

***Paracyllogenes* LANG gen. nov. from Vietnam**

(Lepidoptera, Nymphalidae, Satyrinae, Melanitini)

by

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Abstract: In this paper, a new monotypic genus, *Paracyllogenes* LANG gen. nov., of the tribe Melanitini is established based on its type species *Cyllogenes milleri* MONASTYRSKII, 2005, viz. *Paracyllogenes milleri* (MONASTYRSKII) comb. nov., from S. Vietnam. The status of *Cyllogenes woolletti* RILEY, 1923 from N. Borneo, which is superficially similar to *Paracyllogenes milleri* (MONASTYRSKII) comb. nov., is discussed.

The worldwide generic composition of Melanitini has been slightly debated for few genera out of the core members of the tribe. Synthesizing the following works, including MILLER (1968), SMILES (1973), AOKI et al. (1982), PEÑA et al. (2006), PRICE et al. (2011) and PYRCZ et al. (2020), Melanitini is a tribe from Afrotropical, Indomalayan and Australasian realms and with 8 genera (core members) recognised, viz. *Melanitis* FABRICIUS, 1807 (= *Cyllo* BOISDUVAL, 1832), *Ducarmeia* PYRCZ, 2022, *Gnophodes* DOUBLEDAY, [1849], *Haydonia* PYRCZ & COLLINS, 2022, *Cyllogenes* BUTLER, 1868, *Parantirrhoea* WOOD-MASON, 1881, *Bletogona* C. FELDER & R. FELDER, [1867] and *Hipio* HÜBNER, [1819] (This Australasian genus are also considered as a junior synonym of *Melanitis* F. by many authors, such as D'ABRERA, 1990). According to PRICE et al. (2011), Afrotropical genera *Aeropetes* BILLBERG, 1820 and *Paralethe* VAN SON, 1955, which were considered as components of Melanitini, belong to Dirini, the sibling tribe of Melanitini (ESPELAND et al., 2018). The Neotropical monotypic genus *Manataria* KIRBY, [1904] is still accepted as a member of Melanitini by some authors, for example PEÑA et al. (2006) and WAHLBERG & BROWER (2006). However, PRICE et al. (2011) found that *Manataria* KIRBY is the sibling of Dirini, and at the same time, the clade (*Manataria* KIRBY + Dirini) is the sibling of Melanitini. Therefore, PRICE et al. (2011) wrote “*Manataria* KIRBY should be placed in either the Dirini or its own tribe”. Excepting Satyrini, which is worldwide spread and the largest clade containing the majority of genera and species of satyrid butterflies, other known satyrid tribes are confined their ranges in either Neotropical realm or (Afrotropical + Indomalayan + Australasian) realms. So, the present author considers that Neotropical *Manataria* KIRBY should be “placed in its own tribe (PRICE et al., 2011)”, viz. Manatarini, against Afrotropical Dirini. Putting aside the debate of *Manataria* KIRBY, members of the Indomalayan genus *Cyllogenes* BUTLER is the object of this study. In a recent article, UÉMURA et al. (2016) recognised 6 species in *Cyllogenes* BUTLER, viz. *C. suradeva* (MOORE, 1857) (type species), *C. nigrimaculata* (CHOU & QI, 1999), *C. orientalis* MONASTYRSKII, 2005, *C. janetae* DE NICÉVILLE, 1887, *C. woolletti* RILEY, 1923 and *C. milleri* MONASTYRSKII, 2005, and the authors divided them into 3 species groups, viz. *suradeva*-group, *janetae*-group and *woolletti*-group. Among them, *C. woolletti* RILEY from N. Borneo and *C. milleri* MONASTYRSKII from S. Vietnam are included in the *woolletti*-group (UÉMURA et al., 2016). The present author studied *C. milleri* MONASTYRSKII from Vietnam and found that it has generic differences, including wing venation, wing pattern and secondary sexual brand, from other continental species of *Cyllogenes* BUTLER, so a new genus should be established for it as *Paracyllogenes* gen. nov. Though *Cyllogenes woolletti* RILEY, which is the only insular species of *Cyllogenes* BUTLER, is superficially similar to *Paracyllogenes milleri* (MONASTYRSKII) comb. nov. in wing pattern, its venation is quite different from those of *Paracyllogenes* gen. nov. and other species of continental *Cyllogenes* BUTLER. Obviously, it deserves its own new genus, but without material to study, it is provisionally treated as *Cyllogenes* ? *woolletti* RILEY in this paper.

Terminology: Terminology of genitalia in this paper mainly follows that of KLOTS (1970). Venation of forewing (FW) and hindwing (HW) accords to the numerical notation; upper and lower margins of the cell termed radius and cubitus respectively (CORBET & PENDLEBURY, 1992); short transverse veinlets close the cell are termed discocellular veins, “the lower discocellular vein (*ldc*) is the cross vein joining the origins of veins 4 and 5, the middle discocellular vein (*mdc*) is the cross vein joining the origins of veins 5 and 6, while the upper discocellular vein (*udc*) is the short vein joining the origins of veins 6 and 7 (CORBET & PENDLEBURY, 1992)”.

Material: Materials in this study are kept in Chongqing Museum of Natural History, Beibei, CHINA and Dr. SONG-YUN LANG's private collection, Beibei, CHINA.

***Paracyllogenes* gen. nov.**

Type species: *Cyllogenes milleri* MONASTYRSKII, 2005

Description: Medium sized. Antenna about 2/5 the length of FW, nearly filiform with its tip only weakly clubbed. Eye naked. Wing shape: FW: apex truncated; termen protruding at vein 5; dorsum with its basal three fifths strongly lobed in ♂, straight in ♀. HW: apex nearly square; termen evenly arched and weakly wavy in ♂, sharply protruding at vein 4 in ♀. Venation (fig. 6: a, b): FW: veins 11 and 10 branched separately; vein 10 branched from radius shortly before the origin of vein 7; *udc* vestigial; *mdc* very short; *ldc* elongated and sharply incurved; vein 3 branched from cubitus midway between the origins of veins 2 and 4; ♂ vein 1b shortened, about half the length of vein 2, its terminal point ending on the middle of dorsum and far away from that of vein 2; ♀ vein 1b normal, ending on termen, longer than vein 2. HW: vein 8 short, with its terminal point inside the origin of vein 4; humeral vein separated shortly beyond the origin of vein 8; the origins of veins 7 and 8 in ♂ very close together; the origins of veins 5, 6 and 7 in ♂ close with each other; the origins of veins 6, 7 and 8 in ♀ well separated from each other; the origins of veins 5 and 6 in ♀ close together; *ldc* very elongated and curved in ♂; vein 3 arising far before *ldc*. Wing pattern: Sexual dimorphic. ♂ (figs. 1, 2): Upperside: blackish; FW crossed by a wide oblique blue discal band from mid-costa to tornus; HW costal area and cell greyish; HW apical area tinged with bluish scales; Underside: camouflaging the colour of dead leaf; FW with small and dull white pupillated blackish postdiscal ocelli in spaces 3 and 4; FW spaces 1a and 1b greyish, and exhibiting pearl and silver under a flash lamp; HW with a white postdiscal dot in space 2. ♀ (fig. 4): Upperside: FW blackish brown, with an obscure tawny marginal fasciae; FW postdiscal area with a large white pupillated blackish ocellus in space

3 (this pattern is classic in both sexes of most *Melanitis* spp.) and additional irregular white dots in spaces 2, 4, 5 and 6; HW brown, with an obscure blackish submarginal fascia; Underside: camouflaging dead leaf as in ♂, with an obscure darkish discal band on both wings and a blur subbasal band on FW; FW with a prominent white postdiscal spot in space 3, and additional blur and irregular whitish dots in spaces 2, 4, 5 and 6; HW with a tiny white postdiscal dot in space 2. ♂ sexual brands (fig. 5): a) FW underside brand (fig. 5a): ovate, brown and velvet, present in space 1b alongside the middle section and the inner edge of vein 1b; b) HW upperside brand (fig. 5b): ovate, brown and velvet, present immediately below the base of vein 7, crossed by veins 5, 6 and ldc.

♂ genitalia (fig. 3): Tegumen normal in shape, round dorsally. Uncus longer than the tegumen, bent downwards, and with its tip pointed and hooked. Gnathos absent. Saccus rather long and slender, as long as the valva. Juxta small, heart-shaped. Valva simply built, evenly narrow, moderately bent upwards. Aedeagus straight, as long as the valva, slightly bent, its caudal half weakly spinose. ♀ genitalia (fig. 7): Ostium bursae simple; lamella postvaginalis (llp) with its central section heavily sclerotized, and forming a vertical, bulged mid-dorsal process (a term used by COUTSIS, 1984 and followed by LANG, 2020); lamella antevaginalis (lla) present as a sclerotized narrow transversal belt. Ductus bursae membranous, very long and narrow. Corpus bursae oval, bearing a pair of parallel, narrow signa on its caudal half.

Diagnosis: **A)** The new genus is split from *Cyllogenes* BUTLER, and it can be distinguished from continental *Cyllogenes* BUTLER (abbreviated as CCB in this paragraph), viz. the *suradeva*-group and the *janetae*-group (UÉMURA et al., 2016), by the combination of following characters: 1) wing pattern is sexual dimorphic, whereas it is homomorphic in both sexes in CCB; 2) ♂ FW upperside, discal band is blue, whereas it is yellowish or absent in CCB; 3) ♂ brands are totally different in shape, location and texture from the brand of CCB (present in the *suradeva*-group and absent in the *janetae*-group); 4) ♂ FW dorsum is strongly lobed with its basal three fifths, whereas it is moderately protruding in CCB; 5) ♂ HW termen is evenly rounded, whereas it is protruding at vein 4 in CCB; 6) FW ldc is sharply incurved, whereas it is evenly concave in CCB; 7) FW space 1b is widened posteriorly, whereas it is normal in CCB; 8) ♂ HW, the origins of veins 5, 6, 7 and 8 are close with each other, whereas they are well separated from each other in CCB; 9) ♂ HW ldc is extraordinarily long and curved, whereas it is not elongated and straight in CCB; 10) HW vein 3 is far away from the origin of vein 4, whereas it is rather close to the origin of vein 4 in CCB; 11) fe♂ signa on corpus bursae are narrow, whereas they are shortened and widened in CCB (DAS et al., 2020: figure 8 A, B).

B) The new genus is superficially similar to *Cyllogenes* ? *woolletti* RILEY, which is endemic of Borneo with limited information. Photographs of both sexes of the Bornean were provided by AOKI et al. (1982) and D'ABRERA, B. (1985), and its ♂ venation was illustrated by AOKI et al. (1982). Without information of ♂ genitalia and a well study of ♂ sexual brands of the Bornean, the diagnosis here is not complete, but is only based upon hitherto obtainable knowledges. The new genus can be distinguished from the Bornean by the following known characters: 1) ♂ FW upperside, sexual brand is absent, whereas in the Bornean a large blackish sexual patch is present in discal area and a small oval blackish brand is situated in space 1b along vein 1b; 2) ♂ FW dorsum is strongly lobed with its basal three fifths, whereas only basal third is lobed in the Bornean; 3) ♂ HW termen evenly rounded, whereas it is protruding at vein 4 in the Bornean; 4) FW ldc is sharply incurved, whereas it is evenly and moderately concave in the Bornean; 5) ♂ FW, the origins of veins 2 and 3 are well separated, whereas they are close together in the Bornean; 6) ♂ FW, the terminal point of vein 1b is very far beyond the origin of vein 2, whereas it is not exceeding the origin of vein 2 in the Bornean; 7) ♂ HW, the origins of veins 5, 6, 7 and 8 are close with each other, whereas they are well separated from each other in the Bornean; 8) ♂ HW ldc is extraordinarily long, whereas it is only one third the length of the former in the Bornean.

Etymology: The generic name *Paracyllogenes* composed by the Latin prefix *para*- and *Cyllogenes*, means “near to *Cyllogenes*”.

Taxa included: *Paracyllogenes milleri* (MONASTYRSKII, 2005) **comb. nov.**

Distribution: S. Vietnam.

In the tribe Melanitini, structures of ♂ genitalia are highly homologous in different genera, excepting oriental *Parantirrhoea* WOOD-MASON in which its uncus is “curved and thickened dorso-ventrally (SMILES, 1973)”. However, the ♂ genitalia of *Cyllogenes* ? *woolletti* RILEY is unknown in this research, but it was examined by SMILES (1973) according to his record as “... On one ♂ also, a label printed B. M. (N. H.) Rhopalocera Slide No. 10,580”. It can be speculated that ♂ genitalia of *Cyllogenes* ? *woolletti* RILEY should fall into the scope of the classic model of Melanitini, or else SMILES would point out its particularity, if he found it. Accordingly, ♂ genitalia can hardly be applied in generic classification of Melanitini besides *Parantirrhoea* W.-MASON whose venation (fig. 6: g), with FW veins 9, 10, 11 and 12 forming a network of anastomosing veins (SMILES, 1973), is also distinct in the tribe. Though both ♂ genitalia and venation of *Parantirrhoea* W.-MASON are unique in Melanitini, its wing patterns of both sexes are similar to those of *Cyllogenes* ? *woolletti* RILEY and *Paracyllogenes* LANG **gen. nov.** Therefore, it is possible that wing patterns of *Parantirrhoea* W.-MASON, *Cyllogenes* ? *woolletti* RILEY and *Paracyllogenes* LANG **gen. nov.** are symplesiomorphous similarities and belong to a prototypical pattern of Melanitini.

The differences of venations are often important for the classification of Melanitini on generic level. SMILES (1973) arranged African species in two genera, viz. *Melanitis* F. (fig. 6: i) and *Gnophodes* DBLD. (fig. 6: h), basing upon their different positions of HW Pcv (humeral vein). But when PYRCZ et al. (2020) subdivided them into 4 genera, viz. *Melanitis* F., *Ducarmeia* PYRCZ, *Gnophodes* DBLD. and *Haydonia* PYRCZ & COLLINS (fig. 6: f), no more features of venation could be used. Besides molecular data, the 4 genera system of African Melanitini is mainly supported by morphology of ♂ brand. Comparing with their African relatives, venation is more important for the identification of Asian and Australasian genera in Melanitini. For oriental *Cyllogenes* BUTLER *sensu* UÉMURA et al. (2016), its venation is not only very different from that of sympatric *Melanitis* F., but also with 3 quite disparate types itself, viz. the continental *Cyllogenes*-type (fig. 6: d, e), the *Paracyllogenes*-type (fig. 6: a, b) and the Bornean *Cyllogenes* ? *woolletti*-type (fig. 6: c). Obviously, these 3 types should belong to 3 their own corresponding genera. That's also a reason why *Cyllogenes* ? *woolletti* RILEY appears in Borneo, a totally isolated island far away from the main range of *Cyllogenes* BUTLER in Asian continent. Because kin relationship between *Cyllogenes* ? *woolletti* RILEY and *Cyllogenes milleri* MONASTYRSKII (now type of *Paracyllogenes* LANG **gen. nov.**) is not close enough. Since *Cyllogenes milleri* MONASTYRSKII from Vietnam first published in 2005, it has been believed that two sibling species, respectively from S. Vietnam and N. Borneo, are separated by the South China Sea in a long distance. Certainly, now, it is more clear that their similarities are superficial in wing pattern and they are not congeneric sibling but are two allo-generic species. It is again suggested that their analogous wing patterns are possibly symplesiomorphous in Melanitini.

According to DE BRUYN et al. (2014), it can be known that Borneo and S. Vietnam were directly connected together by a vast ancient

land about 30 mya (mid Oligocene), and this connection sustained to about 20 mya (early Miocene). Even in early Pliocene (about 5 mya), Borneo still had connected with Asian mainland through the south terminal of nowadays Malay Peninsula. But considering the current absence of related species from Malay Peninsula and southwestern Indo-Chinese Peninsula (including Thailand, Cambodian and S. Myanmar), the possible vicariance event between the respective ancestors of *Cyllogenes* ? *woolletti* RILEY and *Paracyllogenes* LANG **gen. nov.** had started at least since about 20 mya, when their terrestrial connection began to “sink”. It was a very long enough period of time which can generate two different genera with their own unique venations.

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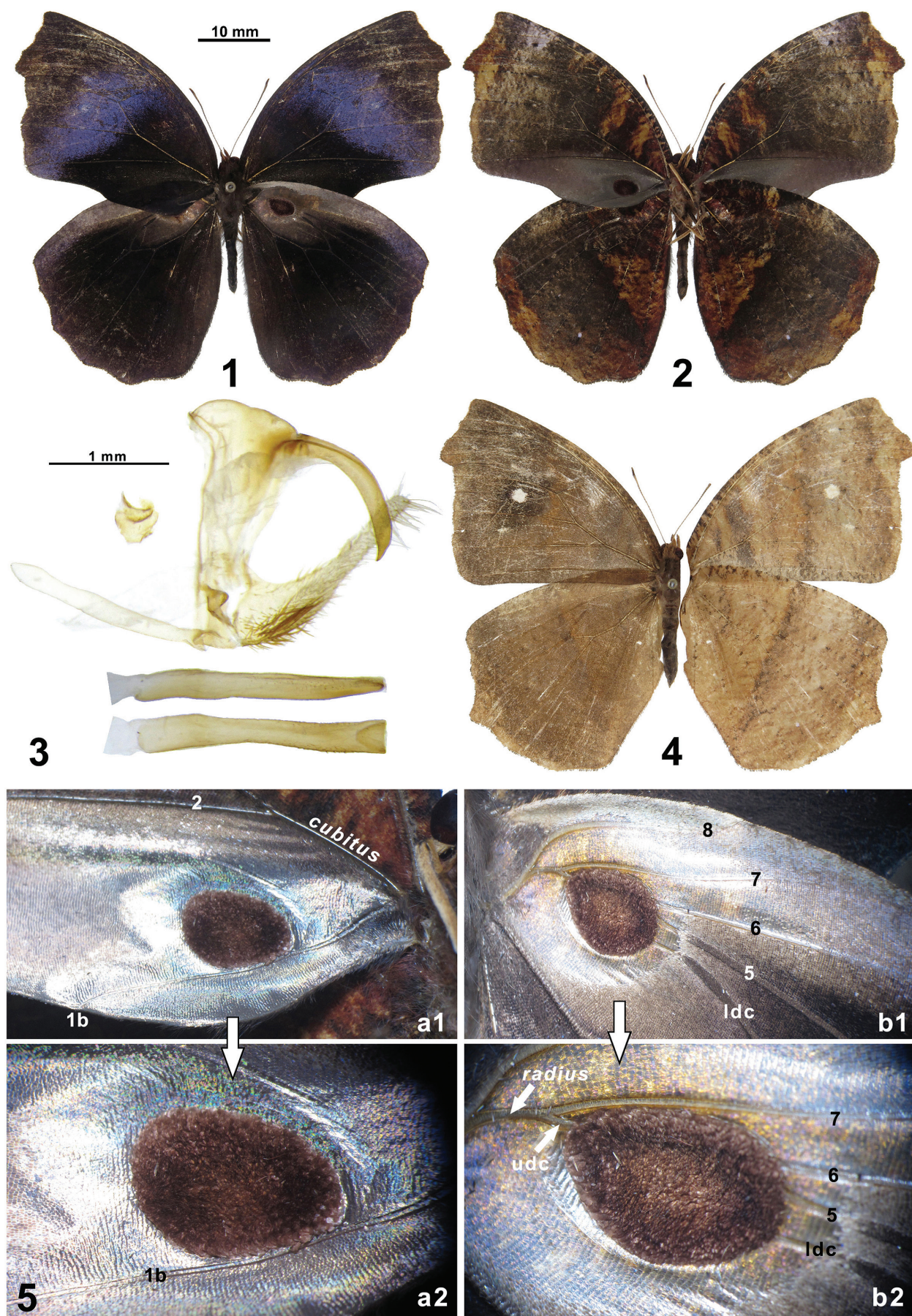


Fig. 1-5: *Paracyllogenes milleri* (MONASTYRSKII, 2005) **comb. nov.**, VIETNAM, Lam Dong, Bao Loc. (1-2) ♂; (3) ♂ genitalia; (4) ♀; (5) ♂ brands - **a1-2:** FW underside brand; **b1-2:** HW upperside brand.

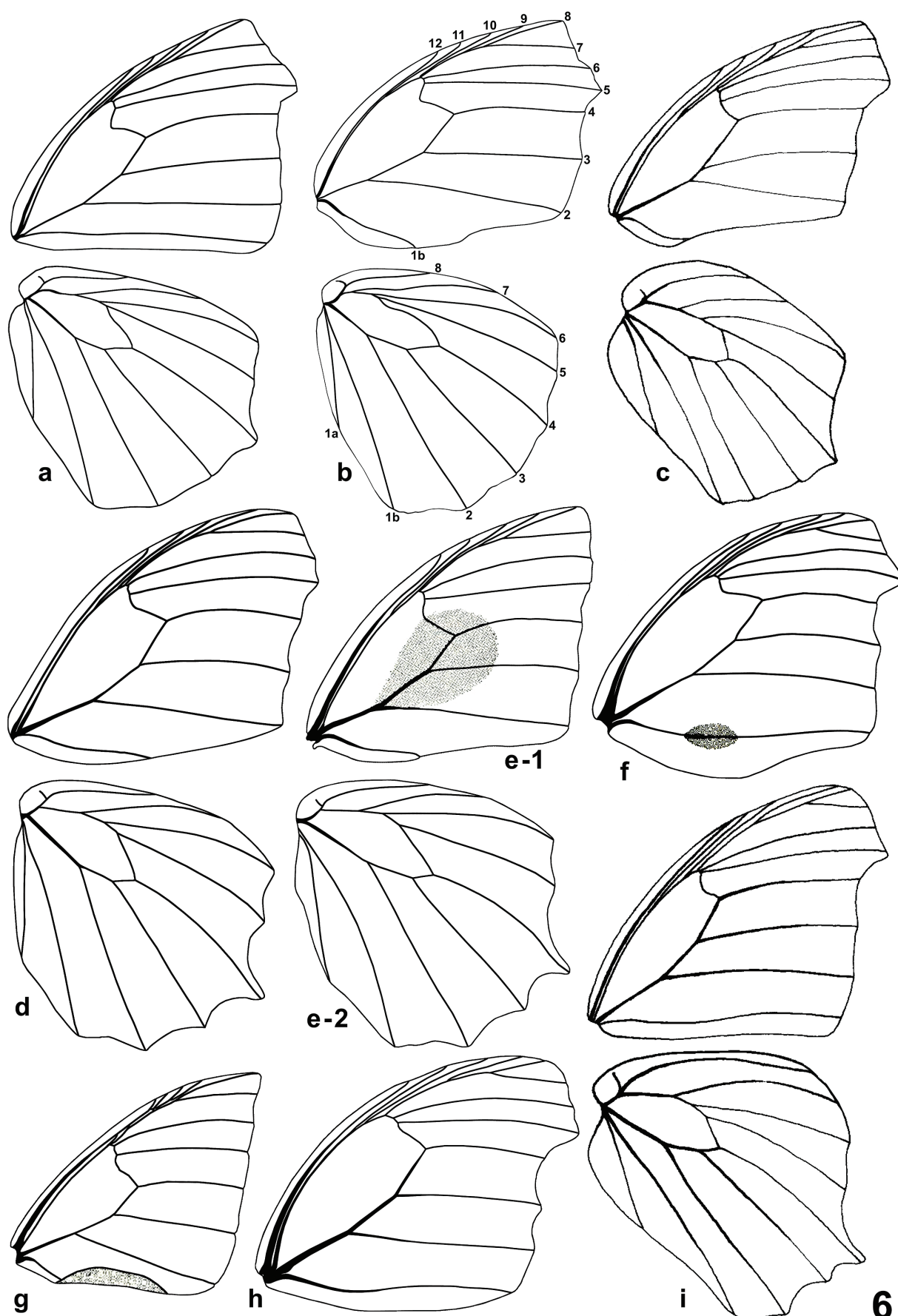


Fig. 6: Venation. **a-b:** *Paracyllogenes milleri* (MONASTYRSKII, 2005) **comb. nov.**, (a) ♀ (b) ♂, S. VIETNAM; **c:** *Cyllogenes*? *woolletti* RILEY, 1923, ♂, N. BORNEO, after AOKI et al. (1982); **d:** *Cyllogenes janetae loba* LANG & HUANG, 2012, ♂, CHINA, S.E. Tibet; **e-1:** *Cyllogenes suradeva* (MOORE, 1857), ♂, FW, after SMILES (1973); **e-2:** *Cyllogenes nigrimaculata* (CHOU & QI, 1999), ♂, HW, CHINA, Fujian; **f:** *Haydonia chelys* (F., 1793), ♂, FW, after “*Gnophodes chelys* (F.)” in SMILES (1973); **g:** *Parantirrhoea marshalli* W.-MASON, 1881, ♂, FW, S. INDIA, after SMILES (1973); **h:** *Gnophodes parmeno* DBLD., [1849], ♂, FW, GUINEA, traced from PYRCZ et al. (2020); **i:** *Melanitis leda* (L., 1758), ♂, after AOKI et al. (1982).

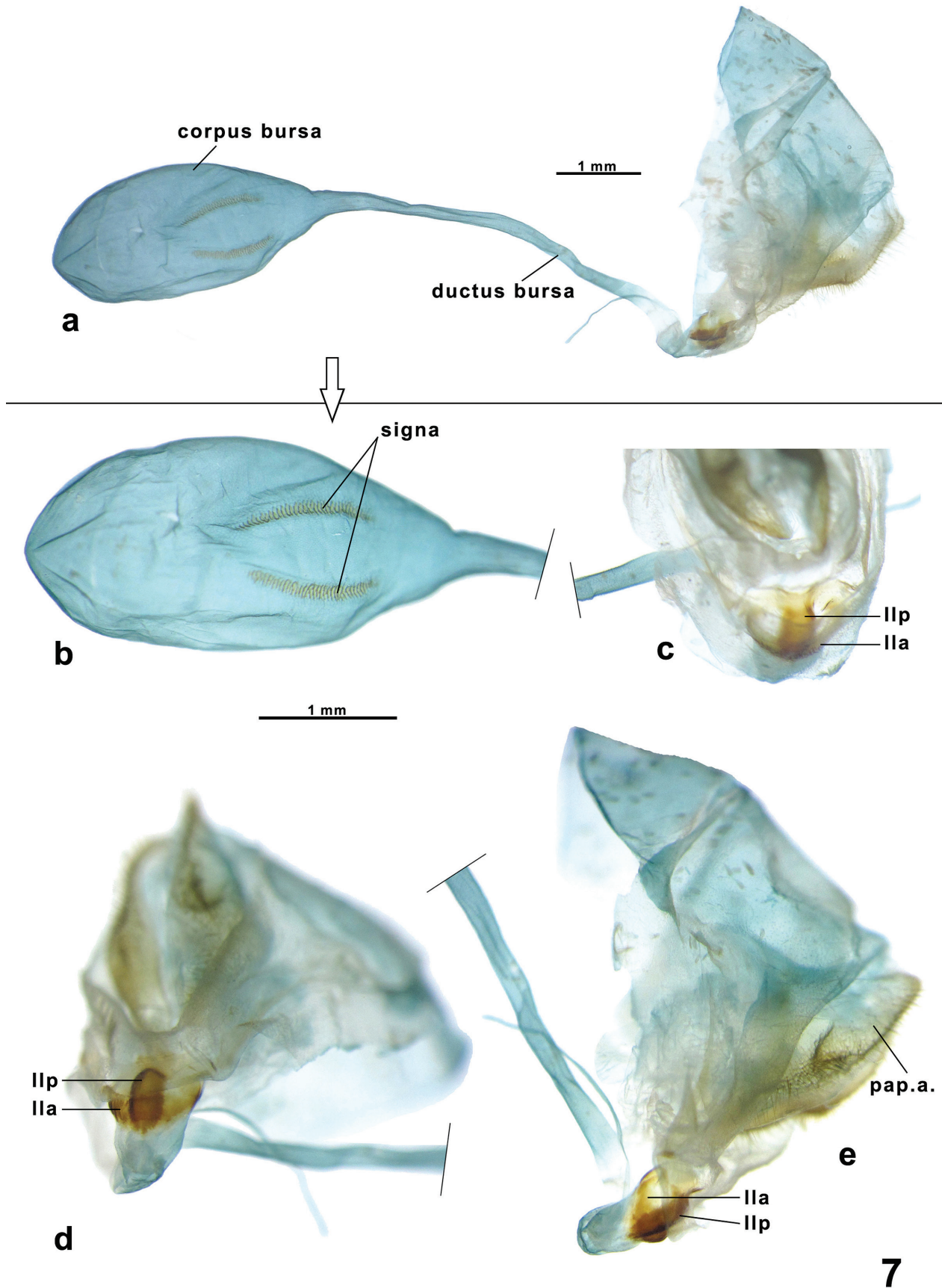


Fig. 7: ♀ genitalia of *Paracyllogenes milleri* (MONASTYRSKII, 2005) **comb. nov.**, VIETNAM, Lam Dong, Bao Loc. **a:** lateral view; **b:** corpus bursae; **c:** caudal view of ostium bursae; **d:** caudal view of ostium bursae + caudal half of ductus bursae + pap.a.; **e:** lateral view of 8th segment + pap.a. + ostium bursae + caudal half of ductus bursae.

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