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Xenicocephalus – an enigmatic genus of American Enicocephalidae (Heteroptera): a new male-based species from Suriname*

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ABSTRACT

Wygodzinsky & Schmidt (1991) established *Xenicocephalus giganticus,* nov. gen., nov. sp. (Hemiptera: Heteroptera: Enicocephalomorpha: Enicocephalidae: Enicocephalinae) from Colombia - the species was based on a single, incomplete female; for description of the genus also the larvae were employed. We describe *Xenicocephalus josifovi* nov. sp. based on a male from Suriname, provide new diagnosis of the genus and discuss the relationship and autapomorphies of the genus. The description of *X. josifovi* covers also male genitalia and internal reproductive organs, and the ducts and reservoirs of persisting dorsoabdominal gland. The classification of *Xenicocephalus* within the Enicocephalinae is confirmed. A new type of raptorial forelegs, unique among the Enicocephalomorpha and Euheteroptera and suggesting oligophagy on a special prey, is characteristic of *Xenicocephalus.* Also the construction of reservoirs of a dorsoabdominal gland is unique – the ducts leading from a single orifice on mediotergite 4 are double and enter two large, differently shaped and exceedingly sclerotized reservoirs within the abdominal segment 6.

Keywords: Hemiptera: Heteroptera: Enicocephalidae, taxonomy, *Xenicocephalus* - redescription, *X. josifovi* nov. sp. (Suriname), morphology: forelegs, male genitalia, dorsoabdominal gland.

* This paper is dedicated to the 80th birthday of Misha Josifov, an eminent student of many groups of Heteroptera, their cataloguer and keen collector, but first of all good and generous man and forever remaining friend.

INTRODUCTION

Wygodzinsky & Schmidt (1991) = W&S described a new genus and species of Enicocephalinae: Enicocephalini**,** *Xenicocephalus giganticus* Wygodzinsky & Schmidt 1991, from Colombia ("Magdalena"*: Sevilla; the holotype in AMNH, New York, examined by P.Š. in 1990), on basis of an incomplete female adult (head and prothorax with their appendages missing). The larvae of *Xenicocephalus* were available from several C and S American countries (Colombia: Santa Marta and Cundinamarca; Panama; Costa Rica; Guayana: Mazaruni-Potaro District); their conspecificity with *X. giganticus* could not be demonstrated, and hence the larvae were excluded by W&S from the type series. However, some characters of the female L5 from Santa Marta have been used for completion of the generic diagnosis because the last instar larvae and adults of the enicocephalids share usually (always?) characters of the head and the armature of forelegs (W&S; Baňař, Štys, pers. observ.). W&S described and illustrated the above larva, and provided figures of some characters also for an early larval instar from Panama (probably a female owing to its strikingly incrassate forelegs - PŠ).

There has been no additional information on *Xenicocephalus* since its original description. Štys (2002) could easily and correctly fit the genus in the key of the Enicocephalomorpha of the World but some doubts about its taxonomic position have persisted because of our ignorance of its critical features (architecture of head, pronotum, forelegs and their armature, male terminalia). Moreover, the general facies of *Xenicocephalus* resembles ("superficially" - W&S) that of the little known monotypic Oriental genus *Megenicocephalus* Usinger, 1945 (Enicocephalidae: Megenicocephalinae).

A new species of *Xenicocephalus* from Suriname, based on a complete adult male, is described here - its description is focused on those features that could not have been studied by W&S. An extended diagnosis of the genus is provided, and its morphology and relationships are discussed.

MATERIAL AND METHODS

Only a card-mounted holotype was available for study. Glue used for its mounting could not have been dissolved in water (even after boiling), and after relaxing the specimen and dissecting parts of it, the glue has covered the objects by a continuous, transparent film obscuring the details. Consequently, we could not study those body parts, which were most heavily affected (the pterothorax except for mesoscutellum; midlegs, hindwings, and the basis of abdomen).

The arrangement of some internal organs is well visible through the semitransparent abdominal cuticle of the holotype, dry-mounted some 40 years ago, and only relaxed and

* The Colombian town Sevilla (4.16 N, 75.58 W) is actually situated in the Department Valle del Cauca.

observed in alcohol. We have used the opportunity for brief descriptions of the reservoirs of the persisting dorsoabdominal larval gland, and male gonads.

Comparison of *Xenicocephalus* nov. sp. to *X. giganticus* is tentative since part of the differences may be species-specific or stage-specific, others may reflect sexual dimorphism, and some may be idiosyncratic and of no diagnostic value. To facilitate the comparison, we have used the same nomenclature of forewing veins and cells as W&S, except for that on clavus. All measurements are given in millimetres.

The following abbreviation are used:

FW - forewing(s), L - length, max - maximum, min - minimum, W - width; C*x* - coxa, *F* - femur, *Ta* - tarsus, *Ti* - tibia, *Tr* - trochanter, subscripts $_{1,2,3}$ - concerning first, second, third pair of legs, respectively (e.g., Tr_1 - trochanter of the foreleg).

Genus ***Xenicocephalus* Wygodzinsky & Schmidt, 1991**

Xenicocephalus Wygodzinsky & Schmidt, 1991: 37 (keyed), 200-205 (O.D.)
Xenicocephalus: Štys (2002): 350 (listed), 354 (keyed)

Type species: *Xenicocephalus giganticus* Wygodzinsky & Schmidt, 1991 by original designation

Distribution: Southern Central America and northern South America (W&S)

Diagnosis: Adults large, broad and flat, at least 7.9 mm long. Most of the cuticle covered by black granules; no true setigerous tubercles, trichobothria-like setae and strong bristles. Head very short (shorter than pronotum), the preocular part short, antennifers close to eyes, transverse constriction well marked, posterior lobe transverse. Labium thick and short. Antennal segments 2 and 3 terete, 4 subfusiform. Pronotum of three distinct lobes, much wider than long; midlobe with a Y-shaped median not interrupting its posterior margin but with a complex, depressed basis, and with 2+2 lateral depressions; posterior margin ample, strikingly broad. Foretrochanter with a ventral crest. Ventral faces of incrassate forefemur and foretibia concave, sharply delimited and lacking any vestiture;. apicitibial armature of 7 spiniform setae (♂; ♀ ?) directed outwards. Foretarsal armature of 1+1 proximal spiniform setae and 1 distal spiniform seta + 1 distal simple seta; anterior claw stout, posterior reduced in a stump. Mid- and hindtibiae proximally bent, with 2 apical combs associated with a diverse number of spiniform setae each; tarsi two-segmented with two claws each. Macropterous; venation of forewing complete, both basal and discal cells present and closed, the former shorter only by one fifth. Abdomen membranous (exc. distal segments and terminalia), both dorsal and ventral laterotergites individualized; connexival edge sharp. Male opening of dorsal gland associated with two large and strongly sclerotized reservoirs situated within the abdominal segment 6. Pygophore small, cup-shaped, subtriangular, parameres bi-partite, guide elongate, subtriangular, pointed; no remnants of other genital elements present; tergum 10 fused with but distinct from the pygophoral bridge. Female ventrite 8 produced in a short tab. Forewing lobes of larva 5 contiguous.

Differential diagnosis: The peculiar construction of forefemur and foretibia with ventral faces sharply delimited, concave and devoid of vestiture as well as presence of black granules all over body are autapomorphies of *Xenicocephalus;* they are not shared with any known genus of the Enicocephalomorpha.

Xenicocephalus josifovi, nov. sp.

(Figs 1-33)

Etymology: *josifovi* - a patronym derived from the surname of the Bulgarian heteropterist, Michail Josifov.

Type material.Holotype: ♂, "Suriname Onverdacht \ Para Distr. 07.07.1962.\ 5°36'N-55°09'W. \ on light, mercury \ PHvDoesburg ♂2000" [printed] "RMNH \ 12774" [printed]; card mounted, left foreleg and right hindleg mounted on separate card.

Measurements. ***Total body L*** – 7.9, ***W*** (max.) – 2.36.

Head. Total L (without neck) - 1.08 Anterior lobe L – 0.68; distance of eye to apex of antennifer – 0.22; distance of eye to basis of antennifer - 0.04; eye L – 0.28; preocular W (min) - 0.42; diatone (max W across eyes) – 0.66; min interocular distance, dorsal – 0.35; min interocular distance, ventral – 0.15. Posterior lobe: L – 0.40, W – 0.63. ***Labium***. Total L – 0.79; segment 1 - 0.09; segment 2 L – 0.20; segment 3 – 0.31; segment 4 - 0.19. ***Antenna***. Segment 1 L – 0.35; segment 2 L – 0.71; segment 3 L – 0.66; segment 4 L – 0.64. ***Pronotum***. Total L (max) – 1.44; collum: L (median) – 0.22, W (max) – 0.75; midlobe: L (max) – 0.55, W (max) – 1.33; hindlobe: L (max) – 0.64, L (median) – 0.36, W (max) – 2.22. ***Forewing***. L – 5.35, W (max) – 1.86. ***Foreleg***. F_1: L – 1.33, W (max) – 0.44; Ti_1: L – 1.15, W (max) – 0.26; Ta_1: L – 0.28, W (max) – 0.15; anterior claw L (basis – apex) – 0.19; posterior claw L (basis – apex) – reduced. ***Midleg***. F_2: L – 1.26, W (max) – 0.24; Ti_2: L – 1.15, W (max) – 0.15; Ta_2: L (without claw) – 0.35, W (max) – 0.13. ***Hindleg***. F_3: L – 1.55, W (max) – 0.29; Ti_3: L – 1.37, W (max) – 0.15; Ta_3: L (without claw) – 0.51, W (max) – 0.20.

General shape. Macropterous, strikingly large and broad, flat, nearly parallel-sided. Head unusually small, contrasting with ample pronotum, and long and broad forewings and abdomen. Body 3.35 times as longer as wide; proportions of body parts, head L (without neck) : pronotum L (max) : FW = 1 : 1.3 : 5.

Coloration. Nearly monochromatic, non-contrastingly coloured, without distinct pattern. Groundcolour pale yellow-brown; FW olive-brown to blackish brown; labium yellow; venter yellow to orange; legs stramineous. Mesoscutum laterally to parapsidal sulci contrastingly whitish (in the area normally covered by pronotum in the encicocephalines).

Texture. Cuticle basically matt, somewhat lustrous on the pronotum, mesoscutellum and FW; usually densely covered by small, wart-like, subsphaerical **black granules** (as described and illustrated for *X. giganticus* by W&S); the granules scarce on FW and abdomen, missing on antennae, labium, whitish parts of mesothorax (present in the area between the parapsidal sulci), some parts of forelegs, and all the mid- and hindlegs. Most of the cuticle of

legs not smooth but covered by "**sand-grain granules"** visible only under high magnification and resembling rows of loaf-shaped tiles. Some areas (e.g. F_1, Ti_1, F_3) also with small and thin but rather conspicuous **conical tubercles.** Setigerous tubercles absent.

Vestiture. The whole surface of body and its appendages covered by "soft", golden, usually straight, semierect to erect pile of thin golden macrotrichia, never arising from setigerous tubercles, never containing spiniform, trichobothrium-like, thickened or otherwise outstanding setae* (excepting specialized setae on legs).

Body, antennae and legs very densely covered by "soft", rather long, thin, setae. Antennae, head and pronotum with rather long, semierect macrotrichia forming a radiating fringe along lateral margins of the posterior lobe of head and collum, and a unidirectional fringe along lateral and posterolateral margins of pronotum (dorsal view); the excised medial sector of posterior margin of pronotum bare. Venter of head with uniformly long, erect, curved, nearly unidirectional hairs, twice that long as the pile on the dorsal surface of head. Dorsal side of labium with short macrotrichia, ventral sides with mixed short and long, and straight and curved setae, some of them on segments 3 and 4 outstanding. Eyes densely covered by short macrotrichia. Macrotrichia on lateral margins of mesoscutellum longer than elsewhere, curved and ruffled. Lateral and ventral sides of thorax with rather long, sparse, curved, uniform pubescence. Ventral side and margins of the abdomen with uniform, dense, rather short pile, with no outstanding long setae (not even on margins of posterior segments); only those on sides of the pygophore longer and denser. Dorsum of abdomen with very short, straight, rather sparse filiform setae.

Forewings with four types of macrotrichia: (a) Long, straight, erect to semierect setae distributed densely all over the veins and on those sclerotized parts formed originally by veins (in proximal two thirds of FW). (b) Short, erect, black (sic!) setae distributed among the long ones. (c) Short, curved macrotrichia, usually in two rows, on or along margins of distal sectors of veins, semierect to appressed. (d) Short, multiple-rowed, curved macrotrichia along the anterior and apical margins of FW and on hypocostal lamina; these setae very dense basally; the same type of macrotrichia occurring also on the proximal part of the anterior margin of hindwing, both on its dorsal and ventral side.

Legs. (For the specialized rows of tubercles and spines along F_1 and Ti_1 and the apicitibial and tarsal armatures see under Fore leg.) Coxae and trochanters without particulars; femora with very dense pile of diagonal macrotrichia all over (excepting ventral face of forefemora), densest and longest on F_1; long macrotrichia mixed with uniformly long short ones**. Ti_1 with diagonal to erect (particularly distally) macrotrichia all over, except the bare area in the proximal part of depression of its posterior face, and specialized, silvery appressed setae in the distal part of this depression, and except bare area on its ventral (adfemoral) face. Ti_2 and Ti_3 with sparse, erect macrotrichia on dorsal face, denser and diagonal on ventral face.

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* W&S obviously had in mind that strong or otherwise outstanding setae are missing while stating that the "macrotrichia" in *Xenicocephalus* are absent.

** Short macrotrichia were called "microtrichia" by W&S.

Abdomen. Dorsum bare; venter with uniform, short, appressed hairs, slightly longer and suberect on its medial, convex part. Connexival edge with a dense pilosity, very short on proximal segments, gradually longer towards the apex of abdomen, with no outstanding setae.

Head (Figs 1-2, 10) strikingly short. Preocular part abbreviated owing to extremely short genae; the latter slightly diverging in dorsal view; antennifers conspicuous, strongly diverging, reaching nearly the level of the outermost margin of eyes. Dorsum of preocular lobe convex, but provided with an inconspicuous, flat, wedge-shaped elevation, tapering and disappearing between the eyes. Eyes large, facets separately convex, dorsal ocular index 4.26, ventral ocular index 2.59; in lateral view, the eyes by far not reaching the level of dorsum of head, but strongly exceeding its ventral outline. Postocular constriction sharp, long and deep. Postocular lobe strikingly transverse, lateral margins regularly rounded; its anterodorsal surface convex but mediodorsally broadly and shallowly concave (no median); its posterodorsal surface nearly flat, gradually declivous towards the neck; ocelli large, set widely apart, interocellar distance much larger than distance eye-ocellus.

Antennae (Fig. 1). Segments 1-3 terete, their widths gradually decreasing distad, 4 subfusiform. Antennal formula (the longest segment first) 2,3,4,1.

Labium (Fig. 2) short and thick, nearly reaching the posterior margin of eyes. Segment 1 broad and abbreviated, directed anteroventrad; 2 short, widening distad, directed ventrad, its upper margin straight; 3 rather long, its dorsal margin straight, ventral moderately convex; 4 short, conical. Labial formula 3, 2 = 4, 1.

Pronotum tripartite (Figs 1, 10), wider than long (ratio L, max : W, max 0.65), its lobes of a strikingly different width, constrictions between lobes linear and deep**. Collum** with a distinct precollum; the collar median marked by a shallow groove; lateral sides of collum with a transverse sulcus delimiting a subventral, posteriorly directed, broad, hook-shaped tubercle. **Midlobe** lateral margins simply rounded, posterior margin convex, not interrupted. The midlobe median proceeding from the anterior midlobe margin as an inverted Y-shaped impression, with the stem (in first third of midlobe) linear, sharply delimited, and the branches thick and vaguely delimited, embracing a large, shallow, medial, subcircular depression (in second third of midlobe). Proximal part of this depression with an anchor like, dark (hypersclerotized?) anchor-shaped structure provided with a short, thick, tongue-shaped stem. Posterior third of midlobe with no median structure but with 1+1 submedial, longitudinal, shallow depressions arising from the anchor-shaped structure. Lateral areas of dorsum with 1+1 extensive, indistinctly delimited depressions distant from lateral margins*; the deepest anterolateral part of the depression provided with a whitish macula devoid of black tubercles. Similar, less well delimited whitish maculae (formed largely by arrangement of black tubercles and lack of them) occurring also mesad of and posterad to the depressions. **Hindlobe** strikingly ample, lateral and posterolateral margins broadly and continuously rounded; posterola-

* These isolated and strictly dorsal depressions are unlike sharply delimited 1+1 Y-shaped impressions or 1+1 pits often connected with lateral margins in many other enicocephalines.

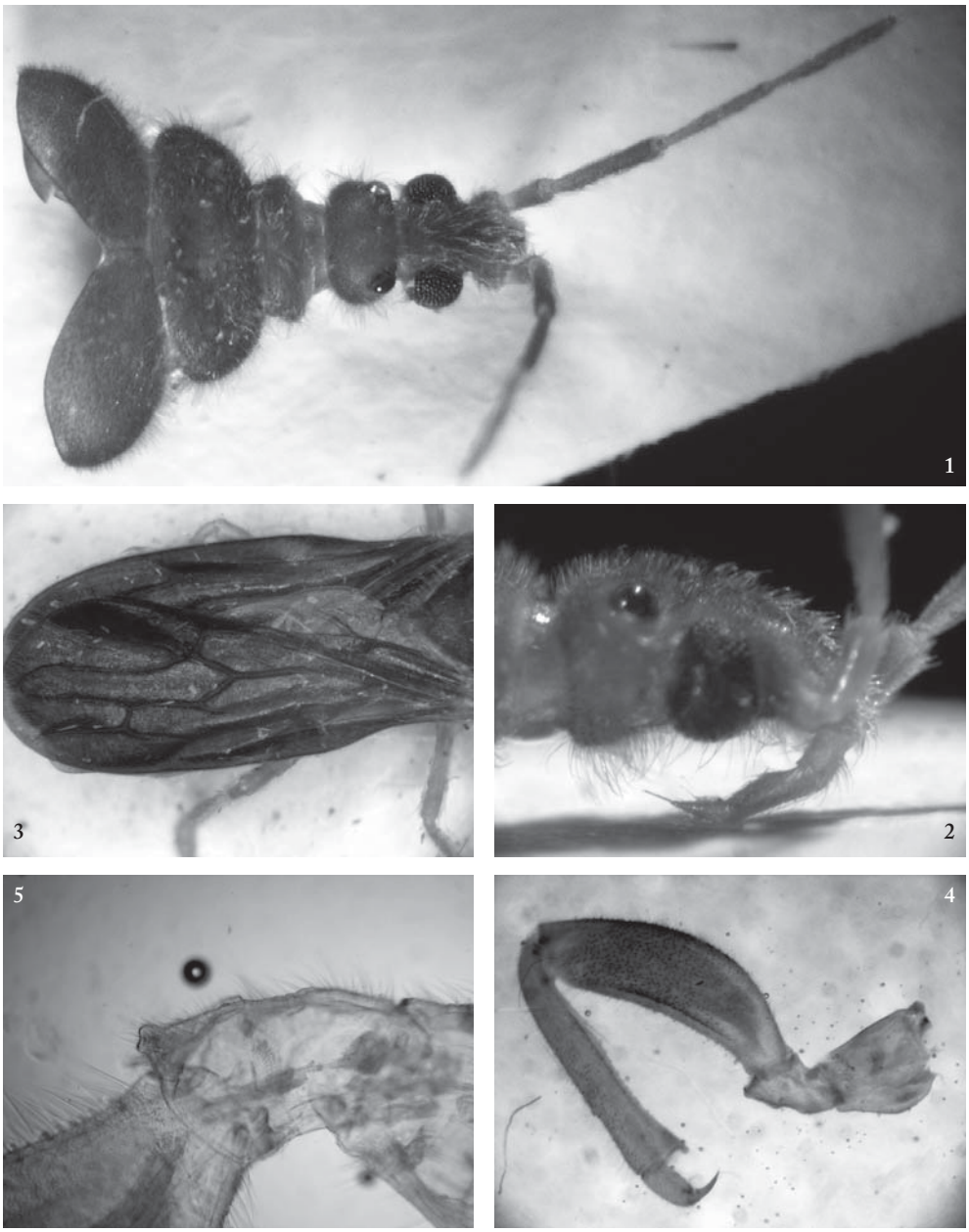

Fig. 1: *Xenicocephalus josifovi* nov. sp., male holotype, head and pronotum, dorsal view.
Fig. 2: *Xenicocephalus josifovi* nov. sp., male holotype, head, lateral view.
Fig. 3: *Xenicocephalus josifovi* nov. sp., male holotype, forewings.
Fig. 4: *Xenicocephalus josifovi* nov. sp., male holotype, left foreleg, posterior view.
Fig. 5: *Xenicocephalus josifovi* nov. sp., male holotype, left foretrochanter, anterior view.

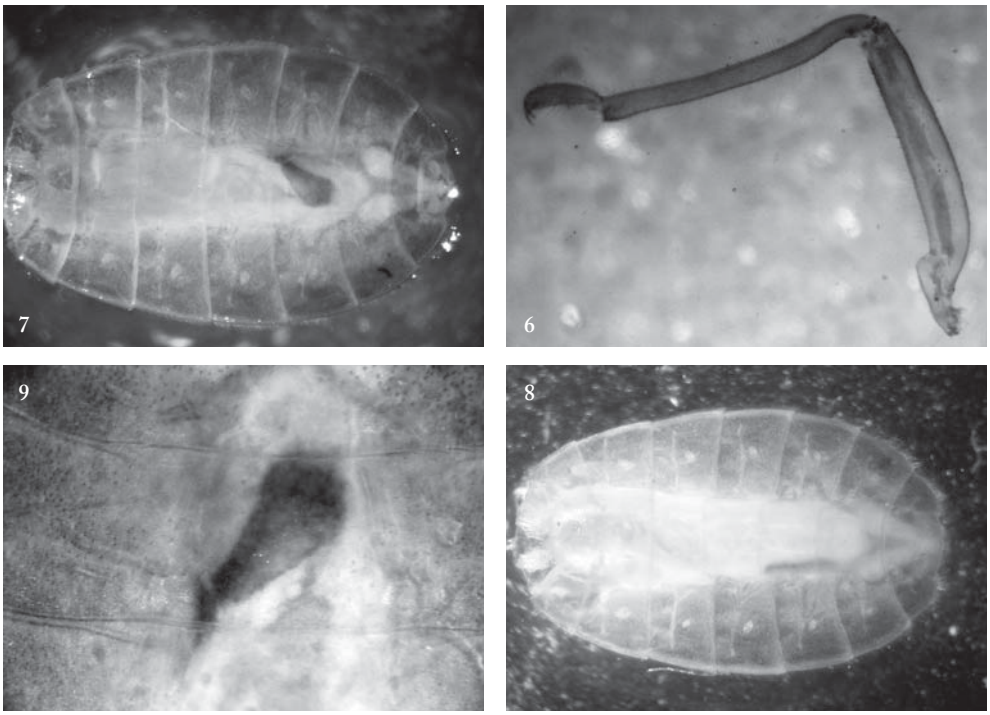

Fig. 6: *Xenicocephalus josifovi* nov. sp., male holotype, right hindleg, anterior view.
Fig. 7: *Xenicocephalus josifovi* nov. sp., male holotype, abdomen, dorsal view.
Fig. 8: *Xenicocephalus josifovi* nov. sp., male holotype, abdomen, ventral view.
Fig. 9: *Xenicocephalus josifovi* nov. sp., male holotype, abdomen, dorsal view, detail of dorsoabdominal gland.

teral angle indistinct, broadly obtuse; posteromedial margin broadly and deeply excised, convex, only the very midpoint of the excision concave. Median marked by a linear keel extending to the posterior margin, and forming there a concave triangle with a concave basis. "Proepimeral lobe" broad, short, visible in lateral view only; the upper part of its posterior margin concave, the lower one (ventral) broadly rounded, the lobe(s) fusing with the posterior prosupracoxale and externally delimited from the latter by a shallow depression only.

Mesoscutellum ample, triangular, mucronate, the mucro long, broad, parallel-sided, apically rounded.

Lateral parts of prothorax (as seen in lateral view). **Collum** subdivided by a horizontal sulcus (situated at the level of notopleural impression - see below) in dorsal and lateral parts; the dorsal one formed by a ventrally narrowing, elongate, apically rounded elevation (provided with black granules) surrounded by flat precollar and post-elevation parts (both lacking the granules); ventral part of collum split by a sulcus in equally long precollar and collar parts. Sulcus between collum and midlobe considerably widening ventrad. Lateral parts of pronotal **midlobe** widely reflected ventrad, and the true **propleuron**

restricted to a broad and deep **notopleural impression** delimiting the supracoxalia from the notum. Anterior part of notopleural sulcus with a deep **propleural pit** resembling a spiracle. Anterior supracoxale moderately large, subrectangular, delimited from the posterior supracoxale by pleural sulcus not extending onto the notopleural impression; posterior supracoxale ample, widening posteroventrad and fused with the "proepimeral lobe". Proacetabula free posteriorly, not enclosed by the "proepimeral lobes".

Prosternum: eusternum simple, triangular; **sternellum** extensive, forming mesal parts of proacetabula, apex subtriangular, produced but apically rounded, its median with a broad, shallow groove.

Foreleg (Figs 4-5, 11-13, 16-20).

Coxa. All the faces covered with sand-grain granules.

Trochanter (Figs 4-6, 16-18) bearing on distal two thirds of its posteroventral edge a prominent ridge (Figs 5, 20), resembling a rough mountain crest increasing distad, apically rounded (in anterior view, of two equally long lobes) and much exceeding the basis of femur both dorsad and distad. In strictly ventral view, two strikingly distinct, chocolate-coloured sinuate lines (sharply contrasting with the stramineous background) are delimiting the ridge and terminate on a pair of equally coloured distalmost tubercles each.

Femur (Figs 4, 11, 19, 23-24) incrassate, nearly uniformly thick in all its length, ratio L : max W 3.02; distinctly curved, moderately C-shaped; *all the ventral face*[*] *concave, with absolutely no vestiture, parallel-sided and sharply delimited* at both anterior and posterior edges by a row of macrotrichia and irregularly distributed black granules intermixed with a row of conspicuous, high, non-setigerous conical tubercles (Fig. 24). Basal third of anterior face of forefemur nearly bare, with a few short setae, without sculpture. All the other faces (exc. the ventral concavity) covered with both black and sand-grain granules. The concave face densely tiled by small, broad, transverse, scale-shaped structures (Fig. 23).

Neopatella[**] formed by two distinct slerites: the proximal one, crescent-shaped, articulating with the distidorsal concave posterior margin of femur and with the distal sclerite, the latter shaped as a broadly open and rounded V, and providing contact with the small, basidorsal process of tibia**.**

Tibia (Figs 4, 11). Nearly straight, cylindrical, of uniform width, only the dorsal outline slightly curved; ratio L to max W 4.4. *All the ventral face moderately concave, with no vestiture*, the edges of the tibial concavity less sharply delimited than those of the femoral one. Anterior edge with 14, posterior edge with numerous conical tubercles of the same shape as on the femur. Anterior face approximately with 50 black granules, posterior face with several hundred of them. Sculpture of ventral concavity as in the femur. All the faces of foretibia covered with sand-grain granules. Cleaning comb very long, consisting of 40-42 setae. Apicitibial process moderately long, only slightly protruding, with no pointed projection. **Apicitibial armature** (Fig. 12) of 7 straight, spiniform setae: four in ventral

[*] The architecture of the ventral side of forefemur described in the following text is unique among all the Enicocephalomorpha. See Discussion.

[**] For definition and discussion of neopatella (forming a "knee" between femur and tibia) see ŠTYS & BAŇAŘ (2007).

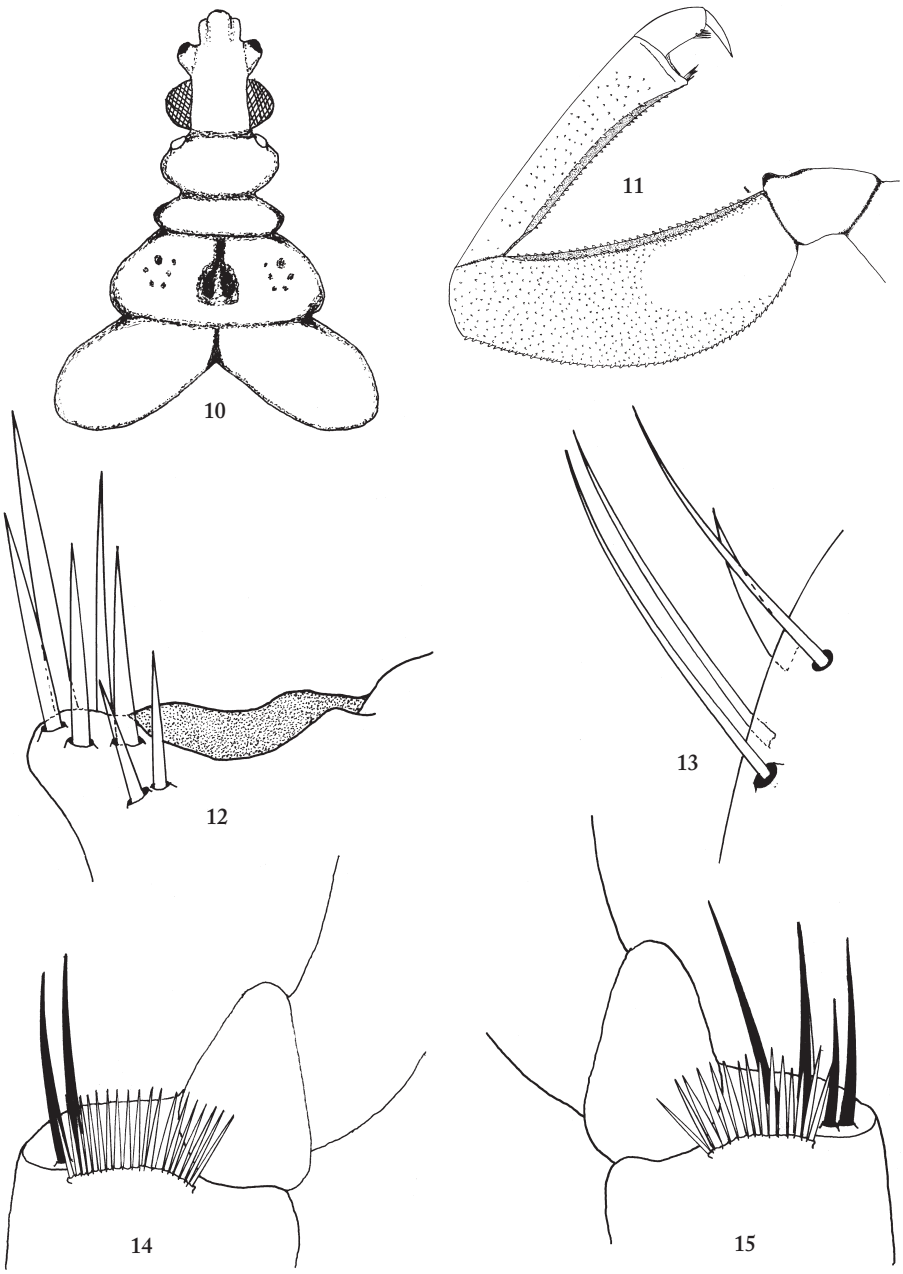

Fig. 10: *Xenicocephalus josifovi* nov. sp., male holotype, head and pronotum, dorsal view.
Fig. 11: *Xenicocephalus josifovi* nov. sp., male holotype, left foreleg, anterior view.
Fig. 12: *Xenicocephalus josifovi* nov. sp., male holotype, left foreleg, apicitibial armature, posterior view.
Fig. 13: *Xenicocephalus josifovi* nov. sp., male holotype, left foreleg, tarsal armature, posterior view.
Fig. 14: *Xenicocephalus josifovi* nov. sp., male holotype, right hindtibia, anterior apicitibial comb.
Fig. 15: *Xenicocephalus josifovi* nov. sp., male holotype, right hindtibia, posterior apicitibial comb.

row, three in dorsal row. Spiniform setae situated (and well visible) exclusively on posterior face and directed outwards (instead of inwards as in the other enicocephalines).

Tarsus one-segmented, cylindrical, narrowing distad. Tarsal armature (Fig. 13) of 1+1 proximal thin, spiniform setae, 1 short and thin distal seta (anterior) and 1 distal spiniform seta (posterior). **Claws:** the anterior one stout and regularly curved, the posterior one reduced in an inconspicuous tubercle.

Specialized sense organs on foreleg. Basal rim of forecoxa anteromesally with coxal rim organ, consisting of cluster of 7-8 badly visible, diversely directed, straight setae. Condylar trochanteral organ of six short setae (Fig. 16). Anterior trochanteral organ (Fig. 17) of 4+2 campaniform sensilla (4 in a row and 2 isolated); posterior trochanteral organ (Fig. 18) of 5+1 campaniform sensilla (5 in straight row and 1 isolated). Anterior femoral organ (Fig. 19) of 5 nearly basal campaniform sensilla (4 in straight row and 1 isolated); posterior femoral organ absent.

Midlegs short and slender, not studied in detail. Femur with conical tubercles on both dorsal and ventral faces, femur and tibia covered by sand-grain granules; no black granules. Tibia strongly curved in basal third, sulcate; apex with two combs. Tarsus 2-segmented, basitarsus very short, nearly without dorsal surface; claws short and thin, moderately curved, the posterior one stouter.

Hindlegs (Figs 6, 14-15, 21-22) relatively long and slender. Anterior face of hindtrochanter with trochanteral organ, consisting of 5+1 campaniform sensilla (Fig. 21), one large isolated campaniform sensillum and two strong, prominent setae. Posterior face of hindtrochanter with trochanteral organ, consisting of 6+1 campaniform sensilla (Fig. 22). Femur with conical tubercles on the dorsal and ventral faces. All faces of femora and tibiae covered with small sand-grain granules. Tibia curved in basal third (Fig. 6), sulcate. Anterior apicitibial comb on hindtibia formed by 19 setae on ventral face and two strong, longer spiniform setae (Fig. 14), posterior comb formed by 15 setae on posterior face and 4 strong, spiniform ventral setae (one short, three longer, subequal in length) (Fig. 15); the spiniform setae not incorporated in combs but situated behind them and more ventrad. Tarsus and claws as on the midleg.

Forewings (Figs 3, 25-26) 2.87 times as long as wide (max), reaching the apex of abdomen. Anterobasal transverse anchor-like vein well developed; anteradial furrow distinct. Details of venation and shape as described and illustrated for *X. giganticus* by W&S, with the following exceptions (situation in *X. giganticus* in parantheses):

- right FW in upper position (x left FW);
- costal margin much more concave in basal third;
- diffusion of the sclerotized material from proximal sectors of remigial veins, veins along costal margin, and particularly the veins on clavus, onto surrounding areas of the wing membrane, the meeting point of AA1+2 and AA3+4 thus forming nearly a plate (x not such a diffusion);
- proportions of veins delimiting the basis of basal cell or associated with the latter different (cf. Figs 25-26 x W&S, Fig. 148A):
- r-m a distinct crossvein (x nearly a point);

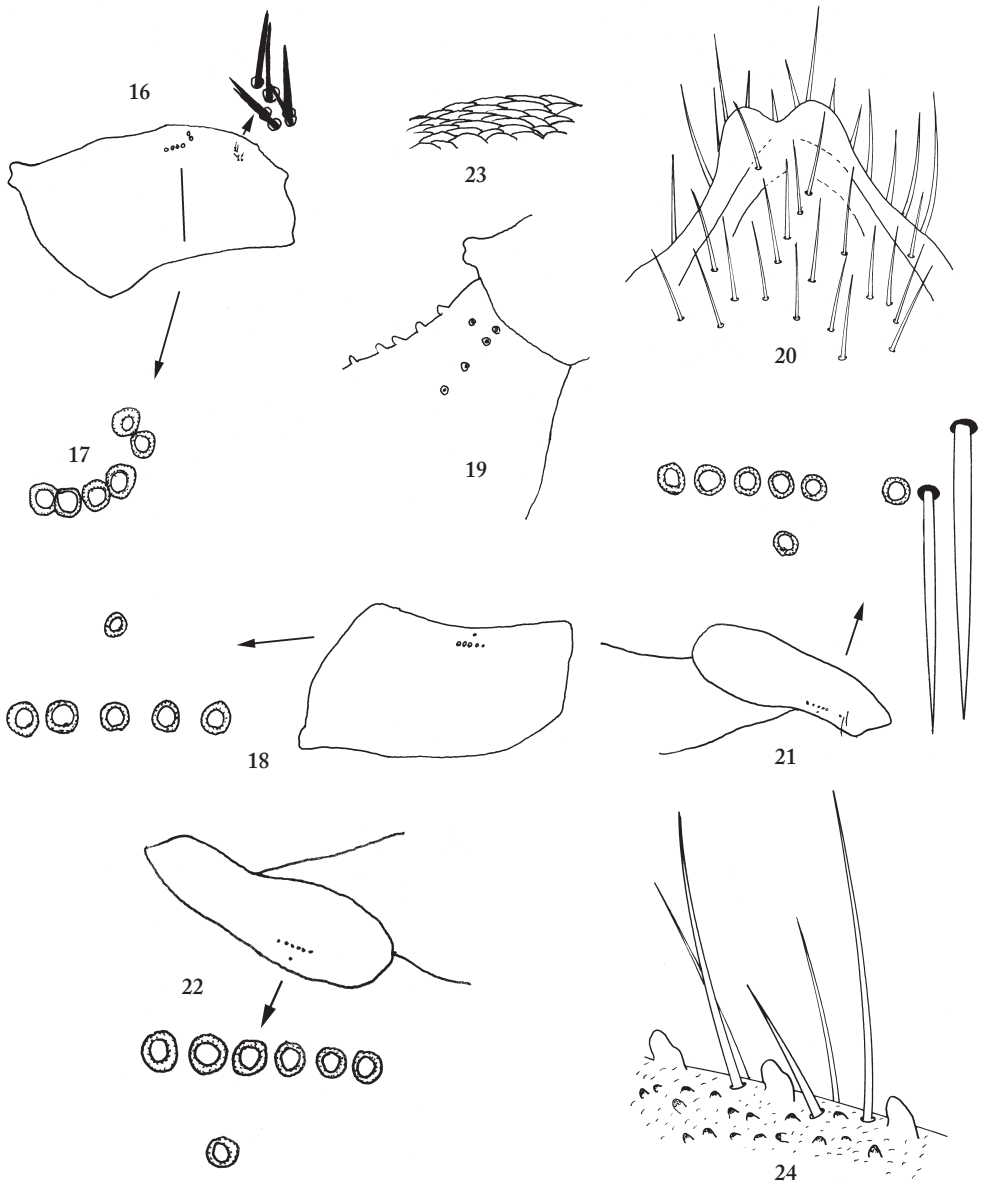

Fig. 16: *Xenicocephalus josifovi* nov. sp., male holotype, foretrochanter, condylar trochanteral organ.
Fig. 17: *Xenicocephalus josifovi* nov. sp., male holotype, foretrochanter, anterior trochanteral organ.
Fig. 18: *Xenicocephalus josifovi* nov. sp., male holotype, foretrochanter, posterior trochanteral organ.
Fig. 19: *Xenicocephalus josifovi* nov. sp., male holotype, forefemur, anterior femoral organ.
Fig. 20: *Xenicocephalus josifovi* nov. sp., male holotype, foretrochanter, detail of trochanteral process.
Fig. 21: *Xenicocephalus josifovi* nov. sp., male holotype, hindtrochanter, anterior trochanteral organ.
Fig. 22: *Xenicocephalus josifovi* nov. sp., male holotype, hindtrochanter, posterior trochanteral organ.
Fig. 23: *Xenicocephalus josifovi* nov. sp., male holotype, forefemur, detail of femoral concavity.
Fig. 24: *Xenicocephalus josifovi* nov. sp., male holotype, forefemur, detail of anteroventral face.

- claval AP branching from AA3+4 distinct (AP not illustrated by W&S);
- vein connecting discal cell with wing margin extremely short;
- FW covering the abdomen, the anterior margins of wings and lateral margins of abdomen coinciding (x abdomen broader and longer than FW - a female character ?).

Hindwings not examined.

Abdomen (Figs 7-9, 27-33) oval, its lateral margins diverging up to intersegmental line 5-6, then converging distad. All the eight pregenital segments and pygophore exposed, little sclerotized (except for parts of the terminalia).

Pregenital dorsum. Mediotergites 1 and 2 fused, delimited by a transverse apodeme, lateral parts amalgamated. Dorsal laterotergite (1&2) triangular, delimited from mediotergite1&2 by anterior longitudinal incisions coinciding with more posterior longitudinal sulci. Mediotergites 3-8 nearly fused with corresponding dorsal laterotergites, no distinct intratergal sulci present, but the original areas clearly separated by longitudinal impressions becoming more pronounced distad and separating dorsal laterotergites (provided with sclerites) from mediotergites (provided with lateral, paired, sclerotized maculae marking the insertions of dorsoventral muscles). Sclerites of dorsal laterotergites 3-5 vaguely delimited, those of 6 and 7 strongly sclerotized and spreading across laterotergal boundaries onto lateral mediotergites; dorsum 8 fully sclerotized; the sclerotized areas always bearing the black cuticular granules. Posterior margin of the more anterior segment (from 1&2 up to 7) always slightly overlapping the anterior margin of the following segment. Posterior margin of dorsum 8 broadly and deeply subrectangularly excised, posterolateral angles of the segment prominent, rounded, subrectangular. Pygophore situated within the excision of segment 8, not at all telescoped.

Anterior part of mediotergite 4 with a simple, minute, ellipsoid, crevice-like, intrasegmental opening of a **dorsoabdominal gland** (Figs 27-28, 30); cuticle surrounding the opening unmodified. Duct of the gland (Fig. 28) thin and non-sclerotized in segment 4; double and wide in segment 5, becoming fully sclerotized in distal half of this segment. In segment 6, the thick **left duct** (Fig. 28) entering a strongly sclerotized proximal part of a horizontally situated **left bulbous reservoir** (Fig. 28) whose distal flat, elongate, diagonal, flask-shaped part, longer than segment 6, is occupying the whole median region of the latter. A short, most proximal part of the left bulbus differentiated from the distal one. The narrow **right duct** (Fig 28) percurrent along mediotergite 6, then forming a loop, turning anterad, and at the anterior margin of mediotergite 6 entering a differentiated proximal part of vertically situated, elongate, **right plate-shaped reservoir** (Figs 30-31), visible in ventral and lateral views only. In ventral view, the right reservoir stretching from distal fifth of segment 5 up to proximal fifth of segment 7.

Connexival edge sharp, strikingly distinct on segments 1-8.

Abdomen - pregenital venter. (Ventrite 1 with sharply delimited and sclerotized triangular ventral laterotergites, and a sclerotized medial part; the latter damaged and, consequently, presence or absence of opening of basiabdominal scent glands not ascertained. All further observations concern an untreated, not cleared specimen.) Each of the ventrites 2-7 subdivided in a medial convex region and lateral flat parts; the latter

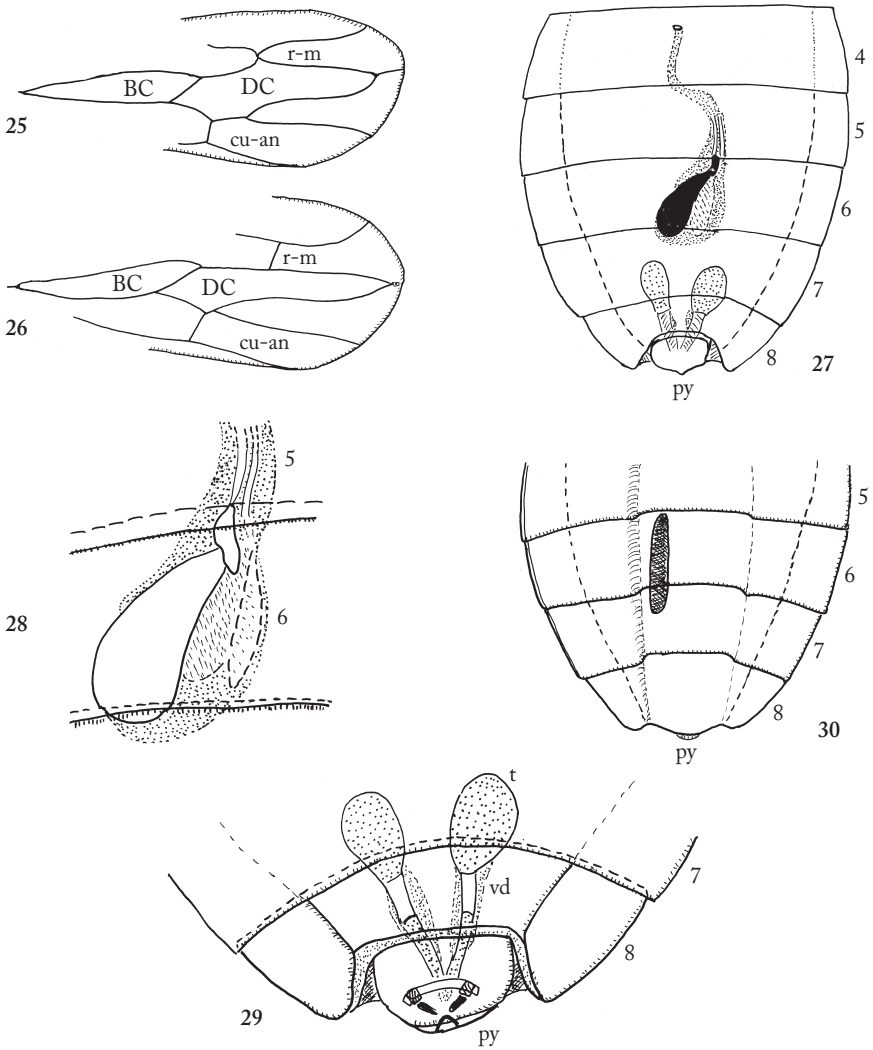

Fig. 25: *Xenicocephalus giganticus*, female, venation associated with the discal cell of forewing (modified from Wygodzinsky & Schmidt, 1991: Fig. 148A), highly schematised. BC - basal cell, DC - discal cell.

Fig. 26: *Xenicocephalus josifovi* nov. sp., male holotype, venation associated with the discal cell of forewing, highly schematised. BC - basal cell, DC - discal cell.

Figs 27-29: *Xenicocephalus josifovi* nov. sp., male holotype, distal part of abdomen and internal organs (dorso-abdominal gland and its reservoirs and reproductive organs as seen through the abdominal cuticle) in dorsal view; coiling of ducts of the resrvoir is not illustrated and laterotergal sclerites are omitted. The right reservoir is visible as a shade only. 27. Total view. 28. Left reservoir; scheme. 29. Terminalia and reproductive organs. Lettering: py - pygophore, t - testis, vd - vas deferens.

Fig. 30: *Xenicocephalus josifovi* nov. sp., male holotype, distal part of abdomen with the right reservoir of dorso-abdominal gland in ventral view (the left reservoir not visible), laterotergal sclerites omitted. Lettering: py - pygophore (part of).

subdivided again in lateral, sclerite-bearing regions and non-sclerotized submedial regions. The sclerite-bearing regions corresponding to ventral laterotergites and provided with black granules; the sclerites indistinctly delimited on segments 2-5, strongly sclerotized and sharply delimited on 6-7. However, no intrasegmental sulci present, except for those delimiting medial part of ventrite 2. Posterior margins of segments 1-7 slightly overlapping anterior margins of the followings segments. Segment 8 fully sclerotized, subdivided only in lateral flat (laterotergal) and medial convex parts; posterior margin bisinuate, formed by three moderately convex lobes, the medial one (functioning as a subgenital plate) about as long but twice as wide as the lateral ones.

Abdominal spiracles 2-8 minute, situated just mesad to laterotergal sclerites, situated in about first fifths of segment width. (Spiracle 1 not found.)

Terminalia (Figs 29, 32-33). **Pygophore** fully exposed on dorsum (only basal tenth covered by segment 8), ventrally covered by **subgenital plate 8**, apparently largely immobile. The visible part (dorsal view) cup-shaped, subtriangular, apically rounded, dorsal bridge (= tergum 9) complete, posterior foramen situated at the dorsal and posterodorsal side. Dorsal area of the foramen with a proximal, arcuate sclerotized strip turning laterov-entrad and disappearing there within the cavity of the pygophore; the strip representing **tergum 10**, distinct from but probably immovably fused with anterior margin of dorsal foramen. A membraneous **segment 11** filling up the mediodorsal part of the foramen, while its mediolateral parts occupied by paired, bipartite, immobile and non-articulating, two-dimensional **parameral sclerites** formed by proximal plate (covered by tergum10 just under its lateral apodemes and easily mistaken for them) and thinner distal rod. In dorsal view, only the thin sclerotized frame of the distal acutangular, apically rounded part of the **guide** is visible. The guide fully visible in posterior view: shaped as a narrow, slightly convex, well sclerotized triangular frame, with apex pointing dorso-anteriorly; the solid base hardly sclerotized, fused with posteroventral wall of the pygophore, its basilateral margins produced into apodemes within the wall. The space between the guide and the membrane containing the parameres filled up by everted, coiled, thin **intromittent organ.**

Paired, spherical **testes** (Fig. 29) situated in distal 3/5 of segment 7; thick **vasa defferentia** retaining paired condition till the proximal margin of the dorsal foramen of pygophore, being dilated in segment 8 in **seminal vesicles.**

Differential diagnosis. *Xenicocephalus josifovi* nov. sp. **(**based on a male) and *X. giganticus* (based on an incomplete female) can be distinguished by some features in the venation of forewing, which are not sex-linked and can hardly be explained by individual variation (schemes in Figs 25-26). The most striking are the following (condition in *X. giganticus* in parentheses - see W&S, Fig. 148A):

- r-m normal cross-vein, as long as cu-an and longer than Cu1a, emanating from apex of discal cell (r-m extremely short, forming a contact point of discal cell with R only, shorter than any other cross-vein and than Cu1a);

- apex of discal cell nearly reaching the margin of wing, Cu1a very short and rather indistinct (apex of discal cell distant from wing margin, Cu1a moderately long and distinct);

- proportions of sectors of longitudinal veins forming the proximal part of discal cell and the associated crossveins strikingly different in both species.

Only the examination of further material of both sexes might test our above characters and reveal further potential differences. The type localities of both species are nearly 2200 km apart and are situated in biotically different Neotropical provinces (Andean and Venezuelan, respectively) - this supports our conviction that two species are involved.

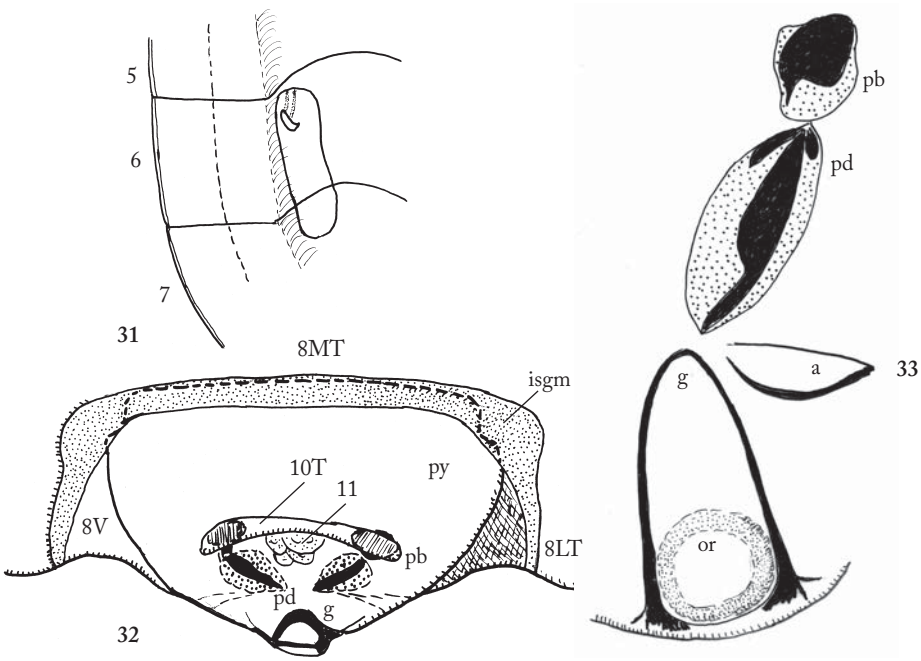

Fig. 31: *Xenicocephalus josifovi* nov. sp., male holotype, right reservoir in dextral, ventro-lateral view; scheme.

Figs 32-33: *Xenicocephalus josifovi* nov. sp., male holotype. 32. Pygophore as observed *in situ* in the posterior foramen of abdominal segment 8, dorsal view. Only the distinct structures are shown (membranous and sclerotized structures of pygophore not clearly distinguishable as well as margins of its posterior foramen). Shapes of minute parameres and guide distorted owing to angle of observation. 33. Genitalia *in situ*; basically dorsal view (slightly more posterior than Fig. 32 - compare the different shape of guide and distance guide - paramere); tentative scheme, open to reinterpretation.

The guide, in truly posterior view, has the same shape as in Fig. 33, only the sclerotized basal part between its arms is distinct. Lettering: 8LT - dorsal laterotergite; 8MT - mediotergite; 8V - dorsal surface of produced part of ventrite 8; 10T - tergum 10; 11 - membraneous, seemingly amorphous valves of segment 11; a - two sublinear apodemes (strikingly black) of unknown homology, precise position and function, situated within the lumen of pygophore; g - guide (in nearly dorsal view); or - orifice representing probably a secondary gonopore through which the coiled ejaculatory duct (?), situated within the pygophore and providing for a tertiary gonopore, may be everted; pb - basal part of a paramere (covered by 10T, and coinciding with its lateral apodeme); pd - distal part of a paramere; py - pygophore (segment 9).

DISCUSSION

1. Discrepancies between original description of *Xenicocephalus* and *X. giganticus* by Wygodzinsky & Schmidt (1991) and our findings in *X. josifovi*

The important discrepancies concern (a) the construction of forefemur and foretibia (studied by W & S in ♀ larva only), (b) number of spines in fore apicitibial armature (ditto) - 3-5 in *X. giganticus*, 7 in *X. josifovi,* (c) composition of the armature of foretarsus (ditto), (d) presence of apicitibial projection in *X. giganticus* (ditto) and its absence in *X. josifovi*, (e) length and width of abdomen relative to forewings (adult ♀ studied by W&S) - broader and longer in *X. giganticus*, equally long in *X. josifovi,* (f) pattern formed by sclerites on dorsum and venter of abdomen (ditto), (g) architecture of apicitibial comb on hindleg (ditto).

Taking into account the unusual accuracy of both Wygodzinsky´s and Schmidt´s studies and particularly their illustrations, we suggest the following tentative assessment of the above discrepancies.

The characters (a), (b), (c) and (d) are possibly larval characters different from adult situation; in this case the statement by W&S "the basic features of the raptorial forelegs in enicocephalids are identical in larva 5 and adults" (modified by PŠ) have no universal validity. Alternatively, these characters may be female characters different from those of adult male. Minor cases of sexual dimorphism in these characters were recorded by W&S in several genera, the only striking case being the Enicocephalinae: Alienatinae, an extremely derived group with winged males and apterous females. However, such variation in number of fore apicitibial spines as recored in *Xenicocephalus* (3-7) is unique and open to doubt. The characters (c) and (d) may, of course, be also species-specific.

There is no doubt that the characters (e) and (f) are sex-linked. We suspect that the ambiguous statement by W&S (p. 201) on architecture of the hind apicitibial combs (not accompanied by an illustration) - "Spines even with arc (i.e. neither within arc, nor outside of it) formed by bristle combs" - might have been caused by erroneous observation: a sex-linked variation of this character is unknown in enicocephalids.

Description of "scent gland auricle" associated with mesothoracic FW grooves of *X. giganticus* as provided by W&S (p. 201) refers actually to a wing-holding device characteristic of the Enicocephalomorpha (Štys 1998).

2. Relationship of *Xenicocephalus*

The general facies of *Xenicocephalus* - flat, broad, robust, short-headed - is unique among the American genera of the Enicocephalomorpha and among Enicocephalidae of the World. Only the Oriental genus *Megenicocephalus* Usinger, 1945 (Megenicocephalinae) with so far single species *M. chinai* Usinger, 1945 from the continental Malaysia is superficially similar by its robust stature, incrassate and curved forefemora and foretibia,

and crested foretrochanter. However, all the elements of the similarity are homoplasic, and *Megenicocephalus* differs strikingly by its universal aposematism, ambulatory forelegs, the three lobes of pronotum indistinctly delimited, presence of incipient costal fracture on forewings, etc. These genera do not share any synapomorphies and cannot belong to the same clade.

On the other hand, despite the below reviewed strange autapomorphies, *Xenicocephalus* clearly belong to the Enicocephalidae: Enicocephalini as assumed by W& S, and as suggested by architecture of pronotum, forewing structure and venation, character of fore apicitibal armature, male pygophore provided with guide and immobile parameres but no other major genital structures, and distinct abdominal tergum 10.

3. Autapomorphies of *Xenicocephalus*

Only a few characters are briefly mentioned since most of them will be studied in future in a broader comparative context.

3.1. Black granules

These cuticular, uniformly black structures are probably unique in the Enicocephalidae. They are definitely not melanization centres, and we must admit a complete ignorance on their biochemical composition and potential function. It seems significant that their unique presence seems to be associated with an equally unique absence of differentiation among the macrotrichia, except for those forming specialized apicitibial and tarsal organs.

3.2. Crested fore trochanter

The crested or tuberculate or otherwise modified fore trochanter (and/or forecoxa) is diagnostic for the Enicocephalidae: Phallopiratinae and Megenicocephalinae, and it occurs mosaic-like also in the Enicocephalinae (e.g., *Xenicocephalus*, *Systellodereslobli* Štys & Baňař, 2007 from New Caledonia). We have already briefly discussed its potential function (Štys & Baňař 2007).

3.3. Apicitibial armature of foreleg

The spiniform or spatulate setae ("platellets") of the apicitibial armature are normally directed inwards, towards the foretarsus with its own armature and towards the claw(s) curved towards the tibial process. When stretched, the foreleg armature is well suited for boring into and thus grasping a soft prey (e.g. chrysomelid larvae; P.Š., pers. observ. on an Australian *Oncylocotis* sp.) or holding a small prey (e.g., a collembolan, P.B., pers.observ. on a Madagascan *Euchelichir* sp.). In *Xenicocephalus*, the spines are directed outwards, can hardly cooperate with the tarsal armature and claws, and a different mode of holding the prey is suggested. As far as we know the situation is unique among the Enicocephalidae.

3.4. Bare and concave ventral faces on forefemur and foretibia

The architecture of forefemora and foretibiae in *Xenicocephalus* has been sufficiently explained and illustrated in the descriptive part; it is unique in all the Heteroptera. Femur and tibia seems to form a raptorial organ (see sub 3.3) serving for holding a rounded, potentially strongly sclerotized prey. We can only suggest that *Xenicocephalus* must be trophically specialized and catches the prey by a unique method.

3.5. Apicitibial armature of hindleg

In most enicocephalids, the apicitibial combs on mid-and hindtibiae are formed by thin macrotrichia (a notable ecception being *Brevidorsus arizonensis* Kritsky, 1977), and the strong, spiniform setae participate in formation of the comb are diversely situated, but nearly always potentially functioning as comb guarding setae. The notable exceptions are *Xenicocephalus* and *Hymenocoris* Uhler, 1892, possibly also *Urnacephala* Wygodzinsky & Schmidt, 1991, in which the setae are situated between the comb and the basitarsus, resembling thus rather a situation on forelegs. Also the high number of spiniform setae in *Xenicocephalus* is unusual. For a review of American genera see W&S: Fig. 14 and SEM photographs within the monograph; there is no review available for the Old World genera.

3.6. Male terminalia

The occurrence of immobile structures representing the parameres which lost the articulation and were transformed in generally flat sclerites is a synapomorphy (?) of most Enicocephalinae (probably paraphyletic) and all the Alienatinae and Megenicocephalinae. The bipartite condition found in *Xenicocephalus josifovi* is highly unusual and requires a new morphological interpretaion.

3.7. Male dorsoabdominal gland

All the enicocephalomorphans possess a single opening of the persisting dorsoabdominal gland onto the abdominal mediotergite 4. Very few data on the gland itself and potential sexual differences in size and degree of persistence are available to allow any generalizations. However, in all the heteropterans examined, in which the gland persists (including a few genera of the Enicocephalinae), the gland(s) is situated direct beneath the opening(s). The described situation in *Xenicocephalus josifovi*, with two large, sclerotized and asymmetrical reservoirs situated far more caudad than the external orifice, is unique. One of us (PŠ) can only recall an existence of a similar, large, plate-shaped and strongly sclerotized reservoir in *Maoristolus* sp. (Aenictopecheidae: Maoristolinae; New Zealand), found during dissection but not sufficiently appreciated and not studied in detail. We included this situation among autapomorphies of *Xenicocephalus*, but our opinion is open to reinterpretation.

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РЕЗЮМЕ

Wygodzinsky & Schmidt (1991) описват *Xenicocephalus giganticus,* nov. gen., nov. sp. (Hemiptera: Heteroptera: Enicocephalomorpha: Enicocephalidae: Enicocephalinae) от Колумбия - видът е описан на базата на една, не запазена изцяло женска; за описанието на рода са използвани и ларви. Ние описваме *Xenicocephalus josifovi* nov. sp. на базата на мъжки екземпляр от Суринам, с нова диагноза на рода и обсъждане на родствените връзки и апоморфиите на рода. Описанието на *X. josifovi* включва също мъжките гениталии и вътрешните репродуктивни органи, дуктуси и резервоари на дорзоабдоминалната жлеза. Потвърдена е класификацията на *Xenicocephalus* в подсем. Enicocephalinae. Нов, уникален сред Enicocephalomorpha и Euheteroptera, тип хватателни предни крака е характерен за род *Xenicocephalus*, който предполага олигофагия със специфична жертва. Конструкцията на резервоарите на дорзоабдоминалната жлеза е уникална - дуктусите започват от един единствен отвор на четвърти медиотергит, двойни са и се отварят в два големи, различни по форма, и изключително склеротизирали резервоари в шести коремен сегмент.

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