New subspecies of Papilionidae LATREILLE, [1802] from Sabah, Malaysia (Lepidoptera: Papilionidae)

Fatimah ABANG and Malcolm G. P. PAGE[1]

Prof. Dr. Fatimah ABANG, Faculty of Resource Science and Technology, University of Malaysia, Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia
Prof. Dr. Malcolm G. P. PAGE[1], Wintergasse 18, CH-4056 Basel, Switzerland; mgppage@gmx.ch

Abstract: We describe five new subspecies of Papilionidae from the islands of Balambangan and Banggi, Sabah, East Malaysia. These are: *Arisbe (Pathysa) antiphates* ***sinambungensis*** **ssp. n.** from Banggi, *Arisbe (Pathysa) antiphates* ***simpulensis*** **ssp. n.** from Balambangan, *Arisbe (Eurypleana) doson* ***sarpedonoides*** **ssp. n.** from Balambangan and Banggi, *Menelaides hipponous* ***jalanii*** **ssp. n.** from Balambangan and Banggi, and *Achillides palinurus* ***audryae*** **ssp. n.** (holotype ♀; the other holotypes are ♂♂) from Banggi. All holotypes and paratypes are in the collection of the University of Malaysia, Sarawak, Kota Samarahan.

Keywords: swallowtail butterflies, distribution, Borneo, Balambangan, Banggi.

Neue Unterarten von Papilioniden aus Sabah, Malaysia (Lepidoptera: Papilionidae)

Zusammenfassung: Wir beschreiben fünf neue Papilionidae-Unterarten von den Inseln Balambangan und Banggi, Sabah, Ostmalaysia: *Arisbe (Pathysa) antiphates* ***sinambungensis*** **ssp. n.** aus Banggi, *Arisbe (Pathysa) antiphates* ***simpulensis*** **ssp. n.** aus Balambangan, *Arisbe (Eurypleana) doson* ***sarpedonoides*** **ssp. n.** aus Balambangan und Banggi, *Menelaides hipponous* ***jalanii*** **ssp. n.** aus Balambangan und Banggi, and *Achillides palinurus* ***audryae*** **ssp. n.** (Holotypus ♀; die übrigen Holotypen sind ♂♂) aus Banggi. Die Holotypen und Paratypen der neuen Taxa sind in der Sammlung der University of Malaysia, Sarawak, Kota Samarahan, deponiert.

Introduction

Balambangan and Banggi are islands located off the northernmost tip of Sabah, Borneo. Earlier studies of the Ledidoptera of Balambangan (ABANG et al. 2004) have shown that the fauna of this island comprises elements from both Borneo proper and the Philippines, with a tendency to form endemic subspecies. This is confirmed by our study of the Papilionidae, described herein. The discovery of *Menelaides hipponous* (FELDER & FELDER, 1862) on Balambangan and Banggi constitutes the first record of this species from Malaysia. It is otherwise confined to the Philippines and Talaud Island of Indonesia, while the very closely related (if not conspecific) *M. pitmani* ELWES & DE NICÉVILLE, 1886 is found from N. India through Myanamar, Thailand, Laos, Cambodia, Vietnam and S. China to Hainan. *Arisbe (Pathysa) antiphates* (CRAMER, 1775) is a typical species of the Sundaland faunal province and here reaches the edge of its distribution on Banggi and Balambangan. The systematic taxonomy used here follows that of PAGE & TREADAWAY (2003a, 2003b, 2004).

Abbreviations used:

UMSK University of Malaysia, Sarawak, Kota Samarahan (entomological collection).

Descriptions

Arisbe (Pathysa) antiphates ***sinambungensis*** **ssp. n.**

Holotype ♂: Bukit Sinambung, N. Banggi, 14. VI. 2004, in UMSK; Fig. 1.

Paratypes (in total 6 ♂♂, 3 ♀♀, all in UMSK): All from **Banggi:** allotype ♀, 15. VI. 2004; Fig. 2. 1 ♂ 30. V. 1973, leg. J. C. ROBINSON, ex coll. J. HAUGUM; 1 ♀ 5. VI. 2004, 2 ♂♂ 15. VI. 2004; 2 ♂♂ 16. VI. 2004; 1 ♀ 7.–11. V. 2005, 1 ♂ 11. VI. 2005.

Etymology: This subspecies is named after the principal collecting area Bukit Sinambung (Mt. Banggi). The name is herewith defined as being a noun in apposition.

Holotype. Forewing length from base to tip 39.9 mm. Similar in general facies to *A. (P.) antiphates itamputi* (BUTLER, 1885) from Borneo proper, however, the area of grey maculation on the hindwing upperside is considerably larger. This area is typically 4.1–5.5 mm deep in specimens of ssp. *itamputi* from N. Borneo but is 6.4 mm in the holotype of ssp. *sinambungensis*.

Allotype. Forewing length from base to tip 42.3 mm. Similar to the ♂, with an extensive area of grey maculation on the hindwing upperside.

Variability. The ♂ and ♀ paratypes correspond well to the holotype and allotype, respectively. The area of grey maculation on the hindwing upperside is between 6.1 and 7.5 mm deep. In 1 ♂ and 1 ♀ specimen, the submarginal spot in cell M1 of the hindwing is marked with a small area of grey scales (not seen in any specimens of *itamputi* from N. Borneo).

Arisbe (Pathysa) antiphates ***simpulensis*** **ssp. n.**

Holotype ♂: Balambangan, 3. VI. 2004, in UMSK; Fig. 3.

Paratypes (in total 13 ♂♂, 5 ♀♀, all in UMSK): All from **Balambangan:** allotype ♀, 23. VI. 2003; Fig. 4. 3 ♂♂, 1 ♀ 17. VI. 2003; 2 ♂♂ 22. VI. 2003; 1 ♂ VI. 2003; 2 ♂♂ 23. VI. 2003; 1 ♀ 7.–11. VI. 2004, 1 ♀ 9. VI. 2004, 2 ♂♂, 1 ♀ 11. VI. 2004; 1 ♂ 2. V. 2005.

Etymology: This subspecies is named after the principal collecting area near Kuak Simpul and the Balambangan Forest Reserve. The name is herewith defined as being a noun in apposition.

Holotype. Forewing length from base to tip 42.8 mm. Similar in general facies to *A. (P.) antiphates sinambungensis* ssp. n. from Banggi, sharing the extended area of grey maculation on the hindwing upperside, which is even more extensive. This area is 6.1–7.5 mm deep in

[1] To whom correspondence should be addressed.

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Figs. 1–2: *Arisbe (Pathysa) antiphates sinambungensis* ssp. n. **Fig. 1:** holotype ♂. **Fig. 2:** allotype ♀. — **Figs. 3–4:** *Arisbe (Pathysa) antiphates simpulensis* ssp. n. **Fig. 3:** holotype ♂. **Fig. 4:** allotype ♀. — **Figs. 5–6:** *Achillides palinurus audryae* ssp. n. **Fig. 5:** holotype ♀. **Fig. 6:** paratype ♀, Banggi, 15. VI. 2004. — **Figs. 7–9:** *Arisbe (Eurypleana) doson sarpedonoides* ssp. n. **Fig. 7:** holotype ♂. **Fig. 8:** allotype ♀. **Fig. 9:** paratype ♀, yellow form, Balambangan, 23. VI. 2003. — **Figs. 10–12:** *Menelaides hipponous jalanii* ssp. n. **Fig. 10:** holotype ♂. **Fig. 11:** allotype ♀. **Fig. 12:** paratype ♂, Banggi, 15. VI. 2004. — Specimens not figured to the same scale! See text for sizes.

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specimens of *sinambungensis* ssp. n. from Banggi but is 8.4 mm in the holotype of *simpulensis* ssp. n. All of the submarginal spots are marked with grey scaling.

Allotype. Forewing length from base to tip 42.3 mm. Similar to the ♂, with an extensive area of grey maculation on the hindwing upperside and a complete row of grey submarginal spots on the hindwing upperside. The postmedian area has a yellowish cast not seen in ♀♀ of other subspecies of *antiphates*.

Variability. Range in forewing lengths, ♂♂: 37.2–43.5 mm. The ♂ and ♀ paratypes correspond well to the holotype and allotype, respectively. The area of grey maculation on the hindwing upperside is between 5.5 mm (a very small specimen) and 8.5 mm deep in the ♂♂, and between 7.8 and 8.6 mm deep in the ♀♀. All specimens have at least the submarginal spot in cell M_1 of the hindwing marked with a small area of grey scales and the majority have spots in cells S_c+R_1 and R_s as well. Two of the ♀ paratypes have a yellowish cast in the postmedian area of the hindwing, just as in the allotype.

Arisbe (Eurypleana) doson sarpedonoides ssp. n.

Holotype ♂: Banggi, 14. VI. 2004, leg. M. PAGE, in UMSK; Fig. 7.

Paratypes (in total 12 ♂♂, 3 ♀♀): From **Balambangan:** allotype ♀, 23. VI. 2003, leg. M. PAGE; Fig. 8. 1 ♀ 16. VI. 2003, 1 ♀ 18. VI. 2003, 1 ♀ 21. VI. 2003, 1 ♀ 23. VI. 2003, 1 ♂ 7.–11. VI. 2004, 1 ♂ 9. VI. 2004, 1 ♂ 10. VI. 2004. – From **Banggi:** 1 ♂ 14. VI. 2004; 1 ♂ 15. VI. 2004; 2 ♂♂ 16. VI. 2004; 1 ♂ 17. VI. 2004; 1 ♂ 5. V. 2005; 1 ♂ 11. V. 2005; 3 ♂♂ 13. V. 2005.

Etymology: This subspecies is named after its similarity to *Graphium sarpedon* (LINNAEUS, 1758). The name is a noun in apposition.

Holotype. Forewing length from base to tip 43.6 mm. Upperside ground-colour nearly black. The green spots are intense bluish-green, approaching the colour of *Graphium sarpedon* (LINNAEUS, 1758) rather than the duck-egg green typical of *A. doson evemonides* (HONRATH, [1884]). The outer margin of the hindwing median band is deeply incised at the cell and the band is narrower than in *A. doson evemonides*.

Allotype. Forewing length from base to tip 40.8 mm. Similar to the ♂, except that the green spots are yellowish-green, still being more intense than found with green ♀♀ of *A. doson evemonides*. The outer margin of the hindwing median band is deeply incised at the cell and the band is narrower than in *A. doson evemonides*.

The ♂♂ conform very closely to the holotype. The ♀♀ fall into two colour forms. One form is similar to the allotype, with yellowish-green spots, whereas the other form is bright yellow (Fig. 9). Similar dimorphism is observed in ♀♀ of *A. doson evemonides,* where spots of the yellow form are cream to pale yellow.

Menelaides hipponous jalanii ssp. n.

Holotype ♂: Balambangan, 11. VI. 2004, leg. M. PAGE, in the UMSK. Fig. 10.

Paratypes (in total 13 ♂♂, 4 ♀♀, all in UMSK): From **Balambangan:** allotype ♀, 1 ♂ 11. VI. 2004, leg. Jalani MORTADA; ♀ Fig. 11. – From **Banggi:** 8 ♂♂ 13.–15. VI. 2004, 2 ♀♀ 15./17. VI. 2004, 4 ♀♀ 4.–8. V. 2005, 2 ♂♂ 8./9. V. 2005.

Etymology: This subspecies is named after Jalani MORTADA, who collected several of the paratypes including the allotype. The name is a noun in apposition.

Holotype. Forewing length from base to tip 49.2 mm. Upperside ground-colour brownish black with a scattering of tawny scales in the postmedian and submarginal areas. The wing margin in cells CuA_2 to M_1 is decorated with a fringe of long white scales. Underside, ground colour brownish with the white marginal areas more extensive on the upperside. There are white spots forming a postmedian band in cells CuA_1 and CuA_2.

Hindwing. There is a spatulate tail on vein M_3. Upperside, ground-colour brownish black. There is a postmedian band of creamy white spots: those in cells R_S, M_1 and M_2 being conspicuosly larger than the others. The spots in cells M_3, CuA_1 and CuA_2 are suffused with brown scales of the ground-colour and are more yellow in colour than the others. All cells have a white marginal fringe. Underside, ground-colour blackish brown. There are white marginal fringe-spots and a submarginal band of orange to white spots present in all cells. The spot in CuA_2 appears to be larger than the others, but this area is damaged. There are two diffuse spots formed from a scattering of metallic blue scales, one in each of cells CuA_1 and CuA_2. The prominent postmedian band of white spots on the upperside is reproduced on the underside.

Allotype. Forewing length from base to tip 54.5 mm. Upperside similar to that of the ♂♂ but somewhat lighter brown and more heavily suffused in the postmedian area. Underside, ground-colour brownish black with prominent white spots in a submedian band from the costal margin to the hind margin. The white fringe-spots on the wing margin are more prominent than in the male holotype.

Hindwing. Tailed, upperside markings similar to those of the ♂. Underside with larger marginal fringe-spots and yellowish submarginal spots in all cells except CuA_2, where the spot is orange. There are spots formed from metallic blue scales in cells CuA_1 and CuA_2. The prominent white postmedian band is well-marked also on the underside.

Variability. ♂♂: Range in fore wing lengths: 45–49 mm. The second ♂ from Balambangan is somewhat darker in ground-colour than the holotype and the postmedian band of spots on the hindwing upperside is narrower. This narrowing is mostly due to suffusion of its inner margin by black scaling. The ♂♂ from Banggi also show considerable variation in the width of the postmedian band of white spots, from being as broad as that of the holotype to having the spots only half the width, particularly in cells R_S, M_1 and M_2 (Fig. 12).

♀♀: One of the ♀♀ from Banggi is very similar to the allotype from Balambangan. The other specimen is considerably larger (FW length 52 mm) and is brightly marked but otherwise consistent with the description of the allotype.

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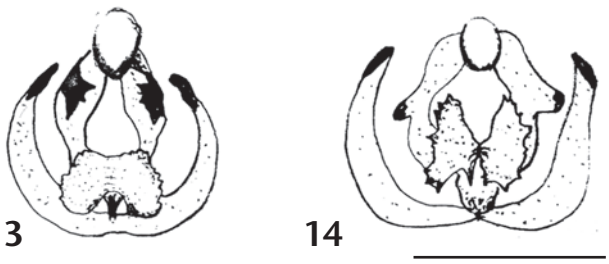

Fig. 13: ♀ genitalia of *Menelaides hipponous jalanii* ssp. n. **Fig. 14:** ♀ genitalia of *Menelaides fuscus dayacus* Rothschild 1908. — UMSK relates genitalia preparations to the specimen by cross-refencing labels on the preparation vial and the specimen; specimens numbers were not available at the time of writing. The specimen of *M. h. jalanii* from which the dissection was made is the paratype ♀ from Balambangan, 11. vi. 2004. The specimen of *M. h. dayacus* from which the dissection was made is from Sabah, Crocker Range, 5. v. 1998. — Scale 5 mm.

Genitalia. The ♂ (data not shown) and ♀ genitalia (Fig. 13) are typical of *Menelaides hipponous* (Felder & Felder, 1862), see Page & Treadaway (2003b, 2004) for a complete description of the Philippines subspecies. The ♀ genitalia of *hipponous* differ from those of *M. fuscus dayacus* (Rothschild, 1908) (Fig. 14). The ventral process from the lamella antevaginalis of *M. fuscus dayacus* is greatly produced and the lateral distal processes are small whereas the ventral process is smaller in *hipponous* and the lateral are larger.

In outward appearance, this subspecies of *M. hipponous* is most similar to the subspecies found in the central Philippines such as *M. h. daku* Page & Treadaway, 2003, from Marinduque, or *M. h. rolandi* Page & Treadaway, 2003, from Bohol. However, the narrow-banded form of the ♂ is more reminiscent of *M. h. gamay* Page & Treadaway, 2003, from Palawan and Balabac and this is probably where the true affinities of this new subspecies belong. Inspection of the ♀ genitalia in particular confirm this supposition as the structure is very similar to that of the ♀ of *M. h. gamay*. The principal difference is that the chitinization of the peri-ostial lamellae is even stronger in ssp. *jalanii* than it is in the ♀ of *M. h. gamay*.

Achillides palinurus audryae ssp. n.

Holotype ♀: Banggi, 8. v. 2004, leg. M. Page, in UMSK; Fig. 5.

Paratypes (in total 4 ♂♂, 1 ♀, all in UMSK): All from **Banggi:** 1 ♀, 15. vi. 2004, leg. M. Page; Fig. 6; 1 ♂ 13. vi. 2004, 1 ♂ 15. vi. 2004, 1 ♂ 8. v. 2005, 1 ♂ 13. v. 2005.

Etymology: This subspecies is named after Audry Mengan of the University of Malaysia, Sarawak, who caught several of the paratypes described in this paper during the 2004 and 2005 expeditions to Balambangan and Banggi organized by the University.

Holotype. Forewing length from base to tip 44.2 mm. Upperside, ground colour brownish black with a scattering of iridescent-green scales and a solid median band of iridescent green scales. The median band of green does not have the same bluish cast that is typical of *A. p. palinurus* (Fabricius, 1787) from Sabah mainland (Jordan 1910), but it is not as bright green as found either in *A. p. palinurus* from West Malaysia or in *A. p. angustatus* (Staudinger, 1888) from Balabac, Palawan and Cuyo. The band is narrower than found in *A. p. palinurus* from Sabah mainland and *A. p. angustatus*.

Hindwing. There is a spatulate tail on vein M_3. Upperside, ground-colour brownish black with a scattering of iridescent-green scales and a solid median band of iridescent-green scales. The median band of green is narrower than in *A. p. palinurus* from Sabah mainland and is truncated in cell R_s closer to vein M1 than in other subspecies of *A. palinurus*, especially *A. p. angustatus* and *A. p. daedalus* (Felder & Felder, 1861), where the band extends further towards the costal margin.

Underside, ground-colour brownish-black, darker than found in other subspecies of *A. palinurus*.

Variability: The ♂♂ are very similar in size and colour to the holotype ♀, except that they lack the eyespot in the anal tornus of the hindwing upperside. They vary somewhat in the extent of the green median band, but the essential features of bright green colour and, on the underside, a darker ground colour are exhibited by all specimens. The second ♀ (Fig. 6) is significantly larger than the holotype (forewing length from base to tip 48.2 mm). The iridescent green bands on the forewing upperside are more yellowish green, approaching the colour of *A. p . palinurus* (Fabricius, 1787).

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