# The Corkscrew Moths (Lepidoptera, Geometroidea, Sematuridae) of Trinidad and Tobago

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**Abstract:** Two similar, sexually dimorphic species of Sematuridae are found in Trinidad: *Mania lunus* (Linnaeus) and *M. empedocles* (Cramer). Only the former is recorded from Tobago. Male and female adults and the male genitalia of both species are illustrated and diagnostic features are provided. Information on their occurrence in Trinidad and Tobago is summarised. The applicability of the diagnostic features beyond Trinidad is considered, and as a result, *Lars empedoclaria* Hübner, the type species of *Mania* Hübner, 1821, is reinstated as a junior subjective synonym of *M. lunus*, **revised status**.

**Key words**: identification, *Mania lunus*, *Mania empedocles*, *Mania empedoclaria*, *Sematura*, *Nothus*

## INTRODUCTION

Sematuridae is amongst the smallest families of moths, comprising six genera and 40 species (van Nieukerken *et al*., 2011). In the past, Sematuridae has been treated as part of the Uraniidae, as a family in the Uranioidea, and a family of the Geometroidea. With the support of DNA-based phylogenies, the situation has become clearer, and Sematuridae is now accepted as a family in the superfamily Geometroidea (Minet & Scoble, 1999; Sihvonen *et al*., 2011; Heikkilä *et al*., 2015).

Sematuridae is entirely Neotropical in distribution, apart from one South African species placed in a separate subfamily (Minet & Scoble, 1999). It is based on the genus name *Sematura* Dalman, 1825, which has been widely used in the limited literature on this family since the middle of the 19th century, but is now accepted as a synonym of *Mania* Hübner, 1821 (ICZN, 2015). Hampson (1918) recognised four genera of Sematuridae, of which only one, *Mania*, occurs in Trinidad and Tobago as two very similar species (Kaye & Lamont, 1927; Cock, 2003). Because they are attracted to light, are of large size and have striking twisted tails, they are amongst the moths most frequently noticed by naturalists and the public. As the two species are difficult to distinguish, I set out how to separate them and summarise what is known about them in Trinidad and Tobago.

In preparing this account, I examined the following collections:

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| **NHMUK** | The Natural History Museum, London, UK |
| **OMNH** | Hope Entomological Collections, Oxford University Museum of Natural History, Oxford, UK |
| **NMSE** | National Museum of Scotland, Edinburgh, UK |
| **UWIZM** | University of the West Indies Zoological Museum, Trinidad and Tobago, including the collections of the Imperial College of Tropical Agriculture and CABI, Trinidad and Tobago |
| **MJWC** | Private collection of Matthew J.W. Cock, UK |

## TAXONOMY AND IDENTIFICATION

### *Mania* Hübner, 1821

Early workers incorrectly considered *Mania* to be a junior homonym of *Mania* Treitschke, 1825, and so the name dropped out of use (Cock & Lamas, 2011). For the last 100

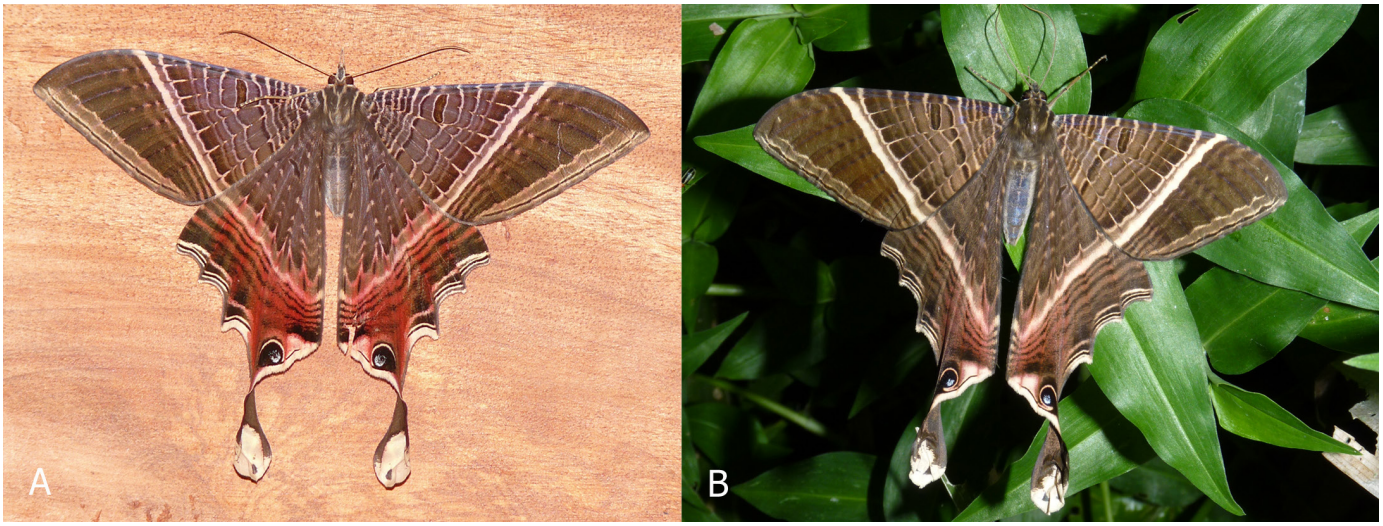


**Fig. 1**. Adult females of *Mania* spp. **A**, *M. lunus*, Mon Desir, South Oropouche, 12 Dec 2009, Tarran P. Maharaj. **B**, *M. empedocles*, Penal, 11 Mar 2013, Kris Sookdeo.

years, this genus has been known almost exclusively as either *Nothus* Billberg, 1820 or *Sematura* Dalman, 1825. *Nothus* is an unavailable homonym of *Nothus* Olivier, 1811 (Coleoptera) and should not be used. An application was made to the International Commission on Zoological Nomenclature (ICZN) to give *Sematura* precedence over *Mania* in order to stabilise the nomenclature on recent usage (Cock & Lamas, 2011), but it was turned down (ICZN, 2015), and so the older genus name *Mania* must now take precedence.

*Mania* species are distinctive due to the broad, spatulate tails. In life (Fig. 1) the basal half of the tail is rotated through 180°, giving rise to the common name of Corkscrew. In pinned specimens, this spiral may be untwisted and flattened out to make the tail lie flat during the spreading process.

Hampson (1918) recognised four species: *M. lunus* (Linnaeus), *M. empedocles* (Cramer), *M. diana* (Guenée) and *M. aegisthus* (Fabricius). The first two co-occur from Mexico to Amazonia, *M. diana* is restricted to southern Brazil, and *M. aegisthus* to the Greater Antilles. In his treatment in Seitz' *Macrolepidoptera of the World*, Gaede (1930) basically followed Hampson's arrangement, but struggled to separate *M. lunus* and *M. empedocles*, especially the females, and only illustrated *M. lunus*. In his treatment of this genus on Barro Colorado Island, Panama, Forbes (1942) treated *M. lunus* and *M. empedocles* as one species, found from the Amazon rainforest northwards. Almost certainly the early publications in the 19th century did not differentiate the two species, but described and referred to the male and female as separate species. However, when examined in series, the differences between males of the two species are clear, although less so for the females.

The diagnostic features of the male dorsal sides are indicated in Fig. 2, based on material from Trinidad: **A**, *M. empedocles* has a distinct white postdiscal line on the forewing and hindwing, but this is more or less undifferentiated in *M. lunus*; **B**, the submarginal line of the forewing is usually rather straight in *M. lunus* and sinuous in *M. empedocles*; **C**, the postdiscal lines beyond postdiscal line A are more contrasting at the forewing tornus and on the hindwing distal costa in *M. lunus*; **D** (and inset), the innermost of the white submarginal lines of spaces Sc+$R_1$-Rs and Rs-$M_1$ of the hindwing (see Rajaei *et al*. (2015, Figure 7.32) for the venation of *M. lunus*) is stronger and forms a more or less straight, continuous line across the two spaces in *M. lunus*, whereas they are weaker and out of alignment at vein Rs in *M. empedocles*; and **E**, the red submarginal suffusion extends across the hindwing in *M. lunus* but is restricted to the tornal area in *M. empedocles*. As noted above, when material is examined in series (Fig. 3), the differences are easy to appreciate.

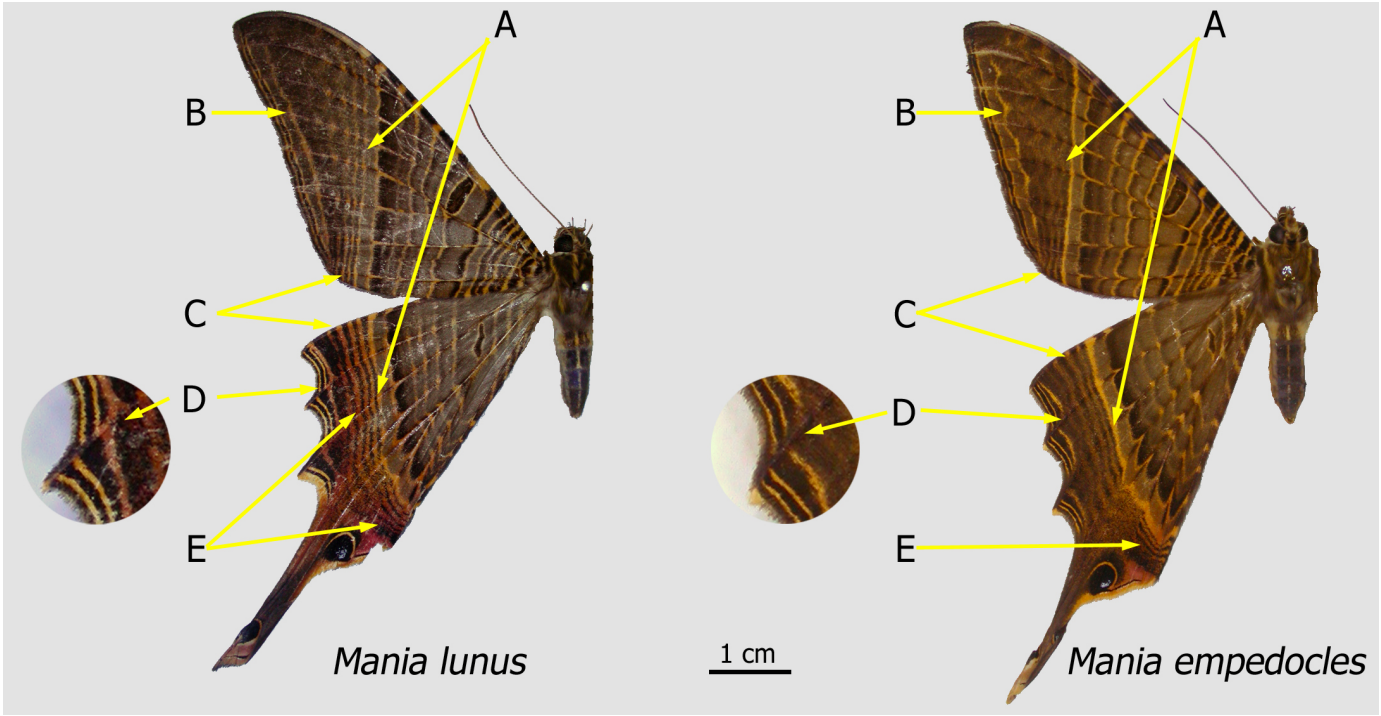


**Fig. 2**. Diagnostic features to distinguish males of *Mania lunus* (Inniss Field, mercury vapour light, 17.v.1999, M.J.W. Cock [MJWC]) and *M. empedocles* (Morne Bleu Textel Installation, at light, Nov 1978, M. Dookie [MJWC]) as explained in the text.

The male genitalia of the two species are similar (Fig. 4), but the row of peg-like structures on the inside face of the valves of *M. empedocles* are even in size and regularly spaced, whereas those of *M. lunus* are irregular and unevenly spaced. The genitalia of two examined specimens of *M. lunus* were almost identical with regard to this character, but only one dissection of *M. empedocles* was made (all that were available to me), so the implications of individual variation have not been further evaluated.

The females are more challenging to separate (Fig. 5) as both have a strong white postdiscal line on each wing, although that of *M. empedocles* is generally broader. Characters B-E shown for the males (Fig. 2) can be used, and of these, D (the white submarginal lines of spaces Sc+$R_1$-Rs and Rs-$M_1$ of the hindwing) and E (the extent of the red submarginal suffusion across the hindwing) seem the most useful.

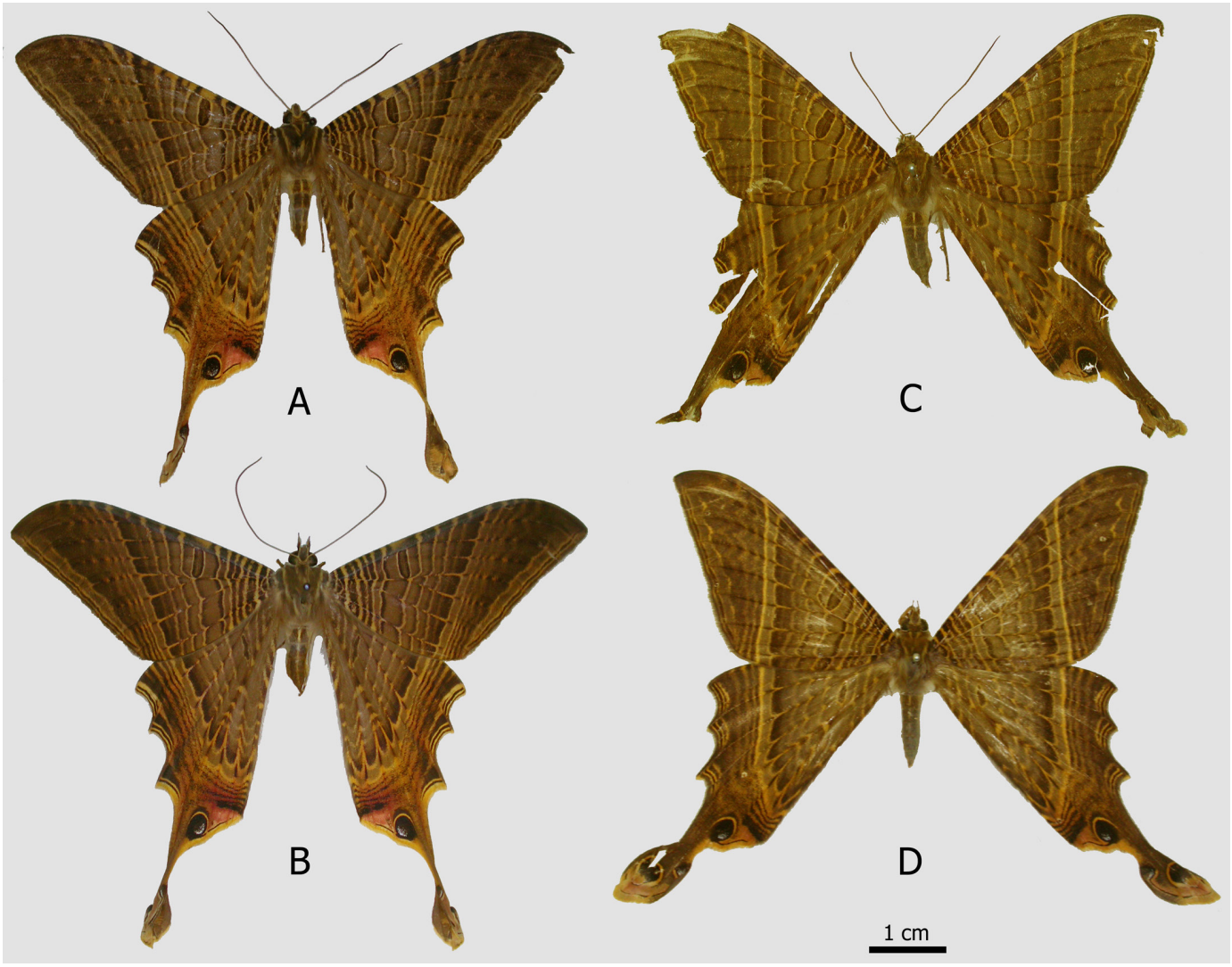


**Fig. 3.** Males of *Mania lunus*: **A**, **B**, Palmiste, iv.1930, iv.1930, [N. Lamont] [NMSE]; and *M. empedocles*: **C**, Caparo, Nov 1904 [NHMUK]; **D**, Trinidad, 17.vi.1904, W.J. Kaye [NHMUK].

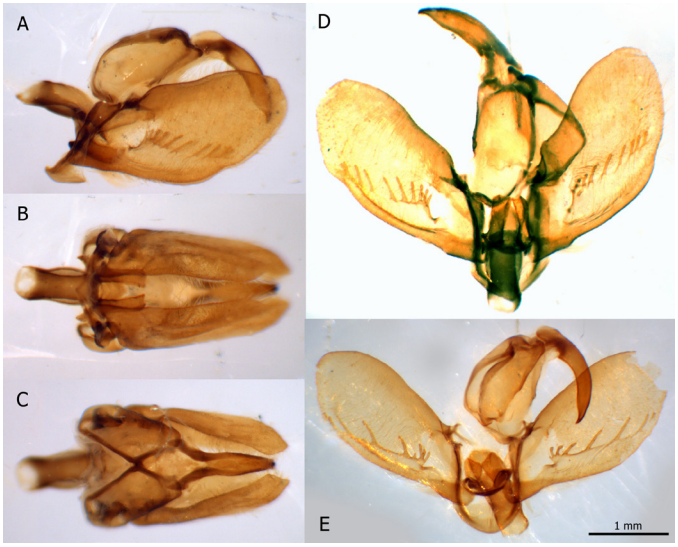


**Fig. 4.** Male genitalia of *Mania* spp. **A–D**, *M. empedocles*: **A**, lateral view, **B**, ventral view, **C**, dorsal view, **4**, with valves spread. **E**, *M. lunus* with valves spread. Figures to scale; the specimens are those shown in Fig. 2.

***Mania lunus* (Linnaeus, 1758)**

*Mania* (*Saematura* [sic]) *actaeon* (C. Felder and R. Felder): Kaye (1901)

*Sematura lunus* (Linnaeus): Hampson (1918), Kaye & Lamont (1927), Cock (2003)

Kaye & Lamont (1927) refer to this species as 'The Corkscrew' and considered it to be common and widely distributed. I have also found it to be widespread, but based on observations and records since the late 1970s consider it occasional rather than common. Both *M. lunus* and *M. empedocles* occur in forested areas, but *M. lunus* seems to be the more common of the two in suburban areas. There is a specimen from Tobago in the Admiral Bourke collection (OMNH), which is the only record of a *Mania* species from that island.

Dyer *et al*. (2016) reared this species in Ecuador, and show an image of the caterpillar, which they report to feed on the reproductive parts of *Pentaclethra macroloba* (Fabaceae) and *Syzygium longifolium* (Myrtaceae).

**Specimens/photos examined.** Trinidad 31 records, Tobago 1 record. Localities: Arena Forest Reserve; Arima Valley, Asa

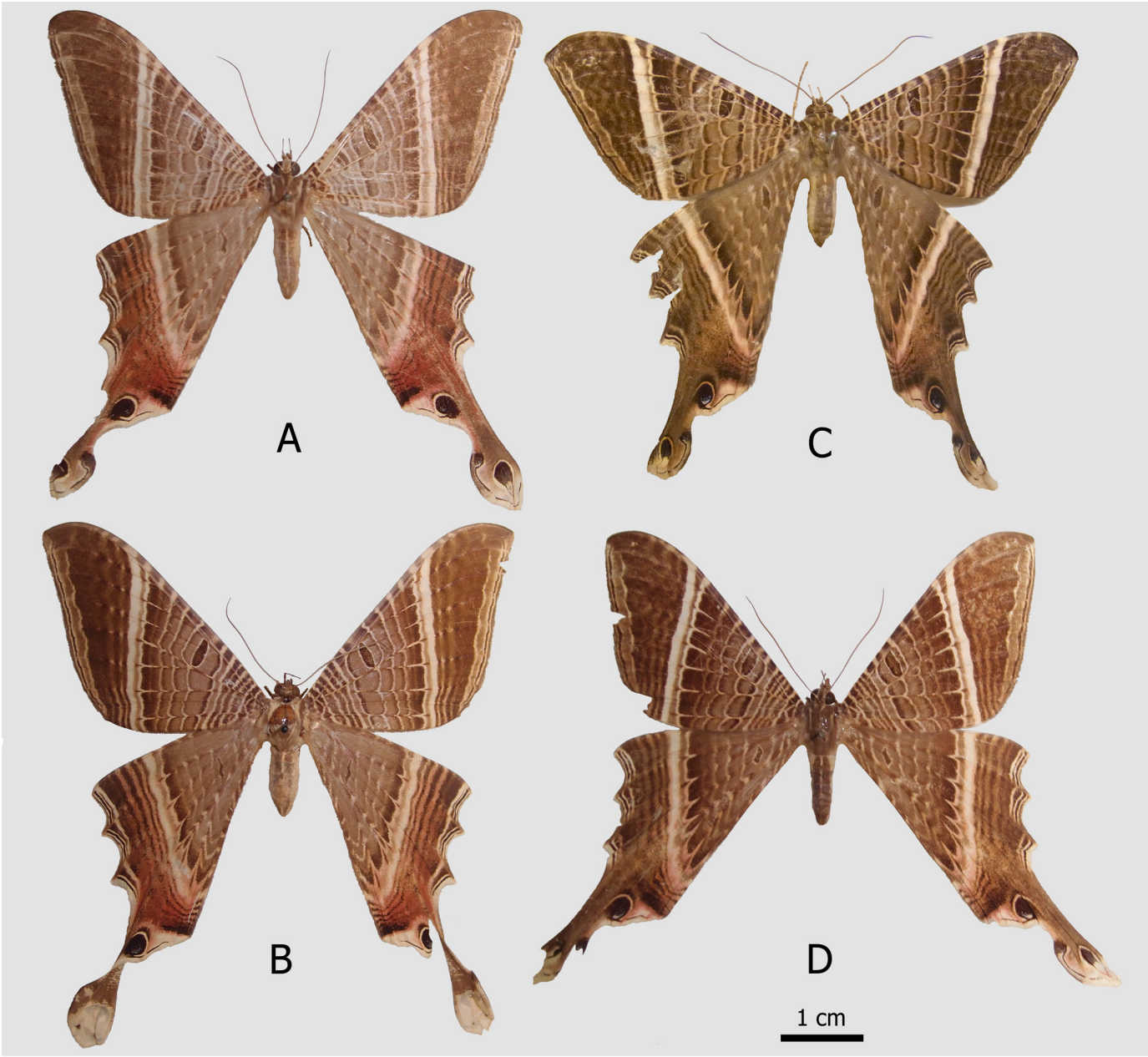


**Fig. 5**. Females of *Mania lunus*: **A**, Curepe, MVL, 8.x.1978 (M.J.W. Cock) [UWIZM CABI.4255]; **B**, St. Augustine (D.J. Stradling) [UWIZM 2014.9.447]; and *M. empedocles*: **C**, Trinidad, iv-v.1902 (E. Bourke) [OMNH]; **D**, Curepe, MVL, 18.ix.1978 (M.J.W. Cock) [UWIZM CABI.4256].

Wright Centre; Arima Valley, Simla; Curepe; Hollis Reservoir; Inniss Field; Manzanilla; Palmiste; track to Paria Bay; Port of Spain; St. Augustine; Tobago. Months: Jan (1), Feb (2), Mar (6), Apr (2), May (2), Aug (1), Sep (3), Oct (3). Museums/collections: MJWC (4), NHMUK (4), OMNH (6), NMSE (5), UWIZM (14).

### ***Mania empedocles* (Cramer, 1779)**

*Mania* (*Saematura* [sic]) *empedoclaria* Hübner: Kaye (1901)
*Sematura empedocles* (Cramer): Hampson (1918), Kaye & Lamont (1927)

Kaye (1901) lists *M. empedoclaria* Hübner in his provisional list of Trinidad moths, based on a specimen which I have not located from Maraval Valley (C.W. Ellacombe). Kaye & Lamont (1927) list specimens of this provenance under both *M. lunus* and *M. empedocles*. *Mania empedoclaria* has been treated as a synonym of *M. lunus* (Hampson 1918) and of *M. empedocles* (Fletcher 1979), but because Kaye (1901) treats *M. lunus* separately (as *M. actaeon*), it seems likely that he was referring to *M. empedocles*.

Kaye & Lamont (1927) refer to this species as 'The Scarce Corkscrew' and list four records. I have ten records, and consider it widespread, mostly in forested areas, and uncommon. It is not recorded from Tobago. I have found no information on the early stages.

**Specimens/photos examined.** Trinidad 10 records. Localities: Balandra; Caparo; Curepe; Morne Bleu, Textel

Installation; Port of Spain; Palmiste; Penal. Months: Feb (1), Mar (1), Apr-May (1), Jun (1), Aug (1), Sep (1), Oct (1), Nov (2). Museums/collections: MJWC (1), NHMUK (4), OMNH (1), NMSE (1), UWIZM (2).

## DISCUSSION

Diagnostic features have been found to separate adults of *M. lunus* and *M. empedocles* based on material from Trinidad. Subsequent examination of the NHMUK collection originally curated by G. F. Hampson showed that these criteria could be applied to almost all specimens of the two species from Central America to the Amazon. No attempt was made to investigate the status of *M. diana*, or whether other currently unrecognised species might be present.

These diagnostic features can now be checked against selected available species names for the genus, particularly where based on female specimens. Linnaeus' (1758) description of *M. lunus* is not adequate to distinguish the species, but Clerck's ([1764], pl. 52) illustration of Linnaeus' specimen shows it to be a male *M. lunus* as treated here. Cramer's (1779, pl. 199A, 199B) illustration of *M. empedocles* is a female of that species, as treated here. *Lars empedoclaria* Hübner, [1819] was named and well illustrated in Hübner ([1806]-[1826], vol. 1, plate 201); the illustration shows a female *M. lunus*. Hübner (1821) established the genus *Mania* based on *L. empedoclaria*. Fletcher (1979) confirmed this, but incorrectly considered *L. empedoclaria* to be a junior subjective synonym of *M. empedocles, de facto* reinstating *M. empedocles* as a valid species, reversing the treatment of Forbes (1942). In view of the diagnostic features established here, *Lars empedoclaria* Hübner, [1819], the type species of the genus *Mania*, is reinstated as a junior subjective synonym of *M. lunus* (Linnaeus, 1758), **revised status**.

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