

New subtribes and a new genus of Podopini (Heteroptera: Pentatomidae: Podopinae)

Dmitry A. GAPON

Zoological Institute of Russian Academy of Sciences, Universitetskaya nab. 1, St. Petersburg 199034, Russia;
e-mail: TentatDAG@yandex.ru

Abstract. The tribe Podopini is divided into three subtribes: Kayesiina subtrib. nov., Podopina, and Scotinopharina subtrib. nov., differing in the length and shape of jugae, presence or absence of a tooth on the anterior part of bucculae and transverse carinae on pronotum, structure of pygophore, parandria, aedeagus, and female genitalia. *Scotinophara dentata* Distant, 1902, is transferred to a new genus, *Stysiellus* gen. nov., which differs from Scotinopharina in having large pyramidal lateral parandria, characteristic of Podopina, and some other characters. *Stysiellus* gen. nov. is distributed in India and Nepal (new record).

Key words. Heteroptera, Pentatomidae, Podopinae, Podopini, Kayesiina, Podopina, Scotinopharina, *Stysiellus*, taxonomy, new subtribes, new genus, Nepal

Introduction

This paper presents partial results of my extensive work on the phylogeny and classification of the subfamily Podopinae which will be published soon. The main objective of this paper is the description of a new podopine genus. Its placement in the classification and differences from other genera require the erection of subtribes within the Podopini. With great pleasure, I dedicate this paper to an outstanding entomologist, Professor Pavel Štys, for his extensive contributions to the classification of the Heteroptera.

Material and methods

The work is based on extensive material in the collection of the Zoological Institute of the Russian Academy of Sciences (St. Petersburg, ZIN), and material from the American Museum of Natural History (New York), Museum of Natural History (London), National Museum (Prague, NMPC), and the collection of D. A. Rider (Fargo, USA). The aedeagi were studied in a completely inflated state with the use of the method of hydraulic inflating of aedeagus and subsequent drying (GAPON 2001). The terminology of aedeagal parts follows KONSTANTINOV & GAPON (2005).

Results

1. New subtribes of the tribe Podopini

I consider the Podopinae to be a holophyletic taxon. It is divided into two sister groups: the Graphosomatini s. l. and the Podopini (SCHOUTEDEN 1905; SCHAEFER 1981, 1983). The former group is characterised by a reduction of the apical part of the theca and the latter by the pedicellate transverse eyes and division of parandria into lateral and medial parts. The two groups are not homogeneous and each can be divided into holophyletic subgroups. The Podopini are divided here into three subtribes.

Subtribe *Kayesiina* subtrib. nov.

Type genus. *Kayesia* Schouteden, 1903.

Diagnosis. Dorsal surface of head evenly convex. Jugae extended, closed before clypeus. Tooth on anterior part of bucculae present (lost in *Kundelungua* Schouteden, 1951; present in the Graphosomatini). Transverse carina on pronotum absent. Metathoracic scent gland openings located on raised roundish areas (as in *Brachycerocoris* A. Costa, 1863, *Tholagmus* Stål, 1860, and the Deroploini). Latero-apical margins of pygophore with sensory projections (Fig. 2). Parandria divided into lateral and medial parts (Figs. 2, 5) Ventral infolding of pygophore bent dorsad in *Kayesia* (Fig. 2) and lost in *Kundelungua*. Sensory process of paramere small. Ventrolateral lobes of conjunctiva (Figs. 6, 7) present in different groups of the Podopinae, long and membranous (lost in *Kundelungua*). Medial penal plates lying between them, divided into longitudinal bands and apical processes. Body covered with extremely short setae.

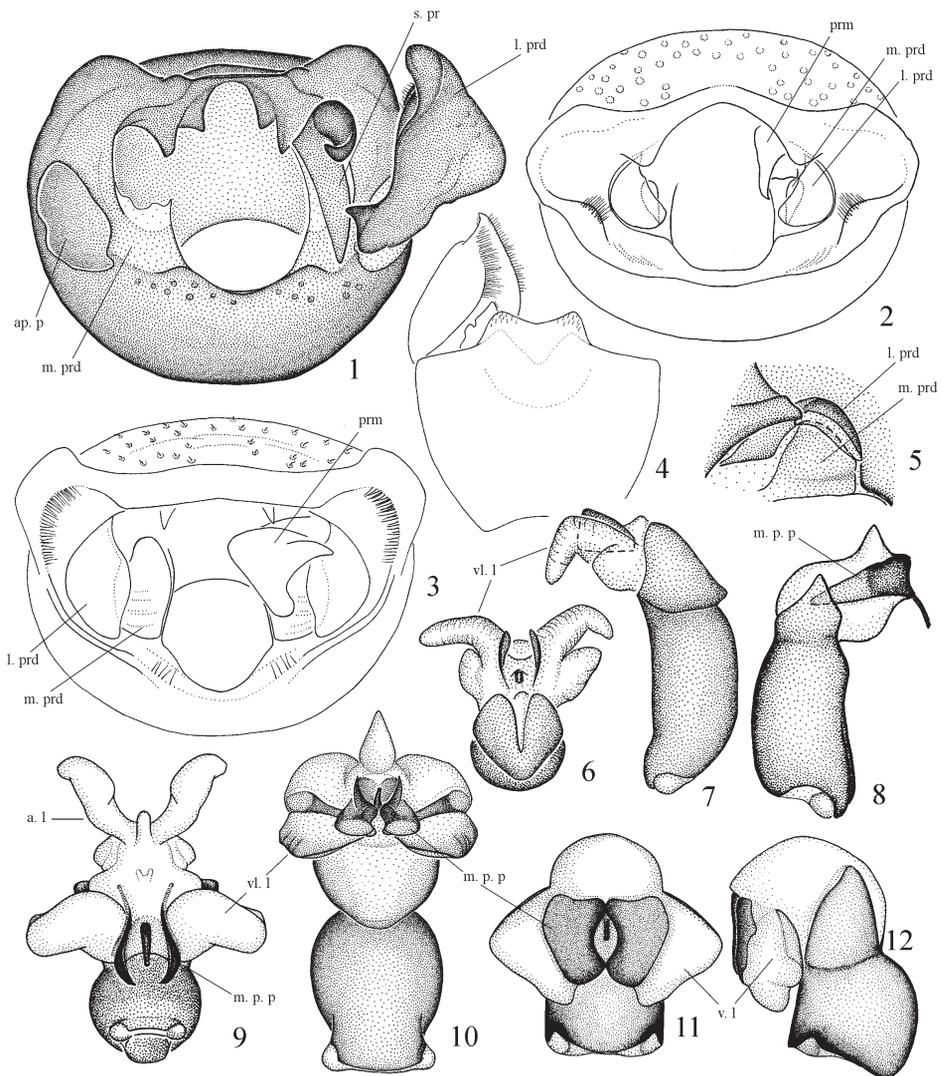
Genera included. *Kayesia* Schouteden, 1903, and *Kundelungua* Schouteden, 1951.

Distribution. Subsaharan Africa.

Subtribe *Podopina* Stål, 1872

Type genus. *Podops* Laporte, 1833.

Diagnosis. Dorsal surface of head convex along midline; tooth on anterior part of bucculae present, in other Podopinae lost. Jugae initially not closed before clypeus. Transverse carina present on pronotum. Metathoracic scent gland openings located on small roundish tubercles surrounded by a large evaporatorium. Parandria (which I consider as homologous of lateral parandria of the *Kayesiina* and *Scotinopharina*) very long and pyramidal (Figs. 1, 4, 14-16), their articulation with latero-apical margins of pygophore mobile. Medial parandria probably transformed into narrow sclerotized bridge strengthening bases of lateral parandria (Figs. 1, 15). Ventral infolding of pygophore not bent dorsad, bearing two acutely angled projections on each side of medial notch (Fig. 14). Sensory process of paramere long (Figs. 1, 15, 17). Large membranous ventrolateral lobes of conjunctiva developed in more primitive representatives (Fig. 9). Medial penal plates lying between them and divided into longitudinal bands and apical processes. The head and the anterior part of pronotum of the *Podopina* bear rather long setae that are absent in the *Kayesiina* and most primitive *Scotinopharina*, but exist in other genera of the *Scotinopharina*.



Figs. 1-12. 1-4 – pygophores (1-3 caudal view, 4 ventral view). 1 – *Podops inunctus* (Fabricius, 1775); 2 – *Kayesia parva* Schouteden, 1903; 3 – *Scotinophara mixta* Linnavuori, 1970; 4 – *Crollius conspersus* Walker, 1867. 5 – parandria of *Kayesia parva* (caudal view). 6-12 – aedeagi (6 – apical view; 7-8, 12 – lateral view; 9-11 – ventral view). 6-7 – *Kayesia parva*; 8 – *Gambiana aspera* (Walker, 1867); 9 – *Podops rectidens* Horváth, 1883; 10 – *Crollius conspersus*; 11-12 – *Amaurochrous cinctipes* (Say, 1828). **a. l** – apical lobe of conjunctiva; **ap. p** – aperture of lateral parandrium; **l. prd** – lateral parandrium; **m. p. p** – median penal plates; **m. prd** – medial parandrium; **prm** – paramere; **s. pr** – sensory process of paramere; **v. l** – ventro-lateral lobe of conjunctiva.

Genera included. The subtribe includes 11 genera and consists of four groups of genera: the *Podops*-group (*Podops* Laporte, 1833), the *Thoria*-group (*Crollius* Walker, 1867, *Severinina* Schouteden, 1903, and *Thoria* Stål, 1865), the *Stysiellus*-group (*Stysiellus* gen. nov.), and the *Amaurochrous*-group (*Allopodops* Harris & Johnston, 1936, *Amaurochrous* Stål, 1872, *Neapodops* Slater & Baranowski, 1970, *Notopodops* Barber & Sailer, 1953, *Oncozygia* Stål, 1872, and *Weda* Schouteden, 1905). Having as yet no possibility to examine *Neapodops* and *Notopodops*, I base their tribal placement on the original descriptions (BARBER & SAILER 1953, SLATER & BARANOWSKI 1970).

Distribution. Palaearctic Region, Africa, India, Nepal, and North America.

Subtribe *Scotinopharina* subtrib. nov.

Type genus. *Scotinophara* Stål, 1867.

Diagnosis. Dorsal surface of head convex along midline. Tooth on anterior part of bucculae lost. Jugae initially not closed before clypeus. Transverse carina present on pronotum. Metathoracic scent gland opening and evaporatorium as in the Podopina. Ventral infolding of pygophore bent dorsad (Fig. 3). Medial parts of parandria standing apart from their lateral parts and appearing as a large plate lying in frontal plane (Fig. 3). Sensory process of paramere short. Ventrolateral lobes of conjunctiva reduced to barely distinguishable vestiges or absent (Fig. 8). Medial penal plates not differentiated into longitudinal bands and apical processes, and lying on lateral surfaces of conjunctiva.

The setae covering the dorsal surface of the body of most primitive representatives of the group are as in the Kayesiina; in other genera, the setae are rather long and dense.

Genera included. The subtribe includes at least nine genera: *Amauropepla* Stål, 1867; *Aspidestrophus* Stål, 1854; *Coracanthella* Musgrave, 1930; *Haullevillea* Schouteden, 1903; *Gambiana* Distant, 1911; *Melanophara* Stål, 1876; *Oncozygidea* Reuter, 1884; *Scotinophara* Stål, 1867; and *Storthechoris* Horváth, 1883.

Distribution. Mainly in the Indo-Malayan and Ethiopian Regions; *Scotinophara sicula* (A. Costa, 1841) is distributed in southern Europe and introduced to North America (ROLSTON et al. 1984).

Note. The genera *Moffartsia* Schouteden, 1908, and *Sepidiocoris* Schouteden, 1903, belonging to the Podopini, and the unplaced genera *Burrus* Distant, 1908, and *Eobanus* Distant, 1901, have not been studied in this work.

2. A new genus of Podopinae

Scotinophara dentata Distant, 1902, was described from India. It differs from other species in the genus by characters which place it in the Podopina, but it cannot be placed in any existing genus and requires the establishment of a separate genus.

Stysiellus gen. nov.

Type species. *Scotinophara dentata* Distant, 1902.

Description. Body (Fig. 13) rather small, its dorsal and ventral surfaces equally slightly convex. Coloration yellowish with head, anterior part of pronotum, points of punctation, and

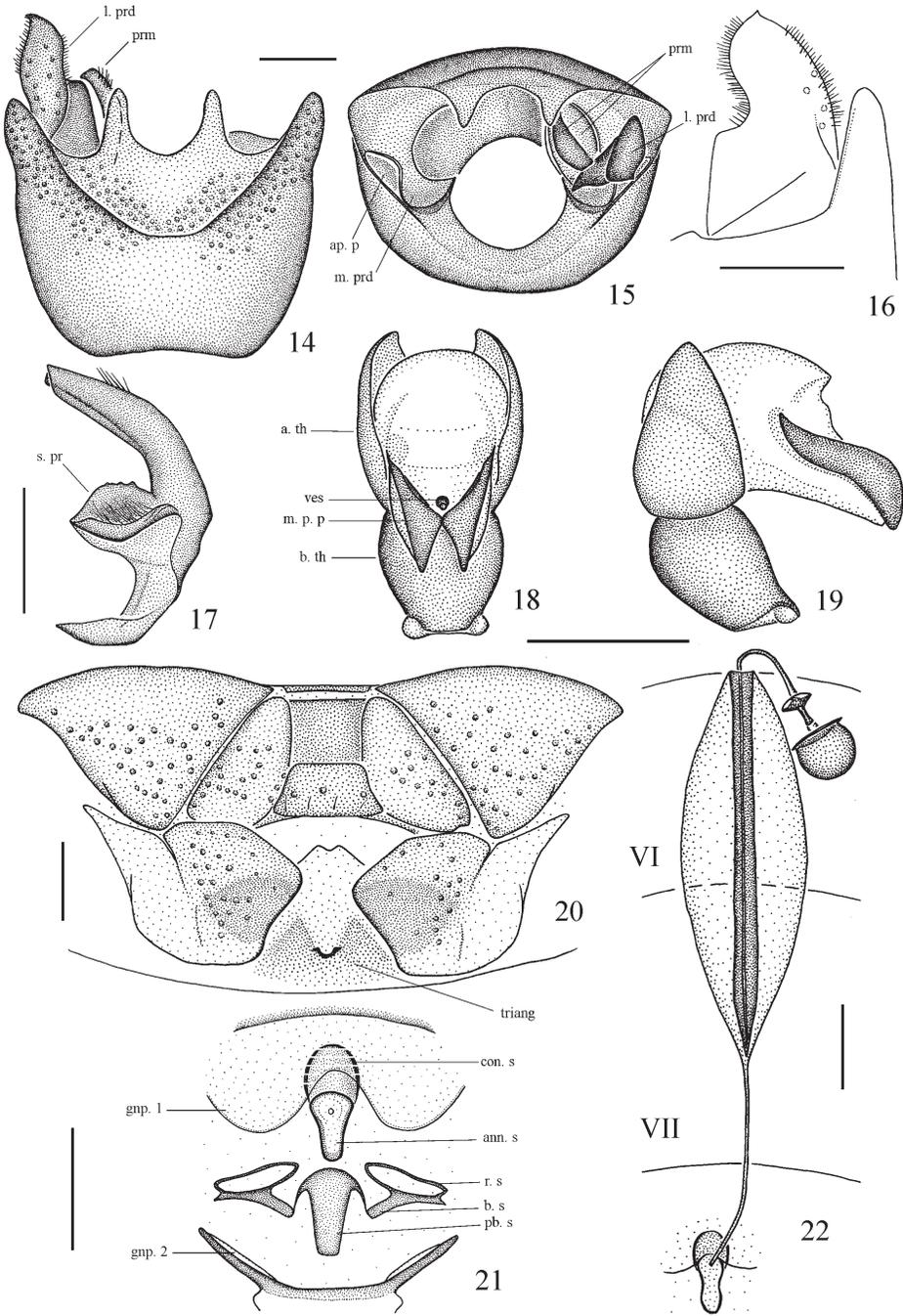


Fig. 13. *Stysiellus dentatus* (Distant, 1902), habitus.

ventral surfaces of abdomen except its sides dark brown. Pubescence short, accumbent on head, anterior part of pronotum and ventral surfaces of abdomen, and partly raised on other parts of body.

Head wider than long, not inclined. Eyes pedicellate, slightly wider than long. Preocular part of head wide, parabolically narrowed anteriorly. Jugae with hardly appreciable lateral notches and smoothly bent lateral angles, very weakly extending beyond clypeus, not converging. Clypeus evenly narrow, its base and frons very weakly convex. Dorsal surface of head with pale narrow longitudinal stripe and pale apices of jugae. Points of punctation very small, dense, absent on small areas at postero-internal margins of eyes. Bucculae evenly low on all length, with a straight inferior margin, without tooth on anterior part. Rostrum reaching middle of metacoxae. Antenniferous tubercles with very small teeth. Antennae 5-segmented, basal segments pale, segments 4 and 5 dark.

Pronotum. Anterior margin of pronotum weakly concave, with thin elevation. Lateral margins of pronotum straight or very weakly convex in anterior part and slightly concave in posterior part, with thin pale rib, bearing 4-5 small denticles directed laterad and caudad. Teeth on anterior angles of pronotum large, directed anteriorly and laterad. Lateral angles of pronotum in anterior part with small tooth directed laterad and widely rounded in posterior part. Anterior and posterior portions of pronotal disk nearly evenly high. Anterior portion of disk



with strongly smoothed tubercle on each side and wide pale cicatrices around it. Transverse carina behind them strongly smoothed. Transverse impression of disk superficial but distinct along the whole length. Narrow smooth pale medial line without punctation situated in anterior and middle parts of pronotum. Points of punctation moderately large, superficial.

Mesothorax. Scutellum almost reaching apex of abdomen, leaving connexivum and most of corium exposed, its base slightly wider than distal part. Lateral margins of scutellum with deep notches and strongly convex distal area. Impressions in basal corners of scutellum superficial. Basal elevation of scutellum very low, with unclear contours. Calloused areas in lateral corners small, roundish. Punctation on scutellum as on pronotum. Scutellum with five longitudinal yellow lines without punctation, external ones wider, blurry, not reaching apex of scutellum; paired internal lines narrower, more separate basally, approximated and parallel elsewhere; medial line short, located between converging bases of internal lines and narrowing distad. Corium with yellow areas lacking punctation along border of exocorium. Posterior margin of mesopleurite with rather narrow strip of poriferous cuticle forming large folds.

Metathorax. Scent gland opening on small roundish tubercle, with very small tubercle near anterior edge of gland aperture. Evaporatorium large, narrowed in distal part, its surface forming rather large folds. Sterna of all segments of thorax very slightly bent, almost flat, covered with short felt-like pubescence.

Legs pale. Femora and bases of tibiae covered with small brown spots; anterior surfaces of femora before apex with two obscure brown rings divided by light area.

Abdomen. Laterotergites of connexivum pale, with blackish antero-lateral corners. Posterior angles of abdominal segments with small pale tubercles. Base of abdominal ventral surface with transverse impression but without tubercle or longitudinal impression.

Pygophore (Figs. 14-15) wider than long. Latero-apical angles strongly protruded apicad with narrowly rounded apices. Dorsal infolding of pygophore weakly separated, bent ventrad, with deep wide notch. Lateral infoldings narrow; ventral infolding slightly bent dorsad. Ventro-apical margin of pygophore with deep rounded lateral notches, slightly bent in medial part. Projections on each side of medial notch of ventral infolding very strongly elongate, equal to latero-apical angles of pygophore in size. Impression of ventral walls of pygophore deep and wide, with very distinct edge. Bridges (medial parandria) separating lateral parandria rather wide, narrowed ventrad, with bent surfaces in dorsal part. Aperture of lateral parandrium detached by these bridges small. Lateral parandria much longer than latero-apical angles of pygophore (Fig. 16), their dorsal margins straight, without tooth at base, with notch in middle of length. Inner surface of lateral parandria with slanting impression; outer surfaces weakly

Figs. 14-22. *Stysiellus dentatus* (Distant, 1902). 14-15 – pygophore (14 – ventral view; 15 – caudal view). 16 – left parandrium (dorso-lateral view). 17 – right paramere (lateral view). 18-19 – aedeagus (18 – ventral view; 19 – lateral view). 20 – external genitalia of female (ventral view). 21 – gonapophyses and gynatrial sclerites (ventral view). 22 – spermatheca. Scale bars = 0.25 mm. **a. th** – apical part of theca; **ann. s** – annular sclerite of gynatrium; **ap. p** – aperture of lateral parandrium; **b. s** – basal sclerites of gynatrium; **b. th** – basal part of theca; **con. s** – conoid sclerite of gynatrium; **gnp. 1, 2** – gonapophyses 1 and 2; **l. prd** – lateral parandrium; **m. p. p** – median penal plates; **m. prd** – medial parandrium; **pb. s** – parabasal sclerite of gynatrium; **prm** – paramere; **r. s** – ring sclerites, **s. pr** – sensory process of paramere; **triang** – triangulum; **ves** – vesica.

convex; all surfaces, especially internal one in distal part, densely covered with raised setae. Apices of lateral parandria narrow.

Paramere (Figs. 14-15, 17). Basal plate not large. Small stalk and body of paramere moderately narrow and long. Sensory process long and wide, rounded in apical view. Hypophysis long, smoothly bent forward, triangular in transverse section. Apex of hypophysis truncated, outer angle of its apex slightly longer than inner. Outer surface of hypophysis bearing several setae.

Aedeagus (Figs. 18-19). Phallobase. Caudal ends of plates of phallobase not reaching half of basal part of theca. Ventral processes of phallobase very short. Dorsal connectives short. Capitulate processes with distinct small stalks and large rounded plates perpendicular to the processes, each with perpendicular carina. Theca. Basal part of theca strongly sclerotized, with rather strong convex dorsal wall and straight ventral wall. Apical part of theca sclerotized more weakly than basal part; length of each nearly equal. Latero-apical angles of apical part of theca strongly oblong, narrowly rounded, extending beyond apex of conjunctiva. Dorso-apical notch of apical part of theca deep and rounded. Conjunctiva. Ventrolateral lobes of conjunctiva absent. Apex of conjunctiva weakly convex and appearing as a low dome. Ventral lobe of conjunctiva large. Longitudinal bands of medial penal plates narrow and parallel at base; these bands smoothly converging in ventral view and expanding in lateral view. Apical processes of medial plates wide, with truncate apices. Upper angles of apical processes touching each other. Membrane of inferior wall of ventral lobe long and visible in lateral view. Vesica appearing as a very short and rather wide tube.

Female genitalia. Gonocoxae 1 with large anterior parts lying under posterior margin of sternum VII in repose (Fig. 20). Posterior margins of gonocoxae 1 convex in lateral part and bent in medial part. External surface of gonocoxae 1 along posterior margin with several strong setae, internal surface without impression near medial margin. Medial plate short, without impression, with several strong setae. Paratergites IX wide in anterior part, narrowed caudad, with straight outer margins, not extending beyond posterior margin of proctiger and not covering inner angles of paratergites VIII; the latter large, about as long as wide, with weakly convex posterior margins and without spiracles. Triangulum weakly sclerotized at base, with slightly oblong and narrowed apex. Vestiges of first gonapophyses visible as rather large membranous folds (Fig. 21). Vestiges of second gonapophyses very small. Gynatrial sclerites (Fig. 21). Parabasal sclerite rather large, longitudinal, with straight lateral margins, slightly extending anteriorly, with convex anterior margin. Basal sclerites longitudinal, very narrow, their anterior ends connected with large round sclerites, posterior ends connected to anterior part of parabasal sclerite by thin bands. Annular sclerite roundish in anterior part and strongly extended in posterior part. Conoid sclerite brought closer to annular sclerite, longer than wide, with widely rounded apex. Spermatheca (Fig. 22). Proximal part of spermathecal duct nearly reaching anterior margin of sternum VII. Medial part of duct reaching middle of sternum V. Proximomedial part of duct (membranous dilation) without sharp constriction proximally, distimedial part (sclerotized rod) rather wide, without dilatation before strongly narrowed posterior end. Visible distal part of spermathecal duct and spermathecal capsule as long as pump. Capsule oblong, without processes.

Comparative notes. *Stysiellus* gen. nov. differs from the Scotinopharina by having large pyramidal lateral parandria, a long sensory process of paramere, and the ventral infolding of pygophore not bent dorsad (or absent?). It forms its own group in the subtribe Podopina close to the *Thoria*-group and especially to the *Amaurochrous*-group. These three groups differ from *Podops* by a strong reduction of the ventrolateral lobes of conjunctiva (Figs. 10-12, 18-19), absence of the apical lobes of conjunctiva, expanded sensory process of paramere (Figs. 1, 15, 17), and rather short hypophysis of paramere. *Stysiellus* gen. nov. differs from the *Amaurochrous*-group by the dentate lateral margin of pronotum, absence of the tooth at the base of the dorsal margin of lateral parandria (characters developed probably independently in the *Thoria*-group), narrow medial penal plates divided into longitudinal bands and apical processes located in the sagittal plane in repose, absence of lateral membranous parts of the ventral lobe of conjunctiva, and longer latero-apical angles of pygophore. *Stysiellus* gen. nov. and the *Amaurochrous*-groups differ from the *Thoria*-group in the strongly protruded latero-apical angles of pygophore (Fig. 14), deep notches in lateral parts of the ventro-apical margin of pygophore, weakly convex outer surfaces of lateral parandria, absence of the ventrolateral lobes of conjunctiva (Figs. 11-12, 18-19), tubercles on its dorsal wall, and the oblong annular gynatrial sclerite.

Etymology. This genus is dedicated to Professor Pavel Štys. The gender is masculine.

Composition. The genus is monotypic.

***Stysiellus dentatus* (Distant, 1902), comb. nov.**

(Figs. 13-22)

Scotinophara dentata Distant, 1902: 75.

Material examined. NEPAL: 'Rapti Tal Jhwani, 200 m, V.1967 (Dierl-Fortster-Schacht) (Staatslg. München)', 1 ♂ 1 ♀ (NMPC), 1 ♂ (ZMAS).

Description. Coloration and structure as in description of the genus.

Measurements (all in mm). Total length 5.90-7.40, width of pronotum 3.30-3.90, length of pronotum 1.45-1.75. Length of head 2.75-3.40, width of head 3.45-3.90, intraocular width 1.18-1.35, intraocellar width 0.73-0.83. Lengths of antennal segments I-V equal to 0.33, 0.35, 0.45, 0.48, and 0.85. Length of scutellum 3.15-4.13, width of scutellum at base 2.23-2.63, width of scutellum in distal portion 1.95-2.53.

Bionomics. Unknown.

Distribution. *Stysiellus dentatus* is distributed in West Bengal in northeastern India (Distant 1902) and in southern Nepal in the Himalayan foothills (new record).

Acknowledgements

I am grateful to I. M. Kerzhner (St. Petersburg, Russia) for help in the preparation of this paper and to P. Kment (Prague, Czech Republic), D. A. Rider (Fargo, USA), R. T. Schuh (New York, USA) and M. Webb (London, Great Britain) for providing material for this study.

References

- BARBER H. G. & SAILER R. I. 1953: A revision of the turtle bugs of North America (Hemiptera: Pentatomidae). *Journal of the Washington Academy of Sciences* **43**:150-162.
- DISTANT W. L. 1902: Rhynchota. Vol. I (Heteroptera). In: BLANFORD W. T. (ed.): *The fauna of British India, including Ceylon and Burma*. Taylor & Francis, London, xxviii + 438 pp.
- GAPON D. A. 2001: Inflation of heteropteran aedeagi using microcapillaries (Heteroptera: Pentatomidae). *Zoosystematica Rossica* **9(1)**: 157-160.
- KONSTANTINOV F. V. & GAPON D. A. 2005: K stroeniyu edeagusa klopov-shchitnikov (Heteroptera, Pentatomidae). I. Podsemeystva Discocephalinae i Phyllocephalinae. (On the structure of the aedeagus in shield bugs (Heteroptera, Pentatomidae): 1. Subfamilies Discocephalinae and Phyllocephalinae). *Entomologicheskoe Obozrenie* **74**: 334-352 (in Russian, English summary; translated in *Entomological Review* **85**: 221-235).
- ROLSTON L. H., HOBERLANDT L. & FROECHNER R. C. 1984: Scotinophara sicula A. Costa, a Mediterranean species in the Virgin Islands (Hemiptera: Pentatomidae: Podopinae). *Proceedings of the Entomological Society of Washington* **86**: 266-268.
- SCHOUTEDEN H. 1905: *Heteroptera, Fam. Pentatomidae. Subfam. Graphosomatinae. Genera Insectorum. Vol. 30*. Wytzman, Bruxelles, 46 pp + 3 pls.
- SCHAEFER C. W. 1981: Genital capsules, trichobothria, and host plants of the Podopinae (Pentatomidae). *Annals of the Entomological Society of America* **74**: 590-601.
- SCHAEFER C. W. 1983: Host plants and morphology of the Piesmatidae and Podopinae (Hemiptera: Heteroptera): further notes. *Annals of the Entomological Society of America* **76**: 134-137.
- SLATER J. A. & BARANOWSKI R. M. 1970: A new genus and species of turtle bug from southern Florida (Hemiptera: Pentatomidae). *Florida Entomologist* **53**:139-142.