

First record of *Acanthaspis cincticrus* (Hemiptera: Reduviidae: Reduviinae) from Pakistan

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Abstract. *Acanthaspis* Amyot & Serville, 1843 is a species-rich genus in the subfamily Reduviinae; however, only a few species of the genus have been recorded so far from Pakistan. Herein, we report *A. cincticrus* Stål, 1859 commonly known as the ant-feeding assassin bug, for the first time from Pakistan. This species is redescribed along with details of morphometrics and illustrations of important diagnostic morphological features.

Key words: Reduviidae, Reduviinae, *Acanthaspis*, redescription, new record, Pakistan.

Introduction

Assassin bugs mainly feed on arthropods; therefore, many are important in insect pests biocontrol (Schaefer 1988; Ambrose 1991, 1995, 1999; Grundy & Maelzer 2002; Saharaj 2014). 182 reduviid species belonging to 69 genera and ten subfamilies prey upon 261 known forest and agricultural insect pests (Ambrose 2006a). Members of the family Reduviidae are found everywhere on the earth (Yildirim et al. 2010), with the highest species-level diversity in Old and New World tropics, while some subfamilies are restricted to specific biogeographic regions (Froeschner & Kormilev 1989; Maldonado 1990; Cassis & Gross, 1995).

The subfamily Reduviinae is polyphyletic (Hwang and Weirauch, 2012) with more than 1,070 species under 141 genera (Melo 2007). Currently, it stands as the second-largest subfamily of the family Reduviidae and its genus *Acanthaspis* Amyot & Serville, 1843 represents the second most species-rich, comprising 124 species within the subfamily (ITIS 2022). During our surveys for assassin bugs, we found *Acanthaspis cincticrus* Stål, 1859 as a new country record from Pakistan.

Most species belonging to the genus *Acanthaspis* are generally considered predators. Both nymphs and adults of the ant-feeding assassin bug, *A. cincticrus* voraciously feed on different species of ants. They cover their body with two boorish layers i.e. soil, sand or tiny plant particles and ants or other dead insects (Cao et al. 2014), which they attach with the help of gummy secretions from specialized setae (Weirauch 2006). In the present paper, this species is redescribed along with the images of the habitus and the other body parts and male genitalia.

Materials and methods

This study is based on the material preserved in the Pakistan Museum of Natural History (PMNH) and National Insect Museum (NIM), Islamabad. External morphology was examined using the Nikon SMZ-745 dissecting microscope. Male genitalia were soaked in lactic acid for six hours at 28°C, boiled with 20% lactic acid for 20 minutes, rinsed in distilled water and dissected under a dissecting microscope. After being studied, dissected genitalia were placed in vials with glycerin and pinned under the corresponding specimens. Photographs were taken with a Canon 7D Mark II digital camera conjoined with Nikon SMZ-18 and Olympus BX51 fluorescence microscopes. Images were stacked with Helicon Focus. Measurements were obtained using a calibrated micrometer and expressed in millimeters. Morphological terminology mainly follows Cao et al. (2014).

Taxonomy

Reduviidae Latreille, 1807

Reduviinae Latreille, 1807

Acanthaspis Amyot & Serville, 1843

Genus *Acanthaspis* Amyot & Serville, 1843

Acanthaspis Amyot & Serville, 1843: 336. Type species: *Reduvius sexguttatus* (Fabricius, 1775: 832); by subsequent designation (Kirkaldy 1903: 231). For synonymical references see Cao et al. (2014).

Distribution: Oriental and Ethiopian Regions.

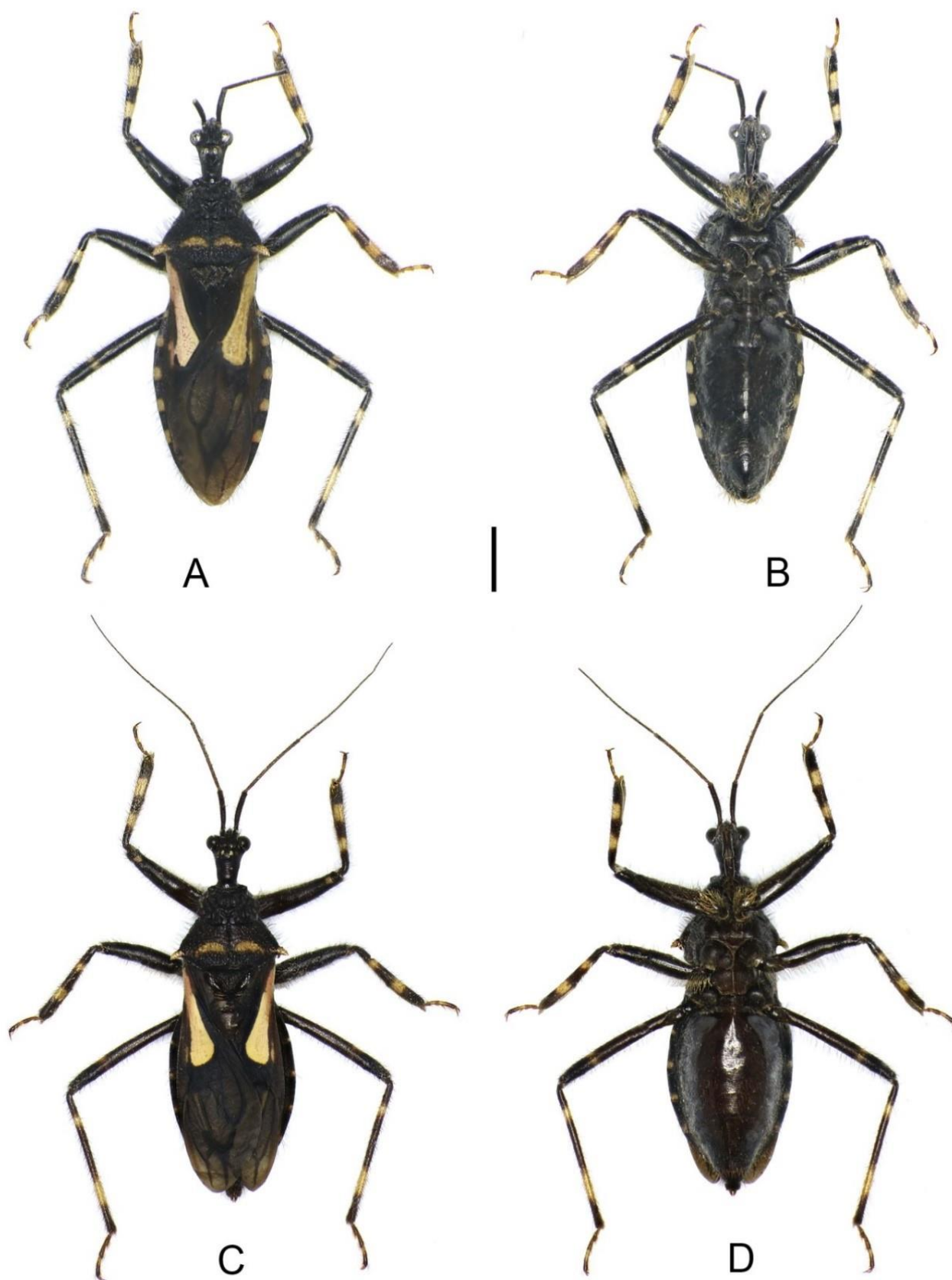


Fig. 1. *Acanthaspis cincticrus* Stål, 1859, habitus. ♂(A–B); ♀(C–D). A, C, Dorsal view; B, D, Same, ventral view. Scale bar = 2.00 mm.

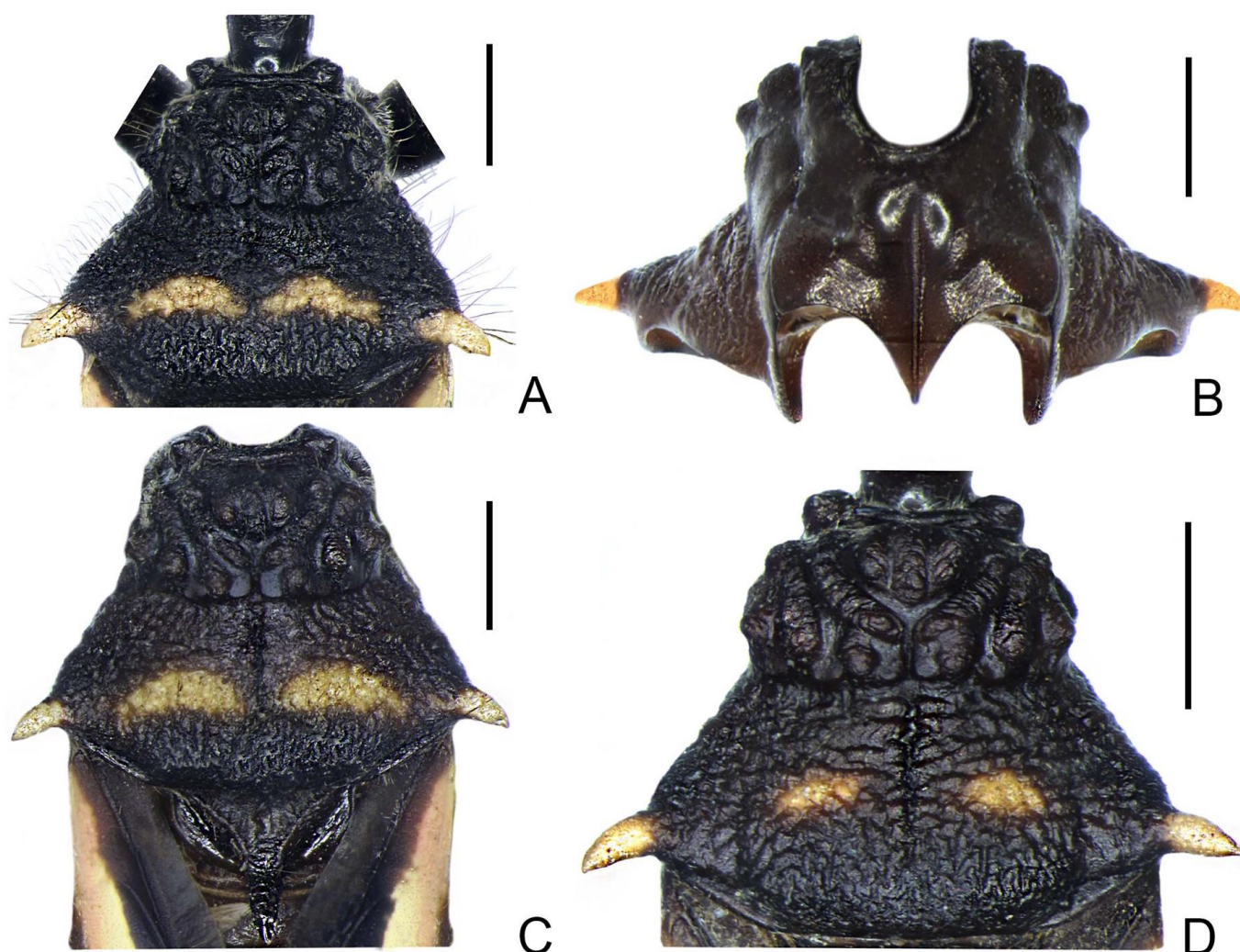


Fig. 2. *Acanthaspis cincticus* Stål, 1859. ♂A; ♀(B–D). A, Pronotum. B, Stridulitrum & humeral spines. C, Pronotum & scutellum. D, Posterior pronotal lobe with different colour patterns. A, C–D, Dorsal view; B, Ventral view. Scale bar of A, C–D = 1.00 mm; B = 0.50 mm.

Acanthaspis cincticus Stål, 1859 (Figures 1–7)

Acanthaspis cincticus Stål, 1859: 188; Reuter, 1887: 157; Distant, 1904: 270; Maldonado Capriles, 1990: 384; Aukema & Rieger, 1996: 186; Tomokuni & Cai, 2002: 106; Ishikawa et al. 2005: 270; Ambrose, 2006b: 2402; Cao et al. 2014: 6.

Diagnostic characters

Body length 12.20–12.70 mm; corium with an oblique concave longitudinal fascia (Fig. 3A–B); profemora with a single dorsal pale spot at extreme apical portion (Fig. 5C), mesofemora at extreme apex bearing one light pale spot ventrally and two on the subapical area (Fig. 5F), metafemora with subbasal annulus only (Fig. 5G–H).

Redescription

Colouration: General colouration black to piceous or light brownish; head, neck, first two visible labial segments, antennal scape, dorsum of pronotum, scutellum, prosternum and pleura black to piceous, whereas last labial segment, antennal segments II–IV and thoracic sterna light to dark chocolate-brown; eyes and ocelli silver shiny; two medial eyebrow-like colouration marks located on posterior pronotal lobe, humeral

spines pale (sometimes these spines beige or light to dark yellowish); hemelytra dark brownish to piceous with combination of light to dark pink and yellowish to light beige fascia, although colour markings on these fasciae are variable sometimes even with the right side differing from the left one on the same individual (Fig. 1A); hindwing mostly whitish with robust light brown veins (Fig. 3C); legs piceous with light pale annuli and spots (Fig. 5C–H); male abdomen mostly piceous, but the first four sternites medially light to dark chocolate-brown, whereas female abdomen light to dark brownish with first three sternites distinctly chocolate-brown; male connexivum pale to dark orange (Fig. 4A–B), while female light to dark pale (Fig. 4C–D).

Vestiture: Habitus generally intermixed with ochraceous, light brownish and creamy-white short and long vestiture; anteocular area clothed with light creamy-white short adpressed setae; basal area of antennifers with few stiff setae; lateral portions of head, antennal scape, margins of pronotum, scutellum, ventrolaterally abdomen and its pygophore partially clothed with brownish scattered setae of varying lengths, whereas dorsum and ventromedial portions of abdomen mostly glabrous; pedicel and fla-

gellomeres mostly covered in procumbent setae; ventrally, prothrochanters with dense long setae, mesofemora with short setae; pro- meso- and metatibiae infested with partially long erect setae.

Structure: Macropterous male and female, (brachypterous female documented by Cao et al. 2014); body ovoid (Fig. 1A–D); head with eyes semi-globular, protruding outwards, in lateral view not reaching to ventral margins

of the head; vertex divided by a deep longitudinal interocular suture; mandibular plates anterior to antennal insertions; clypeus and maxillary plates conspicuous; antennal scape thickened with distinct antennifers; combined lengths of first two basal visible labial segments equal or subequal to postocular region of head, while first visible labial segment slightly longer or subequal to following segment and third shorter.

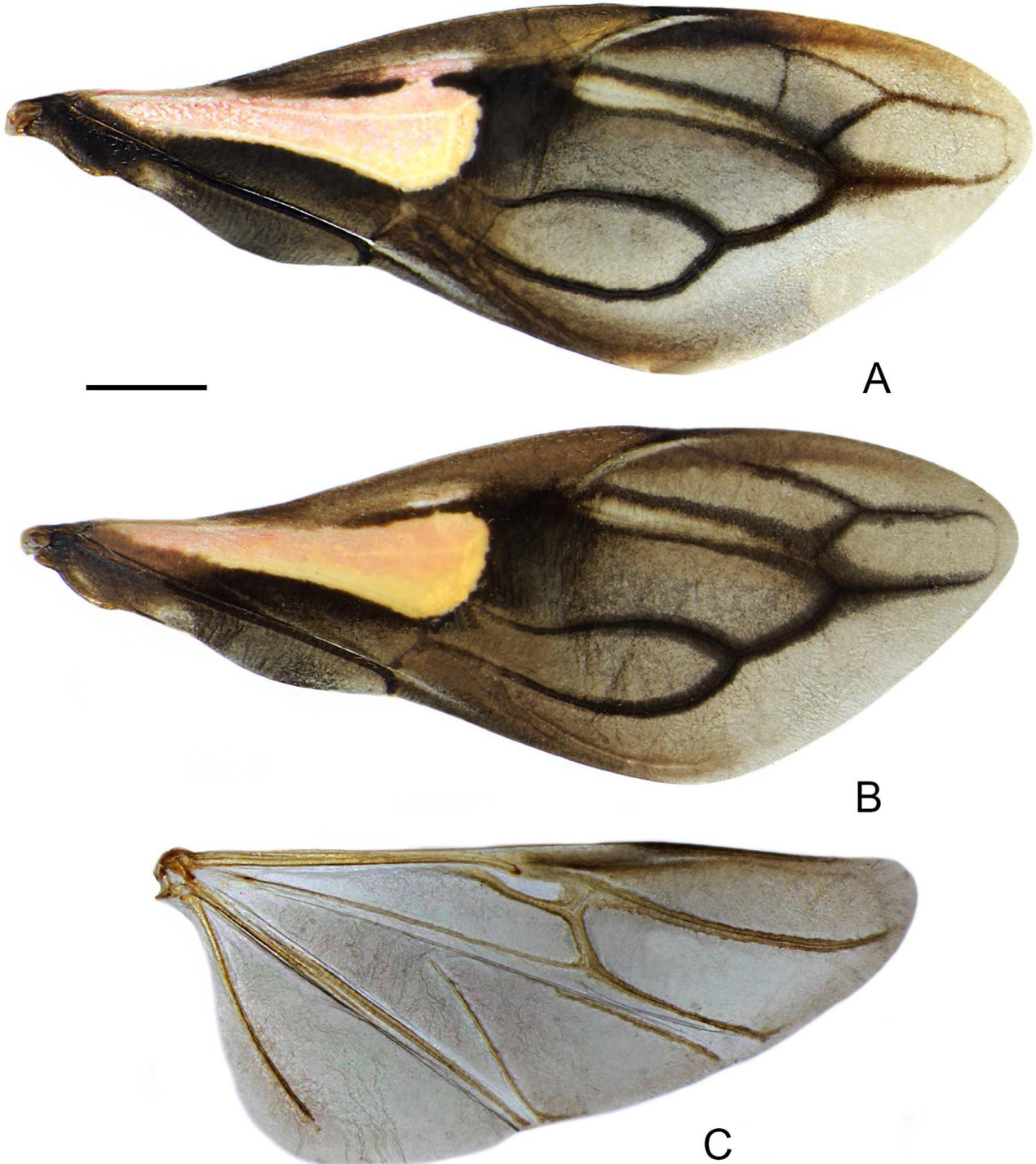


Fig. 3. *Acanthaspis cincticus* Stål, 1859. ♂A, C; ♀B. A–B, Hemelytron. C, Hindwing. A–C, Dorsal view. Scale bar = 1.00 mm.

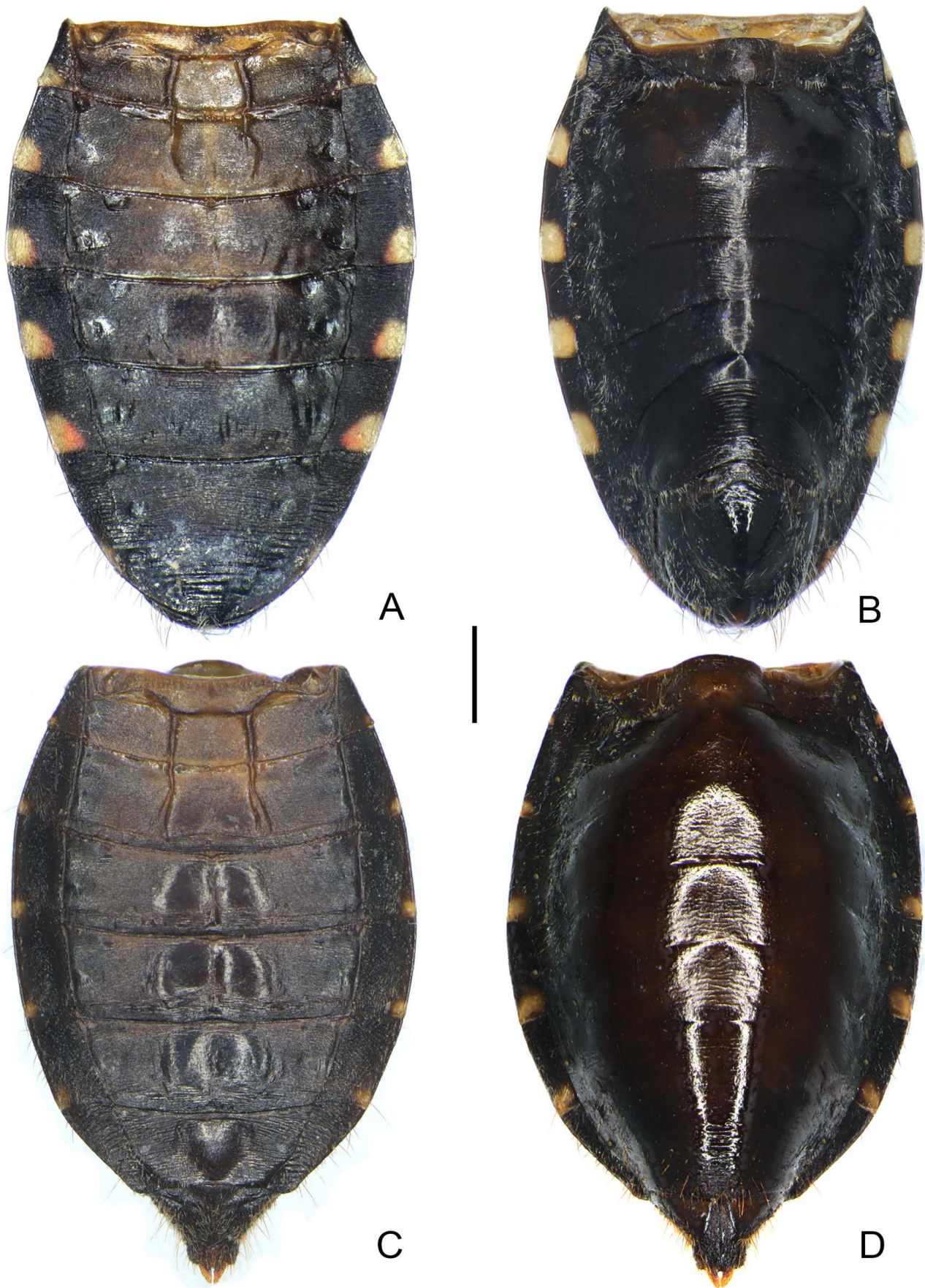


Fig. 4. *Acanthaspis cincticrus* Stål, 1859. ♂(A-B); ♀(C-D). A-D, Abdomen. A, C, Dorsal view; B, D, Same, ventral view. Scale bar = 1.00 mm.

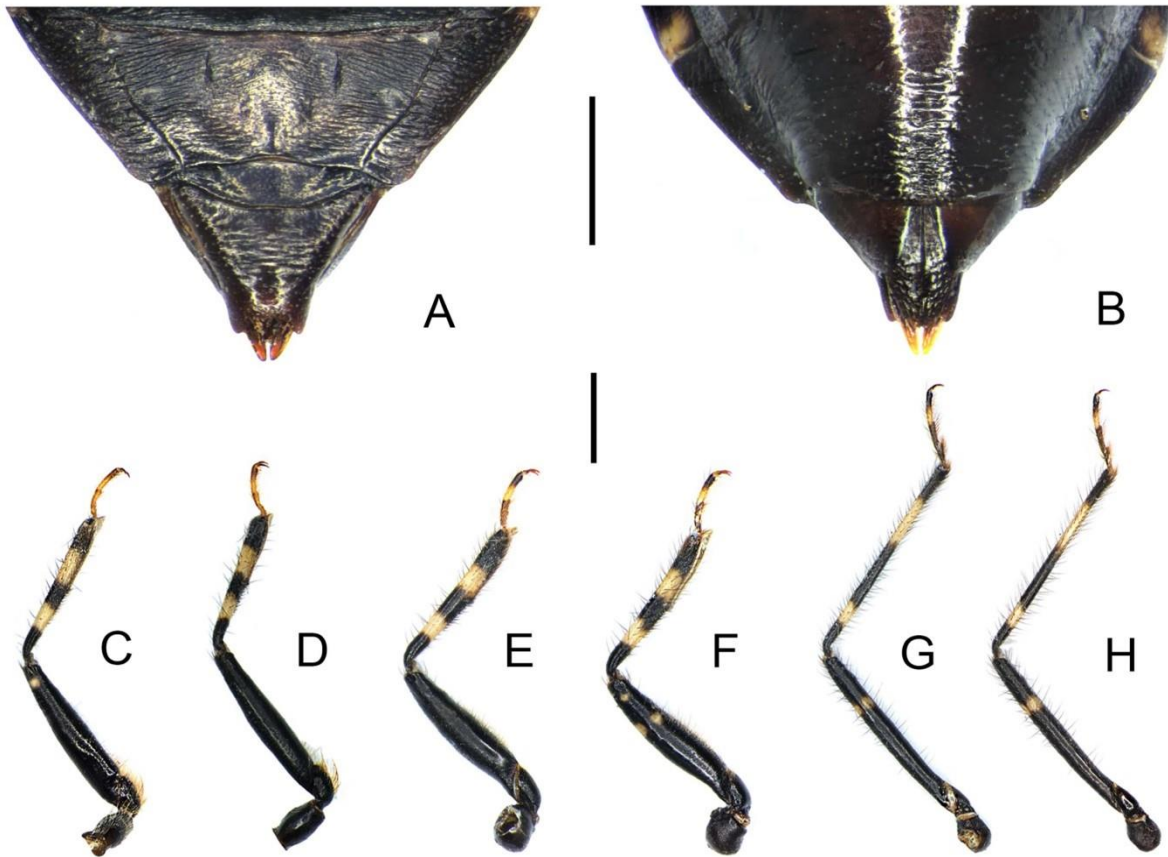


Fig. 5. *Acanthaspis cincticus* Stål, 1859. ♀(A-B); ♂(C-H). A-B, Abdominal venter. C-D, Pro-leg. E-F, Meso-leg. G-H, Meta-leg. A, C, E, G, Dorsal view; B, Same, ventral view; D, F, H, Same (flipped horizontally), ventral view. Scale bar = A-B, 0.50 mm; C-H, 2.00 mm.

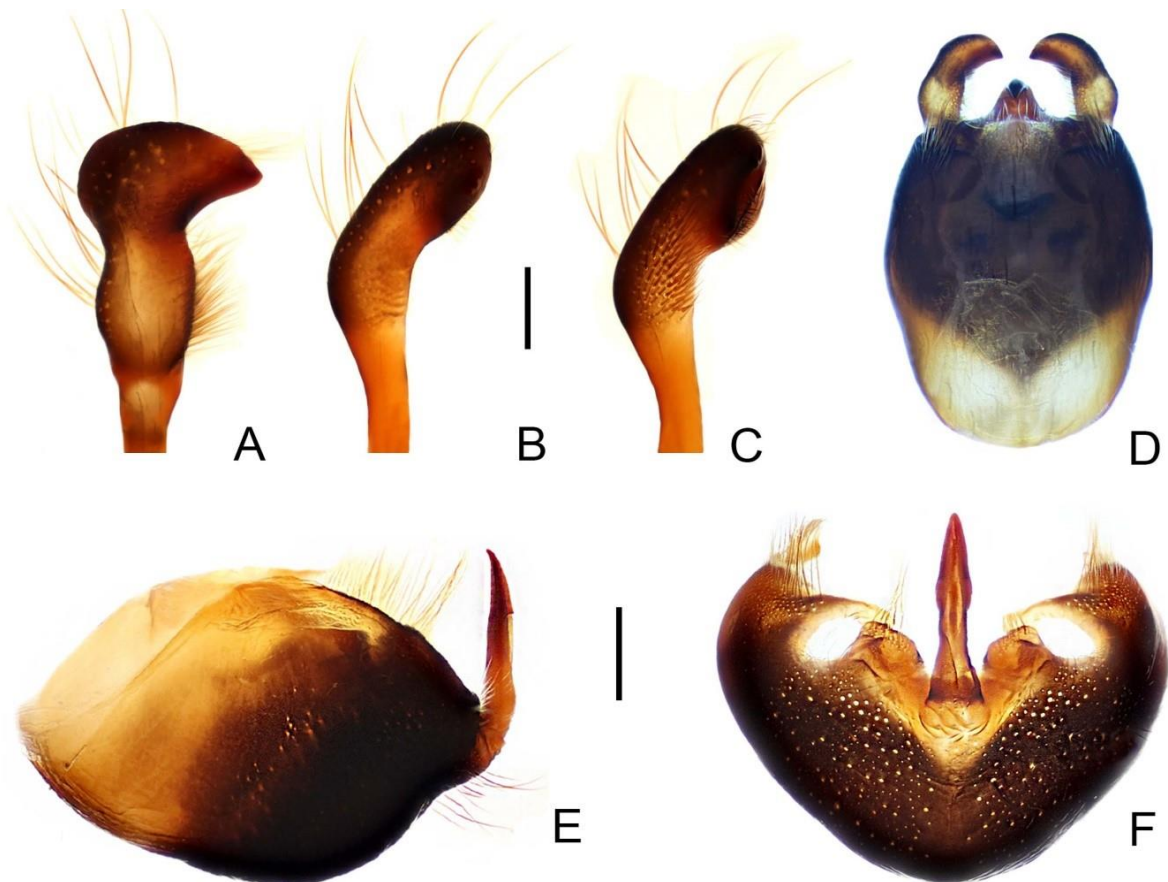


Fig. 6. *Acanthaspis cincticus* Stål, 1859, ♂(A-F). A-C, Different view of paramere. D, Pygophore with phallus inside. E-F, Pygophore with phallus removed. D, Ventral view; E, Lateral view; F, Same, caudal view. Scale bar = 0.50 mm.

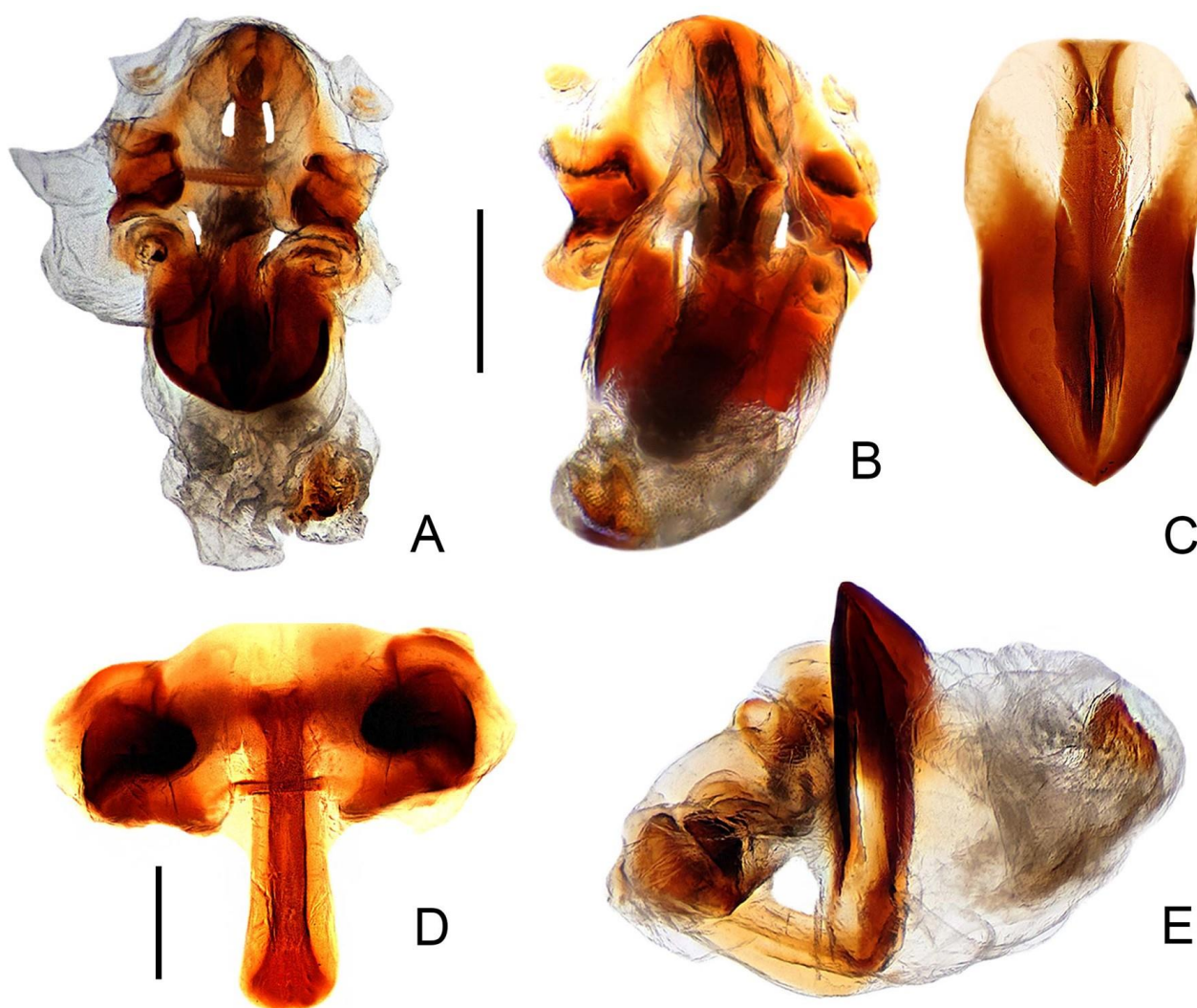


Fig. 7. *Acanthosis cincticus* Stål, 1859, ♂ (A–E). A–B, Phallus slightly everted. C, Dorsal phallosclerite and struts. D, Phallobase. E, Phallus. A, C, D, Dorsal view; B, Same, ventral view; E, Same, lateral view. Scale bar = A–B, E, 0.50 mm; D, 0.25 mm.

Pronotum with anterolateral processes slightly rounded and depressed; integument of anterior lobe of pronotum rugose, medially with two eyebrow-like colouration (Fig. 2A, C–D) separated by a short shallow sulcus; discal area unarmed; humeral angles with conspicuous curved spines; scutellum with a sharp and erect spine at apex (Fig. 2C); stridulitrum “V-shaped” with a long and deep medial furrow (Fig. 2B), its apical tip approaching posterior margins of procoxal cavities.

Hemelytra slightly surpassing abdominal apex in males, not reaching abdominal apex in females; distinctive coloured fasciae in each sex (Fig. 3A–B); hindwing shown in Fig. 3C; male with shorter legs than female; procoxae longer than meso- and metacoxae (Fig. 5C–H); pro- and mesofemora incrassate (Fig. 5C–F); pro- and mesotibiae with distinct ventral fossula spongiosa leading medially to the basal portion of tarsi; dorsum at the extreme apical portion of profemora with a small spot, ventral mesofemora with one spot at extreme apical and two at subapical area, whereas metafemora with one annulus (Fig. 5G–H); tibiae of all three pairs of legs with a pair of annuli (Fig. 5C–H).

Abdomen (Fig. 4A–D) oblong, ovoid; tergites II–III in both sexes with a pair of ridges; intersegmental sutures very prominent, but more indistinct in ventral surface of female than in male; connexivum distinctly dilated; dorsum of male abdomen having irregular notches, fifth tergite with thumb-like impressions, seventh elliptic (Fig. 4A), eighth sternite prominently visible; female abdomen distinctly wider, its dorsum strongly convex, while ventrally concave, thumb-like impressions on tergites IV–VII (Fig. 4C), scent gland indistinct at fifth tergite; eighth tergite small and convex, ninth comparatively bigger than X–XI and fused (Fig. 5A), first valvifer distinct and subtriangular, first valvula indistinctly, styloid distinctly pointed (Fig. 5B).

Male genitalia: (Fig. 6A–F, 7A–E): Pygophore oblong, clothed with short and long pubescence; median process of pygophore long and erect with pointed apex (Fig. 6E–F), basal portion swollen while, medially narrowed; parameres ax-shaped, subapically attenuated (Fig. 6A–C); phallus very compact (Fig. 7A–B, E); articulatory apparatus basal plate robust with a narrow transverse bridge (Fig. 7D); basal plate extension

slightly curved and thickened (Fig. 7D–E); struts erect, its arms fused basally, separated medially and sharp apically (Fig. 7C, E); dorsal phallothecal sclerite long, flipper shaped and strongly sclerotized (Fig. 7C); endosomal portion slightly apart from phallotheca, mostly translucent with a prominent medial dorsal lobe of endosoma (Fig. 7E).

Measurements (in mm): male (n = 2)/female (n = 2). Body length to apex of fore wings 12.50–12.70/12.20–12.40; body length to apex of abdomen 12.20–12.55/12.60–12.75; length of abdomen 6.60–6.65/6.90–6.95; greatest width of abdomen 3.80–3.80/4.30–4.35; head length 1.75–1.75/1.45–1.45; length of anteocular part 0.40–0.40/0.25–0.25; length of postocular part 0.80–0.80/0.80–0.80; distance between ocelli 0.15–0.15/0.15–0.15; length of antennal segments I–IV = 1.15–1.20/1.65–1.65, 2.40–2.45/missing, missing/missing, missing/missing; length of visible rostral segments I–III = 0.80–0.82/0.91–0.92, 0.81–0.83/0.89–0.92, 0.30–0.30/0.40–0.40; median length of anterior lobe of pronotum 1.30–1.32/1.35–1.35; greatest width of anterior lobe of pronotum 2.10–2.15/2.25–2.30; median length of posterior lobe of pronotum 1.60–1.62/1.60–1.60; greatest width of posterior lobe of pronotum excluding lateral spines 3.35–3.38/3.50–3.52; length of hemelytron 8.80–8.85/8.60–8.70; greatest width of hemelytron 3.07–3.10/2.77–2.80; length of hind wing 6.80–6.85/6.60–6.65; greatest width of hind wing 5.50–5.50/5.97–6.00; lengths of fore leg coxa 1.35–1.35/1.55–1.55, trochanter 0.75–0.75/0.99–1.00, femur 3.45–3.50/3.40–3.45, tibia 3.30–3.32/3.50–3.50, fossula spongiosa 1.63–1.64/1.72–1.73; lengths of middle leg coxa 0.75–0.75/0.85–0.86, trochanter 1.00–1.00/1.10–1.10, femur 3.15–3.20/3.25–3.30, tibia 3.30–3.32/3.45–3.48, fossula spongiosa 1.63–1.64/1.71–1.72; lengths of hind leg coxa 0.95–1.00/0.95–0.95, trochanter 1.05–1.10/1.00–1.00, femur 4.55–4.55/4.65–4.70, tibia 5.10–5.15/5.05–5.10.

Material examined

PAKISTAN: 1♂, vii.2017, Islamabad (Margalla Hills), leg. Syed Ishfaq Ali Shah, NIMISB-10010; 1♂, vii.2017, Islamabad (Margalla Hills), leg. Syed Ishfaq Ali Shah, NIM-10025; 2♂♂, viii.2017, Swat, leg. Ghani Khan, PMNH-68486, PMNH-68487; 1♀, viii.2017, Rawalpindi (Aube National Park), leg. Saad Asghar, PMNH-68488; 1♀, viii.2017, Muzaffarabad, leg. Syed Ishfaq Ali Shah, NIMISB-10011; 1♂, vii.2005, Islamabad, leg. M. Abbas, PMNH-46274; 1♀, vi.2005, Islamabad, leg. Khurram Fida, PMNH-44566.

Distribution

Pakistan (Islamabad, Muzaffarabad, Rawalpindi and Swat), China (Cao et al. 2014), India, Japan, Korea (Maldonado Capriles 1990) and Myanmar (Ambrose 2006b; Aukema & Rieger 1996).

Discussion

Interestingly, many assassin bugs are found in the bark of trees or on the foliage of herbs, shrubs and trees

(Readio 1927; Miller 1953; Louis 1974). *Acanthaspis cincticrus* lives under the boulders near ant nests (Ishihara 1937; Cao et al. 2014). We collected a few adults from the base of trees during the night with the help of an electric torch while a few nymphal stages were caught above ground. The adult was found comparatively more active than the nymphal stage.

Some species of this genus show distinct polymorphism in wing forms and colour patterns. Ambrose & Livingstone (1987) recorded dissimilarities in body colours among the individuals of *A. pedestris* collected from various ecological and geographical habitats of Indian peninsula. Lakkundi (1989) observed adults of *A. quinquespinosa* with light and dark habitus from two different localities. Ambrose & Livingstone (1990) recorded four different colour patterns in *A. siva* on the posterior lobe of pronotum and legs. According to Cao et al. (2014), the Indian species of *A. cincticrus* are comparatively different from those of China, Japan and Korea in body size, colour patterns on hemelytron, structures of pronotum and male genitalia. The same, we found only two different kinds of colour patterns on the posterior lobe of the pronotum (Fig. 2C–D) separated by a short, shallow sulcus (these colour patterns are sometimes indistinct or absent); macropterous males and females (Fig. 1A–D); body size ranged from 12.20 to 12.70 mm in length; medial dorsal lobe of endosoma at the endosomal area in male genitalia (Fig. 7A–B, E); spots on pro- and meso-femora (Fig. 5C, F) and dimorphic fasciae (Fig. 1A), whereas, Cao et al. (2014) recorded six kinds of different colour patterns on the posterior lobe of pronotum in Chinese species, as well as a brachypterous form of female individuals; body size of males and females ranged from 13.00 to 17.30 mm in length; endosoma in male genitalia translucent, without any tuber, thorn or spur. Our observation regarding the dimorphism is confirmed by Ishikawa et al. (2005), who recorded dimorphic fasciae in Japanese species of *A. cincticrus*.

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