

The genus *Epanycles* (Lepidoptera: Erebidae: Arctiinae: Ctenuchina): 145 years of monotypy

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El género *Epanycles* (Lepidoptera: Erebidae: Arctiinae: Ctenuchina): 145 años monotípico

RESUMEN. El género *Epanycles* Butler (Lepidoptera: Erebidae: Arctiinae: Ctenuchina) ha sido considerado como monotípico desde hace 145 años, incluyendo solo a *Epanycles imperialis* (Walker). En base a datos de morfología externa, morfología de los genitales de machos y hembras, estudios de filogenia morfológica, información molecular de DNA barcoding y distribución geográfica, se propone una nueva combinación: *Epanycles satania* **new comb.** Esta última descrita y considerada dentro del género *Episcepsis* Butler.

PALABRAS CLAVE. *Episcepsis*. Neotrópico. Nueva combinación. Taxonomía.

ABSTRACT. The genus *Epanycles* Butler (Lepidoptera: Erebidae: Arctiinae: Ctenuchina) has been considered as monotypic for 145 years, including only *Epanycles imperialis* (Walker). Herein, we propose a new combination: *E. satania* **new comb.** based on external morphology, genital morphology of males and females, morphological phylogeny, DNA barcoding, and geographical distribution. *Epanycles satania* was originally described for the genus *Episcepsis* Butler.

KEYWORDS. *Episcepsis*. Neotropic. New combination. Taxonomy.

INTRODUCTION

The subtribe Ctenuchina (Lepidoptera: Erebidae: Arctiinae) includes more than 90 genera (Zerny, 1912) with a wide variety of wing coloration patterns, presence of different androconial organs, and diurnal habits. Within this subtribe, at least ten genera could be engaged in mimetic complexes with wasp species of the Suborder Apocrita (Hymenoptera). Several genera have been proposed and yet considered as monotypic (Hampson, 1898; Draudt, 1916-1919) and this would be related to the limited knowledge when descriptions were published. Moreover, data survey on species occurrence in many Neotropical countries is scarce. We have a fair knowledge of Mexico, Costa Rica, Ecuador, Peru, Brazil and French Guiana.

Recently, Grados et al. (2020) suggested that the genus *Parascepsis* Dognin, originally considered as monotypic, would actually include at least five species, based on

material from Peru. Something similar occurs with *Epanycles* Butler, currently considered as monotypic (Hampson, 1898; Draudt, 1916-1919; Araujo et al., 2019). This genus was proposed by Butler (1876) who designated *Euchromia imperialis* Walker, 1854 as type-species by monotypy. This species is easily recognized by its coloration pattern. A detailed study of *Epanycles* with the three species historically included in the genus can be found in Araujo et al. (2019).

This study proposes the non-monotypy of *Epanycles* based on external morphology, genital morphology of male and female, morphological phylogeny (Grados & Mantilla, unpublished data), DNA barcoding, and geographical distribution. According to our observations, this genus included two species: *Epanycles imperialis* (Walker) and *Epanycles satania* (Schaus) **new comb.**; this latter has been included historically in the genus *Episcepsis* Butler. The geographical distribution of *E. imperialis* in Peru is also presented and discussed, which

will help future biogeographical studies on this species along the Neotropical region.

MATERIAL AND METHODS

For genital dissection, this study followed Robinson (1976) with modifications. The abdomen was immersed in a test tube filled with KOH (10%) in a water bath for 15 to 20 min. Scales were removed with fine brushes, chlorazol black was used for staining purposes (Cannon, 1937, 1941; Carayon, 1969) and then, stored in a microvial with glycerin. Adult specimens were photographed with a digital camera Nikon D80 and genital organs with a camera Canon EOS Rebel T6 and macro lens Canon MP-E 65 mm. Terminology for wing venation follows Comstock & Needman (1898; 1899), Miller (1970), Wootton (1979) and Common (1990); for genital structures Klots (1970), and for coremata Kreuzel (2000).

Sample sequencing of *Epanycles imperialis* was obtained from the Peruvian Amazon (Tambopata River, Madre de Dios) which is part of the Wired Amazon project, Discovery new species, that took place at Guelph University (Canada), corresponding code: RFEWA744-19 (GenkBank access number: BankIt2604995 gn|uoguelph|RFEWA744-19.COI-5P OP028699). DNA sequences of *Epanycles imperialis* from French Guiana is: LNOUG055-18 (GenkBank access number: BankIt2604995 gn|uoguelph|LNOUG055-18.COI-5P OP028700). DNA sequences identified as "*Epanycles imperialis*" from Central America were obtained from public data available in BOLD SYSTEM. Codes for each specimen are presented as follows: Costa Rica (Guanacaste Conservation Area): BLPCE695_08, BLPCN301_08 y BLPCM478_08; Panama: BCIPY865-21. Genetic distances were calculated with the aid of the software MEGA 11 (Tamura et al., 2021).

The following collections were examined to the elaboration of the present work: Private Research Collection A. y R. Turrent, Mexico City, Mexico (**CART**); Museo de Historia Natural de la Ciudad de México, Mexico (**MCM**); Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima, Peru (**MUSM**); Natural History Museum, London, United Kingdom (**NHMUK**), and National Museum of Natural History, Smithsonian, Institution, Washington DC, USA (**USNM**).

RESULTS

Taxonomy

Epanycles Butler, 1876.

Epanycles Butler, 1876: 425-426.

Type species: *Euchromia imperialis* Walker, 1854, by original designation.

Diagnosis: Head, thorax and abdomen brown with iridescent green scales. Antenna brown slightly iridescent

green. A fold in the anal area on the ventral side of the hind wings, presenting androconial organs: (1A+2A) - 3A. Tegumen with two spiniform processes. Uncus lobe subrectangular. Presence of subsclaphium. Ductus bursae sclerotized in part and bursa copulatrix rounded.

Epanycles imperialis (Walker, 1854)

(Figs. 1, 4a-c, 5a)

Euchromia imperialis Walker, 1854: 241.

Diagnosis: Brown head, thorax and abdomen with iridescent green scales; tornus margin of hind wings oval; presence of androconial organs in the form of long yellowish hairs tufts in a fold in the anal area on the ventral side of the hind wings; uncus longer than wide; coremata present (tube-shape, on the ventral side of the last abdominal segments); anal papillae higher than long; sclerotized part of antrum convex; sclerotized part of ductus bursae more than half of total length; bursa copulatrix about twice the width of anal papillae.

Description: A detailed redescription and photographs of male and female adults and genital character of both sexes can be found in Cerda (2017) and Araujo et al. (2019).

Examined material. AMAZONAS: 2 males, Cordillera del Condor, ca. Qda. Chinganasa (Qda. Ponce), 03°47'S, 78°20'W, 14.xi.2003, 800 m, J. Grados & A. Asenjo; 3 males, idem except, 15.xi.2003, 850-1160 m. **LORETO.** 1 male, Soplín, Vargas, 00°22'30"S, 74°40'30"W, 14-18.v.2010, 210 m, J.J. Ramírez leg.; 1 male, Río Curaray, Campamento Paiche, 01°29'25"S, 75°23'53"W, 02.iii.2008, 200 m, Williams Yawarcani; 1 male, Río Curaray, Campamento Paiche, 01°32'00"S, 75°25'16"W, 10.ii.2008, 215 m, Williams Paredes; 1 male, Río Arabela, Campamento 7B, 01°54'06"S, 75°22'56"W, 18.xi.2007, 190 m, J. J. Ramírez leg.; 1 male, El Milagro, 03°57'S, 73°22'W, 24.ix.2004, 120 m, J. J. Ramírez. **UCAYALI.** 1 male, 12 km SSE Lontananza, Río Yaquirana, 06°14'50"S, 73°17'32"W, 04-06.x.2008, 165 m, A. García; 2 males, 3.5 km SSO de Nevo Galicia (Río Abujao), 08°22'25"S, 73°48'50"W, 22-25.ix.2011, 213 m, C. Espinoza; 1 male, 1 female, 29.5 km NO de Nuevo Mundo, Campamento Kinteroni CX, río Sepa, 11°22'38"S, 73°24'47"W, 20-24.i.2010, 643 m, J. Grados. **PASCO.** 1 male, Comunidad 24 de junio, 10 km NO de Cajonari, 10°03'57"S, 75°07'02"W, 03-06.xi.2015, 359 m, L. Figueroa, GENITALIA # JGA - 1223, MUSM. **JUNÍN.** 1 male, 9.5 km NE de Soroja, Campamento Mashira JX, río Mayapo, 11°25'21"S, 73°27'56"W, 28.i.-02.ii.2010, 545 m, J. Grados, GENITALIA # JGA - 967, MUSM. **CUSCO.** 1 male, Río Urubamba, Conkariari, 11°40'S, 72°59'W, 13.x.97, 350 m, J. Grados, LIGHT TRAP MV; 2 males, San Martín C, 11°47'S, 72°41'W, 24.iii.97, 480 m, J. Grados; 3 males, idem except, 25.iii.97; 2 males, idem except, 26.iii.97; 1 male, idem except, 28.iii.97; 1 male, idem except, 30.iii.97; 2 male, idem except, 31.iii.97; LIGHT TRAP MV; 1 male, Segakiato, río Camisea,

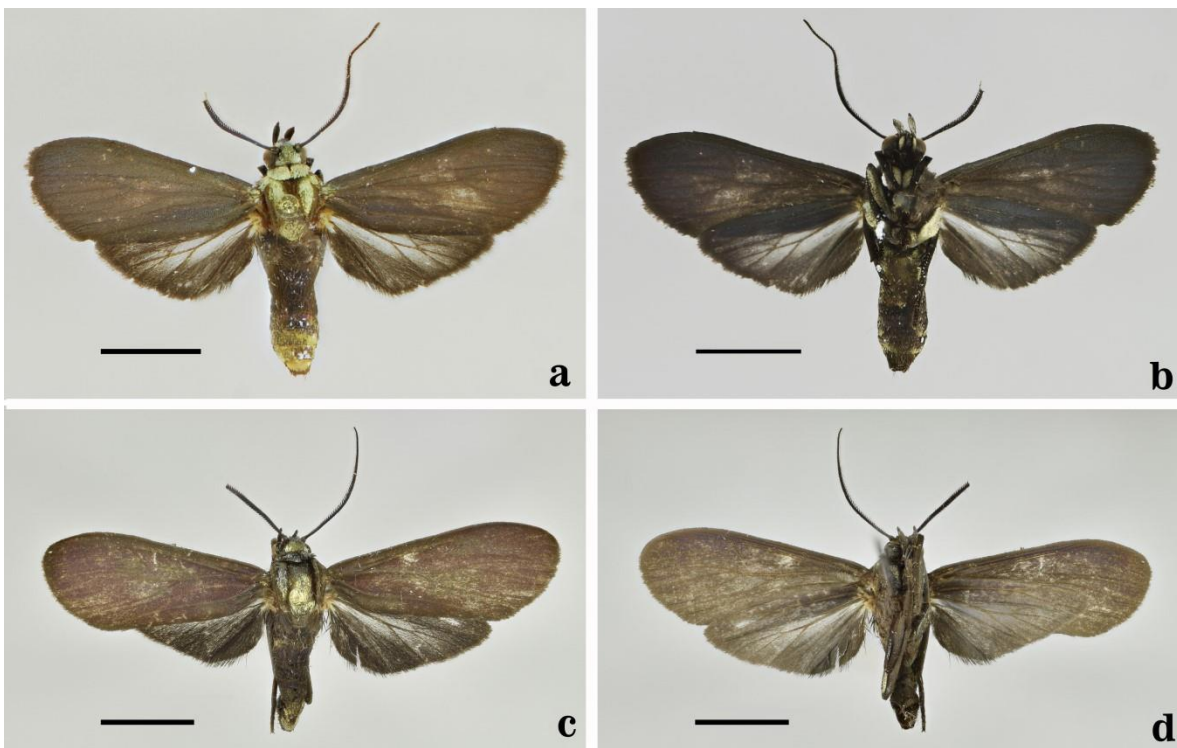


Fig. 1. *Epanycles imperialis*. a-b. Male, 9.5 km NE from Soroja (Junín). a. Dorsal view. b. Ventral view. c-d. Female, 10 km NO from Cajonari (Pasco). c. Dorsal view. d. Ventral view. Scale bars = 5 mm.

11°48'S, 72°52'W, 02.x.97, 330 m, J. Grados, LIGHT TRAP MV/UV; 1 male, idem except, 03.x.97; 1 male, Armihuari, 11°51'S, 72°46'W, 11.vi.97, 560 m, G. Valencia, LIGHT TRAP; 2 males, Las Malvinas, río Urubamba, 11°52'S, 72°56'W, 18.ix.97, 360 m, J. Grados, LIGHT TRAP MV; 1 male, Cashiriari, 11°52'S, 72°39'W, 04.xii.1997, 690 m, J. Grados, 7:00-8:00; 2 males, La Convención Echarate, CC., Timpia, 12°06'47.04"S, 72°49'34.56"W, 20-21.x.2009, 519 m, M. Alvarado y E. Rázuri, Light trap; 1 male, La Convención Echarate, CC. Pomareni, 12°15'28.38"S, 72°50'8.8"W, 08.xi.2009, 477 m, C. Carranza & C. Rossi, Light trap; 1 male, Campamento Mangoriari, 12°21'S, 73°02'W, 05.xi.2002, 1500 m, J. Grados; 1 male, idem except, 07.xii.2002; 1 male, idem except, 10.xii.2002; 1 male, 3.5 km ONO de Monte Carmelo, Echarate, 12°26'21.0"S, 72°59'21.1"W, 21.ii.2011, 1349 m, M. Alvarado & E. Rázuri; 4 males, La Convención, Echarate, CC. Ochigoteni, 12°39'31.36"S, 73°08' 57.71"W, 19.x.2009, 1449 m, C. Carranza y C. Rossi, Light trap; 1 male, Campamento Segakiato, 12°43'S, 73°18'W, 01.xi.2002, 1850 m, J. Grados; 1 male, idem except, 02.xi.2002; 1 male, idem except, 08.xi.2002; 1 male, Campamento Comerciato, 12°47'S, 73°22'W, 23.xi.2002, 1350 m, J. Grados; 1 male, Quebrada Santa Isabel, 13°02'S, 71°31'W, 13.v.2018, 1194 m, J. Grados; 1 male, San Pedro, 13°03'S, 71°32'W, 27.ix.2004, 1400 m, J. Grados, HELIOTROPIUM BAIT-NIGHT. **MADRE DE DIOS.** 2 males, Río Los Amigos, CICRA, 12°33'S, 70°06'W, 22.vii.2006, 280 m, A. Asenjo; 1 female, Río Los Amigos, CICRA, 12°33'S, 70°06'W, 25.vii.2006, 280 m, A. Asenjo, HELIOTROPIUM BAIT-NIGHT; 1 female, idem except, 28.vii.2006; 1 male, idem

except, 20.x.2006; 2 males, idem except, 28.x.2006; 3 females, idem except, 29.x.2006; 1 female, idem except, 06.xi.2006; 1 male, idem except, 23.viii-15.ix.2008; 2 males, CICRA, Río Los Amigos, 12°33'36.3"S, 70°06'17.3"W, 9.v.2005, 380 m, P. Centeno; 2 males, idem except, 11.v.2005; 1 male, idem except, 13.iv.2005; 1 male, Río Los Amigos, CICRA, 12° 34'7.35"S, 70°05'56.8"W, 06.xii.2005, 380 m, J. Grados leg. (Introducción al estudio de los artrópodos de la Amazonía tropical - CICRA 04-15.xii.2005); 1 female, idem except, 07.xii.2005; 2 males, idem except, 08.xii.2005; 2 males, idem except, 09.xii.2005; 1 male, Tambopata Reserve, Explorer's Inn, 12°50'S, 69°17'W, 11.xi.97, 250 m, J. Grados, HELIOTROPIUM BAIT-NIGHT; 1 male, Tambopata Reserve, 12°50'S, 69°17'W, 4.xii.96, 250 m, AVZ Brower, J Grados, S Green, G Lamas, JS Miller & C Snyder, MV/ UV LIGHT TRAP; 1 male, Albergue Refugio Amazonas, 12°52'30"S, 69°24'35"W, 12.vi.2018, 231 m, J. D. Shoobridge et al., Voucher DNA barcoding Arct-00 744 JGA - MUSM, ARCT-001081 JGA COLLECTION; 1 male, Río Alto Madre de Dios, cerca de Atalaya, 12°53'S, 71°22'W, 2.v.2006, 587 m, P. Centeno, MV LIGHT TRAP 08:00 PM - 9:00 PM; 1 male, idem except, MV LIGHT TRAP 10:00- 11:00 PM; 1 male, idem except, MV LIGHT TRAP 00:00- 1:00 AM; 2 males, idem except, MV LIGHT TRAP 11:00 PM- 00:00 AM; 1 male, idem except, 21.viii.2006, MV LIGHT TRAP 8:00- 9:00 PM; 1 male, idem except, 22.viii.2006, MV LIGHT TRAP 08:00 PM- 9:00 PM; 1 male, idem except, MV LIGHT TRAP 11:00 PM- 00:00 AM; 1 male, idem except, 16.ii.2007, MV LIGHT TRAP 10:00 PM- 11:00 PM; 1 male, Tambopata, Research Center, 13°08'S, 69°36'W, 11.v.2001, 300 m, J.

Grados, HELIOTROPIUM BAIT- NIGHT; 1 male, idem except, 13.v.2003; 1 male, idem except, 12.ix.2008; 1 male, idem except, 24.v.2002, Heliotropium bait 8-9 pm; 1 male, Tambopata, Research Center, 13°08'S, 69°36'W, 12.v.2001, 300 m, J. Grados, LIGHT TRAP MV; 1 male, idem except, 15.v.2001; 1 male, P.N. Bahuaja-Sonene, 13°11'35"S, 70°07'56"W, 17.vi.2013, 353 m, J. Grados, E. Rázuri & J. Barrientos; 1 male, idem except, 18.vi.2013; 1 male, idem except, 05.vi.2013, GENITALIA # JGA - 1137, MUSM. **PUNO**. 1 male, Lanlacuni, 13°29'24.9"S, 70°25'22.8"W, 25.x.2010, 775 m, E. Huamaní.

Geographical distribution (Fig. 6): Occurs in the French Guiana, Venezuela, Brazil, Bolivia and Peru (Cerda, 2017, Araujo et al., 2019). It is very common throughout the Peruvian Amazon, also found at montane forests (1850 m).

Barcoding: The mitochondrial DNA sequence (Peruvian Amazon) of one specimen is as follows (Voucher MUSM-Arciinae VB # 744). GenBank access number: BankIt2604995 gn|uoguelph|RFEWA744-19.COI-5P

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AACATTATATTTTATTTTTGGTATTTGAGCTGGAATA
GTAGGAACATCTTTAAGATTATAATTCGAGCAGAATT
AGGTAATCCAGGATCATTAAATGGTGATGATCAAATTT
ATAATACAATTGTTACAGCACATGCTTTTATTATAATTT
TTTTCATAGTTATACCAATTATAATTGGAGGATTTGGT
AATTGATTAGTACCTCTTATATTAGGAGCTCCTGATAT
AGCTTTCCCCGAATAAATAATATAAGTTTTTGACTTTT
ACCCCTTCTCTTACTTTATTAATTTCAAGAAGAATCG
TAGAAAATGGAGCAGGAACAGGATGAACAGTTTACCC
CCCCTTTCATCTAATATTGCCATGGCGGTAGTTCT
GTTGATCTAGCTATTTTTCCCTTCATTTAGCAGGTAT
TTCTTCAATTTTAGGTGCTATTAATTTTACTACTACAAT
TATTAATATACGATTAATAATCTATCTTTTGATCAAAT
ACCTTTATTTATTTGAGCTGTAGGAATTACTGCATTTTT
ATTATTATTATCTCTTCTGTATTAGCAGGAGCTATTA
CTATACTTTTAACTGATCGTAATTTAAATACATCATTCT
TTGATCCTGCTGGAGGAGGAGATCCTATTTTATACCA
ACATTTATTT
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Epanycles satania (Schaus, 1924) **new. comb.**

(Figs. 2, 4d-f, 5b)

Episcepsis satania Schaus, 1924: 11.

Diagnosis: Tornus margin of hind wings angular; androconial organs in the fold of anal areal composed by short yellowish hairs and small hyaline area on hindwings; uncus as long as wide; spiniform structures of the uncus wide; coremata absent; anal papillae longer than high; sclerotized part of ductus bursae less than half of total length; distal side of the sclerotized area of antrum bilobed; bursa copulatrix almost three times the papillae width.

Redescription.

Male (Fig. 2). **Head.** Labial palps brown with iridescent green, curved upwards reaching the vertex. Proboscis

blackish brown. Frontoclypeus brown, wider than high and with the upper third iridescent green. Vertex and occiput iridescent green. Antennae bipectinate, blackish brown with bluish hue. Middle rami the same width as the flagellum axis. **Thorax.** Patagia, tegulae, meso and metascutum brown with iridescent green. Presence of a tymbal organ on the katepisternum. Legs brown with iridescent green. Epiphysis blackish brown. **Forewing.** Forewing span: 13 - 14 mm (n=3). **Dorsal surface.** Brown with slight greenish tint. **Ventral surface.** Brown with slightly blueish tint, except for the anal area which is only brown. Retinaculum brown. **Hindwing. Dorsal surface.** Brown with slight iridescent blueish tint. Hyaline area elongated and narrow from the base, below the disc cell and extending to before the beginning of Cu₂. **Ventral surface** (Fig. 5b). Brown with slight iridescent blueish tint. Cell (1A+2A) - 3A modified in an elongated fold containing yellowish acicular scales. **Abdomen.** Brown with slight iridescent greenish tint. Two first tergites with hairy scales, dorsally; the third with few scales on dorsal part and anteriorly. Presence of coremata between the VII and VIII sternites. **Genitalia** (Fig. 3) (Genitalia # JGA - 1026, MUSM). Tegumen longer than wide, anterior side concave, trilobed; posterior side V-shaped with two divergent sclerotized hairy projections originating from the mesial margin. Uncus long at the base but sclerotized on its lateral parts; distal part subquadrate, sclerotized with a slight invagination on middle part and setae on the latero-distal part of its base. Juxta sclerotized and subcircular, with a constriction on its distal part. Subscaphium present, trapezoidal, with rounded edge at distal end. Valve elongated and almost straight, with the dorsal-distal part with a somewhat rounded evagination, notched distal end; ventral view, sinusoid at its base, wider at the juxta level, arched in its distal half, with setae on its mesal margin, somewhat denser at its apical end; dorsal view, mesal margin of dorsal part with numerous setae, distal area of ventral part with setae, distal end acute and sclerotized. Aedeagus wide and somewhat arched but sclerotized at its distal half. Vesica membranous, smaller than the aedeagus; with narrow, elongated, sclerotized areas on dorsal side.

Female (Figs. 2c-d). Similar to male, except for the following: frenulum light brown with two bristles, fasciculum above the CuP and androconial organ absent. **Forewing.** Forewing span: 14 mm (n = 1). **Genitalia** (Fig. 4d-f) (Genitalia # JGA - 1222, MUSM). Eighth tergite uniformly sclerotized. Eighth sternite with sclerotized areas along both sides. Anal papilla esclerotized and higher than wide, with setae throughout the surface. Posterior apophyses somewhat longer than the anterior. Antevaginal lamella membranous. Postvaginal lamella esclerotized. Ventral side of antrum sclerotized with a convex distal area. Ductus bursae enlarged with more than distal half sclerotized. Corpus bursae with signa on the entire surface.

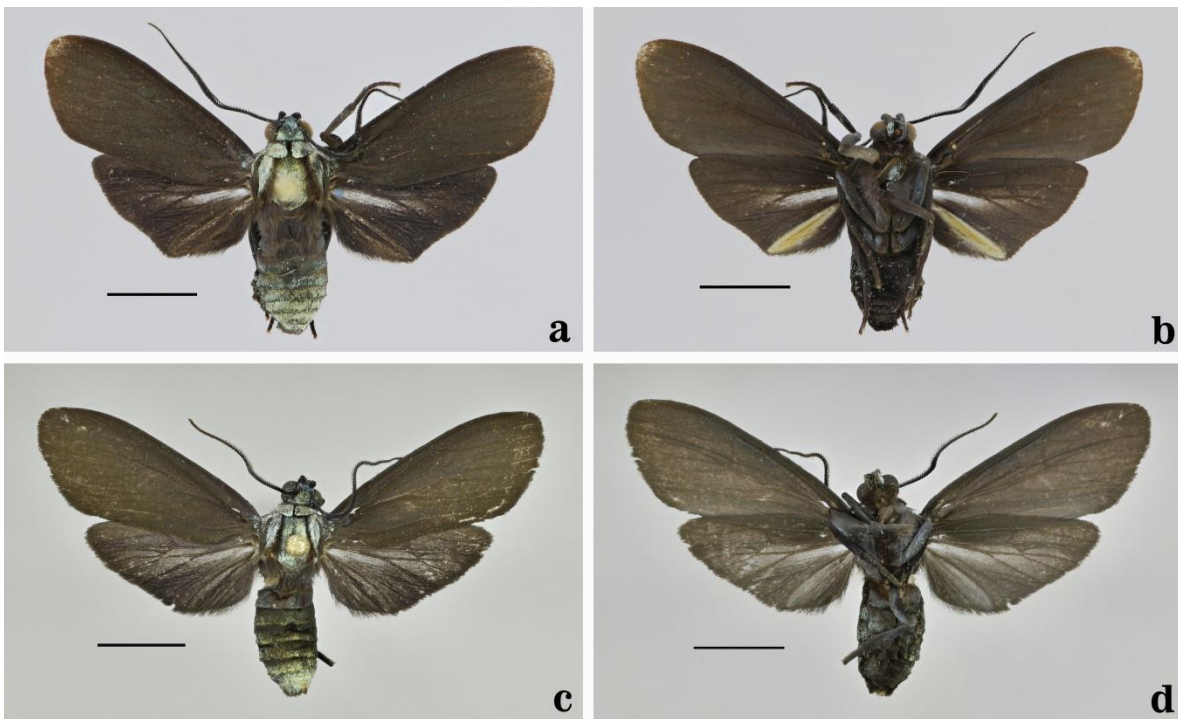


Fig. 2. *Epanycles satania* nov. comb. Guanacaste, Costa Rica. a-b. Male. a. Dorsal view. b. Ventral view. c-d. Female. c. Dorsal view. d. Ventral view. Scale bars = 5 mm.

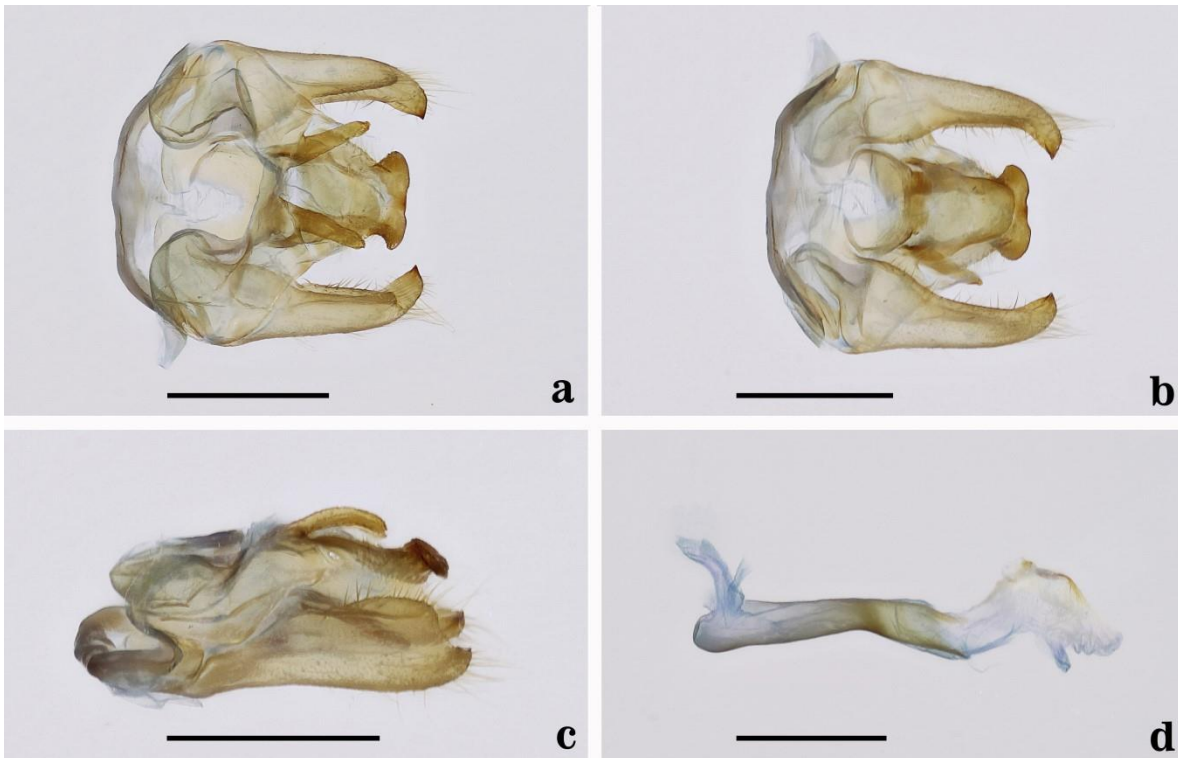


Fig. 3. Male genitalia of *Epanycles satania* nov. comb. (Genitalia JGA # 1026-MUSM). a. Dorsal view. b. Ventral view. c. Lateral view. d. Aedeagus. Scale bars = 1 mm.

Examined material. MEXICO: 1 male, Orizaba, Estado de Veracruz, junio (MCM); 1 female, Chajul [Boca de], Municipio Marqués de Comillas, Chiapas, de mayo de 1981 Leg. J. de la Maza, volando de día; 1 male, idem except, 8 de noviembre de 1992, Leg. A. Pescador; 1 female, Reserva de la Biosfera Montes Azules, estación Chajul, Municipio de Marqués de Comillas, Chiapas, 14 al 21 de octubre de 1991 Leg. J León; 1 male, idem except, 27 de enero al 1 de febrero de 1992. Leg. J León; 1 male, Ejido Loma Bonita, Municipio Marqués de Comillas, Chiapas, del 26 de diciembre de 1991 al 2 de enero de 1992. Leg. A Zacarías; 1 male, Ejido Loma Bonita [8km al este de Boca de Chajul], Municipio de Marqués de Comillas, Chiapas del 24 de mayo de 1992. Leg J. León. All in CART. **GUATEMALA.** 1 male, Panzos, Vera Paz,

Champion / B.C.A. Lep. Het. *Epanycles imperialis* / Godman-Salvin, Coll. 97.-52. (NHMUK); 1 male, Alta Verapaz, Cobén, Santa Lucía Lachua, 270 m, 22-24.iv.2002, Col. Bailey y Monzón (Genitalia # JGA - 905, MUSM). **COSTA RICA.** 1 male, Guanacaste, nr. Santa Cecilia, El Bosque Nuevo, 11°03.38 N, 85°21.34 W, 27 Aug. 2012, at light, leg. M. Boppré (Genitalia # JGA - 1026, MUSM); 1 male, idem except, 23 Aug. 2012; 1 female, idem except, 05 Sep. 2012 (Genitalia # JGA - 1222, MUSM).

Geographical distribution: This species occurs in Mexico (Santa Rosa, type-locality; Type Cata. Nº 25889 U.S.N.M.) [Examined], Guatemala, Costa Rica and Panamá.

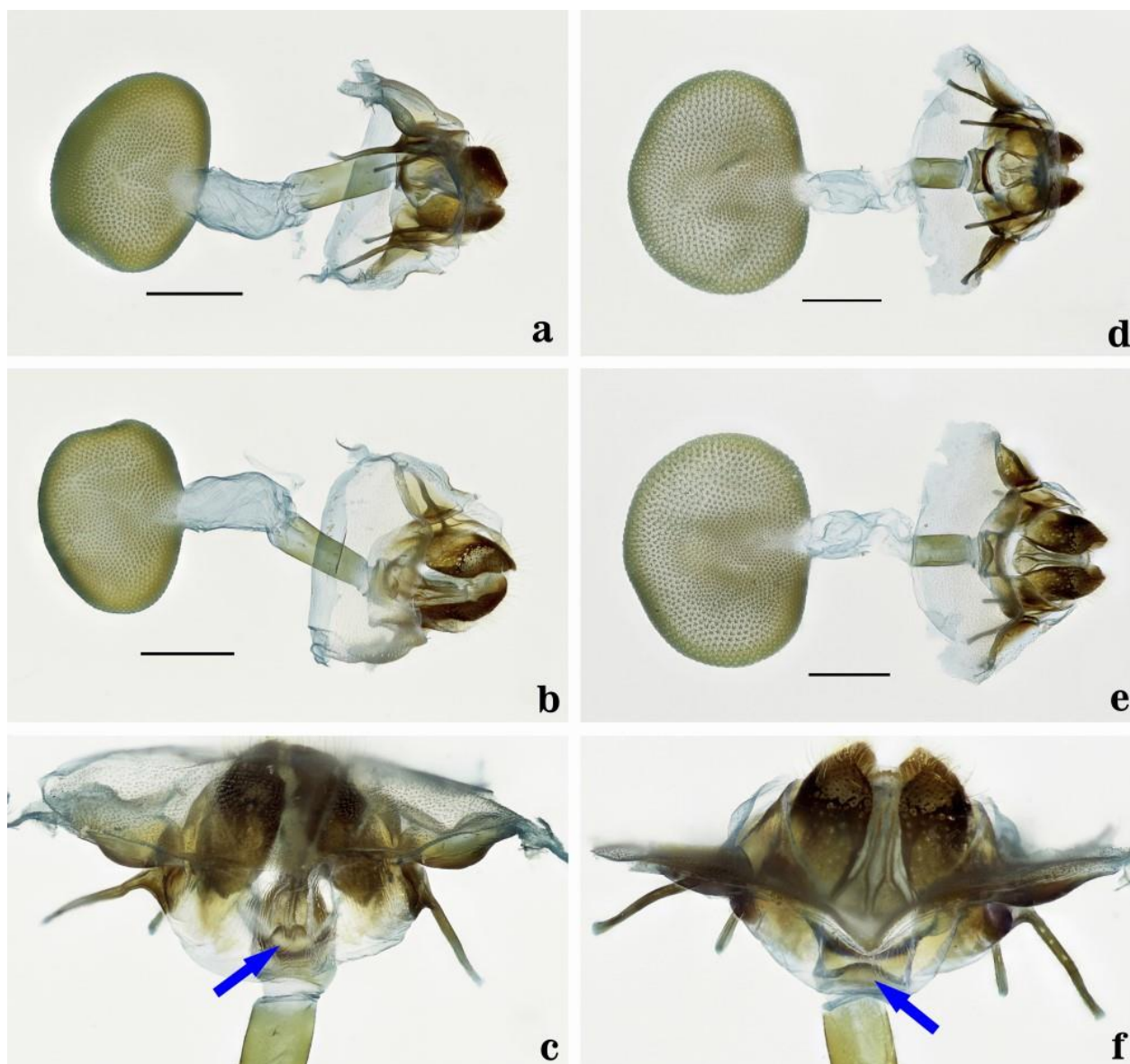


Fig. 4. Female genitalia. a-c. *Epanycles imperialis* (Genitalia JGA # 1223-MUSM). a. Dorsal view. b. Ventral view. c. Antrum view. d-f. *Epanycles satania* (Schaus) nov. comb. (Genitalia JGA # 1222-MUSM). d. Dorsal view. e. Ventral view. f. Antrum view. Scale bars = 1 mm.

Comparative morphology

The genus *Episcepsis* was proposed by Butler (1877), including as type-species *Episcepsis venata*. This species was described on the basis of a single female collected at a tributary of the Amazonas River (Brazil) and a brief history on the genus was provided by Mantilla & Grados (2021). The type locality of *Episcepsis satania* is Santa Rosa (Mexico). At the end of its original description, Schaus (1924) mentioned that this species lacks a tuft of long hairs on the inner margin of hind wings, a condition that is similar to the typical androconial organs observed in species belonging to *Episcepsis*. This citation indicates some uncertainty of Schaus (1924) about the generic allocation of *E. satania*.

Epanycles imperialis (*Euchromia imperialis*) was described by Walker (1854) based on material collected by H.W. Bates at Santarem (Brazil). Apart from its unmistakable coloration, this species possesses a fold on the ventral side of hind wings, where androconial organs are present, and yellowish hairy scales (Fig. 5a). However, this fold is not very conspicuous and was unnoticed in the original species description (Walker 1854). *Epanycles satania* **new. comb.** presents a similar coloration pattern, in addition to the fold in the anal area of the ventral part of

hind wings. The latter is very noticeable and has short needle-like scales (Fig. 5b). On the other hand, the hyaline area of hind wings is wide in *Epanycles imperialis* and very reduced in *Epanycles satania* **new. comb.**

Differences between both species regarding the morphology of components of genital capsules are: *Epanycles imperiales* presents an uncus longer than wide (vs. as long as wide in *Epanycles satania* **new. comb.**); anterior invagination of juxta wide (vs. narrow in *E. satania* **new. comb.**); mesal parts of valves separated in ventral view (vs. close to each other in *E. satania* **new. comb.**); spiniform projections from the posterior margin of the uncus wider in *E. satania* **new. comb.** than in *E. imperiales*. Both species present the proximal support of sternite VIII and the sternite VIII sclerotized and T-shaped. Only *E. imperialis* presents a coremata. Females of *E. satania* **new. comb.** differ by having anal papillae longer than high (vs. higher than long in *E. imperialis*); sclerotized part of ductus bursae less than half of total length (vs. more than half of total length in *E. imperialis*); distal side of the sclerotized are of antrum bilobed (vs. convex in *E. imperialis*); bursa copulatrix almost three times the width of anal papillae (vs. two times in *E. imperialis*).



Fig. 5. Ventral view of hindwings. a. *Epanycles imperialis*. b. *Epanycles satania* nov. comb.

Geographical distribution

Two species were identified based on the samples analyzed: *Epanycles imperialis* and *Episcepsis satania*. *Epanycles imperialis* is known to occur in French Guiana, Venezuela, Brazil, Peru, Bolivia (Grados, 1999; Cerda, 2017; Araujo et al., 2019) and has also been reported in Mexico, Guatemala and Costa Rica (Hampson, 1898; Turren-Díaz & Pescador, 2013; Draudt, 1916; Araujo et al., 2019). *E. satania* **new. comb.** Occurs in Mexico, Guatemala, and Costa Rica (Schaus, 1924 and material examined in this study).

Both species are morphologically similar and very often misidentified (Beutelspacher, 1988; Hernández-Baz & Grados, 2004). Draudt (1916) presented the geographical distribution of *E. imperialis*, before the description of

Episcepsis satania. According to our study, specimens from Central America belong to *Episcepsis satania*.

It is highly probable that the records of Araujo et al. (2019) regarding *Epanycles imperialis* in Central America are, in fact, *Episcepsis satania*. Bold System sequences of "*Epanycles imperialis*" analyzed in this work correspond to the morphology of *Episcepsis satania*.

DNA Barcoding

From the Cytochrome oxidase 1 (CO1) sequencing, a matrix of genetic distances was obtained (Table I). The maximum value of genetic distances between specimens from Costa Rica (CR) and Panama (PA), identified as "*Epanycles imperialis*" was 0.19%; even three comparisons showed identical genotype. Comparing

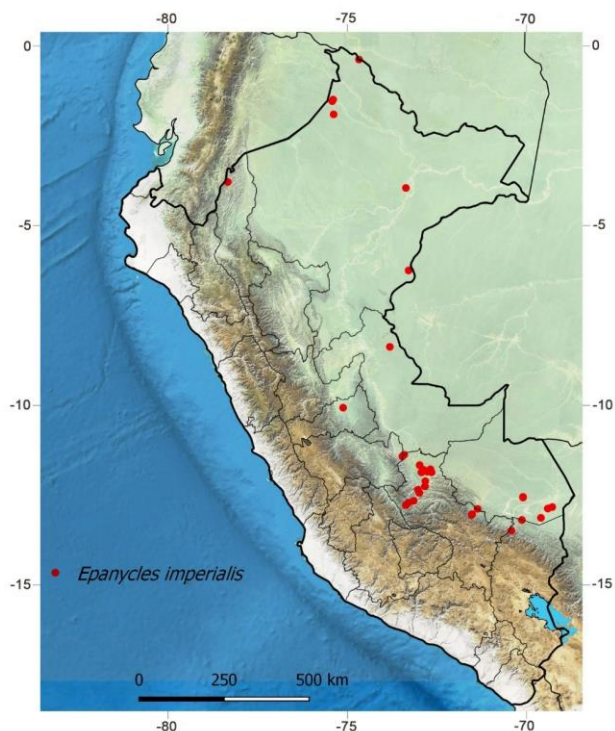


Fig. 6. Geographical distribution of *Epanycles imperialis* in Peru.

E. imperialis from Peru (PE) to specimens from Central America ("*Epanycles imperialis*"), genetic distances correspond to 2.6-2.8%. Genetic distances between a French Guiana specimen and others from Central America were 2.7-3.3%. Lastly, distances between Peru and French Guiana specimens were 2%.

Our results help us to discriminate between the two taxa, as proposed by Hebert et al. (2003) as well as for other Arctiinae species in the Neotropical region (Vincent, 2012; Vincent, & Laguerre, 2013; Vincent, 2018). However, it is important to mention that the differentiation threshold might vary (Wiemers & Fiedler, 2007), depending on the evolutionary history of the groups analyzed.

Based on genetic evidence, we hypothesized the occurrence of *E. imperialis* in South America and a second species mistakenly identified as such that occurs in Central America. At least, in relation to *E. imperialis*, the external morphological characters and the male genitalia of specimens from Brazil, French Guiana (Cerda, 2017; Araujo et al., 2019) and Peru have no significant differences. Although DNA barcoding is a powerful tool that could give us indications of the differentiation between two species, morphological and, biogeographical data should also be considered before nomenclatural changes are made.

Table I. Genetic distance calculated from DNA barcode sequence (Kimura-2-parameter) between *Epanycles imperialis* (Peru) and "*Epanycles imperialis*" from Costa Rica and Panama (*Epanycles satania*).

	<i>Epanycles imperialis</i> (PE)	" <i>Epanycles imperialis</i> " (CR)	" <i>Epanycles imperialis</i> " (CR)	" <i>Epanycles imperialis</i> " (CR)	<i>Epanycles imperialis</i> (PA)	<i>Epanycles imperialis</i> (GF)
<i>Epanycles imperialis</i> (PE)	-	0.0265	0.0281	0.0265	0.0274	0.0202
" <i>Epanycles imperialis</i> " (CR)	0.0265	-	0.0015	0	0	0.0314
" <i>Epanycles imperialis</i> " (CR)	0.0281	0.0015	-	0.0015	0.0019	0.033
" <i>Epanycles imperialis</i> " (CR)	0.0265	0	0.0015	-	0	0.0314
" <i>Epanycles imperialis</i> " (PA)	0.0274	0	0.0019	0	-	0.0274
<i>Epanycles imperialis</i> (GF)	0.0202	0.0314	0.033	0.0314	0.0274	-

CR = Costa Rica, GF = French Guiana, PA = Panama, PE = Peru.

CONCLUSION

The genus *Epanycles* has been considered monotypic for more than 145 years. In this study, we propose that *Epanycles imperialis* and *Episcepsis satania* share a common evolutionary history and should be reunited in the same genus, based on data from external morphology, genital morphology of males and females, geographic distribution, DNA barcoding and phylogenetic studies of some genera of Ctenuchina (Grados & Mantilla, unpublished data). *Epanycles satania* **new. comb.** is proposed as a new generic combination.

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