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New taxa and new records of butterflies from Vietnam (Lepidoptera, Papilionoidea)

ALEXANDER L. MONASTYRSKII^{1,2} & VU VAN LIEN^{1,3}

¹Vietnam National Museum of Nature, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Cau Giay, Ha Noi, Vietnam ^(a) https://orcid.org/0000-0001-7645-2458

²Fauna & Flora International, Vietnam Programme, Ha Noi, Vietnam

³ vulien@gmail.com; ⁶ https://orcid.org/0000-0003-2389-9402

Abstract

A new species and eight new subspecies of Papilionoidea discovered in Vietnam between 2002 and 2020 are described and illustrated. The status of two taxa are revised. New taxa include Pieridae: *Delias sanaca bidoupa* Monastyrskii & Vu **subspec. nov.** and *Talbotia naganum aurelia* Monastyrskii & Vu **subspec. nov.**; Nymphalidae: *Abrota ganga pulcheria* Monastyrskii & Vu, **subspec. nov.**; *Bassarona recta consonensis* Monastyrskii & Vu, **subspec. nov.**; *Pantoporia bieti aurantina* Monastyrskii & To **subspec. nov.**; *Ragadia latifasciata cristata* Monastyrskii & Vu, **subspec. nov.**; *Ragadia latifasciata crystallina* Monastyrskii & Vu, **subspec. nov.**; *Faunis indistincta luctus* Monastyrskii & Vu **subspec. nov.** & *Aemona gialaica* Monastyrskii, K. Saito & Vu, **spec. nov.** The taxon *infuscata* Devyatkin & Monastyrskii, previously described as the subspecies *Aemona tonkinensis infuscata*, was elevated to the species level, while the taxon *critias* (*Ragadia critias* Riley & Godfrey) was reduced to a subspecies. Three Satyrinae species were recorded from Vietnam for the first time: *Palaeonympha opalina* Butler, 1871; *Ypthima motschulskyi* Bremer & Grey, 1853; and *Ragadia latifasciata* Leech, 1891.

Key words: Butterfly fauna, genitalia, new taxa, Nymphalidae, Pieridae, Vietnam

Introduction

The intensity of faunistic and taxonomic studies on Indochinese butterflies has accelerated in the 21st century as indicated by the appearance of comprehensive editions such as Osada *et al.* (1999) and Nakamura & Wakahara (2012) on Laos, and Monastyrskii & Devyatkin (2003; 2015) and Monastyrskii (2005a, 2007, 2011, 2019a, 2019b) on Vietnam. Many additional papers contain new descriptions and revisional notes: Monastyrskii & Devyatkin, (2000, 2003), Monastyrskii (2005b, 2011, 2016); Saito K. & Inayoshi (2018).

These works clearly document Vietnam's high butterfly diversity: over 1,200 species in six families (Monastyrskii & Devyatkin, 2015; Inayoshi, 2021). During the last twenty years, a number of new taxa were discovered in poorly studied habitats in Vietnam including Con Dao N.P. (Con Son Is.), Kon Ka Kinh N.P., Ngoc Linh N.P., Bi Doup N.P. These are geographically isolated areas with a high proportion of rare and endemic taxa (Monastyrskii, 2009, 2011; Monastyrskii & Holloway, 2012. At the same time, some new taxa have been discovered in well-studied areas, such as Hoang Lien N.P. (Lao Cai Province), Dong Van district (Ha Giang province) and Tam Dao N.P. (Vinh Phuc province). Based on recent discoveries, there is a seemingly inexhaustible number of new taxa at these sites. For example, every year additional taxa are recorded at Hoang Lien N.P. and the vicinity of Sa Pa town.

Lycaenidae, Riodinidae and Hesperiidae are families of small butterflies and are relatively poorly documented in Vietnam. Nevertheless, new taxa in these families are frequently discovered all over the country (e.g., Chiba, 2009; Devyatkin, 2012; Devyatkin & Monastyrskii, 1999, 2002, 2003; Koiwaya, 2007; Monastyrskii & Devyatkin, 2000; 2003a; 2003b; 2015; Monastyrskii, 2005b; 2012; 2016). Many species differing in wing pattern and genitalia structure have been found in northern, central, and southern Vietnam (Monastyrskii, 2005b; 2007; K. Saito & Inayoshi, 2018). This geographic variation is most pronounced in taxa with specialized (stenotopic) ecological requirements such as the nymphalid subfamilies Satyrinae and Limenitidinae. Geographic variation in Pieridae and Papilionidae is less common, but can be seen in taxa with stenotopic requirements including species in the genera *Delias*, *Cepora*, and *Appias*.

We report new faunistic and taxonomic data at sites in the Central Highlands of Vietnam: Kon Tum, Gia Lai, Quang Nam, Quang Ngai, Lam Dong, Khanh Hoa Provinces. New taxa and new records were also found in wellstudied sites of northern Vietnam including Lao Cai Province (Hoang Lien N.P.); Ha Giang Province (Dong Van district). Finally, a new nymphalid subspecies is described from Con Son Island in southern Vietnam.

Material and methods

Abbreviations

N.P.	National Park
N.R.	Nature Reserve
NHM	The Natural History Museum (London)
HT	Holotype
PT	Paratype
LC	Local collector
MNHN	Museum National d'Histoire Naturelle (Paris)
VFM/FIPI	Vietnam Forest Museum (Hanoi)
VNMN	Vietnam National Museum of Nature (Hanoi)
SIE	Southern Institute of Ecology (Ho Chi Minh City)
ALM	A.L. Monastyrskii (VNMN, Hanoi)
VVL	Vu Van Lien (VNMN, Hanoi)
TQ	To Quang (SIE)
PNT	Pham Nhat Tan (VFM)

Study areas

We surveyed butterflies in the following areas of Vietnam:

Northern Vietnam

Dong Van district, Ha Giang Province ($23^{\circ} 16^{\circ} N$, $105^{\circ} 22^{\circ} E$) Vicinity of Dong Van town: secondary vegetation, grassland and small heavily disturbed coniferous and broad-leaved forest fragments dominated by Fagaceae species at ~1,500 m.

Hoang Lien N.P., Lao Cai Province $(22^{\circ}08^{\circ} - 23^{\circ} N, 103^{\circ}45^{\circ} - 104^{\circ}00^{\circ} E)$. There are three types of forest: submontane dry evergreen forest, tropical montane deciduous forest, and sub-alpine forest. In addition, scrubland and savannah areas are found on ridge tops. Dwarf bamboo habitats are confined to the highest ridges of the Fansipan massif. The site contains Indochina's highest peak (Fansipan) at 3,143 m, and most of this area lies above 1,000 m.

Tam Dao N.P., Vinh Phuc, Thai Nguyen and Tuyen Quang Provinces (21° 21'–42' N, 105° 23'–44' E). The natural forest is of two main types: 1) lowland evergreen forest distributed at 700–800 m and dominated by tree species from Fabaceae, Dipterocarpaceae, Meliaceae and Myrtaceae; and 2) lower montane evergreen forest distributed above 800m and dominated by Fagaceae, Lauraceae and Magnoliaceae. There are also some coniferous tree species.

Mau Son Mt., Lang Son Province (21° 52' N, 107° 00' E)

Central Vietnam

Bach Ma N.P., Thua Thien Hue Province (16° 05'-16' N, 107° 43'-53' E). The main forest types are lowland evergreen forest below 900 m, and montane evergreen forest above this elevation. All forest habitats are rather disturbed, and the dominant habitats are scrub and grassland.

Song Thanh N.R., Quang Nam Province (15°13'–41'N, 107°24'–39'E). The vegetation of this site is dominated by upper montane evergreen forest which covers approximately 95% of the nature reserve. This montane area has numerous peaks over 1,000 m.

Kon Chu Rang N.R., Gia Lai Province (14°26'-35' N, 108°30'-39' E). The main forest type is lower montane and montane evergreen forest distributed at elevations between 900–1,500 m. Tree flora is dominated by a number of species from the Fagaceae, Lauraceae and Magnoliaceae, mixed with gymnosperms.

Kon Ka Kinh N.P. Gia Lai Province (14°09'–30'N, 108°16'–28'E). Lower montane and montane broad-leaved evergreen forest; coniferous forest where *Fokienia hodginsii* (Cupressaceae) is the dominant species; and riverine forest at 900–1,500 m. The highest peak is about 1,742 m, Mount Kon Ka Kinh.

Ngoc Linh N.P., Kon Tum Province (15°00'–18' N, 107°41'–108°01' E). A montane area whose highest peak is at 2,598 m (Mount Ngoc Linh). Forest types in Ngoc Linh are as follow: high montane broad-leaved evergreen forest; medium to high montane broad-leaved evergreen forest; low montane broad-leaved evergreen forest and secondary forest.

Bi Doup/Nui Ba N.P. Lam Dong Province (12°00'-19' N, 108°21'-44' E). Located on the Da Lat plateau, the whole site lies above 1,400 m (the highest point, Mt. Bi Doup, reaching 2,287 m). The area contains two main forest types: coniferous forest, dominated by *Pinus kesiya* with smaller numbers of *P. latteri* (=*P. merkusii*) and evergreen forest, further classified into lower montane, dominated by species of Fagaceae and Lauraceae including *Castanopsis indica, Lithocarpus* spp., *Quercus* spp., *Cinnamomum* spp. and *Litsea* spp., and upper montane forest characterized by the presence of the genera *Syzygium* and *Rhododendron*. The flora and fauna of this area are highly endemic.

Hon Ba Provincial N.R., Khanh Hoa Province (12° 02 '- 15' N, 108°57'-109° 05' E). There are three main vegetation types depending on the elevation: montane evergreen forest between 1,000 and 1,700 m; evergreen forest at moderate elevations between 500 and 1,000 m; and lowland evergreen forest.

Southern Vietnam

Cat Tien N.P. (**Nam Cat Tien** sector) Dong Nai, Lam Dong and Binh Phuoc Provinces (11°21'–48' N, 107°10'–34' E). The topography of the area varies greatly among the three sectors of the N.P. from the low, gentle hills of the lowlands of southern Vietnam (the Nam Cat Tien and Tay Cat Tien sectors) to the steep hills of the western extent of the Central Highlands (the Cat Loc sector); the highest elevation reaches 650 m. The N.P. supports a great variety of habitat types, including primary and secondary lowland evergreen forest, primary and secondary lowland semi-deciduous forest, freshwater wetlands and open lakes and seasonally inundated grasslands, flooded forest, and a range of secondary habitat types, including grassland and areas dominated by bamboo.

Con Dao N.P. Con Son Is. (previously known as **Pulo Condore**), Ba Ria—Vung Tau Province (8° 37'–48' N, 106° 32'–45'). The N.P. is centred on an archipelago of 14 islands, the largest of which is Con Son, located about 80 km off the coast of southern Vietnam. The topography of Con Son is dominated by a granite ridge (running from southwest to northeast) which shelters the bays on both sides from strong winds. The highest point, Mt. Thanh Gia, reaches 577 m. Con Son and many islands of the archipelago are extensively forested. An outstanding feature of Con Dao's flora is the 44 plant species discovered for the first time on the islands and mostly named after the site, including *Dipterocarpus condorensis, Ilex condorensis, Pavetta condorensis* and *Psychotria condorensis*.

Methods of morphological and taxonomic studies

The genitalic morphology of both sexes was studied after boiling abdomens in 10–15% potassium hydroxide for 30–40 minutes, rinsing the excised genitalia in distilled water and 96% alcohol before examination and storage in glycerol. Dissection was implemented under an Olympus binocular stereoscopic microscope. Terminology of genitalia structure was adopted from works by Klots (1970); Kuznetzov & Stekolnikov (2001), Shirôzu & Shima, 1979).

Results

New taxa

Pieridae, Pierinae

Delias sanaca bidoupa Monastyrskii & Vu subspec. nov. (Fig. 1–3) **Description:** Female. Length of forewing: HT 44mm; PT 48 mm; antennae black with greyish club, 18.0–19.0 mm.

Forewing upperside (Figure 1-A, C). Ground colour black with pattern of whitish spots: 1. Series of subterminal spots extends from cell R_3 to Cu_{1b} ; the spot in cell Cu_{1b} is double; 2. Series of postmedian elongated spots extends from R_3 to Cu_{1b} , though spots in R_4 and R_5 are absent; spot in cell Cu_{1b} is double and small whitish spot in cell M_1 is shifted towards the subterminal spot; 3. Large elongated whitish spot located at distal part of discal cell near discocellular veins. **Forewing underside** (Figure 1-B, D). Ground colour black; the wing pattern similar to that in upperside, but all spots brighter and more distinct; subterminal spots in cells R3, R5 and M1 are yellow. Discal cell includes long whitish streak which is ended by the large elongated whitish spot. **Hindwing upperside** (Figure 1 A, C). Ground colour black with pattern of whitish spots; Dorsal area within cells 3A, 1A+2A and Cu_{1b} is whitish yellow; small bright yellow spots are located at basal area in cell Sc+ R_1 and around humeral vein; bright white streak in discal cell; series of subterminal whitish spots extend from cell Rs to Cu_{1b} . **Hindwing underside:** (Figure 1 B, D) Ground colour black; the wing pattern similar to the upperside, but all spots smaller and more distinct; all subterminal spots are yellow; postmedian whitish spots extend from cell Rs to Cu_{1b} . **Hindwing underside:** (Figure 1 B, D) Ground colour black; the wing pattern similar to the upperside, but all spots smaller and more distinct; all subterminal spots are yellow; postmedian spots in cells M_3 and Cu_{1a} are also yellow; whitish streak within discal cell has yellowish distal part.



FIGURE 1. *Delias sanaca bidoupa* Monastyrskii & Vu **subspec. nov.** A-B—HT^{\bigcirc}, central Vietnam, Lam Dong province, Bi Doup N.P.; C-D—PT^{\bigcirc}; upperside on the left; underside on the right

Male is unknown.

Female genitalia (Figure 2): Corpus bursae oval with appendix bursae round; ductus bursae rather long and thin; signum broad, invaginated formed bi-oval flat structure both sides of which armed with short spines. Antrum is weakly developed but sterigma and lamella postvaginalis are prominent. Sterigma is the pair prominent invaginated structure having some well sclerotised vanes (blades). The lamella postvaginalis is triangular. Posterior apophyses thin and short; anterior apophyses not differentiated (vestigial).



FIGURE 2. Female genitalia of *Delias sanaca bidoupa* Monastyrskii & Vu **subspec. nov.**—PTQ: Ab—appendix bursae; Bc—bursa copulatrix; Db—ductus bursae; Ds—ductus seminalis; Si—signum; St—sterigma; Lp—lamella postvaginalis; Ap—apophysis posterior; Pa—papilla analis.

Diagnosis: The new taxon closely resembles *Delias sanaca perspicua* Fruhstorfer, 1910 distributed in China, Laos, and northern Vietnam (Nakamura & Wakahara, 2012). The male specimen figured in that work resembles both specimens collected near Mt. Bi Doup. Several wing pattern elements are similar (*e.g.*, the pattern of yellow spots on the underside of both wings). However, the wing pattern of *D. s. perspicua* figured by Pinratana, 1983; Ek-Amnuay, 2012; Wu & Hsu, 2017 differs by having larger whitish and yellow spots on both sides of the wings. The female genitalia of *D. sanaca* and other species of the *belladonna* group have never been published. When compared with *D. belladonna*, *D. berinda*, and *D. sanaca perspicua*, the female genitalia of *D. sanaca bidoupa* are most similar to *D. sanaca perspicua* from China, with a similar corpus bursa, signum, sterigma and lamella postvaginalis (Figure 3A–B); however, the lamella postvaginalis of *D. berinda* from China is more rounded (Figure 3C–D).



FIGURE 3. A–B: Female genitalia of *Delias sanaca perspicua* Fruhstorfer (southern China); **C–D**: Female genitalia of *Delias berinda adelma* Mitis (central China). A, C—a part of bursae copulatrix with signum; B, D—genitalia in ventral view: Db—ductus bursae; Ds—ductus seminalis; Si—signum; St—sterigma; Lp—lamella postvaginalis; Ap—apophysis posterior; Pa—papilla analis (with permission of Dr. Shao-ji Hu)

The male of the new taxon is unknown, and our study was based only on the morphology of a single female. We therefore regard this taxon of *Delias sanaca* from Lam Dong province as a separate, distinctive subspecies rather than a full species. Nevertheless, the new taxon requires additional study.

Type material: Holotype: CENTRAL VIETNAM: \bigcirc Lam Dong province, Bi Doup N.P., 06.IV.2002, ALM leg.; evergreen forest at 1,500 m. Paratype \bigcirc : from the same locality and date as HT.

Distribution: Females of this rare taxon are thus far known only from the vicinity of Mt. Bi Doup where they were discovered along an evergreen forest stream at 1,600 m.

Etymology: The new taxon is named after Mt. Bi Doup where the type specimen was discovered and collected.

Talbotia naganum aurelia Monastyrskii & Vu, subspec. nov. (Fig. 4)

Description: Male. Length of forewing: \bigcirc HT 30 mm; \bigcirc PTs 30, 27.5, 31, 29, 26, 28, 27, 29, 28.5, 29, 27, 27.5, 30, 27.5, 25, 30, 29.5 mm (n=17; mean=28.32)

Forewing upperside (Figure 4A). Ground colour uniformly white with blackened costal edge at basal and sub-basal areas; black broad submarginal band bordered distal part of costa, apex and half of termen extends from costa to the cell Cu_{1a} with connection to large black submarginal spot in cell M_3 , though rarely submarginal band is not connected with black spot in cell M_3 ; discocellular vein between M_2 and M_3 is ornamented by one black spot; submarginal area in cell Cu_{1b} sometimes bears blackish round spot varied in size. Forewing underside (Figure 4B). Ground colour uniformly white with yellowish ochreous margin from mid costa to mid termen which broadens at the apical area; large, usually rectangular black spot presented within centre of cell M_3 ; sometimes, small, blackened spots presented in cells Cu_{1b} and M_1 . Basal and sub-basal part of discal cell densely covered by blackish scales;



FIGURE 4. *Talbotia naganum aurelia* Monastyrskii & Vu, **subspec. nov.** A-B—HT \Diamond : central Vietnam, Gia Lai province, Kon Ka Kinh N.P.; E-F—PT \Diamond same location as the male. *Talbotia naganum pamsi* Vitalis de Salvaza, C-D— \Diamond : northern Vietnam, Lang Son province, Mau Son; G-H— \Diamond : northern Vietnam, Vinh Phuc province, Tam Dao N.P.

such dusty black area prominent at lower part of discal cell along cubitus; distinct black spot on the discocellular vein between M_2 and M_3 diffuses along cubitus. **Hindwing upperside** (Figure 4A). Ground colour of hindwing uniformly whitish with very pale creamy tinge which is the result of intensive yellow ground colour of the hindwing under surface. **Hindwing underside** (Figure 4B). Ground colour of the hindwing uniformly intensive yellow with light golden tinge and whitish scales on veins.

Female. Length of forewing: PTs 28, 27, 26, 27, 23 mm (n=5; mean= 26,2)

Forewing upperside (Figure 4E) Ground colour of the forewing varies from uniformly white to uniformly very pale yellowish unequally dusted with black scales; pattern includes a thick black border around the wing perimeter with small gap in cell Cu_{1b} , which includes a black oval spot; discal cell densely covered by black scales or it is fully black; discocellular veins covered by distinct black spot and thick black band connects discal cell with black border in cell M_3 . **Forewing underside** (Figure 4F) Ground colour of the white, densely dusted with blackish scales especially within discal cell; yellowish ochreous border spread from mid costa to mid termen becoming broader at the apical area; black band within cells 2A and Cu_{1b} from the basal area to the termen where it terminates as a large oval spot in cell Cu_{1b} . **Hindwing upperside** (Figure 4E). Ground colour of hindwing varies from pale creamy (specimens of dsf) to yellowish; series of marginal blackish triangle spots from vein Cu_{1b} to M_2 and spot in cell Rs usually weakly developed; in some specimens of dsf these spots fully disappeared; basal area dusted with black scales. **Hindwing underside** (Figure 4F). Ground colour of the hindwing uniformly intensive yellow with light golden tinge; fringe is white.

Diagnosis and discussion: The bright golden yellow colouration and unique pattern of the hindwing undersides are the main distinctive characteristics in both sexes of the new taxon. The subspecies *pamsi* is distributed in northern Vietnam and the northern part of central Vietnam, and the intensity of the yellow colouration increases from north to south. Other subspecies found in China (subspec. *cisseis*) and Taiwan (subspec. *karumii*) have much paler hindwing undersides. The females of *T. n. pamsi* and the other subspecies mentioned above have prominent marginal black spots on the upperside of the hindwing while these spots are usually weakly developed or absent in the *T. n. aurelia*. In addition, all black markings on the underside of the forewing are larger and darker. Gia Lai province in the Vietnamese Central Highlands is the southern-most border of the subspecies' distribution. Comparison of populations demonstrates intensification of yellow coloration on the underside of both wings from north to south.

Type material: Holotype: CENTRAL VIETNAM: ♂ Gia Lai province, Man Giang district, Kon Ka Kinh N.P., 19.V.2018, forest stream, 800 m asl, ALM leg. Paratypes 11♂, 5♀ from the same locality as HT; 18–19.V.2018; 13.IV.2019; 11.IV.1999; 6♂, CENTRAL VIETNAM, Quang Nam province, Son Thanh N.R., 30.V.2014; Kon Tum province, Ngoc Linh N.P. Paratypes 1♂ 12.VI.2018; ♀27.III.1998, forest valley at 1,600 m; VVL, ALM & PNT leg.

Distribution: The new taxon is distributed from Quang Nam to Gia Lai province.

Etymology: The name aurelia refers to the unusually bright golden yellow colour of the hindwing undersides.

Nymphalidae: Limenitidinae

Abrota ganga pulcheria Monastyrskii & Vu, subspec. nov. (Fig. 5)

Description: Male: Length of forewing: ∂HT 39 mm; ∂PT 38, 42 mm (n= 2).

Forewing upperside (Figure 5A). Ground colour dark orange with blackish brown markings: terminal fascia from apex to dorsum; thin, upper subterminal fascia extends from apex to vein M_3 ; separated lower part of subterminal fascia thick and extended from vein M_3 to tornus; this fascia joins the curved, thick postdiscal fasciae in cell M_3 , starting from radial vein R_5 , bend in cell M_2 and undulate through the mid areas of cells M_3 , Cu_{1a} , Cu_{1b} and 1A+2A; basal areas of cells Cu_{1b} and 1A+2A densely dusted with black scales; discal cell includes dark undulating marking over the discocellular veins. **Forewing underside** (Figure 5B). Ground colour is mainly beige with rich pattern of fulvous markings principal of which is thick postdiscal fascia extending from apex to mid of vein 1A+2A; discoidal cell bears undulated spot at the place of non-existent discocellular veins and two round spots merged; along the termen there is subterminal series of arrow-like spots bordering the termen. **Hindwing upperside** (Figure 5A).

Ground colour similar to the forewing; There are four dark brown parallel fasciae crossing the hindwing in parallel with the termen: terminal, subterminal, postdiscal and subbasal fasciae arise from vein 1A+2A and gradually narrow at vein Rs; marginal and submarginal fasciae extend to subcostal vein. **Hindwing underside** (Figure 5B). Ground colour similar to the underside of forewing with a pattern of diverse markings tinged with brownish-violet. Thick terminal fascia extend from vein 1A+2A to vein M_1 ; subterminal and postdiscal zigzagged fasciae also extend from vein 1A+2A to vein M_1 ; discal fascia extends from vein 1A+2A to vein Sc+R₁; subbasal area bears some round shape spots.

Female: Length of forewing: \bigcirc PTs 47.0, 45.0, 48.0 mm (n = 3).

Forewing upperside (Figure 5C). Ground colour blackish brown; the pattern includes a discal cell streak and streak beyond the discal cell that merges with spot at base of cell M_3 ; upper and lower postdiscal bands and subterminal fascia well developed; all markings fulvous. **Forewing underside** (Figure 5D). Ground colour dark reddish-brown with indistinct paler upper postdiscal bands in cells Rs and M_1 and lower postdiscal band in cells Cu_{1a} , Cu_{1b} ; discal cell streak obscure and streak beyond discal cell unclear; other markings not distinct except well visible whitish dotted line extended from mid of cell Cu1b to the distal part of cell Rs. **Hindwing upperside** (Figure 5C). Ground colour blackish brown: the pattern includes discal and postdiscal fulvous bands extending from vein 1A+2A to vein Sc+R₁. **Hindwing underside** (Figure 5D). Ground colour dark reddish-brown with obscure indistinct pattern similar to moire.



FIGURE 5. *Abrota ganga pulcheria* Monastyrskii & Vu, **subspec. nov.**: **A**–**B**—HT♂: central Vietnam, Gia Lai province, Kon Chu Rang N.R.; **C**–**D** PT ♀, same locality and date as in HT.

Diagnosis. The wing patterns of both sexes are seasonally variable. In addition, the male ground colour and colour of female markings vary geographically. Yoshino (2021) describes three male forms differing in their dark wing pattern elements. While Yoshino (2021) purports that these forms have distinct geographic distributions, we have observed all three phenotypes throughout their distribution. These forms are therefore equivalent to subspecies. Other more significant characters include the ground colour of the wing upperside in males and colouration of the bands and spots in females.

Males of the new subspecies have dark fulvous (dark orange) ground colour (Figure 5A), which is usually duller

than in other subspecies. The upperside wing pattern in the females is usually similar to the nominate subspecies; however, the colour of the markings varies geographically from pure white in Taiwan (subspec. formosana) and pale yellow in N.E. India, eastern Tibet and Yunnan (the nominate subspecies) to pale orange in Sichuan, Fujian, Guangdong, northern Vietnam (Ha Giang) (subspec. pratti) and clear dark orange in this new subspecies (subspec. pulcheria) from the southern part of central Vietnam. In addition, in the new subspecies all markings on the upperside of both wings are much broader.

Type material: Holotype: CENTRAL VIETNAM: ♂ Gia Lai province, K'Bang district, Kon Chu Rang N.R., 20.V.2015, evergreen forest trail at 500 m asl, ALM leg.

Paratypes: 1♂, 1♀ from the same locality as holotype; 20. V. 2015 and 21.V.2015; 1♂, CENTRAL VIETNAM, Khanh Hoa province, Mt. Hon Ba, 1,540 m asl; 16.V.2016, T. Miyagawa leg., ex coll. K. Saito; 19, CENTRAL VIETNAM, Kon Tum, Mang Den, VI.2018, local collector (ex coll. K. Saito); 13, 19 CENTRAL VIETNAM, Quang Nam province, Ma Cooih district, Son Thanh N.R., 28.IX.2002, primary evergreen forest, 880 m asl, R. Shore leg.

Distribution: The new taxon has been recorded in the Vietnamese Central Highlands from Quang Nam to Lam Dong provinces.

Etymology: The name *pulcheria* may be translated as "beautiful".

Bassarona recta consonensis Monastyrskii & Vu, subspecies nov. (Fig. 6)

Description: Male. Length of forewing: HT 33 mm; PT 32.5; mm (n= 2)

Forewing upperside (Figure 6A). Ground colour of both wings is black with different tinges in some areas: basal and discal areas uniformly velvety black; submarginal and marginal areas on both wings slightly paler. Postdiscal band on both wings pale greenish yellow; shape of spots is more rectangular than oval; spaces between spots narrower than the vein thickness.







FIGURE 6. Postdiscal band on the forewing in the male of: A-B-Bassarona recta consonensis Monastyrskii & Vu subspec. nov.—HT♂, Con Son Is. (southern Vietnam); C-D—B. recta monilis Moore; Cat Tien N.P. (southern Vietnam, Dong Nai province); postdiscal band on the forewing in the female of: E-F-Bassarona recta consonensis Monastyrskii & Vu subspec. **nov.**—PT♀, Con Son Is. (southern Vietnam); G–H—B. recta monilis Moore; Cat Tien N.P. (southern Vietnam, Dong Nai province)

Forewing underside (Figure 6B) Ground colour is pale brown; middle of discal cell has a small round, red spot and a red lunular spot bordered with black; pale greenish postdiscal band bordered by brown; stroke-like submarginal black spots located within cell M_1 , M_3 -Cu_{1b}.

Female: Length of forewing: *QPTs* 39, 38, 35, 38.5 mm (n=4; x=37,63)

Forewing upperside (Figure 6E) Ground colour of both wings is dark brown; basal and discal areas uniformly dark brown; submarginal area out of postdiscal band pale brown with dark, nearly black medial band; spaces between spots on postdiscal band between cells M_2 and Cu_{1b} not broader than thickness of a vein. **Forewing underside** (Figure 6F) Ground colour of both wings brown; shape and colour of markings similar to the upperside.

Diagnosis. In the new subspecies, the ground colour on the upperside of both wings is slightly darker than in individuals from the Vietnam mainland. The yellowish postdiscal band is similar in shape and colour to individuals from the mainland; however, it is slightly broader and the spaces between neighbouring spots are narrower than the thickness of a vein. In $\Im \Im$, spots in cells Cu_{1a} and M₃ are more rectangular than the ovoid shapes found in other subspecies (Figures 6C–D), while in $\Im \Im$ the shape of spots in cells Cu_{1a} and M₃ is more rectangular than oval. Spaces between spots in cells M₁–Cu_{1a} are absent, whereas these spaces are much broader in individuals from the Vietnam mainland (Figures 6G–H).

Distribution: The new subspecies is distributed only in the Con Dao Archipelago: Con Son Is. and Hon Ba Is.

Pantoporia bieti aurantina Monastyrskii & To, subspecies nov.

(Figs. 7A, B)

Description: Female: Length of forewing: HT 25 mm.

Both wings upperside. (Figure 7A) Ground colour is black; all spots and bands are uniformly bright orange, including large discal cell streak merged with the streak beyond discal cell; lower postdiscal large spots in cells A1+A2 and Cu_{1a} are connected in cell Cu_{1b} ;

Both wings underside. (Figure 7B) Ground colour of both wings dark reddish brown; all spots and bands are yellow; markings broad and distinct; wing patterns similar to those on the upperside except for a series of distinct pale violet subcostal spots in cells R_1 , R_2 , R_5 and M_1 .

Diagnosis: The new taxon may be distinguished from individuals of other subspecies distributed in western China (the nominate subspecies) (Figure 7E–F), Naga Hills and northern Vietnam (subspec. *paona*) (Figure 7C–D). It has well developed, broad, bright orange markings on the upperside of both wings, while the other subspecies have whitish (eastern Tibet; Bozano, 2008) or yellowish markings (the nominate subspec. from central China and subspec. *paona* from northeastern India (ex Lepidoptera collection of the NHM). The most unusual character of the new taxon is the well-developed series of subcostal spots on the underside of the forewing. Individuals of other subspecies either lack this character or it is unclear. In addition, subcostal spots on the forewing are not typical for *Pantoporia*. This character is usually observed in some *Neptis* with orange markings, such as the *armandia*, *themis* and *antilope* groups.

Type material: Holotype: CENTRAL VIETNAM, \bigcirc Gia Lai province, Kon Ka Kinh N.P., IV.2016, TQ leg. **Distribution:** Currently only recorded from Central Vietnam, Gia Lai province, Kon Ka Kinh N.P.



FIGURE 7.—*Pantoporia bieti aurantina* Monastyrskii & To, **subspec. nov.** A–B—♀HT, central Vietnam, Gia Lai province, Kon Ka Kinh N.P.; C–D—*P. b. paona* Tytler, 1915, Type, ♀, Kirbari, Naga Hills; E–F—*P. b. bieti* (Oberthür, 1894), Type, ♂, western China, Ta-Tsien-Lou

Nymphalidae: Satyrinae

Ragadia latifasciata Leech, 1891 (Fig. 8)

For many years, this half-forgotten species was known only from type specimens collected in Moupin [Baoxing, Sichuan] (western China) deposited in NHM: Type \Diamond , B.M. Type NoRh2682, Moupin, July 1890; Type \bigcirc B.M. Type NoRh2683, Moupin, July 1890 (Figure 8). A female similar to *R. latifasciata* was mentioned by Nishimura (2008) from northern Vietnam (Ha Giang province). It was the first record of *R. latifasciata* from Vietnam. However, the taxon was regarded as a form of *R. crisilda*.



FIGURE 8. *Ragadia latifasciata cristata* Monastyrskii & Vu, **subspec. nov.** A–B—♂HT, northern Vietnam, Ha Giang province, Dong Van district; C–D—PT ♀—ditto HT; E–F—*R. latifasciata* Leech, ♂Type; B.M. Type NoRh 2682, China, Moupin, Kricheldorf coll., July 1890; BMNH(E) #141965; G–H—*R. latifasciata* Leech, ♀Cotype; B.M. Type NoRh 2683, Moupin, Kricheldorf coll., July 1890; BMNH(E) #141963



FIGURE 9. Male genitalia of **A**—*Ragadia latifasciata cristata* Monastyrskii & Vu, **subspec. nov.** (northern Vietnam, Ha Giang province); **B**—*R. l. crystallina* Monastyrskii & Vu, **subspec. nov.** (central Vietnam, Thua Thien Hue province); **C**—*R. l. critias* Riley & Godfrey, (southern China, southern Yunnan)

Ragadia latifasciata cristata Monastyrskii & Vu, subspec. nov.

(Figs. 8, 9)

Description: Male. Length of forewing: HT 22.5 mm.

 \bigcirc **Upperside** (Figure 8A). Ground colour of both wings blackish with a broad, white postdiscal band broadened at dorsum on the forewing and to the costal edge on the hindwing; on the forewing the band ends at vein M₁. Basal and sub-basal whitish fasciae on the forewing are indistinct. **Underside** (Figure 8B). Both wings ground colour blackish with broad postdiscal white band and well distinct basal, sub-basal and submarginal whitish fasciae. Forewing with series of submarginal eye spots including spots in cells from Cu_{1b} (double spot) to R₄ (single spots in all other cells); hindwing with series of subterminal eye ringed spots spreading from cell Cu_{1b} to Rs; spot in cell M₁ is absent.

Female: length of forewing: PTs 24.0; 24.5; 25 mm.

 \bigcirc (Figure 8C, D) The female is slightly larger than the male with a convex terminal edge on the forewing; wing patterns on both surfaces are similar to that in the male. The most conspicuous character is the absence of an eye spot in cell M₁ of the hindwing.

Male genitalia. (Figure 9). Uncus long, slender and gradually tapering at tip; uncus in 1.5 times longer than tegumen and pointed towards the tip; gnathos is $\frac{1}{2}$ of the uncus length and pointed towards the end; saccus relatively long but shorter than valvae; phallus long with hooked bend at the tip; valvae elongated with the round apex and small and small spike at upper side.

Diagnosis. Specimens recently collected in Ha Giang province are similar to the \mathcal{J} and \mathcal{Q} *R. latifasciata* type specimens described from Moupin [Baoxing, Sichuan] (W. China) and deposited in the NHM. It is definitely a rare species that has not been collected or mentioned since Leech's (1892–94) publication of the species description. Recently, the taxon *latifasciata* was misidentified as a subspecies of *R. crisilda* in Lang (2017) and has been regarded as a form of *R. crisilda*. However, type specimens of *latifasciata* from China and the recent discovery from Ha Giang bear no resemblance to *R. crisilda*, which has a complete series of submarginal spots on the hindwing underside. The wing patterns of *R. latifasciata* are similar to those of *R. critias* Riley & Godfrey, 1921 from central Vietnam, which can be easily distinguished from specimens from the type locality (N. Thailand) and from Southern China (Yunnan province, near the border to Vietnam). At the same time, the male genitalia of *latifasciata* from N. Vietnam and *critias* from C. Vietnam, Thailand and S. China show high similarity (Figures 10). Considering these observations, we suggest a revision of these species.

Type material: Holotype: NORTHERN VIETNAM, \mathcal{S} Ha Giang province, Dong Van district, Yen Minh commune, VI.2015, local collector leg. Paratypes \mathcal{Q} the same location and date as holotype, local collector leg.; \mathcal{Q} the same location as holotype, VI.2009, HVT leg.; \mathcal{Q} Ha Giang province, IV–V.2007, local collector leg.

Distribution. The new taxon is known only from Ha Giang province (northern Vietnam), though it may occur in southern China.

Ragadia latifasciata critias Riley & Godfrey, 1921 stat. rev.

The male genitalia and wing patterns of *critias* and *latifasciata* (Figures 9A-C) are highly similar. Thus, the former name must be regarded as a junior synonym of *latifasciata* and described as a subspecies of the new valid species name. The most important character separating *critias* from other subspecies is the absence of the eye spot in cell M_3 on the underside of the hindwing.

Ragadia latifasciata crystallina Monastyrskii & Vu, subspec. nov.

(Figs. 10C-F)

Description: Male: length of forewing: HT 21 mm; PTs 23, 24, 21, 20 mm.

 \Diamond **Upperside** (Figure 10C–D). Ground colour of both wings is black with two whitish bands on both wings; forewing with very wide postdiscal band which is broad at dorsum and gradually tapering toward the apex and ending near vein M₁; the thin subterminal fascia starting from vein 1A+2A and ends at vein M₃; terminal fascia

barely noticeable; poorly visible basal and sub-basal fasciae starting from vein 1A+2A and extending to subcostal vein; hindwing white discal fascia starting from costal edge and gradually narrowing at dorsal edge; basal and sub-basal fasciae very poor visible; narrow submarginal whitish fascia prominent.

Underside (Figure 10E–F). Ground colour of both wings blackish brown. Forewing pattern of fasciae similar to upperside, but all whitish fasciae prominent, and postdiscal whitish band reaches costal edge near apex; submarginal blackish area bears series of single yellow ringed ocelli from the cell R_4 to Cu_{1a} ; there are two ocelli in the cell Cu_{1b} ; every ocellus has a bluish pupil surrounded by a thick black ring. Hindwing pattern of fasciae similar to upperside, but all whitish fasciae prominent; broad submarginal blackish brown area bears series of oval ocelli in cells Cu_{1b} -Rs except cell M_1 ; the cell Cu_{1b} includes two ocelli.

Female: length of forewing: 2PTs 20, 24 mm.

 \bigcirc (Figures 10E–F). Both **upperside** and **underside** wing pattern similar to that in the \Diamond .



FIGURE 10. A–B—*Ragadia latifasciata critias* Riley & Godfrey, 1921 stat. rev., ♂—southern China; C–D—*R. latifasciata crystallina* Monastyrskii & Vu, subspec. nov., ♂HT—central Vietnam, Thua Thien Hue province, Bach Ma N.P.; E–F—Ditto, ♀PT—central Vietnam, Kon Tum province.

Male genitalia (Figure 9B) similar to the nominate subspec. *latifasciata* and other subspecies including *critias* and *cristata* from W. China, N. Vietnam and Thailand (Lang, 2017).

Diagnosis. The new subspecies differs from the nominate subspecies and subspecies *critias* in the following characters: 1. Compared to the nominate subspecies, both sexes of *crystallina* have much narrower whitish postdiscal bands on both wings; 2. Similar to the nominate subspecies, the new taxon lacks an ocellus only in cell M_1 , while subspecies *critias* lacks submarginal ocelli in cells M_1 and M_3 .

Type material: Holotype: CENTRAL VIETNAM, \Im Thua Thien Hue province, Bach Ma N.P., VII.2010, ALM leg. Paratypes: CENTRAL VIETNAM, $4\Im 2 \Im$ Kon Tum province, Ngoc Linh N.P., Lo Xo pass, 24.V.2015; Kon Chu Rang N.R., 20–21.V.2015.

Distribution. Central Vietnam: Ha Tinh province (Vu Quang N.P., Huong Son SFE), Thua Thien Hue province (Bach Ma N.P.); Quang Nam province (Saola N.R.), Kon Tum province (Ngoc Linh N.P.); Gia Lai province (Kon Ka Kinh N.P., Kon Chu Rang N.R.) (Monastyrskii, 2005a).

Nymphalidae: Satyrinae, Amathusiini

Aemona infuscata Devyatkin & Monastyrskii, 2008 stat. rev.

(Figs. 11A, B)

Aemona infiscata Devyatkin & Monastyrskii, 2008 was originally described as a subspecies of *A. tonkinensis* Rothschild, 1916. The status of the latter taxon was established by Devyatkin & Monastyrskii (2008) showing that *A. amathusia* (Hewitson, 1868) and *A. tonkinensis* are separate species. *Aemona infuscata* is smaller than *A. tonkinensis*. The hindwings are ochreous brown and darker than the forewings with faint submarginal lunules. The original description does not describe genitalia. However, since the description of *infuscata*, we have been able to examine the genitalia of many specimens and find that the phallus has a conspicuous, sclerotised rib, the centre of which bears a few spines (Figure 11A, B). In *A. infuscata*, only the distal margin of the clasper's tip is covered by spines, while in *A. tonkinensis* spines cover around half of tip. This difference, in concert with differences in size and wing colouration demonstrate that *infuscata* should be elevated to the species level.

Aemona gialaica Monastyrskii, K. Saito & Vu spec. nov.

(Figs. 11C-F, 12)

Description: Male: length of forewing: HT 37 mm; PTs 37-38

Upperside. (Figure 12A). Forewing weakly falcate; ground colour pale orange with slight brownish tinge on basal and subbasal areas; apex and terminal (marginal) fascia is brown; hindwing ground colour uniformly dirty orange

Underside (Figure 12B). Ground colour of both wings uniformly pale fulvous; they bear dark brown fasciae in sub-basal and postdiscal areas; subterminal area on the forewing bears white pupiled round spot in cell Cu_{1a} ; subterminal area on hindwing bears a series of small round, white pupiled spots within cells Rs- Cu_{1b} .

Female: length of forewing: PT 41.2 mm.

Upperside. (Figure 12C). Forewing ground colour uniformly dark brown from basal to discal area; apical area blackish brown with thin blackish terminal fascia from apex to termen; between apex and discal area postdiscal yellowish band. Nearly all of hindwing uniformly dark brown with slightly paler ochreous patches at Rs and M_1 .

Underside. (Figure 12D). Outer forewing greyish area extending from apex to dorsum is separated from other parts of the wing by dark brown fascia; another part of the forewing has a uniformly brown ground colour; the thin sub-basal dark brown fascia crosses discal cell and abuts at the vein 1A+2A. Outer hindwing greyish brown area extending from apex to tornus is separated from darker brown discal area which also separated from basal and sub-basal areas; series of subterminal whitish round spots extends from cell Rs to Cu_{1b} with largest spot in cell Cu_{1a}

Male genitalia (Figure 11C–E) Generally, the genitalia of the new species is similar to *A. tonkinensis* (Figure 11G–J). In particular, the uncus, tegumen, gnathos, and valvae of specimens from Kon Ka Kinh are similar to those *A. tonkinensis*, though the apical part of the claspers is more elongated and evenly rounded with a spatula-like shape



FIGURE 11. A–B—Aemona infuscata Devyatkin & Monastyrskii, stat. rev.: A—phallus in lateral view; B—ditto in ventral view; C–E—Genitalia of the male and female Aemona gialaica Monastyrskii, K. Saito & Vu, spec. nov.,: E—general structure of the male genitalia in lateral view, \Im PT; D—phallus in dorsal view; C—phallus in lateral view; F—the female genitalia in ventral view, \Im PT; G–J—Genitalia of the male and female Aemona tonkinensis Rothschild, 1916: I—general structure of the male genitalia in lateral view; H—phallus in dorsal view; G—phallus in lateral view; J—the female genitalia in ventral view; spec. La—lamella antevaginalis; Db—ductus bursae; St—sterigma

(Figure 11E). The most conspicuous character of the new species is a structure of its phallus (Figures 11C, D). In lateral view the phallus is more or less evenly thick from the base to distal part and smoothly curved in the centre (Figure 11C); the sclerotised rib is not very long and covered with spines only in the central part (Figures 11 C, D). In dorsal view the phallus is straight and broadened at the distal end.

Female genitalia (Figure 11F). The most distinctive character of the female genitalia in species of *Aemona amathusia*—group is shape and size of lamella antevaginalis. In *A. gialaica* and *A. tonkinensis*, the shape of this structure are similar. However, in *A. gialaica*, the dorsal part of lamella antevaginalis is flat and lacks any excavation, whereas the lamella in *A. tonkinensis* has a visible concavity (Figure 11F, J).

Diagnosis and discussion. The new species resembles *A. tonkinensis*. Both species have similar wing shapes and patterns. However, the males are slightly smaller, and the upperside of both wings darker. In *A. gialaica*, the phallus is more or less straight in dorsal view (Figure 11D). The sclerotised rib on the dorsal side of the phallus is shorter than in *A. tonkinensis* and shifted at its base; the rib is covered with only a few spines and only in the central part of the phallus (Figure 11C). The tip of the clasper is elongated and densely covered with spines arranged in rows mostly along the ventral side. In the female of new species shape of the lamella antevaginalis is similar in shape to *A. tonkinensis* from northern Vietnam and *A. peali* distributed in Manipur and southern Shan States in Myanmar.

Type material: Holotype 3° : CENTRAL VIETNAM, Gia Lai province, Mang Yang district, A yun commune, Kon Ka Kinh N.P., 21.V.2018; evergreen forest at 900 m; leg. ALM; Paratypes 23° : same location and habitat as the HT, 24.V.2018; 22.V.2018; ALM leg.; $13^\circ 1^\circ \uparrow$ CENTRAL VIETNAM, Gia Lai province, Chu Dang Ya, Pleiku, 08.V.2017, alt. 800–1,250 m; leg. T. Miyagawa; ex. coll. K. Saito.



FIGURE 12. A–B—*Aemona gialaica* Monastyrskii, K. Saito & Vu, **subspec. nov.**, *∂*HT—central Vietnam, Gia Lai province, Kon Ka Kinh N.P.; **C–D**—ditto, *♀*PT—Gia Lai, Pleiku

Distribution and habitats. This newly elevated species from Quang Ngai and Gia Lai (Kon Chu Rang N.R. and Kon Ka Kinh N.P.) provinces increases the remarkable number of *Aemona* species found in the Central Vietnamese Highlands. These species are distributed from lower forest habitats (400–600 m) to high montane forest at 1,600–1,700 m). The new species was discovered between 900–1,000 m.

Etymology: This taxon is named after type locality—Con Son Island.

Faunis indistincta luctus Monastyrskii & Vu subspec. nov.

(Figure 13, 14)

Description: Male: length of forewing: HT: 45.0 mm; PTs: 46.0; 45.0; 46.0 mm; antennae dark brown (22.0 mm). **Forewing upperside** (Figure 13A): ground colour uniformly grey; area from termen and apex to postmedian and subcostal penetrating into discal cell uniformly blackish brown; there is a smooth transition from greyish black to bright grey in the postmedian area; series of small whitish subterminal spots is lined from cell R₄ to Cu_{1a}; cilia dark brown.

Hindwing upperside (Figure 13A): ground colour uniformly grey with blackish brown bordering from termen to subterminal area and smooth transition to greyish colour; there is a series of small and subtle whitish subterminal spots from cell Rs to Cu_{1a} ; cilia dark brown. At base of cubitus there is hair tuft touching a small spot of specialised scent scales on underside of forewing base.



FIGURE 13. A–B—Faunis indistincta luctus Monastyrskii & Vu, subspec. nov., ♂HT; C–D—F. caelestis Monastyrskii & Lang, 2016, ♂HT

Forewing underside (Figure 13B): Ground colour dark brown with three darker brown fasciae located within discal cell (submedian) and at postmedian and subterminal areas; series of subterminal small whitish spots located in a row from cell R_4 to Cu_{1a} .

Hindwing underside (Figure 13B): ground colour is similar to the forewing; the hindwing pattern includes submedian straight fascia extending from $Sc+R_1$ to Cu_{1b} ; postmedian fascia extending from $Sc+R_1$ to Cu_{1b} and subterminal fascia from Rs to Cu1b; series of small whitish subterminal spots extending from cell Rs to Cu_{1a}

Female: unknown



FIGURE 14. The male genitalia of *Faunis aerope*-group: A, C–E—*Faunis indistincta luctus* Monastyrskii & Vu subspec. nov., ♂PT: A—general view of male genitalia in lateral aspect; C–E—ditto, apex of right claspers; B—general view of male genitalia of *F. caelestis* Monastyrskii & Lang, 2016; F—*F. aerope aerope* (Leech, 1890)—right clasper (after Monastyrskii & Lang, 2016); G—*F. aerope yunnanensis* Brooks, 1933 (after Monastyrskii & Lang, 2016).

Diagnosis. The new taxon collected in Lao Cai Province resembles members of the *Faunis aerope* speciesgroup distributed in southern China and northern Vietnam. The most distinctive character of *F. indistincta* Mell is the male genitalia structure which vaguely resembles that of *F. aerope*: relatively short and curved valvae with apex covered by dense spines (Figure 14A, C–E). *Faunis indistincta luctus* is similar to recently the described species *Faunis caelestis* Monastyrskii & Lang, 2016 (Figure 13C–D). Both species have similar wing patterns on the undersides of both wings, though in *F. caelestis* the ground colour is paler. The upperside of *F. indistincta luctus* is similar to *F. aerope yunnanensis* Brooks and *F. caelestis*, though the new taxon has broad black borders on both wings (Figure 13A) and distinctive male genitalia (Figure 14A, C–E). The female genitalia structures in species of *F. aerope* group are also distinctive; however, this character cannot be used in the current study because the female of *F. indistincta luctus* has not yet been discovered.

Type material. Holotype: NORTHERN VIETNAM, \mathcal{O} , Lao Cai province, Hoang Lien N.P., Cong Troi pass (Tram Ton ranger station), 20.V.2011; evergreen mountain forest at ~1,900 m; VVL leg.; Paratypes: $3\mathcal{O}$: same data as holotype. The holotype and two paratypes will be deposited in the VNMN (Hanoi); one paratype will be deposited in the NHM (London).

Distribution and habitats. The new taxon has been recorded only at Hoang Lien National Park in the vicinity of Fan Si Pan peak and the forest ranger station at elevations around 2,000 m.

New records

Nymphalidae: Heliconiinae

Argyronome laodice (Pallas, 1771)

♂ northern Vietnam, Ha Giang province, iv.2010.

This is the second record from Vietnam.

Previously this rare species was recorded by A. de Cooman in 1928 from Hoa Binh province (north-western Vietnam) (Monastyrskii, 2019). This specimen resembles ssp. *japonica* Ménétriés, though populations from S. China are similar to ssp. *rudra* Moore. The specimen collected in Ha Giang province (eastern side of N. Vietnam) is similar to ssp. *rudra*.

Nymphalidae: Satyrinae

Palaeonympha opalina Butler, 1871

3 northern Vietnam, Ha Giang province, Dong Van district, V.2013, local collector; 1 northern Vietnam, Ha Giang province, 26.VIII.2007, local collector.

First record from Vietnam.

Ypthima motschulskyi (Bremer & Grey), 1853

(Fig. 15)

2 northern Vietnam, Ha Giang province, Dong Van district (?), V–VI. 2016, local collector. First record from Vietnam.

Considering the first record of *Ypthima motschulskyi* from Vietnam we demonstrate here the images of the male from Vietnam. The male genitalia are similar to genitalia of this species illustrated in literature (e.g., Elwes & Edwards, 1893; Shrôzu & Shima, 1979 and Bascombe *et al.*, 1999) (Figure 15). These illustrations confirm the identity of this new addition to the butterfly fauna of Vietnam.

Discussion

Some of the new butterfly subspecies from central Vietnam described in this paper—when compared with conspecific specimens from elsewhere—demonstrate a latitudinal gradient in wing pattern and colouration. In particular, some orange spotted species in the tribe Neptini (Nymphalidae, Limenitidinae) tend to be whitish or pale yellow in the north, transitioning to intensive yellow and orange in more southern parts of the species' range in central Vietnam.

This is curious because some species that have whitish markings in Myanmar and central Himalayas have yellow or orange markings in China and Indochina. According to Eliot (1969) the precise boundary between yellow and white forms occurs in different places in different species, suggesting that there is no single cause for the change.

Pantoporia bieti exemplifies this latitudinal colour shift, which has previously been demonstrated in *Neptis armandia*, *N. manasa*, *N. zaida*, *Phaedyma aspasia* and a few other species in this tribe. These species are remarkable for exhibiting an unusually high degree of variability and a large number of described subspecies: whitish, pale yellow, and orange monomorphic subspecies occurring from the central Himalayas to S. Myanmar and N. & C. Indochina including Vietnam (Monastyrskii & Devyatkin, 2003; K. Saito & Inayoshi, 2018).



FIGURE 15. *Ypthima motschulskyi*. **A–B**— \mathcal{J} upperside and underside: N. Vietnam, Ha Giang province; **C**— \mathcal{J} genitalia: T— tegumen; U—uncus; ARC—apex of right clasp in lateral and dorsal view; LC—left clasp in lateral view; RC—right clasp in ventral view; Sc—saccus; T, U—tegumen and uncus in dorsal view.

Similar geographic variability in wing colour pattern has been found in *Abrota ganga* (Nymphalidae: Limenitidinae, Adoliadini). Female wing patterns in monotypic genus are similar to Neptini and vary geographically like species in this tribe. In particular, the pale yellow markings of specimens from northern India and the whitish markings of specimens from Taiwan change to yellowish orange in central and southern China and northern Vietnam.

Isolated *A. ganga* populations in the Central Highlands of Vietnam (Quang Nam, Kon Tum, Gia Lai provinces) are characterised by dark, fulvous markings. Unusually intense coloration of specimens from the Central Highlands

is pronounced in *Talbotia naganum*. The undersides of both wings are intensely golden yellow, far darker than in populations elsewhere. Such pattern has been mentioned in literature (Cheng *et al.*, 2018; Xing *et al.*, 2018).

Butterflies with species distributions in the Sino-Himalayan or Indo-Burmese regions typically inhabit tropical evergreen mountain forest in the Central Highlands of Vietnam, among of which pierids *Delias sanaca*, *Talbotia naganum* and nymphalids: *Abrota ganga*; *Pantoporia bieti*; *Ragadia latifasciata*; *Faunis indistincta*; *Aemona gialaica* were recorded. These observed changes in coloration over a latitudinal and elevational gradient may be due to differences in climate, coloration, or predation pressure in different areas. The geological uplift that formed the Central Highlands of Vietnam may have also isolated the biota of the region, exposing it to high elevation conditions.

The species richness of Amathusiini is likely higher in Vietnam than any other country. This study adds two new species, bringing the number of Amathusiini species endemic to the Vietnamese Central Highlands to a total of five. The diversity of the *Aemona amathusia* species-group is higher in Vietnam than anywhere else, including China and northeastern India. Recent revision and descriptive work on the genus *Faunis* has demonstrated high species diversity in different areas of Vietnam and Indochina, similar to *Aemona* and *Stichophthalma* (Monastyrskii & Lang, *in* Monastyrskii, 2016). This paper describes a new subspecies of *Faunis indistincta* in the *Faunis aerope* group from Lao Cai province. The male genitalia of this new taxon is similar to the nominate subspecies from China. The list of other Satyrinae in Vietnam has been extended to include three new species, one of which, *Ragadia latifasciata*, now has two subspecies.

The collection localities of the new taxa described in this paper suggest that the following isolated areas of the country may yield additional new taxonomic discoveries: 1) mountain massifs in central Vietnam; 2) northern mountains along the boundary with China in Lao Cai, Ha Giang, Cao Bang and Lang Son provinces; and 3) the southern islands. Taxa new to science are mostly likely in the Satyrinae (Nymphalidae), Lycaenidae, Riodinidae, and Hesperiidae.

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