

Butterflies (Lepidoptera: Papilionoidea) of Mount Kilimanjaro: Nymphalidae subfamilies Libytheinae, Danainae, Satyrinae and Charaxinae

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ABSTRACT

This paper, which presents an annotated checklist of the 'lower Nymphalidae' (Libytheinae, Danainae, Satyrinae, Charaxinae), is the fourth in a series on the butterfly fauna of Mount Kilimanjaro. Four genera of lower Nymphalidae (*Danaus*, *Amauris*, *Bicyclus*, *Charaxes*), with a total of 11 included species, are known or believed to occur within the main forest zone, from c. 1800 to 2800 m. Of these, only three species of *Charaxes* (*Charaxes berkeleyi*, *Charaxes ansorgei*, *Charaxes xiphares*) may be restricted locally to this primary forest. The lower slopes fauna, below 1800 m, is considerably richer, with a total of 11 genera and 41 species listed (8 species of which extend into the forest zone). Possible additional species, dubious earlier records, problems with African subspecies of *Danaus chrysippus*, a need for more work on certain Satyrinae, and classification of the genus *Charaxes* are discussed. An identification key to the subfamilies of Nymphalidae, and the 19 genera of Libytheinae, Danainae, Satyrinae, Charaxinae that occur in Tanzania, together with a key to the adults of all the species of these four subfamilies considered to occur or have occurred on Kilimanjaro, with 206 colour images, are included as online Supplementary Information.

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Introduction

This paper, which offers a synopsis of the 'lower nymphalid' butterflies of Mt Kilimanjaro, is the fourth in a series intended to present a checklist for all butterflies currently known or likely to occur on the peak and its lower slopes (Liseki and Vane-Wright 2011, 2013, 2014). As indicated by Liseki and Vane-Wright (2011), the ultimate goal of this inventory programme is to facilitate monitoring the butterfly fauna of this exceptional mountain, including the potential to use these conspicuous day-flying insects as a focal group to document possible impacts of climate change in eastern Africa. Keys and photographs, provided as online Supplementary Information (SI), offer a practical means for identification of the adult butterflies.

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Nymphalidae

Wahlberg et al. (2009) divided the Nymphalidae *sensu lato* into four major groups: the Libytheinae (long regarded as the sister group of all other nymphalids – but not found to be so in all analyses – e.g. Wu et al. 2014; some other recent work suggests a relationship with Danainae – N. Wahlberg, pers. comm.), the Danainae (the next branch, or even the first – Wu et al. 2014), and two highly diverse sister taxa: the satyrine clade (to include among other higher groups Satyrinae and Charaxinae) and the nymphaline clade (to include Apaturinae, Limenitidinae, Heliconiinae and Nymphalinae, among other subfamilies). The monophyly of these two major groups, separate from the Libytheinae and Danainae, could receive additional support if the suggestion that their wing eyespots (= border ocelli of Nijhout 1991) are controlled by a network of co-opted genes that evolved just once within the Papilionoidea c. 90 million years ago (Oliver et al. 2012, Monteiro 2015) were corroborated.

Although there would be no logical justification for regarding either of the major terminal clades as more basal than the other (Krell and Cranston 2004), for convenience we propose to refer to the first three branches (Libytheinae + Danainae + satyrine clade) as the 'lower Nymphalidae'. The fourth branch, the 'higher Nymphalidae', will be dealt with in the following papers of this series.

For Tanzania as a whole, Kielland (1990) and Congdon and Collins (1998) recognized just over 180 species of lower Nymphalidae from Tanzania, as defined above, divided here among 19 genera (Table 1). Many of these species and several of the genera do not occur in the northeastern region of the country, where Kilimanjaro is situated. Since 1998 there have been further changes and additions, but these are only noted where they affect the Kilimanjaro fauna.

Annotated checklist of the Libytheinae, Danainae, Satyrinae and Charaxinae of Mt Kilimanjaro

The genera are treated in the sequence of Table 1. Within each genus (and subgenus in the case of *Amauris* and *Charaxes*), species are listed alphabetically. Headings for those genera and species known to occur within the montane forest reserve areas of Mount Kilimanjaro (above 1800 m) are printed in bold. Additional genera and species known to occur or to have occurred on the lower slopes are indicated in non-bold. Species about which we are uncertain, consider only as possibilities, or that have been recorded from Kilimanjaro falsely, are listed in square brackets.

To develop this list we have relied mainly on Kielland (1990), Ackery et al. (1995) and Congdon and Collins (1998), and the collections of the Natural History Museum (BMNH), London. In addition, RIVW has searched the main butterfly collection of Oxford University Museum of Natural History (OUMNH), where valuable material from Kilimanjaro and nearby Taveta (Kenya) exists. SDL carried out fieldwork on six occasions during 2001, with RIVW accompanying him during the May visit (see Liseki and Vane-Wright 2011).

Bicyclus smithi smithi (Aurivillius, 1899) was noted from Kilimanjaro by Condamin (1973, p. 185). Within Tanzania this small, dark *Bicyclus* appears to be a purely western insect, restricted to the Mahale mountain area adjacent to Lake Tanganyika (Kielland

Table 1. The 19 genera of ‘lower Nymphalidae’ here considered to occur in Tanzania.

Libytheinae			<i>Libythea</i> Fabricius, 1807
Danainae	Danaini		<i>Danaus</i> Kluk, 1780 (subgenus <i>Anosia</i> Hübner, 1816) <i>Tirumala</i> Moore, 1880 <i>Amauris</i> Hübner, 1816 (subgenus <i>Amauris</i>) <i>Amauris</i> (subgenus <i>Amaura</i> Geyer, 1837)
Satyrinae	Melanitini		<i>Gnophodes</i> Doubleday, 1849 <i>Melanitis</i> Fabricius, 1807
	Elymniini		<i>Elymnias</i> Hübner, 1818
	Satyrini	Mycalesina	<i>Bicyclus</i> Kirby, 1871 <i>Heteropsis</i> Westwood, 1850
		Lethina	<i>Aphysoneura</i> Karsch, 1894
		Ypthimina	<i>Mashuna</i> van Son, 1955 <i>Ypthima</i> Hübner, 1818 <i>Ypthimomorpha</i> van Son, 1955 <i>Physcaeneura</i> Wallengren, 1857 <i>Neita</i> van Son, 1955 <i>Coenyropsis</i> van Son, 1958 <i>Neocoenyra</i> Butler, 1886
Charaxinae	Charaxini		<i>Palla</i> Hübner, 1819 <i>Charaxes</i> Ochsenheimer, 1816 (<i>nichetes</i> group) <i>Charaxes</i> (<i>Polyura</i> Billberg, 1820) <i>Charaxes</i> (<i>Eriboea</i> Hübner, 1819) <i>Charaxes</i> (<i>Euxanthe</i> Hübner, 1819) <i>Charaxes</i> (<i>Charaxes</i> Ochsenheimer, 1816)

Inclusion is based on Kielland (1990), with the addition of *Elymnias* from Congdon and Collins (1998), the substitution of *Heteropsis* for *Henotesia* Butler (following Lees et al. 2003; Williams 2010; and Kodandaramaiah et al. 2010), and the separation of *Tirumala* from *Danaus* by Ackery and Vane-Wright (1984). The subgenera of Danainae reflect Ackery et al. (1995). Following Aduse-Poku et al. (2009), *Euxanthe* is included as one of five subgenera of *Charaxes* currently recognized (one as yet unnamed), all of which occur in Tanzania. Doleck et al. (2014) have recently questioned the separation of *Gnophodes* and *Bletogona* (an Asian genus) from *Melanitis*, but this has yet to be substantiated; for now we retain the separation of *Gnophodes*, as dealt with by Smiles (1973). The order and higher classification is based on Larsen (1996), Peña et al. (2006), Peña et al. (2011), Peña and Wahlberg (2008), Wahlberg et al. (2009), Aduse-Poku et al. (2009), Brower et al. (2010), Marín et al. (2011) and Wu et al. (2014). None of these publications deals with all of the genera listed here and, moreover, all aspects of the higher classification of the Nymphalidae remain ‘work in progress’. Further changes must be anticipated.

1990, p. 83). We have not seen any specimens from the northern highlands, nor do we know of any other records for Kilimanjaro in the literature. We conclude that Condamin’s record was an error.

Bicyclus jefferyi Fox, 1953, is listed by de Jong and Congdon (1993: appendix 8.2) as a montane species present on Kilimanjaro. Based on Kielland (1990), all other available literature, and the absence of material from the Kilimanjaro area in BMNH and OUMNH, this appears to be a mistake.

Charaxes (Eriboea) fulgurata Aurivillius, 1898, is not noted by Henning (1989), Kielland (1990), Larsen (1996), or Congdon and Collins (1998), for Tanzania or Kenya. van Someren (1966, p. 98), however, in listing *Charaxes etheocles etheocles* female f. ‘lunigera’ Rothschild, 1900, as a synonym of *Charaxes fulgurata*, notes ‘Delagoa Bay, Zomba and Taveta’ as the distribution of this form. This also appears to be an error, as Rothschild described f. ‘lunigera’ from northern Angola – well within the normal range accepted for *C. fulgurata* [Angola, the Democratic Republic of Congo (DRC), Zimbabwe and Zambia]. We have not located any museum material of *C. fulgurata* from Taveta or elsewhere in the region of Kilimanjaro. We therefore exclude *C. fulgurata*, together with *Bicyclus smithi* and *Bicyclus jefferyi*, from the list.

Neocoenyrta parallelopupillata (Karsch, 1897) is listed below (and illustrated) as a result of what has since proven to be an erroneous Kilimanjaro label added during curation. The specimen concerned was collected by SDL in the Usambaras. Normally we would have eliminated this 'record' altogether, especially if *N. parallelopupillata* is truly endemic to the Usambaras, as usually supposed. However, our investigations suggest the *possibility* that this species may be more widespread, perhaps extending south to Malawi and north to Kenya. Consequently we have retained *N. parallelopupillata* in our treatment, to draw attention to the need for further work – but there is no empirical evidence that it occurs on Kilimanjaro.

Conventions

In most cases male and female forewing lengths are given for each species. The means and standard deviations (SD) have been calculated from small samples of BMNH (and some OUMNH) specimens, as in Liseki and Vane-Wright (2011). The ranges are estimates based on these measurements. Wherever possible we have used material entirely from northeastern Tanzania. Where necessary, however, BMNH material from elsewhere in Tanzania, Kenya or East Africa has been used. All sizes given should be regarded as indicative only (see discussion in Liseki and Vane-Wright 2011, p. 2392). For most *Charaxes* we have also noted the forewing length ranges given by van Someren in his 'revisional notes' (van Someren 1963–1975).

Altitudinal ranges are given in metres as rounded estimates, largely by reference to the work of Kielland (1990), but sometimes modified from other sources. In the SI figure legends and at certain places in the text, however, heights at which individual specimens were stated to have been captured are given in the units used on the data labels – notably 'feet' (conversion to metres gives a spurious impression of accuracy, or rounding difficulties). Place names are generally standardized to modern spellings (e.g. Moshi for 'Moschi'; Engare Nairobi for 'Ngare Nairobi').

Subfamily LIBYTHEINAE Genus *Libythea* *Libythea laius* Trimen, 1879

Larsen 1996: pl. 11, fig. 384 ii,iii (as *L. labdaca laius*). d'Abrera 2004: 529 (1 fig.; as *L. labdaca laius*). SI: fig. 2a,b.

Forewing length: male 21.5–27 mm [mean ($n = 6$) 24.01 mm, SD = 1.572]; female 24–27.5 mm [mean ($n = 5$) 25.84 mm, SD = 0.546].

Note: The status of this taxon has been, and continues to be, uncertain (Appendix 1). Here, following Kawahara (2013, p. 26), we refer to the East African 'snout' as *Libythea laius*.

Records

According to Kielland (1990, p. 91), this butterfly occurs in forested areas and forest margins at elevations up to 2000 m, in the 'Eastern and northern part' of Tanzania. Although a very distinctive species, *L. laius* has a very variable underside pattern. Cordeiro (1990, p. 33) recorded it from Lake Manyara National Park. Included here as a

member of the Kilimanjaro lower slopes fauna on the basis of a single male from 'Slopes of Kilimanjaro' collected by Hannington, and a ?male from New Moshi, collected by Selous, v.1916 (BMNH; both specimens listed by Kawahara 2013, p. 30). *Libythea* butterflies sometimes migrate or disperse in huge numbers and, although not encountered by Liseki (2009), it is possible this species occurs from time to time in the lowest zone of the montane forest. More widely, *L. laius* occurs in eastern and southern Africa, from Sudan to Malawi, Zambia (Heath et al. 2002), Mozambique and South Africa, including eastern Kenya (Kawahara 2013, p. 30). The very closely related *L. labdaca* Westwood, 1851, has an essentially parapatric distribution, being found throughout much of the rest of Africa, from Ethiopia through western Kenya and western Tanzania to the Congo Basin, Angola and West Africa, including São Tomé and Príncipe. The claim of Ackery et al. (1995, p. 472, as *L. labdaca laius*) that *L. laius* also occurs west as far as Angola may be in error – but, given Zambia and Angola share a border, this needs to be checked.

Subfamily DANAINAE

Genus *Danaus*

Danaus (Anosia) chrysippus chrysippus (Linnaeus, 1758)

Larsen 1996: pl. 27, fig. 385 i. d'Abreera 1997: 185 (6 figs, as *D. chrysippus aegyptius*). SI: Figure 2c–h.

Forewing length: male 33–47 mm [mean ($n = 30$) 39.94 mm, SD = 3.008]; female 27–46 mm [mean ($n = 13$) 36.97 mm, SD = 4.888].

Note: see Appendix 2 for an account of recent debate regarding the taxonomy of African *Danaus*.

Records

In most parts of the country, from sea level to high mountains, flying all year (Kielland 1990, p. 73). Godman (1885, p. 537, as *Danaus dorippus* (Klug, 1845)) recorded this butterfly from Kilimanjaro up to c. 1500 m, but Aurivillius (1910a, p. 2, as *Danaida dorippus*) gave elevations up to 3200 m. Kielland (1990) did not give specific records but the continuing presence of this butterfly on the mountain was confirmed by Liseki (2009). Beyond Tanzania this subspecies occurs throughout the Afrotropical Region, much of Arabia and Asia, including Asia Minor and the Levant, and even breeds occasionally in parts of southern Europe (notably Italy and Greece) (Ackery and Vane-Wright 1984; Ackery et al. 1995, p. 268, as *Danaus c. aegyptius* (Schreber, 1759)).

In many parts of Africa, including Tanzania, *D. chrysippus* exhibits unimodal wing-pattern polymorphism (terminology of Vane-Wright 1975). In the Kilimanjaro area most individuals appear to be of the 'dorippus' phenotype, but forms 'transiens', 'semialbinus' and 'albinus' also occur – indicating that the population is polymorphic at the loci controlling both hindwing coloration (the A-locus, with white recessive) and forewing pattern (the C-locus, with pre-apical forewing bar recessive). In OUMNH there is a single male f. 'chrysippus' from North Kilimanjaro (Kenya), collected 19 June 1905, ex Brodie Collection – which can be presumed to have the genotype AAcc (see summary table in Ackery and Vane-Wright 1984, p. 95) – however, the nominate form appears genuinely rare on Kilimanjaro. In Asia, form 'dorippus' is found as far east as Sri Lanka. In addition to colour pattern polymorphism, both sexes (and all forms) of this species vary very greatly in size.

Genus *Tirumala*

Tirumala formosa formosa Godman, 1880

Larsen 1996: pl. 27, fig. 387 i. d'Abrera 1997: 187 (1 fig.). SI: Figure 3a–d.

Forewing length: male 43.5–52 mm [mean ($n = 9$) 47.19 mm, SD = 2.072]; female 43.5–50.5 mm [mean ($n = 11$) 47.10 mm, SD = 1.507].

Records

Highland forest, forest edges and forest mosaic up to 2300 m in north and north-eastern Tanzania, south to Mufindi, and inland to the Rubeho Mountains, with disjunct populations to the west in Mpanda and Kigoma; also in lowland forest at Kasoge and Sanje, and common in semi-evergreen bush near Lufusi River, in the Rubehos (Kielland 1990, p. 73). Although not specifically recorded from Kilimanjaro by Kielland (1990), and not found there by Liseki (2009), it is included here as a member of the lower slopes fauna based on Rogers' (1908, p. 494) record for Taveta (a corresponding specimen is extant in OUMNH), and Aurivillius's (1910a, p. 2) records for the cultivated area and slopes of Kilimanjaro. Three female specimens in OUMNH were collected by W.A. Lamborn, 16 May 1916, from Arusha at c. 1400 m, in 'dense evergreen forest'. The BMNH has at least nine specimens collected on West Kilimanjaro by B. Cooper, at heights up to 5000 ft, and a pair from Moshi collected by Selous. Cooper also collected this butterfly on Mt Meru, including a female at 6500 ft – so it is possible this species could extend into the lower levels of the Kilimanjaro protected forest.

Beyond Tanzania this subspecies occurs in Kenya (highlands east of Rift Valley central highlands, Nairobi, Taita Hills, Chyulu Hills, Namanga, Mt Sagala). In Zambia it is known from a single specimen from the Mafinga Mountains, collected by Heath, September 1981 (Heath et al. 2002, p. 47). The collective species comprises in total four recognized subspecies, ranging from Nigeria and Gabon east to Ethiopia and Somalia, south to Zambia (Ackery et al. 1995, p. 270). *Tirumala formosa* is very distinct from all other members of the genus (Ackery and Vane-Wright 1984), including the only other African species included.

Tirumala petiverana (Doubleday, 1847)

Larsen 1996: pl. 27, fig. 386 i. d'Abrera 1997: 185 (1 fig.). SI: Figure 3e–h.

Forewing length: male 40.5–48.5 mm [mean ($n = 11$) 44.70 mm, SD = 1.904]; female 44.5–51 mm [mean ($n = 12$) 47.14 mm, SD = 1.583].

Records

Kielland (1990, p. 73, as *Danaus petiverana* Doubleday and Hewitson) stated that this butterfly occurs at 400–1600 m, noting 'Eastern, northern and western Tanzania. From many areas records are lacking.' Aurivillius (1910a, p. 2) listed two females (as *Danaida limniace* var. *petiverana*) from 'Kilimandjaro: Kake', collected in June. It has been suggested to us that 'Kake' is a misprint for the well-known Kahe, a populated area south-east of Moshi and north of Nyumba ya Mungu dam. Consistent with this, the BMNH has a male from Moshi collected at 2500 ft by Cooper, and a female from New Moshi

collected by Selous. OUMNH has two males from Taveta, c. 2500 ft, collected by Wiggins. On this basis, we include this species as a member of the lower slopes fauna. No subspecies of *T. petiverana* are currently recognized. This butterfly, which occurs throughout much of sub-Saharan Africa (Ackery et al. 1995, p. 270), as long believed, is closely related to the widespread Oriental species *Tirumala limniace* (Cramer, 1775) (Hashimoto et al. 2012).

Genus *Amauris*

Amauris (Amauris) niavius dominicanus Trimen, 1879

d'Abrera 1997: 187 (1 fig.). SI: Figure 4a–d.

Forewing length: male 41.5–50 mm [mean ($n = 8$) 46.25 mm, SD = 2.177]; female 43–49.5 mm [mean ($n = 9$) 46.56 mm, SD = 1.576].

Records

According to Kielland (1990, p. 75), occurs in eastern, northern and southwestern areas of Tanzania, from sea level to over 2300 m. Carcasson (1963, p. 23) recorded it from Moshi, and in the BMNH there are several Moshi specimens collected by Cooper, and others collected by Fontaine. Cooper also collected at least one male from Engare Nairobi, West Kilimanjaro, at 4500–5500 ft. E. Barns obtained this butterfly in the Taveta Forest, at c. 2500 ft, where Rogers (1908, p. 499) evidently found it abundantly. Not encountered in the forest zone by Liseki (2009). We regard this as a member of the lower slopes fauna – but it would appear to have the potential to enter the lower levels of the forest. Subspecies *dominicanus* occurs widely in eastern Africa, from Kenya south to Natal, whereas the nominate race occurs from western Kenya west to Guinea. A third subspecies is found in northern Uganda, southern Sudan and Ethiopia. According to Ackery et al. (1995, p. 271; based on Talbot 1940, p. 320), it is possible that a fourth, unnamed race occurs on Bioko (Fernando Po) – however, although the species is confirmed for the island by Spearman et al. (2000, p. 457), and there do appear to be minor differences in phenotype (photographs made available by J.D. Weintraub), these authors make no comment on status.

Amauris (Amauris) tartarea damocliides Staudinger, 1896

Gifford 1965: pl. G, fig.101. SI: Figure 4e–h.

Forewing length: male 40–47 mm [mean ($n = 9$) 44.06 mm, SD = 1.864]; female 39–47 mm [mean ($n = 6$) 43.6 mm, SD = 2.685].

Talbot (1940, p. 320, 321) included 11 named forms under *A. tartarea tartarea* Mabille, 1876. Unpublished research suggests the possibility that some of these may represent separate species – and this may also apply to the two other taxa currently regarded as separate subspecies: *A. t. damocliides* and *A. t. tukuyuensis* Kielland, 1990.

Records

Amauris t. damocliides was said by Talbot (1940, p. 321) to come from 'Tanganyika Territory and south-east Kenya', implying its likely presence in the Northern Highlands

of Tanzania. Kielland (1990, p. 75), however, indicated eastern Tanzania only, at altitudes up to 2000 m, from the Ulugurus to Rubeho and Mufindi – apparently unaware of Carcasson's (1963, p. 24) records from Moshi and Himo. The BMNH has a number of specimens from Moshi and Taveta. The presence of *damoclines* in the Moshi area was confirmed by Cordeiro (1995, p. 195), who noted it as common in the Rau and Kahe forest reserves. Included here as a member of the lower slopes fauna. Beyond Tanzania, *A. t. damoclines* also occurs in Malawi and coastal areas of southern Kenya. Southwestern Tanzania is inhabited by an endemic subspecies (subsp. *tukuyensis*), whereas the highly polytypic nominate race occurs from southern Sudan to Guinea south through western Tanzania and DRC to Namibia (Ackery et al. 1995, p.272).

Amauris (Amaura) albimaculata interposita Talbot, 1940

Larsen 1996: pl. 27, fig. 393 i. d'Abrera 1997: 191 (1 fig., of *A. albimaculata albimaculata*).

Kielland 1990: 272 (3 figs, of other subspecies).SI: Figure 5a–d.

Forewing length: male 31–38 mm [mean ($n = 13$) 34.75 mm, SD = 1.689]; female 35.5–40 mm [mean ($n = 5$) 38.12 mm, SD = 1.165].

Note: see Appendix 3 regarding a potential problem with the subspecies name applicable to this taxon.

Records

Known from the Northern Highlands, including Mt Kwaraha, the Mbulu Mountains, Oldeani-Ngorongoro, and Meru, Kilimanjaro and Longido, at 1200–2600 m (Kielland 1990, p. 74). The type locality is 'West Kilimanjaro, Ngare-Nairobi', with a paratype female collected at over 2200 m on Mt Meru (Talbot 1940, p. 327). The BMNH has numerous specimens of both sexes collected from West Kilimanjaro by Cooper, including the types. OUMNH has material from New Moshi (Lamborn), north Kilimanjaro (Kenya), and slopes of Kilimanjaro (ex Rogers). Said by Aurivillius (1911a, p. 77, as *A. albimaculata hanningtoni* Butler, 1888) to be very common on Kilimanjaro, Liseki (2009) encountered this butterfly on the mountain in November 2001, at 2000 m. Beyond Tanzania this subspecies occurs in Kenya (central and west) and Unyoro District, Uganda (Talbot 1940, p. 327). With a total of eight recognized races, *A. albimaculata* Butler, 1875, is generally a highland butterfly found in eastern Africa, from Somalia to Natal, but also in DRC and Cameroun (Ackery et al. 1995, p. 272).

Amauris (Amaura) echeria meruensis Talbot, 1940

d'Abrera 1997: 191 (2 figs, of other subspecies). Kielland 1990: 272 (1 fig.). SI: Figure 5e–h.

Forewing length: male 38–44 mm [mean ($n = 11$) 41.55 mm, SD = 1.634]; female 45.0 mm (1 only).

Records

Highland forests and coffee plantations at 1400–2600 m, on Mts Kilimanjaro, Meru, Lolkisale, Kwaraha, Longido, the Oldeani-Ngorongoro highlands and Mbulu forests

(Kielland 1990, p. 74), Arusha and Moshi (Carcasson 1963, p. 26). Talbot (1940, p. 330) listed numerous specimens collected on Kilimanjaro by Cooper, but all at or below 5000 ft (c. 1500 m), with one male from Moshi, and form 'luxurians' from Doringo Erok, northwest of the mountain, on the Kenya border. There are two males from the 'slopes', ex Rogers in OUMNH (who evidently considered it a common species up to about 1500 m – Rogers 1908, p. 493, 511). Given these data, and the fact that the species was not encountered by Liseki (2009), who worked in the protected forest from 2000 to 3000 m, we list this butterfly as part of the lower slopes fauna – but it must surely have the capacity to enter at least the lower levels of the protected forest. *Amauris e. meruensis* is endemic to Tanzania. *Amauris echeria*, which includes 18 recognized subspecies, ranges widely across forested biotopes in Africa, from Bioko to Ethiopia and south to South Africa (Ackery et al. 1995, p. 274).

***Amauris (Amaura) ellioti altumi* van Someren, 1929**

d'Abrera 1997: 193 (1 fig., of *A. ellioti ellioti*). Sl: Figure 6a–d.

Forewing length: male 39–43 mm [mean ($n = 8$) 40.94 mm, SD = 0.971]; female 40–44 mm [mean ($n = 3$) 42.33 mm, SD = 0.850].

Records

According to Kielland (1990, p. 74), *A. ellioti* Butler, 1895, is represented in Tanzania by a single subspecies, *A. e. junia* Le Cerf, 1920, which flies in montane forests at 1100–2400 m in the northern highlands (including Kilimanjaro), and in eastern, southern and southwestern areas, including the Uluguru Mountains south to Songea, and thence west to Mt Rungwe and Tukuyu. Aurivillius (1910a, p. 2) recorded a pair of this species (as *A. ansorgei* Sharpe, now restricted as a race of *ellioti* from parts of Kenya and Uganda) from Kilimanjaro, Kibong'oto, 2000 m. However, Liseki (2009) did not encounter this species on the mountain and, apart from a male collected by Cooper at Moshi, 2500 ft, noted by Talbot (1940, p. 335), there does not appear to be any other Kilimanjaro material of this species in the BMNH. No material was found in OUMNH. Given that Talbot saw a distinction between the two subspecies (*altumi* with submarginal spots on hindwing, *junia* without), there is some uncertainty regarding the subspecific name to apply to the Kilimanjaro population of *A. ellioti*. Provisionally, we have followed Talbot (and de Jong and Congdon 1993; and Ackery et al. 1995) rather than Kielland. So we consider that *A. e. altumi* flies from Kilimanjaro northwards to Mt Kenya, and thence west to Uganda east of the Rift Valley (Talbot 1940, p. 335). *Amauris ellioti* has four recognized subspecies, all of which are restricted to highlands in eastern Africa (Ackery et al. 1995, p. 274).

[*Amauris (Amaura) ochlea ochlea* (Boisduval, 1847)]

Larsen 1996: pl. 27, fig. 389 i. d'Abrera 1997: 189 (1 fig., of *A. ochlea affinis*). Kielland 1990: 272 (1 fig., of *A. ochlea bumilleri*). Sl: Figure 6e–h.

Forewing length: male 33.5–39.5 mm [mean ($n = 5$) 35.90 mm, SD = 1.631]; female 36–41.5 mm [mean ($n = 6$) 39.12 mm, SD = 1.429].

Records

Kielland (1990, p. 75) considered the nominate race of *A. ochlea* in Tanzania to be coastal, occurring inland up to 1000 m in the Uluguru and Nguru Mountains, and on the Udzungwa escarpment. Although we have not found any Kilimanjaro material in BMNH or OUMNH, and Cordeiro (1990) did not encounter this butterfly in Lake Manyara National Park, with several specimens in BMNH from the East Usambaras, we consider this distinctive species a possible member of the lower slopes fauna. The nominate race is east African, found from Kenya south to Natal. The four other recognized subspecies occupy western Tanzania, the Horn of Africa and the Comoro Islands (Ackery et al. 1995, p. 276).

Subfamily SATYRINAE

Genus *Gnophodes*

Gnophodes betsimena diversa (Butler, 1880)

Larsen 1996: pl. 28, fig. 396 i. d'Abrera 1997: 197 (1 fig.). SI: Figure 7a–d.

Forewing length: male 31.5–37 mm [mean ($n = 8$) 34.36 mm, SD = 1.170]; female 32.0–41.5 mm [mean ($n = 8$) 36.53 mm, SD = 2.579].

Records

Kielland (1990, p. 77) stated that this subspecies occurs in the north, east and south of Tanzania, at altitudes up to 1600 m and 'occasionally to 2000 m'. Not found at 2000 m or above by Liseki (2009), but included here as a member of the lower slopes fauna on the basis of three male and three female specimens in BMNH from Moshi, New Moshi and Engare-Nairobi (where it was collected at 4000–5000 ft), and a single female from Taveta, c. 2500 ft, in OUMNH. More widely subspecies *diversa* extends from northern Kenya (Marsabit) south to the Cape, with the species as a whole found throughout the Afrotropics, including Madagascar (Smiles 1973; Ackery et al. 1995, p. 280).

Genus *Melanitis*

Melanitis leda helena Westwood, 1851

Larsen 1996: pl. 28, fig. 398 i–iii. d'Abrera 1997: 197 (1 fig.). SI: Figure e–h.

Forewing length: male 32–41 mm [mean ($n = 6$) 37.33 mm, SD = 2.840]; female 34–42 mm [mean ($n = 9$) 38.28 mm, SD = 1.902].

Records

The whole of Tanzania, in forest and savanna, including semi-arid regions, from sea level to 2000 m (Kielland 1990, p. 77, as *M. leda africana*). Although this species varies considerably not only in coloration (most notably the underside) but also in forewing shape, it is unmistakable in the local fauna. Not encountered on Kilimanjaro at 2000 m or above by Liseki (2009). On the basis of two specimens from Moshi, and a specimen collected '6 miles NW of Moshi ... May 1916' in BMNH, and one male and three females from Taveta, c. 2500 ft (OUMNH), we include this butterfly as a member of the lower slopes fauna. However, it is possible that it does occur within the lowest levels of the protected forest, its crepuscular habits often making it difficult to detect. *Melanitis leda*

helena occurs in suitable areas throughout the whole of the Afrotropical region; other subspecies of the Evening Brown occur in Asia and the Indo-Australian tropics.

Genus *Bicyclus*

Bicyclus anynana anynana (Butler, 1879)

Larsen 1996: pl. 29, fig. 419 i,ii. d'Abrera 1997: 217 (2 figs). Sl: Figure 8a–d.

Forewing length: male 18.5–21 mm [mean ($n = 6$) 19.90 mm, SD = 0.310]; female 21–25.5 mm [mean ($n = 6$) 23.27 mm, SD = 1.015].

Records

Kielland (1990, p. 79) states that this butterfly is common in woodlands and forests from sea level up to 2000 m in all parts of Tanzania. Recorded by Cordeiro (1990, p. 29) from Lake Manyara National Park, where it was 'very common'. Included here as a member of the lower slopes fauna on the basis of one male labelled 'Kilimanjaro', without further data or provenance, ex Rothschild Collection (BMNH), and Condamin's (1973, p. 295, fig. 384) distribution map, which has a spot centred on southern Kilimanjaro. The nominate subspecies occurs in eastern Africa south from Kenya to the Transvaal and Natal, and the Comoro Islands. There are two further subspecies recognized, one from Uganda to northern Angola, the second on Socotra (Condamin 1973; Ackery et al. 1995, p. 288).

Bicyclus campina ocelligera (Strand, 1910)

Larsen 1996: pl. 29, fig. 410 ii–iv. d'Abrera 1997: 207 (1 fig.). Sl: Figure 8e–h.

Forewing length: male 21–24.5 mm [mean ($n = 10$) 22.44 mm, SD = 0.646]; female 24–26.5 mm [mean ($n = 3$) 25.27 mm, SD = 0.252].

Note: in line with general lepidopterological practice, the original orthographies *campina* and *ocelligera* are maintained here rather than altered to 'agree' with the supposed masculine gender of *Bicyclus*. As noted by Condamin (1973, p. 144), specimens from Kilimanjaro and the Taita Hills (Kenya) are intermediate in phenotype between nominotypical *ocelligera* (type locality Amani) and subspecies *carcassoni* Condamin, 1963 (type locality Mt Kenya).

Records

Tanzania (coast and northeastern highlands), including Mt Meru, Mt Kilimanjaro, Usambaras, Udzungwa Range, Nguru and Uluguru Mountains, in forests at altitudes up to 2000 m, with intermediates to ssp. *carcassoni* in eastern and northern Tanzania (Kielland 1990, p. 79, as *B. campinus ocelligerus*). The ABRI collection (Nairobi) has several specimens from Lukani, southern Kilimanjaro, collected at about 2000 m (D.C. Lees, pers. comm.). Five males and two females in OUMNH were collected by Rogers on the slopes of Kilimanjaro, January 1906. Material in BMNH includes three males and one female from Moshi, vii.1920, collected by W.N. van Someren, and one male labelled 'Slopes of Kilimanjaro 3–8000 ft, iii.1885', collected by Hannington. Although not encountered at 2000 m or above by Liseki (2009), *B. c. ocelligera* is included here as a member of the protected area fauna, but presumably limited to the lowest zones of the forest, as

according to Aurivillius (1911b, p. 94, as *Mycalesis campina subapicalis* Aurivillius, 1910 – treated as a junior subjective synonym of *ocelligera*) it is found ‘on Mt Kilimanjaro on shady foot-paths in the woods up to 2000 m.’ Beyond Tanzania this subspecies occurs in coastal areas of Kenya. Subspecies *carcassoni* is found in highland forests in Kenya and the Taita Hills. The only other subspecies, nominotypical *B. campina* (Aurivillius, 1901), ranges from southern Tanzania into the DRC, Zambia, Malawi, Zimbabwe and Mozambique (Condamin 1973, p. 146; Ackery et al. 1995, p. 288).

Bicyclus safitza safitza (Westwood, 1850)

Larsen 1996: pl. 29, fig. 420 i–iv. d’Abrera 1997: 217 (2 figs). Sl: Figure 9a–d.
Forewing length: male 23–26.5 mm [mean ($n = 12$) 24.59 mm, SD = 0.757]; female 25–28 mm [mean ($n = 12$) 26.63 mm, SD = 0.628].

Note: the name of this species should be conserved (Larsen and Vane-Wright 2012).

Records

The most widespread and common Tanzanian *Bicyclus*, recorded from every part of the country and in most habitats, from sea level to 2200 m (Kielland 1990, p. 81). This butterfly was not encountered by Liseki (2009), and is therefore listed as a member of the lower slopes fauna – but it may well also occur in the lower zones of the protected forest. Two specimens ex Rothschild Collection (BMNH) are labelled ‘6 miles NW of Moshi, 8.v.1916, Buchanan’. There are numerous specimens in BMNH from Lake Manyara. The OUMNH has six males and seven females from the slopes of Kilimanjaro and Taveta. Beyond Tanzania this butterfly is found throughout almost all of Africa south of the Sahara (Aurivillius 1911b, p. 93; Condamin 1973, p. 236), with the population in Ethiopia regarded as a separate subspecies (Ackery et al. 1995, p. 292).

Genus *Heteropsis*

Heteropsis perspicua perspicua (Trimen, 1873)

Larsen 1996: pl. 30, fig. 425 i,ii (as *Henotesia perspicua*). d’Abrera 1997: 225 (2 figs; as *Henotesia perspicua*). Sl: Figure 9e–h.

Forewing length: male 19–24 mm [mean ($n = 19$) 22.21 mm, SD = 1.259]; female 20.5–27 mm [mean ($n = 13$) 24.59 mm, SD = 1.297].

Note: Kielland (1990, p. 83, as *Henotesia perspicua*) considered this to be a polytypic species, with ‘a distinct race in Cameroun’, named in a later publication (Kielland 1994). Only treated as monotypic by Ackery et al. (1995, as *Henotesia perspicua*), and listed as without representation in Cameroon, because Kielland’s 1994 paper came too late for inclusion. Like many *Mycalensina*, this species shows seasonal variation, notably with respect to expression of the border ocelli – for which Riley (1925, as *Henotesia perspicua*) still offers a useful summary in relation to two closely related species, *Heteropsis simonsii* (Butler, 1877) and *Heteropsis teratia* (Karsch, 1894), both of which occur elsewhere in Tanzania.

Records

Described by Kielland (1990, p. 84) as 'very common in woodland and savanna from sea level to 2150 m ... throughout the country in suitable habitats'. In contrast, noted as 'rare' during the dry season only at Lake Manyara National Park (Moehلمان and Liseki 2003). This butterfly is included here as a member of the lower slopes fauna on the basis of 10 males in OUMNH from Taveta collected at c. 2500 ft by Rogers (see also Butler 1901, p. 23) and, in BMNH, several specimens labelled Kilimanjaro (mostly collected by F. J. Jackson), together with a single male from southeast Kilimanjaro obtained by Cooper at Marangu, 4000–5000 ft, during January 1937. Liseki (2009), working at 2000 m upwards, did not encounter this butterfly on Kilimanjaro. Beyond Tanzania *H. p. perspicua* is found widely in eastern Africa, from Ethiopia to South Africa, but extending west only into parts of Zambia, the Congo Basin and Uganda.

Genus *Neocoenyra*

Neocoenyra duplex Butler, 1886

Larsen 1996: pl. 30, fig. 444 i. d'Abbrera 1997: 245 (2 figs). Sl: Figure 10a–d.

Forewing length: male 15.0–18.0 mm [mean ($n = 13$) 16.66 mm, SD = 0.559]; female 17.0–20.5 mm [mean ($n = 8$) 18.61 mm, SD = 1.086].

Records

According to Kielland (1990, p. 88), this butterfly occurs in arid thorn-bush, at 1400–1900 m, in northern Tanzania (with an isolated record from Mbeya). Included here as a member of the lower slopes fauna on the basis of ten male and three female specimens in OUMNH collected by Rogers in 1905 and 1906 at Taveta, c. 2500 ft (see also Butler 1901, p. 23), and, in BMNH, three males from West Kilimanjaro collected by Cooper at 4500–5000 ft., two males from Taveta (ex Rogers), and a further example from Taveta (sex uncertain). Not encountered by Liseki (2009) at 2000 m or above. More widely, according to Ackery et al. (1995, p. 315), this monotypic species ranges from Somalia southwards to Uganda and the Rwanda/DRC border.

Neocoenyra gregorii Butler, 1894

Larsen 1996: pl. 30, fig. 445 i,ii. d'Abbrera 1997: 245 (2 figs). Sl: Figure 10e–h.

Forewing length: male 17.5–21.5 mm [mean ($n = 8$) 19.80 mm, SD = 1.032]; female 18.0–23.0 mm [mean ($n = 6$) 20.52 mm, SD = 1.038].

Records

Open areas at 1200–2200 m in the Northern Highlands and Singida area; possibly also at Iringa, and in the Mpanda and Kigoma districts (Kielland 1990, p. 89). Not encountered by Liseki (2009), but included here as a member of the lower slopes fauna on the basis of a single male collected by Cooper on West Kilimanjaro at 4500–5000 ft (BMNH). In addition, the BMNH has a male from Mt Meru, June–July 1938, also ex Cooper. However, there does not appear to be any Kilimanjaro or Taveta material in OUMNH. Beyond Tanzania this species occurs in Somalia, Kenya, Uganda, DRC (east) and Malawi, at altitudes up to 3000 m (Larsen 1996, p. 279). Larsen (1996, p. 280) also recorded it from Zambia, but this was not substantiated by Heath et al. (2002).

The status of this species on Kilimanjaro requires further investigation.

[Neocoenyrā parallelopupillata (Karsch, 1897)]

Kielland, 1990: 276 (1 fig.); d'Abrera 1997: 245 (3 figs). Sl: Figure 11a–d.
Forewing length: both sexes, c. 18–22 mm.

Records

This butterfly is generally considered endemic to the Usambara Mountains (e.g. Kielland 1990, p. 90; Congdon and Bampton 2001), where it was encountered at Magamba during March and May by Liseki (2009, p. 99), who indicated that 'This species is numerous during its season, [flying] low in dark places near ground level'. Amongst the material deposited by SDL at the BMNH, there is a single male with a printed label 'Kilimanjaro, 2000 m, 26.v.2001'.

Although we now realize that, without doubt, this is a subsequent labelling error (confirmed by examination of the original collecting envelope, still attached, with the data 'Magamba, 26.v.2001, 2000 m, 12.40 hrs'), it led us to consider the possibility that *N. parallelopupillata* might also occur on Kilimanjaro. This species has been reported in the past from Malawi and Kenya (Gifford 1965, p. 91; the record for 'Kenya' being credited to Elliot Pinhey). Although these records have generally been discounted (e.g. Carcasson 1981, p. 182; Ackery et al. 1995, p. 316), it is not inconceivable *N. parallelopupillata* has a wider range than previously thought. The BMNH has a male of what appears to be this very dark species from 'Itumba District', collected by G. Wood in July 1904. This could be the Itumba located in the Mbeya District of southwest Tanzania, adjacent to the border with Malawi. The Malawi record noted by Gifford was based on material supposedly collected in April at Nyamkhowa Hill, near Livingstonia, by R.C. Wood (hopefully still preserved in what is now the Natural History Museum of Zimbabwe, Bulawayo). The late David Gifford's own collection is in the National Museum of Scotland, Edinburgh but, according to Keith Bland (pers. comm. May 2015), it does not contain any material of *N. parallelopupillata*. However, the NMS apparently does have what appears to be a single example of this species from Kenya, labelled 'Athi Plains, 31. xii.1952, C. de Worms'. The Athi Plains lie south of Nairobi, about 200 km northwest of Kilimanjaro. Further investigation into this species seems desirable.

Genus *Ypthima*

[Ypthima asterope asterope (Klug, 1832)]

Kielland 1982: pl.1, figs 1–8. Larsen 1996: pl. 30, fig. 428 i, ii. d'Abrera 1997: 231 (2 figs). Sl: Figure 11e–h.

Forewing length: male 12.5–15.5 mm [mean ($n = 4$) 14.35 mm, SD = 0.656]; female 16.0–18.0 mm [mean ($n = 2$) 16.85 mm, SD = 0.354].

Note: as indicated by Kielland (1990, p. 85), who only knew of one reliable record for Tanzania based on a single male collected near Amani by T.H.E. Jackson, without dissection this butterfly is very difficult to separate from other species. Larsen (1996, p. 274), however, offered exophenotypic characters for separation, including a difference in antennal segment number between *Y. asterope* and *Ypthima yatta* Kielland, 1982, a

Kenyan and Ethiopian species considered otherwise to be 'similar'. These differences were first noted by Kielland (1982, p. 108), including *Y. asterope* reported as having 32 antennal 'joints' [segments], but only 29 in *Y. yatta*.

Putative records

According to notes apparently made by the late Jan Kielland, a pair of *Ypthima* from Lake Manyara in BMNH (collected by Cooper), formerly identified as *Y. asterope*, are *Ypthima antennata* van Son, 1955 (SI: Figure 12a–d). Moehlman and Liseki (2003) list *Y. antennata* as rare during the wet season at Lake Manyara National Park. *Ypthima asterope* is included here as a possible member of the lower slopes fauna based on four males and two females in OUMNH, long standing over the name *Y. asterope*, and which do not appear to be *Y. antennata*, collected by Rogers at Taveta, c. 2500 ft, on various dates in 1905. Supposedly found mainly in arid bush, according to Ackery et al. (1995, p. 305), *Y. asterope* occurs from India through parts of the Arabian peninsula and much of Africa south of the Sahara, with a separate subspecies (or replacement species: Larsen 1996, p. 275) recognized in the southwest (western Cape, Namibia and Angola). However, Kielland (1982, p. 107) noted that he had not seen reliable specimens or records from DCR to southern Nigeria and Ghana, Zambia, Burundi, Rwanda or Malawi. Heath et al. (2002) did not include it among the 11 species they recorded for Zambia. Gifford (1965, p. 92) did include *asterope* for Malawi, but his material (presumed to be in RSM Edinburgh), identified long before Kielland's 1982 revision, needs to be checked. If possible, a long series of *Ypthima* should be sought from various areas on the lower slopes, and subject to critical examination.

Ypthima simplicia Butler, 1876

Kielland 1982: pl. 2 figs 7,8; pl. 3 figs 1–4. d'Abbrera 1997: 233 (2 figs). SI: Figure 12e–h. Based on Kielland (1982, p. 114), male forewing length c. 15–17 mm, females 15–21 mm.

Note: reliable identification of this species is difficult based on external characters alone. Larsen (1996 – who did not illustrate this species) discussed its separation from *Y. asterope* and *Y. yatta* (see also Kielland 1982), considering it to be more similar to the latter in lacking pale margins – but Larsen did not illustrate *Y. yatta* either.

Records

Found in Tanzania in montane and semi-montane grassland at altitudes up to 2200 m (Kielland 1990, p. 86). Specific localities are given as Meto Hills, Mt Longido and West Kilimanjaro – with Kielland (loc. cit.) suggesting that the Kenya/Tanzania populations 'may very well belong to a distinct race'. The type locality of *Y. simplicia* is generally treated simply as Ethiopia, but it is in fact either Atbara town (Sudan), or somewhere along the Atbara River – which, although it rises in northwestern Ethiopia, flows for most of its length through the Sudan – see Appendix 4.

Ypthima simplicia was not encountered on Kilimanjaro over the range 2000–3000 m by Liseki (2009), nor have we been able to locate material of this species from the mountain in the BMNH or OUMNH. Its inclusion here, as a member of the lower slopes fauna, is based

on Kielland (1982, p. 115; 1990, p. 86). Beyond Tanzania, *Y. simplicia* is thought to occur in Sudan, Ethiopia, Somalia and Kenya (Ngong Hills) (Ackery et al. 1995).

Subfamily CHARAXINAE

Genus *Charaxes*

Charaxes (Polyura) pleione oriens Plantrou, 1989

Henning 1989: 369,370 (5 figs). Larsen 1996: pl. 40, fig. 498 i,ii. Sl: Figure 13a,b (male); *C. p. bebra* Rothschild Figure 13c,d (female).

Forewing length: male 25.5–32 mm [mean ($n = 10$) 28.76 mm, SD = 1.432]; female 30–33.5 mm [mean ($n = 7$) 31.86 mm, SD = 0.824].

Note: van Someren (1974, p. 428) gave forewing length for this population (both sexes) as 30–32 mm, and suggested that it is slightly larger than *Charaxes p. bebra* Rothschild and Jordan, 1900, from Uganda and DRC – but our figures hardly bear this out.

Records

Coastal areas inland to Usambara, Nguu and Uluguru mountains, Udzungwa Rift and Magombera Forest, at altitudes up to 1600 m, with a record by Cordeiro (pers. comm. to Kielland) from Rau Forest (Kielland 1990, p. 108). Although not mentioned by Cordeiro (1995), he confirms that he did see this distinctive species in the forest, although it ‘was very hard to capture’ (Cordeiro pers. comm. 29 September 2014). There does not appear to be any Kilimanjaro area material in OUMNH or BMNH, and it is therefore not certain that this population does belong to *C. p. oriens* – which subspecies extends outside Tanzania to coastal areas of Kenya. Collectively, the five named subspecies of *C. pleione* (Godart, 1824) occur widely across a central belt of Africa, from Sierra Leone east to Kenya, and south to Angola, DRC, Rwanda and Tanzania. The female illustrated (Sl: Fig. 13c,d), from western Kenya, represents the similar subspecies *Charaxes p. bebra* Rothschild, 1900 – which ranges from west Kenya to Uganda and northeastern DRC (Ackery et al. 1995, p. 454–455; Larsen 1996, p. 302).

Charaxes (Polyura) zoolina (Westwood, 1850)

Henning 1989: 374,375 (13 figs). Larsen 1996: pl. 40, fig. 500 i,ii. d’Abrera 2004: 521 (4 figs). Sl: Figure 14a–h.

Forewing length (all forms): male 25–31 mm [mean ($n = 26$) 28.27 mm, SD = 1.396]; female 29–35.5 mm [mean ($n = 18$) 31.83 mm, SD = 1.450]. van Someren (1974, p. 444–446) gave male forewing length as 28–30 mm in male and 30–32 mm in form ‘zoolina’, and 25–28 mm in male and 30–35 mm in female form ‘neanthes’.

Note: this species can be regarded as an example of class 2 polymorphism, in which both sexes occur in multiple but essentially identical colour forms – except insofar as males have only one well-developed pair of hindwing tails, whereas females always have two (Vane-Wright 1975). Intermediate colour forms also occur, with individual variation (including very darkly marked males originally named as subspecies *obscuratus* Suffert,

1904); it seems likely this is more a case of seasonal polyphenism rather than genetic polymorphism.

Records

Kielland (1990, p. 112) indicates that this butterfly can be found in most parts of Tanzania, at altitudes up to c. 2100 m, usually in thorn-bush but also entering montane forests where its primary habitat is adjacent. Cordeiro (1990, p. 35) noted it as common in Lake Manyara National Park. Recorded [as the synonym *Charaxes neanthes* (Hewitson)] by Butler (1901, p. 24) from Taveta. OUMNH has six males and three females from Taveta, c. 2500 ft, collected by Rogers in 1905/06 – all are f. 'zoolina', not f. 'neanthes'. The BMNH collection includes a male from West Kilimanjaro, 4500–5000 ft, May–July 1938, and a female from Moshi, 2500 ft, January–February 1938, both collected by B. Cooper, and both f. 'neanthes'. Not encountered in the forest by Liseki (2009), so included here as a member of the lower slopes.

Charaxes zoolina occurs widely in eastern Africa, from Somalia to South Africa. Three additional subspecies have previously been recognized – of which one occurs in Madagascar, and another in Angola. The third, *C. z. mafugensis* Jackson, 1956, is found in montane forests in Rwanda and southwest Uganda (Henning 1989, p. 376; Ackery et al. 1995, p. 463), and Rumanyika Orogundu Game Reserve in the bordering Karagwe District of western Tanzania (Kielland 1992, p. 51). However, molecular evidence now suggests all four could be regarded as specifically distinct (Vingerhoedt et al. 2009).

Charaxes (Eriboea) aubyni aubyni van Someren and Jackson, 1952

Henning 1989: 350 (4 figs). Kielland 1990: 281 (1 fig.). d'Abrera 2004: 482 (3 figs). Sl: Figure 15a–f.

Forewing length: male 34–39.5 mm [mean ($n = 9$) 36.28 mm, SD = 1.232]; female 39.5–45.5 mm [mean ($n = 6$) 42.17 mm, SD = 1.483]. van Someren (1966, p. 77) gave male forewing length as 35–37 mm, female 43–45 mm.

Note: The name of this butterfly is sometimes incorrectly attributed to Poulton, 1926 – who originally introduced the name *aubyni* as a female (infrasubspecific) form of *C. etheocles* (Cramer, 1777). *Charaxes aubyni* was first made available as a species group name by van Someren and Jackson (1952, p. 272), when they recognized it as a distinct, separate species (this may be of significance in assessing the primary type material). The discal bands of the females vary from pale cream to ochreous; as noted by Henning (1989, p. 351), an extreme of the latter type was named 'female f. ochrefascia' by van Someren and Jackson, and it is arguable that the females should be considered dimorphic.

Records

Known in Tanzania from Mt Kilimanjaro, Mt Kwaraha, and the Lossoganeu, Pare, Usambara, Uluguru, North Nguu, Nguru, Ukaguru and Rubeho mountains (Kielland 1990, p. 96), to which Henning (1989, p. 351) adds Monduli. The BMNH includes specimens from Lindi, Amani, and one male from West Kilimanjaro, collected at 4000–5000 ft by Cooper. Not encountered by Liseki (2009). According to Kielland (loc. cit.), it occurs in submontane and montane forests at 400–2400 m. Cordeiro (1990, p. 34) records it from

Lake Manyara National Park. Beyond Tanzania the nominate subspecies also occurs in Kenya: the Taita Hills (including the type locality, Mt Dabida, and the Sagala Hills) and Mbololo (Henning 1989, p. 351). The two other recognized subspecies of *C. aubyni* occur elsewhere in Kenya, and in southern Tanzania and Malawi (Ackery et al. 1995, p. 434).

Charaxes (Eriboea) baumanni tenuis van Someren, 1971

Henning 1989: 251 (2 figs). SI: Figure 13e–h.

Forewing length: male 25.5–30.5 mm [mean ($n = 12$) 27.81 mm, SD = 1.241]; female 28–33.5 mm [mean ($n = 6$) 30.88 mm, SD = 1.326]. van Someren (1971, p. 219) gave male forewing length as 27–31 mm, female 30–31 mm.

Records

The Northern Highlands, including Oldeani-Ngorongoro Range, Mt Meru, Mt Kilimanjaro, Longido, Mbulu Forests, Mt Kwaraha and Lolkisale, at 1400–2000 m (Kielland 1990, p. 96). The population from Lolkisale is intermediate to the nominate subspecies (Kielland 1990, loc. cit.). Henning (1989, p. 252) notes Moshi and Arusha (probably based on van Someren 1971, p. 219). In OUMNH there is a female from the slopes of Kilimanjaro, December 1905, and a male from Taveta, c. 2500 ft, both collected by Rogers. The BMNH has three males collected by Cooper at Engare-Nairobi, West Kilimanjaro, at 4000–5000 ft, February–March 1937, a male from Old Moshi collected by Selous, and a female labelled ‘Kilimandjaro’ ex Rogenhofer ex Honrath ex Adams that could have been part of the original type series of *Charaxes baumanni* Rogenhofer (the restricted type locality of which nominal species is the Pare Mountains). Although not encountered by Liseki (2009), it might conceivably enter the lowest forest zone on Kilimanjaro – although, according to Kielland (loc. cit.), it is found in open forests and shrublands. Outside Tanzania subspecies *tenuis* occurs in Kenya (highlands east of Rift Valley). Collectively, the 10 subspecies of *C. baumanni* Rogenhofer, 1891, listed by Ackery et al. (1995, p. 434) range widely in eastern Africa, from southern Sudan to Mozambique.

Charaxes (Eriboea) berkeleyi marci Congdon and Collins, 1998

Congdon and Collins 1998: pl. 2, fig. 11 (both sexes). SI: Figure 16a–d.

Forewing length (estimated from photographs): male 31–36 mm [mean ($n = 4$) 33.3 mm, SD = 1.372]; female 32–43 mm [mean ($n = 6$) 38.4 mm, SD = 3.248].

Note: The female differs from other subspecies on the forewing upperside, on which the postdiscal spotting is reduced, and on the hindwing upperside, which has the discal band broader. In females of *marci*, the bands on the upperside of both wings are the same colour, whereas other subspecies have the hindwing markings paler than those of the forewings (Congdon and Collins 1998, p. 52).

Records

The type locality is ‘West Mt Kilimanjaro, 7000 ft.’ Collected in March 1993 by S.C. Collins, the type series (three males, six females, with one additional male) is in the African

Butterfly Research Institute, Nairobi. Endemic to Kilimanjaro, and known only from the type locality (Congdon and Collins 1998, p. 52), it was not encountered by Liseki (2009). The two other recognized subspecies of *C. berkeleyi* van Someren and Jackson, 1957, are restricted to highland forests in Kenya (Ackery et al. 1995, p. 435).

Charaxes (Eriboea) ethalion littoralis van Someren, 1967

Henning 1989: 305,306 (6 figs). Kielland 1990: 284 (3 figs). Sl: Figure 17a–h.
Forewing length: male 29–36 mm [mean ($n = 20$) 32.49 mm, SD = 1.320]; female 34–42 mm [mean ($n = 13$) 37.51 mm, SD = 1.985]. van Someren (1967, p. 294) gave male forewing length as 33–34 mm.

Note: the females are very different to the black males, and are also polymorphic – three named female forms are recognized in this subspecies: ‘ethalion’, ‘rosae’ and ‘swynner-toni’ (Henning 1989, p. 305–306). However, with individual variation in pattern and size, to some extent these intergrade.

Records

Eastern Tanzania, inland to Mikumi, Kilimanjaro and the Rubeho, Nguru and Nguu mountains, flying from sea level to 2000 m (Kielland 1990, p. 101). Henning (1989, p. 306) notes Dar-es-Salaam, Morogoro, Arusha and Taveta, this last apparently reflecting van Someren (1967, p. 295). Rogers (in Butler 1901, p. 24) noted this species (as *Charaxes rosae* Butler) as fairly common at Taveta – from where OUMNH has eight males collected by Rogers at c. 2500 ft, April and May 1905, one female (f. ‘ethalion’) May 1905, ex Wiggins, together with one male from New Moshi 6 May 1916, collected by Lamborn. The BMNH has males from New Moshi, March 1916 (F.C. Selous), Moshi July 1920 (W.N. van Someren) and ‘6 miles NW of Moshi’ May 1916 (Buchanan). Not encountered by Liseki (2009), *C. e. littoralis* is included here as a member of the lower slopes fauna. Beyond Tanzania this race occurs in the coastal belt of Kenya. Collectively, the nine subspecies of *C. ethalion* (Boisduval, 1847) range from Kenya south to South Africa, and west as far as southern DRC and Zambia (Ackery et al. 1995, p. 441).

Charaxes (Eriboea) jahlusa kenyensis Joicey and Talbot, 1925

Henning 1989: 236 (4 figs). Larsen 1996: pl. 36, fig. 479 i,ii. d’Abrera 2004: 453 (3 figs). Sl: Figure 16e–h.

Forewing length: male 22–26 mm [mean ($n = 4$) 23.68 mm, SD = 1.231]; female 28–34 mm [mean ($n = 5$) 30.26 mm, SD = 1.731]. van Someren (1974, p. 421) gave male forewing length as 28–30 mm, female as 32–35 mm, both apparently larger than the small sample we have measured.

Records

Kielland (1990, p. 104) recorded subsp. *kenyensis* from Ukerewe Island (Lake Victoria), the Pare Mountains, the Usambaras, and Pemba, at altitudes up to 1500 m, describing it as ‘uncommon and local’. Henning (1989) gives no specific records for Kilimanjaro, and there is no Kilimanjaro material of this taxon in OUMNH. However, van Someren (1975, p.

425) lists 'Taveta-Kilimanjaro area' as part of its range – and on this basis, together with a male from New Moshi and another from Taveta in BMNH (where they have been placed, perhaps incorrectly, as the more southerly *Charaxes j. argynnides* Westwood), we include *C. j. kenyensis* as an element of the lower slopes fauna. There must be significant doubt, however, regarding the subspecies assignment (including the issue of size, as noted above). Beyond Tanzania, subsp. *kenyensis* is restricted to Kenya, where it occurs up to the Somali border, with transitional forms in northwestern Kenya and eastern Uganda. Divided into eight races, *C. jahlusa* (Trimen, 1862) is an east African insect, found from Somalia to South Africa (Ackery et al. 1995, p. 446).

Charaxes (Eriboea) kirki kirki Butler, 1881

Henning 1989: 341 (4 figs). Larsen 1996: pl. 39, fig. 492 i,ii. d'Abrera 2004: 495 (2 figs, as *C. kirki*). Sl: Figure 18a–d.

Forewing length: male 29–37 mm [mean ($n = 14$) 33.61 mm, SD = 1.405]; female 34–41 mm [mean ($n = 4$) 37.80 mm, SD = 1.941]. van Someren (1969, p. 130, as *Charaxes viola kirki*) gave male forewing length as 44 mm (lapsus for 34 mm?), female as 34–38 mm.

Note: this is one of the 'black *Charaxes*' that exhibit class 7 polymorphism (Vane-Wright 1975) – having multiple female forms that never match the almost all-black upperside of the single male phenotype. Henning (1989, p. 341–342) recognizes four named female forms: 'kirki', 'albifascia', 'rogersi' and 'handari'.

Records

Kielland (1990, p. 105) lists this as a relatively rare butterfly from central, northern and parts of eastern Tanzania, occurring in dry woodland, savannah and bush, 300–1600 m. Neither Kielland nor van Someren (1969 – as *C. viola kirki*) gives specific records for the Kilimanjaro area. Included here as a member of the lower slopes fauna based on one male from the slopes of Kilimanjaro, 5–16 January 1906, and six males and one female from Taveta, c. 2500 ft, May 1905, all collected by Rogers (OUMNH). The Oxford female is of the 'rogersi' phenotype. In BMNH there are four males from Taveta, two males from Engare-Nairobi, West Kilimanjaro, 4000–5000 ft, February–March 1937 (B. Cooper), one Cooper male from Moshi, 2500 ft, January–February 1938, and three females of the 'kirki' phenotype: Taveta, 2500 ft (Rogers), Taveta (ex Adams Collection), and 'Kilimanjaro' (ex Adams). In addition to Tanzania, the nominate subspecies occurs in coastal areas of Kenya, inland to Nairobi.

Charaxes kirki is an East African insect, often treated as having two or three subspecies. *Charaxes kirki suk* Carpenter and Jackson, 1950, occurs in central and northern Kenya (van Someren 1969, p. 132; Larsen 1996, p. 300). Carcasson 1981, p. 158, listed *suk* as a taxon from northwest Uganda, in which he was followed by Ackery et al. 1995, p. 449, now in error due to changes in administration affecting the Karasuk area. However, d'Abrera (2004, p. 494) regarded *suk* as a synonym. Henning (1989, p. 343; followed by Larsen 1996) included *C. etheocles daria* van Someren and Jackson, 1952, as a third subspecies – but this Ethiopian butterfly has been treated, at least by some, as a separate species (Rydon 1982, p. 63; Ackery et al. 1995, p. 439; d'Abrera 2004, p. 494).

Charaxes (Eriboea) tavetensis tavetensis Rothschild, 1894

Henning 1989: 220, 4 figs (as *etesipe tavetensis*). Kielland 1990: 287, 3 figs. SI: Figure 18e–h.

Forewing length: male 36–42 mm [mean ($n = 7$) 39.37 mm, SD = 1.631]; female 41–47 mm [mean ($n = 2$) 44.20 mm, SD = 1.414]. van Someren (1966, p. 62) gave male forewing length as 38–41 mm, female as 40–44 mm.

Note: see Appendix 5 regarding the name and status of this taxon. In females, the pale hindwing band varies from off white through cream to pale yellow.

Records

Mt Meru and lower slopes of Mt Kilimanjaro (the type locality is Taveta) to the Usambaras and south to Rondo Plateau (near Lindi), the Nguru Mountains, Udzungwa Rift and Kitonga Gorge, at altitudes up to 1500 m (Kielland 1990, p. 109). There is no Kilimanjaro area material in OUMNH, but it was recorded from Moshi by van Someren (1966, p. 63) – probably based on a single male in BMNH from ‘6 miles NW of Moshi’. Not encountered by Liseki (2009). Beyond Tanzania, subspecies *tavetensis* occurs in Kenya (coastal region), Malawi, eastern Zimbabwe, and Mozambique to northern regions of South Africa (Ackery et al. 1995, p. 441). Subspecies *C. t. pemba* van Someren, 1966, and *C. t. shaba* Berger, 1981, associated with *tavetensis* by Kielland (1990), occur on Pemba island and in Lualaba, DRC, respectively. *Charaxes etesipe gordonii* van Someren, 1936, from the region of Mt Kenya, which is phenotypically very similar, may also belong with *C. tavetensis* (see Ackery et al. 1995, p. 441; Larsen 1996, p. 294). *Charaxes etesipe* (Godart, 1824) occurs to the north and west of the range of *C. tavetensis*, from Sierra Leone east to Ethiopia and south to Uganda and northwestern Tanzania.

Charaxes (Euxanthe) tiberius tiberius (Grose-Smith, 1889)

Henning 1989: 405 (4 figs, as *Euxanthe t. tiberius*). Kielland 1990: 277 (1 fig, ‘atypical’, as *E. t. tiberius*). d’Abrera 2004: 527 (2 figs, as *E. t. tiberius*). SI: Figure 19a–d.

Forewing length: male 43–53 mm [mean ($n = 6$) 46.63 mm, SD = 2.806]; female 51–60 mm [mean ($n = 7$) 53.84 mm, SD = 2.150]. van Someren (1975, p. 90) gave male forewing length as 45–50 mm, female as 50–53 mm.

Records

Kielland (1990, p. 93) gave the distribution of *C. tiberius tiberius* in Tanzania as lowland forest, up to 1350 m, in eastern and northeastern parts of the country, from south of Ifakara to the Usambaras, with an isolated sighting for Lake Duluti, Arusha, by Arthur Rydon. Cordeiro (1995), who concluded that this butterfly must be very rare in the Kilimanjaro area, cited Smiles’ (1985) record for Moshi. This appears to be based on a male in BMNH collected by Cooper, 2500 ft, January–February 1938; there is also a Cooper female from West Kilimanjaro, Engare-Nairobi, at 4500–5500 ft, collected during the same period. This has smaller forewing postdiscal white spots than the female from Amani illustrated (SI: Figure 19c). In females from Tanzania the pale hindwing ‘window’ varies from white to pale yellow, but is apparently never so buff as in *C. tiberius meruensis* (van Someren, 1936) from Kenya. There is no *tiberius* material from the Kilimanjaro area in OUMNH. Included here as a member of the lower slopes fauna.

Subsp. *tiberius* extends north into the coastal areas of Kenya. The only other race of *C. (E.) tiberius* is found in the vicinity of Mt Kenya (Ackery et al. 1995, p. 468).

Charaxes (Euxanthe) wakefieldi (Ward, 1873)

Henning 1989: 399,400 (4 figs, as *Euxanthe wakefieldi*). Larsen 1996: pl. 40, fig. 504 i. d'Abrera 2004: 527 (2 figs, as *E. wakefieldi*). Sl: Figure 19e–h.

Forewing length: male 36.5–44 mm [mean ($n = 10$) 40.91 mm, SD = 1.923]; female 45–54 mm [mean ($n = 9$) 50.78 mm, SD = 1.972]. van Someren (1975, p. 85–86) gave male forewing length as 40–43 mm, female 50–52 mm.

Note: In museum specimens, the blue membrane colour of the males often fades to yellowish or straw colour.

Records

Lowland forests, up to 600 m, in coastal areas of Tanzania northwards from Ifakara to the Usambaras, and inland as far as Udzungwa, Mbulu Forest and Arusha – where it may sometimes occur at 2000 m or even higher (Kielland 1990, p. 93). Cordeiro (1990, p. 35) recorded it from Lake Manyara National Park. The BMNH has specimens from Taveta, New Moshi, Moshi and Rau, all localities at approximately 750 m. In OUMNH there are four males from Taveta collected by Rogers in 1905. Not observed in the forest by Liseki (2009). On the evidence above included here as a member of the lower slopes fauna – with perhaps the capacity to enter the lowest zone of the forest. More widely *C. (E.) wakefieldi* occurs from coastal areas of Kenya south to South Africa, including populations on Pemba and Zanzibar (Henning 1989, p. 401; Ackery et al. 1995, p. 467).

Charaxes (Charaxes) acuminatus teitensis van Someren, 1963

Henning 1989: 48 (1 fig.). Sl: Figure 20a–d (two males).

Forewing length: male 46–51 mm [mean ($n = 8$) 48.09 mm, SD = 0.951]; female 51–60 mm [mean ($n = 4$) 54.18 mm, SD = 3.585]. van Someren (1963, p. 216) gave male forewing length as 47 mm, female 55 mm.

There is almost no sexual dimorphism in colour pattern in this species, but the leaf-like undersides vary considerably.

Records

Mountains of the Northern Highlands, including Oldeani, Ngorongoro, Mt Meru and Mt Longido, at elevations of 1700–2600 m (Kielland 1990, p. 94). Encountered on Kilimanjaro by Liseki (2009, p. 105) at 2000 m during January and March. Four male and 1 female specimens in BMNH were collected at altitudes from 4000–5500 ft by Cooper. In addition there are three males from Moshi district, one collected at Rau Forest on 8 September 1943, one from '6 miles NW of Moshi', obtained 13 May 1916 by Buchanan, and the third from Mwika, 4000 ft, ex Adams Collection. In OUMNH there is a single male from Kilimanjaro collected by Rogers, May 1905. Beyond Tanzania this subspecies occurs in southeastern Kenya (Mt Mbolo, Taita Hills, Chyulu Hills, Ol'Doinyo Orok: Henning 1989; Larsen 1996). Over a dozen subspecies of *C. acuminatus* Thurau,

1903, are recognized, distributed in highland forests from Kenya and Uganda to Zambia and Zimbabwe (Ackery et al. 1995).

***Charaxes (Charaxes) ansorgei kilimanjarica* van Someren, 1967**

Henning 1989: 112 (1 fig.). d'Abbrera 2004: 464 (2 figs). SI: Figure 22a–h.

Forewing length: male 38–41 mm [mean ($n = 2$) 39.40 mm, SD = 1.154]; female 43–47 mm [mean ($n = 2$) 45.10 mm, SD = 1.310]. van Someren (1967, p. 309) gave male forewing length as 38 mm, female 45 mm.

Note. See Appendix 6 regarding the type material of this taxon.

Records

Known only from the type locality: 'Western foot hills, 6–7000 ft., Kilimanjaro' (van Someren 1967, p. 309; Henning 1989, p. 112). This subspecies appears endemic to Kilimanjaro (de Jong and Congdon 1993, appendix 8.2), but was not encountered by Liseki (2009). According to Kielland (1990, p. 95), most if not all of the several subspecies of *C. ansorgei* Rothschild, 1897, recognized to occur in Tanzania have been recorded up to 2000 m or higher. If this population survives on Kilimanjaro, it probably flies within the lowest zone of the forest reserve. Collectively, the 11 subspecies listed by Ackery et al. (1995, p. 433) are found in montane and submontane forests from Kenya and Uganda to eastern DRC and Malawi.

***Charaxes (Charaxes) brutus alcyone* Stoneham, 1943**

Henning 1989: 103 (2 figs). SI: Figure 21a–d.

Forewing length: male 40–49.5 mm [mean ($n = 11$) 43.58 mm, SD = 2.256]; female 44–51 mm [mean ($n = 7$) 47.01 mm, SD = 1.874]. van Someren (1970, p. 219) gave average male forewing length as 40 mm – which from our data appears to be an underestimate.

Note: The subspecific assignment of populations of *C. brutus* (Cramer, 1779) in the northern highlands appears uncertain (van Someren 1970, p. 219; Larsen 1996, p. 288).

Records

A common butterfly throughout most of Africa south of the Sahara, although supposedly relatively uncommon in West Africa (Ackery et al. 1995; Larsen 2005). Found in all suitable habitats in Tanzania, up to 2600 m, including Pemba (Kielland 1990, p. 98). Although not encountered during this study, *C. brutus* was recorded from Kilimanjaro by van Someren and Rogers (1928, p. 153, as *brutus natalensis* Staudinger, 1885), and is included here as a member of the lower slopes fauna. Rogers (in Butler 1901, p. 23) noted it as 'fairly common' at Taveta (four males in OUMNH). The BMNH collection has two males from West Kilimanjaro (Ngaserai, and Engare-Nairobi) collected by Cooper at altitudes between 3000 and 5000 ft, a female from the 'slopes', and two pairs from Arusha collected by A.H.B. Rydon. Beyond northeastern Tanzania, *C. b. alcyone* occurs only in eastern and coastal Kenya. *C. b. natalensis* occurs from the Cape northwards to Angola and southern and western Tanzania.

Charaxes (Charaxes) candiope candiope Godart, 1824

Henning 1989: 55 (4 figs). Larsen 1996: pl. 31, fig. 450 i,ii. d'Abrera 2004: 519 (2 figs). SI: Figure 21e–h.

Forewing length: male 38–47 mm [mean ($n = 9$) 42.76 mm, SD = 2.136]; female 47.5–54.5 mm [mean ($n = 9$) 50.47 mm, SD = 1.616]. van Someren (1974, p. 468) gave male forewing length as 39–44 mm, female 45–55.

Records

The Green-veined Charaxes is a common butterfly throughout most of its vast range (Larsen 1996, p. 283). According to Kielland (1990, p. 98), found in all suitable habitats in Tanzania, up to 2600 m, including Pemba. Although van Someren (1974) and Henning (1989) gave no specific records for Tanzania, and this butterfly was not encountered by Liseki (2009), the BMNH has one male from the east side of Mt Meru collected at 5000 ft by B. Cooper, June–August 1937, two more Cooper males (West Kilimanjaro, 4500–5000 ft, December 1937 to February 1938; Engare-Nairobi, 4000–5000 ft, February–March 1937), and two females from Moshi area collected in 1942 and 1943. Cordeiro (1990, p. 34) recorded it from Lake Manyara National Park. We thus include this taxon as a member of the lower slopes fauna. Beyond Tanzania, the nominate subspecies occurs throughout almost the whole of tropical Africa; the only other recognized races are insular forms on São Tome and Socotra.

Charaxes (Charaxes) castor flavifasciatus Butler, 1895

Henning 1989: 98 (4 figs). SI: Figure 23a–d.

Forewing length: male 43.5–51.5 mm [mean ($n = 12$) 47.30 mm, SD = 1.954]; female 51.5–58.5 mm [mean ($n = 7$) 54.59 mm, SD = 1.793]. van Someren (1971, p. 187) gave male forewing length as 44–49 mm, female as 50–55.

Records

Kielland (1990, p. 98) states that *C. c. flavifasciatus* is found in northern and eastern parts of Tanzania, in woodlands, forests and coastal shrubland, at altitudes up to 2000 m, with its range said to include the 'Kilimanjaro area' (van Someren 1971, p. 188). The only certain material we have located comprises three males from Taveta collected by Rogers at c. 2500 ft, April and May 1905 (OUMNH). Included here as a member of the lower slopes fauna. More widely this east African subspecies extends northwards into Kenya, and south as far as Natal and Transvaal. The nominate subspecies extends widely throughout central and western Africa, and to the north in Ethiopia (which may represent a separate taxon); local endemic insular races occur on Grand Comore and Pemba (Ackery et al. 1995, p. 437).

Charaxes (Charaxes) cithaeron kennethi Poulton, 1926

Henning 1989: 184 (2 figs). SI: Figure 23e–h.

Forewing length: male 40–48.5 mm [mean ($n = 13$) 45.26 mm, SD = 2.160]; female 45.5–54 mm [mean ($n = 5$) 49.72 mm, SD = 2.538]. van Someren (1964, p. 231) gave male forewing length as 44–47 mm, female 47–51.

Note: the separation of *C. c. nairobiicus* van Son, 1953, from subspecies *kennethi* appears tenuous. Females vary in width of the hindwing lilac band or ‘window’.

Records

Northeastern and southeastern parts of Tanzania, including the Mbulu, Nguru and Ukaguru mountains and the Udzungwa rift, only rarely occurring above 800 m (Kielland 1990, p. 99). Henning (1989, p. 184) notes it from the Usambaras, Morogoro, Lindi area, foothills of Kilimanjaro (including Moshi and Arusha – most likely based on van Someren 1964, p. 232). Cordeiro (1990, p. 34) records it from Lake Manyara National Park. The BMNH has males from the slopes of Kilimanjaro and Moshi, a pair from Rau forest, and a female from Taveta. Two males in OUMNH are from Kibosa, western slopes of Kilimanjaro, c. 5000 ft, collected by Rogers, 1 November 1905 [we have been unable to locate ‘Kibosa’]. Not encountered by Liseki (2009), this taxon is included here as a member of the lower slopes fauna. Beyond Tanzania it occurs in the Kenya coast area. More widely this east African species is found from Kenya to South Africa with, in addition to *kennethi*, localized subspecies recognized from Zambia, central Kenya and Malawi (Ackery et al. 1995, p. 438).

Charaxes (Charaxes) druceanus teita van Someren 1939

van Someren 1963: pl. 18, figs 111,112,114–116. Sl: Figure 24a–d.

Forewing length (based entirely on material from Taita Hills, Kenya): male 39–45.5 mm [mean ($n = 7$) 42.17 mm, SD = 1.598]; female 47–50.5 mm [mean ($n = 4$) 48.93 mm, SD = 0.802]. van Someren (1963, p. 238) gave male forewing length as 43–45 mm, female 49–50.

Note: van Someren (1963, p. 238) and Kielland (1990) only tentatively associated material from the Northern Highlands of Tanzania with this race. Henning (1989, p. 127) indicates that true *teita* is endemic to eastern Kenya (Taita Hills, and the Chawia, Wandanyi, Wesu and Mbololo forests). For convenience we include the Kilimanjaro population as subsp. *teita*, but its status needs to be confirmed.

Records

Montane forests and forest margins at 1700–2600 m on Mt Kilimanjaro, North Pare Mountains, and Mt Longido (Kielland 1990, p. 101). *Charaxes druceanus* ‘near *teita*’ was encountered on Kilimanjaro, in a disturbed area of forest at 2000 m, in March 2001 (Liseki 2009, p. 105). Ackery et al. (1995, p. 441) list subspecies *C. d. teita* from the ‘Arusha-Moshi district’. We did not find specimens from Kilimanjaro in OUMNH or BMNH. More widely, *C. druceanus* Butler, 1869, occurs as a series of some 15 named subspecies, including three others found in Tanzania, collectively covering a huge part of Africa, from Nigeria to Angola, Kenya and South Africa (Ackery et al. 1995).

Charaxes (Charaxes) hansali baringana Rothschild, 1905

Henning 1989: 95 (4 figs). Larsen 1996: pl. 33, fig. 460 i. Sl: Figure 24e–h.

Forewing length (based entirely on material from Kenya): male 39–46 mm [mean ($n = 11$) 42.87 mm, SD = 1.646]; female 45.5–52.5 mm [mean ($n = 4$) 48.15 mm, SD = 2.437]. van Someren (1971, p. 191–192) gave male forewing length as 39–43 mm, female 43–50 mm.

Records

'Mostly arid habitats ... Mlamba Forest in North Pare Mountains, Kilimanjaro, Mto wa Mbu (below Ngorongoro), Usambara region, Mwanza' (Kielland 1990, p. 104). Cordeiro (1990, p. 34) recorded it from Lake Manyara National Park, where it appeared to be scarce. Not encountered by Liseki (2009), and there does not appear to be any Kilimanjaro area material in OUMNH or BMNH. Although not specifically recorded by van Someren (1971) or Henning (1989) as a Kilimanjaro species, it is included here, on the basis of Kielland's general statement, as a member of the lower slopes fauna. Outside Tanzania this savanna and woodland subspecies occurs in Rwanda (east), Kenya (including *kulalae* van Someren 1975; treated by Henning 1989; as distinct, but synonymized by Larsen 1996, p. 287), Uganda (north), Sudan (south) and Ethiopia (south). The nominate subspecies is found in parts of Ethiopia, Somalia and Arabia, with a third subspecies in Oman (Ackery et al. 1995, p. 445), and a fourth in Yemen, *Charaxes h. yemeni* Turlin, 1998.

Charaxes (Charaxes) lasti lasti Grose-Smith, 1889

Henning 1989: 70 (4 figs). Larsen 1996: pl. 32, fig. 453 i,ii. d'Abrera 2004: 473 (3 figs). Sl: Figure 25a–d.

Forewing length: male 35.5–39 mm [mean ($n = 5$) 37.24 mm, SD = 0.777]; female 39–49 mm [mean ($n = 5$) 44.00 mm, SD = 2.894]. van Someren (1970, p. 232–233) gave male forewing length as 35–38 mm, female 39–42 mm.

Records

Judging by the NHM this is a rare species, at least in collections – but there is no suggestion of this in van Someren (1963). For *C. lasti lasti*, Kielland (1990, p. 105) noted 'lowland forest to 900 m ... From the Usambaras to Pugu Hills, Morogoro and Turiani. A record from Moshi is probably this race.' Cordeiro (1995, p. 195) indicates that the Moshi record refers to material that he collected at Rau Goundwater Forest Reserve, where it was apparently first collected by the Rev. Baker. We failed to find Kilimanjaro area material in OUMNH, but the BMNH has single females from Moshi and New Moshi, and on this basis we include subsp. *lasti* in the lower slopes fauna. Beyond Tanzania *lasti lasti* also occurs in coastal regions of southern Kenya; there are two other subspecies, both endemic to Tanzania (Kielland 1984, 1990, p. 105; Ackery et al. 1995, p. 449).

Charaxes (Charaxes) pollux maua van Someren, 1967

Henning 1989: 116 (4 figs). Sl: Figure 25e–h.

Forewing length: male 38–44 mm [mean ($n = 3$) 40.80 mm, SD = 1.967]; female 43–48.5 mm [mean ($n = 7$) 45.80 mm, SD = 1.390]. van Someren (1967, p. 316) gave male forewing length as 39–40 mm.

Note: Populations from Mbulu and Mt Kwaraha have the median bands relatively narrow and the basal area darker; specimens from Mt Meru are paler than those from Mt Kilimanjaro (Kielland 1990, p. 108). The type material of *C. p. maua* is supposedly in the Iain Grahame Collection (Suffolk, UK).

Records

The type locality is ‘western foothills, Mt Kilimanjaro, Maua’. Occurs in highland forest on Mt Kilimanjaro, Mt Meru, Mt Oldeani, Ngorongoro Crater, Mbulu Forests and Mt Kwaraha, at 1700–2400 m (Kielland 1990, p. 108). Cordeiro (1990, p. 34) recorded it from Lake Manyara National Park. This apparently endemic Tanzanian race was encountered by Liseki (2009), who found it at 2000 m in March 2001. OUMNH has two females from the slopes of Kilimanjaro, collected December 1905, ex Rogers. The BMNH has specimens labelled Arusha, Kilimanjaro, West Kilimanjaro Engare-Nairobi 4–5000 ft, Moshi 2700 ft., and 6 miles NW of Moshi, while van Someren (1967, p. 316), noting long series obtained, lists ‘Lyamungu Moshi, Marangu’ – all of which suggests that this butterfly also occurs at altitudes below 1700 m. Three other named races of *C. pollux* (Cramer, 1775) occur in Tanzania. The collective species, now with a total of seven recognized subspecies (*C. p. mira* Ackery, 1995, being a replacement for *C. p. mirabilis* Turlin, 1989, preoccupied), is widespread across the centre of Africa, in an area delimited by Bioko and Guinea to southern Sudan, and northern Angola to Mozambique (Ackery et al. 1995, p. 455).

Charaxes (Charaxes) protoclea azota Hewitson, 1877

Henning 1989: 63,64 (4 figs). Larsen 1996: pl. 31, fig. 451 i,ii. d’Abrera 2004: 475 (2 figs).

Sl: Figure 26a–d.

Forewing length: male 38.5–48 mm [mean ($n = 11$) 43.05 mm, SD = 2.081]; female 45–52 mm [mean ($n = 11$) 48.33 mm, SD = 1.940]. van Someren (1971, p. 206) gave male forewing length as 40–42 mm, female ‘42–48, mostly 45–46’.

Records

Forests, woodland and coastal bush, up to 1700 m, in northeastern, eastern, southern and southwestern parts of Tanzania, inland to North Pare, Nguru and Ukaguru Mountains (Kielland 1990, p. 108). There is no Kilimanjaro area material in OUMNH, but the BMNH has a pair from Engare Sero, Arusha National Park, collected by A.H.B. Rydon. Cordeiro (1995, p. 195), however, records *azota* from the southern foothills of Kilimanjaro, notably near rivers such as the Karanga, abundantly at Rau Groundwater Forest Reserve, and frequently in the Kahe Forest. Not encountered by Liseki (2009), *C. p. azota* is included here as a member of the lower slopes fauna. Beyond Tanzania the subspecies occurs in Kenya (coast and Shimba Hills), south to parts of Malawi,

Zimbabwe, Zambia and Mozambique and South Africa. *Charaxes protoaclea* Feisthamel includes six named subspecies, ranging collectively through lowland forests from Senegal to northern Angola, east to Uganda and Kenya and south to South Africa.

Charaxes (Charaxes) saturnus Butler, 1866

Henning 1989: 88,89 (9 figs, as *C. jasius saturnus*). Larsen 1996: pl. 33, fig. 458 i. d'Abrera 2004: 459 (2 figs). Sl: Figure 26e–h.

Forewing length: male 37–45.5 mm [mean ($n = 17$) 42.58 mm, SD = 2.009]; female 44.5–53 mm [mean ($n = 9$) 49.09 mm, SD = 2.246]. van Someren (1963, p. 205) gave male forewing length as 40–44 mm, female 46–50 mm.

Note: there are considerable differences of opinion concerning the taxonomic status of this butterfly and its relatives (see e.g. Larsen 1996, p. 286). Recent molecular work, although far from definitive (Aduse-Poku et al. 2009, p. 475), supports the contention that *C. saturnus* is a separate species from both the Mediterranean *C. jasius* (Linnaeus, 1758), with which it has long been and often still is associated (e.g. Vingerhoedt 2015) and the largely parapatric African *Charaxes epijasius* Reiche, 1850. The nominal taxon *Charaxes harrisoni* Sharpe, 1904, from Kenya, may represent hybrid *C. saturnus* × *C. epijasius* (Henning 1989, p. 85), or a further species in this complex (Larsen 1996, p. 286).

Kielland (1990, p. 104, as *C. jasius saturnus*) describes this butterfly as occurring in savannah and open woodland, 200–2200 m, from the whole of Tanzania where suitable habitats occur. van Someren (1963) does not give any specific records for the Kilimanjaro area. Based on three males in OUMNH from Taveta, c. 2500 ft, collected by Rogers during 1905, we include *C. saturnus* as a member of the lower slopes fauna. More widely, this butterfly extends north throughout Kenya, and south and west to the Cape and Namibia. If admitted as separate but belonging to *C. saturnus*, *C. s. brunnescens* Poulton, 1926, occurs from northern Angola to the Central African Republic, while *C. s. pagenstecheri* Poulton, 1926, flies in Ethiopia and Somalia (Henning 1989). However, as already noted, the respective status of all these taxa and other members of the *C. jasius* species complex remain uncertain.

Charaxes (Charaxes) varanes vologeses (Mabille, 1876)

Henning 1989: 37,38 (4 figs). Larsen 1996: pl. 31, fig. 447 i,ii. d'Abrera 2004: 516 (2 figs). Sl: Figure 20e–h.

Forewing length: male 36.5–46 mm [mean ($n = 13$) 41.96 mm, SD = 2.155]; female 38.5–49.5 mm [mean ($n = 13$) 45.20 mm, SD = 2.839]. van Someren (1974, p. 478) gave male forewing length as 35–45 mm, female 45–51.

Note: the underside of both sexes is dead-leaf-like, and very variable.

Records

Kielland (1990, p. 110) records *C. varanes vologeses* from woodlands and open areas, thickets, and occasionally forests and montane forests, up to 2300 m – apparently throughout Tanzania (mentioning the possibility of a separate subspecies on Pemba). There does not appear to be any Kilimanjaro area material of this common species in

OUMNH, but the BMNH has a male collected 6 miles northwest of Moshi, a pair from Old Moshi collected by Selous, and a pair from Arusha, 4500 ft, collected by Rydon. In 1982 the late Ivan Bampton observed *C. v. vologeses* migrating in numbers, travelling up to 480 km through central and northern Tanzania (Henning 1989, p. 40; repeated by Larsen 1996, p. 282). On this basis it is included here as a member of the lower slopes fauna. While not encountered by Liseki (2009), evidently this butterfly has the potential to move into the lower levels of the main forest, and should be looked for. *Charaxes varanes* (Cramer, 1777), which occurs throughout almost the whole of Africa, is divided into three named subspecies: one occurs only in southern Arabia, the nominate race occurs in Botswana, Mozambique and most of South Africa, while *C. v. vologeses* occupies a vast range, north to Yemen (Henning 1989, p. 36–40; Ackery et al. 1995, p. 460). However, the Yemeni population appears distinct, and has since been named as a further subspecies (Turlin 1999).

Charaxes (Charaxes) violetta melloni Fox, 1963

Henning 1989: 187 (4 figs). SI: Figure 27a–d.

Forewing length: male 36–45 mm [mean ($n = 13$) 40.83 mm, $SD = 1.748$]; female 37.5–49.5 mm [mean ($n = 12$) 44.54 mm, $SD = 2.527$]. For *C. v. maritima*, van Someren (1966, p. 52) gave male forewing length as 36 mm, female as 44 mm.

Note: van Someren's (1966) treatment of Tanzanian *C. violetta* Grose-Smith, 1885, seems ambiguous (see discussion in Henning 1989, p. 186). Kielland (1990) deals with two subspecies, *C. v. maritima* van Someren, 1966, from coastal areas of Tanzania and Kenya, and *C. v. melloni* Fox, 1963, from inland eastern Kenya, Tanzania and further south. However, he suggests that, other than smaller size of the coastal populations, there is little to separate the two populations. This seems borne out by the fact that specimens in BMNH from Arusha and Moshi are regarded as subsp. *melloni*, whereas van Someren (1966, p. 54) attributed Taveta material to subsp. *maritima*. Taveta lies less than 50 km to the east of Moshi, and both are situated at much the same elevation. Here we treat the Kilimanjaro populations under the older of the two names – and they have not been differentiated in making the forewing length estimates reported above. For comparison, Henning (1989, p. 187,188) provides images of *C. v. maritima*, with discussion of what he considers to be its distinguishing characteristics. Larsen (1996, pl. 35, figs 471i,ii) shows a male from coastal Kenya, as *C. v. maritimus* [sic].

Records

Occurs in forests and thickets at 300–1700 m through much of inland eastern Tanzania (i.e. other than the coastal area), westwards to Mt Meru and Mt Kilimanjaro, and south to Tukuyu (Kielland 1990, p. 110). The type locality of *melloni* is Nguru Mountains. OUMNH has two males and a female from Taveta, c. 2500 ft, collected May 1905 by Rogers. The BMNH has a male collected at Rau Forest, 2500 ft, 5 December 1943, and another from Moshi, collected by J.J.S. Dudgeon. Not encountered by Liseki (2009), this taxon is included here as a member of the lower slopes fauna. Outside Tanzania *C. v. melloni* occurs in parts of Mozambique, Zimbabwe and Malawi. Nominate *C. violetta* is limited to

southern Mozambique; a fourth subspecies is restricted to central Kenya (Ackery et al. 1995, p. 461).

***Charaxes (Charaxes) xiphares kilimensis* van Someren, 1969**

van Someren 1969: pl. 28, figs 244–245, 247–248; 1972: pl. 12, figs 96,97. Sl: Figure 27e–h (*C. x. kilimensis* female, and *C. x. maudei* male).

Size: male 49 mm; female 55 mm (van Someren 1969, p. 83).

Forewing length (based on *C. x. maudei* Joicey and Talbot, 1918): male 45–50 mm [mean ($n = 8$) 47.55 mm, SD = 1.366]; female 48.5–56.5 mm [mean ($n = 4$) 52.98 mm, SD = 2.986].

Note: See Appendix 7 regarding the date of publication of this taxon. Henning (1989, p. 173) states that it has an intermediate phenotype between *C. k. brevicaudatus* Schultz, 1914, with short hindwing tails, and *Charaxes maudei*, with very long tails.

Records

The type locality is ‘Lower slopes of West Kilimanjaro at Maua Estate’ (van Someren 1969, p. 84). Apparently confined to montane forest on the west side of the mountain. Very few specimens are known of this rare endemic (Kielland 1990, p. 112); it was not encountered by Liseki (2009), and we know of no specimens other than the original type material (only the female of which was deposited in BMNH – see Appendix 7). In addition to *kilimensis*, Kielland (1990) records six other subspecies of *C. xiphares* (Stoll, 1781) from Tanzania. In total, Ackery et al. (1995, p. 461,462) list 22 subspecies of this east African highland forest butterfly (to which at least two more must now be added), distributed from Kenya and Uganda south to South Africa,

Discussion

Ypthima* and *Neocoenyr

The current taxonomy of these two groups, especially *Ypthima*, does not appear fully satisfactory. Comprehensive work including DNA sequencing could lead to significant changes in the number of species recognized. As noted under *Y. asterope* above, although *Ypthima* species are unlikely to move up into the protected forest area of Kilimanjaro, a major effort to collect a good sample of these ringlets on the lower slopes will be necessary if any *Ypthima* present are to be identified with confidence.

Classification of the genus *Charaxes*

As noted in the introductory section on Nymphalidae, Aduse-Poku et al. (2009) divided the genus *Charaxes* into five subgenera, including *Euxanthe*, formerly treated as a distinct genus (even a monobasic tribe: Rydon 1971; Henning 1989), and *Polyura*, often considered in the past to be a separate, exclusively Indo-Australian generic group. Robert Smiles, however, had already suggested that ‘*Charaxes* in its present usage is paraphyletic ... I regard [the Indo-Australian] *Polyura* as monophyletic, having its sister group within *Charaxes*’ (Smiles 1982, p. 116). Since 2009 the new, five

subgenera system for *Charaxes* has generally been well received (although certainly not by all – e.g. Toussaint et al. 2015), and we decided to follow it here. In this scheme (Aduse-Poku et al. 2009, fig. 3), the interrelationships of the five subgroups can be written parenthetically (*nichetes* group (*Polyura* (*Euxanthe* (*Eriboea* + *Charaxes*))))). *Eriboea* includes the ‘green charaxes’, recently separated as the nominal genus *Viridixes* Bouyer and Vingerhoedt, 2008 (Bouyer et al. 2008, p. 2). (No green charaxes have been recorded from Kilimanjaro, although a race of *C. (Eriboea) dilutus* Rothschild occurs nearby, in the Usambaras: Liseki 2009.) Notably in the Aduse-Poku scheme, the sister group of *Polyura sensu stricto* (Indo-Australia) is the *C. pleione* species group (Africa), with these two together sister to the *zoolina* species group (Africa + Madagascar) – all to be included in subgenus *Polyura sensu lato*. Four of the subgenera recognized by Aduse-Poku et al. (all but the as yet unnamed subgenus required to accommodate *C. nichetes* Grose-Smith, 1883) have representatives on the slopes of Mt Kilimanjaro. At the species level, the *C. jasius* complex is clearly in need of further investigation (Larsen 1996; Aduse-Poku et al. 2009).

Subspecies of *Danaus chrysippus*

Braby et al. (2015) argue, in effect, that despite all the complexities of the population and ecological genetics of *D. chrysippus* in Africa, it is probably better to regard its different phenotypes as (largely) genetically controlled forms, and that formal subdivision of *D. chrysippus chrysippus* into further subspecies throughout Africa, Arabia, the Indian Ocean and its vast range over much of the Asian mainland, is unhelpful – in effect, the system is too complex to be ‘reduced’ to a system of (widely overlapping) ‘subspecies’. This accords with the earlier view of Larsen (1996, p. 256) that ‘variation in the species [*D. chrysippus*] is not well expressed in conventional subspecific terms’, and Kielland’s (1990, p. 73) tacit treatment in which he did not apply any subspecies division to the whole of *D. chrysippus* other than to state ‘there is a distinct race in Australia’ (clearly referring to what is now treated as a separate species, *D. petilia*). Thus, despite the great geographical variation in colour pattern form frequencies throughout Africa, including populations at or near fixation (e.g. form ‘alcippus’ in parts of West Africa, and form ‘dorippus’ in parts of the Arabian peninsula), we follow Braby et al. (2015) in placing all these populations under *Danaus chrysippus chrysippus*.

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Appendix 1

Taxonomy of African Libythea

Ackery et al. (1995, p.471), following Okano (1987), included all five libytheid taxa currently recognized from the Afrotropical Region as members of a single species, *Libythea labdaca* Westwood, 1851. This was questioned by d’Abrera (2004, p.528), who reinstated (but without character analysis) the distinctive Mauritian *Libythea cinyras* Trimen, 1866, to full species status. The cladistic analysis of Kawahara (2009) confirmed this separation, and demonstrated that the Mauritian taxon appears to be more closely related to certain Oriental libytheids than to the African and Malagasy taxa.

Much of the recent African literature (e.g. Carcasson 1981; Kielland 1990; Larsen 1996) treats the two African mainland taxa as subspecies of *Libythea labdaca* – nominotypical *labdaca*, and *labdaca laius* Trimen, 1879. Even Aurivillius (1919, p.294) considered the latter as ‘scarcely more than the southern and eastern representative of *labdaca*’. Kawahara (2013) now proposes to treat the two again as specifically distinct – the former as a monotypic species from western and central Africa south of the Sahara, the latter as a polytypic species from eastern and southern Africa (*L. laius laius*), Madagascar (*L. l. tsiandava* Grose-Smith, 1891), and southern India and Sri Lanka (*L. l. lepitoides* Moore, 1901). However, David Lees (pers. comm., unpublished) indicates that the Madagascan *tsiandava* is sufficiently divergent, based on molecular data, to warrant being considered yet another species in its own right. The characters used by Kawahara (2013) refer only to details of the wing pattern. It would appear that the systematics of *Libythea*, although greatly clarified in many respects by Kawahara (2009, 2013), is yet to reach a mature state, and that more changes can be expected once extensive molecular analyses have been undertaken. Here we have opted to treat the East Africa taxon simply as *Libythea laius*.

Appendix 2

Taxonomic status of the African Queen, Danaus chrysippus L., 1758

Talbot (1943, p.120,121) divided the Afrotropical populations of *D. chrysippus* (type locality Canton, China) into three or four subspecies: *alcippus* (Cramer, 1777) in West Africa, *dorippus* (Klug, 1845) ('it may be considered almost as an eastern race') in the horn of Africa to Tanzania, *liboria* (Hulstaert, 1931) in the Malagasy region, and *aegyptius* (Schreber, 1759) in the rest of Africa. Smith et al. (2005) recognized three subspecies: *chrysippus* (= *aegyptius*, northeastern Africa as far south as Kenya, Uganda and DRC), *alcippus* (West Africa to Kenya and Tanzania), and *orientis* (Aurivillius, 1909 = *liboria*, to include not only Indian Ocean populations but mainland Africa from Tanzania to Gabon and south to the Cape and St Helena), elevating *dorippus* to full species status (as in Aurivillius 1910b), including Tanzania in its distribution. However, Smith et al. (2010, p.81) recently reversed this last decision.

Most recently, Braby et al. (2015) suggest that, as originally demonstrated by Smith (1975; summarized by Ackery and Vane-Wright 1984, p.95), it is probably best to regard the different phenotypes as (largely) genetically controlled forms affecting the (mainly) African populations of subspecies *chrysippus*. Two or three insular races can perhaps be recognized across the Malay Archipelago eastwards through Indonesia, with however the Australian region *D. petilia* (Stoll, 1790), included by Talbot (1943) as a subspecies of *chrysippus*, now convincingly demonstrated to be a separate species (Lushai et al. 2005; Braby et al. 2015). There is however no doubt that the population genetics of *Danaus chrysippus*, especially in Africa, are very complex. The great mobility of this insect, which often migrates, is at least partly responsible for local and seasonal variations in wing-pattern morph frequency, and may indeed reflect earlier periods of partial isolation (incipient speciation) as extensively discussed by David Smith and others (for overview, see Smith 2014).

Appendix 3

Subspecies of Amauris albimaculata in the Kilimanjaro region

Butler (1888, p.91), in a paper entitled 'Descriptions of some new Lepidoptera from Kilima-njaro', described *Amauris hanningtoni* from two males collected by Hannington from 'Hills of Terta in April'. Talbot (1940, p.327) notes 'Terta' as the type locality, but then clearly interprets this as Teita [= Taita], Kenya. The Taita Hills lie approximately 80 km east of the Kilimanjaro massif. However, the precise location of 'Hills of Terta' appears uncertain, and perhaps debatable – several lepidopterists, including the present authors (Liseki and Vane-Wright 2011, p. 2390) have accepted it to be some part of, or in the immediate vicinity of Kilimanjaro. If so, then *A. albimaculata interposita* Talbot, the name used here, might fall as a synonym of *A. albimaculata hanningtoni* – currently in use to denote a different, more easterly subspecies of *A. albimaculata*. The name *Hirsutis virginalis* Köhler, 1923, as *A. albimaculata virginalis* (Köhler), would appear to be available for the latter, if required (Ackery et al. 1995, p. 272). To add to the confusion, while describing *A.*

a. interposita from West Kilimanjaro, Talbot (1940, p.327) also lists *A. a. hanningtoni* from Kilimanjaro (as well as 'Teita')! Given the current lack of certainty regarding the location of Hills of Terta, and so the true type-locality of *hanningtoni*, we retain Talbot's name here, in line with current usage. [With respect to James Hannington's time in this part of Africa, it is evident that he travelled the approximately 200 km return trek from Taita to Taveta, Moshi and Kilimanjaro, commencing 12 February 1885 and ending some time (well) before 23 July in the same year (when he left Rabai on a subsequent mission) – see Michael (1886). His location during April is unfortunately not clear, but plausibly was in the vicinity of Kilimanjaro, rather than the Taita Hills. Even so, some form of orthographical error by Butler or other curators at the BMNH rendering Teita as 'Terta' may be the ultimate explanation.]

Appendix 4

Type material and type locality of Ypthima simplicia Butler, 1876

Kielland (1982) selected and described a male in BMNH as the lectotype of *Y. simplicia* Butler. However, there is uncertainty regarding his action.

The type locality (Butler 1876, p.480) is specifically Atbara, Abyssinia [Atbarah], not just 'Ethiopia' as given by Kielland (1982, p.113), 'Abyssinia' as stated by Ackery et al. (1995, p.307), or 'Ethiopia ('Abyssinia')' as reported by Williams (2010). Kielland supposedly illustrated the lectotype, but his legend (Kielland 1982, pl. 2, figs 7,8) gives the locality as 'Bole Valley (West Ethiopia)' – which, situated close to Addis Ababa, lies at least 300 km south of any section of the Atbara River. The town of Atbara lies in Sudan, at the confluence of the Atbara and White Nile rivers. The Atbara rises in Ethiopia, to the north of Lake Tana, and then flows about 50 km west before entering Sudan, in which country it then continues for some 300 km in a generally northerly direction before reaching the White Nile and Atbara town.

Butler's authentic type material is labelled 'Atbara, Abyssinia, pur.[chased] from Gerrard, [BM] [18]76–59'. Judging by Lydekker's (1914, p.139, 160) account of ungulate mammals in the British Museum, the collector might have been 'Herr Essler', who evidently worked in the Atbara Valley or Upper Atbara Valley at the relevant time, and sold his material through Gerrard. Although 'Upper Atbara' seems to suggest Ethiopia rather than Sudan, the area where the Setit and Atbara rivers join in eastern Sudan, near Showak, is considered to be part of the Upper Atbara Valley. The Upper Atbara could also be interpreted as the Tekezé River, which rises in the Ethiopian Highlands and flows west into Sudan, becoming the Setit before its confluence with the Atbara. Kielland (1982) does not mention Atbara (town, river or valley) in his account, and states that he only found male specimens. Butler evidently had both sexes (as catalogued by Riley and Gabriel 1924), and described the insect as 'common'. Further clarification, beyond the scope of this work, is needed.

Appendix 5

Name and status of *Charaxes tavetensis*

Charaxes tavetensis was first described by Rothschild (1894, p.535) as a full species, but it has since generally been treated as a subspecies of *Charaxes etesipe* (Godart) (e.g. Rothschild and Jordan 1900, p. 458; Aurivillius 1911c, p. 129; van Someren 1966, p. 52; Henning 1989, p. 220; Larsen 1996, p. 294; Ackery et al. 1995, p. 441). However, based on a limited comparison of male genitalia, Kielland (1990, p.109) treated it as a full, separate species, to include subsp. *pemba* van Someren and, tentatively, subsp. *shaba* Berger, and, probably, *gordoni* van Someren. Most recently, in the molecular study of Aduse-Poku et al. (2009), a sample of *tavetensis* from Kenya grouped with the distinct *Charaxes penricei* Rothschild from DRC before grouping with two samples of *etesipe* (from Ghana and Uganda). More work appears required, but current evidence seems to favour separate species status.

Appendix 6

Type material of *Charaxes ansorgei kilimanjarica*

The original description in van Someren (1967, p.309) gives the type data for this rare taxon as 'Holotype male. Tanzania: Western foot hills, 6–7000 ft., Kilimanjaro, ii.1964 (A. Brown and J. G. Williams). In B.M.(N.H.). Allotype female. Same data as holotype. In B. M.(N.H.).' Two pages later, in a summary, he states: 'Known only from the western slopes of Mt Kilimanjaro at Wasendo, 6000 ft. Types in B.M. (N.H.).' From this it is easy to form the impression that the description was based on just one male and one female, collected by Brown and Williams. However, as catalogued by former NHM staff member Michael Clifton, *C. a. kilimanjarica* was based on at least two pairs, with one male (the holotype) and two females collected by Williams, and a second male by Brown. Moreover, these two pairs had recently become separated in the NHM collection (one pair under *C. a. rydoni* van Someren), giving rise to some confusion. We have illustrated all four specimens (SI: Figure 22a–h), and brought them together in the collection. The male illustrated in colour by Henning (1989, p.112) is neither of the two BMNH males – but, as he states that *kilimanjarica* is only known 'from the western slopes of Mount Kilimanjaro at Wasendo', just conceivably this image represents an additional paratype.

Appendix 7

Date of publication of *Charaxes xiphares kilimensis*

Inexplicably, the original description of this subspecies first appears in part 5 of van Someren's 'revisional notes' (van Someren 1969, p.82), although it was clearly intended for part 8 (van Someren 1972, p.260), where it is repeated. The 1969 description is accompanied by figures of the whole upper and undersides of both sexes; the 1972 description has the same figures 'halved'. Major printed accounts (e.g. Henning 1989; Kielland 1990; Ackery et al. 1995; d'Abrera 2004) give the later date, but this should be

corrected to 1969 (the 1969 date is given correctly in two online databases: Beccaloni et al. 2015; Savela 2015).

With respect to the type material, there is a significant difference between the 1969 and 1972 accounts. The former states that both the holotype male and female paratype ('allotype') were deposited in the BMNH. In the latter, however, only the female is said to be so deposited. It seems likely (cf. account of *Charaxes pollux maua*) the holotype was retained by Iain Grahame (Suffolk, UK).