A new *Themonocoris* from South Africa (Hemiptera: Heteroptera: Reduviidae: Phymatinae: Themonocorini)

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Doesburg, P.H. van & D.H. Jacobs. A new *Themonocoris* from South Africa (Hemiptera: Heteroptera: Reduviidae: Phymatinae: Themonocorini).

Zool. Med. Leiden 85 (3), 29.iv.2011: 55-67, figs 1-23.— ISSN 0024-0672.

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Key words: Insecta; Heteroptera; Reduviidae; Phymatinae; Themonocorini; new species; key; biology; South Africa.

Themonocoris endroedyi spec. nov. from eastern Transvaal is described and illustrated, and its biology discussed. A key to the species of *Themonocoris* and a distribution map are provided.

Introduction

The genus *Themonocoris* is a small group of peculiar reduviid bugs which until now consisted of four described species distributed in west and central Africa (Fig. 23). Carayon et al. (1958) described the genus and included three species: *T. tshikapanus* from the Democratic Republic of the Congo (formerly Belgium Congo or Congo-Kinshasa) and Cameroon; *T. kinkalanus* from the Republic of the Congo (formerly Middle Congo or Congo-Brazzaville), French Equatorial Africa, Equatorial Guinea, Cameroon, Benin (formerly Dahomey) and the Ivory Coast and *T. bambesanus* from the Democratic Republic of the Congo. Kormilev & van Doesburg (1986) described an additional species, *T. aethiopicus* from Ethiopia (formerly Abyssinia).

Carayon et al. (1958) placed *Themonocoris* in the tribe Themonocorini of the subfamily Phymatinae of the family Reduviidae. In their scheme they regard the Themonocorini as primitive phymatines that stand opposed to the other phymatines in the Phymatini. They, however, made no suggestions how to treat the longstanding subfamilies of the former Phymatidae – the Carcinocorinae, Macrocephalinae and Phymatinae.

The arrangement proposed by Carayon et al. (1958) was variously accepted by subsequent authors, but the affiliation of *Themonocoris* to the Phymatidae and Phymatinae was generally not questioned. China & Miller (1959), Kormilev (1962, 1966: as subfamily Themonocorinae) and Froeschner & Kormilev (1989) retained the Phymatidae at family rank and treated the Themonocorinae with *Themonocoris* as a fourth subfamily of equal rank to the Carcinocorinae, Macrocephalinae and Phymatinae. Maldonado Capriles (1990) also regarded the Phymatidae as a separate family and did not include it in his Systematic Catalogue of the Reduviidae of the World. Schuh & Slater (1995) regarded the Phymatinae as a subfamily of the Reduviidae and divided it into four tribes that correspond with the subfamilies of Froeschner & Kormilev (1989: 62). Van Doesburg (2004) argued that the placement of Themonocorinae as a reduviid subfamily next to the Phymatinae is an equally acceptable arrangement. In his key, however, he treated the Themonocorini as a tribe of the Phymatinae. Weirauch (2008) in a cladistic analysis of the Reduviiae confirmed the monophyly of the phymatine complex and placement of the Phymatinae as a subfamily recognizing four tribes following Schuh and Slater (1995), as we do in this paper. We are of the opinion that considering the morphological differences, in future the tribe Themonocorini may be best treated as a subfamily of the Reduviidae, next to the Phymatinae. The latter, consisting of the three tribes Carcinocorini, Macrocephalini and Phymatini, are considered to be a concise group characterized by their very high specialized raptorial fore legs and different habitat.

In the present paper a new *Themonocoris* species from South Africa is described and figured. Notes on its habitat and a key to the *Themonocoris* species are presented. Finally, the holotypes of *T. aethiopicus*, *T. bambesanus*, *T. kinkalanus and T. tshikapanus* are illustrated (Figs 18-21).

Material and methods

Specimens prepared for SEM examination were investigated with the aid of a JEOL JSM-840 SEM using an acceleration voltage of 5kV. Colour photographs were taken with the aid of a Leica M165C stereomicroscope using a Zeiss Axiocam MRc5 digital camera (TMSA) and Olympus SZX12 Colour View Soft Imaging System (RMNH). Several photographs of a subject were taken at different focus levels before they were stacked with the aid of the CombineZP software program to increase depth of focus.

The material examined will be placed in the following collections: The Natural History Museum, London (BMNH); Muséum national d'Histoire naturelle, Paris (MNHN); D.H. Jacobs collection, Pretoria (DHJS); Musée Royal de l'Afrique Centrale, Tervuren (MRAC); Natal Museum, Pietermaritzburg (NMSA); National Collection of Insects, Pretoria (SANC); Transvaal Museum, Pretoria (TMSA) and Netherlands Centre for Biodiversity Naturalis, Leiden (RMNH).

All lengths are given in mm; b in captions = scale bar.

Systematic part

Genus Themonocoris Carayon, Usinger & Wygodzinsky, 1958

Themonocoris Carayon, Usinger and Wygodzinsky, 1958: 258; Kormilev, 1966: 277 (Themonocoris tshicapanus (sic!)), 1989: 62 (list, key to species); van Doesburg, 2004: 149 (key to species).

Type species: Themonocoris tshikapanus Carayon, Usinger & Wygodzinsky, 1958.

To the generic description can be added: anterior of each compound eye of the new species is a long dark setigerous spine (Figs 3, 8) found also in the inspected species *T. tshikapanus*, *T. bambesanus*, *T. aethiopicus* and seems to be a generic characteristic.

Themonocoris endroedyi spec. nov.

Type material.— South Africa, holotype, \eth (fig. 1), Vryheid Hill Nat. Res., nr. Vryheid (KwaZulu-Natal province), 27°75′34″S-30°79′05″E, 30.i-2.ii.2007, Jacobs, Stiller & Grobbelaar (TMSA); allotype, 𝔅, same data as holotype (TMSA); paratypes: 24 𝔅 , 21 𝔅 𝔅, 3 nymphs, as follows: 2 𝔅 𝔅 , 1 𝔅, God's Window

(24°53′S-30°54′E) [N-Drakensberge], Eastern Transvaal (now Mpumalanga province), 4.v.1981, Podocarp. & Aloë veg., [S.] Endrödy-Younga, # E-Y 1773 (TMSA); 6 $\delta \delta$, 4 $\Im \Im$, Nelsberg KuMbuyane, nr. Badplaas (Mpumalanga province), 25°85′66″S-30°76′84″E, 14.xi.2007, D.H. Jacobs (2 $\delta \delta$ RMNH, 4 $\delta \delta$, 4 $\Im \Im$ DHJS); 17 $\delta \delta$, 17 $\Im \Im$, 3 nymphs, same data as holotype (2 $\delta \delta$, 2 $\Im \Im$, each to BMNH, MNHN, MRAC, NMSA; RMNH, SANC, TMSA, 3 $\delta \delta$, 3 $\Im \Im$, 3 nymphs, DHJS).

Diagnosis.— Large (4.55-4.85 mm) blackish species with long antero-dorsal projections of head, length of third antennal segment three times second and femora black (including apices).

Description.— Head (Figs 2-3, 8) dark brown, dorsally black, surface finely and closely punctate and densely set with dark setigerous tubercles, bearing whitish curved setae, moderately long, ratio length to width across eyes, about 1:0.75, eyes dark red, ocelli clear red or yellow, laterally inserted on ocellar elevations medially of eyes, prominent, between these, frons and vertex bare with two deep pores; projections anterior of eyes long, directed anteriorly, longer (11/10) than the length of an eye (0.25 mm) as seen from aside; between eyes and antennal base is a long, dark, antero-ventrally directed spine-like setigerous tubercle; antenna about 2.5 times longer than width of head across eyes, first segment short, thick cylindrical and a little curved, finely and closely punctate, bearing distally some small setigerous tubercles, II-III very thin, last segment slender fusiform, proportions of antennal segments 1:0.87:2.67:0.87 (approximately, as first antennal segment was not exactly measurable); underside dark brown, bucculae large, brown, genae ventrally with a row of large white tubercles, gula with several very large



Fig. 1. Themonocoris endroedyi spec. nov., ♂ holotype, dorsal aspect; length 4.65 mm.



Figs 2-7. *Themonocoris endroedyi* spec. nov. 2, head, dorsal aspect, b = 0.1 mm; 3, head, lateral aspect, b = 0.1; 4, pronotum, dorsal aspect, b = 0.1; 5, anterior part of pronotum, dorsal aspect, showing surface texture, setigerous spines and pit, b = 0.1; 6, prosternum, ventral aspect, showing lateral setigerous spines and central stridulatory groove, b = 0.1; 7, thorax, ventral view, showing arrangement of coxae, b = 0.1.

tubercles. Rostrum short and stout, segment I very stout, about three times as long as wide, apically a little narrowed, longer than segments II and III together, II somewhat inflated ventrally, III short and pointed.

Pronotum (Figs 4-6) dorsally black or very dark brown, little wider (across humeral angles) than long (along midline), anterior margin moderately excavate, lateral margins

divergent posteriorly, slightly concave, posterior angles rounded, posterior margin almost straight with small posterior projections adjacent to the scutellum at the terminations of the dorsal pronotal rows, central part slightly excavate, lateral parts rounded into the lateral margins; anterior lobe black, finely shagreened to punctate with two longitudinal interrupted rows of setigerous tubercles, posteriorly medially deeply punctate; posterior lobe blackish brown, sometimes lighter at the sides, densely punctate, posterior quarter rather sharply and steeply bent downwards, lateral and dorsal ridges set with rows of yellowish brown setigerous tubercles, anteriorly terminating on posterior part of fore lobe, posteriorly terminating in the projections adjacent to scutellum; sides with same colour and texture as corresponding dorsal parts, anterior part of sides irregularly set with very small yellowish brown setigerous papillae; prosternum (Figs 6-7) forming a narrow furrow between propleural, whitish rimmed epicoxal lobes, anteriorly running into a widened yellowish prosternal smooth stridulatorial sulcus whose surface is very finely transversely grooved (460 striae/mm), lateral ridges set with some large yellow setigerous papilla; meso- and metapleurae blackish with light brown papillae, epicoxal lobes distally whitish; meso- and metasterna black, finely shagreened, with a medially longitudinal keel, high and wide on mesosternum with about 6+6 erect setigerous papillae on or next to it, lower and narrower on metasternum, flanked by about 6+6 erect setigerous papillae and ending posteriorly in a slightly raised whitish rimmed point at anterior level of posterior coxae.

Scutellum black, as long as broad, laterally finely ridged, medially carinate, surface finely punctate and shagreened, dark brown, sides with setigerous spines along its margin and central ridge set with setigerous tubercles.

Wings.— Fore wings large, almost covering the whole abdomen, corium rather slender, heavily sclerotized, especially distally, veins prominent, set with setigerous tubercles; posterior margin of corium somewhat raised and setigerous tubercles more prominent from which the distal three or four are large with long setae; corium areolate between veins; colour of wing brown, proximally whitish to about tip of scutellum, rest of corium dark brown, apically blackish shagreened; membrane large, densely microareolate; veins broad, forming two cells.

Legs (Figs 7, 9, 14).— Femora dark brown to black, those of the population from Nelsberg with a medial brown annulus; fore femora dark brown, sometimes with a median brown annulus that extends to the apex ventrally, raptorial setae in two rows (Fig. 9), posteriorly with a row of long setigerous papillae from which the largest is as long as diameter of femur on the spot, anteriorly with a row of smaller setigerous papillae; fore tibiae usually light brown with subproximal and apical dark brown annuli, sometimes uniformly brown; middle and hind tibiae entirely dark brown (Vryheid population) or brown with a relatively narrow subbasal dark annulus; tarsi including claws, brown, basally lighter; pretarsi (Fig. 14) with bald claws usually spread for somewhat less than 90° and with diverting straight parempodia; remarkable are the minute spurs at each side behind the claws.

Abdomen oval, dorsally and ventrally black; ventral surface with a medio-longitudinal trough, beginning narrow at base, gradually widening posteriorly and ending rounded halfway seventh sternite; in the male this trough is more or less sideways restricted at the border of the seventh sternite; spiracles small, protruding, yellowish white, very close to border with the laterosternites, with posterior border of sternite VII (along pygophore) narrowly brown, that of VIII, yellowish brown; laterotergites II-VI (connexivum in Carayon et al.: 258) broad, its width about one seventh of the width of abdomen including laterotergites, smooth, finely shagreened, lateral margin finely set with curled setae, laterotergites dorsally and ventrally dark brown, laterally darker, posterior borders narrowly whitish to light brown (sometimes with a reddish sheen), anterior borders of III-V with narrow whitish transverse band, those of segments VI-VII progressively broader, posterior half of laterotergites VII dark brown, in the male meeting each other posteriorly above the pygophore, leaving a small medial indentation in the posterior border and curled setae of connexivum here large.

Female pregenital abdomen resembles that of the male, but border of laterotergites is continued posteriorly by two large plates of eighth segment which are medially partly joined together leaving a deep medial cleft and small lateral indentations in the border line; perpendicularly down from baseline of these plates, follows the ninth tergite and further female terminalia.

Underside of abdomen (female) sternites 2-3 medially sharply keeled, sternites 4-7 medially with a narrow, shallow furrow which at the boundaries of the segments is somewhat indented, in the seventh sternite this furrow is widened to oval; surface of the abdomen is finely shagreened and remotely set with short, fine, white, curled setae on micro-papillae and pointing anteriorly, except the setae of medial part of sixth and seventh segments which are facing posteriorly; setae are arranged in two transverse rows on each sternite but with several present between the rows near the midline.

The female terminalia (Fig. 11) consist of the mentioned elongated ninth tergite flanked at both sides by the anterior gonocoxites; these plates are finely blackish chagrined but the tergite is laterally dirty white bordered, apically narrow, distally gradually much broader; on distal half of tergite with some white curled setae; distally of ninth tergite is the small tenth tergite and the two strongly reduced triangular posterior gonocoxites both covered by white microscopic setae.

In male seventh sternite posteriorly widely concave to accommodate the pygophore, leaving part of posterior margin of eighth sternite visible (Fig. 15); laterotergites large and fused posteriorly leaving a deep, narrow posterior indentation and in this area ventrally deeply punctate.

The pygophore is oval to egg shaped with its posterior margin bisinuate (Fig. 10); exposed ventral side (Fig. 15) deeply and rather remotely punctate, sides finer and closely to tightly punctate, bare but somewhat setose around and, especially in anterior corners and posterior part, in rows; caudo-dorsally opening of pygophore large (Fig. 16), showing proctiger and diaphragmatal plate with caudo-lateral processes and parameres in rest position.

Paramere (Fig. 12).— Apart from the expected resemblances with the paramere of *T. kinkalanus* depicted by Carayon *et al.* (Fig. 28, here reproduced as Fig. 13), there are clear differences. The apical hook is smaller, its direction is closer to the main axis and the number of the setigerous tubercles on the 'head' (inflated part of the paramere) is much smaller, its surface finely reticulate, the hook is smooth (Fig. 17).

Measurements. — Holotype, δ : total length 4.65; length of head 0.72; length of pronotum 1.01; length of scutellum 0.44; length of wings 2.97; width of head (diatone) 0.53; width of pronotum 1.07; width of scutellum 0.44; width of abdomen 1.42; antenna I ± 0.26; II 0.25; III 0.75; IV 0.25.



Figs 8-12. *Themonocoris endroedyi* spec. nov. 8, head, lateral aspect, b = 0.25 mm; 9, left fore leg, posterior aspect, b = 0.5; 10, pygophore, ventral aspect, b = 0.5; 11, ventral aspect of female end of abdomen showing genital sclerites, b = 0.5. 12, left paramere, ventral aspect, b = 0.1; Fig. 13, *Themonocoris kinkalanus* Carayon *et al.*, 1958, left paramere, after original figure 28 in Carayon *et al.*, 1958: 267.

Mean lengths. Vryheid: mean length of 14 \eth \eth is 4.55 mm, varies from 4.4 to 4.75 mm; of 14 \circlearrowright \circlearrowright is 4.77 mm, varies from 4.55 to 5.1 mm. Nelsberg (Badplaas): mean length of 4 \eth \eth is 4.8 mm, varies from 4.7 to 4.85 mm; of 5 \circlearrowright \circlearrowright is 4.95 mm, varies from 4.85 to 5.1 mm. God's Window: \eth , 4.8 mm, \eth , 4.85 mm, \circlearrowright , 5.0 mm.

Etymology.- The species is named after the late Dr Sebastian Endrödy-Younga,



Figs 14-17. *Themonocoris endroedyi* spec. nov. 14, pretarsus, showing claws, parempodia and other setation, b = 0.01 mm; 15, end of male abdomen, ventral view, showing 7th sternite and part of the 8th, together harbouring the oval pygophore, apically surrounded by connexival plates, b = 0.1; 16, dorsal aspect of isolated pygophore, showing the large caudo-dorsal opening, proctiger, diaphragmatal plate with lateral processes and the parameres in rest position, b = 0.1; 17, idem, parameres enlarged, showing surface texture and setation, b = 0.01.

who collected it for the first time and whose notes led to its subsequent discovery by the junior author. Dr Sebastian Endrödy-Younga (1934-1999), who worked as a coleopterist at the Transvaal Museum, Pretoria (1972-1998), took always care in collecting and processing invertebrates belonging to all orders during his extended collecting trips. This resulted in the discovery of many undescribed and interesting taxa.

Notes.— The macrosetae on the apex of the corium as depicted and mentioned for *T. kinkalanus* (not in text) by Carayon *et al.*, 1958 on p. 266, fig. 16, we also found in *T. endroedyi*, *T. bambesanus*, *T. aethiopicus* and *T. tshikapanus*.

The type specimen of *Themonocoris kinkalanus* has the following labels: 'Sur *Elaeis* (inflorescences), Kinkala Moyen Congo, A.E.F. Janvier 1955', 'Museum Paris', 'Holotype *Elaeocoris kinkalajanus*' [red label], obviously a provisional name; *Elaeocoris* [or *Elaeiocoris*?] is and remains a nomum nudum. Dr D. Pluot-Sigwalt (*in litt.*) wrote: 'The first label is from Carayon; I recognize the handwriting. A.E.F. means - without doubt - 'Afrique Equatoriale Française'. The red label is not from Carayon and maybe from Wygodzinsky (?)'. We are certain that this specimen is the holotype of *Themono*-



Figs 18-19. *Themonocoris* holotypes. 18, *Themonocoris kinkalanus* Carayon *et al.*, 1958, δ (NMHN), length 3.75 mm; 19, *Themonocoris aethiopicus* Kormilev & van Doesburg, 1986, \Im (BMNH), length 4.6 mm (measured without the first antennal segments, as obviously were included in the measurement in the original description (4.80 mm).



Figs 20-21. *Themonocoris* holotypes. 20a, b, *Themonocoris bambesanus* Carayon *et al.*, 1958, ♀ (MRAC), length 4.7 mm; 21a, b, *Themonocoris tshikapanus* Carayon *et al.*, 1958, ♂ (MRAC), length 4.45 mm.

coris kinkalanus and added the label: 'Themonocoris kinkalanus Carayon, Usinger et Wygodzinsky, 1958, HOLOTYPE, det. P.H. van Doesburg 2009'.

Comparative notes.— From the four known *Themonocoris* species *T. endroedyi* seems to be most closely related to *T. kinkalanus* Carayon *et al.*, 1958 and *Themonocoris aethiopicus* Kormilev & Van Doesburg, 1986. Comparing *T. endroedyi* with the holotype of *T. kinkalanus*, reveals the following differences: 1) *T. endroedyi* is larger (\mathcal{J} , 4.6-4.9 mm), *T. kinkalanus* (\mathcal{J} , 4 mm, holotype \mathcal{J} , 3.75 mm). 2) frontal projections of the head (as seen from above) of *T. endroedyi* almost two times as long as broad, those of *T. kinkalanus* very short, as long as broad. 3) *T. endroedyi* predominantly blackish brown, *T. kinkalanus* 'broadly pale'. 4) femora of *T. endroedyi* blackish brown, sometimes with a pale median annulus, those of *T. kinkalanus* 'broadly pale', brown only subbasally and subapically. 5) tibiae of *T. endroedyi* entirely dark brown, or brown with a relatively narrow subbasall dark annulus, those of *T. kinkalanus* pale with ill defined brown rings subbasally and apically (see Figs 18-21).

After comparison with the holotype of *T. aethiopicus* the following differences were found: 1) overall body colour of *T. endroedyi* predominantly blackish-brown, that of *T. aethiopicus* brown with pale parts. 2) frontal projections of the head of *T. endroedyi* (antero-dorsally directed projections of Carayon *et al.* 1958) longer (1.1 ×) than the length of an eye, reaching 7/8 of the apex of the first antennal segment and the plate-like genae

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much more prominent, those of *T. aethiopicus* shorter (0.8) than the length of an eye, reaching about to 2/3 of the first antennal segment. 3) the antennal ratio between the third and second antennal segments of *T. endroedyi* is about 3.1, for *T. aethiopicus* it is about 3.64 (4 in the original description). 4) femora of *T. endroedyi* blackish-brown, sometimes with a pale median annulus, those of *T. aethiopicus* dark brown, apical half white with a dark annulus. 5) the underside of the abdominal terminal lobes in *T. aethiopicus* are contrary to *T. endroedyi*, clearly punctate.

Key to species of the genus Themonocoris

- 1. Small, pale species, total length about 4 mm; femora mostly pale T. kinkalanus

- Third antennal segment longer, more than 2.8 times the length of the second segment; mentioned spines longer or very small
 3

- Femora black basally, apical 1/4-1/5 yellow; tibiae pale with a subbasal and apical brown ring; posterior margin of head and anterior part of pronotum with remarkably large setigerous spines ______ T. tshikapanus

Biology

Themonocoris species seem to be associated with 'masses of partially dead plant material which usually retain a high humidity and harbour a rich fauna of small insects' (Carayon et al. 1958). *T. kinkalanus* was mostly collected in the nests of weaver birds (*Ploceus* species) but they also seem to be associated with oil palm trees (likely *Elaeis* guineensis Jacq.) where they are found in the inflorescences and seed clusters which harbour a rich micro-fauna. Similarly *T. endroedyi* was found to be associated with clusters of dead leaves of *Aloe arborescens* Mill. (Fig. 22). Fair numbers of adults and nymphs were collected by DHJ by beating such leaf clusters. The bugs also seemed to be somewhat gregarious as some leaf clusters yielded several specimens while many others did not yield any.

Themonocoris species are undoubtedly predators but it is uncertain which prey they favour. Carayon et al. (1958) were unable to rear *T. kinkalanus* on a diet of psocids and a



Fig. 22. *Aloe arborescens* Mill. vegetation in the Vryheid Hill Nature Reserve with clusters of old leaves from which series of *Themonocoris endroedyi* spec. nov. were collected. Photo: D.H. Jacobs.

Fig. 23. Map of Africa south of the Sahara [Central and South Africa] showing the known distribution of the species of *Themonocoris*.

variety of larvae and adults of small Coleoptera and reported that only the caterpillars of a pyralid moth were taken. The raptorial front legs of *Themonocoris* are rather delicate; they are armed with long spines bearing long apical setae (like those present in many species of Emesinae). This suggests that the legs are touch-sensitive to detect and hold specific prey. It is likely that their diet consist of specific soft-bodied arthropods like spiders, midges or Lepidoptera and other larvae.

Acknowledgements

We are most grateful to the following persons: Prof. Dr Ing. C. van Achterberg (RMNH) for photographing type specimens and critically reading the manuscript;

Dr Eliane De Coninck (MRAC) for the loan of the holotype of *T. bambesanus*, holo and allotypes of *T. tshikapanus*; late Dr Sebastian Endrödy-Younga for the specimens from God's Window; Dr Elisabeth (Beth) Grobbelaar and Michael (Mike) Stiller (TMSA) for their assistance DHJ, Dr Dominique Pluot-Sigwalt (MNHN) for the loan of the holotype of *T. kinkalanus* and Mick Webb (BMNH) for the loan of the holotype of *T. aethiopicus*.

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Received: 30.vi.2010 Accepted: 1.xi.2010 Edited: C. van Achterberg

Appendix

Types of Themonocoris Carayon, Usinger & Wygodzinsky, 1958

Themonocoris aethiopicus Kormilev & van Doesburg, 1986: 114.

Holotype 9 (BMNH), C. Abessynia, Maraquo, 26.vi.1914.

- *Themonocoris bambesanus* Carayon, Usinger & Wygodzinsky, 1958: 269. Holotype ♀ (MRAC), Bambesa, Belgian Congo, 1938.
- **Themonocoris endroedyi** van Doesburg & Jacobs, holotype, ♂ (TMSA), Vryheid Hill Nat. Res., nr. Vryheid (KwaZulu–Natal province), 27°75′34″S-30°79′05″E, 30.i-2. ii.2007, Jacobs, Stiller & Grobbelaar (TMSA); Allotype, ♀ (TMSA), same data as holotype; paratypes: 24 ♂ ♂, 21 ♀ ♀, 3 nymphs from God's Window (Drakensberge) Eastern Transvaal (now Mpumalanga province); Nelsberg KuMbuyane, nr. Badplaas (Mpumalanga province) in: BMNH, MNHN, MRAC, NMSA; RMNH, SANC and TMSA.
- Themonocoris kinkalanusCarayon, Usinger & Wygodzinsky, 1958: 264.Holotype &, allotype and 2 paratypes (MNHN), Kinkala, Middle Congo, FrenchEuatorial Africa, January 1955, Elaeis inflorescences; 8 paratypes (MNHN), fromCameroon, Ivory Coast and French Guinea.
- Themonocoris tshikapanus Carayon, Usinger & Wygodzinsky, 1958: 262.Holotype ♂, paratype ♂ (MRAC), Kasai, Tschikapa, Kabuya, Belgian Congo, 1930;Allotype ♀, paratype ♂ and two nymphs (MNHN), Kasai, Mukendi, Belgian Congo, 1930, one paratype ♂ (MNHN), N'Kongsamba, Cameroons, 1957.