

A review of *Aporia peloria* (HEWITSON, [1853])

(Lepidoptera, Pieridae)

by

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Abstract: Subspecific classification of *Aporia peloria* (HEWITSON, [1853]) is reviewed. The type locality of the nominotypical subspecies is clarified as near Burang (= Pulan) area, SW Tibet. The type locality of ssp. *leechi* (BANG-HAAS, 1934) is clarified as Tatsienlu (= Kangding) area, W Sichuan. Six valid subspecies are recognized, with ssp. *lama* ALPHÉRAKY, 1887, ssp. *leechi* (BANG-HAAS, 1934), ssp. *minima* (HUANG, 1998), ssp. *wymanni* (ZIEGLER, 2007) and ssp. *epsteina* (TADOKORO, KOIDE & HORI, 2014) revalidated as bona subspecies, not synonyms as treated in literature. Ssp. *grayi* (BANG-HAAS, 1934) is proved to be either a synonym or a transitional form of ssp. *lama* ALPHÉRAKY, 1887. A detailed distributional map is provided.

Introduction: DELLA BRUNA et al. (2013: 69) first stated that the genus *Mesapia* GRAY, 1856 (type species: *Pieris peloria* HEWITSON, [1853]) is not different from the genus *Aporia* HÜBNER, [1819] (type species: *Papilio crataegi* LINNAEUS, 1758) by preliminary data on mitochondrial DNA sequences, but gave no details. DING & ZHANG (2016, 2017) found that *Mesapia* GRAY proposed either as a subgenus of *Aporia* HÜBNER or as a distinct genus is nested within *Aporia* HÜBNER, using either a mitochondrial COI fragment alone or accompanied by a second nuclear gene, though taxon sampling in both of these studies was incomplete. TODISCO et al. (2020) confirmed this result by a study based on mitochondrial DNA barcode data alone for more species of *Aporia* HÜBNER, they synonymized *Mesapia* GRAY with *Aporia* HÜBNER.

The subspecific classification of *Aporia peloria* (HEWITSON, [1853]) is very controversial in literature (D'ABRERA, 1990; HUANG, 1998; ZIEGLER, 2007; DELLA BRUNA et al., 2004 & 2013; TADOKORO et al., 2014 & 2015; SAKAI, 2018), this is reflected by a fact that all the subspecific taxa were treated as synonyms by various authors. The major problem is that the type locality of *Aporia peloria* (HEWITSON) remained unclear with all the historical opinions based on speculations without sound evidences. A historical review of this problem is presented under the term of the nominotypical subspecies. It is noteworthy that SAKAI's (2018) astonishing surmise on this problem is confirmed in this work on sound evidence.

Abbreviations

IZCA:	Institute of Zoology, Chinese Academy of Science, Beijing, China.
CHH:	Collection of HAO HUANG, Qingdao, Shandong.
TL:	Type locality.
n:	number of specimens.
CMNH:	Chongqing Museum of Natural History, Chongqing, China.
MTDG:	Museum für Tierkunde Dresden, Germany.
NHMUK:	Natural History Museum, London.
NHMB:	Natural History Museum of Bürgergemeinde Bern (Switzerland).

Taxonomic accounts

Pieridae

Aporia peloria (HEWITSON, [1853])

Sexual dimorphism. Sexual dimorphism is well performed in all subspecies as follows: ♀ always has ground colour on both sides of forewing brownish yellow or deep yellow, not whitish as ♂, and has ground colour of hindwing underside usually more or less pinkish, very occasionally pure yellowish as ♂. ZIEGLER (2007: 307, figs. 7, 17-18) made mistakes in regarding 4 ♂♂ from Xiahe, Qinghai and Dschie-Song La as ♀♀ (probably partly an error in editing). Both ZIEGLER (2007) and TADOKORO et al. (2014 & 2015) incorrectly used the ground colours of forewing upperside and both wings underside as diagnostic characters in ♀ to separate subspecies, however all the known subspecies have no reliable difference in ground colour of ♀ except that on hindwing upperside; only ssp. *minima* (HUANG) has a more pinkish ground colour on hindwing upperside than all other subspecies in ♀, but this character might be confined to a limited population and is inappropriate for a subspecific definition. The diagnostic characters between subspecies in ♀ are generally confined to markings on veins.

Diagnostic characters. The most important diagnostic characters for subspecific division of this species must be the shape and the width of the discocellular bars on both wings upperside. SAKAI (2018) used these characters as the only diagnostic characters to separate subspecies, ignoring all other characters.

TADOKORO et al. (2014 & 2015) employed the width of black streaks on vein 7 of hindwing upperside as important. This character is found to be individually variable within a few populations such as those from Cuomei (SE Tibet) and E. Mila Pass (SE Tibet). It might be useful on large numbers of specimens.

TADOKORO et al. (2014 & 2015) employed the presence or the absence of a transparent zone inside of the forewing cubital vein as important. This character is found to be useful in distinguishing ssp. *epsteina* (TADOKORO et al.) from all other subspecies, but is useless for separating the remaining subspecies. Actually, this character is somewhat relevant to the character on the dark streak along the basal part of the forewing vein 2. The width of the dark streak on basal half of the forewing vein 2 is important in distinguishing some subspecies from one another (figs. 1-6).

The radial dimensions of the dark patches at ends of veins on hindwing upperside could be important, though this character is a little individually variable within some populations. The importance of this character depends on subspecies: it might be useful for a subspecies but more variable for another subspecies.

Key to subspecies. The following key is used for a better understanding of subspecific division, not for an identification of specimens, as most of the character states are rather continuous than discrete, being not practically useful for an identification.

1. Discocellular bar on forewing upperside of ♂ wider.....2
- Discocellular bar on forewing upperside of ♂ thinner.....4
2. Discocellular bar on hindwing upperside in both sexes thinner. Dark streak along basal part of vein 2 on forewing underside of ♀ thinnerssp. *epsteina* (TADOKORO et al.)
- Discocellular bar on hindwing upperside in both sexes wider. Dark streak along basal part of vein 2 on forewing underside of ♀ wider.....3
3. Dark patches at ends of veins on forewing upperside of ♂ shorter (in radial dimension). Dark patches at ends of veins on hindwing upperside in both sexes shorter. Blackish streaks along veins on hindwing underside of ♂ rather even in width throughout.....ssp. *wymanni* (ZIEGLER)
- Dark patches at ends of veins on forewing upperside of ♂ longer. Dark patches at ends of veins on hindwing upperside in both sexes longer. Blackish streaks along veins on hindwing underside of ♂ gradually widened toward termen.....ssp. *lama* ALPHÉRAKY
4. Size in both sexes smaller. Dark streak along basal part of vein 2 on forewing underside of ♀ very thin, leaving a very wide pale streak in space 2. Hindwing upperside ground colour in ♀ more or less pinkish.....ssp. *minima* (HUANG)
- Size in both sexes larger. Dark streak along basal part of vein 2 on forewing underside of ♀ wide, leaving a very thin pale streak in space 2. Hindwing upperside ground colour in ♀ not pinkish.....5
5. Discocellular bar on hindwing upperside usually clearly marked in both sexes. Hindwing underside of ♂ hardly marked by deep orange colouring.....ssp. *leechi* (BANG-HAAS)
- Discocellular bar on hindwing upperside always obsolete in both sexes. Hindwing underside of ♂ clearly marked by deep orange colouring.....ssp. *peloria* (HEWITSON)

***Aporia peloria peloria* (HEWITSON, [1853])**

Pieris peloria HEWITSON, [1853]: pl. Pieridae Pieris II, figs. 15-16 (TL: “Chinese Tartary”; clarified as Burang area, SW Tibet in this paper); ZIEGLER, 2007: partim - cpl. 1, figs. 2-4 for ♀ syntype.

Mesapia peloria: LEE, 1982: 132, partim on specimens from Burang (= Pulan), SW Tibet.

Aporia peloria peloria: SAKAI, 2018: 11-12, partim on speculation of TL as “east of Spiti”.

Material. SW Tibet: 6 ♂♂, 12 ♀♀ (IZCA), Selongqu (a wetland), Baga, Burang County, Ali Pref., 4950 m, 22.VII.1976, FU-SHENG HUANG leg.

TL & topotypes (figs. 1, 7, 11, 22). The TL of ssp. *peloria* (HEW.) was incorrectly interpreted as Ta Tsien Lu (D’ABRERA, 1990), Kukunoor (HUANG, 1998), Qinghai (DELLA BRUNA et al., 2004 & 2013), Xining (ZIEGLER, 2007), or eastern part of Tibetan Plateau (TADOKORO et al., 2014). Though TADOKORO et al. (2014: 53, fig. 3C) declared that a specimen from Sichuan examined by them “perfectly matches with ssp. *peloria* in wing markings”, that specimen actually differs from the original figure of ssp. *peloria* (HEW.) in having thinner black streaks on veins (especially basal half of forewing vein 2), better defined discocellular bar on hindwing upperside, and longer black patches at ends of veins on hindwing upperside.

SAKAI (2018) surmised that the TL could be the same as that of *Parnassius charltonius* GRAY, 1853, *P. simo* GRAY, 1853 and *P. acco* GRAY, 1853, as the latter three species were described in the same year (1853) with the same “Chinese Tartary” as TL. SAKAI (2018) declared that specimens from Tibet-Kumaon border (supposed TL of *Parnassius charltonius* GRAY) and the southern Tibet match with ssp. *peloria* (HEW.) in having vestigial discocellular bar on hindwing upperside. However, SAKAI (2018) did not know any specimens from Tibet-Kumaon border and he only examined a few specimens from Nyalam and C Nepal as the westernmost populations. He synonymized both ssp. *minima* (HUANG, 1998) from Tsochen area and ssp. *epsteina* (TADOKORO et al., 2014) from C Nepal as synonyms of ssp. *peloria* (HEW.), ignoring most wing-characters except discocellular bar. Actually the specimens examined by SAKAI (2018) from Nyalam, as well as those of ssp. *minima* (HUANG) and ssp. *epsteina* (TADOKORO et al.), do not match with the original figures and the known ♀ syntype of ssp. *peloria* (HEW.) in some details.

Aporia peloria (HEWITSON) has never been known from the extreme west of Nepal and its adjacent Indian area; it has not been encountered by the authors from the Burang area, SW Tibet (TL of *Parnassius charltonius* GRAY). However, *Aporia peloria* (HEWITSON) was recorded precisely from the Burang area in an earlier report for the butterfly fauna of Tibet by the late C.-L. LEE (1982); six ♂♂ and 12 ♀♀ specimens of this material were successfully traced by the junior author in the collection of IZCA. A careful examination of these specimens proved that SAKAI’s (2018) astonishing surmise is correct.

These specimens from Burang (figs. 1, 7, 11) are entirely in common with the syntypes of ssp. *peloria* (HEW.) (figs. 1- left top, 7- left, 11- left) by having the following characters:

- 1) Wingspan 38-45 mm in both sexes (n = 18). [Wingspan less than 34 mm in ssp. *minima* (HUANG) (n = 38)]
- 2) End of cell not marked by a broader bar. [End of cell always marked by a broad bar in ssp. *lama* ALPHÉRAKY and ssp. *wymanni* (ZIEGLER), frequently marked by a bar in ssp. *leechi* (BANG-HAAS)]
- 3) Blackish marginal patches at ends of veins on hindwing upperside rather short in both sexes. [Such spots frequently longer in ssp. *leechi* (BANG-HAAS) and ssp. *lama* ALPHÉRAKY, always shorter in ssp. *wymanni* (ZIEGLER)]
- 4) Black streaks on veins of forewing underside, especially that on basal half of vein 2 in ♀, constantly broad. [Such streak always narrower in ssp. *minima* (HUANG), ssp. *lama* ALPHÉRAKY and ssp. *wymanni* (ZIEGLER), frequently narrower in ssp. *leechi* (BANG-HAAS), nearly absent in ssp. *epsteina* (TADOKORO et al.)]
- 5) Ground colour of hindwing upperside in ♀ creamy or yellowish. [Such ground colour broadly pinkish in ssp. *minima* (HUANG)]
- 6) Hindwing underside of ♂ with deep orange colouring at costa, bases of spaces or lower half of cell. [Such orange colouring is

not well performed in other subspecies]

Some ♀ specimens from C & E Tibet (fig. 9 - Lhorong and E Mila Pass) might be very similar to the ♀ syntype of ssp. *peloria* (HEW.) in most wing-characters, but they still possess more whitish ground colour or longer radial blackish patches at ends of veins on hindwing upperside. The ♂ specimens from the same localities (fig. 14) could have wider discocellular bar on hindwing upperside and thinner black streaks at bases of veins on forewing. Moreover, the ♂ specimens from E Tibet lack the deep orange colouring on hindwing underside that is well marked in the ♂ syntype of ssp. *peloria* (HEW.).

TADOKORO et al. (2015) stated that the specimens from Ta-la (= Qia-la, on west of Lhunze, coordinate 28.67 N, 92.93 E) perfectly match with the type specimens of ssp. *peloria* (HEW.). However, those specimens have thinner dark streak along vein 2 on forewing underside than the type specimens of ssp. *peloria* (HEW.), and the ♂ has no deep orange colouring on hindwing underside. The specimens from Ta-la are transitional between ssp. *leechi* (BANG-HAAS) and ssp. *minima* (HUANG).

In conclusion, the Burang area, SW Tibet could be the real TL of ssp. *peloria* (HEW.).

***Aporia peloria minima* (HUANG, 1998) stat. rev.**

Mesapia peloria minima HUANG, 1998: 276 (TL: Maojiali to Darwa lake, North Tsochen area; between “31.67 N, 85.15 E” and “31.42 N, 85.16 E”), cpl. 2, figs. 7-8; SAKAI, 2018: 11, synonymy for ssp. *peloria* (HEW.).

Aporia peloria peloria: SAKAI, 2018, partim (figs. 86, 88, ♂♂ from Nyalam and Kangmar).

Material. W Tibet: the entire type series (18 ♂♂ & 20 ♀♀ from N Tsochen, VI-VII.1995, H. HUANG leg.).

Remarks. The populations from C Tibet (Nyalam, Kangmar, Tsurphu, Monda-la, Ta-la = Qiala on west of Lhunze), figured and identified as ssp. *peloria* (HEW.) by SAKAI (2018: figs. 86, 88) and TADOKORO et al. (2015: figs. 2-A, B & C), are transitional populations between ssp. *minima* (HUANG) and ssp. *leechi* (BANG-HAAS), possessing obsolete discocellular bar on hindwing upperside and linear dark line at basal half of vein 2 on forewing.

***Aporia peloria epsteina* (TADOKORO, KOIDE & HORI, 2014) stat. rev.**

Mesapia peloria epsteina TADOKORO, KOIDE & HORI, 2014: 52 (TL: Jarchuk Kang, Dolpo Reg., C. Nepal), figs. 2, 3-A; SAKAI, 2018: 11, synonymy for ssp. *peloria* (HEW.).

Aporia peloria peloria: SAKAI, 2018, partim (figs. 89-90, ♂♂ from C Nepal)

Material. None.

Remarks. SAKAI (2018) incorrectly synonymized this subspecies with ssp. *peloria* (HEW.). However, this subspecies is sharply different from the nearby subspecies by having the obsolete blackish line on forewing vein 2 and the wider discocellular bar on forewing upperside in both sexes.

***Aporia peloria leechei* (BANG-HAAS, 1934)**

Mesapia peloria leechei BANG-HAAS, 1934: 16 (TL: erroneously as “China mer. occ. Szetschwan, Bango, Ginfu Shan”; clarified as Kangding area in this work); ZIEGLER, 2007: 161, synonymy for ssp. *peloria* (HEW.); DELLA BRUNA et al., 2013: 70, synonymy for ssp. *peloria* (HEW.).

Mesapia peloria peloria: D’ABRERA, 1990: 82, figs. for ♂ from Ta Tsien Lu; DELLA BRUNA et al., 2004: 64, partim (figs. for ♂ & ♀ from Xiahe); ZIEGLER, 2007: 307, partim - figs. 7-9 for ♂♂ (most probably from Xiahe); DELLA BRUNA et al., 2013: 70, partim (figs. for ♂ & ♀ from Xiahe); TADOKORO et al., 2014: 53, fig. 3C for ♂♂ from Sichuan; TADOKORO et al., 2015: fig. 2D for specimen from Damxung, figs. 3-4 for specimens from Sichuan, SE Tibet and NW Yunnan; SAKAI, 2018: fig. 87 for ♂ from Dam Xung, Tibet.

Mesapia peloria minima: DELLA BRUNA et al., 2004: 64, partim (figs. for ♂ from Damxun); ZIEGLER, 2007: 308, fig. 19 for “♀” (actually ♂) from Dschie-Song La; DELLA BRUNA et al., 2013: 70, partim (figs. for ♂ from Damxun).

Aporia peloria leechei: SAKAI, 2018: figs. 79-84 for ♂♂ and ♀♀ from Xuebaoding, Mt. Sigunyang, Rawu, Baxoi and Nujiang Shan Pass.

Aporia peloria lama: SAKAI, 2018: partim (fig. 77 for ♂ from Xiahe).

Material. W & N Sichuan: 9 ♂♂ (CHH), NE Xinduoqiao (30.04 N, 101.53 E), W Kangding, 3800 m, 9.VI.2017, H. HUANG leg.; 2 ♂♂, 3 ♀♀ (CHH), Mengbisan Pass (31.70 N, 102.32 E), on old road between Barkam and Xiaojin, 3900 m, 16.VII.2023, H. HUANG leg. C & E Tibet: 5 ♂♂, 1 ♀ (CHH), Songduo (29.89 N, 92.50 E), E of Mila Pass, Gongbo-gyamda County, 4300 m, 5.VII.2013 & 6.VIII.2020, X.-D. YANG, S.-Y. LANG & H. HUANG leg.; 7 ♂♂, 1 ♀ (CHH), Mopola Pass (30.86 N, 96.57 E), E Lhorong, Qamdo Pref., 4700 m, 20.VI.2023, H. HUANG leg.; 2 ♂♂ (CHH), E of Bianba (30.80 N, 95.23 E), Qamdo Pref., 4595 m, 4600 m, 22.VI.2023, H. HUANG leg.; 2 ♂♂ (CHH), W of Xiagong-la Pass (30.85 N, 94.52 E), Jinling, Bianba County, Qamdo Pref., 4900 m, 24.VI.2023, H. HUANG leg.; 6 ♂♂ (CHH), N of Demula, on road between Chayu and Ranwu, 4700 m, 30.VI.2023, H. HUANG leg.; 2 ♂♂ (CHH), Anjiula Pass (29.67 N, 96.72 E), N of Ranwu, 4400 m, 13.VII.2010, H. HUANG leg.; 3 ♂♂, 1 ♀ (CHH), Yela Pass (30.16 N, 97.30 E), on road between Bangda and Baxoi (= Basu), 4660 m, 20.VII.2012, X.-D. YANG leg.; 3 ♂♂ (CHH), E of Dongdala Pass (29.72 N, 98.06 E), E of Zuogong, 4800 m, 23.VII.2000, H. HUANG leg.; 3 ♂♂ (CHH), Juebashan Pass (29.55 N, 98.31 E), W Mangkang, 3900 m, 13.VII.2012, X.-D. YANG leg. S Gansu: 3 ♂♂, 1 ♀ (CHH), Xiongmaogou (35.14 N, 102.66 E), Xiahe County, Gannan Pref., 3000 m, 18.VII.2017 & 2.VII.2018, H. HUANG leg. NE Qinghai: 2 ♂♂ (CHH), on road between Tongren and Xiahe (35.49 N, 102.31 E), E Tongren, near Qinghai-Gansu border, 3400 m, 30.VI.2018, H. HUANG leg.

TL. The type series was verified by Dr. S.-Y. LANG (personal communications, October 2023) as to be collected by WALTER FRIEDRICH (FU DE-LI) in 1930-1932 from a few localities around Kangding in western Sichuan. A series of FRIEDRICH’s specimens of *Aporia peloria leechei* (BANG-HAAS) were found by Dr. LANG in the old collection of CMNH, Chongqing, wrapped by the same paper bags as those of the other butterflies described by BANG-HAAS in 1934, such as the type specimens of *Graphium leechei aprilis* (BANG-HAAS, 1934) kept in MTDG. One of the localities labeled on the paper bags is Wassuland (near Kangding), but none of these *Aporia peloria leechei* (BANG-HAAS) specimens is labeled from Bango (= Banhe, a village at foot of Ginfushan, coordinate 29.11 N, 107.25 E). *Aporia peloria leechei* (BANG-HAAS) does not distribute into Ginfushan that is too low in altitude for this highland

species; and none of the Chinese collectors has ever encountered this species at Ginfushan. “Bango” is one of the most important localities frequently labeled on FRIEDRICH’s specimens and it can be sure that BANG-HAAS mixed the labels of the *Aporia peloria leechi* (BANG-HAAS) specimens with other specimens collected from Ginfushan.

In short, the correct TL of ssp. *leechi* (BANG-HAAS) should be “Wassuland”, near Kangding, W Sichuan, according to the old specimens in CMNH from the same source as the type material.

Identification. The original description is short and not informative: the ♂ has vein-ends more dusted than that of the specimens from “Amdo and Kukunor”; the ♀ is not vivid brown but lighter coloured. Such description for ♂ matches with the ♂ specimens from Kangding area examined by the authors: the ♂♂ from Xinduqiao (west of Kangding) have blackish streaks on veins longer and more developed than those from Xining and Heimahe (at Kukunoor). The vague description for ♀ might fall into individual variation or be inaccurate due to a misidentification of the sex, as all the known ♀♀ of this species are more or less brownish yellow and individually variable in tone and details of markings.

The ♂ specimen figured by DELLA BRUNA et al. (2004), labeled from “Jinfo Shan” (not from the type material), must be mislabeled, possessing characters of ssp. *lama* ALPHÉRAKY.

Diagnosis & populations. All the populations of this subspecies can be divided into two groups: an eastern group (E Populations) and a western group (W Populations). The dividing line (fig. 22) seems to be along the Mekong valley in eastern Tibet. The E Populations, representing typical ssp. *leechi* (BANG-HAAS), have longer (in radial dimension) blackish patches at ends of veins on hindwing upperside and wider blackish streaks at bases of veins on forewing upperside than the W Populations (fig. 15). However, such difference is slight and individually variable thus a separation in subspecific level is unnecessary.

In W Populations, individuals with obsolete hindwing discocellular bar (like in ssp. *minima* (HUANG)) are frequently seen. However, these individuals can be attached to ssp. *leechi* (BANG-HAAS) instead of ssp. *minima* (HUANG) in ♀ by having wider black streaks at bases of veins on forewing. The specimens from Dschie-Song La (not located) and Damxun (= Damxung), recorded as ssp. *minima* (HUANG) by ZIEGLER (2007: fig. 19) and DELLA BRUNA et al. (2013: 70), or as ssp. *peloria* (HEW.) by TADOKORO et al. (2015: figs. 2D), should belong to the W Populations of ssp. *leechi* (BANG-HAAS).

As above discussed under ssp. *minima* (HUANG), the populations from C Tibet are transitional populations between ssp. *minima* (HUANG) and ssp. *leechi* (BANG-HAAS), possessing obsolete discocellular bar on hindwing upperside and linear dark line at basal half of vein 2 on forewing.

Populations from Xiahe and its adjacent area (Tongren, E Qinghai) were treated by previous authors as ssp. *lama* ALPHÉRAKY or the same subspecies as those from the Xining area. However, these populations form a transition from ssp. *leechi* (BANG-HAAS) to ssp. *lama* ALPHÉRAKY but are a little more similar to ssp. *leechi* (BANG-HAAS) in having thinner discocellular bar on both wings upperside.

Transitional populations between ssp. *minima* (HUANG) and ssp. *leechi* (BANG-HAAS)

Material. C Tibet: 2 ♂♂ (CHH), Riduo (29.70 N, 92.21 E), west of Mila Pass, MedroGongkar (= Mozhugongka) County, Lhasa City, 4300 m, 5.VII.2013, X.-D. YANG leg.

Remarks. As shown in fig. 22, these transitional populations were recorded by SAKAI (2018: figs. 86, 88) and TADOKORO et al. (2015: figs. 2-A, B & C) from Nyalam, Kangmar, Tsurphu, Monda-la (28.42 N, 90.56 E) and Ta-la (28.67 N, 92.93 E), misidentified as ssp. *peloria* (HEW.). They possess obsolete discocellular bar on hindwing upperside and linear dark line at basal half of vein 2 on forewing. Further research on more materials from the area between Tsochen and Shigatse (= Xigatse) is necessary.

It might be possible to regard these transitional populations as a further subspecies standing on its larger size than in ssp. *minima* (HUANG); and by such treatment, the W Populations of ssp. *leechi* (BANG-HAAS) will become the transitional populations or be attached to this further subspecies.

Aporia peloria ssp. unnamed

Material. SE Tibet: 6 ♂♂ (CHH), W of Cuomei (28.45 N, 91.22 E), on road between Lhozhag (= Luozha) and Cuomei, Shannan Pref., 4600 m, 24.VI.2017, H. HUANG leg.; 2 ♂♂ (CHH), E of Lhozhag (28.47 N, 91.02 E), Shannan Pref., SE Tibet, 4900 m, 24.VI.2017, H. HUANG leg.

Remarks. The populations from the mountain range between Lhozhag and Cuomei, SE Tibet (fig. 16) show a constantly smaller size and more marked dark streaks on veins than the W Populations of ssp. *leechi* (BANG-HAAS). The fresh ♂ specimens possess a yellow ground colour at apical half of forewing upperside. The ♀ is however unknown to the authors. This population deserves a further research on its subspecies identity in future.

Aporia peloria lama ALPHÉRAKY, 1887

Aporia lama ALPHÉRAKY, 1887: 404 (TL: N.E. du Thibet; clarified as a vast area in northeastern Qinghai); ALPHÉRAKY, 1889: 68-69, synonymy for *Aporia peloria* (HEW.), pl. IV, fig. 2 for ♀ syntype of *Aporia lama* ALPHÉRAKY; DELLA BRUNA et al., 2004: 64, synonymy for ssp. *peloria* (HEW.).

Mesapia peloria RÖBER, 1907: 43, pl. 18-a for ♂, pl. 19-b for ♀; VERITY, 1907: 114, pl. 26, figs. 2-4 for ♂ and ♀ from Amdo.

Mesapia peloria tibetensis D’ABRERA, 1990: 82 (TL: “Amdo”; clarified as the area around Lajishan and Guide), figs. for ♂♂ (“Recu de GROUM GRIGIMAILO Jan 1894”); DELLA BRUNA et al., 2004: 64, synonymy for ssp. *peloria* (HEW.); ZIEGLER, 2007: 161, synonymy for ssp. *peloria* (HEW.); TADOKORO et al., 2014: 55, fig. 7 for ♂ holotype, 58, synonymy for ssp. *lama* ALPHÉRAKY; SAKAI, 2018: 13, synonymy for ssp. *lama* ALPHÉRAKY.

Mesapia peloria leechi: DELLA BRUNA et al., 2004: 64, partim - fig. for ♂ from “Jinfo Shan” (mislabeled).

Mesapia peloria peloria: ZIEGLER, 2007: 307, partim - cpl. 1, fig. 10 for ♂ without a label.

Mesapia peloria grayi BANG-HAAS, 1934: 16 (TL: “Richthofen Gebirge, westl. Liangtschou”; clarified as part of Qilianshan between Zhangye and Wuwei); ZIEGLER, 2007: 164, synonymy for ssp. *lama* ALPHÉRAKY; TADOKORO et al., 2014: 54, fig. 6 for ♂ syntype, 58, synonymy for ssp. *lama* ALPHÉRAKY.

Mesapia peloria lama: ZIEGLER, 2007: 307, partim - cpl. 1, figs. 17-18 for “♀♀” (actually ♂♂) from Heimahe and NW Caka (requiring confirmation); TADOKORO et al., 2014: 53, fig. 3-D for ♂♂ from Qinghai.

Material. NE Qinghai: 5 ♂♂ (CHH), Lanmiwan (36.42 N, 101.49 E), Huangzhong, Xining City, 3000 m, 27.VI.2018, H. HUANG leg.; 1 ♂ (CHH), N of Lajishan Pass (36.36 N, 101.45 E), Huangzhong, Xining, 28.VI.2018, H. HUANG leg.

TL of *Aporia lama* ALPHÉRAKY. ZIEGLER's (2007) surmise on the TL as Bourkhane-Bouddha Mts. is short in evidence. ALPHÉRAKY (1887) described a few taxa on a mixed material collected by N. PRZEWAŁSKY from a vast area and he gave the TL of *Parnassius przewalskii* ALPHÉRAKY, 1887 as "Bourkhane-Bouddha" Mts., but gave the TL of *Aporia lama* ALPHÉRAKY as "N.E. du Thibet" (the current Qinghai); this means that the type material of *Aporia lama* ALPHÉRAKY was not labeled specifically. The TL of *Aporia lama* ALPHÉRAKY could be in a vast area in northeastern Qinghai. Judging from the original figure (ALPHÉRAKY, 1889: pl. IV), the ♀ of this taxon has longer blackish streaks around ends of veins on hindwing upperside than that of ssp. *wymanni* (ZIEGLER). Therefore, the TL can not be on the west of the Qinghai lake (Kukunoor).

TL of *Mesapia peloria grayi* BANG-HAAS. BANG-HAAS (1934) clearly gave "Richthofen Gebirge, westl. Liangtschou" as the TL, which is a part of Qilianshan Mts. between Zhangye and Wuwei.

TL of *Mesapia peloria tibetensis* D'ABRERA. The type material is labeled with "Recu de Groum Grigimailo Jan 1894", thus this material should be collected by GRUM-GRSHIMAILO in VI-VII.1890 (GRIESHUBER et al., 2012). The TL could be at Myn-da-sha and Gui-da-sha valleys of the Lajishan Mts., where the senior author encountered a good number of *Aporia peloria* (HEW.) in late June, 2018. GRUM-GRSHIMAILO's collecting time at Lajishan was between 2.VI.1890 and 12.VII.1890, thence he went south into Dzhakhar (south of the current Guide County) till late July. The ♂ holotype (fig. 20- left bottom) matches with the ♂ specimen collected by the senior author from north slope of Lajishan (fig. 20- L2). In conclusion, the TL of this taxon could be at a small area around Lajishan and Dzhakhar as shown in fig. 22.

Remarks. The typical specimens of ssp. *lama* ALPHÉRAKY should have rather long dark streaks at ends of veins on hindwing upperside as indicated by the original figure (ALPHÉRAKY, 1889). Most of the ♂ specimens collected by the senior author from Lanmiwan (36.42 N, 101.49 E) on north of Lajishan, match with this characteristic. The ♂ specimen collected by the senior author from the north slope of Lajishan (36.36 N, 101.45 E; about 10 km south of Lanmiwan in the same mountain range) is almost identical with the syntype of ssp. *grayi* (BANG-HAAS) figured by ZIEGLER (2007) and TADOKORO et al. (2014). Therefore it is reasonable to regard ssp. *grayi* (BANG-HAAS) as a synonym of ssp. *lama* ALPH. as the ♂ specimens in form of ssp. *grayi* (BANG-HAAS) can be found in the main range of ssp. *lama* ALPH.

The ♂ specimens in form of ssp. *grayi* (BANG-HAAS) are intermediate between ssp. *lama* ALPH. and ssp. *wymanni* (ZIEGLER) in external features; however they are more similar to ssp. *lama* ALPH. than to ssp. *wymanni* (ZIEGLER). On the other hand, all the known ♂ specimens of ssp. *wymanni* (ZIEGLER) from Jiayuguan and Wulan are at 100% level distinguishable from those of ssp. *lama* ALPH. from Xining area and SE Qilianshan area, including the form of ssp. *grayi* (BANG-HAAS).

The major reason why some authors regarded ssp. *wymanni* (ZIEGLER) as synonym of ssp. *lama* ALPH. is probably due to some wrongly labeled specimens. ZIEGLER (2007) himself figured two ♂♂ of ssp. *wymanni* (ZIEGLER) as ssp. *lama* ALPH., mislabeled from Xiahe; and he also figured two ♂♂ in form of ssp. *wymanni* (ZIEGLER) as ssp. *lama* ALPH. from Caka, and two other ♂♂ in form of ssp. *lama* ALPH. from NW Caka and Heimahe. If all these records from Qinghai are reliable, the ranges of ssp. *lama* ALPH. and ssp. *wymanni* (ZIEGLER) will be interlaced at Caka area. It is noteworthy that none of the authors who synonymized ssp. *wymanni* (ZIEGLER) with ssp. *grayi* (BANG-HAAS) had proved that the two forms were collected together from the same locality. These authors misidentified ♂ specimens in form of ssp. *wymanni* (ZIEGLER) as ssp. *grayi* (BANG-HAAS), ignoring that the ♂ syntype of ssp. *grayi* (BANG-HAAS) is closer to ssp. *lama* ALPH. than to ssp. *wymanni* (ZIEGLER) by having longer streaks along veins on upperside and gradually widened streaks along veins on underside. The difference in ♀ between these subspecies is unclear at present as only very few specimens are known in literature. Even if both forms [ssp. *lama* ALPH. and ssp. *wymanni* (ZIEGLER)] are found sympatric at a transitional zone (such as Caka), the major populations of these two subspecies could be still highly separable, deserving the subspecies names of their own.

***Aporia peloria wymanni* (ZIEGLER, 2007)**

Mesapia peloria grayi: DELLA BRUNA et al., 2004: 64, partim - figs. for ♂ and ♀ from Qilian Shan.

Mesapia peloria wymanni ZIEGLER, 2007: 167 (TL: NW-Qilian-Shan, Jiayuguan), cpl. 2, figs. 20-27; DELLA BRUNA et al., 2013: 70, synonymy for ssp. *grayi* (BANG-HAAS); SAKAI, 2018: 12, synonymy for ssp. *grayi* (BANG-HAAS); TADOKORO et al., 2015: 24, synonymy for ssp. *lama* ALPHÉRAKY.

Mesapia peloria peloria: ZIEGLER, 2007: 307, partim - cpl. 1, figs. 5-6 for ♂♂ (mislabeled from Xiahe).

Mesapia peloria lama: ZIEGLER, 2007: 307, partim - cpl. 1, figs. 15-16 for ♂♂ from Caka, 60 km W Heimahe (locality requiring confirmation).

Material. C Qinghai: 1 m (CHH), N of Wulan County, Haixi Pref., VII.2012, ex coll. JIAN-BEI TIAN.

Remarks. See under ssp. *lama* ALPHÉRAKY. Further investigations to the TL and the transitional zone around Caka and central part of Qilianshan are necessary.

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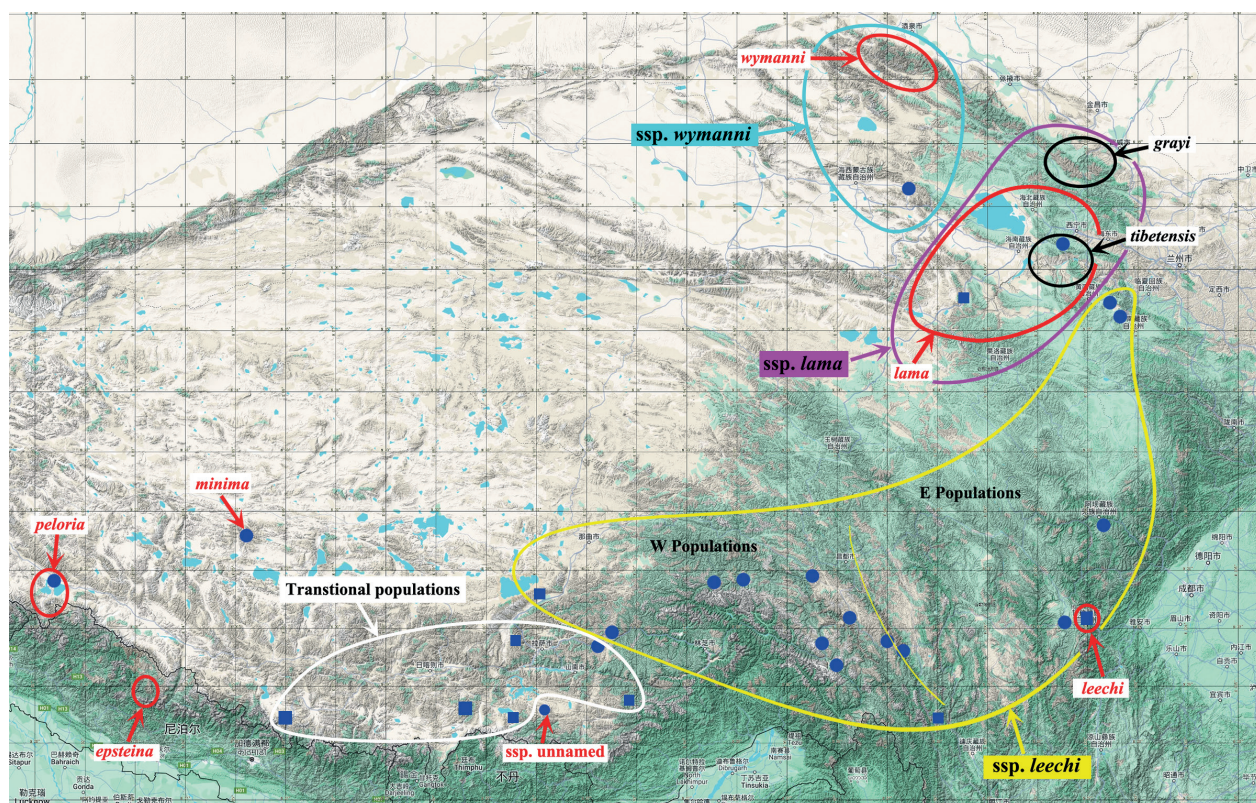
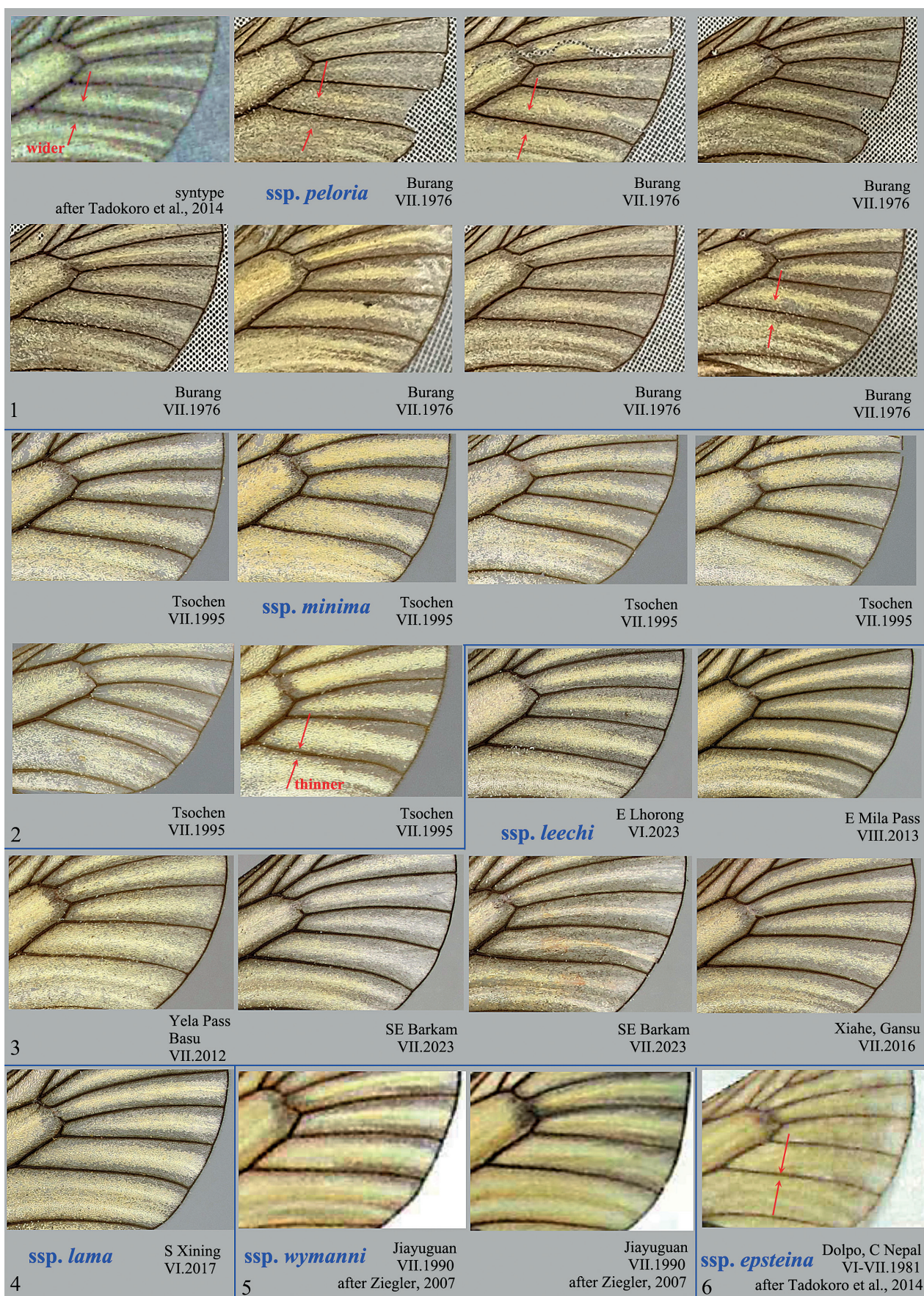


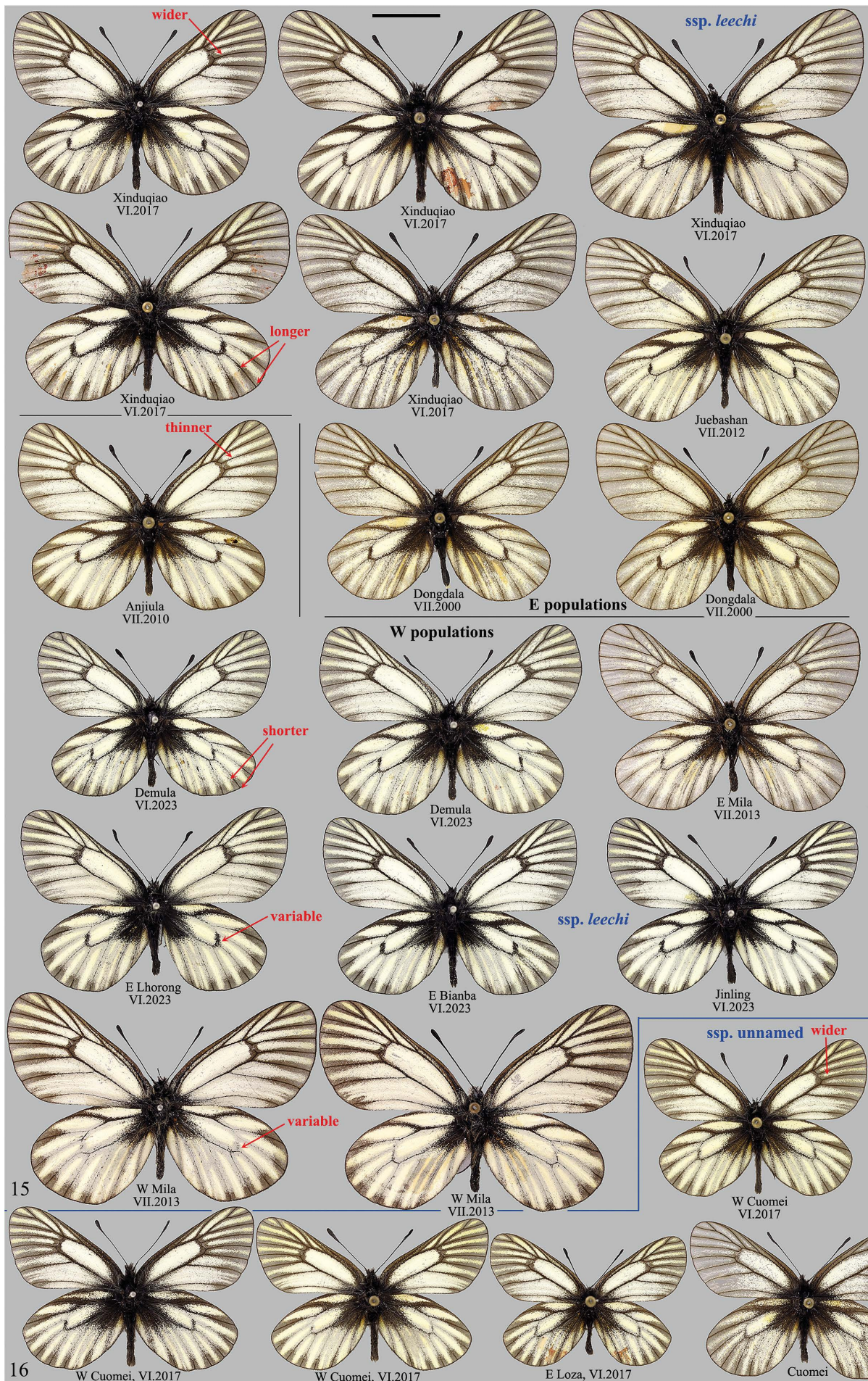
Fig. 22: Distribution of *Aporia peloria* (HEWITSON, [1853]). Blue circular spots: collecting localities in this work. Blue squares: collecting records in literature. Red arrows or rings: TLs of bona subspecies. Black arrows or rings: TLs of synonyms. Rings in colour: ranges of bona subspecies.



Figs. 1-6: Character on forewing underside of *Aporia peloria* (HEWITSON, [1853]) ♀. Red arrows indicating difference in width of dark streak on vein 2.



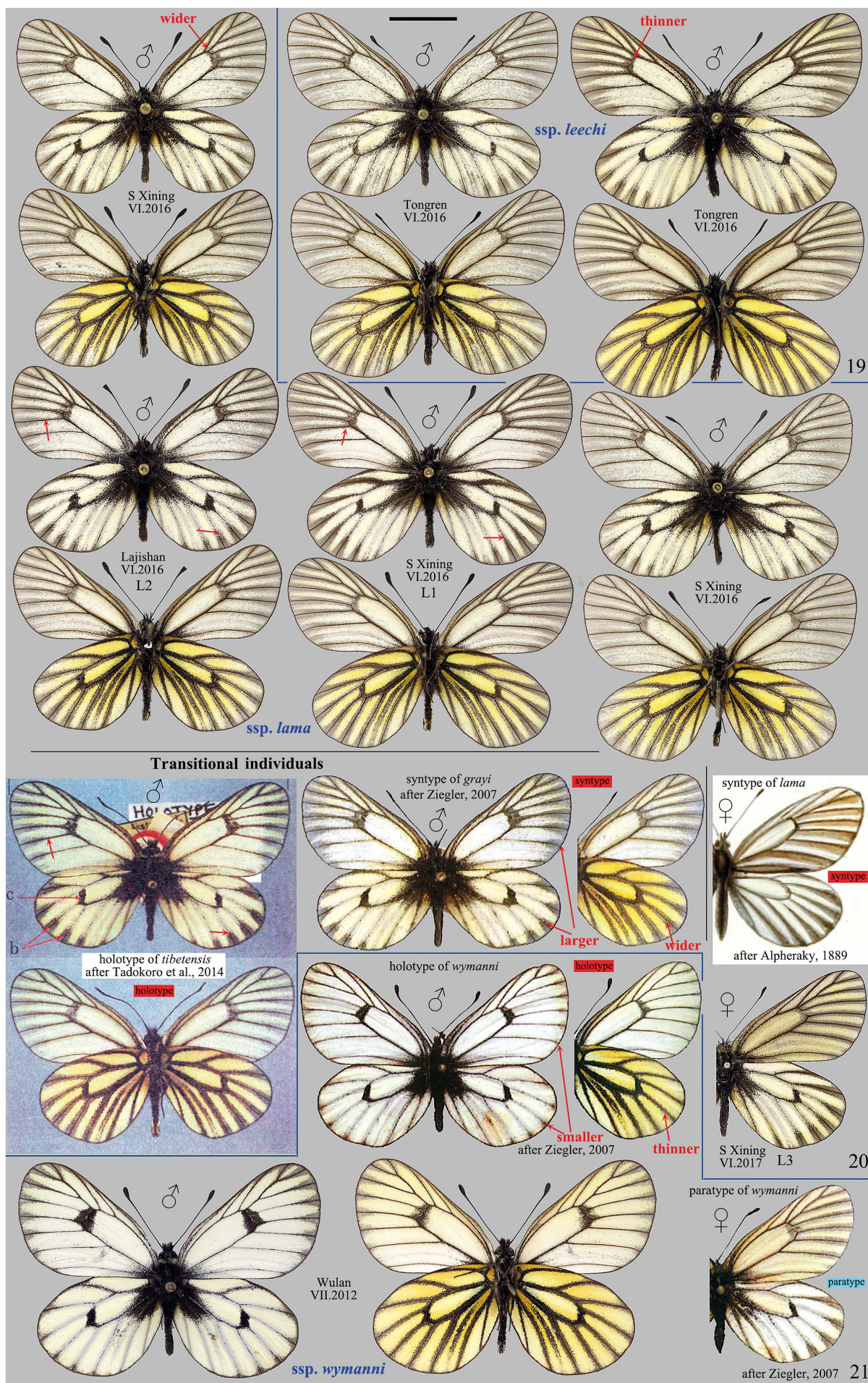
Figs. 7-10: Habitus of *Aporia peloria* (HEWITSON, [1853]) ♀♀ under same scale. Scale bar = 1 cm.



Figs. 15-16: Habitus of *Aporia peloria* (HEWITSON, [1853]) ♂♂ under same scale - Upper side. Scale bar = 1 cm.



Figs. 17-18: Habitus of *Aporia peloria* (HEWITSON, [1853]) ♂♂ under same scale - Underside. Scale bar = 1 cm.



Figs. 19-21: Habitus of *Aporia peloria* (HEWITSON, [1853]) under same scale. Scale bar = 1 cm. Red arrows without texts indicating ends of streaks on veins.

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