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Revision of the *A. delicata* group of *Afriodinia* d'Abrera, 2009 (Papilionoidea: Riodinidae) with the description of a new species from Mount Lico, Northern Mozambique, and the reinstatement of a species

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Abstract: This paper describes a new species of *Afriodinia* from Mount Lico in northern Mozambique, and revises the *Afriodinia delicata* (Lathy, 1901) group, reinstating *Afriodinia zanzibarica* (Collins, 1990) as a result. The new species from Mount Lico is a member of the 'white-banded' group of *Afriodinia*, which are generally found in sub-montane forest and forest edge. This is also the first record of this genus from Mozambique. *Afriodinia delicata* has previously been recorded from Mount Mulanje in southern Malawi, approximately 200 km away from Mount Lico, however no specimens of this genus have been recorded from the mountains in-between despite numerous butterfly surveys over the last 15 years. A morphological analysis and dissection of the genitalia highlight significant differences between *A. delicata*, *A. zanzibarica*, and *Afriodinia lico* sp. nov. The primary character that clearly distinguishes *Afriodinia lico* sp. nov. from all other species is the unique form of the aedeagus. Evidence suggests that *A. lico* sp. nov diverged relatively recently, very approximately between 14k to 135k years ago. The new species from Mount Lico was collected on the forest edge at 1000m over the course of a two-week scientific expedition in May 2018 to survey this mountain in northern Mozambique.

Key words: Afriodinia, Abisara, Mount Lico, Mozambique, delicata, zanzibarica, tanzania, barcode divergence
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INTRODUCTION

The genus *Abisara* was revised by Callaghan in 2003 to comprise 11 species from Africa and 19 species from Asia (Callaghan, 2003). In 2009 d'Abrera split this genus into Afrotropical species for which he erected the genus *Afriodinia*, and those from Asia which are still under the genus *Abisara*. The genus *Afriodinia* belongs to the Family Riodinidae Grote, 1895; Subfamily Nemiobiinae Bates, 1869; Tribe Abisarini Stichel, 1928; Subtribe Abisarina Stichel, 1928.

In his 2003 revision Callaghan grouped the Afrotropical *Afriodinia* into 'blue-banded' species - having convex forewing inner margins covering the scent patches on the costa of the hindwing (Williams, 2020) - and 'white-banded' species. The blue-banded *Afriodinia* are generally western lowland species while the white-banded ones are more eastern sub-montane forest and forest edge (Sáfián, 2016). According to Callaghan (2003) *Afriodinia* d'Abrera, 2009 show good characters in the male and female genitalia.

Of the taxa of *Afriodinia* which are recognised all have fairly wide distributions, with the solitary exception of *A. delicata zanzibarica*, which is known only from Jozani Forest on the Unguja Island of Zanzibar. The recent discovery of another small, isolated population, this time on Mount Lico, Northern Mozambique (15°47.538'S 37°21.783'E), has prompted a review of *Afriodinia delicata*, resulting in the description of one new species and the restoration of another.

The new species of *Afriodinia* described in this paper is a white-banded species. It is close to *A. delicata* but morphological differences in the facies and analysis of the genitalia prove that this is a distinct species.

Afriodinia delicata (Lathy, 1901) is a species found in Malawi where the type, *A. delicata delicata*, is from Mulanje/Zomba Mountains. It is a forest and forest edge species found at low to medium altitudes, and its host plant is *Maesa lanceolata* (Myrsinaceae). A sub-species, *A. delicata tanzania* (Kielland, 1986), is known from the Usambara, Nguru and Udzungwa mountains in Tanzania, as far west as Kihansi (8°36.348'S 35°50.760'E) (Congdon, unpubl.).

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Abisara zanzibarica was originally described by Collins (1990), although in a recent revision Callaghan (2003) placed this taxon as a sub-species of *Afriodinia delicata* thus *Afriodinia delicata zanzibarica*. However, upon examination of the genitalia significant differences were identified as well as noticeable differences in the facies, thus we have reinstated *Afriodinia zanzibarica* as a distinct species (stat. rev. comb. nov.).

The mountains of northern Mozambique have only recently started to reveal their biological secrets. Since 2005 a series of expeditions have been organised to survey the biodiversity of a selection of these mountains that rise above 1000 metres in Zambezia Province (Fig. 1) highlighting the question of shared endemism between these sites. As a result more than 30 new species have been discovered which included several new Lepidoptera species (Congdon *et al*. 2010; Staude *et al*. 2011; Congdon & Bayliss 2012; van Velzen *et al*. 2016; Bayliss *et al*. 2016; Bayliss *et al.* 2018; Bayliss *et al.* 2019; Richardson, 2020; Sáfián *et al*. 2022). Arguably the most significant was the discovery of the largest continuous tract of medium elevation rainforest in southern Africa (Bayliss *et al*. 2014).

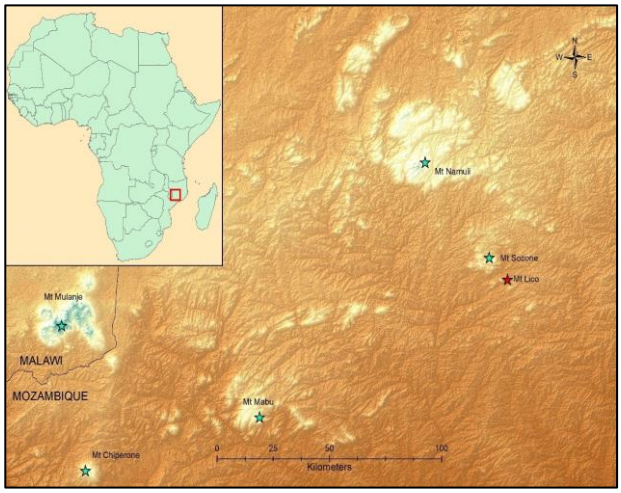

Figure 1 – Map showing study area between Malawi and Mozambique, and location of Mount Lico in relation to neighbouring mountains above 1000m

METHODS AND MATERIALS

Genitalia dissection

Male genitalia of specimens were dissected and photographed. The abdomen tip was detached from the specimen and immersed in glass vials containing about 500 µl 10% solution of potassium hydroxide (KOH) and heated to just below boiling point for 15 minutes. The samples were then transferred to a 70% ethanol solution to neutralise the alkali and cleaned under a stereomicroscope using a pair of micro forceps. Dissections were undertaken in glycerine using a binocular microscope, dissecting forceps, and a fine blade to detach parts of the structures. The entire structure was cleaned and the genitalia (aedeagus and valve) were detached and photographed whilst immersed in glycerine. To improve the depth of field for the images we used focus-stacking software provided with the microscope (Leica Application Software (LAS) Ver. 3.8.0). Images were then processed using Adobe® Photoshop® to remove extraneous material only.

Wing venation

In the description of the new species the wing venation terminology follows Larsen, 2005: 54 (Figs 19a & b).

Digital processing of images

Photographs and colour plates were edited in Adobe® Photoshop®. The accession numbers of photographed specimens are stated in the figure captions. For ABRI specimens the accession number is, for example, ABRI - 2022-0001.

Material examined

A full list of material examined appears in Table 1 (p. 42).

DNA sequencing

A single leg was removed from each selected specimen and submitted to the Natural History Museum (NHM), London, where three different overlapping primer pairs were used to amplify ~650 to 700 bp of the mitochondrial COI gene (including the "barcode" region). The samples worked with all primer sets and resulted in long sequences. As a result a Klee diagram of barcode pairwise differences (number of nucleotides different) for *Afriodinia* species using sequences listed in BOLD and the sequence for *A. lico* was also produced.

Acronyms and abbreviations

ABRI – African Butterfly Research Institute, Nairobi, Kenya
BOLD – Barcode Of Life Data system
NHMUK – Natural History Museum, London, UK

RESULTS

DESCRIPTION OF NEW SPECIES

Genus *Afriodinia* d'Abrera, 2009.
Type-species: *Abisara (Papilio) gerontes* Fabricius, 1781, by original designation.

***Afriodinia lico* sp. nov.** Bayliss, Congdon, Richardson, and Collins.
urn:lsid:zoobank.org:act: 0660F272-0CD2-4BB2-90A5-58B2C0F54843

Type material: Holotype ♂: ABRI-2018-4648 Mount Lico, Zambezia Province, Mozambique (Fig. 1), 15°47.538'S 37°21.783'E; 1000m asl, 15–16.v.2018; leg. J. Bayliss; ABRI. Paratypes: 2♂ 8♀ Mount Lico, Zambezia Province, Mozambique. Same data.

Description (Holotype): Wingspan: 30.8 cm. Forewing length: 17.2 mm. Antenna-wing ratio: 0.50.
Head: Upper side: antennae black narrowly ringed white, club tipped ginger brown, head black, frons white tinged brown. Underside: antennae as upper side, head black.
Thorax: Upper side: black. Underside: black with white markings, legs brown.
Abdomen: Upper side: black. Underside: white.
Wing surfaces: Upper side: Fore wing: apical band black reaching tornus, inner border rounded, an indistinct subapical white streak. Discal band white, broad. Basal area dark blue-grey. Hindwing: post discal area black containing two ocelli. Ocelli black with iridescent blue

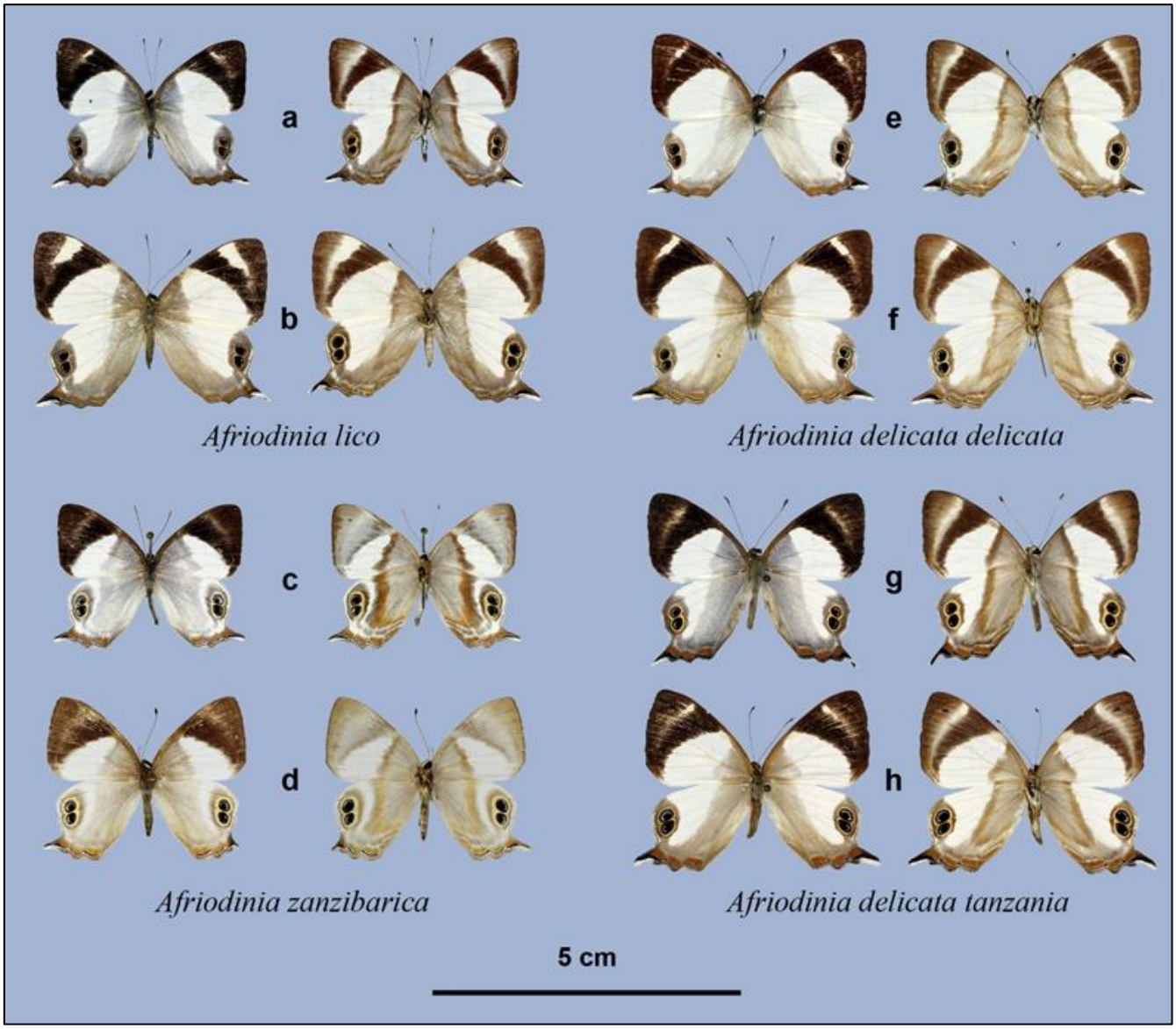

Figure 2 – Specimens of *Afriodinia* species: recto (left) and verso (right) (photos D. Bernard).
a. *Afriodinia lico* ♂; ABRI-2022-0001; Mt Lico, Zambesia, Mozambique; 15°47.538'S; 37°21.783'E, 1000 m; 15–16.v.2018; J. Bayliss; **b**. ♀; ABRI-2022-0002; Mt Lico, Zambesia, Mozambique; 15°47.538'S; 37°21.783'E, 1000 m; 15–16.v.2018; J. Bayliss; **c**. *Afriodinia zanzibarica* ♂; ABRI-2022-0003; Jozani Forest, Zanzibar, Tanzania; 6.2417°S; 39.4111°E, 12 m; ix.1990; S.C. Collins; **d**. ♀; ABRI-2022-0004; Jozani Forest, Zanzibar, Tanzania; 6.2417°S; 39.4111°E, 12 m; vii.1987; S.C. Collins; **e**. *Afriodinia delicata delicata* ♂; ABRI-2018-4658; River Ruo, Mt Mulanje, Malawi; 15.95° S; 35.617° E, 900 m; ii.1983; S.C. Collins; **f**. ♀; ABRI-2022-0007; River Ruo, Mt Mulanje, Malawi; 15.95° S; 35.617° E, 900 m; v.1988; R.J. Murphy, S.C. Collins; **g**. *Afriodinia delicata tanzania* ♂; ABRI-2022-0005; Udzungwa Mts, Tanzania; 7.80°S; 36.88°E, 1000 m; 16.iii.2000; T.C.E. Congdon, I. Bampton, P. Walwanda, M. Hassan; **h**. ♀; ABRI-2022-0005; Udzungwa Mts, Tanzania; 7.80°S; 36.88°E, 1000 m; 3.iii.2000; T.C.E. Congdon, I. Bampton, P. Walwanda, M. Hassan.

scaling, narrowly ringed in light brown. White discal area narrower than fore wing. Basal grey area greatly extended and reaching tornus. Tail black, bordered basally with white.
Underside: Fore wing: as upper side, white subapical streak larger and indistinctly bordered brown. Basal grey area darker than upper side and edged black. Hindwing: basal grey area, a diffuse brown band bordering, entering basal area in 4, making V-shape in 3, reaching inner margin in 1a. Basal area with brown sub-marginal markings in 1– 3. Ocelli more broadly ringed pale brown than upper side.

Male genitalia:
Uncus (Fig. 3a): bilobed posteriad with a broad "V" shaped depression between lobes, posterior apex of lobes pointed, lateral edges rounded and the anterior edge slightly concave.
Gnathos (Figs 3b & 3d): "U" shaped with arms almost parallel, lower arm significantly longer than upper arm, upper arm turning slightly dorsad at rounded extremity and lower arm pointed.
Valve (Figs 3c & 3e): length 1.2 mm, posterior extremity taking form of a broad paddle narrowing towards body of valve, extremity of paddle flat, long dorsal crest with long thin point posteriad and broad point anteriad, body of valve tapering to a blunt point anteriad.
Tegumen curving sharply ventrad at posterior edge to meet uncus. Vinculum narrow long and straight, length 1.2 mm.
Aedeagus (Figs 4a & 4b): length 2.6 mm, narrow tip posteriad with a small projection without a hook on ventral side, body of aedeagus broadening to midpoint where

vesica leaves sclerotised body on dorsal side, anterior half of body broadening slightly and curving dorsad, a rounded projection on dorsal side at anterior extremity (Figs 4a & b; & Fig. 5a & b).

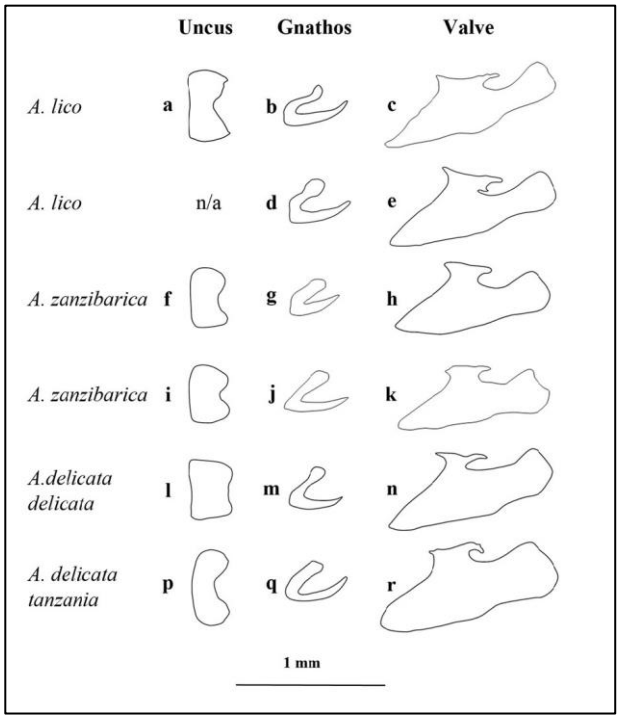

Figure 3 – Comparison of the uncus, gnathos and valve of *Afriodinia* species and subspecies. **a,b,c.** *Afriodinia lico*: ABRI-2018-4657; Mt Lico, Zambesia, Mozambique; 15°47.538'S; 37°21.783'E, 1000 m; 15–16.v.2018; J. Bayliss. **d,e.** *Afriodinia lico*: ABRI-2018-4648; otherwise as for a,b,c. **f,g,h.** *Afriodinia zanzibarica*: ABRI-2021-0023; Jozani Forest, Zanzibar, Tanzania; 6.2417°S; 39.4111°E, 12 m; ix.1990; S.C.Collins. **i,j,k.** *Afriodinia zanzibarica*: ABRI-2021-0025; otherwise as for f.c.h. but iv.1994; S.C.Collins. **l,m,n.** *Afriodinia delicata delicata*: ABRI-2018-4658; River Ruo, Mt Mlanje, Malawi; 15.95°S; 3.5617°E, 900 m; ii.1983; S.C. Collins. **p,q,r.** *Afriodinia delicata tanzania*; ABRI-2021-0024; Udzungwa Mts, Tanzania; 7.80°S 36.88°E, 1000 m; iii.2000; T.C.E. Congdon, I. Bampton, P.Walwanda, M. Hassan.

DNA barcodes:
Single specimens of *Afriodinia lico* and *Afriodinia delicata delicata* produced barcoded sequences on lengths 613 and 630 nucleotides respectively. The pairwise difference between these is 0.15%, which equates to one nucleotide difference (Fig. 6).

Sequences for single specimens of three further *Afriodinia* species are available in BOLD, *gerontes*, *rutherfordii* and *rogersi*. These show the two white banded species *gerontes* and *rogersi* to be almost equidistant from *lico* and *delicata* with pairwise differences of 35 and 38 base pairs respectively (5.3% and 5.8%). The blue banded species, *rutherfordii*, is more distant with pairwise difference 53 to 56 base pairs (8.1% to 8.5%) with respect to the four white banded species. This pattern of barcode differences is consistent with the differences in the facies.

Distribution:
Afriodinia lico is currently known from one site in Zambezia Province, Northern Mozambique – Mount Lico 15°47.538'S 37°21.783'E (Fig. 1). So far it has not been found on other mountains in the area. This is also the first record of this genus for Mozambique.

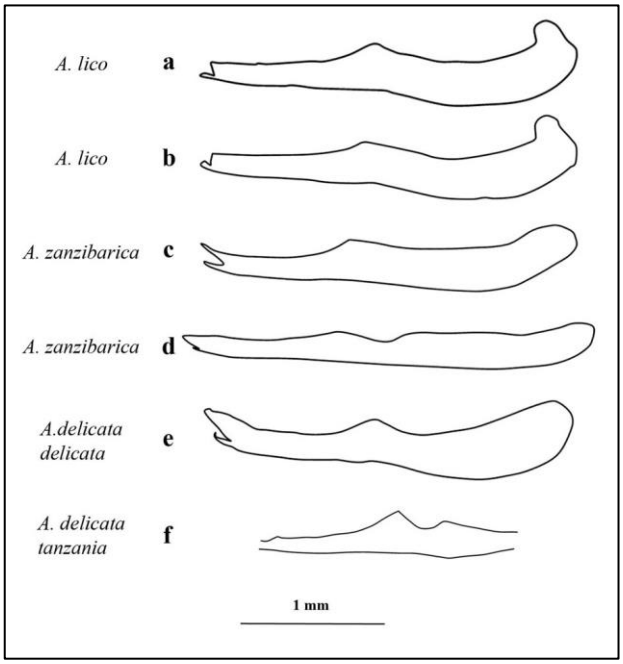

Figure 4 – Comparison of the aedeagi of *Afriodinia* species and subspecies. **a**. *Afriodinia lico*: ABRI-2018-4657; **b.** *Afriodinia lico*: ABRI-2018-4648; **c.** *Afriodinia zanzibarica*: ABRI-2021-0023; **d.** *Afriodinia zanzibarica*: ABRI-2021-0025; **e.** *Afriodinia delicata delicata*: ABRI-2018-4658; **f.** *Afriodinia delicata tanzania*; ABRI-2021-0024. Label data as per Fig. 3

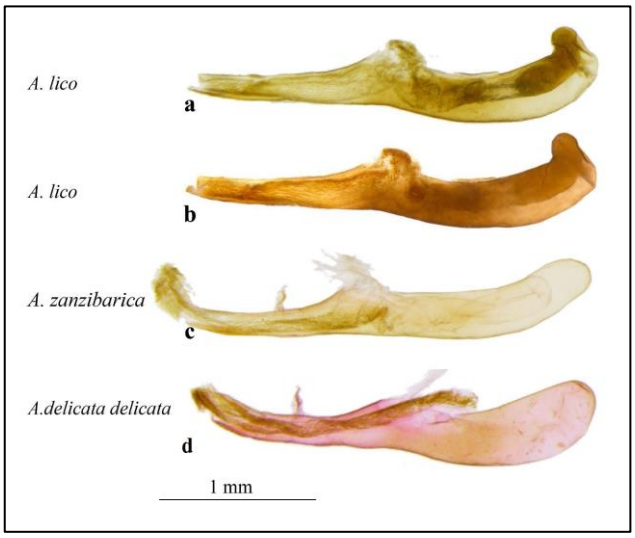

Figure 5 – Direct photographic comparison of the aedeagi of **a.** *Afriodinia lico*: ABRI-2018-4657 **b.** *Afriodinia lico*: ABRI-2018-4648; **c.** *Afriodinia zanzibarica*: ABRI-2021-0023 **d.** *Afriodinia delicata delicata*: ABRI-2018-4658. Label data as per Fig. 3.

Etymology:
Afriodinia lico is named after the mountain site at which it was discovered by J. Bayliss in May 2018 - Mount Lico in Zambezia Province in northern Mozambique.

Larval host plant:
No information, although as with other members of the genus it will probably be *Maesa lanceolata* (Myrsinaceae).

Species		Af. lico	Af. delicata	Af. gerontes	Af. rogersi	Af. rutherfordii
Species	**Locality**	Mt Lico, Moza	Mt Mlanje, M	unknown	unknown	unknown
Af. lico	Mt Lico, Mozambique					
Af. delicata	Mt Mlanje, Malawi	1				
Af. gerontes	unknown	35	34			
Af. rogersi	unknown	38	37	16		
Af. rutherfordii	unknown	56	55	54	53	

Figure 6 – Klee diagram of barcode pairwise differences (number of nucleotides different) for *Afriodinia* species using sequences listed in BOLD and the sequence for *A. lico*.

DIAGNOSIS

Afriodinia lico* vs *A. delicata

The major morphological differences between *Afriodinia lico* (Figs 2 a & b) and *A. delicata delicata* (Figs 2 e & f) from Mount Mulanje in Malawi (Fig. 1), the nearest population of *Afriodinia*, are the consistently larger subapical patch in the females, and the general basal markings which are much darker in the Lico population than in the Mulanje *delicata* population, particularly on the underside. In the female, the forewing subapical white bar is crisply defined and widest where it reaches the costa. In the other races this bar is usually rather diffuse, and if it reaches the costa at all, does not widen when it does so. Thus, in the female, on the forewing upper side, the white bar in the apical area is enlarged and wedge-shaped, broadest at the costa.

The males differ from *A. delicata delicata* in the forewing apical area, larger, with a less curved inner margin, and wider at the tornus. The basal blue-grey area is darker and more extensive, almost reaching the apical area at costa although it is similar to *tanzania* in this respect. On the hindwing, the basal area is larger and darker, reaching the ocelli. On the underside, the forewing post discal white area is reduced. The basal area is darker and more extensive. On the hindwing, the post discal area is reduced, the basal dark area is darker, more extensive and reaches the ocelli, as in *delicata tanzania*.

On the genitalia, the primary character that distinguishes *Afriodinia lico* from the other species is the form of the anterior extremity of the aedeagus, which is distinctly different in shape from the rest of the taxa examined (Fig. 4 a&b and Fig. 5 a&b). The secondary characters are:

- The narrowing of the apical "paddle" of the valve; more pronounced than in other species
- The unequal lengths of the two arms of the gnathos, the lower arm being longer. Note that *delicata tanzania* tends to this form as well.
- The shape of the uncus with a V shaped well between the two lobes.
- The width of the uncus, broad as in *delicata tanzania* as well.

***Afriodinia zanzibarica* Collins 1990 stat. rev. comb. nov.**

Collins, 1990 gives a good description of the facies.

A. zanzibarica is a much smaller insect than *A. delicata delicata*, *A. delicata tanzania*, and *Afriodinia lico*. This is evident in the forewing lengths of the males and the females. Forewing length:
Male: *A. zanzibarica* 15.0mm (n=19), *A. delicata delicata* 18.8mm (n=6), *A. delicata tanzania* 18.3mm (n=23), *Afriodinia lico* 17.2 (n=3).
Female: *A. zanzibarica* 16.0mm (n=15), *A. delicata delicata* 20.3 (n=4), *A. delicata tanzania* 19.1mm (n=11), *Afriodinia lico* 19.2 (n=6).

On the hindwing the line between the ocelli and the margin is white, not dark grey-brown as in *A. delicata tanzania*. The ocelli are bordered with a white ring, much wider than in *A. delicata tanzania*, and set within a narrow grey-brown area, which is much narrower than in *A. delicata tanzania*.. On the forewing upperside, there is a subapical white band, very diffuse, whereas in *A. delicata tanzania* it is clearly defined. On the underside, the grey-brown basal area is greatly extended, reducing the discal white area on both wings. In the forewing apical area, the dark brown is almost completely replaced with whitish, leaving only the edges brown, a feature not seen in any other species in the genus.

The gnathos in *A. zanzibarica* has a sharper angle between the two arms creating "V" shape as opposed to the "U" shape in *A. delicata* and *A. lico*. The posterior extremity of the valve is paddle shaped narrowing anteriad as in *A. lico*, but shorter. In *A. delicata*, the posterior extremity of the valve does not narrow. The aedeagus in both *A. zanzibarica* and *A. delicata* terminates, posteriad, in two projections, the upper being longer than the lower. In *A. delicata*, however, the lower projection is hooked whereas the hook is not present in *A. zanzibarica*.

Given the very appreciable difference in the facies, the marked differences in the genitalia (Figs. 3 & 4), and the appreciable size difference between *A. zanzibarica* and *A. delicata*, we believe *A. zanzibarica* is a good species.

DISCUSSION

The description of a new species involves looking at the wider evidence base, and using all available information to determine the status of distinction or not as the case maybe. It is a combination of factors (not just one) and, as such, there is no one determining factor that can be applied. In this article we examined the results of morphology, genitalia, and genetics. We found that 'two out of three' provided sufficient evidence to declare a new species within the *Afriodinia* group of east Africa. There are clear distinctions in the facies and genitalia between the aforementioned species. In particular, according to (Callaghan, 2003), the shape of the valvae in the male genitalia and their secondary structures are good for defining species.

As such this study is quite topical as it raises the question of 'why (or when) do the morphology and barcodes sometimes disagree'. The description of *Afriodinia lico* in this publication is an example of morphological evolution versus mitochondrial evolution. And this is very much a temporal distinction (and a current debate). Morphological evolution is considered to be more rapid than mitochondrial evolution due to the way the genetic recombinations occur within the nuclear genome through

meiosis and environmental drivers, opposed to point mutations in the mitochondrial genome. As a result, morphological evolution can be a much quicker process than mitochondrial evolution with appropriate environmental drivers (such as forest isolation). Thus, recently evolved species may still have very similar barcodes although they have evolved to be evolutionarily distinct from each other (i.e. different species).

Several studies have estimated the divergence rate for the mitochondrial barcode (COI sub-unit 1 or cox 1) between two independent populations. For example Brower (1994) was the first to use mitochondrial data to estimate divergence in *heliconius* butterflies resulting in a 2.3% pairwise sequence divergence per million years (My^{-1}). Lushai *et al.* (2003) deduced a divergence rate of 2.4% My^{-1} for a study on *Danaus* and *Tirumala* species. Papadopalou *et al.* (2010) estimate the barcode divergence rate to be 3.54% My^{-1} for species of Tenebrionidae. These are average rates and we would expect to see variations in the rate for different instances due to the random nature of barcode change over time.

A simple stochastic model of barcode divergence for two populations was developed based on over 1000 barcodes obtained for *Neptis* species (Richardson, 2022) and using a mean divergence rate of 3% My^{-1}. As identical barcodes have not diverged at the initial divergence time (the model initialisation condition with two identical barcodes), and the probability of a mutation in a barcode at each time step (9 ky) is only 0.09, there is a significant probability that both the modelled barcodes will remain unchanged for several time steps. This means that the statistical measures of divergence time for identical barcodes will be greater than zero. This provided an estimate of the probable spread of divergence versus time characterised as the 90th, 50th and 10th percentile elapsed times for a given divergence:

1. For identical barcodes, the times are 0 ky, 14 ky and 45 ky respectively.
2. For one base pair difference, as in the case of *A. lico* and *A. delicata*, the times are 14 ky, 54 ky, 135 ky respectively.

Therefore, we can say (approximately) that *Afriodinia lico* became distinct between 14 to 135 kys ago, which is sufficient time for morphological speciation to occur even at the 90th percentile when applied.

We conclude that similar barcodes do not preclude different species. This was also found to be the case with *Neptis exaleuca suffusa* to *Neptis occidentalis occidentalis* – similar barcodes (one nucleotide difference) but morphologically different (Richardson, 2019). We also have examples of this trait in the *Leptotes* and the *Ornipholidotos*, quite possibly as a result of relatively recent speciation within the morphology but not the mitochondrial gene, as is the case in our scenario. *Afriodinia zanzibarica* shows even more morphological differences to the *delicata* group although the genetics of this species await fresh material for analysis.

In summary, it is always better to look at all of the evidence when declaring new species, and seek agreement between the morphology, biology, ecology, biogeography, phylogeography, and the genotypes. In this case we conclude that *Afriodinia lico* is a recently evolved species (14 ky to 135 ky ago), and that this is reflected more in the morphology than in the mitochondrial genes. As such this is an important species description as it highlights the emerging evidence base that speciation can indeed occur despite almost identical barcodes, and that this is due to a very recent divergence as outlined in this paper. *Afriodinia lico* is a good species based on the distinct shape of its aedeagus and wing morphology. However, we accept that barcoding is still a solid guide to separating species over a greater temporal period.

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TABLE 1 – Comparative material examined and collection data of *Afriodinia* specimens

Species	Figure no.	Accession no.	Locality and coordinates	Date(s)	Collector(s)
lico	2 a ♂	ABRI-2022-0001	Mt Lico, Zambesia, Mozambique 15.472972°S; 37.214359°E, 1000 m	15–16.v.2018	J. Bayliss
lico	2 b ♀	ABRI-2022-0002	Mt Lico, Zambesia, Mozambique 15.472972°S; 37.214359°E, 1000 m	15–16.v.2018	J. Bayliss
lico	3 a b c ♂	ABRI-2018-4657	Mt Lico, Zambesia, Mozambique 15.472972°S; 37.214359°E, 1000 m	15–16.v.2018	J. Bayliss
lico	3 d e ♂	ABRI-2018-4648	Mt Lico, Zambesia, Mozambique 15.472972°S; 37.214359°E, 1000 m	15–16.v.2018	J. Bayliss
lico	4 a ♂	ABRI-2018-4657	Mt Lico, Zambesia, Mozambique 15.472972°S; 37.214359°E, 1000 m	15–16.v.2018	J. Bayliss
lico	4 b ♂	ABRI-2018-4648	Mt Lico, Zambesia, Mozambique 15.472972°S; 37.214359°E, 1000 m	15–16.v.2018	J. Bayliss
zanzibarica	2 c ♂	ABRI-2022-0003	Jozani Forest, Zanzibar, Tanzania 6.2417°S; 39.4111° E, 12 m	ix.1990	S.C. Collins
zanzibarica	2 d ♀	ABRI-2022-0004	Jozani Forest, Zanzibar, Tanzania 6.2417°S; 39.4111° E, 12 m	viii.1987	S.C. Collins
zanzibarica	3 f g h ♂	ABRI-2021-0023	Jozani Forest, Zanzibar, Tanzania 6.2417°S; 39.4111° E, 12 m	ix.1990	S.C. Collins
zanzibarica	3 i j k ♀	ABRI-2021-0025	Jozani Forest, Zanzibar, Tanzania 6.2417°S; 39.4111° E, 12 m	iv.1994	S.C. Collins
zanzibarica	4 c ♂	ABRI-2021-0023	Jozani Forest, Zanzibar, Tanzania 6.2417°S; 39.4111° E, 12 m	ix.1990	S.C. Collins
zanzibarica	4 d ♀	ABRI-2021-0025	Jozani Forest, Zanzibar, Tanzania 6.2417°S; 39.4111° E, 12 m	iv.1994	S.C. Collins
delicata delicata	2 e ♂	ABRI-2018-4658	River Ruo, Mt Mlanje, Malawi 15.95°S; 35.617°E, 900 m	ii.1983	S.C. Collins
delicata delicata	2 f ♀	ABRI-2022-0007	River Ruo, Mt Mlanje, Malawi 15.95°S; 35.617°E, 900 m	v.1988	R.J. Murphy, S.C. Collins
delicata delicata	3 l m n ♂	ABRI-2018-4658	River Ruo, Mt Mlanje, Malawi 15.95°S; 35.617°E, 900 m	ii.1983	S.C. Collins
delicata delicata	4 e ♂	ABRI-2018-4658	River Ruo, Mt Mlanje, Malawi 15.95°S; 35.617°E, 900 m	ii.1983	S.C. Collins
delicata tanzania	2 g ♂	ABRI-2022-0005	Udzungwa Mts, Tanzania 7.80°S; 36.88°E, 1000 m	16.iii.2000	T.C.E. Congdon, I. Bampton, P. Walwanda, M. Hassan
delicata tanzania	2 h ♀	ABRI-2022-0005	Udzungwa Mts, Tanzania 7.80°S; 36.88°E, 1000 m	16.iii.2000	T.C.E. Congdon, I. Bampton, P. Walwanda, M. Hassan
delicata tanzania	3 p q r ♂	ABRI-2021-0024	Udzungwa Mts, Tanzania 7.80°S; 36.88°E, 1000 m	16.iii.2000	T.C.E. Congdon, I. Bampton, P. Walwanda, M. Hassan
delicata tanzania	4 f ♂	ABRI-2021-0024	Udzungwa Mts, Tanzania 7.80°S; 36.88°E, 1000 m	16.iii.2000	T.C.E. Congdon, I. Bampton, P. Walwanda, M. Hassan