An illustrated and annotated checklist of *Arhopala* Boisduval, 1832, taxa occurring in North Maluku and Maluku, Indonesia (Lepidoptera: Lycaenidae) — Part 5: The *thamyras* species-group

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Abstract: This paper is the 5th in the series covering the species and subspecies of the lycaenid genus *Arhopala* Boisduval, 1832 that occur in the Indonesian provinces of North Maluku and Maluku and deals with the *thamyras* species-group. Seven taxa (all belonging to one species) are recognised as occurring there. One new subspecies is described from the Kei Islands: *Arhopala thamyras* ***zfiae*** **ssp. n.** (holotype male, in NHMUK). The taxa *potidaea* Fruhstorfer, 1914 from Obi and *calaureia* Fruhstorfer, 1914 from Misool, described as subspecies of *Arhopala thamyras,* and treated by Evans (1957) as synonyms of other subspecies, are restored to distinct subspecies (**stat. rev.**). The history of the relationship between the names *thamyras* Linnaeus, 1758 and *helius* Cramer, 1779 is discussed and clarified. New island locality records are introduced, a map shows the islands discussed in the text and all taxa are illustrated in colour.

Keywords: Lepidoptera, Lycaenidae, Theclinae, *Arhopala*, *thamyras* species-group, *thamyras, helius*, new subspecies, new locality records, Indonesia, North Maluku, Maluku.

Illustriertes und kommentiertes Verzeichnis der *Arhopala*-Arten (Lepidoptera: Lycaenidae, Theclinae), die in den Nordmolukken und Molukken (Indonesien) vorkommen — Teil 5: Die *thamyras*-Artengruppe

Zusammenfassung: Dies ist die fünfte Publikation einer Serie über die Arten und Unterarten der Lycaenidengattung *Arhopala* Boisduval, 1832 aus den indonesischen Provinzen Nordmaluku und Maluku. Sie befaßt sich mit der Artengruppe von *thamyras*. 7 beschriebene Taxa (nur 1 anerkannte Art) sind von dort bekannt. Eine neue Unterart, *Arhopala thamyras* ***zfiae*** **ssp. n.,** wird von den Kei-Inseln beschrieben (männlicher Holotypus, in NHMUK). Die Taxa *potidaea* Fruhstorfer, 1914 von Obi und *calaureia* Fruhstorfer, 1914 von Misool, beschrieben als Unterarten von *Arhopala thamyras* und von Evans (1957) als Synonyme von anderen Unterarten interpretiert, werden wieder aufgestuft zu vollwertigen Subspecies (**stat. rev.**). Der geschichtliche Hintergrund und die Beziehungen zwischen den Namen *thamyras* Linnaeus, 1758 und *helius* Cramer, 1779 werden diskutiert und geklärt. Neue Inselnachweise werden gegeben, eine Karte zeigt die besprochenen Inseln, und alle Taxa werden farbig illustriert.

Introduction

***Arhopala* Boisduval, 1832** (Lycaenidae, Theclinae, Arhopalini) is the 5th genus to be published in NEVA in this series on the lycaenid genera of the Indonesian provinces of North Maluku (Maluku Utara) and Maluku. As *Arhopala* is a large group we have split the genus into sections for publication. Previous parts (Rawlins et al. 2018a, 2018b, 2018c, 2019) have covered an introduction to the genus and the *anthelus, theba, democritus, eumolphus, centaurus* and *fulla* species-groups.

This is the 5th part and covers the *thamyras* species-group. Of this group, only *Arhopala thamyras* occurs in Maluku and North Maluku. Seven subspecies occur in the region, including one new subspecies described here. We introduce some new locality records.

The history of the relationship between the names *thamyras* Linnaeus, 1758 and *helius* Cramer, 1779, is discussed and clarified. Two taxa — *potidaea* from Obi and *calaureia* from Misool — described as subspecies of *A. thamyras* by Fruhstorfer (1914) and treated by Evans (1957) as synonyms of other subspecies, are differentiated and returned to subspecies status.

For the biogeography of the region see Rawlins et al. (2014: 5–8) but for the purposes of this paper we make the following key points:

- We use the term Maluku to include both the Indonesian political Provinces of North Maluku (= Maluku Utara) and Maluku.
- The province North Maluku comprises: the Sula islands, the islands we term "northern Maluku" (see below), Obi and Gebe.
- The province Maluku comprises: the islands we term "central Maluku" (see below), the Gorong, Watubela and Tayandu Island groups, the Banda Islands, the Kei Islands, the islands of Southwest Maluku (including Wetar), the Tanimbar Islands and the Aru Islands.
- We use the biogeographical term "northern Maluku" to mean the islands of Morotai, Halmahera, Ternate, Bacan, Kasiruta and Mandioli and some associated smaller islands.
- We use the biogeographical term "central Maluku" to mean the islands of Buru, Ambelau, Manipa, Kelang, Buano, Seram, Ambon, Haruku, Saparua, Nusa Laut, Geser and Seram Laut.

A map shows these islands of Maluku and North Maluku. Here we note that the Indonesian western half of the Island of New Guinea along with its associated offshore islands (previously variously known as Irian, Irian Jaya, West Irian, Irian Barat) now consists of two political provinces: West Papua and Papua. We use the term "New Guinea" in its geographical sense to mean the whole island including these two Indonesian Provinces along with the mainland part of the country of Papua New Guinea.

Where available, both surfaces of both sexes of each taxon are illustrated. To reduce the number of plates

needed, the specimens are illustrated "halved", showing the upperside on the left and the underside on the right. In most cases we have depicted the left half of the butterfly, but where the right side is in significantly better condition, we have shown this and flipped the image to allow easier comparison of similar taxa.

We have examined the collections of the Natural History Museum, London (NHMUK), and specimens and photographs from some private collections.

Abbreviations

CARR	Coll. Andrew Rawlins, Rainham, Kent, UK.
coll.	collection.
CSSK	Coll. Stefan Schröder, Köln, Germany.
fw	forewing.
FwL	Forewing length.
HT	Holotype.
hw	hindwing.
LT	Lectotype.
MLU	MLU/Linnaeus collection, housed in the Museum of Evolution, Uppsala University (UUZM).
NHMUK	The Natural History Museum, London, UK.
PT	Paratype.
SMTD	Senckenberg Museum für Tierkunde, Dresden.
ssp. n.	subspecies nova.
stat. rev.	status revivisco (status revised).
TL	Type locality.

Arhopala Boisduval, 1832

Type species: *phryxus* Boisduval, 1832, designated by Scudder (1875: 120).

Annotated checklist of the *Arhopala "thamyras* species-group" taxa of North Maluku and Maluku

Introduction to the *thamyras* species-group

Evans (1957: 127) considered the species in this group were the only true *Arhopala* species. The remainder of the *Arhopala* species covered in our papers, were treated by Evans as species of *Narathura* Moore, 1878. He included five species in this group. Parsons (1986: 132) described a sixth – *Arhopala doreena* Parsons, 1986. Parsons (1998: 393) mistakenly stated Evans had listed six species and that he (Parsons) had described a seventh.

One species is found in Maluku.

Checklist

Arhopala thamyras (Linnaeus, 1758)

Papilio (*Plebejus*) *thamyras:* Linnaeus (1758: 483); TL: "*in calidioribus regionibus*", *recte* Ambon – see note 1.

= *Papilio helius:* Cramer (1779: 15, pl. 201, figs. F & G); TL: "Surinam", *recte* Ambon – see note 2A.

= *Papilio esra:* Herbst (1800: 260, pl. 285, figs. 5 & 6) – replacement name for *helius* – see note 2A.

= *Arhopala carolina:* Holland (1900: 78); TL: Buru – see note 3.

Range: Maluku, widespread throughout the New Guinea Region, Bismarcks, Solomon Islands (NHMUK).

Note 1: Linnaeus (1758) described *thamyras* very briefly in Latin and then noted "*M. L. U.*" This referred to the Museum Ludovicae Ulricae in Uppsala. The LT is held in the MLU/Linnaeus collection, today housed in the Museum of Evolution, Uppsala University (UUZM). Linnaeus also stated: "*Habitat in calidioribus regionibus*" – meaning "lives in warmer countries".

Corbet (1949: 198) recorded that the ♂ "type" was in the MLU and was illustrated by Aurivillius on plate 1, though he mistakenly noted fig. 5, not fig. 2. He stated that the "true habitat" was Ambon.

Honey & Scoble (2001: 385) also noted that the LT ♂ was in the MLU. They added that the illustration by Aurivillius (1882: 109, pl. 1, fig. 2), based on the specimen in the MLU, "is taken to be a valid lectotype designation".

Note 2: Concerning the confusion surrounding the names *helius* and *helus.*

A) Cramer (1779: 10, pl. 198, fig. B), in Dutch and French described *Papilio helius* from the "West Indies". This taxon is a riodinid from Central and South America, now placed in the genus *Xenandra* Felder & Felder, 1865.

Cramer (1779: 15, pl. 201, figs. F & G) then described and illustrated a very different butterfly, reportedly from Surinam, also under the name *Papilio helius*. The name was preoccupied and could not stand. As we shall show, the taxon represented by this invalid "*helius*" is the same as Linnaeus' *thamyras*. For the purposes of this paper any further reference to Cramer's *helius* refers to this taxon.

Then Herbst (1800), in Latin and German, introduced the name *Papilio esra* to replace Cramer's second *Papilio helius*, noting that the name had already been used for another butterfly. He illustrated both surfaces and followed Cramer in stating that the butterfly came from Surinam.

From Cramer (1779) to Aurivillius (1882)

It seems that none of the main authors after Cramer (1779) and up until Aurivillius (1882) realised that Cramer's second *helius* was the same butterfly as Linnaeus' *thamyras*.

1. Goeze (1780) listed *thamyras* (p. 16) and Cramer's *helius* (p. 99) separately in the section headed "*Plebeji Rurales*".
2. Gmelin (1790: 2346), in his section on "*Plebeji Rurales*", listed *thamyras,* but gave no mention of Cramer's second *helius*.
3. Thunberg (1804: 9) included *Papilio thamyras,* but made no mention of *helius*.
4. Hübner (1819: 70) listed *Lampides helius* Cramer and gave *esra* Herbst as a synonym. He did not include *thamyras*.
5. Godart (1824: 652) listed "*Polyommate Hélus*". He referred it to "*Papilio Helius*. Cram." Godart gave a description of the taxon in French, noting that the specimens were sent from the East Indies by Diard and Duvaucel "naturalistes voyageurs" and he added that Cramer was mistaken in saying the butterfly came from Surinam. Hewitson (1862: 6) pointed out that Godart, when evidently describing *A. centaurus*, referred the butterfly to Cramer's *helius*. Hewitson also stated that Horsfield (1829: 103) "in describing the species to which I have given the name *Aedias,* refers it to Cramer's *Helius*."
6. Lucas (1845: 87, pl. 44, fig. 4) mistakenly followed Godart by listing "*Polyommate Helus. Polyommatus Helus.* God." and referring it to "*Papilio Helius*. Cram. Herbst." He stated that it came from the "Indes orientales".
7. Both Hewitson (1862: 6, pl. 4, figs. 34 & 35) and Kirby (1871: 421) listed *Amblypodia helius* Cramer. Hewitson stated the

Plate 1, Figs. 1–12: Subspecies of *Arhopala thamyras*. — **Figs. 1–6:** *A. thamyras* ***thamyras:*** **1:** ♂, LT, ups./uns., Probably Ambon, (MLU, with permission). **2:** ♀, ups./ uns., Seram (IV. 2005, CARR). **3:** AURIVILLIUS' (1882) illustration of *thamyras* LT. **4:** ♂, ups./uns., Ambon (Ambonia [sic], H. FRUHSTORFER, NHMUK). **5:** ♀, ups./uns., Ambon (Amboina, JOICEY Bequest, NHMUK). **6:** ♂, ups./uns., Buru (PT *carolina* = *thamyras*, Bourou, Coll. DOHERTY, NHMUK). — **Figs. 7–12:** *A. thamyras* ***anthore:*** **7:** ♂, ups./uns., Morotai (Daeo, IV. 2004, CARR). **8:** ♀, ups./uns., Bacan (Batjan, ex J. WATERSTRADT, 1904, NHMUK). **9:** ♂, type, ups./uns., Bacan (Batchuan, HEWITSON Coll., NHMUK). **10:** ♂, ups./uns., Bacan ("Obi" – *recte* Bacan, ex WATERSTRADT, 1904, NHMUK). **11:** ♀, ups./uns., Bacan ("Obi" — *recte* Bacan, ex WATERSTRADT, 1904, NHMUK). **12:** ♀, ups./uns., Halmahera (Baru, Ibu, VI. 2005, CARR). — All NHMUK specimen photographs on all plates are © Trustees of the Natural History Museum London, reproduced here with permission.

specimens from Aru were in the NHMUK, and KIRBY likewise gave Aru as the habitat. Neither author mentioned *thamyras*.

B) AURIVILLIUS (1882: 109, plate, fig. 2) seems to have been the first author to recognise *helius* was a synonym of *thamyras*. He noted in Latin that previous authors were ignorant of the significance of LINNAEUS' *thamyras* and that this species is easily shown to be the same as *P. helius* CRAMER. He tabulated a comprehensive synonymy and illustrated the *thamyras* type in the MLU to avoid any further confusion.

C) After AURIVILLIUS (1882) many authors recognised the correct relationship between *thamyras* and *helius* (along with its synonyms).

1. BETHUNE-BAKER (1903: 58, pl. 1, fig. 1) however, appears to have been unaware of AURIVILLIUS' synonymy. He did not include *Arhopala thamyras* in his revision of the *Amblypodia* group, however he did include *Arhopala helius* CRAMER. He listed as a synonym "*Amblypodia tamyrus* FELDER, Reise Novara, Lep. vol. ii. p. 230, pl. xxviii. fig. 30 (1865)." We cannot explain this reference as we can find no mention of "*tamyrus*" or *thamyras* on page 230, or any other page, of FELDER & FELDER (1865), and plate xxviii has only 19 figures. EVANS (1957: 127) noted: "*tamyrus* BETHUNE-BAKER, 1903: misspelling" as a synonym of *thamyras*.

BETHUNE-BAKER listed Ambon, Seram, Kei, Aru, Waigeo, New Guinea, Fergusson Island and the Solomons as the habitat for *helius*. He included the taxa *phryxus* BOISDUVAL, 1832 (New Guinea Region and Solomons), *sophax* MATHEW, 1887 (Ugi Island) and *anthelius* STAUDINGER, 1888 (Kei – but see below, Aru) as synonyms of *helius*. EVANS (1957: 127) placed *anthelius* and *phryxus* as subspecies of *thamyras* and

synonymised *sophax* with *phryxus*. Thus, by implication the range for nominate *thamyras/helius* recorded by Bethune-Baker was Ambon and Seram.

2. Fruhstorfer (1914: 156–157) recognised that *thamyras* was the correct name for Cramer's *helius*. He described 4 new subspecies of *Arhopala thamyras*. Evans (1957: 127) considered all these to be synonyms of other *thamyras* subspecies, but we consider 2 — *potidaea* and *calaureia* — warrant status as distinct subspecies. Fruhstorfer described *A. thamyras potidaea* and compared it to "*thamyras* L. (*helius* Cr.)" from Ambon, indicating he correctly understood the relationship of *helius* and *thamyras,* as well as its true location. Seitz (1926: 953) listed *Amblypodia thamyras* with *helius* Cramer as a synonym.
3. Evans' (1957: 127) widely read paper confirmed and consolidated the relationship between Linnaeus' *thamyras* and Cramer's *helius*. He also considered the TL for *thamyras* (as well as *helius*) to be Ambon.

Note 3: Holland (1900: 78) described *carolina* as a full species from 5 ♂♂ and 1 ♀ from Buru. He recognised it was part of the *anthore* group. Both Bethune-Baker (1903: 50) and Seitz (1926: 951) included *Arhopala carolina* in their works, noting they had not seen any specimens. There is a PT ♂ in the NHMUK (Fig. 6). Evans (1957: 127) listed *carolina* as a synonym of *thamyras* and we concur.

Note 4: Evans (1957: 127) considered *phryxus* to be the subspecies found across the whole New Guinea Region, apart from the Bismarcks (but including the Admiralty Islands), and in the Solomons. Parsons (1998: 394) noted a similar distribution for *phryxus* and stated that the subspecies *minnetta* Butler, 1882 occurred throughout the Bismarcks, excluding the Admiralty Group. He added: "The distinctive facies of *minnetta*, and its geographical position between populations of *phryxus*, suggests that the taxon may represent a distinct species." Schröder (2017) noted the range for *phryxus* in West Papua/Papua as Waigeo, Batanta, Numfor, Supiori, Biak, Yapen and widespread on the mainland.

Evans' key to identifying *phryxus* stated "Unh markings fully macular and conspicuously darker than the ground: uniform. Very variable." We have examined series of specimens in the NHMUK from Waigeo, Biak, Numfor (labelled Mefor), Yapen, Mioswar and mainland New Guinea and we note variation in the undersides and in the width of the ♀ upperside hindwing black marginal border. The latter character is very consistent within all the Maluku subspecies (and *minnetta*) and is a key feature in distinguishing them. It is possible that the populations currently treated as *phryxus* may represent more than one subspecies, but that is beyond the scope of this paper.

Note 5: Evans (1957: 127) listed 5 subspecies. Parsons (1998: 393) recognised all these. Tennent & Rawlins (2010: 15) noted that *thamyras* from Kofiau Island may represent a new subspecies but we include the Kofiau population with *A. thamyras phryxus* Boisduval, 1832 — see below. We also include the Gebe population with *phryxus*.

As noted earlier, we return *potidaea* and *calaureia* to distinct subspecies and describe one new subspecies. Thus, in total we consider there are 8 subspecies of *Arhopala thamyras*, 7 of which are found in Maluku.

Arhopala thamyras thamyras (Linnaeus, 1758)

(Fig. 1: ♂ LT, Ambon; Fig. 2: ♀, Seram; Fig. 3: ♂ LT, Aurivillius' figure; Fig. 4: ♂, Ambon; Fig. 5: ♀, Ambon; Fig. 6: ♂ PT *carolina* = *thamyras*, Buru.). The *thamyras* LT image (Fig. 1) is shown with kind permission of the Museum of Evolution, Uppsala University.

Papilio (Plebejus) thamyras: Linnaeus (1758: 483); TL: "*in calidioribus regionibus*", *recte* Ambon.

= *Papilio helius:* Cramer (1779: 15, pl. 201, figs. F & G); TL: "Surinam", *recte* Ambon.

= *Papilio esra:* Herbst (1800: 260, pl. 285, figs. 5 & 6) — replacement name for *helius* (preoccupied).

= *Arhopala carolina:* Holland (1900: 78); TL: Buru.

Range: endemic to central Maluku — Buru, Seram, Ambon, Saparua (NHMUK). — **New record:** Kelang (1 ♀, I. 2014, CARR).

Arhopala thamyras anthore (Hewitson, 1862)

(Fig. 7: ♂, Morotai; Fig. 8: ♀, Bacan; Fig. 9: ♂ type, Bacan. Fig. 10: ♂, Bacan; Fig. 11: ♀, Bacan; Fig. 12: ♀, Halmahera.)

Amblypodia anthore: Hewitson (1862: 6, pl. 3, figs. 21, 22); TL: Bacan — see note 1.

Range: Halmahera, Ternate, Bacan (NHMUK), Morotai, Mandioli (Tennent & Rawlins 2010).

Note 1: Hewitson (1862) described both sexes of *anthore* from specimens in the NHMUK from Bacan. He illustrated both surfaces of the ♂. Evans (1957: 127) noted that the ♂ "type" was in the NHMUK (Fig. 9).

Note 2: Bethune-Baker (1903: 58) treated *anthore* as a full species of *Arhopala* and illustrated the ♂ genitalia. Seitz (1926: 953) also treated *anthore* as a full species, whilst Evans (1957: 127) considered *anthore* a subspecies of *thamyras* and we agree.

Note 3: Evans (1957: 127) listed *potidaea* as a synonym of *anthore,* but as discussed below we consider them distinct subspecies.

Arhopala thamyras potidaea Fruhstorfer, 1914, stat. rev.

(Fig. 13: ♂, Obi; Fig. 14: ♀, Obi; Fig. 15: ♂ type, Obi; Fig. 16: ♂, Obi; Fig. 17: ♀, Obi; Fig. 18: ♀ type, Obi.)

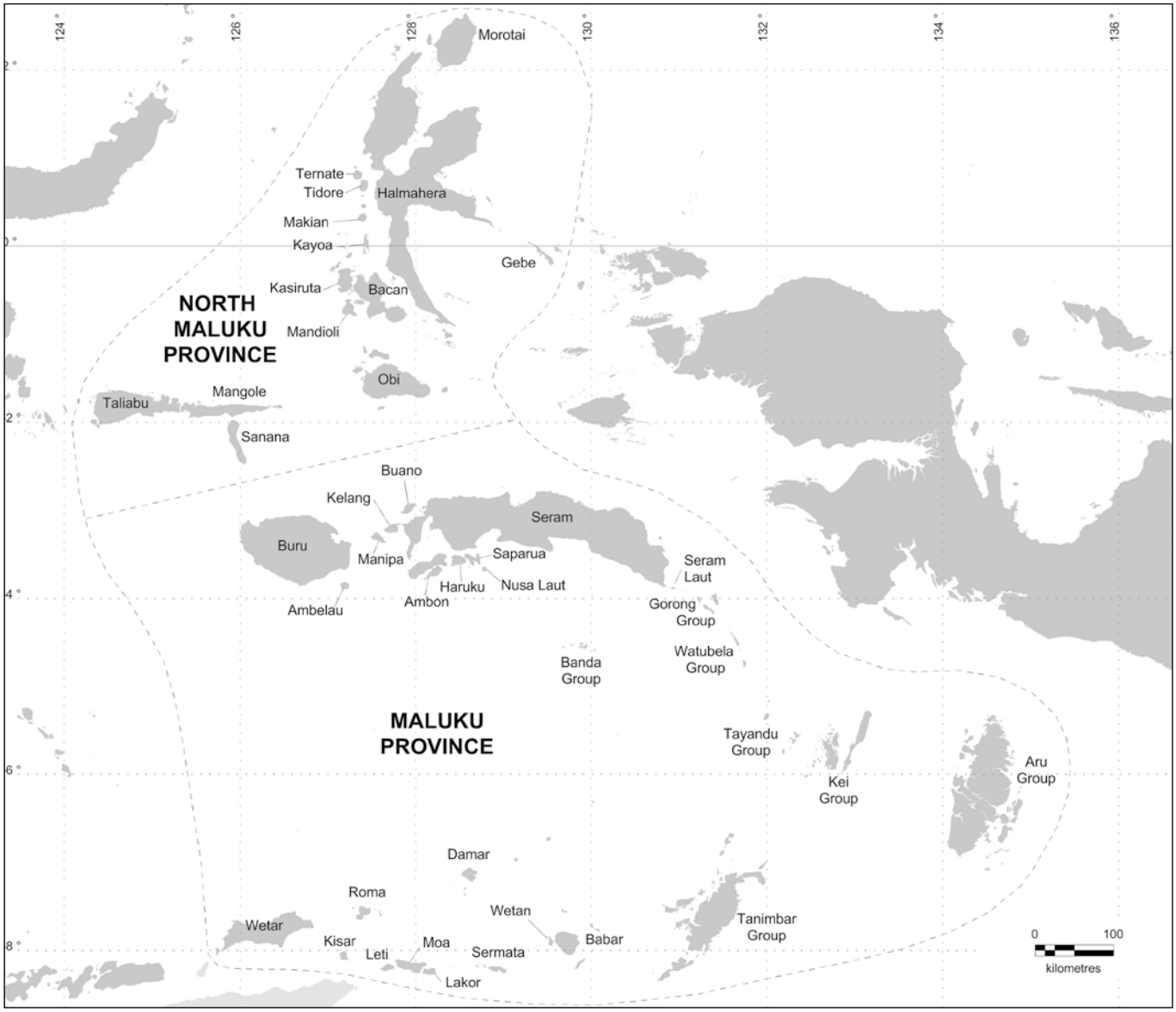
Arhopala thamyras potidaea: Fruhstorfer (1914: 156); TL: Obi — see notes 1 & 2.

Note 1: Fruhstorfer (1914), in German, described both sexes of *potidaea* from 10 ♂♂ and 2 ♀♀ from Obi in his collection. He noted that the ♂♂ were smaller but otherwise scarcely differed from *thamyras* and *anthore,* but the ♀♀ were immediately discernible by a much reduced upperside hw black marginal border. He recorded that the underside of both sexes was lighter than in Bacan and Halmahera specimens (i.e. *anthore*). Seitz (1926: 953) followed Fruhstorfer.

Note 2: Evans (1957: 127) listed *potidaea* as a synonym of *anthore*. He noted that, in addition to the *potidaea* ♂ "type", the NHMUK held 16 ♂♂ & 16 ♀♀ from Obi. We have examined the Obi series in the NHMUK. Several specimens of each sex (a pair is illustrated in Figs. 10 & 11) all carry the same labels stating "Obi, ex J. Waterstradt 1904, ex Oberthür Coll. Brit Mus. 1927-3". These labels are considered erroneous, as Tennent & Rawlins (2012: 140), Rawlins et al. (2014: 13, 16, 28) and Rawlins & Cassidy (2016: 148) explained, and the specimens are thought to originate from Bacan.

The 8 "Obi" Waterstradt ♀♀ match *anthore* from Bacan and Halmahera, but do not correspond to Fruhstorfer's description and clearly differ from Obi specimens from other sources. These include 7 ♀♀ with Obi Frost labels (Fig. 17) in the NHMUK as well as a recent specimen in Coll. Okubo (Fig. 14).

We have the compared the *potidaea* ♂ and ♀ "types" (Figs. 15 & 18) in the NHMUK and other specimens known to be from Obi, with specimens of nominotypical *thamyras* from central Maluku and *anthore* from Bacan and Halmahera. We find that the ♂ upperside of Obi specimens is indistinguishable from *anthore*, however it differs from *thamyras* — the forewing purple sheen is more extensive, entering the cell and reaching further down the margin (to the dorsum) than in *thamyras*. The Obi ♂♂ are in general smaller than *anthore* specimens. The Obi ♀ upperside (Figs. 14 &



Map: Provinces of North Maluku and Maluku showing the island names used in the text.

17) is quite different to that of *anthore,* having the significantly reduced black marginal border that Fruhstorfer noted. The Obi ♀ upperside matches that of *thamyras*. The undersides of both sexes from Obi are slightly lighter than in *anthore* and *thamyras* specimens. We conclude that the population in Obi does represent a distinct subspecies – *Arhopala thamyras potidaea* Fruhstorfer, 1914.

Arhopala thamyras phryxus Boisduval, 1832

(Fig. 19: ♂, Gebe; Fig. 20: ♀, Gebe; Fig. 21: ♀, Gebe; Fig. 22: ♂, New Guinea; Fig. 23: ♀, New Guinea; Fig. 24: ♀ type *teuthrone* = *phryxus,* New Guinea.)

Arhopala phryxus: Boisduval (1832: 75); TL: New Guinea – see note 1.

= *Amblypodia sophax:* Mathew (1887: 47); TL: Ugi, Solomon Islands – see note 2.

= *Arhopala helius latimarginata* (♀ var.): Strand (1912: 78); TL: Teba, New Guinea – see notes 3 & 5.

= *Arhopala interniplaga:* Strand (1912: 79); TL: Waigeo –see notes 3 & 5.

= *Arhopala thamyras teuthrone:* Fruhstorfer (1914: 157); TL: Eilanden River, Dutch New Guinea – see notes 4 & 5.

= *Arhopala thamyras zelea:* Fruhstorfer (1914: 157); TL: Fergusson – see notes 4 & 5.

Range: Waigeo, Salawati, Mioswaar, Numfor (labelled Mefor), Biak, Yapen, New Guinea, Milne Bay Islands and the Solomons (NHMUK), Kofiau (CARR) – see note 8. – **New record** from Maluku: Gebe (CARR) – see note 7.

Note 1: Boisduval (1832) described *phryxus* in Latin and French from "Nouvelle-Guinée". He didn't specify the sex or number of specimens, but he was clearly describing the ♂. As Parsons (1998: 393), we have been unable to locate the HT.

Note 2: Mathew (1887) described both sexes of *sophax* from Ugi in the Solomon Islands and considered the taxon was a full species of *Amblypodia*. Bethune-Baker (1903: 58) treated *sophax* as a synonym of *Arhopala helius,* i.e. *thamyras*. Evans (1957: 127), Parsons (1998: 393) and Tennent (2006: 39) all considered *sophax* a synonym of *Arhopala thamyras phryxus* and we agree. Evans noted that the *sophax* ♂ "type" was in the NHMUK.

Note 3: Strand (1912), in German, described "*Arhopala helius* Cram. var. ♀ nov. *latimarginata* Strd. n. var." from 1 ♀ from Teba in New Guinea. He then described *Arhopala interniplaga* from 1 Platen ♂ from Waigeo.

Note 4: Fruhstorfer (1914), in German, described both sexes of *teuthrone* from 3 pairs in his collection from the Eilanden River (now called the Pulau River) in New Guinea. The next taxon he described was *zelea* from 3 ♂♂ in his collection from Fergusson and Kiriwina Islands.

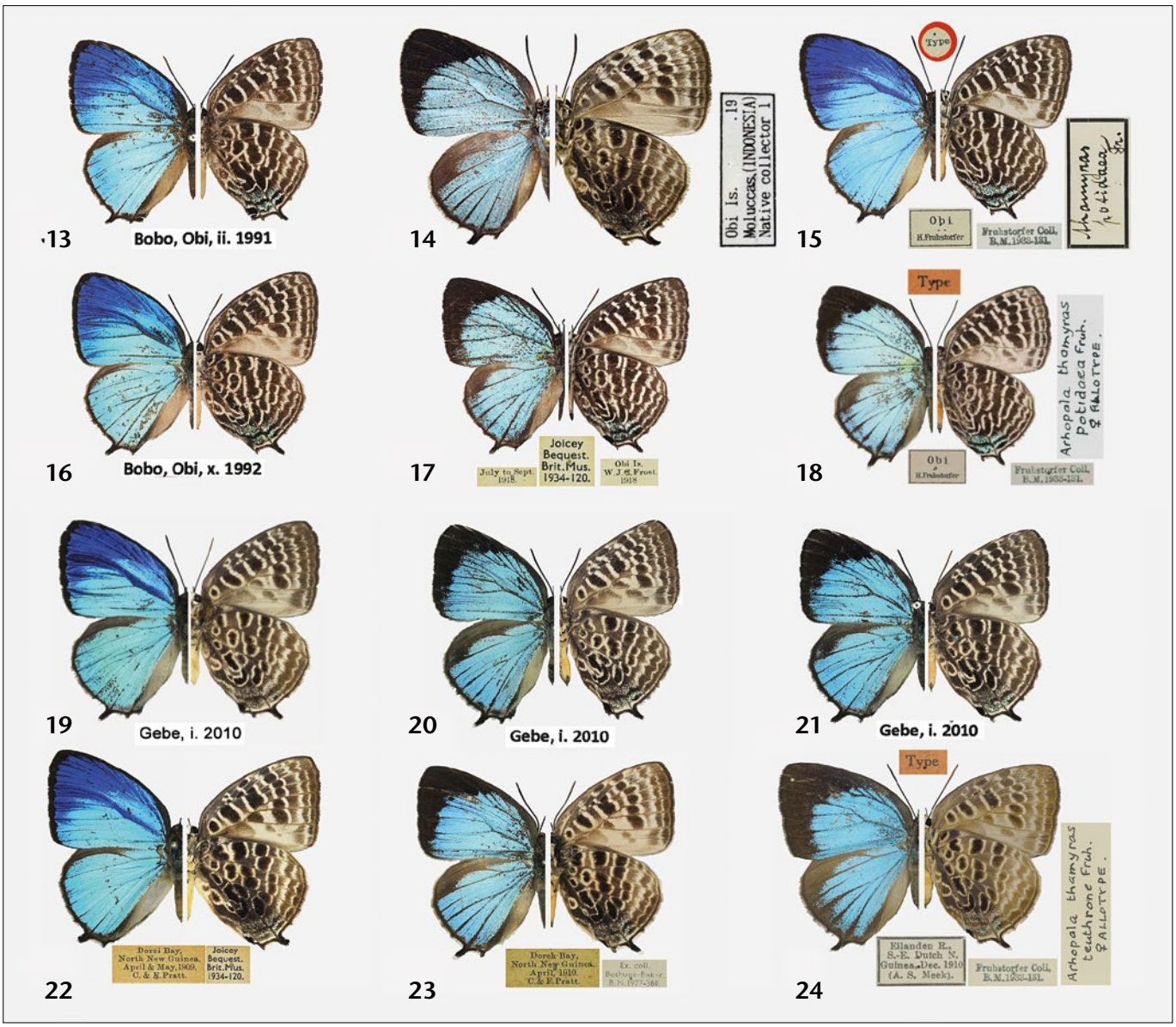


Plate 2, Figs. 13–24: Subspecies of *Arhopala thamyras*. — **Figs. 13–18:** *A. thamyras* ***potidaea:*** **13:** ♂, ups./uns., Obi (Bobo, II. 1991, CARR). **14:** ♀, ups./uns., Obi (Native collector, Coll. Dr. Okubo). **15:** ♂, type, ups./uns., Obi (Fruhstorfer Coll., NHMUK). **16:** ♂, ups./uns. Obi (Bobo, X. 1992, CARR). **17:** ♀, ups./uns. Obi (VII. to IX. 1918, W.J. C. Frost, NHMUK). **18:** ♀, type, ups./uns., Obi (Fruhstorfer Coll., NHMUK). — **Figs. 19–24:** *A. thamyras* ***phryxus:*** **19:** ♂, ups./uns., Gebe (I. 2010, CARR). **20:** ♀, ups./uns., Gebe (I. 2010, CARR). **21:** ♀, ups./uns., Gebe (I. 2010, CARR). **22:** ♂, ups./uns., New Guinea (Dorey Bay, IV. & V. 1909, C. & F. Pratt, NHMUK). **23:** ♀, ups./uns., New Guinea (Dorey Bay, IV. 1910, C. & F. Pratt, NHMUK). **24:** ♀, ups./uns., New Guinea (type *teuthrone* = *phryxus*, Eilanden River, S.-E. Dutch N. Guinea, XII. 1910, A. S Meek, NHMUK).

Note 5: Evans (1957: 127), Parsons (1998: 393) and Tennent (2006: 39) all treated these Strand and Fruhstorfer taxa as synonyms of *phryxus* and we concur. Evans noted that the *teuthrone* and *zelea* ♂ "types" were in the NHMUK.

Note 6: The Maluku subspecies show very consistent phenotypes, but we note that across the New Guinea Region there is minor variation in some features of *phryxus* specimens on the underside and, most noticeably, the width of the ♀ upperside hindwing black border. We figure ♀♀ from Dorey Bay and the *teuthrone* ♀ type from Eilanden River in NG to illustrate the extremes of this feature (Figs. 23, 24). Mild variation can also be seen in specimens from one location. It may be that the populations across the New Guinea Region that are currently included with *phryxus* may represent more than one subspecies.

Note 7: We have examined 5 ♂♂ & 5 ♀♀ from Gebe (I. 2010, CARR). Gebe, politically part of North Maluku, lies half way between Halmahera in northern Maluku and Waigeo in the New Guinea Region. The Gebe ♂♂ are typical of *phryxus*. The upperside hw of all 5 ♀♀ exhibit a very narrow thread-like black border between veins 1b & 6. As noted above, the width of the ♀ upperside hw black border is somewhat variable in *phryxus* specimens across the New Guinea Region. The Gebe ♀♀ match some *phryxus* specimens, for example the Dorey Bay ♀ illustrated in Fig. 23, so we place the Gebe population with *phryxus*.

Note 8: Tennent & Rawlins (2010: 15) noted that the population from Kofiau Island may represent a new subspecies. We have examined 3 ♂♂ from Kofiau (8. IX. 1991, CARR; one is shown in Fig. 33) and note that they are very small (FwL 17–19 mm), but otherwise consistent with *A. thamyras phryxus* Boisduval, 1832. For now, we tentatively place the Kofiau population with *phryxus,* but examination of ♀♀ is needed to confirm this.

Arhopala thamyras anthelius Staudinger, 1888

(Fig. 25: ♂, Aru; Fig. 26: ♀, Aru; Fig. 27: ♀, Aru.)

Arhopala helius var. *anthelius:* Staudinger (1888: 281); TL: Aru — see note 1.

Range: Aru (NHMUK). — **New records** from specific Aru Islands: Wokam (1 ♂, VIII. 2012, CARR), K. Nagai (pers. comm.) — see note 3.

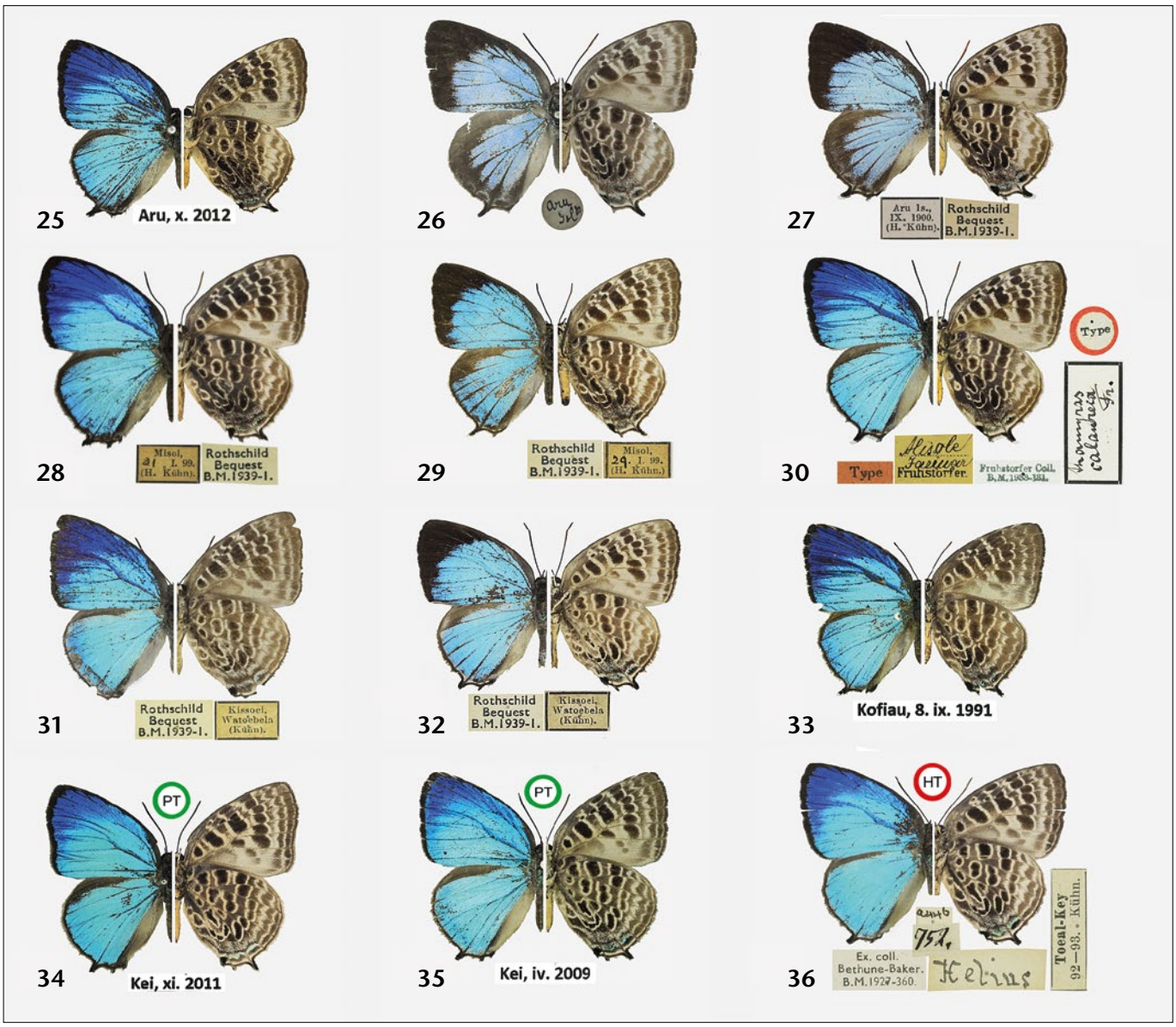


Plate 3, Figs. 25–36: Subspecies of *Arhopala thamyras*. — **Figs. 25–27:** *A. thamyras* ***anthelius*****: 25:** ♂, ups./uns., Aru (x. 2012, CARR). **26:** ♀, ups./uns., Aru (Aru Islds., NHMUK). **27:** ♀, ups./uns., Aru (ix. 1900, H. Kühn, NHMUK). — **Figs. 28–32:** *A. thamyras* ***calaureia*****: 28:** ♂, ups./uns., Misool (Misol, 21. i. [18]99, H. Kühn, NHMUK). **29:** ♀, ups./uns., Misool (Misol, 21. i. [18]99, H. Kühn, NHMUK). **30:** ♂, type, ups./uns., Misool (Misole, Fruhstorfer Coll. NHMUK). **31:** ♂, ups./uns., Kasiui, Watubela Islands (Kissoei, Watoebela, Kühn, NHMUK). **32:** ♀, ups./uns., Kasiui, Watubela Islands (Kissoei, Watoebela, Kühn, NHMUK). — **Fig. 33:** *A. thamyras* ***phryxus*****?:** ♂, ups./uns., Kofiau (8. ix. 1991, CARR). — **Figs. 34–36:** *A. thamyras* ***zfiae*** **ssp. n.: 34:** ♂, PT, ups./uns. Kei (xi. 2011, CARR). **35:** ♂, PT, ups./uns. Kei (iv. 2009, CARR). **36:** ♂, HT, ups./uns. Kei (Toeal-Key, [18]92–93, Kühn, NHMUK).

Note 1: Staudinger (1888) described *anthelius* in German. Under the heading "*A. Helius* Cram." he noted a further local form from Aru and Waigeo and stated "Ich nenne diese Aru-Form var. *Anthelius*." He added that *anthelius* was a bit shinier than *anthore* with a slightly less deep blue apical forewing area, but more than in *helius* (i.e. *thamyras*). He didn't specify the sex he was discussing but it must have been the ♂. He then stated that both his ♀♀ from Aru and Waigeo were almost the same as *helius* on the upperside. Evans (1957: 127) noted that the "type" was a ♂ from Aru. We have been unable to locate any types in the NHMUK, and Takanami (1989, 1992) did not note any *anthelius* types in the Museum für Naturkunde, Berlin, or the SMTD. It is possible they were lost or destroyed in the 2nd World War.

Note 2: Bethune-Baker (1903: 58, pl. 1, fig. 22) noted "Var. *anthelius* Staudinger" was a form from Aru and Waigeo but he stated the Aru specimens were "without doubt ordinary *helius*" and so treated *anthelius* as a synonym of *helius* (i.e. *thamyras*). He considered the Waigeo specimens were readily separable from Aru *anthelius*, but corresponded precisely with Grose Smith's *helianthes*. Bethune-Baker also synonymised *helianthes* with *helius*.

Rothschild (1915: 142) treated *anthelius* as a subspecies of *Arhopala helius* (i.e. *thamyras*) but noted the TL as Waigeo. He placed specimens from Misool under this taxon.

Seitz (1926: 953) listed *helianthes* and *helius* as synonyms of *thamyras*, but he considered *anthelius* to be the Aru form (subspecies) of *thamyras*, noting the reduced metallic blue spots in the anal area of the hindwing underside. His illustration in 148b is captioned there as *helius* but he notes it as *anthelius* in the text. *Arhopala helianthes* Grose Smith, 1902 (TL Milne Bay) is now considered a distinct species (e.g. Evans 1957: 127, Parsons 1998: 394). Evans (1957: 127) noted specimens of *helianthes* from New Guinea and Waigeo in the NHMUK. He considered the Aru population of *thamyras* (= *helius*) was distinct and so maintained *anthelius* as a subspecies, but he transferred the Waigeo population of *thamyras* from *Arhopala thamyras anthelius* to *Arhopala thamyras phryxus* and we agree. It seems likely Bethune-Baker was looking at specimens of *helianthes* rather than *thamyras*. The two species — *thamyras* and *helianthes* — are sympatric on Waigeo (Schröder 2017). Evans stated that the "type" of *anthelius* was a ♂ from Aru.

Note 3: Evans (1957: 127) treated *calaureia* Fruhstorfer from Misool as a synonym of *anthelius* but we consider *calaureia* is a valid subspecies – see below. Evans also noted 2 ♂♂ and 1 ♀ from Kei in the NHMUK and included these with *anthelius*. In fact, these 3 specimens comprise a pair from the Watubela Islands and 1 ♂ from Kei and we discuss their status below.

Arhopala thamyras calaureia Fruhstorfer, 1914, stat. rev.

(Fig. 28: ♂, Misool; Fig. 29: ♀, Misool; Fig. 30: ♂ type, Misool; Fig. 31: ♂, Watubela; Fig. 32: ♀, Watubela.)

Arhopala thamyras calaureia: Fruhstorfer (1914: 157); TL: Misool – see note 1.

Range: Misool, Watubela (NHMUK) – see note 3.

Note 1: Fruhstorfer (1914) described *calaureia* in German, from 2 ♂♂ from Misool. He noted they were very close to subspecies *anthelius* from Aru and *phryxus* Boisduval, 1832 from Waigeo.

Note 2: Seitz (1926: 953) listed *calaureia* as the subspecies of *thamyras* from Misool. Evans (1957: 127) treated *calaureia* as a synonym of *anthelius* and noted that the *calaureia* ♂ "type" was in the NHMUK (Fig. 30). We have examined this type and other Misool specimens and compared them to Aru *anthelius.* The Misool ♀♀ have narrower upperside hw black borders and in both sexes the hw underside has a narrower white postdiscal band than Aru specimens. We consider the Misool population is distinct – *Arhopala thamyras calaureia* Fruhstorfer, 1914.

Note 3: As noted above, Evans (1957: 127) recorded 2 ♂♂ and 1 ♀ from Kei in the NHMUK and included these with *anthelius*. Evans' 3 Kei specimens actually comprise 1 ♂ from Kei and a pair from Kasiui Island in the Watubela Islands (the next island group northwest of Kei).

The Watubela ♀ upperside is very different from Aru ♀♀, most notably in the much narrower, black borders. The Watubela ♂ upperside is similar to that of Aru *anthelius*, Misool *calaureia* and *phryxus,* but the purple blue on the forewing apex is more extensive than in central Maluku *thamyras* or Kei specimens. The underside of the Watubela specimens differs from *anthelius,* but closely resembles *calaureia*. We include the Watubela population with *calaureia*.

We have examined the NHMUK Kei ♂ and a further 5 ♂♂ from Kei (CARR; CSSK) and note some differences. The purple blue on the upperside fw apex of Kei ♂♂ is clearly and consistently less extensive and less deep purple than in the Watubela ♂, the Aru *anthelius* specimens and all other subspecies of *thamyras* except the nominate. The underside of Kei ♂♂ is clearly different from nominate *thamyras*, most notably having a paler ground colour between the dark spots, resulting in a more contrasted appearance. We therefore consider the Kei population to represent a new subspecies which we describe here.

Arhopala thamyras zfiae ssp. n.

(Fig. 34: ♂ PT, Kei; Fig. 35: ♂ PT, Kei; Fig. 36: ♂ HT, Kei.)

Holotype ♂: Indonesia, Maluku, Kei, Toeal-Key [= Tual, Kei Kecil], [18]92–[18]93, Kühn. Ex. coll. Bethune-Baker. B.M. 1927-360 (NHMUK).

Paratypes (5 ♂♂): Indonesia, Maluku, Kei: 2 ♂♂, ix. 2011; 1 ♂, xi. 2011, 1 ♂, iv. 2009 (CARR); 1 ♂, ii. 2012 (CSSK).

Etymology: named for Zfia, the first author's daughter.

Range: Kei.

Diagnosis and description

♂ (Figs. 34–36). FwL 20 mm.

Upperside: both wings shining brilliant blue, turning into purple along the costa and towards the apex of the forewing. This purple area similar to nominate *thamyras*, but less extensive and a less deep purple than in *anthore, potidaea, anthelius, calaureia* or *phryxus*. The forewing black border thin, less than 1 mm, expanding only very slightly towards the apex. Hindwing with a short, blunt tail at vein 2 and a short marginal tuft at vein 1b.

Underside: of the typical *thamyras*-pattern, with the spot markings broadly outlined in creamy-white on a pale brown ground-colour. The ground colour markedly paler than in *anthore*, *potidaea, phryxus* and nominate *thamyras*, more strongly contrasting with the dark brown spots.

Hindwing with a sagittate cream band in spaces 3 to 7, just lateral to the postdiscal band of dark spots, narrower than in Aru *anthelius*, but broader than in *anthore*, *potidaea, phryxus* and nominate *thamyras*. A narrow band of tornal blue-green scales in spaces 1b and 2 on both sides of tailed vein 2. A conspicuous tornal black spot in space 1a. Tornal lobe not conspicuously projecting.

♀ Not seen.

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