

A new species of *Onychotrechus* Kirkaldy, 1903 (Hemiptera, Heteroptera, Gerridae) from Dooars, West Bengal, India, and a key to males of all species

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Abstract

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A new species of hygropetric water strider, *Onychotrechus dooarsicus* sp. n. is described from Buxa Tiger Reserve, Dooars, West Bengal, India. Representatives of the new species were collected from a stream with boulders and rocks splashed by water, with slow current, situated at an altitude of 630 m a.s.l. This is the seventh species of *Onychotrechus* confirmed for India. The new species is closely related with *O. robustus* Andersen, 1980 from northwestern India and *O. jaechi* Zettel & Tran, 2007 from Bhutan. An identification key to males of all species of *Onychotrechus* species is also provided.

Introduction

The hygropetric water striders of the genus *Onychotrechus* Kirkaldy, 1903 are members of the subfamily Eotrechinae and chiefly distributed on the Indian subcontinent and Sri Lanka (11 species, including the new one), but two species inhabit southeastern Asia (Andersen 1980). They can be recognized by the small size (body length less than 7.4 mm); middle and hind legs with subequal lengths, first tarsomere shorter than second, long pre-apically inserted claws, and ventral row of stout spine-like setae; and genital segments of males small, with relatively simple structure.

Species of *Onychotrechus* are mostly found resting, walking, running or jumping on the wet seeping rock faces covered with algae or splashed by water of small mountainous streams. Both nymphs and adults, including copulating individuals, can be encountered in their typical habitats. Although their coloration appears vivid, it is cryptic and makes them difficult to recognize in the dark

wet rocks. The hygropetric way of life is a secondary adaptation evolved from life on water surface in this group (Andersen 1980).

Hitherto, six species of *Onychotrechus* have been recorded from India (Thirumalai 2002), namely *O. major* Andersen, 1980 (Kerala, Maharashtra), *O. robustus* Andersen, 1980 (Himachal Pradesh, Uttar Pradesh), *O. rupestris* Andersen, 1980 (Karnataka), and *O. spinifer* Andersen, 1980 (Karnataka, Kerala, Maharashtra), *O. baijali* Gupta, 1982 (Tamil Nadu), *O. rhexenor* Kirkaldy, 1903 (Karnataka, Kerala, Maharashtra, Rajasthan, Tamil Nadu). The record of a seventh species, *O. sakuntala* (Kirkaldy, 1901), from Tripura (Bal and Basu 2000) needs confirmation, because it is considered to be endemic of Sri Lanka (Andersen 1980).

In a recent expedition to the Buxa Tiger Reserve, near the Indo-Bhutan border of West Bengal, the second author collected a specimen, that is herein described and named as *Onychotrechus dooarsicus* sp. n.

Material and method

Specimens were collected by a short-handled aquatic net and preserved in 70% ethyl alcohol (C₂H₅OH). Samples were identified using a binocular microscope Leica M205A and body parts were photographed. Male genitalia was dissected and kept in 10% KOH for 30 minutes to clear the hard sclerotized structure and drawings were prepared using a camera lucida attached to the Leica M205A binocular microscope. Identified specimens were deposited in the National Zoological Collections of Zoological Survey of India, Kolkata. All measurements are given in millimetres.

Onychotrechus dooarsicus sp. n.

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Figs 1–19

Holotype (apterous male): INDIA: West Bengal; Jalpaiguri; Buxa Jhora near Buxa fort; Buxa Tiger Reserve, 26.76223° N, 89.59968° E, 630 m a. s. l., 19.IV.2013, Srimoyee Basu (**Reg. No.: 3130/H15**). **Paratypes**: one apterous male, one apterous female, same data as holotype (**Reg. No.: 3131/H15**).

Type locality. INDIA: West Bengal; Jalpaiguri; Buxa Jhora near Buxa fort; Buxa Tiger Reserve; stream with large rocks, stones in forested areas.

Description of apterous male (Fig. 1). *Size*: Body length (from head tip to tip of proctiger) of apterous male holotype 3.30, male paratype 3.27; maximum width of body across mesoacetabula 1.12 (holotype), 1.07 (paratype).

Colour: Body dorsally black with yellow markings. Head with a median yellow longitudinal stripe, which ends in a blunt arrow head (Fig. 3); head anteriorly and along medial and posterior eye margins yellow. Antenna and leg segments yellowish brown. Pronotum with two broad yellow sub-lateral stripes, a thin median yellow stripe, and two yellow curved lateral stripes. Meso- and metanotum (Fig. 4) with two thin lateral stripes, two broad sub-lateral stripes and an indistinct short yellow median line. Abdominal tergites completely black (Figs 4, 12). Forefemur yellow with one broad dark band on dorsal side and one very slender dark brown band on extensor side. Venter yellow. Mesosternum (Fig. 6) with paired black patches behind forecoxae and metasternum posteriorly with an almost W-shaped broad dark region. Abdominal sternites pale yellowish brown (Fig. 13).

Structural characteristics (measurements refer to holotype). Head length 0.64, width 0.89. Interocular width 2 times as large as eye width (0.45 : 0.22). Eye length 0.44. Length of antennal segments 1-4: 0.96, 0.94, 0.89, 1.38; first antennomere with three spines distally, being two long, and a small one arising near base of first spine. Rostrum reaching up to mid-way of mesosternum, length 1.50.

Pronotum 0.84 mm in width; pronotum length 0.53, width 0.79. Combined length of mesonotum and meta-

notum 1.12, width 0.98. Mesosternum (Fig. 6) modified, with narrow median groove slightly widened posteriorly; depression with black, scattered setae directed to its centre; posterior swelling with densely arranged long stout black setae covering base of mesosternum. Forefemur (Fig. 8) slender, widened basally, but almost evenly tapering apically; length of forefemur 1.17, width 0.25; forefemur apically with a few setae and with short dark stiff setae distributed throughout. Foretibia (Fig. 9) strongly curved, basally with patch of few short setae on flexor side; a soft spinous structure protruded outwards from base of curvature; apical region with two prominent black spines that diverge from almost touching bases (forming a 'V'), and with four black spines and a row of short setae towards extensor side. Mid and hind femora slender, each about 1.1 times as long as body; both with distinct rows of short spines arranged equidistantly. Foreclaws (Fig. 11) sharply bent and slightly longer than mid and hind claws. Measurements of leg segments provided in Table 1.

Abdomen (Figs 12, 13) short, only about one third of body length. Length of abdominal sternites 1.01, width 0.90. Sterna II-VI visible as very narrow curved strips; sternum VII (Fig. 13) much longer; sterna II-VII without median groove. Segment VIII broad, with median depression, posterior part with several setae, bluntly ending.

Genitalia (Figs 16-19): Pygophore sub-oval, slightly elongated, widened basally. Proctiger (Fig. 17) short, widened distally, gradually tapering towards basal part, with long setae and medially with numerous punctures. Endosomal sclerites as in Fig. 18. Paramere (Fig. 19) short, simple and with a distinct median notch.

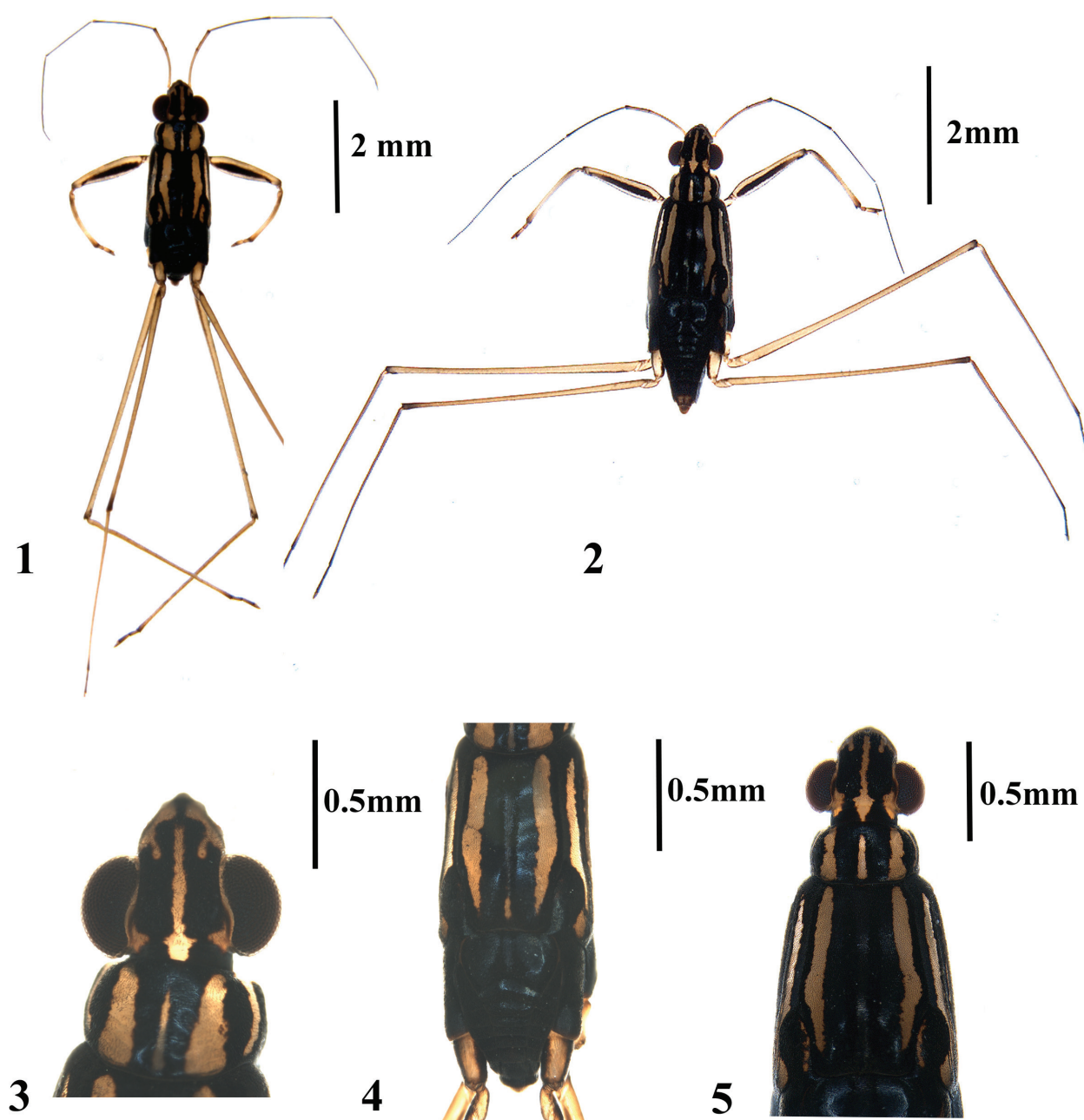
Description of apterous female (Figs 2, 7). *Size*: Body length 4.4; maximum body width across mesoacetabula 1.38.

Colour: Almost identical to male, with the following exceptions: posterior yellow mid-line lacking from metanotum (Fig. 5). Venter yellow, with two broad markings on mesosternum. Metasternum brownish yellow. Abdominal sterna II-VI yellowish brown, paler at mid-line and sides; sternum VII black anteriorly, yellowish posteriorly.

Structural characteristics: Length of head 0.75, width 0.91. Interocular width 0.52. Eye length 0.42, width 0.23. Length of pronotum 0.51, width 0.85. Length of antennal segments 1-4: 1.10, 1.08, 1.04, 1.48. Combined length of meso- and metanotum 1.38, width 1.36. Forefemur slender (Fig. 10). Foretibia less curved, without spinous protrusion from curvature. Measurements of leg segments provided in Table 1. Abdominal tergites (Fig. 14) elongated, densely covered by setae. Abdominal sterna II-VI with median groove; sternum VII (Fig. 15) broad, trapezoidal, concave towards end, partly concealing genitalia. Proctiger acuminate.

Macropterous male and female. Unknown.

Comparative notes. *Onychotrechus dooarsicus* sp. n. is probably a close relative of *O. jaechi*, recently described from Bhutan. They share some common characters: males have almost identical pro-, meso- and metasternal



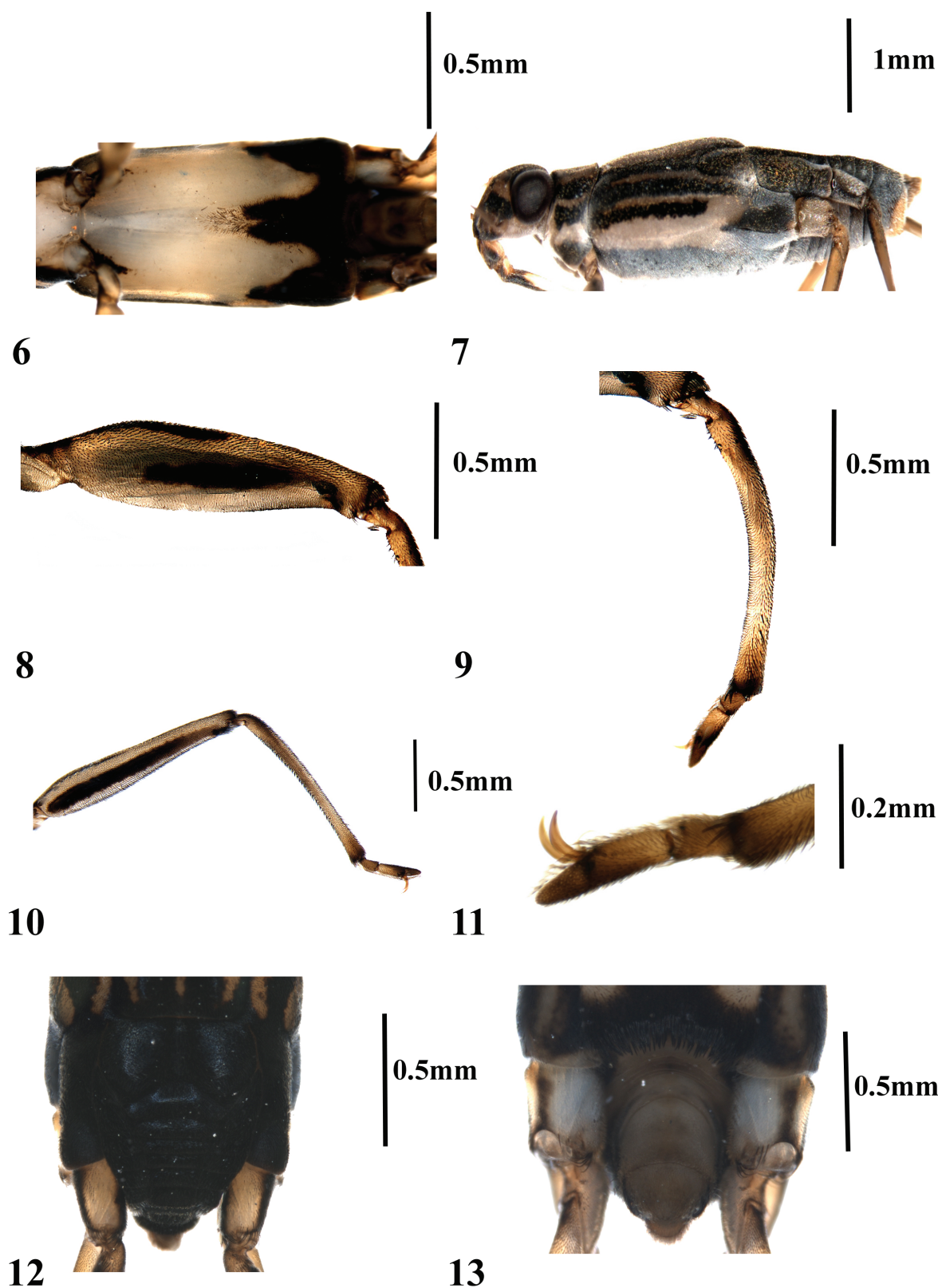
Figures 1–5. *Onychotrechus dooarsicus* sp. n. 1. Dorsal view of apterous male. 2. Dorsal view of apterous female. 3. Head and pronotal marking pattern in male. 4. Meso- and metanotal marking pattern in male. 5. Marking pattern in female.

Table 1. Measurements (value in mm) of leg segments of apterous males and female of *Onychotrechus dooarsicus* sp. n.

Leg	Femur	Tibia	Tarsus 1	Tarsus 2
Foreleg: ♂♂	1.15, 1.17	0.99, 1.1	0.07, 0.08	0.19, 0.22
♀	1.36	1.17	0.12	0.28
Mid leg: ♂♂	3.71, 3.72	2.54, 2.56	0.15, 0.16	0.26, 0.28
♀	4.03	2.70	0.19	0.29
Hind leg: ♂♂	3.80, 3.81	2.62, 2.63	0.13, 0.15	0.34, 0.36
♀	4.36	3.09	0.24	0.41

markings, basally incrassate forefemora, similar mesosternal modifications and short abdominal segments. However, the male of *O. dooarsicus* sp. n. distinctly

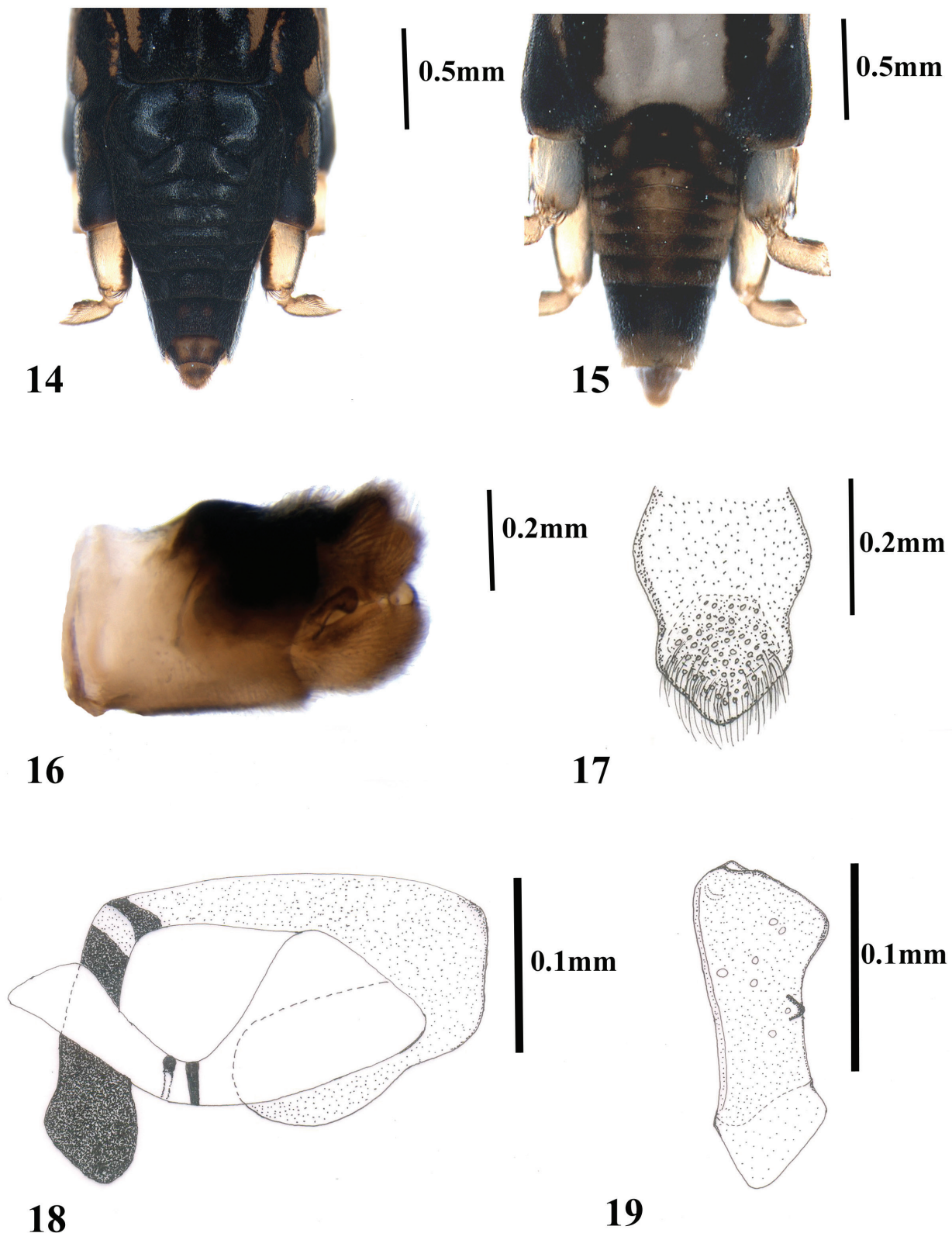
differs from *O. jaechi* by the following characteristics: 1) The foretibia of *O. dooarsicus* sp. n. bears a patch of few short setae basally on flexor side, and a soft spinous structure protruding outwards from the base of the curvature; its apical region bears two prominent black spines (forming a 'V'), four black spines and a row of short setae towards extensor side; whereas, in *O. jaechi* its base bears a patch of long hairs on the flexor side and the distal modifications are absent. 2) The mesosternum of *O. dooarsicus* sp. n. has a median narrow groove that is slightly widened posteriorly, whereas *O. jaechi* has a strongly modified mesosternum, with a medial, posteriorly widened depression and a prominent transverse swelling



Figures 6–13. *Onychotrechus dooarsicus* sp. n. 6. Mesosternum of male, ventral view. 7. Lateral view of female. 8. Forefemur of male. 9. Foretibia and tarsi of male. 10. Foreleg of female. 11. Foreleg claws in male. 12. Abdominal tergites of male. 13. Abdominal sternites with genital segments in male.

at its hind margin. 3) In *O. dooarsicus* sp. n., the paramere has a notch at mid-length, that is absent from *O. jaechi*. The female of *O. jaechi* is unknown.

Etymology. The specific epithet ‘*dooarsicus*’ comes from its place of occurrence, ‘Dooars’ of West Bengal. Dooars is a large region, forming the gateway from India



Figures 14–19. *Onychotrechus dooarsicus* sp. n. 14. Abdominal tergites of female. 15. Abdominal sternites of female. 16. Dissected genital segments of male. 17. Proctiger of male. 18. Endosoma, lateral view. 19. Left paramere, lateral view.

to Bhutan and stretching from the plains of Darjeeling District, Jalpaiguri District, and the upper regions of Cooch Behar District of West Bengal to some parts of Assam. This part mainly consists of Himalayan foothills.

Habitat. Representatives of this species have been found in the shallow zone between the rocks, splashed by a slow-flowing stream (630 m), known as Buxa Jhora, located near Buxa fort of Buxa Tiger Reserve Range.

Key to *Onychotrechus* species (males)

Note: The authors were able to study male specimens of most species, but not of *O. baijali* and *O. singalensis*. For these species characters were taken from the original descriptions.

- 1 Forefemur at flexor side with one or two prominent spine-like structures usually consisting of densely-packed setae 2
- Forefemur at flexor side without prominent spine-like structures..... 4
- 2 Forefemur at flexor side with two spine-like structures, one sub-apically and another one at mid-length. (India: Tamil Nadu)*O. baijali*
- Forefemur at flexor side with one spine-like structure sub-apically 3
- 3 Forefemur at flexor side between base and spine-like group of setae with row of long flexible setae; at extensor side basally with a few short spiny setae. (India: Karnataka)..... *O. rupestris*
- Forefemur at flexor side without long flexible setae; at extensor side basally without spiny setae; spine-like group of setae on a tubercle. (India: Karnataka, Kerala, Maharashtra) *O. spinifer*
- 4 Forefemur strongly incrassate (Fig. 8), about 4 times as long as wide 5
- Forefemur relatively slender, more than 6 times as long as wide..... 7
- 5 Foretibia weakly curved, chiefly in basal third. Mesosternum posteriorly with short black pegs. Middle femur with row of relatively long, erect spines near base. (India: Himachal Pradesh, Uttar Pradesh) *O. robustus*
- Foretibia strongly curved (Fig. 9). Mesosternum posteriorly with dense brush of long black hairs (Fig. 6) that cover metasternum. Middle femur only with a few short spines at base 6
- 6 Flexor side of foretibia basally with patch of long hairs and apically without prominent spines. Mesosternum with median groove posteriorly strongly widened and posterior margin with strong, transverse swelling. Paramere without median notch. (Bhutan).....*O. jaechi*
- Flexor side of foretibia basally with patch of few short hairs and apically with two prominent black spines (Fig. 9). Mesosternum with median groove posteriorly slightly widened and posterior margin without swelling. Paramere with median notch (Fig. 19). (India: West Bengal) *O. dooarsicus* sp. n.
- 7 Large species; body length (from apex of head to tip of proctiger) 5.8 mm or more. (India: Kerala, Maharashtra)*O. major*
- Small species; body length (from apex of head to tip of proctiger; excluding wings) 5.2 mm or less 8
- 8 Dark markings of body much reduced; colour chiefly pale..... 9
- Dark markings of body prominent 10
- 9 Middle and hind claws shorter than first tarsomeres. (Sri Lanka) *O. singalensis*
- Middle and hind claws longer than first tarsomeres. (Malaysia: Penang, Selangor) *O. pallidus*
Note: Besides colour, *O. pallidus* differs from *O. esakii* (couplet 12), which is common in southeastern Asia, by the more slender forefemur and by small shiny areas on thoracic nota (often completely absent from pronotum and metanotum), whereas these areas are much expanded in *O. esakii* (in macropterous morph prominent on pronotum, but absent from pronotal lobe).
- 10 Metasternum laterally with one pair of round tubercles. (Sri Lanka)*O. tuberculatus*
- Metasternum without pair of tubercles 11
- 11 Forefemur relatively slender, almost evenly tapering from base to sub-apex, width at midlength less than 2 times maximum width of foretibia; its flexor side at base with conspicuous and long patch of black pegs surpassing midlength. (India: Karnataka, Kerala, Maharashtra, Rajasthan, Tamil Nadu)..... *O. rhexenor*
- Forefemur distinctly thickened in basal two thirds, width at midlength clearly more than 2 times maximum width of foretibia; its flexor side with inconspicuous patch of pale or minute pegs not surpassing midlength of femur..... 12
- 12 Forefemur suddenly narrowed sub-apically (more distinct in apterous morph); its flexor side with patch of minute black pegs. Distal part of paramere relatively slender, apically rounded. (widely distributed in southeastern Asia: Myanmar, southern China, Thailand, Vietnam, West Malaysia) *O. esakii*
- Forefemur evenly narrowed in distal third; its flexor side with indistinct patch of pale pegs. Distal part of paramere relatively wide, with distinct apex. (Sri Lanka).....*O. sakuntala*

Discussion

The genus *Onychotrechus* shows its maximum diversity in southern India (Kerala, Karnataka, Tamilnadu) (Andersen 1980). In contrast, *Onychotrechus dooarsicus* sp. n. is the first species reported from north-eastern India. This new species was collected from the banks of a stream at an altitude of c 630 m in the Buxa Tiger Reserve Forest, which falls within the Jalpaiguri subregion of the Himalayas. It

is expected that the Eastern Himalayan states of India – including the Darjeeling Himalayas and the Himalayan foot-hills – harbor further undiscovered species of *Onychotrechus* and other eotrechine water striders that could be described if an extensive faunal survey was carried out. Due to their cryptic habits, specialized collecting is necessary to find the hygropetric species of *Onychotrechus* or *Eotrechus* that are usually overlooked when doing general surveys of aquatic insects.

Species identification of eotrechine water striders is usually based on the strongly modified genitalia of the males (see, e.g., Andersen 1982 for *Eotrechus* and *Chimarrhometra*; Polhemus and Andersen 1984 for *Amemboa* and *Amemboides*), whereas the identification of females is often extremely difficult or – as in *Amemboa* – even impossible so far. In contrast with related genera, in males of *Onychotrechus* male genitalia is relatively simple and provide few differentiating characters (Andersen 1980). For *Onychotrechus*, Andersen (1980) provided one key to both sexes, although characteristics of males forelegs and abdomen are dominating. However, the starting couplet of his key using the relative lengths of claws and tarsal segments – proved to be problematic, because the differences are small and subject to intraspecific variation. For this reason, and also because some additional species were described afterwards (Gupta 1982; Zettel and Tran 2007; this paper), we present a new key only for males, but with the advantage of a clearer discrimination of the species. Special attention is recommended to the inexperienced researcher who wants to identify females not associated with males.

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