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A new species of *Diopsis* L. (Diptera: Diopsidae) from South Africa and Swaziland, and brief review of African species with a large apical wing spot

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ABSTRACT

Diopsis stuckenbergi Feijen & Feijen, sp. n. is described and illustrated from South Africa and Swaziland. This species belongs to the *D. cruciata*-group, one of three African *Diopsis* species-groups with a large apical wing spot. *Diopsis stuckenbergi* sp. n. is closely related to *D. eisentrauti* Lindner and this latter species is redescribed. A T-shaped pruinose cross is always evident on the scutum of *D. eisentrauti*, but in many specimens of *D. stuckenbergi* sp. n. the central section of the T-cross is absent. The two species form a subgroup within the *D. cruciata*-group. All species of the African species-groups with apical wing spots are briefly reviewed. *Diopsis fumipennis* Westwood, 1873 is proposed as a junior synonym of *D. atricapilla* Guérin-Méneville, 1835. Data are presented on sexual dimorphism with respect to eye span in *D. stuckenbergi* sp. n. and *D. eisentrauti*.

KEY WORDS: Diopsidae, Diptera, *Diopsis*, Afrotropical, South Africa, Swaziland, stalk-eyed flies, new species, redescription.

INTRODUCTION

In continental Africa, the stalk-eyed Diopsidae are represented by the genera *Diopsina* Curran, 1928, *Diopsis* Linnaeus, 1775, *Sphyracephala* Say, 1828 and by the *Diasemopsis* genus-group (Feijen 1989). *Diopsis* is a very large genus, into which a number of species have been placed by default. It remained the single diopsid genus, until Say (1828) erected *Sphyracephala*. Prior to Rondani's (1875) description of two additional genera, all newly described diopsids were placed in *Diopsis*, with the exception of two additional species of *Sphyracephala*. As a result, many species were subsequently referred to newly described genera. A thorough revision of the genus *Diopsis* is, therefore, long overdue.

To date only tentative and partial attempts have been made to distinguish subdivisions within *Diopsis*, by Eggers (1925), Séguy (1955), Lindner (1962) and Feijen (1978, 1984). Feijen and Feijen (2009) proposed a provisional subdivision of *Diopsis*. They distinguished nine species-groups, four of which are characterised by large apical wing spots: *D. apicalis*-group, *D. atricapilla*-group (formerly *D. fumipennis*-group) and *D. cruciata*-group occurring in Africa, plus the *D. indica*-group from Asia. The combined number of species in the three African species-groups may amount to 74 species, while in the Oriental species-group it may exceed 15 species.

In South Africa only five species with large apical wing spots are known. The distribution of *D. longicornis* Macquart, 1835 extends marginally into South Africa. Based on the male terminalia, this species also belongs to the *D. apicalis*-group, although the apical wing spot is indistinct. For the *D. cruciata*-group, one species is known to occur in South Africa and Swaziland. This species is here described as *D. stuckenbergi* sp. n. The new species is closely related to *D. eisentrauti* Lindner, 1962 from Cameroon, Democratic Republic of Congo, Gabon and Togo. This latter species is redescribed below. A brief overview of the African *Diopsis* spp. with a large apical wing spot is presented.

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MATERIAL AND METHODS

Specimen preparation, preparation of abdomens and imaging

For *D. stuckenbergi* sp. n. both pinned specimens and specimens preserved in alcohol were available, for *D. eisentrauti* only pinned specimens. Abdomens were removed and macerated in hot 10% potassium hydroxide for several minutes. After dissection of the genital structures, abdomens were mounted in glycerol for temporary slides or in Hoyer's medium, sealed with ringing shellac, for permanent slides. Material on temporary slides was later transferred to microvials and pinned beneath the original specimens. Drawings were made with a Leica Wild M3B dissecting microscope and an Olympus CH compound microscope, using a *camera lucida*. Photographs were captured with an Olympus motorised stereomicroscope SZX12 with AnalySIS Extended Focal Imaging Software. The brief review of African *Diopsis* with a large apical wing spot is based on an as yet unpublished study of type specimens and additional specimens. Only the type of *D. atricapilla* Guérin-Méneville, 1835 appears lost.

Measurements

The following morphometric parameters were measured using a Leica Wild M3B: eye span, body length, wing length and length of scutellar spine. For details on the ways the measurements were taken can be referred to Feijen and Feijen (2011).

The following abbreviations applied in the text: *D* – rate of dimorphism, *IVB* – inner vertical seta, *OVB* – outer vertical seta, *SE* – standard error.

Institutional codens:

AMNH – American Museum of Natural History, New York, USA;
BMNH – The Natural History Museum, London, United Kingdom;
MNHNP – Muséum national d'Histoire naturelle, Paris, France;
NMSA – KwaZulu-Natal Museum, Pietermaritzburg, South Africa;
RMNH – NCB Naturalis (formerly Rijksmuseum van Natuurlijke Historie), Leiden, The Netherlands;
SMNS – Staatliches Museum für Naturkunde, Stuttgart, Germany;
ZSM – Zoologische Staatssammlung, Munich, Germany.

TAXONOMY

Family Diopsidae Billberg, 1820

Diopsidae: Billberg 1820: 115 (as Natio Diopsides). Type genus: *Diopsis* Linnaeus, 1775: 5.

Genus *Diopsis* Linnaeus, 1775

Diopsis: Linnaeus 1775: 5. Type species: *Diopsis ichneumonea* Linnaeus, 1775: 5, by monotypy.

Diopsis eisentrauti Lindner, 1962

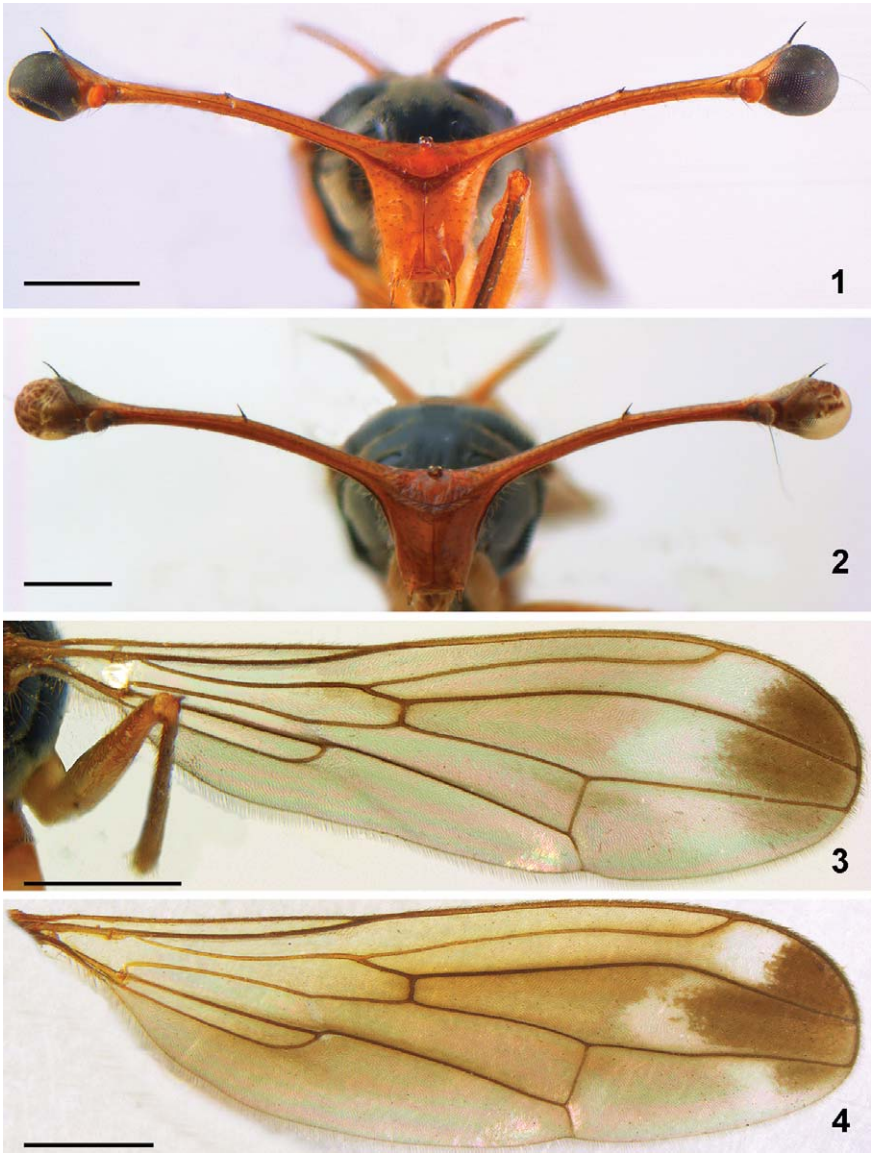
Figs 1, 3, 5–7, 10–14, 16, 18, 20–22

Diopsis eisentrauti: Lindner 1962: 9; Feijen 1989: 23, 26, 39; Feijen & Feijen 2009: 703.

Diagnosis: The species can be recognised by the vague circular groove on the frons, strong facial teeth, very small *IVB* (~0.5× eye stalk diameter), vague granulated structure mesally on scutum, pruinose T-cross on scutum, large rounded apical wing spot, pale 'iridescent' subapical band between apical wing spot and central infuscation, slender front

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femora, whitish apical four tarsal segments of front leg, brown terga, trapezoid ♀ sternum 7, ♀ tergum 8 and sternum 8 single sclerites, wrinkled sausage-shaped spermathecae with small tubercles, ellipse-shaped to rounded epandrium, non-articulated surstyli in lateral and posterior view club-shaped (basally strongly constricted), and (probably) low sexual dimorphism in eye span ($D \sim 1.0$, proportion eye span/body length 1.02 in ♀ and 1.36 in ♂).



Figs 1–4. Head, anterior view (1, 2), wing, dorsal view (3, 4): (1) *Diopsis eisentrauti* (♀ Togo); (2) *D. stuckenbergi* sp. n. (♀ paratype, Pietermaritzburg, South Africa); (3) *D. eisentrauti* (♂ Yaoundé, Cameroon); (4) *D. stuckenbergi* sp. n. (♂ paratype, Pietermaritzburg, South Africa). Scale bars = 1 mm.

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Redescription (♂ and ♀):

Measurements: Overall length: ♀ 7.2 mm ± *SE* 0.1 (range 7.0–7.4, *n* = 3), ♂ 7.1 mm ± 0.2 (range 6.0–7.7, *n* = 7); eye span: ♀ 7.4 mm ± 0.2 (range 7.1–7.7, *n* = 3), ♂ 9.5 mm ± 0.4 (range 7.5–11.1, *n* = 7); wing length: ♀ 5.4 mm ± 0.0 (range 5.4, *n* = 2), ♂ 5.6 mm ± 0.1 (range 5.2–6.0, *n* = 6); length of scutellar spine: ♀ 1.53 mm ± 0.01 (range 1.52–1.54, *n* = 2), ♂ 1.50 mm ± 0.02 (range 1.45–1.57, *n* = 6).

Head (Figs 1, 5): Central part glossy yellowish brown (red in Lindner's description), ocellar tubercle dark brown; frons with vague circular groove in front of tubercle and laterally radiating minor ridges; arcuate groove slightly darker than surrounding areas; face with fine horizontal ridges (hardly visible in the Togo specimen), strong facial teeth; eye span medium sized in female (2 % longer than the length of body) and very large in male (36 % longer than the length of body); rate of dimorphism cannot be determined on the few females available but is likely to be somewhat lower than in *D. stuckenbergi* sp. n., *D* ~ 1.0 (Fig. 5, Table 1); stalks glossy yellowish brown, broad apical parts blackish; funiculus uniformly brown; *IVB* very small, about 0.45× the diameter of the eye stalk, base of *IVB* hardly elevated (Fig. 1); *OVB* small, 1.25× the diameter of the stalk; stalks and face covered with a number of small white setulae.

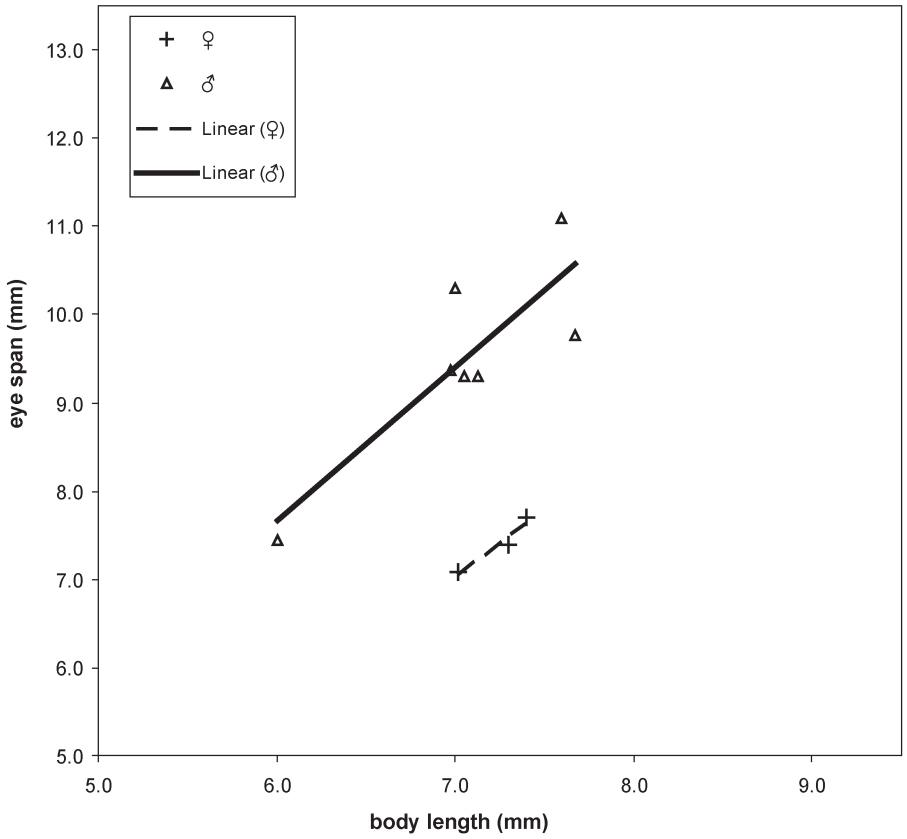


Fig. 5. *Diopsis eisentrauti*, eye span plotted against body length.

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TABLE 1

Mean trait size for eye span, body length, wing and scutellar spine in mm (± *SE*) of *D. eisentrauti* and *D. stuckenbergi* sp. n. Allometric slope (± *SE*) is the least-squares regression slope of eye span on body length. The dimorphism column gives the difference between male allometry and female allometry. *N* refers to the number of pairs determining the allometric slope. For ♀ *D. eisentrauti N* was too low, so dimorphism was estimated.

Diopsis	**Sex**	***N***	**Eye span**	**Body length**	**Wing**	**Scutellar spine**	**Allometric slope**	**Dimorphism**
eisentrauti	♀	3	7.4 ± 0.2	7.2 ± 0.1	5.4 ± 0.1	1.53 ± 0.01	–	~1.0
	♂	7	9.5 ± 0.4	7.1 ± 0.2	5.6 ± 0.1	1.50 ± 0.02	1.74 ± 0.47	
stuckenbergi sp. n.	♀	69	7.9 ± 0.1	7.7 ± 0.1	6.1 ± 0.1	1.56 ± 0.02	1.21 ± 0.03	1.15
	♂	52	9.6 ± 0.3	7.3 ± 0.1	5.8 ± 0.1	1.51 ± 0.02	2.36 ± 0.09	

Thorax (Figs 6, 7): Collar glossy black, lateroventrally pruinose, also some pruinosity along anterior margin and on central knob; scutum glossy black with pruinose mesal band on posterior ¾ which combined with a broad transverse pruinose band gives a T-shaped cross (Figs 6, 7), however this cross is not or hardly extending in anterior direction like in the complete cross of *Diopsis cruciata* (Lindner stated 'grauer Bestäubung, die kreuzförmig ist,' but also the holotype has only a T-cross), width of the transverse band varies from broad in the holotype to rather narrow with two short symmetrical interruptions in a Congo ♂ (Fig. 7), between humeral calli and along mesal band a vague granulated structure; scutellum blackish brown pruinose, scutellar spines glossy brown with darker tip; pleura pruinose except for glossy anterodorsal corner and glossy central section; sterna black, pruinose; scutellar spines long and straight, almost 4× as long as scutellum; diverging under an angle of 50°; metapleural spines well developed, about ⅓ the length of scutellar spine, anterolaterally directed; thorax with some fine white setulae, especially on scutellar spines and below wing base.

Wing (Fig. 3): Apex with large, rounded brown spot extending from r_1 to well into r_{4+5} (Lindner also described the apical wing spot as proximally rounded in which he distinguished it from the more triangular spot of *D. apicalis*; however, *D. apicalis* also has a rounded apical wing spot); pale 'iridescent' subapical band between apical wing spot and central infuscation; central infuscation vague, but rather large with some slightly darker sections around crossvein *R–M* and around anterior half of crossvein *M–Cu*; glabrous basal sections of wing include basal third and posterior edge of cell *c*, basal section of cell r_1 well proximal of junction of veins R_{2+3} and R_{4+5} (but no anterior edge), basal ⅔ of cell *br*, basal section of cell *bm* and basal half of cell cu*p*, remainder of wing covered with microtrichia; tip of vein *Cu* narrowing towards wing margin.

Legs: Front leg with pale brown coxa, trochanter and femur, dark brown tibia and metatarsus and distinctly whitish other tarsi (Lindner considered the white tarsal segments as a diagnostic character; there are other diopsids with strikingly white tarsal segments, but in the *D. cruciata*-group it is indeed a diagnostic character); mid and hind leg pale brown with blackish brown tibia 3; femur 1 slender in both sexes, proportion of length/width in ♀ 5.4 (n = 1) and in ♂ 5.9 ± 0.1 (range 5.7–6.2, n = 5), on distal 0.4 of ventral side with two rows of dark tubercles, inner row in ♀ with 15.0 tubercles ± *SE* 0.4 (range 14–16, *n* = 4) and in ♂ with 15.6 tubercles ± 0.3 (range 14–17, *n* = 11), outer row in ♀ with 13.8 tubercles ± 0.3 (range 13–14, *n* = 4) and in ♂ with 14.5 tubercles ± 0.4 (range 12–16, *n* = 11).

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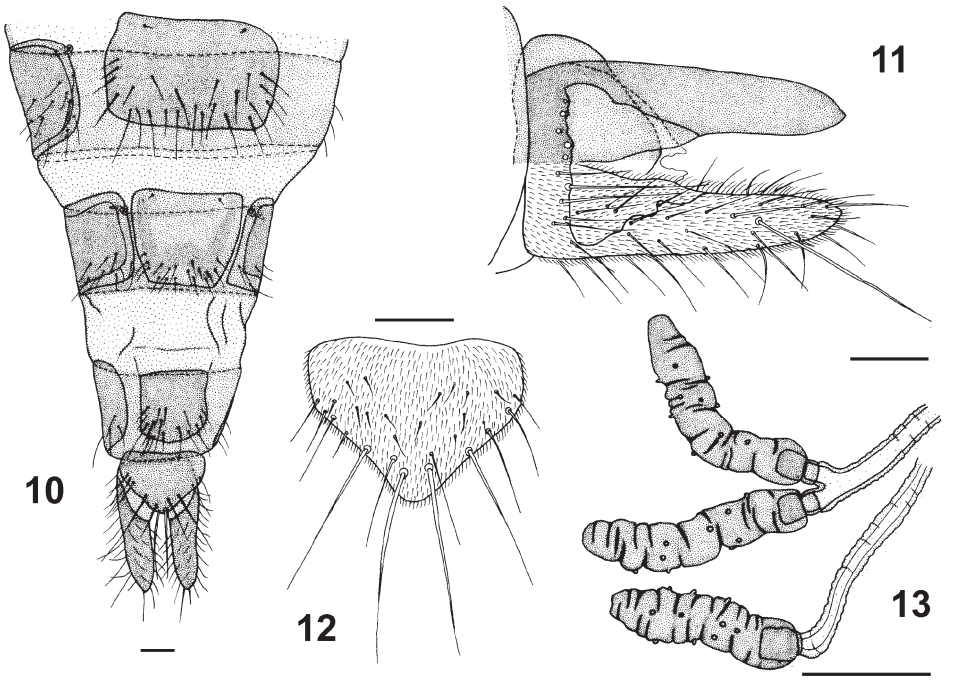
Figs 6–9. Scutum: (6, 7) *Diopsis eisentrauti*, showing difference in width of transverse pruinose facia in males from Congo (note Laboulbeniales in Fig. 6); (8) *D. stuckenbergi* sp. n. (♂ paratype, Swaziland) showing pruinose T-cross; (9) *D. stuckenbergi* sp. n. (♀ paratype, Pietermaritzburg, South Africa) lacking central section of T-cross. Scale bars = 0.5 mm.

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Abdomen: Syntergum 1+2+3 glossy brown, basally some pruinosity medially, no sutures visible; other terga glossy brown, terga with sparse fine setulae; ventral preabdomen yellowish and thinly pruinose, sternum 1 more glossy; spiracle 1 in membrane, intersclerite 1–2 very narrow; sterna 4 and 5 single rectangular plates, sternum in ♂ slightly folded inward on the meson.

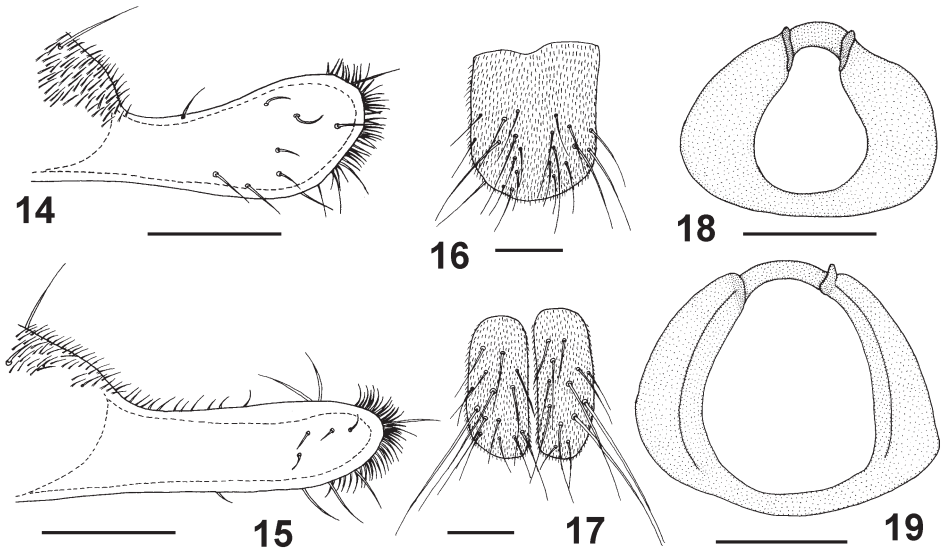
Female postabdomen (Figs 10–13, 16, 18): Straight, not deflexed, terga 6, 7 and 8 single rectangular sclerites (Fig. 10); tergum 10 with two pairs of long setulae and 3 pairs of shorter setulae; cerci rather elongate, proportion of length/width 3.2 (Fig. 11), covered with microtrichia and a number of setulae; sternum 6 a quadrangular sclerite, sternum 7 a trapezoid sclerite more sclerotised laterally and posteriorly (Fig. 10); sternum 8 consisting of a single quadrangular sclerite (Fig. 16); spiracle 6 just in membrane, spiracle 7 on the edge in tergum; subanal plate pentagonal (Fig. 12), posteriorly six pairs of setulae; spermathecae (Fig. 13) wrinkled, sausage-shaped with a number of dispersed tiny tubercles, inner basal structure rather short compared to the long overall form; sclerotised ring of ventral vagina wall almost round with broad lateral arms (Fig. 18).

Male postabdomen (Figs 14, 20–22): Straight; sternum 6 almost absent, just represented by the two characteristic anterior microchaetae and two vague tiny sclerites folded inward; synsternum 7+8 very narrow, almost line like, left spiracle 7 in membrane, right spiracle 7 just touching the synsternum; epandrium (Fig. 20) ellipse-shaped to rounded in posterior view, with about 19 pairs of setulae, covered with microtrichia; surstyli non-articulated, fused to epandrium, in lateral view (Fig. 14) club-shaped, preapically about twice as broad as basally, smoothly rounded apically, in posterior view (Fig. 20)



Figs 10–13. *Diopsis eisentrauti* (♀ holotype, Soppo, Cameroon): (10) postabdomen, ventral view; (11) tergum 10 and cerci, dorsal view; (12) subanal plate; (13) spermathecae. Scale bars = 0.1 mm.

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Figs 14–19. Surstylus, lateral view (14, 15), female sternum 8 (16, 17), sclerotised ring (18, 19): (14) *Diopsis eisentrauti* (Yaoundé, Cameroon); (15) *D. stuckenbergi* sp. n. (paratype, Pietermaritzburg, South Africa); (16, 18) *D. eisentrauti* (holotype, Soppo, Cameroon); (17, 19) *D. stuckenbergi* sp. n. (paratype, Pietermaritzburg, South Africa). Scale bars = 0.1 mm.

distinctly club-shaped, basally constricted, apically smoothly rounded, on apical third a few sparse small setulae, apically some more setulae, on inner side on apical third a dense brush of short setulae, no microtrichia except for small patch near base; surstyli interconnected via slender processus longi; cerci simple, somewhat rectangular, tapering basally, rather broad, proportion length/width 2.2, covered with microtrichia and setulae; phallapodeme rather slender (Fig. 21), anterior arm with smoothly rounded corners, anterior arm just marginally longer than posterior arm; ejaculatory apodeme broadening apically fan-shaped to axe-shaped (Fig. 22).

Distribution and habitat: Cameroon, Democratic Republic of Congo, Gabon and Togo. From the collection data follows that this *Diopsis* occurs in Afromontane forests at altitudes between 500 and 1500 m.

Holotype: ♀ (not ♂ as stated by Lindner, 1962) CAMEROON: Soppo [4°09'N 9°17'E, *ca* 700 m], 10.i.1954, M. Eisentraut (SMNS).

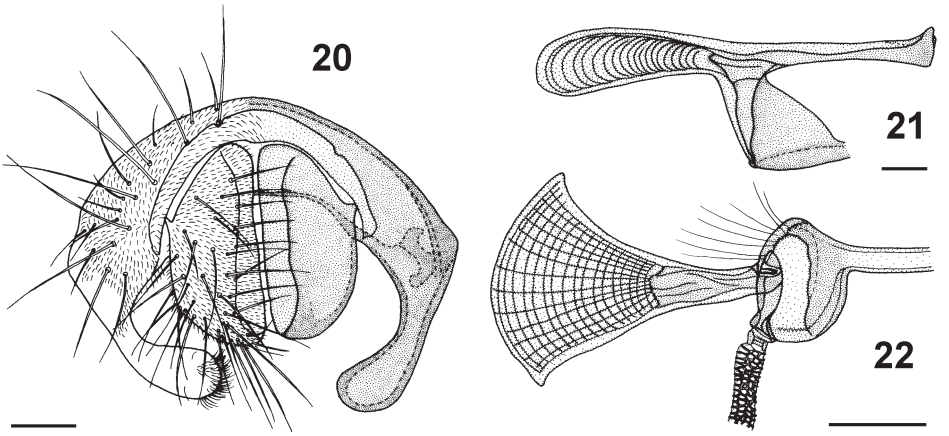
Other material examined: CAMEROON: 1♂ 1♀ Djoungolo, Villa Carde S/Nyong, 22.v.1963, L. Seegers (ZSM); 1♂ Kumba, 26.x.1949, H. Oldroyd (BMNH); 2♂ Yaoundé, N'Kolbisson [*ca* 750 m], 19.vii.1967, 9.viii.1967, L. Matile (MNHNP); TOGO: 1♀ R. des Plateaux, Pte. Baumann (= Mt Agou), 986 m, G.G.M. Schulten (RMNH); GABON: 1♂ entre Lebamba & M'bigou, Forêt et Lisière, Mission M. Donskoff et J. Le Breton, 600 m (RMNH); DEMOCRATIC REPUBLIC OF CONGO: 2♂ Mwenda, Mt Ruwenzori, 13.xii.1948, 1400 m, forest, J.C. Bradley (AMNH); 1♂ Kasongo, viii.1959, P.L.G. Benoit (RMNH).

Diopsis stuckenbergi sp. n.

Figs 2, 4, 8, 9, 15, 17, 19, 23–30

Etymology: This striking species is named after Brian Roy Stuckenberg, who supported the writers' Diopsidae research in its early stages and who accompanied the second author while she collected most of the type series in 1980.

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Figs 20–22. *Diopsis eisentrauti* (♂ Kumba, Cameroon): (20) epandrium with surstyli and cerci, posterior view; (21) phallapodeme, lateral view; (22) ejaculatory apodeme and sac. Scale bars = 0.1 mm.

Diagnosis: The new species can be distinguished by the smooth frons, distinct facial teeth, small *IVB* (equal to stalk diameter), scutum with fine granulated structure and pruinose T-cross (sometimes centre of cross absent), large apical wing spot extending proximally in cell r_{4+5}, two whitish wing spots before apical spot, slender front femora, dark front tarsi, brown terga, trapezoid ♀ sternum 7, ♀ tergum 8 a single sclerite, ♀ sternum 8 two longitudinal sclerites, rounded spermathecae with small tubercles, ellipsoid epandrium, non-articulated surstyli in lateral view almost straight and parallel-sided, in posterior view club-shaped, and low sexual dimorphism in eye span ($D = 1.15$, proportion eye span/body length 1.02 in ♀ and 1.30 in ♂).

Description (♂ and ♀):

Measurements: Overall length: ♀ 7.7 mm ± *SE* 0.1 (range 5.9–9.1, $n = 69$), ♂ 7.3 mm ± 0.1 (range 5.9–8.7, $n = 52$); eye span: ♀ 7.9 mm ± 0.1 (range 5.9–9.5, $n = 69$), ♂ 9.6 mm ± 0.3 (range 6.5–12.8, $n = 52$); wing length: ♀ 6.1 mm ± 0.1 (range 4.9–7.1, $n = 69$), ♂ 5.8 mm ± 0.1 (range 4.7–6.9, $n = 51$); length of scutellar spine: ♀ 1.56 mm ± 0.02 (range 1.16–1.83, $n = 70$), ♂ 1.51 mm ± 0.02 (range 1.08–1.83, $n = 51$).

Head (Fig. 2): Central part glossy reddish brown; frons smooth, but with a very fine and delicate honeycomb-like pattern, more laterally a system of small ridges running towards facial sulcus; arcuate grove slightly darker; face with very fine horizontal ridges, upper half of face slightly protruding, distinct facial teeth; eye span medium-sized in female (2% longer than length of body) and very large in male (30% longer than length of body); rate of dimorphism low, $D = 1.15$ (Fig. 23, Table 1); stalks glossy brown, broad apical parts blackish pruinose posteriorly, funiculus uniformly brown, clothed in whitish pruinosity, *IVB* small, almost equal to diameter of eye stalk, base of *IVB* a minuscule elevation of about 0.25 diameter of stalk (Fig. 2); *OVB* small, just longer than diameter of stalk; head with sparse tiny white setulae.

Thorax (Figs 8, 9): Collar glossy black, anterior edge (including central knob) with very narrow line of pruinosity, lateral margins of collar with some pruinosity; humeral calli and lateral sections of scutum smooth, main part of scutum with finely granulated struc-

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ture (Fig. 8), scutum glossy black with variable pruinosity pattern (compare Figs 8, 9), in 56% of specimens scutum with pruinose mesal band on posterior ⅔ that combines with transverse pruinose band forming T-shaped cross, in other specimens heart of cross lacking, resulting in pruinose lateral sections between humeral callus and intrascutal suture and large triangular section anteriorly of scutellum running out mesally in anterior direction until anteriorly of the intrascutal suture, in all Swaziland specimens T-cross present, no difference between ♀ and ♂ in pruinosity pattern (respectively 59% and 54% with a T-cross); pleura pruinose with large glossy central section; scutellum brown pruinose, scutellar spines glossy brown darkening towards tip; scutellar spines long, strong and straight, 3× as long as scutellum, diverging at an angle of 55–60°; metapleural spines well developed, anterolaterally-directed, somewhat curved; thorax with some fine white setulae, especially on scutellar spines and below wing base.

Wing (Fig. 4): Large apical wing spot in cells r_{2+3}, r_{4+5} and *m*, irregularly-shaped, extending proximally 2× as far in cell r_{4+5} as in cell r_{2+3}, hardly reaching posterior margin in cell *m*; between apical wing spot and central infuscation a band of three clear spots separated by infuscation along veins R_{4+5} and *M*, especially two whitish spots in cells r_{2+3} and r_{4+5} strikingly iridescent without microtrichia at their centre; central infuscation extensive, darkest in basal half of cell r_{4+5} and cell *dm*, along vein R_{4+5}, vein *Cu* and

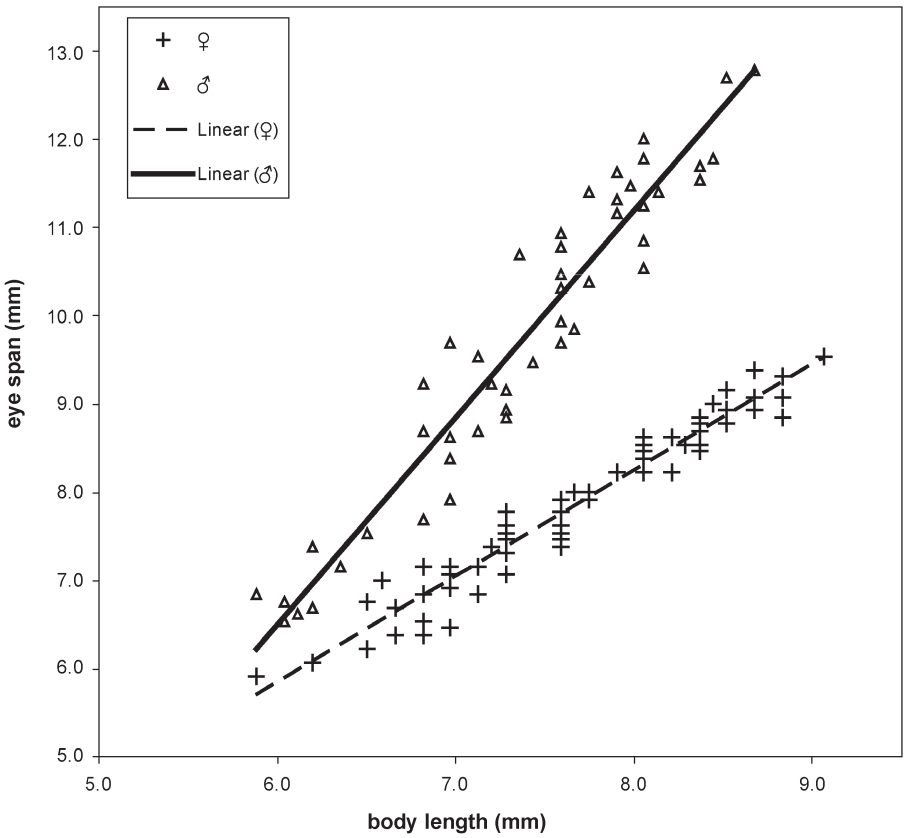


Fig. 23. *Diopsis stuckenbergi* sp. n., eye span plotted against body length.

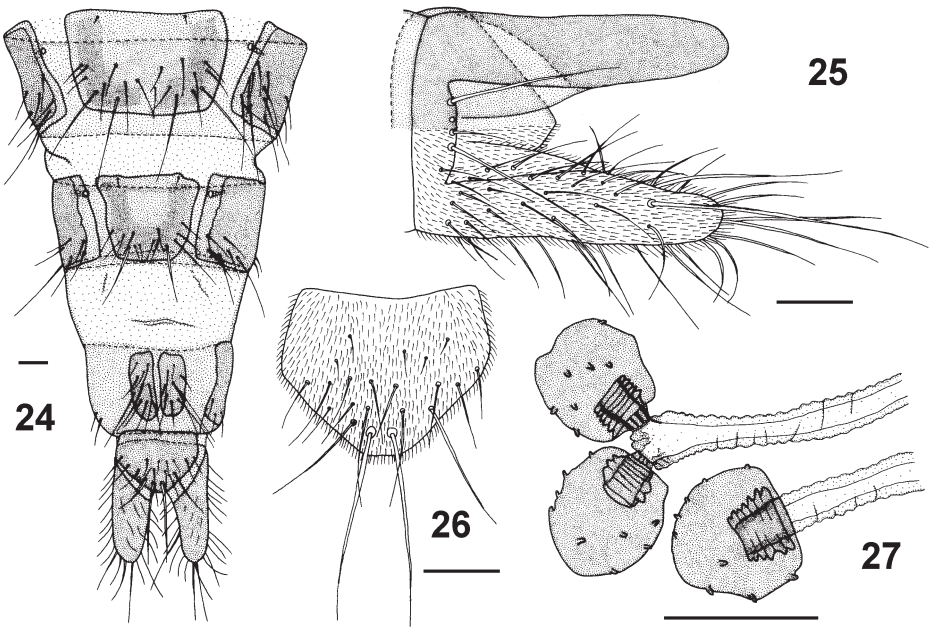
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crossvein *R–M*; clothed in microtrichia, except for glabrous centres of white spots and glabrous basal areas, these last mentioned areas include posterior part of cell *c*, basal tip of cell r_1, basal ⅔ of cell *br*, cell *bm*, except for distal and posterior edges, and basal ⅓ of cell cu*p*.

Legs: Front leg with pale brown coxa, trochanter and femur and dark brown to blackish tibia and tarsi, ventral surface of tibia clothed in dense orange-brown short setulae; mid leg uniformly yellowish brown; hind leg yellowish brown, with dark brown to blackish tibia and longitudinal dark stripe on femur; femur 1 slender in both ♀ and ♂ proportion of length/width: ♀ 6.1 ± 0.0 (range 5.8–6.5, $n=20$), ♂ 6.4 ± 0.1 (range 5.9–7.2, $n=20$), two rows of tubercles in distal ½ to ⅓, inner row ♀ with 14.2 ± 0.3 tubercles (range 11–18, $n=40$) and ♂ with 13.3 ± 0.3 tubercles (range 10–16, $n=40$), outer row ♀ with 12.5 ± 0.2 tubercles (range 9–14, $n=40$) and ♂ with 11.4 ± 0.3 tubercles (range 7–15, $n=40$); femora 2 and 3 with small apical spur.

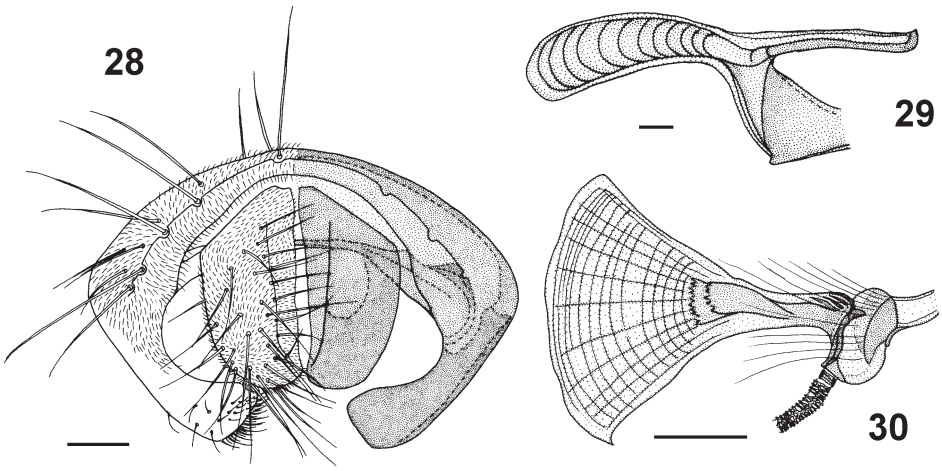
Abdomen: Syntergum 1+2+3 glossy brown, basally somewhat darker, with some pruinosity medially, no sutures visible; other terga glossy brown, terga with sparse, fine setulae; ventral preabdomen yellowish and thinly pruinose, sternum 1 slightly darker, more glossy; spiracle 1 in membrane, intersclerite 1–2 very narrow; sterna 4 and 5 single rectangular plates, sternum in ♂ slightly folded inward on the meson.

Female postabdomen (Figs 17, 19, 24–27): Straight, not deflexed, terga 6, 7 and 8 single rectangular sclerites (Fig. 24); tergum 10 with one pair of long setulae and 1 or 2 pairs of short setulae; cerci rather elongate, proportion of length/width 3.4 (Fig. 25), clothed in microtrichia and some setulae; sternum 6 quadrangular sclerite, sternum 7



Figs 24–27. *Diopsis stuckenbergi* sp. n. (♀ paratype, Pietermaritzburg, South Africa): (24) postabdomen, ventral view; (25) tergum 10 and cerci, dorsal view; (26) subanal plate; (27) spermathecae. Scale bars = 0.1 mm.

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Figs 28–30. *Diopsis stuckenbergi* sp. n. (♂ paratype, Pietermaritzburg, South Africa): (28) epandrium with surstyli and cerci, posterior view; (29) phallapodeme, lateral view; (30) ejaculatory apodeme and sac. Scale bars = 0.1 mm.

trapezoid sclerite more sclerotised laterally and posteriorly; sternum 8 consisting of two longitudinal sclerites (Fig. 17); spiracle 6 just within membrane, spiracle 7 on edge in tergum; subanal plate pentagonal (Fig. 26), posteriorly 4 pairs of setulae; spermathecae (Fig. 27) rounded with number of dispersed diminutive tubercles, inner basal structure well developed; sclerotised ring of ventral vagina wall compact, subelliptical, with very broad lateral arms (Fig. 19).

Male postabdomen (Figs 15, 28–30): Straight; sternum 6 virtually atrophied, represented by two characteristic anterior microchaetae and 2 vague diminutive sclerites folded inward; synsternum 7+8 extremely narrow, almost line-like, weakly sclerotised, left spiracle 7 in membrane, right spiracle 7 just touching synsternum; epandrium (Fig. 28) elliptical in posterior view, with about 12 pairs of setulae, clothed in microtrichia; surstyli non-articulated, seamlessly fused to epandrium, in lateral view (Fig. 15) virtually straight, parallel-sided and smoothly rounded apically, in posterior view (Fig. 28) somewhat club-shaped, apically angular, with few small, sparse setulae in apical ⅓, inner side with small, dense comb of short setulae apically, microtrichia absent, except for few at base; surstyli interconnected *via* laterally broad processus longi, processus tapering to slender form mesally; cerci simple, somewhat rectangular, tapering basally, rather broad, proportion length/width 2.1, clothed in microtrichia and setulae; phallapodeme rather slender (Fig. 29), anterior arm with smoothly rounded corners, anterior arm clearly longer than posterior arm; ejaculatory apodeme strongly broadening apically, fan-shaped (Fig. 30).

Distribution: Collection records indicate the species to occur in forests of South Africa and Swaziland, at elevations from near sea level to 1000 m. All species in the *D. cruciata*-group appear to be forest species.

Holotype: ♂ SOUTH AFRICA: *KwaZulu-Natal*: Pietermaritzburg, Queen Elizabeth Park, 29°33'51"S 30°19'05"E, 930 m, ix.1980, J.J. Feijen (RMNH).

Paratypes: SOUTH AFRICA: *KwaZulu-Natal*: 4♂ 5♀ same data as holotype; 43♂ 61♀ same data but viii–ix.1980; 2♂ 3♀ Pietermaritzburg, Town Bush, drying pond, 12.vi.1968, B. Lamoral; 1♂ 1♀ Pietermaritzburg,

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TABLE 2

Key characters indicating differences and similarities between *Diopsis eisentrauti* and *D. stuckenbergi* sp. n.

Character	***Diopsis eisentrauti***	***Diopsis stuckenbergi* sp. n.**
IVB	~0.5× diameter eye stalk	~1.0× diameter eye stalk
scutal pruinosity	T-shaped cross	T-shaped cross in 56% of specimens
surface of scutum	vaguely granulated on the meson	finely granulated
front tarsi 2–5	whitish	very dark
apical wing spot	rounded	extending proximally in cell r_{4+5}
♀ tergum 8	single sclerite	single sclerite
♀ sternum 8	single sclerite	2 longitudinal sclerites
spermathecae	wrinkled, sausage-shaped	rounded
spermathecae	with tiny tubercles	with tiny tubercles
epandrium	ellipsoid to rounded	ellipsoid
surstyli	seamlessly fused to epandrium	seamlessly fused to epandrium
surstyli in lateral view	club-shaped	straight, parallel-sided
surstyli in posterior view	club-shaped	club-shaped
proportion eye span/body in ♀	1.02 ± 0.01	1.02 ± 0.00
proportion eye span/body in ♂	1.36 ± 0.03	1.30 ± 0.02

Town Bush, 25.xi.1981, J.G. Londt. *Eastern Cape*: 1♀ Port St Johns, G. Heinrich. SWAZILAND: 2♂ 5♀ Usutu Forest, 16.iv.1979, G.G.M. Schulten; 2♂ Usutu Forest, 21.iv.1979, G.G.M. Schulten. (all in RMNH, some paratypes will be deposited to NMSA.)

DISCUSSION

Diopsis stuckenbergi sp. n. and *D. eisentrauti* constitute a small subgroup within the *D. cruciata*-group; the typical T-shaped cross on the scutum of both species being the main character indicating their association. All specimens of *D. eisentrauti* examined here have the characteristic T-shaped cross, but in *D. stuckenbergi* sp. n., only 56% of specimens possess this (100% of Swaziland specimens). In some cases, pruinosity on the scutum may be damaged due to rubbing, but it is clear from a number of pristine unrubbed specimens of *D. stuckenbergi* sp. n. that the central part of the pruinose cross is not always evident. Pruinosity patterns on the scutum are a major character in *Diopsis* spp. with apical wing spots and in some other Diopsidae genera. Different forms may occasionally occur, however, as noted by Feijen (1981) for *Diopsina nitida* (Adams, 1903). Key differences and similarities between *D. stuckenbergi* sp. n. and *D. eisentrauti* are summarised in Table 2. Two remarkable characters for *D. eisentrauti* are the single sclerite representing female sternum 8 and the sausage-shaped spermathecae. In most Diopsidae the female sternum 8 consists of two longitudinal sternites, but in some *Diopsina* and a few *Diopsis* it forms a single plate. The very long and slender spermathecae appear to be unique in the Diopsidae.

A BRIEF REVIEW OF AFRICAN *DIOPSIS* WITH A LARGE APICAL WING SPOT

Nine *Diopsis* spp. possessing a large apical wing spot are currently known within the three African *Diopsis* species-groups. An identification key to these species is not provided here, as at least 65 species await description. In order to summarise current knowledge of the taxonomy of African *Diopsis* possessing a large apical wing spot, a

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list of species is rather provided, together with recognised synonymies, some key morphological characters and notes on distribution.

Diopsis apicalis-group

This group comprises *Diopsis* spp. with a brown head, scutum without a cross-like pattern of pruinosity and wings, almost invariably, with a large apical spot. It must be stressed, however, that this brief diagnosis does not indicate a monophyletic group, as this combination of characters is apparent in some other *Diopsis* spp. with terminalia that place them in the *D. ichneumonea*-group (a group with preapical wing spots). Within the *D. apicalis*-group several subgroups are recognised, such as the *D. apicalis*-complex, larvae of which are primary or secondary stem-borers of Poaceae. Only three species are currently recognised within the *D. apicalis*-group, but about 40 species await description.

Diopsis apicalis Dalman, 1817

Diopsis apicalis: Dalman 1817: 216 (Type locality: Sierra Leone); Lindner 1962: 7 (in part); Steyskal 1972: 7 (in part); Feijen 1987: 410.
Diopsis tenuipes Westwood, 1837*a*: 298 (Type locality: Senegal).

Distribution: Burkina Faso, Cameroon, Chad, Gabon, Gambia, Ghana, Ivory Coast, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone and Togo.

Notes: *Diopsis apicalis* does not occur in Egypt as reported by Ebrahim (2009). The *Diopsis* sp. that occurs there belongs to a different species of the *D. apicalis*-group. Ebrahim's paper is anyway remarkable as it copies six pages of Feijen and Feijen 2009 to the extent even of copying descriptions for wing, thorax and terminalia of *Diopsis malawiensis* Feijen & Feijen in order to 'describe' the Egyptian '*D. apicalis*.' *Diopsis apicalis* also does not occur in South Africa. The molecular data set for "*D. apicalis*" reported on by Baker *et al.* (2001) and the egg morphology of "*D. apicalis*" described by Meier and Hilger (2000) represent a different species of the *D. apicalis*-group. Study of specimens from the same laboratory culture used proved this to be conspecific with a very common, but as yet undescribed species, occurring from South Africa to East Africa as far north as the Arabian Peninsula. True *D. apicalis* is characterised (Feijen 1987) by the smooth central frons, glossy dorsal collar, except for some pruinosity posterior to the central knob, pruinosity pattern of scutum (some pruinosity medially behind collar, lateral pruinosity between humeral callus and intrascutal suture not extending medially along the intrascutal suture, pruinose edge anteriorly of scutellum), pruinose black scutellum, proximally rounded apical wing spot, broad, apically rounded surstyli with only microtrichia apically and some small setulae, rather short ♂ cerci, ♀ tergum 8 with anteriorly a broad medial gap, posteriorly tapering ♀ sternum 7 with more sclerotised V-shaped central section and rounded spermathecae.

Diopsis lindneri Feijen, 1978

Diopsis lindneri: Feijen 1978: 8 (Type locality: Togo).

Distribution: Democratic Republic of Congo, Gambia, Ivory Coast, Nigeria and Togo.

Notes: The species can be recognised by the shape of the apical wing spot (distinctly extending proximally in r_{4+5}), two white spots in cells r_{2+3} and r_{4+5} proximal of the dark apical wing spot, glossy collar, marginal pruinosity pattern on scutum (only very

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narrow pruinose facia anteriorly of scuto-scutellar suture and laterally some pruinosity anteriorly of the intrascutal suture), glossy black scutellum, straight, apically tapering surstyli wholly covered with microtrichia, except apically, long and very slender ♂ cerci, U-shaped ♀ sternum 7 and rounded spermathecae.

Diopsis longicornis Macquart, 1835

Diopsis longicornis: Macquart 1835: 486 (Type locality: 'Guinée' and Senegal); Steyskal 1972: 9; Feijen 1987: 410, 413.
Diopsis thoracica Westwood, 1837*a*: 306 (Type locality: West Africa).
Diopsis phlogodes Hendel, 1923: 37 (Type locality: Kenya).

Distribution: Most of sub-Saharan Africa, including Benin, Botswana, Burkina Faso, Cameroon, Central African Republic, Chad, Ethiopia, Gambia, Ghana, Ivory Coast, Kenya, Liberia, Malawi, Mali, Mozambique, Niger, Nigeria, Senegal, Somalia, South Africa, Sudan, Swaziland, Tanzania, Togo, Zambia and Zimbabwe.

Notes: *Diopsis longicornis* is a well-known rice stem borer, easily recognised by its large and robust built, dorsally pruinose collar, glossy black scutum, with a little pruinosity in the anterior tip, pruinose faciae anteriorly of intrascutal suture and anteriorly of scutellum, red pruinose scutellum, only some infuscation at wing apex, surstylus in lateral view a quarter circle, slightly broader apically with only microtrichia and setulae on apical section, rectangular female sternum 7 and broad cerci.

Diopsis cruciata-group

Diopsis with brown head and large apical wing spot. Thorax usually with a cross-like pruinosity pattern. Forest species. Three species are described, ten others await description.

Diopsis cruciata Curran, 1934

Diopsis cruciata: Curran 1934: 15 (Holotype and one paratype from Democratic Republic of Congo, but five paratypes from Zimbabwe and one paratype from Uganda).

Distribution: ?Burundi, Democratic Republic of Congo, Malawi, Mozambique, Zambia and Zimbabwe.

Notes: Given the presence of several *D. cruciata*-like species in eastern Africa it is likely that the type series represents more than one species. The various species with a pruinose cross on the scutellum can be distinguished by the shape of the surstyli and by subtle differences in wing pattern.

Diopsis eisentrauti Lindner, 1962

Diopsis eisentrauti: Lindner 1962: 9; Feijen 1989: 23, 26, 39 (Type locality: Cameroon).

Distribution: Cameroon, Democratic Republic of Congo, Gabon and Togo.

Notes: Scutum has a T-shaped pruinose cross and a roughened surface on the meson. Apical four front tarsal segments of leg whitish. Apical wing spot rounded. Surstylus in lateral and posterior view club-shaped. Spermathecae have a peculiar wrinkled, sausage-like shape.

Diopsis stuckenbergi **sp. n.**

Diopsis stuckenbergi sp. n. (Type locality: South Africa).

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Distribution: South Africa and Swaziland.

Notes: Scutum often with T-shaped pruinose cross, otherwise centre of cross lacking. Scutum medially with a roughened surface. Front tarsi dark. Apical wing spot proximally extending in cell r_{4+5}. Surstylus straight and parallel-sided in lateral view. Spermathecae rounded.

Diopsis atricapilla-group (formerly *fumipennis*-group)

Diopsis with head black and large apical wing spot. Pruinosity pattern on the scutum variable: glossy with pruinose maculae, glossy with transverse pruinose facia, a large cross-shaped pruinose configuration or a completely pruinose scutum. Feijen and Feijen (2009) named this group the *D. fumipennis*-group. However, Cogan and Shillito (1980) already corrected the publication date for *Diopsis atricapilla* to 1835, and as this species is now placed into synonymy with *D. fumipennis* Westwood, 1837*a*, the latter becomes the junior synonym. Therefore the group name has also been changed. Three species are known, about 15 species await description.

Diopsis atricapilla Guérin-Méneville, 1835

Diopsis atricapillus: Guérin-Méneville 1835: pl. 103, fig. 9; 1844: 554 (Type locality: Senegal); Westwood 1837*b*: 547; Eggers 1925: 484, 486, 489; Steyskal 1972: 7; Feijen 1978: 7.
Diopsis atricapilla: Cogan & Shillito 1980: 586.
Diopsis fumipennis Westwood, 1837*a*: 302 (Type locality: ?Senegal). **Syn. n.**

Distribution: Cameroon, Chad, Gambia, Ivory Coast, Mali, Nigeria, Senegal, Sudan, Togo and Uganda.

Notes: The name of the species became available as *D. atricapillus* in a plate dated 1835, while the description followed in 1844 (see Evenhuis 1997). The type locality was not cited in 1835, but was given later as "Senegal" (Guérin-Méneville 1844). The original descriptions provide no information to separate *D. fumipennis* from *D. atricapilla*. Study of a large series of specimens from Senegal indicates that only one species from the *D. atricapilla*-group occurs in that country that fits the original descriptions. *Diopsis atricapilla* has a glossy scutum with some pruinosity in the anteromedial point, pruinosity before the intrascutal sutures and pruinosity anteriorly of the scutellum. Spermathecae bell-shaped and surstyli strongly broadening apically, clothed in setulae, but lacking microtrichia. Feijen & Feijen (2009) mentioned a cross-like pruinosity pattern on the thorax for *D. fumipennis*, but that is incorrect.

Diopsis fascifera Eggers, 1925

Diopsis fumipennis Westwood, 1837*a* var. *fascifera*: Eggers 1925: 475 (Type locality: Burundi); Lindner 1954: 19.
Diopsis fascifera Eggers: Steyskal 1972: 8.

Distribution: Burundi, Democratic Republic of Congo, Kenya, Rwanda, Tanzania and Uganda.

Notes: *Diopsis fascifera* possesses a large cross-like pruinosity pattern on the scutum.

Diopsis punctiger Westwood, 1837

Diopsis punctiger: Westwood 1837*a*: 302 (Type locality: West Africa); Feijen 1987: 412; Feijen & Feijen 2009: 703.
Diopsis trentepohlii Westwood, 1837*b*: 546 (Type locality: "Guineâ").

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Distribution: Cameroon, Central African Republic, Democratic Republic of Congo, Gabon, Nigeria, Sierra Leone, Tanzania, Togo, Uganda and Zambia.

Notes: *Diopsis punctiger* is one of the easiest species to distinguish, due to its large, strong and erect, black scutellar spines. The scutum has a roughened surface medially and a transverse pruinose fascia. The surstyli are hairbrush-shaped and abruptly broadening apically, with numerous setulae on the inner margin of the broad apical section. The central infuscation of the wing is very dark in this species.

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