# A study of the current subspecies of *Hebomoia glaucippe* (Linnaeus 1758) from the Philippines (Lepidoptera: Pieridae)

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**Abstract:** The species *Hebomoia glaucippe* (Linnaeus 1758) has a wide distribution stretching from India and South China to Malaysia, Indonesia, Sundaland, Taiwan to the Philippines and on to lesser Sunda Islands occurring in a large number of subspecies. On the Philippines *Hebomoia glaucippe*, up till now, was represented by 10 subspecies. A study of a very large number of *glaucippe* specimens from the areas occupied by the so far known subspecies over different periods of the year has illustrated that the variation of each of the known subspecies is very much broader than previously considered. As a consequence, on the Philippines *Hebomoia glaucippe* is now believed to be represented by the following 7 subspecies (the distribution is shown on a map):
1. *Hebomoia glaucippe erinna* Fruhstorfer 1910.
2. *Hebomoia glaucippe philippensis* Wallace 1863, = *H. g. reducta* Fruhstorfer 1907, **n. syn.,** = *H. g. aishines* Fruhstorfer 1911, **n. syn.,** = *H. g. mindorensis* Fruhstorfer 1911, **n. syn.**
3. *Hebomoia glaucippe boholensis* Fruhstorfer 1911, = *H. g. cebuensis* Okano & Okano 1994, **n. syn.**
4. *Hebomoia glaucippe iliaca* Fruhstorfer 1911.
5. *Hebomoia glaucippe palawensis* Fruhstorfer 1907, = *H. g. domoranensis* Fruhstorfer 1911, **n. syn.**
6. *Hebomoia glaucippe cuyonicola* Fruhstorfer 1907.
7. *Hebomoia glaucippe* ***lindae*** **n. ssp.** This western Sulu Archipelago form is described and illustrated in this paper as a new subspecies. The holotype ♂ and 6 ♂♂, 9 ♀♀ paratypes in the collection of C. G. Treadaway will later be deposited in the Senckenberg-Museum, Frankfurt am Main. – Figures of butterflies are depicting representative specimens of each *Hebomoia glaucippe* subspecies on the Philippines, both ♂♂ and ♀♀.

### Bemerkungen zu den gegenwärtig anerkannten Unterarten von *Hebomoia glaucippe* (Linnaeus 1758) von den Philippinen (Lepidoptera: Pieridae)

**Zusammenfassung:** Die eindrucksvolle Pieriden-Art *Hebomoia glaucippe* (Linnaeus 1758) kommt in weiter Verbreitung von Indien und Südchina über Malaysia und Indonesien bis zu den Kleinen Sundainseln, Taiwan und den Philippinen vor und hat eine große Zahl von Unterarten ausgebildet. Auf den Philippinischen Inseln war sie nach der Literatur bislang mit 10 Unterarten vertreten. Die vergleichende Untersuchung einer sehr großen Zahl von Faltern, die auf allen von *glaucippe*-Subspecies besiedelten Inseln und zu den verschiedenen Jahreszeiten gesammelt worden waren, hatte das Ergebnis, daß jede der beschriebenen Subspecies eine weitaus größere Variationsbreite zeigte als bisher angenommen. Folgerichtig werden in diesem Beitrag vier Subspecies in die Synonymie verwiesen (siehe Abstract). Die Population der Tawitawi-Gruppe im südlichen Suluarchipel hingegen läßt eine distinkte Merkmalsausprägung erkennen, so daß wir sie hier in den Unterartrang erheben (*Hebomoia glaucippe* ***lindae*** **n. ssp.**). Holotypus ♂ und 6 ♂♂, 9 ♀♀ Paratypen in der Sammlung C. G. Treadaway, die später in das Senckenberg-Museum, Frankfurt am Main, gelangt. Für jede der philippinischen Subspecies von *H. glaucippe* sind typische Vertreter in beiden Geschlechtern abgebildet, und die Verbreitung der Unterarten wird auf einer Karte dargestellt.

## Introduction

*Hebomoia glaucippe* (Linnaeus 1758) over its broad range of Asian occurrence has developed a large number of subspecies, some of which can be dramatically different – ssp. *vossi* Maitland 1859 from Nias, ssp. *roepstorffi* Wood-Mason 1880 from the Andamans, ssp. *borneensis* Wallace 1863 from Borneo, ssp. *celebensis* Wallace 1863 from Sulawesi (all illustrated in Yata 1981), to name but a few. It should not be a surprise to find that the Philippines have a number of subspecies especially as one considers the evolution of the Philippine Islands (de Jong & Treadaway 1993). The larva of *H. glaucippe* is green with a light coloured stripe on the side. It feeds on various species of Capparidaceae.

Over recent years this pierid species was systematically collected in the Philippines from Babuyanes, Batanes, North Luzon, Central and South Luzon, Catanduanes, Marinduque, Mindoro, Polillo, Bohol, Cebu, Masbate, Negros, Panay, Homonhon, Ticao, Basilan, Camiguin de Mindanao, Dinagat, Jolo, Leyte, Mindanao, Panaon, Samar, Balabac, Dumaran, Palawan, Cuyo, Bongao, Sanga Sanga, Sitangkai, Sibutu and Tawitawi plus several smaller islands. Based on type specimens from the Semper collection (Franz 1955) as well as original descriptions by Wallace (1863), Fruhstorfer (1907, 1910, 1911a, b), and Okano & Okano (1994) comparisons were made to the above mentioned extensive material (over 400 specimens).

The Philippine subspecies are not so dramatically different though one subspecies, *cuyonicola,* is the most divergent from the others. However, in specified island areas of the Philippines there are identifiable and reasonably constant differences. It should be noted that *Hebomoia glaucippe* is a strong fast flier in primary lowland forest, but also in broken forest, hillside woods, villages near to forest and overgrown wasteland. Thus over time it must be expected that only one subspecies should occur on a given Philippine island. As an example, *glaucippe* from Luzon had in Semper's time a northern subspecies and a subspecies for the rest of Luzon. Recent studies support the concept of one subspecies for the whole island with the northern subspecies being replaced by the central/south subspecies but still occurring on islands north of Luzon such as the Babuyanes and Batanes groups. Past authors


**Fig. 1:** Map of the Philippines showing the main islands and naming all listed in the text (map Dr. Wolfgang Eckweiler based on Demis World Map).

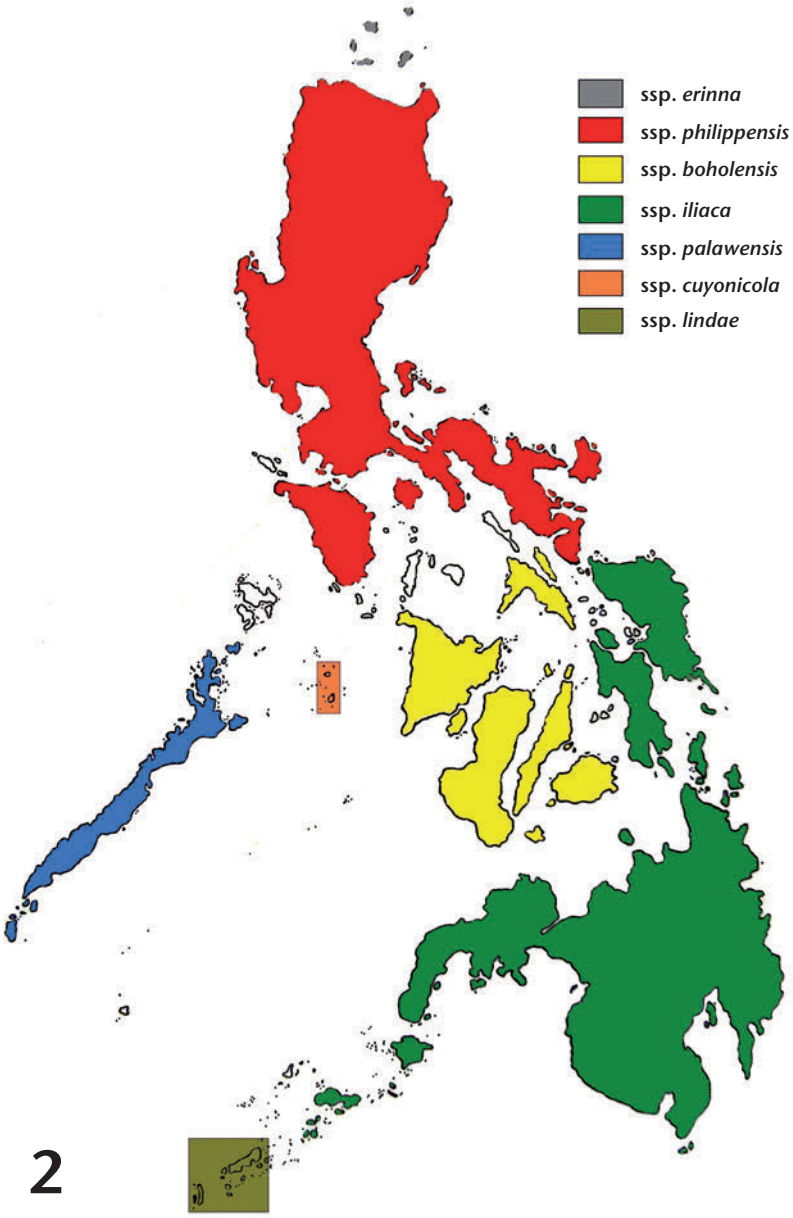
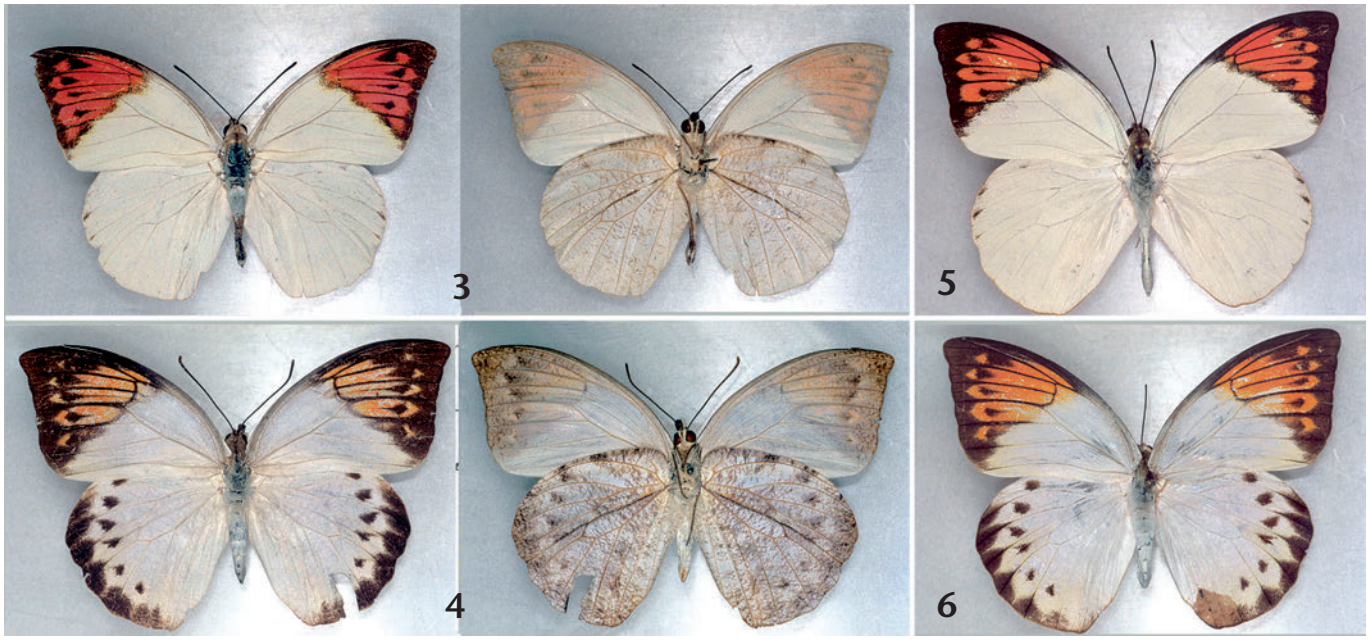



**Fig. 2:** Map of the Philippine islands showing the distribution range of each *Hebomoia glaucippe* subspecies found on the Philippines.




**Figs. 3–6:** *Hebomoia glaucippe* subspecies. — **Figs. 3–6:** *H. g. erinna* Fruhstorfer. **Fig. 3:** Lectotype ♂, Babuyanes (Coll. G. Semper, #1819), left: dorsal, right: ventral; lfw. 43 mm. **Fig. 4:** Paralectotype ♀ (Coll. G. Semper, #1813), left: dorsal, right: ventral; lfw. 48 mm. **Fig. 5:** ♂, dorsal, Camiguin de Luzon, 2. xi. 1998; lfw. 47 mm. **Fig. 6:** ♀, dorsal, Camiguin de Luzon, 29. iv. 1990; lfw. 49 mm.

of *glaucippe* subspecies have tended to use certain wing markings and patterns to differentiate subspecies. When studying very long series from specific areas at different times of the year the following became noticeable:

1. The inner black edge to the ♂ forewing orange patch can be totally absent, slightly marked or firmly marked. Examining specimens from the same island on a monthly capture basis, the above black edge tends to be more prevalent, but not exclusively so, for December to February.
2. The basally yellow edge to the ♂ forewing orange patch (black edged or not) can occur for all subspecies, but varies in width within a subspecies.
3. Except for subspecies *cuyonicola, palawensis* and *lindae* which almost always have small spots, the ♂ and ♀ forewing submarginal and the ♀ hindwing submarginal black spots vary from medium sized to prominent.
4. The ♂ hindwing marginal area has minute black flecks except for subspecies *cuyonicola, palawensis* and *lindae*.
5. The ♂♂ of subspecies *boholensis, iliaca* and *philippensis* can have tinges and/or patches of yellow scales on the hindwing upperside.
6. The relative size of ♂♂ and ♀♀ varies substantially for any of the seven subspecies.

## Taxonomic part

The following covers the key points for differentiating the valid subspecies covered in this report based on good series at different times of the year for the areas involved.

### *Hebomoia glaucippe erinna* Fruhstorfer 1910

(Figs. 3–6)

**Distribution:** Babuyanes and Batanes.

**Forewing length ♂:** 41–47 mm; **♀:** 45–49 mm. — For the ♂ the base colour is white with a large forewing orange patch though the occasional specimen can have a slightly light creamish coloured appearance for the base colour. The forewing black submarginal spots range from small to medium sized. The forewing black apical area tends to be less prominent than subspecies *philippensis* and the forewing black marginal band averages slightly narrower. The orange patch can inwardly have a narrow black edge but this is often missing. A very fine, narrow yellow line is almost always present inwardly from the orange patch or black edge. This can be very minimal. The white hindwing margin always has a few black flecks. The base colour for the ♀ ranges from dull white to a very faint light creamish colour. The forewing orange patch is almost always edged inwardly with black but without the fine yellow line. The forewing black marginal band and apical area are noticeably larger than for the ♂. The hindwing black marginal band is broad and the black submarginal band of spots large. The underside for both sexes varies from a slightly mottled light sandy colour to a darker mottled sandy brown.

### *Hebomoia glaucippe philippensis* Wallace 1863

(Figs. 7–12)

= *Hebomoia glaucippe reducta* Fruhstorfer (1907: 100); loc. typ.: Polillo, **n. syn.**

= *Hebomoia glaucippe aishines* Fruhstorfer (1911b: 188); loc. typ.: Polillo, **n. syn.** — The nominal taxa *aishines* and *reducta* have the same ♀ holotype (= objective synonymy) (Franz 1955: 356, pl. 33, fig. 11).

= *Hebomoia glaucippe mindorensis* Fruhstorfer (1911a: 186); loc. typ.: Mindoro, **n. syn.**

**Distribution:** Catanduanes, Luzon, Marinduque, Mindoro and Polillo.

**Forewing length ♂:** 39–47 mm; **♀:** 40–49 mm. — The large orange forewing patch can be inwardly completely or intermittently bordered with black but can also be without any black border. The yellow edge inwardly from the orange patch (or black border if present) is rather variable. It is usually quite narrow but can stretch well into the forewing white basal area. There can also be on the hindwing tinges of yellow of varying intensity. Further, the forewing orange patch has a prominent submarginal row of large well marked black spots. The forewing marginal black band averaging 2 mm stretches almost the length of the outer margin and joins the somewhat expanded black apical area. The forewing and hindwing base colour is white. All ♂♂ possess small black flecks on the hindwing margin. The hindwing underside is a light mottled sandy colour with some specimens being a somewhat darker sandy brown. The ♀♀ have a bright but light sulphur yellow as a base colour with reduced (some specimens very much reduced) forewing orange patch overlaid with a row of large black submarginal spots which, in the apical area, blend into the enlarged black apical section. This reduced forewing orange patch can inwardly have a fairly wide black edge, a narrow intermittent edge or be without a black edge. Additionally, the black veins passing through the orange patch are usually heavily marked so tend to give the ♀ an overall darker appearance than other subspecies. The hindwing black marginal border is an intense black coupled with a submarginal row of large black spots which can be reduced in size tornally. The hindwing underside is similar to the ♂ but tends to be a somewhat darker mottled sandy brown. Subspecies *reducta* previously listed from Polillo Island fits well within the variation range of subspecies *philippensis*, especially for Luzon, so is synonymized with *philippensis*. This is also valid for subspecies *mindorensis* (n. syn.).

### *Hebomoia glaucippe boholensis* Fruhstorfer 1911

(Figs. 13–18)

= *Hebomoia glaucippe cebuensis* Okano & Okano (1994: 1); loc. typ.: Cebu, **n. syn.**

**Distribution:** Bohol, Cebu, Masbate, Negros, Panay and Ticao.

**Forewing length ♂:** 40–47 mm; **♀:** 42–47 mm. — For the ♂ the forewing orange patch can be bordered inwardly with a black edging but is more often lacking the black

edge. The yellow tinge inwardly from the orange forewing patch (with or without the black edge) is distinct but varies in expanse. The forewing and hindwing base colour is a light creamy white with or without additional yellow tinges or patches. The hindwing upperside margin is usually with but can be without minute black flecks. The row of submarginal forewing black spots vary in size but for most ♂♂ are small to medium sized compared with *philippensis*. For the ♀ the base colour varies on any of its island locations from light yellow to a more intense yellow. Again the forewing orange patch can be inwardly black edged but the clear majority of specimens are without this black edge. The hindwing submarginal black spots are usually large though for a few specimens they are more inclined to be medium sized. The forewing and hindwing black marginal borders are quite prominent for the majority of specimens. The forewing black apical area is large enough to reduce, noticeably, the prominent orange patch apically. The forewing row of submarginal spots is large. The ♂ underside is a light slightly mottled sandy brown while the ♀ is a darker mottled brown. A long series of *Hebomoia glaucippe cebuensis* from Cebu were found to fit easily into the variation band for *boholensis* so are synonymized with *boholensis*.

### *Hebomoia glaucippe iliaca* Fruhstorfer 1911
(Figs. 19–22)

**Distribution:** Basilan, Camiguin de Mindanao, Mindanao, Dinagat, Jolo, Leyte, Panaon and Samar.

**Forewing length ♂:** 41–49 mm; **♀:** 37–50 mm. — This subspecies was originally described from Camiguin de Mindanao. The ♂ usually has a full row of forewing large submarginal black spots. Notwithstanding, the forewing orange patch is large and intense. This orange patch can be inwardly edged with black, intermittently edged with black or without black. There is always a yellow band inwardly from the orange patch or the additional black edge if it exists. Further there can be yellow tinges on the hindwing of some ♂♂ all of which also have small black hindwing marginal flecks. The ♀ tends to be large with a more intense yellow base colour. The hindwing marginal black border is broad being approximately 3 mm while the hindwing submarginal black spots are medium to large, the forewing submarginal black spots are large. The ♂ underside is a light slightly mottled sandy colour while the ♀ is a slightly darker mottled sandy brown.

### *Hebomoia glaucippe palawensis* Fruhstorfer 1907
(Figs. 23–26)

= *Hebomoia glaucippe domoranensis* Fruhstorfer (1911b: 188); loc. typ.: Domoran [= Dumaran], **n. syn.**

**Distribution:** Balabac, Palawan, and Dumaran.

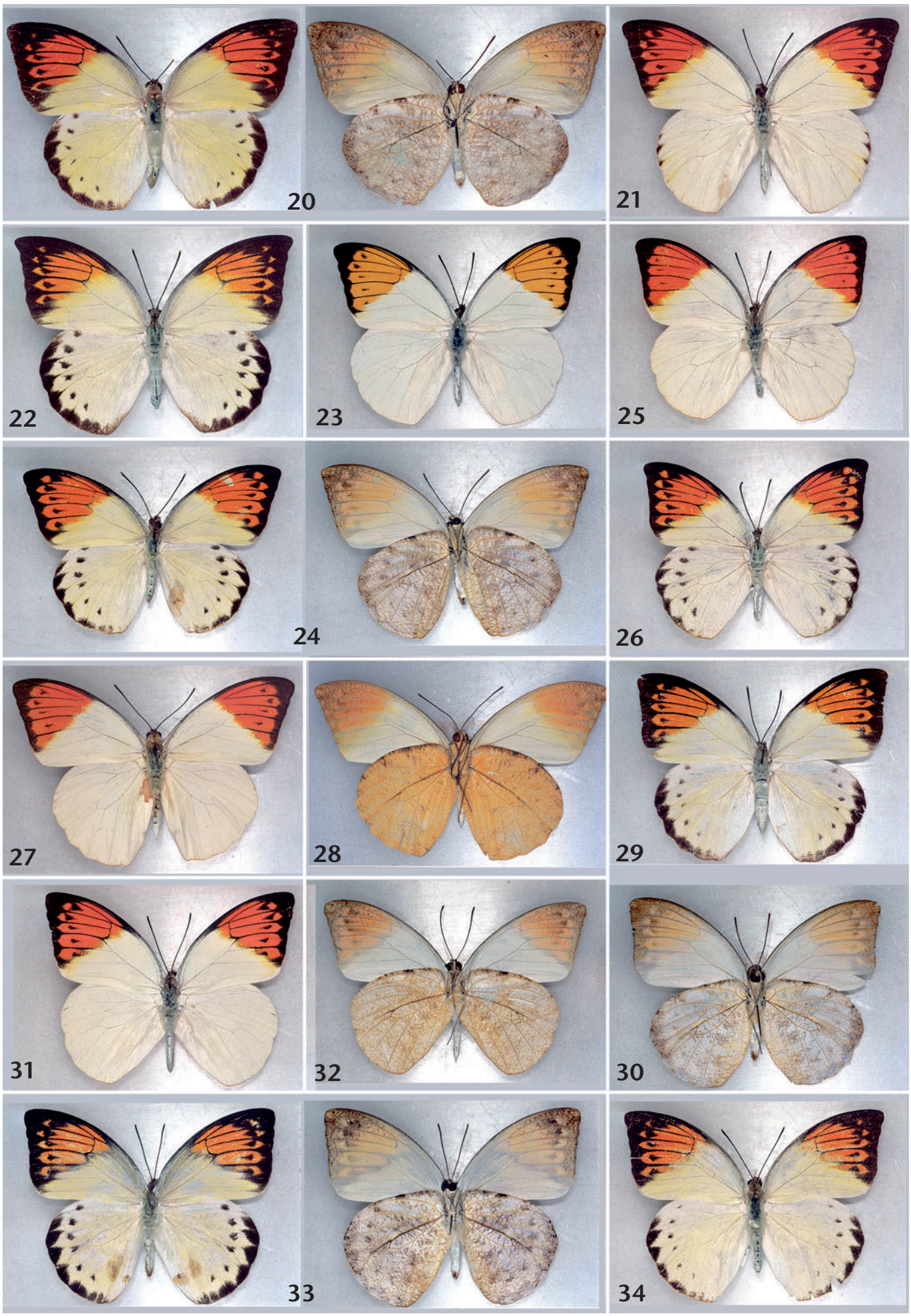
**Forewing length ♂:** 38–45 mm; **♀:** 33–46 mm. — Both ♂♂ and ♀♀ of this subspecies vary considerably in size. The base colour for the ♂♂ is white. The orange patch on the forewing is large and is inwardly yellow bordered. (Interestingly, we have a fresh seemingly rare variation for Palawan where the forewing patch is a beautiful golden yellow without the usual yellow edge.) The forewing marginal black band is narrow though the apical black area is noticeably broader. The forewing row of submarginal black spots varies from almost invisible to comparatively small in size. The hindwing margin is without any minute black flecks. The underside varies considerably ranging from a light sandy colour to a mottled sandy brown to a rich ochre yellow coming close to the underside of *cuyonicola* ♂♂. The ♀ also has a large orange patch, usually but not always without the inwardly black edge. In all examples the forewing orange patch extends into the cell. The base colour is a dull faint creamy yellow with a fine yellow line which borders directly on the orange patch (or black edge if it exists). The forewing black marginal band is slightly wider than this band on the ♂ with the apical black area being about the same. The forewing submarginal black spots are of medium size while the hindwing submarginal row of spots varies from small to medium size. The interrupted black hindwing marginal band is narrow and has inwardly a rather zigzag appearance. For some specimens the base faint creamy yellow colour reaches the hindwing margin between some of the veins. The hindwing underside of the ♀♀ varies from a mottled light sandy colour to a mottled light brown. Subspecies *domoranensis* specimens, for which we have also seen the lectotype and paralectotype ♂♂, fit well within the variation range for subspecies *palawensis* such that subspecies *domoranensis* must be considered a synonym of *palawensis*.

### *Hebomoia glaucippe cuyonicola* Fruhstorfer 1907
(Figs. 27–30)

**Distribution:** Cuyo.

**Forewing length ♂:** 40–49 mm; **♀:** 40–48 mm. — The ♂ has for most specimens a base colour of white, but there are also a few ♂♂ with a light creamy yellow base colour. The forewing orange patch is large with a marginal black band and a limited black apical area. The forewing submarginal black spots are from small to almost invisible. Inwardly from the forewing orange patch there is always a fine but obvious bright yellow line with no specimens having any black edge to this orange patch. We have no specimens with tinges of yellow on the hindwing. The hindwing upperside marginal area is without any small black flecks. The underside of the hindwing is usually a glaring ochre yellow with a few fine brown lines or spots. However, there are a few light more sandy coloured exceptions. The ♀ has a rather light yellow base colour. The forewing orange patch is large with an average marginal black band slightly larger than for the ♂. This also applies to the forewing black apical area. The hindwing marginal black band averages 4 mm. The black submarginal spots are small with the forewing submarginal spots ranging from small to medium. The forewing orange patch lacks an inward black edge — where the orange ends the base light yellow begins. The underside of the ♀ forewing has a light yellow apical wash with small darker buff striations while the hindwing underside is a mottled sandy brown.


**Figs. 7–34:** *Hebomoia glaucippe* subspecies. — **Figs. 7–10:** *H. g. philippensis* Wallace. **Fig. 7:** ♂, NW Luzon, Abra, 24. iv. 1976, left: dorsal, right: ventral; lfw. 40 mm. **Fig. 8:** ♀, C. Luzon, Mt. Banahao, 21. vii. 1968, left: dorsal, right: ventral; lfw. 46 mm. **Fig. 9:** *H. g. reducta* Fruhstorfer (syn. *philippensis*), holotype ♀ of both *reducta* & *aishines*, dorsal, Polillo (Coll. G. Semper, #1805); lfw. 45 mm. **Fig. 10:** ♀, dorsal, C. Luzon, N Mt. Banahao, 10. vi. 1999. — **Figs. 11–12:** *H. g. philippensis* Fruhstorfer. **Fig. 11:** ♂, dorsal, C. Luzon, Los Baños, Mt. Makiling, 15. ix. 1966; lfw. 39 mm. **Fig. 12:** ♀, dorsal, S. Luzon, Quezon Prov., S Mt. Banahao, 7. vii. 1998; lfw. 46 mm. — **Figs. 13–18:** *H. g. boholensis* Fruhstorfer, all from Bohol, Bilar. **Fig. 13:** ♂, dorsal. **Fig. 14:** same specimen, ventral; 2. vi. 1967; lfw. 41 mm. **Fig. 15:** ♀, dorsal. **Fig. 16:** same specimen, ventral; 1. ix. 1973; lfw. 43 mm. **Fig. 17:** ♂, dorsal, 1. ix. 1973; lfw. 45 mm. **Fig. 18:** ♀, dorsal, 27. vi. 1971; lfw. 46 mm. — **Figs. 19–22:** *H. g. iliaca* Fruhstorfer. **Fig. 19:** ♂, S. Mindanao, S. Cotabato, Mt. Matutum, 17. iv. 2006, left: dorsal, right: ventral; lfw. 49 mm. **Fig. 20:** Lectotype ♀, Camiguin de Mindanao (Coll. G. Semper, #1814), left: dorsal, right: ventral; lfw. 44 mm. **Fig. 21:** ♂, dorsal, Mindanao, Surigao, Mangagoy, 16. v. 1960; lfw. 47 mm. **Fig. 22:** ♀, dorsal, N. Mindanao, Bukidnon, Mt. Kitanglad, 12. ix. 1995; lfw. 44 mm. — **Figs. 23–26:** *H. g. palawensis* Fruhstorfer, all from Palawan. **Fig. 23:** ♂, Irawan, 25. i. 1984, left: dorsal, right: ventral; lfw. 42 mm. **Fig. 24:** ♀, 17 km NW Puerta Princesa, dorsal; lfw. 42 mm. **Fig. 25:** ♂, Agusava, 19. vii. 1998, dorsal; lfw. 41 mm. **Fig. 26:** ♀, Irawan, 28. ii. 1996, dorsal; lfw. 39 mm. — **Figs. 27–30:** *H. g. cuyonicola* Fruhstorfer. **Fig. 27:** Lectotype ♂, Cuyo (Coll. G. Semper, #1808), dorsal; lfw. 44 mm. **Fig. 28:** Paralectotype ♂, Cuyo (Coll. G. Semper, #1809), ventral; lfw. 47 mm. **Fig. 29:** ♀, Cuyo group, Agutaya Is., 19. vii. 1998, dorsal; lfw. 45 mm. **Fig. 30:** same specimen, ventral. — **Figs. 31–34:** *H. g. lindae* n. ssp. **Fig. 31:** Holotype ♂, Tawitawi, dorsal; lfw. 45 mm. **Fig. 32:** Paratype ♂, Tawitawi, Tarawakan, 11. ii. 2006, ventral; lfw. 44 mm. **Fig. 33:** Paratype ♀, Tawitawi, Tarawakan, 20. v. 2006, left: dorsal, right: ventral; lfw. 44 mm. **Fig. 34:** Paratype ♀, Bongao, Bongao Peak, 200 m, 10. ii. 1989, dorsal; lfw. 42 mm. — Photos C. G. Treadaway. The specimens are not exactly to the same scale; therefore, the lfw. (length of forewing) is provided for every specimen in the legends.



## *Hebomoia glaucippe lindae* n. ssp.

(Figs. 31–34)

**Holotype ♂:** Philippines, Sulu Archipelago, Tawitawi, near Batu Batu, 17. x. 2007.

**Paratypes** (in total 6 ♂♂, 9 ♀♀): **Tawitawi:** 1 ♂, Languyan, 10. vi. 1990. 1 ♂, 3 ♀♀, near Batu Batu, 25. v. 2007, 27. vi. 2006, 23. v. 2007, 20. x. 2007. 3 ♂♂, 2 ♀♀, Tarawakan, 50 m, 10., 11., 12. ii. 2006, 20. v. 2006. – **Other islands:** 3 ♀♀, Bongao, The Peak, 200 m, 10. ii. 1989, 6. ii. 1991, 10. xi. 2005. 1 ♀, Sitangkai, 5 m, 26. xi. 1988. 1 ♂, Sanga Sanga, Boloboc, 10 m, 19. vi. 1992.

Holotype and paratypes in collection Treadaway, to be transferred to the Senckenberg-Museum, Frankfurt am Main.

**Etymology:** Named after the wife of Noel Mohagan for her and her husband's many kindnesses to the first author on numerous visits to the Philippines.

### Diagnosis

**Forewing length** ♂ (n = 7): 43–46 mm; ♀ (n = 9): 41–45 mm.

**♂.** For the ♂ the forewing and hindwing base colour is close to a "Persil" white. The hindwing upperside is always a pure white without any marginal minute black flecks. The forewing subapical orange patch is uniformly large, overlaid with a row of reduced submarginal black spots. This orange patch is usually, but not always, edged inwardly with black but does have a very fine restricted yellow border inwardly from either the black edge or orange patch edge. The marginal black band for the forewing is 1–2 mm between veins $CuA_2$ and $CuA_1$ and 4 mm at vein $M_1$. For the forewing upperside at the costa, above the cell end, there is always a small black fleck. The hindwing underside is a light slightly mottled sandy colour.

**♀.** The ♀ has the usual orange forewing patch with or without a black edging inwardly. This orange patch is somewhat reduced apically as compared to the ♂ and the black veins crossing the orange patch are more obvious. The forewing and hindwing upperside base colour is a light creamy yellow rather similar to subspecies *palawensis* ♀. The outer margin black edge for the forewing is 3 mm between veins $CuA_2$ and $CuA_1$ and 5 mm at vein $M_1$ while the forewing black apical area is almost twice that of the ♂. The row of submarginal forewing black spots are slightly larger than for the ♂. The hindwing marginal black band can be interrupted between some veins by the base light yellow colour. The hindwing band of black submarginal spots range from mostly small to medium sized. The hindwing underside is a slightly more mottled light brown.

**Distribution:** Tawitawi, Bongao, Sanga Sanga, Sitangkai, and it was observed on Sibutu.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