



Revision of the *Cerautola crippsi* species group, with the description of three new taxa from Cameroon and the Democratic Republic of the Congo (Lepidoptera: Lycaenidae: Poritiinae)

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Abstract: The *Cerautola crippsi* species group is revised, based on examination of some 90 specimens of group members accumulated by ABRI workers during the last fifteen years. Three new taxa are described *Cerautola crippsi teresae* **ssp. nov.** (Northern Cameroon), *Cerautola richardsoni* **sp. nov.** (Western Cameroon) and *Cerautola cuypersi* **sp. nov.** (Western Democratic Republic of the Congo).

Key words: African butterflies, Epitolini, *Epitola sensu lato*.

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INTRODUCTION

In his revision of the genus *Epitola* Westwood (*sensu lato*) Libert (1999) erected the genus *Cerautola* Libert, 1999 and the subgenus *Cerautola*, in which he synonymised *Cerautola crippsi* (Stoneham, 1933) and *Cerautola mittoni* Jackson, 1964, resulting in the monospecific *C. crippsi* species group. This assessment was based on only seven specimens – six from eastern Africa (Uganda and Kenya) (including the types of *C. crippsi* and *C. mittoni*), and a single female from Cameroon.

Bouyer (2013), in a note on the genus *Cerautola*, reinstated *C. mittoni* as a species distinct from *C. crippsi*. He included *Cerautola fisheri* Libert & Collins, 1999 in the *crippsi* species group, and described a new species *Cerautola delassisei* from a female similar to the one illustrated in Libert's (1999) revision.

Subsequently, extensive fieldwork in West, Central and East Africa has enabled collectors from the African Butterfly Research Institute, Nairobi (hereinafter referred to as ABRI) to accumulate almost 90 specimens of various taxa in the *crippsi* species group. This material has facilitated a clearer

understanding of the taxonomy of the species group, which is reviewed hereunder.

MATERIALS AND METHODS

The specimens examined for this study include the historical material, most of which was dealt with in Libert's (1999) revision. ABRI's specimens collected in Western Kenya, Western Uganda, North-eastern Democratic Republic of the Congo (DRC) and Cameroon were also examined, as well as a specimen from Western DRC brought to the authors' attention by Mr. F. Cuypers. A full list of the specimens examined is given with the description of each taxon.

Male genitalia of four populations for which males were available were dissected and examined. Genitalic dissections generally followed the methods described in Libert (1999).

Legs from several cabinet specimens were sent to the Canadian Centre for DNA Barcoding (CCDB, Guelph University), where DNA is extracted, amplified and sequenced for gene CO1 (protocols are available at <http://www.ccdb.ca/page/research/protocols>). The sequences will be made available in the Barcoding of Life Data System (BOLD) database (www.barcodinglife.org; project ALYML).

RESULTS

Examination of approximately one hundred specimens within the *Cerautola crippsi*-group displayed a unique spatial distribution pattern, distinguishing six geographically disjunct populations (denoted as I–VI): I–Western Kenya and Eastern Uganda; II–Western Uganda and North-eastern DRC, III–Northern Cameroon, IV–Western Cameroon, V–Southern

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Cameroon, VI–Western DRC (represented by a single female specimen). Phenotypic variation between populations is sufficient to treat them as taxonomically distinct, with certain characters being stable, with a few exceptions which are highlighted below. These populations were then assigned to either described or undescribed taxa. At least one specimen of each population is illustrated on Plate 1.

Sexual dimorphism is limited to the existence of androconia under vein 1 of the male forewings; they are not always easily observed, and it can be difficult to separate males from females (e.g. the male holotype of *crippsi* was originally described as a female).

The male genitalia of the holotype of *crippsi* and one male of *mittoni* were dissected for Libert's (1999) revision, and their genitalia were found to be identical. The genitalia of three recent specimens that were also examined (two from Wak, one from Koutaba) are also virtually identical, with no reliable diagnostic characters. The genitalia of *C. fisheri* differ by the absence of the coremata that are observed in all other species of *Cerautola*.

Eleven DNA specimens sent to Guelph University were successfully sequenced for gene CO1:

C. crippsi: 1♂, Kakamega; 1♀, Rangwe, Western Kenya.

C. mittoni: 1♀, Lume, North Kivu, DRC.

C. delassisei: 2♀, Mintom, Southern Cameroon.

Population III: 1♂, 1♀, Wak, North Cameroon.

Population IV: 2♂, Koutaba, West Cameroon.

C. fisheri: 1♂, 1♀, Kasaba Bay, Northern Zambia.

The first nine sequences were identical, whereas *C. fisheri* only differed slightly, but close enough to confirm it as a member of the *C. crippsi* species group.

CERAUTOLA CRIPPSI SPECIES GROUP

Cerautola crippsi (Stoneham, 1933) (Plate 1: A)

Holotype: ♂, Soy, Kenya¹, ix.1932, (H.F. Stoneham), National Museum of Kenya, Nairobi.

Neallotype: ♀, Busia, Uganda, xi.1937, (T.H.E. Jackson), National Museum of Kenya, Nairobi.

Other material examined:

1♀, Rangwe Mountain, 1640 m, near Sindo, Kenya, ix.2003 (ABRI leg.); Coll. ABRI, Nairobi; 1♂, 5♀, as above, 15.x.2003; 1♂, as above, 20.x.2003; 1♂, as above, 21.x.2003 (bred); 3♀, as above, 28.x.2003; 1♀, as above, 29.x.2003; 1♀, as above, 8.xi.2003; 1♂, as above, 16.xi.2003 (bred); 1♂, as above, xii.2003 (bred); 1♀, as above, xii.2003; 1♂, Kakamega, Kenya, iii.2009 (ABRI leg.); Coll. ABRI, Nairobi;

Description:

Upperside: Forewings: dark brown, with series of long white spots in spaces 2, 4, 5, 6 and 9 (length: about 6–7 mm); spot in 4 shorter (c. 3 mm), one in 9 much

narrower, usually very small dash in space 10. Twelve specimens with additional much smaller spot in space 3, less often observed in other populations. Hindwings: large white discal area, with dark margin, c. 4 mm wide – almost black in males, 5 mm wide but lighter in females; margin can be lighter in space 7; space 1 very light brown, but base of the wings darker; fresh (bred) specimens often have hint of blue in cell. Basal black spots of underside more or less visible.

Underside: Forewings: similar to upperside, except in apical part (beyond white spots), which is whitish, with well-marked veins and internervural lines hardly less visible; between cell and costa, base of spaces 11 and 12 lighter brown or whitish. Hindwings: very characteristic, with series of ten small black spots in basal region; one or two, sometimes missing, at base of 8, two at base of 7, one at base of 1b and two rows of three in cell (basal spot of upper row much smaller, more or less fused with lower one, and sometimes missing); nerves 1a to 6 thick and conspicuous. Margin brown, but brown scales not as dense as on upperside, especially in spaces 6 and 7, which are almost white; in all spaces, internervural lines are more or less apparent; in spaces 6 and 7 short brown line between costal edge and nerve 6. Cell light brown; discal area white. between cell and brown margin.

Note: Male holotype of *crippsi* has much reduced light areas, on both upper and underside (Libert, 1999 – plate III), not seen in any other specimens examined.

Cerautola crippsi teresae Libert, ssp. nov. (Plate 1: B, C)

urn:lsid:zoobank.org:act:5F35C7CB-3E40-423F-BDFD-524061400F44

Holotype: ♂, Wak, North of Ngaoundéré, Northern Cameroon, x.2006 (ABRI leg.); Coll. ABRI, Nairobi.

Note: The specimen depicted on Plate 1 is the holotype.

Other material examined: 7♀, Wak, north of Ngaoundéré, Northern Cameroon, viii.2000 (ABRI leg.); Coll. ABRI, Nairobi; 1♂, as above, ix.2000; 3♂, 1♀, as above, x.2000; 1♂, 2♀, as above, xi.2000; 1♂, as above, ix.2002; 2♂, as above, x.2002; 3♂, as above, ix.2004; 2♂, 2♀, as above, ix.2006; 2♂, as above, x.2006; 5♂, 1♀, as above, xi.2006; 1♂, as above, vi.2009.

Description: Similar to nominate *crippsi*, except that none of the 32 specimens has white spot in space 3 of forewing upperside.

Diagnosis: The distinctive feature of *crippsi teresae* is the constant absence of a spot in space 3; half the specimens of nominate *crippsi* have this spot. Furthermore, it is likely that *crippsi* evolved over such a wide area (2500 km), because two different taxa are found in Uganda, and three in Cameroon, about 400 km apart in both countries. Finally, nominate *crippsi* is adapted to moister habitats, whereas *crippsi teresae* is a found in a very dry biotope, a significant ecological difference. These three criteria combined are sufficient

¹ The holotype is illustrated by both Larsen (1991, plate 14, as *Hewitsonia crippsi*) and Libert (1999, plate III; the caption erroneously indicates "Uganda").

to justify treating *c. teresae* as separate subspecies to nominate *crippsi*. Note also that nominate *crippsi* is sympatric with the closely related *C. mittoni* in Toro (Western Uganda).

Etymology: This subspecies is named after Teresa Di Micco de Santo, who has helped enormously as a volunteer at ABRI in recent years.

***Cerautola mittoni* (Jackson, 1964)** (Plate 1: D, E & F)

Holotype: ♂, Bwamba Toro, Uganda, ix.1961, (N. Mitton); Natural History Museum, London.

Other material examined: 1♀, Lume, North Kivu, DRC, 2010, (ABRI leg.); Coll. ABRI, Nairobi; 1♂, as above but Mambungu, i.2014; 1♂, as above but Maliva, iii.2014; 1♂, as above but iv.2014; 7♂, 1♀, as above but Kasuo, v.2014; 2♂, as above but Mambungu, v.2014; 1♂, as above but Maliva, vii.2014; 1♂, as above but Kanyatsi, vii.2014; 3♂, as above but Mambungu, x.2014; 3♂, as above but xi.2014; 1♂, as above but xii.2014; 1♂, as above but Maliva, vi.2015.

Description: Original description by Jackson (1964).

Diagnosis: In all the specimens examined for the current study, including the holotype, the white spots of the forewings are slightly shorter in *mittoni* than in *crippsi*. Only two *mittoni* males have a small dot in 3 and the hindwings are entirely brown, with just a lighter zone in the middle of space 7. On the underside, the only difference with *crippsi* is the absence of the brown margin on the hindwings of *mittoni*, with a thin line indicating the limit of the missing margin. With the thicker line of spaces 6 and 7 and a part of nerve 6, this constitutes a sort of zigzagging line (that is also observed in populations IV, V and VI), and there is also a more or less visible dark spot at the end of 6.

***Cerautola fisheri* Libert & Collins, 1999**

Holotype: ♂, Mrombwe stream, Mkushi, Iromi Hill, Zambia, 7.v.1979 (S. Fisher); Coll. ABRI, Nairobi.

Allotype: ♀, Mundwiji plains, NW Zambia, 23.iii.1981 (A.J. Gardiner); Coll. Gardiner, Harare, Zimbabwe.

Other material examined: 16♂, 9♀, Mundwiji plains, NW Zambia, iv/v.1999 (ABRI leg.), Coll. ABRI, Nairobi; 2♂, as above but ix.1999; 2♀, as above but Shiwa Ngandu, viii.2000, 2♂, 1♀, as above but Lake Kasaba, Northern Zambia, 5.iv.2005 (A.J. Gardiner); 3♂, as above but Mporokosa, 19.iv.2005.

Description: Original description by Libert & Collins (1999: 54).

Diagnosis:

C. fisheri is the only species of *Cerautola* in which the veins are not visible on the underside of the hindwings; which has no basal black spots; does not have coremata in the male genitalia; and has a blue upperside, whereas all the other species of the *crippsi* group have upperside brown and white markings.

***Cerautola delassisei* Bouyer, 2013** (Plate 1: J, K)

Holotype: ♀, Ebogo, Cameroon, viii.2013 (A. Delassise), Coll. Th. Bouyer.

Material examined: 1♀, Ebogo Nyong River, Central Cameroon, vii.1997, (ABRI leg.); Coll. ABRI, Nairobi; 1♀, as above but Ebogo, xii.1998; 1♀, as above but Mintom, Southern Cameroon, ix.2008; 2♀, as above but xi.2008; 1♀, as above but Dja River, Cameroon, iii.2012; 1♀, as above but Mintom, Southern Cameroon, x.2014.

Description: Original description by Bouyer (2013: 187–188).

Diagnosis: The first female discovered is larger than all the others (forewing length c. 26 mm); the size of the other females (24–25 mm) is comparable to that of the females of population IV or of several males of *mittoni*. On the upperside, the white spots are on the whole shorter than in the other taxa, especially the one in space 4 (2–3 mm); only one female has a trace of spot in space 3. The basal part of the hindwings (about 50/60% of the wing area) is dark brown, with a lighter zone in the middle of space 7; the rest of the wings (“marginal area” *sensu* Bouyer) is white, without any dark margin. The forewing underside reflects the upperside, but the hindwing underside is lighter than in other populations; the internervural lines are faintly marked, as well as the zigzagging line referred to under *mittoni*.

***Cerautola richardsoni* Collins & Libert, sp. nov.** (Plate 1: G, H, I)

urn:lsid:zoobank.org:act:62CBFC1C-FA57-4C44-9940-DCB02EA0CE95

Holotype: ♂, Koutaba, south of Fouban, Western Cameroon, v.2014 (ABRI leg.); Bold: MLIB–1679; ABRI, Nairobi.

Allotype: ♀, Koutaba, south of Fouban, Western Cameroon, v.2014 (ABRI leg.); ABRI, Nairobi.

Other material examined: 1♂, 1♀, Koutaba, south of Fouban, Western Cameroon, v.2014 (ABRI leg.); ABRI, Nairobi; 1♂, 1♀, as above but v. 2015.

Description and diagnosis: Upperside: Forewings: similar to *mittoni*, with white spots slightly shorter than in *crippsi*. One ♂ has white spot in space 3, and spot in 2 about one third longer in one ♀ (about 11 mm). Hindwings: mostly white, with thin brown margin in spaces 2 to 5; space 1, most of cell and base of 6 light brown; brown darker and slightly more developed in one ♀, which also has some brown at end of 6; rest of the wings white. Underside: similar to *mittoni*.

Diagnosis: The white discal zone of the hindwing upperside is larger than in *delassisei*.

Etymology: This species is named in honour of Ian Richardson, in recognition of his ongoing work on Afrotropical Butterflies.

***Cerautola cuypersi* Libert & Collins, sp. nov.** (Plate 1: L, M)

urn:lsid:zoobank.org:act:1FE6E821-FAC3-44B3-AAF5-F19502382F9C

Holotype: female, Mampu, Batéké plateau (4°20'S, 16°18'E), Western Democratic Republic of the Congo, 30 III 2008 (F. Cuypers); M.R.A.C., Tervuren.**Material examined:** The only specimen so far known is the holotype.**Description:** Upperside: Forewings: internal end of white spots in spaces 2, 4 and 6 distinctly concave; longer, pointed spot in 5; spot in 3 hardly visible; oblique white mark at end of 1b; most of same space lighter; between cell and edge of the wings, base of spaces 11 and 12 yellowish. Hindwings: closest to those of *delassisei*, external half of wing creamy, not white; narrow dark margin. Underside: Forewings: similar to upperside; spot in space 3 more apparent; base of spaces 11 and 12 more distinctly yellow. Hindwings: creamy, with conspicuous nerves and faintly visible zigzagging line; internervural lines in margin visible, as well as dark spot at end of 6.**Diagnosis:** The following features are not observed in any other population:

- Distinctly concave internal end of white spots in spaces 2, 4 and 6;
- Longer, pointed spot in 5;
- Spot in 3 hardly visible;
- Oblique white mark at the end of 1b;
- External half of hindwing upperside creamy, not white;
- Narrower dark margin than *delassisei* – similar to *richardsoni* sp. nov.

Etymology: This species is named for Frank Cuypers, who collected the holotype and many other interesting butterflies when he lived in the Democratic Republic of the Congo and always shared his discoveries. He caught the type on an old abandoned citrus tree, infested by ants, in the middle of a large plantation of *Acacia auriculiformis*; on the same tree, he also captured two males of *Cerautola crowleyi holochroma* Libert, 1999.**DISCUSSION**

The *mittoni* female from Mpanga-Toro, near the type locality of *mittoni*, only differs from *crippsi* by the larger white spots of spaces 2 and 3 on the forewings (respectively 8 and 3 mm). This female has a red label “type”, without species name, but the specimen is associated to the holotype of *crippsi* in the Nairobi Museum. The type label is probably due to Jackson, who did not publish the designation.

The holotype of *crippsi* is somehow intermediate between the females (of *crippsi*) and the two males of *mittoni* that were known when the revision was made; it was therefore justified to consider *mittoni* as a synonym of *crippsi*. The long series of males of both *crippsi* and *mittoni* that were later collected were unknown to Bouyer (2013: 187) when he wrote that the two taxa have “very different patterns” and

reinstated *mittoni*. The present evidence shows that the differences he referred to are not so pronounced when larger series of both taxa are available for comparison.

The absence of any clear diagnostic differences in the male genitalia, or of the CO1 gene sequence, between *crippsi*, *crippsi teresae*, *mittoni* and *richardsoni* has made it difficult to arrive at a conclusive separation of these taxa. Consequently the authors have had to rely upon the stable phenotypic characters described herein to separate the taxa. Analysis of other gene sequences, or study of life history and ecological traits may present more conclusive evidence to future taxonomic workers.

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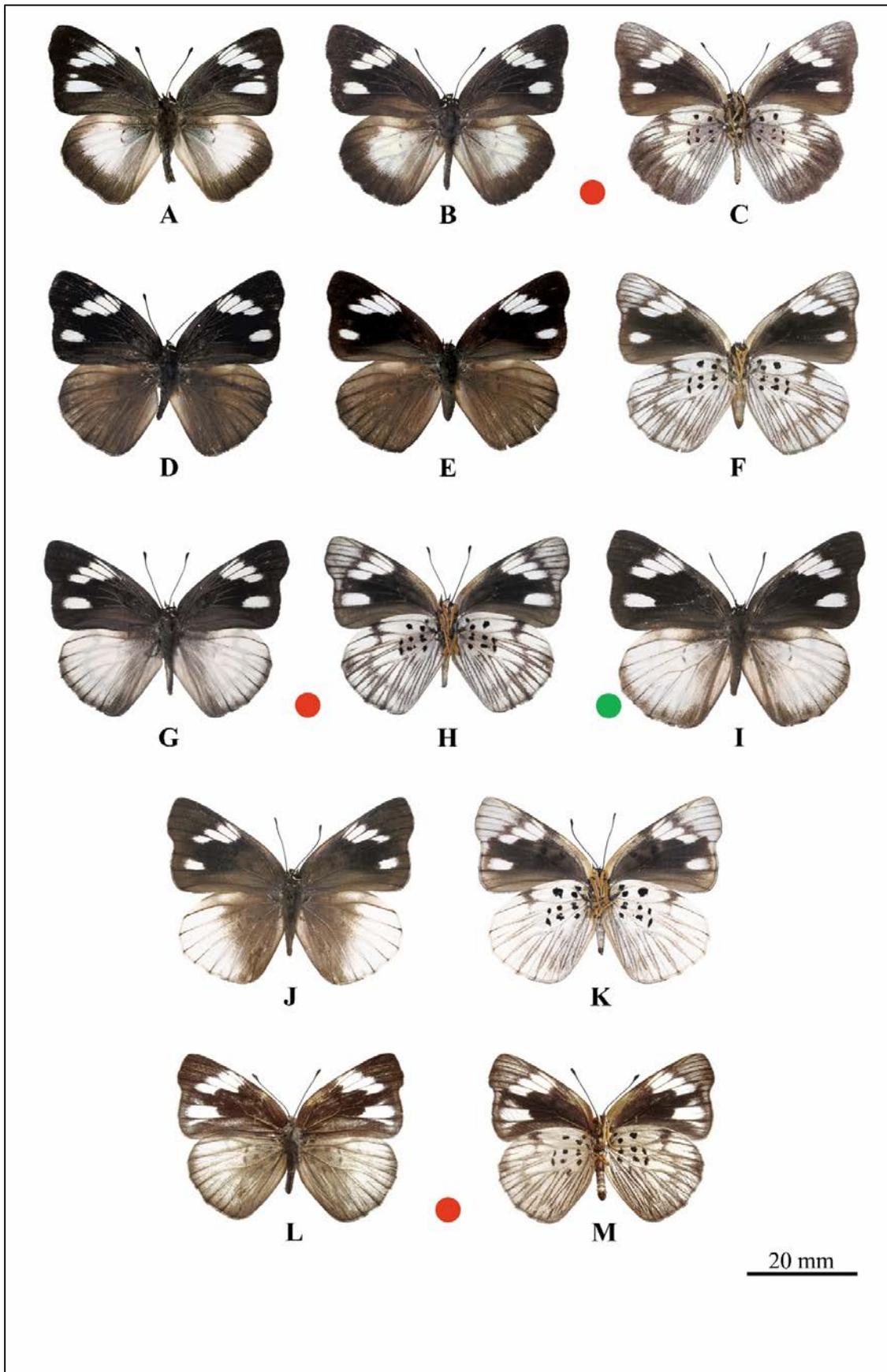
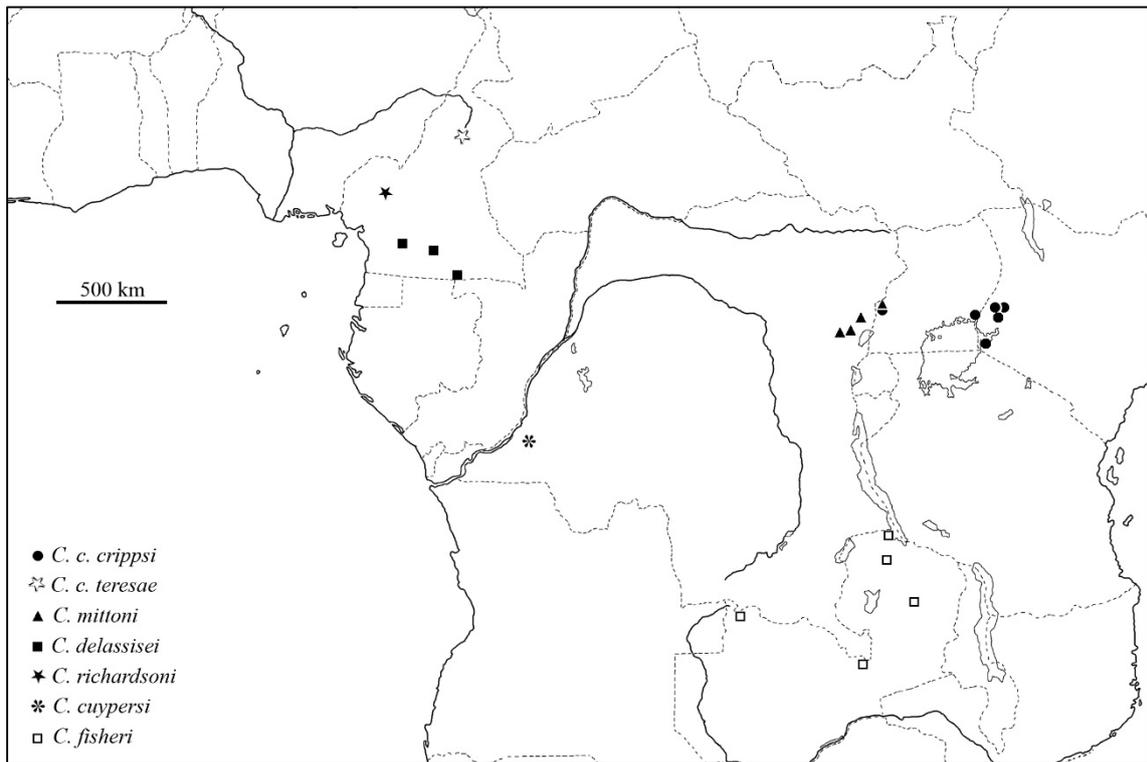


PLATE 1

A: *C. c. crippei*, ♂ recto, Rangwe (Kenya); B, C: *C. c. teresae*, ♂ holotype, recto, verso; D: *C. mittoni*, ♂ recto, Mambungu (North-east DRC); E, F: *C. mittoni*, ♀ recto, verso, Lume (North-east DRC); G, H: *C. richardsoni*, ♂ holotype, recto, verso; I: *C. richardsoni*, ♀ allotype, recto; J, K: *C. delassisei*, ♀ recto, verso, Mintom (Southern Cameroon); L, M: *C. cuypersi*, ♀ holotype, recto, verso.

**PLATE 2**

Geographical distribution of the taxa in the *Ceratola cripsii* species group