

Two new species of *Kokeshia* from India and Thailand (Hemiptera: Heteroptera: Schizopteridae)

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Abstract. *Kokeshia stysi* sp. nov. (India) and *K. oroszi* sp. nov. (Thailand) (Heteroptera: Schizopteridae) are described. A key for the identification of the known species of *Kokeshia* is presented.

Key words. Heteroptera, Dipsocoromorpha, Schizopteridae, *Kokeshia*, new species, India, Thailand

Introduction

The schizopterid genus *Kokeshia* was established by MIYAMOTO (1960) to accommodate his new species *K. esakii* Miyamoto, 1960, from Japan. Shortly after that, the morphology of the alimentary tract of *K. esakii* was studied by the same author (MIYAMOTO 1961). ŠTYS (1985) described two further new species, *K. martensi* Štys, 1985, and *K. similis* Štys, 1985, both from Nepal, provided an extensive morphological treatment of *K. martensi*, and discussed the diagnostic characters as well as the evolutionary significance of the genus. An additional species, *K. hsiao* Ren & Zheng, 1992, was described by REN & ZHENG (1992) from Zhejiang Province, eastern China. *Kokeshia* currently contains the above four species, and no other authors have ever provided original data on the genus.

Among unidentified material deposited in the Hungarian Natural History Museum (HNHM), Budapest, specimens representing two undescribed species of *Kokeshia* were found. These are described as new in the present paper.

Materials and methods

Structures were examined using an optical microscope (XSZ-N107). Drawings were made using a camera lucida. Measurements were taken using a micrometer eyepiece at magnifications up to 400x. Male genitalia were examined after a short clearing in 10% KOH solution. The terminology follows ŠTYS (1985) except parts of the phallus.

The locality data of the type material are cited verbatim; a slash (/) is used for dividing data on different rows of the same label, and double slash (//) for dividing data on different labels.

Taxonomy

Kokeshia Miyamoto, 1960

Kokeshia Miyamoto, 1960: 163. Type species: *Kokeshia esakii* Miyamoto, 1960, by original designation. *Kokeshia*: MIYAMOTO (1960) (original description, nymphs); MIYAMOTO (1961) (alimentary tract); EMSLEY (1969) (morphology, systematics, subfamily placement, catalogue); ŠTYS (1970) (morphology, systematics); ŠTYS (1985) (new species, morphology, systematics); REN & ZHENG (1992) (new species); KERZHNER (1995) (catalogue).

Kokeshia stysi sp. nov.

(Figs. 1-5, 7-13)

Type locality. India, West Bengal, Darjeeling District, 3 km S of Ghum, Senchal Reserve Forest [ca. 27°0'17.23"N and 88°15'46.53"E].

Type material. HOLOTYPE: ♂ (macropterous), 'INDIA, W.Bengal, / Darjeeling Distr., / 3 km S. of Ghum / leg. Gy.Topál // No. 340 sifted / moss samples / 19.IV.1967' (mounted on card, abdomen detached, glued on the same card separately in intact condition) (HNHM). PARATYPES: same labels as holotype: 1 ♂ (macropterous, incomplete and in bad condition, dissected, fragmented, mounted on slide in Euparal 3C 239, used for the illustrations) and 7 ♀♀ (brachypterous, mounted separately on cards) (HNHM).

As the macropterous males and brachypterous females were extracted from the same moss sample, the two sexes of this species can be associated with high confidence.

Description. Macropterous male. Colour. Fore wings light brown; head, pronotum, scutellum and fore wing veins slightly darker; abdomen light brown; appendages yellowish brown.

Structure. General facies (Fig. 1) and external morphology as in *Kokeshia martensi* Štys, 1985, except when indicated otherwise.

Head strongly declivent, interocular distance about 0.67 times as wide as diatone, eyes small. Pronotum about 1.8 times as wide between humeri as median length. Fore wing tegminal, surpassing greatly apex of abdomen, shape and venation as in Fig. 1. Fused apical portion of free distal remigial vein abruptly and subtruncately terminating before margin (Fig. 3); vein distally delimiting marginal postfractural cell moderately oblique. Pregenital abdomen (Fig. 5) symmetrical; subgenital plate (sternum VII) wide, symmetrical, posterior margin widely rounded, slightly truncate, much wider than pygophore, entirely covering terminalia in ventral aspect.

Male terminalia. Tergum VIII (Fig. 7) subdivided into asymmetrical hemitergites; left hemitergite with a horizontal brush composed of thick, spiniform microtrichia; right hemitergite triangularly projecting posteriad, right laterotergite not separated from hemitergite (examined in detached pygophore too). Pygophore (Fig. 7) with slight dextral asymmetry, proximally separated by segment X. Proctiger (Fig. 7): segment X directed slightly dextrally, simple; segment XI very short, not surpassing lateral outline of segment X in dorsal view. Parameres asymmetrical (Figs. 7, 9-12); left paramere (Figs. 9-10) with an oval base provided with a smaller anterior and a longer posterior extension, hypophysis simple, flattened, directed mesad; right paramere (Figs. 11-12) similar, with an oval base provided with a wide, rounded posterior

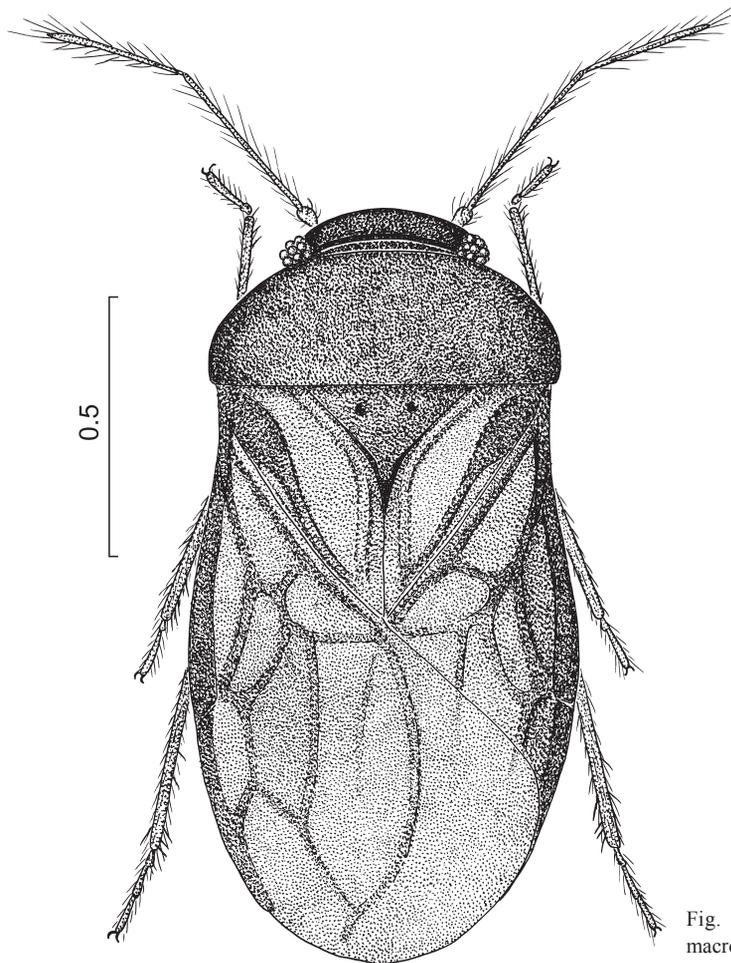
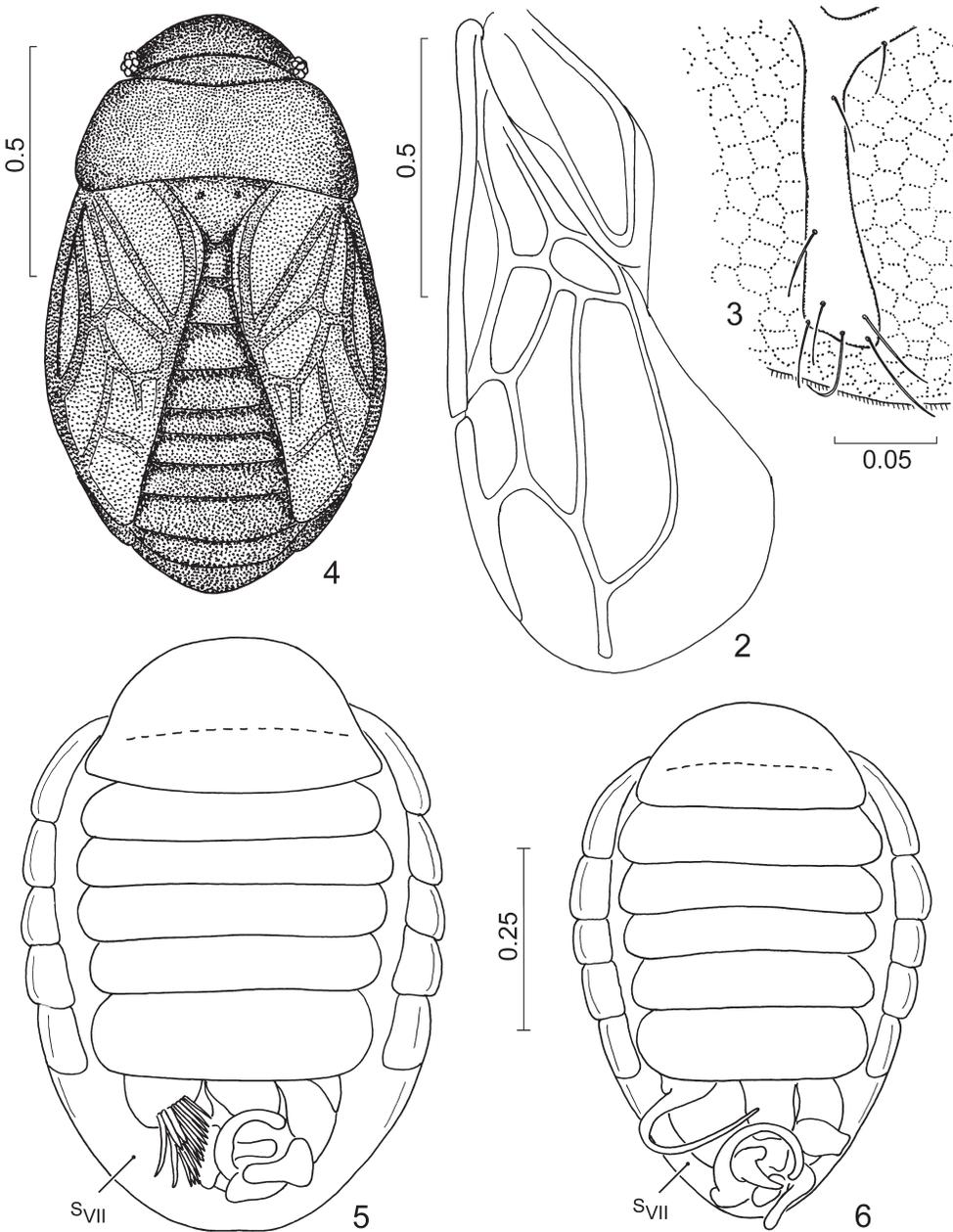


Fig. 1. *Kokeshia stysi* sp. nov., macropterous male. Scale in mm.

extension, hypophysis simple, flattened, apically subtruncate. Phallus (Fig. 13): basal plate slightly asymmetrical; with a stout 'body' provided with a large, wide left process at its base and a narrow, elongate right process close to its apex; with a tubular, curved, relatively stout apical part protruding from pygophore, external part forming slightly more than a half coil, provided with crest-like sclerites. The possible homologies of the different parts of phallus are touched upon in the Discussion.

Measurements (holotype) (in mm). Body length from apex of head to apex of fore wings as visible in dorsal view 1.39; width of head 0.407, interocular distance 0.272; length of pronotum along meson (including collar) 0.679, length of collar along meson 0.073, humeral width 0.373, length of fore wing 1.178.



Figs. 2-6. 2-5. *Kokeshia stysi* sp. nov. 2 – left fore wing of macropterous male; 3 – apex of free remigial vein of fore wing; 4 – habitus of brachypterous female; 5 – male abdomen, dorsal view. 6 – *Kokeshia oroszi* sp. nov., male abdomen, dorsal view. Lettering: s_{vii} – sternum VII. Scales in mm.

Table 1. Differentiating characters of *Kokeshia stysi* sp. nov. and *K. martensi* Štys, 1985.

<i>Kokeshia stysi</i> sp. nov.	<i>Kokeshia martensi</i> Štys, 1985
1. Fused apical portion of the free distal remigial vein terminating before margin with a subtruncate apex.	Fused apical portion of the free distal remigial vein terminating before margin with a clavate apex.
2. Brush-shaped structure of left hemitergite of tergum VIII of male formed by less numerous and distinctly thicker microtrichia.	Brush-shaped structure of left hemitergite of tergum VIII of male formed by several narrow, hair-like microtrichia.
3. Right laterotergite of tergum VIII of male not separated from hemitergite.	Right laterotergite of tergum VIII of male distinctly separated from hemitergite
4. Segment XI of male very short.	Segment XI of male elongate, dextrally and dorsolaterally protruding.
5. Basal part of right paramere with a distinct, wide, rounded posterior extension.	Basal part of right paramere without posterior extension.
6. Curved apical part of phallus protruding from pygophore forming slightly more than a half coil.	Curved apical part of phallus protruding from pygophore forming almost one complete coil.

Brachypterous female. Colour. More or less uniformly light brown; appendages yellowish brown.

Structure. General facies as in Fig. 4; body wide oval, about 1.7 times as long as greatest width. Head strongly declivent, interocular distance about 0.75-0.85 times as wide as diatone, eyes small. Pronotum about 1.9-2.0 times as wide between humeri as median length. Fore wings tegminal, brachypterous, moderately convex, claval fracture not differentiated, reaching from anterior margin to middle of tergum VII. Posterolateral margin of tergum IX simply rounded.

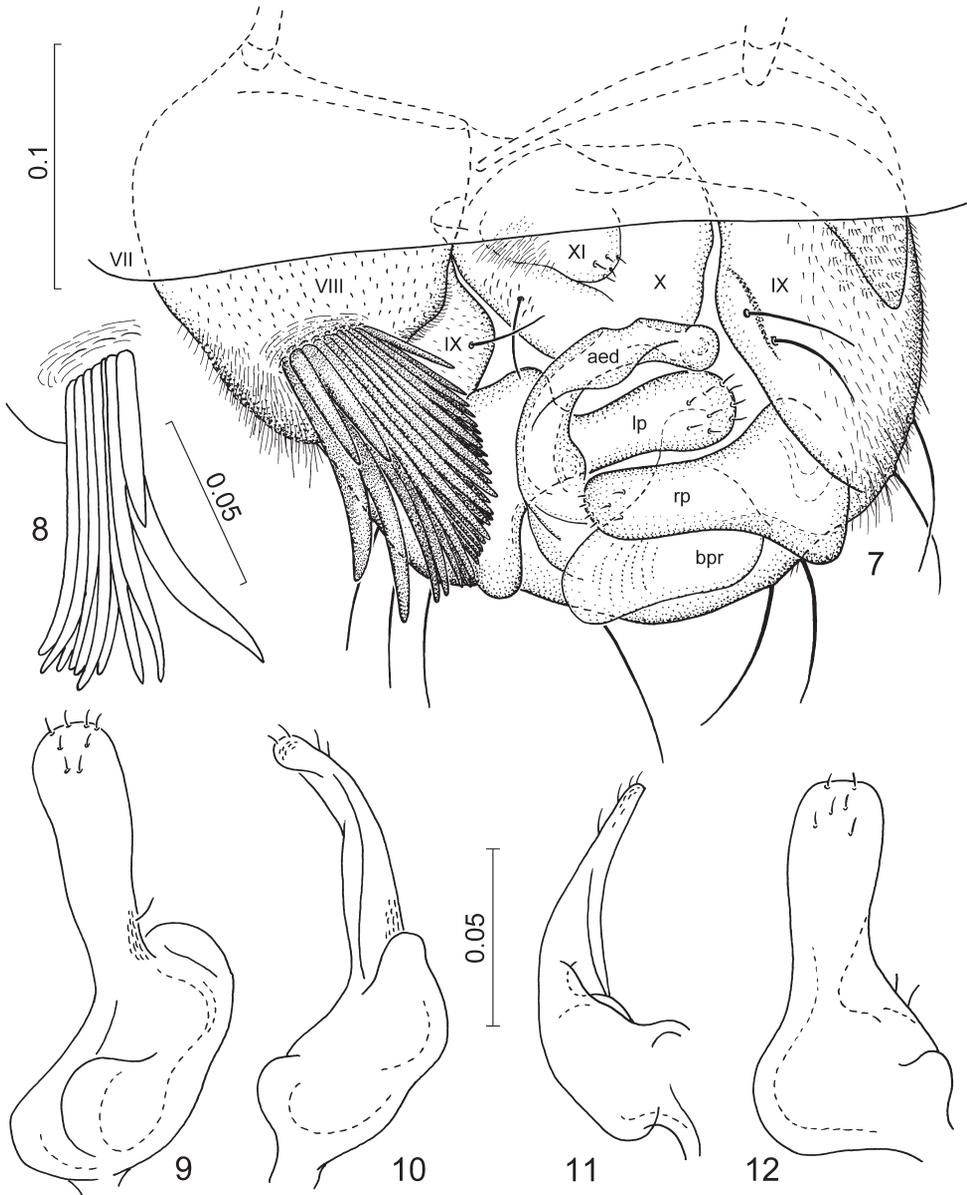
Measurements (n = 5) (in mm). Body length from apex of head in dorsal view to apex of sternum VIII 1.07-1.13; width of head 0.352-0.383, interocular distance 0.291-0.321; length of pronotum along meson (including collar) 0.283-0.291, humeral width 0.581-0.597, length of fore wing 0.597-0.719.

Differential diagnosis. *Kokeshia stysi* sp. nov. markedly differs from all known congeners except *K. martensi* Štys, 1985, by having a brush of spiniform microtrichia on the left hemitergite of tergum VIII in male. The male of this new species is rather similar to that of *K. martensi* and the two species are very probably closely related phylogenetically. The differences of the new species and *K. martensi* are given in Table 1.

Etymology. It is a pleasure to dedicate this new species to Prof. Pavel Štys, in recognition of his outstanding contributions to Dipsocoromorpha as well as various other groups of true bugs on the occasion of his 75th birthday.

Locality and habitat notes. According to Gy. Topál's collecting diary deposited in the HNHM, the specimens have been sifted from moss growing on tree trunks in Senchal Reserve Forest, 2200 m a.s.l.

Distribution. India (West Bengal).



Figs. 7-12. *Kokeshia stysi* sp. nov., male. 7 – pygophore, in situ, dorsal view; 8 – microtrichial brush of left hemitergite of tergum VIII, lateral view; 9-10 – left paramere, two different aspects; 11-12 – right paramere, two different aspects. Lettering: aed – aedeagus (= processus gonopori sensu ŠTYS (1985), see text), bpr – basal process of phallus, lp – left paramere, rp – right paramere. Scales in mm.

***Kokeshia oroszi* sp. nov.**

(Figs. 6, 14-18)

Type locality. Thailand, Trang Province, Khao Chong Botanical Garden [ca. 7°33'20.35"N and 99°47'38.28"E].

Type material. HOLOTYPE: ♂ (macropterous), 'THAILAND: Prov. Trang, / Khao Chong Bot. Garden, / at the staff center // at light, 27. 11. 2003 / leg. A. Orosz & Gy. Sziráki' (glued on the triangle, abdomen preserved in intact condition in plastic microvial with glycerine, pinned with the specimen) (HNHM).

Description. Macropterous male. Colour. General body colour, including appendages, light brown; head and anterior half of pronotum (excluding collar) distinctly darker brown.

Structure. General facies and external morphology as *Kokeshia martensi* Štys, 1985, except when indicated otherwise.

Head strongly declivent, interocular distance about 0.87 times as wide as diatone, eyes small. Pronotum about 1.87 times as wide between humeri as median length. Fore wing tegminal, surpassing greatly apex of abdomen; fused apical portion of free distal remigial vein clavately terminating before margin; vein distally delimiting marginal postfractural cell strongly oblique. Pregenital abdomen (Fig. 6) symmetrical; subgenital plate (sternum VII) relatively narrow, symmetrical, generally subtriangular, only slightly wider than pygophore.

Male terminalia. Tergum VIII (Fig. 14) subdivided into asymmetrical hemitergites; left hemitergite with a slender, flagelliform, curved process gradually narrowing towards apex; right hemitergite triangularly projecting posteriad, right laterotergite could not be observed in situ. Pygophore (Fig. 14) with slight dextral asymmetry, proximally separated by segment X. Proctiger (Fig. 14): segment X directed slightly dextrally, simple; segment XI elongate, tubular, slightly narrowed subapically, dextrally and dorsolaterally protruding, surpassing lateral outline of pygophore in dorsal view. Parameres asymmetrical (Figs. 14-18); left paramere (Figs. 15-16) with an oval base provided with a distinct anterior and posterior extension, anterior extension large, lobe-like, oval, directed mesad, hypophysis simple, finger-like, directed mesad; right paramere (Figs. 17-18) with a wide, subtriangular basal extension projecting posteriad, hypophysis finger-like. Phallus (Fig. 14) examined only in situ; with a tubular, curved, relatively narrow apical part protruding from pygophore, external part forming one incomplete coil, provided with a crest-like sclerite.

Measurements (holotype) (in mm). Body length from apex of head to apex of fore wings as visible in dorsal view 1.04; width of head 0.314, interocular distance 0.272; length of pronotum along meson (including collar) 0.291, length of collar along meson 0.049, humeral width 0.543, length of fore wing 0.872.

Female. Unknown.

Differential diagnosis. The male of this new species is similar to that of *K. esakii* in the relatively narrow subgenital plate and the large, lobe-like anterior extension of the left paramere; however, *K. oroszi* sp. nov. can be readily distinguished from the latter species, among others, by the very long and narrow apical part of phallus forming about 1.5 coils outside the pygophore. The new species is uniquely characterized within the genus by the small body and the simple, flagelliform, curved process of left hemitergite of tergum VIII in male.

Etymology. This new species is dedicated to my friend and colleague András Orosz (Hungarian Natural History Museum, Budapest), collector of the holotype.

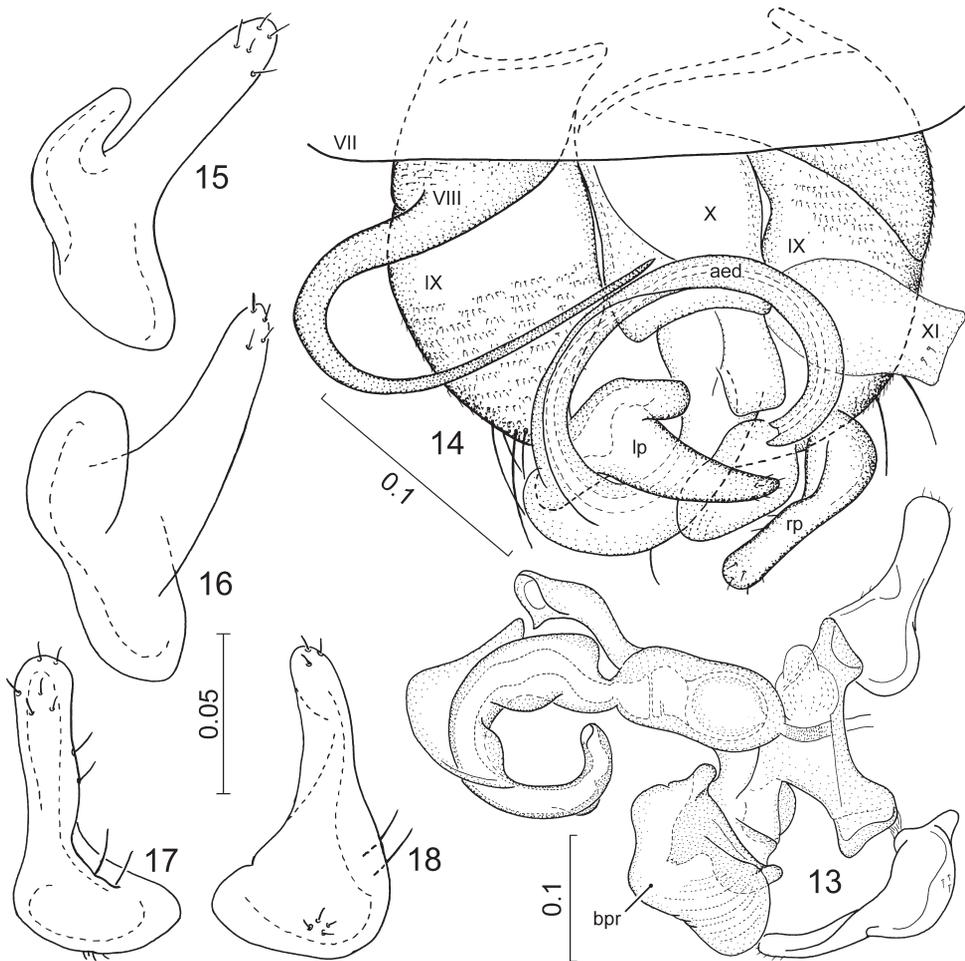


Fig. 13-18. 13. – *Kokeshia stysi* sp. nov., phallus. 14-18 – *Kokeshia oroszi* sp. nov. 14 – pygophore, in situ, dorsal view; 15-16 – left paramere, two different aspects; 17-18 – right paramere, two different aspects. Lettering: aed – aedeagus (= processus gonopori sensu ŠTYS (1985), see text), bpr – basal process of phallus, lp – left paramere, rp – right paramere. Scales in mm.

Locality and habitat notes. The specimen was captured at light in a clearing surrounded by a rainforest.

Distribution. Thailand.

Key to known species of *Kokeshia*

Species of *Kokeshia* can be distinguished using the following key (data on all previously described species are taken from the respective original descriptions):

- 1 Fused apical portion of the two posterior remigial veins extending to wing margin in macro- and brachypterous morphs. Fore wing of brachypterous female reaching tergite IV (visible tergite III). Left hemitergite of tergum VIII of male bearing a slender, curved process provided with an appendage split into 3-5 branches (E China). *K. hsiaoi* Ren & Zheng, 1992
- Fused apical portion of the two posterior remigial veins terminating before margin, at least in macropterous morphs. Left hemitergite of tergum VIII of male not as above. 2
- 2 Left hemitergite of tergum VIII of male bearing a short and thick, hook-shaped, rectangularly bent process. Fore wing of brachypterous female at most surpassing posterior margin of tergum IV (Japan). *K. esakii* Miyamoto, 1960
- Left hemitergite of tergum VIII of male not as above. Fore wing of brachypterous female at least reaching tergum VII (female unknown in *K. oroszi* sp. nov.). 3
- 3 Left hemitergite of tergum VIII of male with a broad brush-like structure formed by microtrichia. 4
- Left laterotergite of tergum VIII of male different, without any brush-like structures. ... 5
- 4 Brush-like structure on left hemitergite of tergum VIII of male formed by several narrow, hair-like microtrichia. Basal part of right paramere without posterior extension (Nepal). *K. martensi* Štys, 1985
- Brush-like structure on left hemitergite of tergite VIII of male formed by less numerous and distinctly thicker microtrichia. Basal part of right paramere with a distinct, wide, rounded posterior extension (India: West Bengal). *K. stysi* sp. nov.
- 5 Left hemitergite of tergum VIII of male long, filiform, rectangularly bent, its apex formed by twisted spiniform microtrichia (Nepal). *K. similis* Štys, 1985
- Left hemitergite of tergum VIII of male slender, flagelliform, curved (Thailand). *K. oroszi* sp. nov.

Discussion

The phallus of *Kokeshia*. Although the homologies and morphological nomenclature of the heteropteran intromittent organ are in need of revision, notes are given here on the phallus of *Kokeshia stysi* sp. nov. (Fig. 13). The large and wide basal process of the phallus situated between basal plate and the stout ‘body’ of phallus (phallobase?) and protruding from the pygophore seems homologous with the right conjunctival process sensu ŠTYS (1985) of *K. martensi*. The narrow and elongate process situated close to the apex of the stout ‘body’ of the phallus may be homologous with the left conjunctival process sensu ŠTYS (1985) of *K. martensi*; this structure is probably a conjunctival process indeed. Examining the intact phallus connected to the parameres taken out from the pygophore, each of these processes are on the opposite side than indicated by ŠTYS (1985) in *K. martensi*; there is no doubt about their position because of the markedly asymmetrical parameres. The tubular, curved apical part is undoubtedly homologous with the processus gonopori sensu ŠTYS (1985); this structure is possibly homologous of the aedeagus (= vesica) itself of higher Heteroptera. The phallus has a slightly twisted position within the pygophore and it is folded anterodorsad in situ before emerging, consequently, the surface of the external part of aedeagus, visible in situ in dorsal view, is the ventral side, and it appears to be coiled clockwise in natural position.

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