

A new species of *Lepidochrysops* Hedicke, 1923 (Lepidoptera: Lycaenidae: Polyommatainae) from Western Zambia

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Abstract: A new *Lepidochrysops* species is described and figured from Western Zambia, *Lepidochrysops ella* sp. n. and a diagnosis for its separation from other similar *Lepidochrysops* is provided.

Key words: Lepidoptera, Lycaenidae, *Lepidochrysops*, systematics, Zambia.

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INTRODUCTION

This paper adds a further species of the genus *Lepidochrysops* Hedicke, 1923 to the thirty one previously described from Zambia (Heath, Newport & Hancock, 2002; Gardiner, 2004) and the 136 described from the Afro-tropical region (Williams, 2018). This species has so far only been collected at one locality in Western Zambia but will probably be found in neighbouring parts of Angola. It belongs to the *L. glauca* group, members of which show little interspecific variation in genitalic structures. At the moment in order to separate this species from other members of this group one has to rely on external morphology. It is possible that in the future differences in life histories will become apparent.

MATERIALS AND METHODS

Morphological studies

The posterior half of male abdomens were cut from specimens and soaked in 5% KOH overnight. They were then cleaned of soft tissue in water in order to expose the genitalia and then transferred to 100% Glycerol. The aedeagus was dissected free from the diaphragm and then the valves separated from the tegumen (+vinculum). A MiniVID Microscope Digital Camera and a Leica M3Z stereomicroscope were used for imaging the dissections, both in natural position and dorso ventrally flattened. The images were processed in ToupView 3.7 and Adobe Photoshop 7.0 programs to enhance and improve quality. Genital

under the corresponding specimens.

Analysis and terminology

Wing pattern characteristics were analysed and compared using the pattern elements and homologs of the nymphalid ground plan (Schwanwitsch, 1924, 1926, 1949; Suffert, 1927; Nijhout, 1991). The terminology used follows Gardiner and Terblanche (2010). Male genital terminology follows Cottrell (1965).

Comparative material examined

Lepidochrysops carsoni: 1♂, Type, Fwambo, A. Carson, NHM #146130.

Lepidochrysops yvonnae: 2♂, 95km E Solwezi, Zambia, 4.ix.2002 A.J. & M.W. Gardiner; 1♂, 1♀, same data but 17.ix.2002; 4♂, same data but 4.ix.2003; 3♂, 2♀, same data but 14.ix.2005, A.J. Gardiner; 2♂, same data but 22.ix.2002 A.J. Gardiner.

Lepidochrysops chala: 1♂, Holotype, Mt. Chala, Ufipa, W. Tanzania, viii.1973, J. Kielland, NHM #147830; 1♂ & Allotype same data but ♀ NHM #147831.

L. violetta: 10♂, 6♀, 11.x.1988, A.J. Gardiner.

Lepidochrysops chittyi: 10♂, 5♀, 14.x–18.xi.1979. Douglasdale, Bulawayo, Zimbabwe, A.J. Gardiner; 4♂, 5♀, same data but 4.x–14.xi.1980; 2♂, same data but 1 & 28.xi.1981, A.J. & M.W. Gardiner; 1♂, 2♀, same data but 29.xi.1982; 2♂, 2♀, Headlands, Zimbabwe, 11 & 25.x.1964, C.B. Cottrell.

Lepidochrysops roussowi: 6♂, nr. Stoffberg, South Africa, 12.i.1981. J. Pullens.

Apart from *L. carsoni* & Holotype & Allotype *L. chala* all other specimens in GPC.

Abbreviations

NHM: Natural History Museum, London.

GPC: Gardiner Private Collection.

IZIKO: Iziko Museum, Cape Town.

ZFMK: Zoological Research Museum Alexander Koenig, Bonn, Germany.

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dissections were retained in glycerol vials pinned

DESCRIPTION OF NEW SPECIES

Genus *Lepidochrysops* Hedicke, 1923

Deutsche Entomologische Zeitschrift 1923: 226.

Replacement name for *Neochrysops* Bethune-Baker, 1923.

Transactions of the Entomological Society of London 1922: 279 (275-366).

Type species: *Papilio parsimon* Fabricius, 1775: 526. Replacement name through Section (i) of Article 67, Szilady, 1922.

Lepidochrysops ella sp. n. (Figs 1 A–F)

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Holotype ♂: Near Mongu, Western Province, Zambia, 15°20'36"S, 23°18'02"E, 1050m; 15.xi.2017; A. Gardiner leg, NHM.

Paratypes: 20 ♂s; 5 ♀s: details as per Holotype, deposited in GPC, ZFMK and IZIKO.

Description of facies

The description although based on the Holotype does include variation within the type series.

Male Holotype (Figs 1A & B)

Wingspan: ♂ 33–42.1 mm, mean 39 mm. Forewing length: 18–22.8 mm, mean 21 mm. Antenna-wing ratio mean 0.44 (n = 21).

Head, white with two narrow rows of black hair like scales between the eyes and some flattened black scales between these two rows, eyes with some short hairs, vertex with flattened grey-black scales, a patch of black hair like scales antero-laterally to the antennae. Antennae black with narrow white bands below the club and at the base of each segment, white markings broader and more noticeable on the ventral surface, ventral surface of club white rest black-brown, apiculus blunt, club flat and twisted. Labial palpi: first segment white with black along narrow dorsal surface, second and apical segment black with white scales ventrally.

Thorax. Above, laterally, on either side, and anteriorly with a clump of mostly white hairs and white-beige-black scales, remainder black above scattered with delicate blue scales and numerous long white hairs laterally and posteriorly, white below with grey-black scales laterally. Legs: femora, tibia and tarsi white with black patches on dorsal surface of each tarsal segment.

Abdomen. Above at base light grey-white, first and second segment with substantial white laterally remaining a grey-black with a light band at junction of each segment, white below, apex grey.

Wings. Upper side a delicate shade of mauve. Forewing: the mauve fades into the marginal and apical dark grey/black areas the mauve being most intense at the base. Along the margin Od dark grey/black, D across end of cell grey/black. Media 1, M1, and Op just visible from the upper side. Cilia: with distal part light grey-white and the proximal part grey-black. Hindwing: Mauve in basal third of 6 and 7, in space 6 it diffuses into the grey/black white & mauve, markings oU²3–oU²7, O2 with narrow

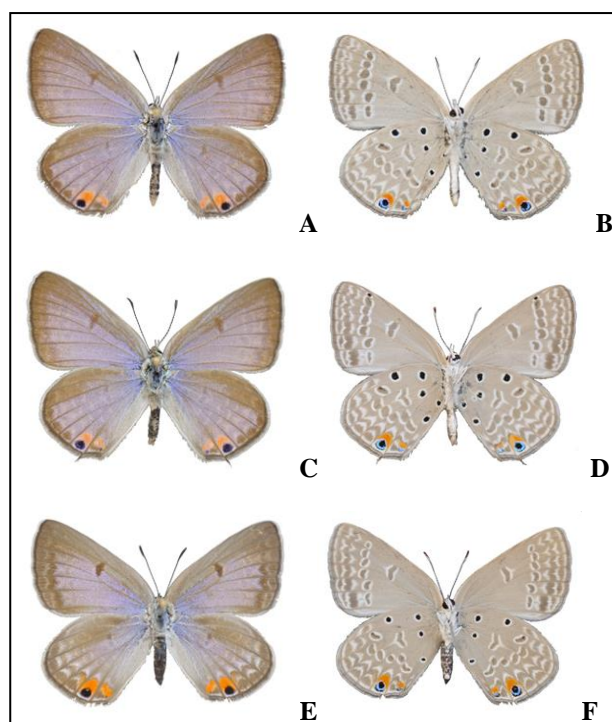


Figure 1 – *Lepidochrysops ella* sp. n. near Mongu, Western Province, Zambia. 15.xi.2017. A & B, ♂ upper and underside without tail; C & D, ♂ upper & underside tailed. E, F ♀ upper side and underside.

some specimens having more mauve than others but never having this colour going evenly up to Op, pale, blue scales distally then forming a distinct black spot followed by a large orange area oU²2, O1c with some blue scales distally and a very small, hardly visible with naked eye, black spot towards cell 1b, oU²1c forming a large orange spot mostly separated from the distal blue by dark grey/black, spaces 1a and 1b a white silvery grey with some orange at the end of 1b, the orange in 1b may be absent from some specimens. Narrow white-blue strips oU¹1c–oU¹6 present fading towards oU¹6, Od dark grey/black and O3–O6 forming a broad dark margin. There is no tail at the end of vein 1c in the holotype and 17 paratypes while 3 specimens have remnants of a tail and one is tailed (Figs 2 C & D). Cilia: spaces 1c–2 forming three bands distally first light then dark then light again, spaces 3–5 first two bands dark and the distal light and in spaces 6–7 basal third dark remainder light grey/white. Underside a light grey. Forewing: lighter towards base and inner margin, spots darker than background colour. The discal spot, D, narrow and edged by white on the inner and outer edge, the outer white sagittate in shape. The two median spots, M¹1 & M¹2, not in line with M¹3–M¹6 being displaced towards the base, M¹1 elongate, M¹3–M¹6 although in a straight line slightly angled inward compared to M¹1 & M¹2, M¹ edged laterally with white, in some specimens a small M¹7 is present. Inner border Op1–Op7 present, the darkest Op1 is dislodged basally the remainder approximately the same colour as the background, Op edged on either side with white, broken at each vein and becoming slightly chevron shaped from Op4–Op6. Border ocelli, O, narrow and edged by white to form a

white line along the margin, Od present as a dark narrow line. Cilia: with distal part light grey-white and the proximal part grey-black. Underside hindwing: M¹1a, M²4 & M²7 forming 3 inner small black dots, M¹1b, M¹7 also forming small black dots but dislodged from rest of M¹ band so all black dots appear isolated and edged by white. Media M¹1c and M¹2 also dislodged towards base from the remaining M¹3–M¹5 but still just touching, M¹1c and M¹2 almost appearing as one elongated spot, M¹6 separated from M¹3–M¹5 and positioned almost half way between M¹5 and M¹7, M¹1c–M¹6 almost same colour as background but M¹1c and M¹6 do contain some black scales. The discal spot, D, narrow and edged by white on the inner and outer edge, the outer white sagittate in shape, D slightly darker than background with a few black scales. White markings on inner edge of Op1b–Op7 present as distinct white sagittate markings those in 6 and 7 appear dislodged towards the base, oU²3–oU²7 present as white markings not as markedly sagittate as white markings of Op. Border ocelli, O2, consisting of blue scales almost enclosing a black dot and on the inner edge a large orange mark, oU²2, O1c also has a small blue and black dot towards 1b, the black hardly noticeable and a large orange mark on its proximal edge oU²1c, oU¹1b–oU¹7 present as a distinct white line along the margin, Od present as a thin line only slightly darker than background. Cilia: spaces 1c–2 forming three bands distally light then dark then light again, spaces 3–5 first two bands dark and the distal light and in spaces 6–7 basal third dark remainder light grey/white.

Female (Figs 1E & F)

Wingspan: 40–44.4 mm, mean 42.6 mm. Forewing length: 21.6–23.3 mm, mean 22.8 mm. Antenna-wing ratio mean 0.42 (n = 5). On average larger than ♂.

Similar markings and pattern to male except: Upper side forewing: discal mark bolder and slightly wider, in some specimens D edged with white that may diffuse into the blue distally, Op more distinctive and wider than in male with the mauve from spaces 2–5 abruptly stopping at this point, oU²1–oU²5 may be more visible as pale lines. Hindwing: in all specimens only a touch of mauve at the base of cells 6 & 7, white on outer edge of Od1b–Od5 clearly visible as white sagittate marks, sometimes also visible in spaces 6 & 7, oU²3–5 also visible as white sagittate marks, providing the appearance of two rows of markings, the black spot and orange at the end of 2 slightly larger than male. Underside markings very similar to male except white markings appear slightly more prominent and on the forewing Op may in some specimens give more of an appearance of a line rather than spots, the white of Op1 and M¹1 may extend and touch. There are no tails at the end of vein 1c in three females while two have traces of a tail.

Genitalia ♂ (Figs 2 A–D): Uncus consisting of two lobes laterally fused to tegumen; subunci long, curved and tapering gradually towards the distinctly hook-shaped apex. Lower fultura with its two arms fused to base of valves. Valves long, broadened at base, then narrowing fairly abruptly, especially on inner edge, to form a long slightly curved neck broadening slightly at apex, and

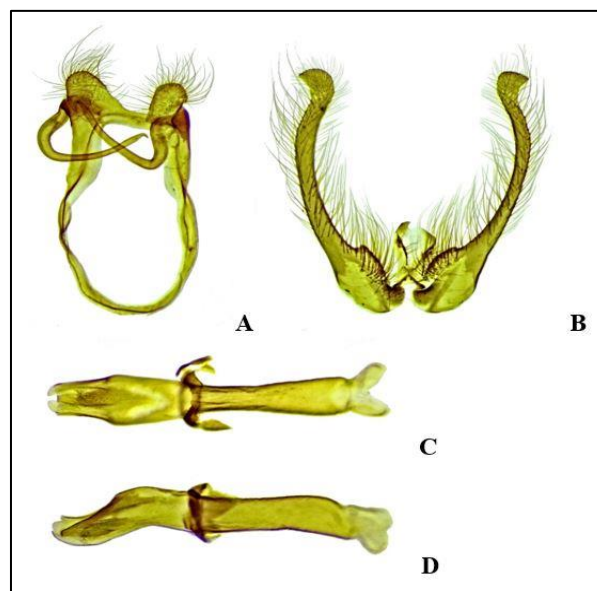


Figure 2 – *Lepidochrysops ella* sp. n. ♂ genitalia: A – uncus, tegumen, subunci and vinculum; B – valves with lower fultura; C – aedeagus ventral view, D – aedeagus lateral view.

twisting outwards to form a blunt point laterally. Valves and uncus lobes with long fine hairs. Aedeagus long and cylindrical, anellus fused to and sheathing the aedeagus. Distal lateral pieces long, distal end strongly bent medially in lateral view.

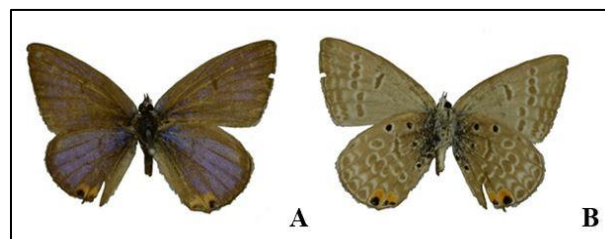


Figure 3 – *Lepidochrysops carsoni*, Type, Fwambo, A. Carson, NHM #146130. A ♂ upper side; B underside.

Diagnosis

Superficially similar in appearance to the only known specimen, the type, of *Lepidochrysops carsoni* (forewing length 19 mm, wingspan 35 mm, Figs 3A & B) due to the presence, in the male, of two obvious orange spots, near the margin, one in 2 and one in 1c, on the upper and under side of the hindwing. *Lepidochrysops ella* sp. n. differs significantly from the type of *carsoni* in the following: on the upper side; the blue is of a more delicate shade; the blue in space 6 never reaches Op, this is the case for all 21 males, and fades some distance from Op, in *carsoni* the blue in space 6 of the hindwing clearly continues all the way to Op stopping abruptly at this point as does the blue in cells 2–5; on the hindwing the blue in space 1c intergrades with the white silvery grey, and in some specimens light blue scales, in spaces 1b and 1c, in *carsoni* 1a, b and c appears to be a dark grey in colour (little to no blue); on the hindwing underside there is a small amount of blue in 1c but never any black while the *carsoni* specimen clearly has black in 1c. The spots of M¹

on the hindwing underside are smaller than *carsoni* and the white on either side of M¹5 are almost parallel while in *carsoni* they curve to such an extent that on the upper edge they touch giving the white a circular appearance; the spot M¹5 is noticeably smaller than in *carsoni*; the entire M¹ smaller in the new species; on the forewing underside M¹1–M¹6 is displaced more towards the outer margin than in *carsoni*; forewing D is shorter and wider; the general shape of the forewing appears more rounded than the pointed forewing of *carsoni*. *Lepidochrysops ella* sp. n. is possibly more closely related to *L. yvonnae*, *L. chala*, *L. violetta* and *L. chittyi*, but the former three, in the male, rarely have orange, on the upper side hindwing of O2 and never in 1c. *Lepidochrysops chittyi* has orange in O2 and rarely the orange can even be noticeable in O1c. However, all four *Lepidochrysops yvonnae*, *L. chala*, *L. violetta* and *L. chittyi* can be easily distinguished on the upperside of the male as they have narrow dark margins compared to the broad dark margins of *L. ella* sp. n. and *L. carsoni*. The females are more difficult to distinguish but *L. ella* sp. n. tends to have a slightly more delicate shade of purple and the underside spots tend to be smaller. *Lepidochrysops rousouwi* has a similar colour pattern to *L. ella* sp. n. and may have orange in both O2 and O1c, however the orange in O1c of *L. ella* sp. n. is more noticeable and always present, the upper side colour of *L. rousouwi* is a delicate shade of blue/green never light mauve and the underside markings tend to be more bold and larger.

Habitat and behaviour



Figure 3 – *Lepidochrysops ella* sp. n. ♀ ovipositing on *Ocimum* sp. near Mongu, Western Province, Zambia. 15.xi.2017.

Adults were found flying in a large open vlei. The males flew rapidly, only stopping to circle within small territories and chasing off any other male they encounter.

The females are also rapid fliers but stopped to visit *Ocimum* sp. flowers to feed and oviposit (Fig. 3).

Distribution

So far this species has been caught from only one locality in Western Zambia.

Etymology

This species is named after Ella Gardiner who accompanied the first author on the trip to search for *Lepidochrysops*. She has been on many other Lepidopteran trips and her enthusiasm while in the field is appreciated.

ACKNOWLEDGEMENTS

We would also like to thank Kim Goodger, Dick Vane-Wright and Phillip Ackery for sending information on other species of *Lepidochrysops* housed in the Natural History Museum, London, and to Blanca Huertas and David Lees for their help during the visit to BMNH by the second author.

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