

Cyphoedma n. gen. now described after a century of use, with the addition of a new species from Central America (Geometridae, Ennominae)

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ABSTRACT

Cyphoedma n. gen., is validly described following a century of use as an unpublished manuscript name. *Cyphoedma mirafloresa* (Dognin, 1892) **rev. stat. n. comb.** is elevated to full species from subspecific status with *Cyphoedma transvolutata* (Walker, 1860) **n. comb.**, and a third species in the genus is described from Central America: *Cyphoedma ashleyorum* n. sp. The adult habitus and male and female genitalia are illustrated for each of the three species and available COI (DNA) barcode data are reviewed.

Introduction

While examining COI (DNA) barcode data and specimens from the extensive Geometridae Costa Rican inventory collections of Dan Janzen, Winnie Hallwachs, and their team of Costa Rican parataxonomists (Janzen, 1986), an unresolved taxonomic issue concerning the moth genus '*Cyphoedma*' (Geometridae, Ennominae) was encountered. This "genus" name, a manuscript name of William Warren (1839 – 1914), has been used provisionally in Neotropical treatments (Pitkin, 2002), phylogenetic studies (Brehm et al., 2019; Murillo-Ramos et al., 2019), and global checklists (Scoble, 1999; Scoble and Hausmann, 2007; Rajaei et al., 2022), despite being unpublished.

Upon further investigation into this genus, an undescribed species from Central America was discovered, and it also became apparent that an Andean subspecies, '*C. transvolutata mirafloresa*' (Dognin) warranted full species status.

Accordingly, each of the three now recognized species are illustrated, and available COI barcode data are reviewed. For taxonomic stability, the name '*Cyphoedma*' is retained for the description of this previously formally undescribed genus.

Material and methods

Cyphoedma holdings (including primary types) were examined from the following institutions: American Museum of Natural History (AMNH), New York City, New York, USA; Essig Museum Entomology Collection (EMEC), University of California, Berkeley, USA; Natural History Museum (NHMUK), London, United Kingdom; and National Museum of Natural History (USNM), Washington DC, USA.

Eight genitalic preparations were made by the author following the methods described in Lafontaine (2004). Preparations were stained with Chlorazol Black and slide-mounted in Euparal. Images were taken using a Visionary Digital imaging system and images manipulated (background removed) with Adobe Photoshop (Adobe Systems, Mountain View, CA). SimpleMappr (Shorthouse, 2010) was used to generate the geographic distribution spot map. GPS coordinates used to generate this map were taken verbatim from coordinates on specimen labels, coordinates downloaded from iNaturalist (iNaturalist, 2023) observations (accessed July 2023), voucher data of specimens publicly available from the Barcode of Life Data System (BOLD) (Ratnasingham and Hebert, 2007) (accessed July 2023), or from coordinates estimated from specimen labels at the USNM without coordinates using Google Earth to find the centroid of the municipality.

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A brief section titled 'Molecular characterization' is included in species accounts where molecular data are available. These data draw from information available in the 'BIN Details' of BOLD's public data portal BIN page. These statistics are based only on sequences with a minimum length of 500 base pairs and < 1% ambiguous bases, and they almost invariably change with the addition of new sequence data, which is an ongoing process.

Results

Cyphoedma Matson, n. gen.

urn:lsid:zoobank.org:act:22432483-C4F8-483A-9CE5-6411ACEDAA65

Type species: *Cimicodes transvolutata* Walker, 1860: 40; by original designation.

Diagnosis. The wing shape and pattern of *Cyphoedma* are similar to some members of *Cimicodes* Guenée, *Acrotomodes* Warren, and *Polla* Herrich-Schäffer (Pitkin, 2002). However, it should be noted that while *Cyphoedma* and *Cimicodes* appear to be sister genera, *Polla* and *Acrotomodes* are not closely related (Brehm et al., 2019) and the resemblance in wing shape is likely fortuitous or a result of convergent evolution on appearing to be a dead leaf to a foraging predator. One distinguishing feature of *Cyphoedma* is the presence of silvery-white, arcing, transverse medial line on the hindwing, which connects with the antemedial line of the forewing. In contrast, this line is either absent, straight, or does not traverse the entire wing in the other aforementioned genera. In *Cyphoedma*, the male valve appears unmodified, i.e., lacking significant processes or ridges. However, the valvae of *Polla* and *Acrotomodes* are divided and possess prominent processes, while the valve of *Cimicodes* features a large, sclerotized region with a spinose or setose ridge (Pitkin, 2002). In females, the absence of a signum further separates *Cyphoedma* from *Polla*. When at rest (Fig. 1), the forewing costal margin of *Cyphoedma* is often perpendicular to the body axis. The recognition of *Cyphoedma* as a distinct genus among related or visually similar genera is also supported by the mito-nuclear phylogenetic results of Murillo-Ramos et al. (2019) and Brehm et al. (2019).

Male description (Figs. 2a-b, 2e-f, 2i-j, 3). Forewing length 20–25 mm. *Head*: Antenna filiform, brown scales above. Vertex dark brown with lighter brown scales near scape. Frons mostly dark brown, but with lighter brown scales medially; ventral margin white. Labial

palpus porrect, slightly longer than diameter of eye, cream to white on inner surface, and variably brown and white on outer surface. Proboscis well developed. Chaetosemata well separated. *Thorax*: Patagium mostly gray. Tegula brown. Mesothorax brown above, white below. Foreleg with large epiphysis; tibial spur formula 0–2–4; hindtibia swollen, bearing plume of long androconia folded into longitudinal groove on inner surface (when not deployed). Legs often whiter on internal surface and variably banded or speckled with yellow and dark brown on external surface; hind leg generally less speckled. *Forewing*: Predominantly brown with slightly falcate apex speckled with white and yellow. Costal and subapical areas given toward mustard-brown; costa often with frosty highlights. Curved, transverse silvery-white antemedial and postmedial lines. Dark brown medial transverse line through frosted central part of wing. Small black discal spot. Irregular, central, light brown patch distad to postmedial line. Subterminal area sometimes with jagged silvery-white line, especially toward apex. Outer margin with silvery-white highlight. Underside pale brown to white in proximal half; transitioning to dark brown in distal half. Fringe brown. *Hindwing*: Concolorous with forewing, but more frosted in basal half; bearing arcing, medial, transverse silvery-white line that joins with antemedial line of forewing. Small black discal spot present. Subterminal area sometimes with small, lighter brown flecks. Outer margin with silvery-white highlight. Underside pale brown to white in proximal two-thirds; transitioning to dark brown in distal third. Fringe brown. *Abdomen*: Dark brown above, pale white to cream below. Third sternite with comb of setae. *Male Genitalia*: (Fig. 3): Uncus short and tapered toward apex. Valva without processes. Juxta plate-like and not strongly sclerotized. Vesica with two separate fields of small dentate cornuti on adjacent diverticula. **Female description** (Figs. 2c-d, 2g-h, 2k-l, 4). Forewing length 23–26 mm. *Head*: As in male. *Thorax*: As in male; though lacking hindtibial androconia. *Forewing*: As in male, but often with lighter brown ground color and less pronounced central light brown patch distad to postmedial line above. Underside brown to tan in proximal half; transitioning to darker brown in distal half. *Hindwing*: As in male, but underside brown to tan in proximal half and transitioning to darker brown in distal half (less contrasted than male). *Abdomen*: As in male but lacking third sternite comb of setae. *Female Genitalia*: (Fig. 4): Papillae anales rounded; posterior apophysis 2.5–3x longer than anterior apophysis. Ductus bursae more heavily sclerotized at junction with corpus bursae. Corpus bursae pyriform with lightly wrinkled surface; signum absent.

Cyphoedma ashleyorum Matson, n. sp.

urn:lsid:zoobank.org:act:22432483-C4F8-483A-9CE5-6411ACEDAA65
(Figures 2a–2d, 3a–b, 4a, 5)

Diagnosis. *Cyphoedma ashleyorum* is the predominant *Cyphoedma* in Central America and is not known to occur in South America. In males, the ground color is typically darker than congeners, and the darkened area of the hindwing underside does not extend as broadly down the outer margin to the tornus as seen in *C. mirafloresa* (see arrows, Figs. 2b, 2f). Males of both *C. ashleyorum* and *C. mirafloresa* also have more starkly contrasted hindwing undersides than seen in *C. transvolutata* (Figs. 2b, 2f, 2j). Genitalia appear to be too similar among congeners to adequately diagnose, but COI barcode data readily supports the recognition of this new taxon (see Molecular characterization).

Male description (Figs. 2a–b, 3a–b). Nearly redundant with generic description. Forewing length 20–25 mm. *Head*: Antenna filiform, brown scales above. Vertex dark brown with lighter brown scales near scape. Frons mostly dark brown, but with lighter brown scales medially; ventral margin white. Labial palpus porrect, slightly longer than diameter of eye, cream to white on inner surface, and variably brown and white



Figure 1 Natural resting posture of *Cyphoedma*. Image of female *C. transvolutata* (Walker) taken in Santa Catarina, Brazil. Photo credit: Douglas Meyer.

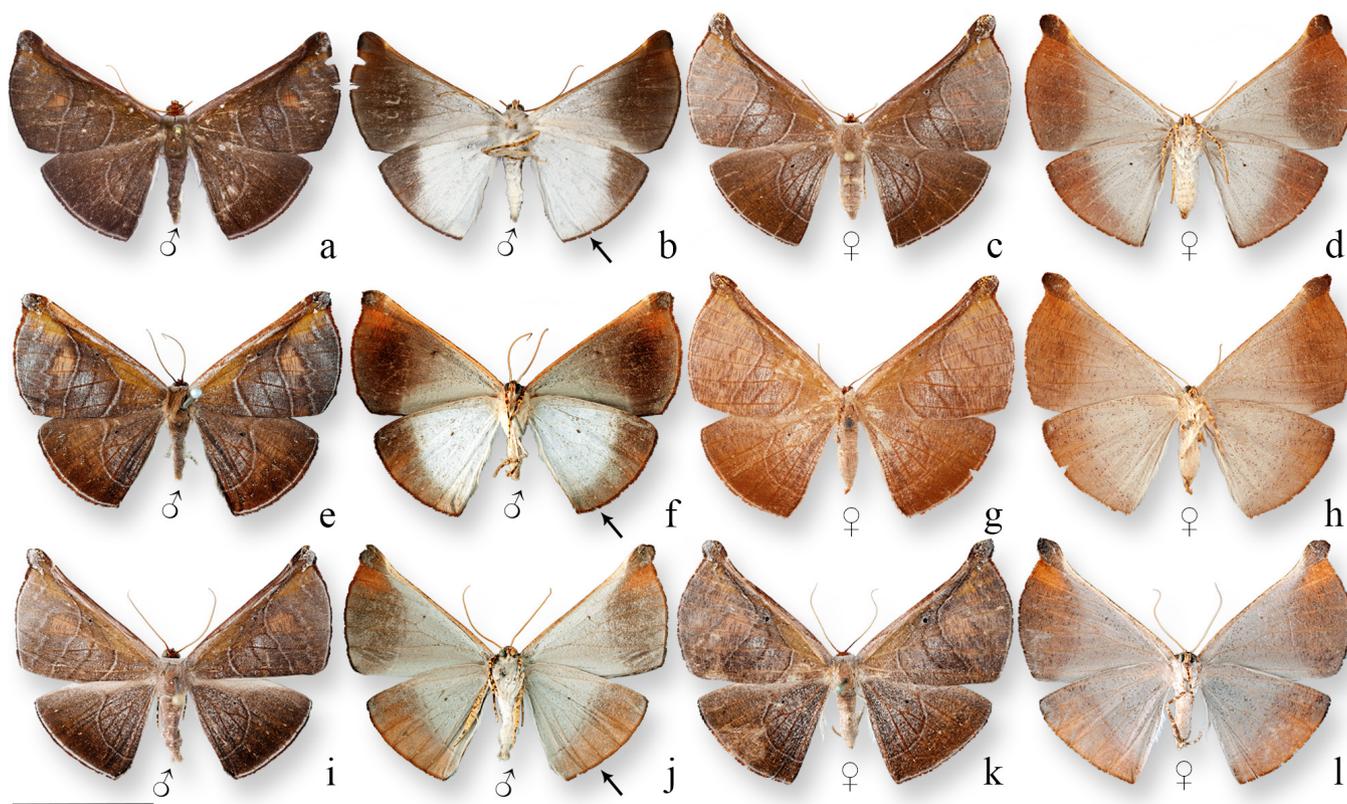


Figure 2 Adult habitus of *Cyphoedma*. Arrows pointing to diagnostic wing differences. (a) *C. ashleyorum* n. sp., male holotype, USNM01771276, dorsal; (b) same, ventral; (c) *C. ashleyorum* n. sp., female paratype, USNM01771288, dorsal; (d) same, ventral; (e) *C. miraflores* (Dognin), male lectotype, USNM01771321, dorsal; (f) same, ventral; (g) *C. miraflores* (Dognin), female, USNM01771294, dorsal; (h) same, ventral; (i) *C. transvolutata* (Walker), male, USNM01771293, dorsal; (j) same, ventral; (k) *C. transvolutata* (Walker), female, USNM01771320, dorsal; (l) same, ventral. Scale bar = 2 cm.

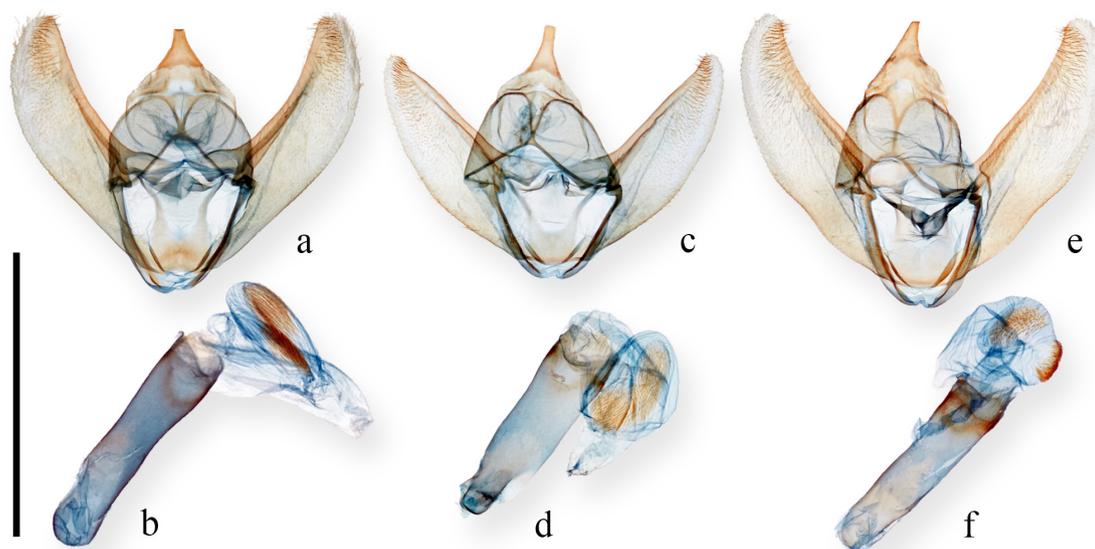


Figure 3 *Cyphoedma* male genitalia. (a) *C. ashleyorum* n. sp., TAM-2023-288 (USNM 154251), USNM01771290, paratype, USNM, genital capsule; (b) same, phallus; (c) *C. miraflores* (Dognin), TAM-2023-279 (USNM 154250), USNM01771323, genital capsule; (d) same, phallus; (e) *C. transvolutata* (Walker), TAM-2023-277 (USNM 154248), USNM01771293, genital capsule; (f) same, phallus. Scale bar = 2 mm.

on outer surface. Proboscis well-developed. Chaetosemata well separated. *Thorax*: Patagium mostly gray. Tegula brown. Mesothorax brown above, white below. Foreleg with large epiphysis; tibial spur formula 0–2–4; hindtibia swollen, bearing plume of long androconia folded into longitudinal groove on inner surface (when not deployed).

Legs often whiter on internal surface and variably banded or speckled with yellow and dark brown on external surface; hind leg generally less speckled. *Forewing*: Predominantly brown with slightly falcate apex speckled with white and yellow. Costal and subapical areas given toward mustard-brown; costa sometimes with frosty highlights.

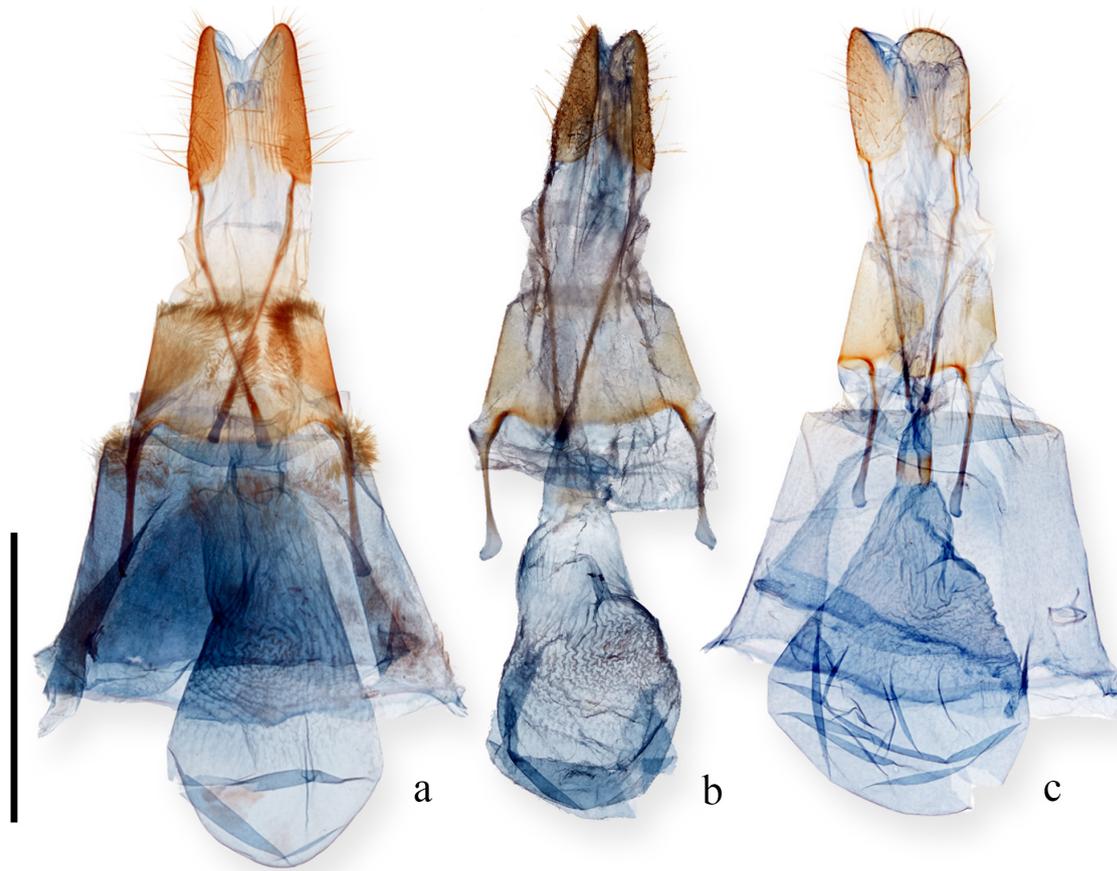


Figure 4 *Cyphoedma* female genitalia. (a) *C. ashleyorum* n. sp., TAM-2023-291 (USNM 154253), USNMENT01771290, paratype; (b) *C. mirafloresa* (Dognin), TAM-2023-290 (USNM 154252), USNMENT01771322; (c) *C. transvolutata* (Walker), TAM-2023-278 (USNM 154249), USNMENT01771320. Scale bar = 2 mm.

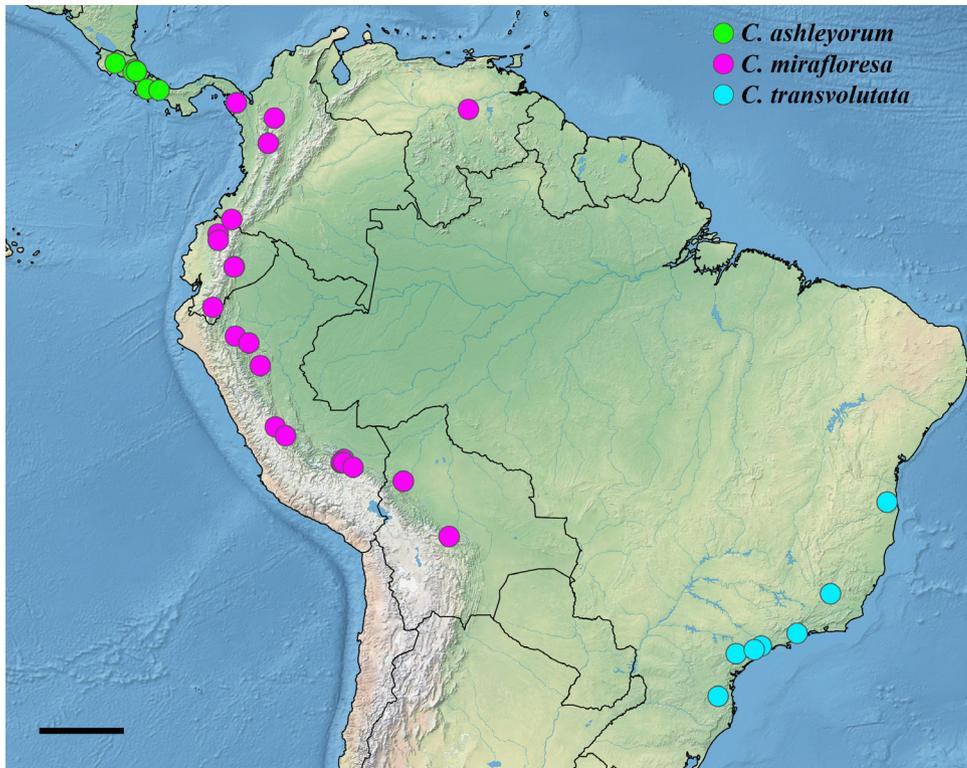


Figure 5 Geographic distribution of *Cyphoedma*: *C. ashleyorum* n. sp., green circles; *C. mirafloresa* rev. stat. (Dognin), magenta circles; and *C. transvolutata* (Walker), turquoise circles. Single points may represent >1 individuals. Scale bar = 500 km.

Curved transverse silvery-white antemedial and postmedial lines. Dark brown medial transverse line through frosted central part of wing. Small black discal spot. Irregular, central, light brown patch distal to postmedial line. Subterminal area sometimes with jagged silvery-white line, especially toward apex. Outer margin with silvery-white highlight. Underside pale brown to white in proximal half; transitioning to dark brown in distal half. Fringe brown. *Hindwing*: Concolorous with forewing, but more frosted in basal half; bearing arcing, medial, transverse silvery-white line that joins with antemedial line of forewing. Small black discal spot present. Subterminal area sometimes with small, lighter brown flecks. Outer margin with silvery-white highlight. Underside pale brown to white in proximal two-thirds; transitioning to dark brown in distal third around apex. Fringe brown. *Abdomen*: Dark brown above, pale white to cream below. Third sternite with comb of setae. *Male Genitalia*: (Fig. 3a-b): Uncus short and tapered toward apex. Juxta plate-like and not strongly sclerotized. Vesica with two separate fields of small dentate cornuti on adjacent diverticula. **Female description** (Figs. 2c-d, 4a). Forewing length 23–26 mm. *Head*: As in male. *Thorax*: As in male; though lacking hind tibial androconia. *Forewing*: As in male, but often with lighter brown ground color and less pronounced central light brown patch distad to postmedial line above. Underside brown to tan in proximal half; transitioning to darker brown in distal half. *Hindwing*: As in male, but underside brown to tan in proximal half and transitioning to darker brown in distal half (less contrasted than male). *Abdomen*: As in male, but lacking third sternite comb of setae. *Female Genitalia*: (Fig. 4a): Papillae anales rounded; posterior apophysis 2.5x longer than anterior apophysis. Ductus bursae more heavily sclerotized at junction with corpus bursae. Corpus bursae pyriform; signum absent.

Type material

Holotype

COSTA RICA • ♂; ACG [Area de Conservación Guanacaste], Guanacaste, Sector Santa Rosa, Area Administrativa, (10.8376°, -85.6187°); elev. 295 m; 08 Sep. 2016; H. Cambronero & R. Franco leg.; light trap; Voucher Code: 16-SRNP-105545; BOLD Process ID: BLPAA1558-17; USNMENT01771276; USNM.

Paratypes (9♂, 9♀)

COSTA RICA • ♂; ACG [Area de Conservación Guanacaste], Guanacaste, Sector Pitilla, Estacion Pitilla, (10.9893°, -85.4258°); elev. 675 m; 12 Mar. 2021; R. Franco & H. Cambronero leg.; light trap; Voucher Code: 21-SRNP-101527; USNMENT01771274; USNM. ♂; ACG [Area de Conservación Guanacaste], Guanacaste, Sector Santa Maria, Crater Bosque Sendero Adentro, (10.8035°, -85.3273°); elev. 1594 m; 21 Jul. 2017; S. Rios leg.; light trap; Voucher Code: 17-SRNP-104721; BOLD Process ID: BLPAA10532-17; USNMENT01771275; USNM. ♀; ACG [Area de Conservación Guanacaste], Guanacaste, Sector Pitilla, Estacion Pitilla, (10.989°, -85.426°); elev. 675 m; 03 Mar. 2006; H. Cambronero & F. Quesada leg.; light trap; Voucher Code: 06-SRNP-102944; BOLD Process ID: BLPAD125-06; GenBank: JN806613; USNMENT01771277; USNM. ♀; ACG [Area de Conservación Guanacaste], Guanacaste, Sector Del Oro, Serrano, (11°, -85.456°); elev. 585 m; 08 Nov. 2007; F. Quesada & S. Rios leg.; light trap; Voucher Code: 07-SRNP-109827; BOLD Process ID: BLPDF522-08; GenBank: JQ562061; USNMENT01771278; USNM. ♀; ACG [Area de Conservación Guanacaste], Guanacaste, Sector Del Oro, Bosque Aguirre, (11.004°, -85.441°); elev. 571 m; 18 Nov. 2009; F. Quesada & S. Rios leg.; light trap; Voucher Code: 09-SRNP-110910; BOLD Process ID: BLPDM1533-10; GenBank: HM410374; USNMENT01771279; USNM. ♀; ACG [Area de Conservación Guanacaste], Guanacaste, Sector Del Oro, Bosque Aguirre, (11.004°, -85.441°); elev. 571 m; 15 Nov.

2009; H. Cambronero & F. Quesada leg.; light trap; Voucher Code: 09-SRNP-110137; Genitalia: TAM-2023-302 (USNM 154255); BOLD Process ID: BLPDM760-10; GenBank: HM401743; USNMENT01771280; USNM. ♂; ACG [Area de Conservación Guanacaste], Guanacaste, Sector Pitilla, Estacion Pitilla, (10.9893°, -85.4258°); elev. 675 m; 16 Jan. 2018; H. Cambronero & R. Franco leg.; light trap; Voucher Code: 18-SRNP-100292; BOLD Process ID: BLPDV6328-18; USNMENT01771281; USNM. ♂; ACG [Area de Conservación Guanacaste], Guanacaste, Sector Santa Maria, Crater Bosque Sendero Adentro, (10.8035°, -85.3273°); elev. 1594 m; 17 May 2018; S. Rios & H. Ramirrez leg.; light trap; Voucher Code: 18-SRNP-103045; Genitalia: TAM-2023-301 (USNM 154254); BOLD Process ID: BLPDV9746-18; USNMENT01771282; USNM. 2♂; ACG [Area de Conservación Guanacaste], Guanacaste, Sector Cacao, Toma de Agua, (10.9296°, -85.4651°); elev. 1160 m; 10 Aug. 2010; S. Rios & F. Quesada leg.; light trap; Voucher Codes: 10-SRNP-112668, 10-SRNP-112669; BOLD Process ID: BLPDW776-11, BLPDW777-11; GenBank: JN267525, JN267526; USNMENT01771283, USNMENT01771284; USNM. ♀; ACG [Area de Conservación Guanacaste], Guanacaste, Sector Pailas, Manta Rio Blanco, (10.7746°, -85.35°); elev. 790 m; 05 Oct. 2010; S. Rios & R. Franco leg.; light trap; Voucher Code: 10-SRNP-114210; BOLD Process ID: BLPDX1083-11; GenBank: JN267567; USNMENT01771285; USNM. ♀; ACG [Area de Conservación Guanacaste], Guanacaste, Sector Pailas, Palmeras, (10.8107°, -85.347°); elev. 1368 m; 07 Oct. 2010; S. Rios & R. Franco leg.; light trap; Voucher Code: 10-SRNP-114609; BOLD Process ID: BLPDY057-11; GenBank: JN267652; USNMENT01771286; USNM. ♀; ACG [Area de Conservación Guanacaste], Guanacaste, Sector Pailas, Manta Rio Blanco, (10.7746°, -85.35°); elev. 790 m; 08 Oct. 2010; S. Rios & R. Franco leg.; light trap; Voucher Code: 10-SRNP-114696; BOLD Process ID: BLPDY144-11; GenBank: JN267659; USNMENT01771287; USNM. ♂; ACG [Area de Conservación Guanacaste], Guanacaste, Sector Pailas Dos, PDL#5, (10.7627°, -85.334°); elev. 825 m; 01 Nov. 2013; S. Rios & H. Cambronero leg.; light trap; Voucher Code: 13-SRNP-103007; BOLD Process ID: BLPEE3571-14; USNMENT01771288; USNM. ♂; ACG [Area de Conservación Guanacaste], Alajuela, Sector San Cristobal, Sendero Vivero, (10.867°, -85.387°); elev. 730 m; Gloria Sihezar leg.; prepupa collected; prepupa: 17 Nov. 1998; eclosed: 11 Dec. 1998; food plant: *Gutteria verrucosa* R.E.Fr.; food plant det.: Gloria Sihezar; Voucher Code: 98-SRNP-15091; BOLD Process ID: MHAGA850-06; GenBank: GU154099; USNMENT01771289; USNM. ♂; ACG [Area de Conservación Guanacaste], Alajuela, Sector San Cristobal, Rio Blanco Abajo, (10.9°, -85.373°); elev. 500 m; Carolina Cano leg.; found as pupa; pupa: 18 Jan. 2005; eclosed: 03 Feb. 2005; 03 Feb. 2005; presumed food plant: *Gutteria verrucosa* R.E.Fr.; host det.: Yesenia Mendoza; Voucher Code: 05-SRNP-155; Genitalia: TAM-2023-288 (USNM 154251); BOLD Process ID: MHMXN675-07; GenBank: GU160999; USNMENT01771290; USNM. ♀; Juan Vinas; May; Schaus & Barnes leg.; Genitalia slide: TAM-2023-291 (USNM 154253); USNMENT01771291; USNM. ♀; Sitio; May; WmSchaus leg.; USNMENT01771292; USNM. ♀; Alajuela Prov., 8km N. Vara Blanca; elev. 1400 m; 25 Mar. 1992; UV & MV lights; J. McCarty & J. Powell leg.; EMEC1748466; EMEC.

Distribution. *Cyphoedma ashleyorum* is known from the mid-elevation montane rain forests of Costa Rica and Panama.

Biology. *Cyphoedma ashleyorum* flies throughout the year. It has been reared from the Costa Rican endemic *Gutteria verrucosa* R. E. Fr. (Annonaceae) (Maas et al., 2015). This food plant record was first published in the doctoral dissertation of Gunnar Brehm (Brehm, 2002), but the source of this record (Voucher: 98-SRNP-15091/USNMENT01771289) belongs to the caterpillar rearing efforts of Dan Janzen, Winnie Hallwachs, and paratonomists in the Area de Conservación Guanacaste, Costa Rica (Janzen and Hallwachs, 2009, 2016).

Etymology. The specific epithet *ashleyorum* was chosen to recognize the invaluable contributions of Richard and Rita Ashley, who have

generously supported the Guanacaste Dry Forest Conservation Fund and made significant contributions to the conservation and study of Costa Rican biodiversity.

Molecular characterization. *Cyphoedma ashleyorum* is represented in BOLD by the BIN: BOLD:AAA0681 (n = 17, Costa Rica). The uncorrected pairwise distance to the nearest neighbor, *Cyphoedma mirafloresae* (BOLD:AAB9560, n = 16, Colombia, Ecuador, Peru, Venezuela), is about 5.1%.

Remarks. A photograph was not taken of the caterpillar in the only known rearing of this species. However, collector Gloria Sihezar, wrote the following brief description of the caterpillar, “green with fine white dots, with three brown and white paths on body in the form of rings, green head.” The reared male moth (Voucher: 98-SRNP-15091/USNMENT01771289) was barcoded and is in the type series. It is smaller than the rest of the type series, as usual for inventory-reared specimens owing to suboptimal food.

Cyphoedma mirafloresae (Dognin, 1892), rev. stat. n. comb.

(Figures 2e-h, 3c-d, 4b, 5)

Polla mirafloresae Dognin, 1892, *Le Naturaliste*, 14: 185.

Type locality: [Ecuador], Environs de Loja. (USNM)

Taxonomic Act. *Cyphoedma mirafloresae* rev. stat. n. comb. is elevated to species status following an examination of morphological differences (see Diagnostic Remarks) and an assessment of biogeography (Fig. 5).

Diagnostic Remarks. *Cyphoedma mirafloresae* is the only member of the genus known to inhabit the moist forests of the northern Andes (Fig. 5). In males, the darkened distal area of the hindwing underside extends broadly along the outer margin, reaching the tornus and lacking the pale white fading into the tornal area that is observed in most *C. ashleyorum* specimens. Additionally, both *C. ashleyorum* (Fig. 2b) and *C. mirafloresae* (Fig. 2f) exhibit more prominent white coloring in the basal area of their hindwing undersides compared to *C. transvolutata* (Fig. 2j). Genitalic differences among congeners appear to be too subtle to adequately describe. Though *C. transvolutata* has yet to be COI barcoded, *C. mirafloresae* may be separated from *C. ashleyorum* by its COI barcode (see Molecular characterization).

Distribution (Fig. 5). *Cyphoedma mirafloresae* is primarily distributed through the tropical forests of the eastern slopes of the northern Andes. However, it has been documented at lower elevations in the tropical forests of Venezuela and southern Panama.

Biology. The immature stages and food plants of *C. mirafloresae* remain unknown. Adults fly throughout the year.

Molecular characterization. *Cyphoedma mirafloresae* is represented in BOLD by the BIN: BOLD:AAB9560 (n = 16, Colombia, Ecuador, Peru, Venezuela). The uncorrected pairwise distance to the nearest neighbor, *Cyphoedma ashleyorum* (BIN: BOLD:AAA0681, n = 17, Costa Rica), is about 5.1%.

Remarks. Dognin described *mirafloresae* from three syntype males—all three were located in the USNM type collection. Specimen USNMENT01771321 (Fig. 2e-f) is heretofore designated as the lectotype.

Cyphoedma transvolutata (Walker, 1860) n. comb.

(Figures 1, 2i-l, 3e-f, 4c, 5)

Cimicodes transvolutata Walker, 1860, *List of the specimens of lepidopterous insects in the collection of the British Museum*, 20: 40.

Type locality: Brazil. (NHMUK)

Diagnostic Remarks. *Cyphoedma transvolutata* is the sole member of the genus found in the Atlantic coastal forests of southeastern Brazil. In males, the underside of the wings exhibits a lighter brown color distally and a more cream color basally, in contrast to *C. mirafloresae*

and *C. ashleyorum* where these areas are, respectively, characterized by darker brown and whiter colors. Genitalic differences among congeners appear to be too subtle to adequately describe.

Distribution (Fig. 5). So far as known, *Cyphoedma transvolutata* inhabits the Atlantic coastal forests of southeastern Brazil.

Biology. The immature stages and food plants of *C. transvolutata* remain unknown. Adults fly throughout the year.

Molecular characterization. No molecular data are available at this time.

Remarks. Walker described *transvolutata* from a female holotype. This individual was examined by the author in February 2023.

Discussion

In most published literature, *Cyphoedma* has been treated as a manuscript name, indicated using scare or single quotation marks, or a question mark. However, across various internet resources and databases, such as iNaturalist, BOLD, Symbiota Collections of Arthropods Network (SCAN, 2023), and numerous other websites, there is no distinction provided to indicate that this genus was previously unpublished. Still other internet resources and some published literature (e.g., Beljaev, 2008) incorrectly ascribe authorship of *Cyphoedma* to Linda Pitkin (NHMUK). For instance, the Global Biodiversity Information Facility (GBIF, 2023)—which relies on taxonomy provided by the Global Lepidoptera Index (LepIndex, 2023)—attributes authorship of this genus to “Pitkin, 1996.” This attribution is doubly incorrect, because Pitkin’s work on Neotropical Ennominae was published in 2002, not 1996, and in it she was explicit that her treatment of the genus was, “...not intended to describe the genus, which is not formally recognised.” The basis on which GBIF credits this name to the LepIndex remains puzzling as LepIndex, on the other hand, lists this genus as a valid taxon authored by Warren. Of course, this is also false since the taxon was never formally authored by Warren. These examples highlight the confusion caused by using manuscript names, impacting both taxonomic information and data reliability.

Determining the closest generic relationships of *Cyphoedma* based on morphology presents a significant challenge. In comparison to related Ennomini, both male and female *Cyphoedma* display relatively simple genitalia. Males lack annular extensions, juxtal processes, a well-developed gnathos, and additional processes on the valvae that could provide valuable insights into their relationships. Similarly, females do not possess a signum. Furthermore, the external phenotype of *Cyphoedma* seems to exhibit convergent features with distantly related genera such as *Acrotomodes* and *Polla*. However, the phylogenetic results of Murillo-Ramos et al. (2019) and Brehm et al. (2019) have revealed *Cimicodes* as the closest sister to *Cyphoedma*.

The formal description of this genus, as well as the recognition of not one, but three distinct species, highlight the importance of ongoing taxonomic research as it relates to more focused conservation efforts and other uses of wild biodiversity. *Cyphoedma* provides yet another example of a Neotropical geometrid species once believed to be a single widespread entity now revealed to be a group of geographically distinct species (Sullivan, 2014; Brehm, 2015, 2018).

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Conflicts of interest

None.

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