species of Heterocera from tropical South America. *Annals and Magazine of Natural History, Series 7* 18: 77-94.

Dunning, D.C. 1968. Warning sounds of moths. *Zeitschrift für Tierpsychologie* 25(2): 129-138.

Dyar, H.G. 1915. New American Lepidoptera chiefly from Mexico. *Insector Inscitae Menstruus* 3: 79-85.

Fabricius, J.C. 1775 Systema entomologiae, sistens insectorvm classes, ordines, genera, species, adiectis synonymis, locis, descriptionibvs, observationibvs. Flensburgi et Lipsiae [= Flensburg and Leipzig]: Korte. [iv], [xii], [xvi], 832 p.

- Felsenstein, J.** 1985. Confidence limits on phylogenies: An approach using the bootstrap. *Evolution* 39:783-791.
- Fleming, H.** 1950. The Euchromiidae (Moths) of Kartabo, British Guiana, and Caripito, Venezuela. *Zoologica* 35: 209-216.
- Fleming, H.** 1957. The Ctenuchidae (moths) of Trinidad, B.W.I. Part I. Euchromiinae. *Zoologica* 42: 105-130, pl. 1-3.
- Fleming, H.** 1959. The Ctenuchidae (Moths) of Trinidad, B.W.I. Part II. Ctenuchinae. *Zoologica* 44: 85-104, pl. 1-3.
- Forbes, W.T.M.** 1939. The Lepidoptera of Barro Colorado Island, Panama. *Bulletin of the Museum of Comparative Zoology at Harvard College* 85: 97-406, 8 pl.
- Gernaat, H.B.P.E., Van Den Heuvel, J., Barten, F. and Van Andel, T.** 2018. Lectotype designation and life history of *Histioea cepheus cepheus* (Erebidae: Arctiinae) in Suriname. *Journal of the Lepidopterists' Society* 72(3): 192-202.
- Grados, J.** 1999. Lista preliminar de los Ctenuchinae (Lepidoptera: Arctiidae) de la Zona Reservada Tambopata-Candamo, Madre de Dios, Peru. *Revista peruana de Entomología* 41(1): 9-14.
- Hampson, G.F.** 1898. Catalogue of the Syntomidae in the collection of the British Museum. Catalogue of the Phalaenae in the collection of the British Museum. Volume I. London: Trustees of the British Museum. xxi, 559 p., pl. 1-17.
- Hampson, G.F.** 1914. Catalogue of the Amatidae and Arctiidae (Nolinae and Lithosiinae) in the Collection of the British Museum. Catalogue of the Lepidoptera Phalaenae in the British Museum. Supplement. Volume I. London: Trustees of the British Museum. xxviii, 838 p. (pl. I-XLI published 1915).
- Hebert, P.D.N., Cywinska, A., Ball, S.L. and deWaard, J.R.** 2003. Biological identifications through DNA barcodes. *Proceedings of the Royal Society (London), Series B Biological Sciences* 270: 313-321.
- Hernández-Baz, F. and Bailey, A.C.** 2006. The Ctenuchinae (Insecta: Lepidoptera: Arctiidae) of the Republic of Guatemala: A preliminary synthesis. p. 403-413. In: **Cano, E.**, ed. State of the Biodiversity of Guatemala. Vol. 1. Guatemala: University of the Valley of Guatemala and Mexico City: CONCYT.
- Hernández-Baz, F. and Grados, J.** 2004. Lista de los Ctenuchinae (Insecta: Lepidoptera: Arctiidae) del Estado de Veracruz, México y algunas notas sobre su riqueza en el Continente Americano. *Folia Entomologica Mexicana* 43: 203-213.
- Hernández-Baz, F., Morón, M.A., Chamé-Vázquez, E. and González, J.M.** 2013. Ctenuchina and Euchromiina (Lepidoptera: Erebidae: Arctiinae) of three biological research stations of México's ECOSUR. *Journal of the Lepidopterists' Society* 67(3): 145-155.
- Hernández-Baz, F., González, J.M. and Heppner, J.B.** 2017. Inventory of wasp moths of the Tumilco Mangrove, Tuxpan, Veracruz, Mexico (Lepidoptera: Erebidae: Ctenuchina - Euchromiina). *Entomological News* 126(4): 274-280.
- Herrich-Schäffer, G.A.W.** 1850-[1858]. Sammlung neuer oder wenig bekannter aussereuropäischer Schmetterlinge. Regensburg: G. J. Manz. 1: p. 1-52 (1856), p. 53-84 ([1858]); pls. [butterflies]: p. [1-10] (1850), p. 11-14 ([1853]), p. 15-18 ([1855]), p. [19-22] ([1856]), p. 23-24 ([1858]).
- Hübner, J.** (1806-[1819]) Sammlung exotischer Schmetterlinge. Erster Band. Augsburg: Jacob Hübner. 1: p. [1-10], pl. [1-213].
- Janzen, D. H. and Hallwachs, W.** 2022. 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 14 June 2022).
- Kaye, W.J.** 1901. A preliminary catalogue of the Lepidoptera Heterocera of Trinidad. *Transactions of the Entomological Society of London* 1901: 115-158, 2 pl.
- Kaye, W.J.** 1911. New species of Syntomidae from British Guiana and south Brazil. *The Entomologist* 44: 142-146.
- Kaye, W.J.** 1913. A few observations in mimicry. *Transactions of the Entomological Society of London* 1913: 1-10, pl. 1.
- Kaye, W.J.** 1920. New species and sub-species of S. American Lepidoptera. *Entomologists' Record and Journal of Variation* 32(10): 187-189.
- 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: 144 pp.
- Kirby, W.F.** 1892. A synonymic catalogue of Lepidoptera Heterocera. (Moths.) London: Gurney & Jackson. xii, 951 p.
- Kitching, I.J. and Cadiou, J.-M.** 2000. Hawkmoths of the World. An Annotated and Illustrated Revisionary Checklist (Lepidoptera: Sphingidae). Ithaca, USA and London: Cornell University Press. viii, 227 p.
- Klages, E.A.** 1906. On the syntomid moths of southern Venezuela collected in 1898-1900. *Proceedings of the United States National Museum* 29: 531-552.
- Kumar, S., Stecher, G., Li, M., Knyaz, C. and Tamura, K.** 2018. MEGA X: Molecular Evolutionary Genetics Analysis across computing platforms. *Molecular Biology and Evolution* 35: 1547-1549.
- Laguerre, M.** 2014. Partial revision of the genus *Homoeocera* Felder, 1874, and description of three new species. *Antenor* 1(2): 153-172.
- Lamont, N. and Callan, E.McC.** 1950. Moths new to Trinidad, B.W.I. *Zoologica* 35: 197-207.
- Laurence, G.A.** 2000. The insect pests of coffee. *Journal of*

- the Agricultural Society of Trinidad and Tobago* 89: 19-20.
- Lesieur, X.** and **Lévêque, A.** 2017. Description et éthologie d'une nouvelle sous-espèce d'*Histioea meldolae* du Panama (Lepidoptera Erebidae Arctiinae Ctenuchini). *Antenor* 4(1): 67-70.
- Linnaeus, C.** 1767. *Systema naturae*. Editio duodecima reformata. Holmiae [= Stockholm]: Laurentius Salvius. 1(2): [ii], p. 533-1328, [36] p.
- Marchant, J.** 1916. Raphael Meldola. London: Williams and Norgate. xv, 225 p.
- Miller, S.E., Hausmann, A., Hallwachs, W.** and **Janzen, D.H.** 2016. Advancing taxonomy and bioinventories with DNA barcodes. *Philosophical Transactions of the Royal Society B* 371: 20150339.
- Nishida, R.** 2002. Sequestration of defensive substances from plants by Lepidoptera. *Annual Review of Entomology* 47: 57-92.
- Orfila, R.N.** 1935. Lepidoptera neotropica I. El género *Sphecosoma* y descripción de tres géneros nuevos de Amatidae. *Revista de la Sociedad Entomológica Argentina* 7: 177-182.
- OUMNH** (Oxford University Museum of Natural History) 2022. Life Collections: collections database. [Records 547 and 1102, 1105, 3708]. [Online]. Available at <http://www.oum.ox.ac.uk/database/entom/collects.htm> (Accessed 26 June 2022).
- Piñas, F.S.J.** and **Manzano, I.** 2003. Mariposas del Ecuador. Vol. 21 b. Arctiidae, subfamilia: Ctenuchinae. Quito, Ecuador: Compañía de Jesús, 95 p., 1 CD.
- Pinheiro, L.R.** and **Duarte, M.** 2010. Revision of the Neotropical moth genera *Mallodeta* Butler and *Erruca* Walker, revalidated (Noctuidae, Arctiinae, Arctiini, Euchromiina). *Zootaxa* 2573: 1-34.
- Pliske, T.E.** 1975. Attraction of Lepidoptera to plants containing pyrrolizidine alkaloids. *Environmental Entomology* 4: 455-473.
- Ratnasingham, S.** and **Hebert, P.D.N.** 2013. A DNA-based registry for all animal species: the Barcode Index Number (BIN) System. *PLoS ONE* 8(8): e66213. doi:10.1371/journal.pone.0066213
- Rodríguez-Loeches, L.** and **Barro, A.** 2008. Life cycle and immature stages of the arctiid moth, *Phoenicoprocta capistrata*. *Journal of Insect Science* 8(5): 13 p.
- Rothschild, W.** 1910. Descriptions of a new hawk-moth and some new Syntomidae. *Annals & Magazine of Natural History*, Series 8 5: 506-511.
- Rothschild, W.** 1911. The Syntomidae of the Tring Museum. *Novitates Zoologicae* 18: 24-45.
- Rothschild, W.** 1912. New Syntomidae. *Novitates Zoologicae* 19: 151-186.
- Rothschild, W.** 1913. Some unfigured Syntomidae. *Novitates Zoologicae* 20: 470-472, pl. XIII-XIV.
- Rothschild, Lord [W.]** 1931. Notes on Syntomidae (Amatidae) with descriptions of new species. *Novitates Zoologicae* 37: 149-158.
- Saitou, N.** and **Nei, M.** 1987. The neighbor-joining method: A new method for reconstructing phylogenetic trees. *Molecular Biology and Evolution* 4:406-425.
- Schaus, W.** 1889. Descriptions of new species of Mexican Heterocera. *Entomologia Americana* 5: 87-90.
- Schaus, W.** 1896. New species of Heterocera from tropical America. *Journal of the New York Entomological Society* 4: 147-154.
- Schaus, W.** 1905. Descriptions of new South American Moths. *Proceedings of the United States National Museum* 29(1420): 179-345.
- Schaus, W.** 1924. New species of moths in the United States National Museum. *Proceedings of the United States National Museum* 65(2520): 1-74.
- Seitz, A.** 1915. 3. Family: Syntomidae. [Introductory remarks]. p. 33-37. In: Seitz, A., ed. 1913-1939. II. Division: The Macrolepidoptera of the American Region. 6. Volume The American Bombyces and Sphinges. Stuttgart: A. Kernan.
- Sepp, J.** 1843-1848. Surinaamsche Vlinders. Naar het leven geteekend. Papillons de Surinam. Dessinés d'après nature. Vol. 2. Amsterdam: Jan Christian Sepp en Zoon. i-iv, p. 109-224, pl. 51-100.
- Simmons, R.B.** 2006. A revision of *Psoloptera* Butler, including a redescription of its known species (Arctiidae: Arctiinae: Euchromiini). *Journal of the Lepidopterists' Society* 60(3): 149-155.
- Simmons, R.B., Weller, S.J.** and **Johnson, S.J.** (2012) The evolution of androconia in mimetic tiger moths (Noctuoidea: Erebidae: Arctiinae: Ctenuchina and Euchromiina). *Annals of the Entomological Society of America* 105(6): 804-816.
- Simmons, R.B.** and **Weller, S.J.** 2006. Review of the *Sphecosoma* genus group using adult morphology (Lepidoptera: Arctiidae). *Thomas Say Publications in Entomology: Monographs* 31: 108 p.
- Starr, C.K.** 2009. Trinidad and Tobago. p. 926-929. In: **Gillespie, R.** and **Clague, D.**, eds. *The Encyclopedia of Islands*. Berkeley, California, University of California Press.
- Stoll, C.** 1780-1782. In: Cramer, P. *De uitlandsche Kapellen voorkomende in de drie Waereld-Deelen Asia, Africa en America*. Papillons exotiques des trois parties du monde l'Asie, l'Afrique et l'Amérique. Vol. 3 [part; the earlier part was authored by Cramer, P.] Title-page (1782), p. 29-90, pls. 305-336 (1780), p. 91-164, pls. 337-372 (1781), p. 165-252, pls. 373-400 (1782). Amsteldam [= Amsterdam]: S. J. Baalde; Utrecht: Barthelemy Wild.
- Strand, E.** 1915. Über einige exotosche (exklus. Asiatische) Syntomididen des Deutschen Entomologischen Museums. *Deutsche entomologische Zeitschrift* 1915: 19-29.
- Strand, E.** 1917. Neue und wenig bekannte Nebenformed

von Syntomididen. *Archiv für Naturegeschichte* 82A(2) (1916): 79-86.

Strand, E. 1927. Énumération des Hétérocères exotiques (à l'exclusion des Noctuides, des Microlépidoptères, des espèces de l'île Formosa et des espèces que j'ai décrites dans Seitz „Macrolépidoptères”) qui jusqu'à l'année 1926 sont nommés et publiés. *Entomologisches Nachrichtenblatt*, Troppau 1(3): 42-55.

Tamura, K., Nei, M. and Kumar, S. 2004. Prospects for inferring very large phylogenies by using the neighbor-joining method. *Proceedings of the National Academy of Sciences (USA)* 101: 11030-11035.

The Linnean Collections (2022) LINN 0875 *Sphinx auge* (Ins Linn). Available at <https://linnean-online.org/15778/>.

Walker, F. 1854. List of the specimens of lepidopterous insects in the collection of the British Museum. Part I. - Lepidoptera Heterocera. London: The British Museum (Natural History). p. 1-278.

Walker, F. 1856. List of the specimens of lepidopterous insects in the collection of the British Museum. Part VII. - Lepidoptera Heterocera. London: The British Museum (Natural History). p. 1509-1808.

Waterhouse, C.O. 1880–1882. Aid to the identification of insects. Vol. 1. London: E. W. Janson. 1: 16 p., pl. 1-100.

Watson, A., Fletcher, D.S. and Nye, I.W.B. 1980. The Generic Names of Moths of the World. Volume 2. Noctuoidea (part); Arctiidae Cocytiidae Ctenuchidae Dilobidae Diopsideae Lymantriidae Notodontidae Strepsimanidae Thaumetopoeidae Thyretidae. London: British Museum (Natural History). xiv, 228 p.

Zahiri, R., Kitching, I.J., Lafontaine, J.D., Mutanen, M., Kaila, L., Holloway, J.D. and Wahlberg, N. 2011. A new molecular phylogeny offers hope for a stable family level classification of the Noctuoidea (Lepidoptera). *Zoologica Scripta* 40(2): 158-173.

Zerny, H. 1912. Syntomidae. *Lepidopterorum Catalogus* 7: 1-179.

Zerny, H. 1931a. Beiträge zur Kenntnis der Syntomiden. *Deutsche Entomologische Zeitschrift, "Iris"*, Dresden 45: 1-27, pl. 1.

Zerny, H. 1931b. Ergebnisse einer zoologischen Sammelreise nach Brasilien, insbesondere in das Amazonasgebiet, ausgeführt von Dr. H. Zerny. VII. Teil. Lepidoptera III: Die Syntomiden des Staates Para. *Annalen des Naturhistorischen Museums in Wien* 45: 225-263.

Zimzen, E. 1964. The type material of I. C. Fabricius. Copenhagen: Munksgaard. 656 p.