A NEW RECORD OF THE PREDATORY BUG *BIASTICUS FLAVUS* (DISTANT) (HEMIPTERA: REDUVIIDAE: HARPACTORINAE) FROM PAKISTAN AND ITS REDESCRIPTION WITH REFERENCE TO ITS UNKNOWN MALE AND FEMALE GENITALIA

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ABSTRACT

A new record of a predatory bug *Biasticus flavus* (Distant) of the subfamily Harpactorinae of Reduviidae is recorded for the first time from Pakistan and is described and illustrated in detail with special reference to its diagnostic characters, male and female genitalia.

Key Words: *Biasticus flavus*, Reduviidae, Redescription, Male and Female genitalia.

INTRODUCTION

The subfamily Harpactorinae is the largest subfamily of the family Reduviidae including about 300 genera and 2000 species worldwide (Putshkov and Putshkov, 1985; Maldonado-Capriles, 1990; Truong *et al*., 2015). Some of them are found on agricultural crops such as cotton, rice, soyabean and can be used as natural enemies for controlling insect pests of these crops (Ambrose, 1999).

Biasticus Stål is widely distributed genus of the subfamily Harpactorinae. It can easily be recognized having antennae with basal segment much longer than head, posterior lobe of pronotum mid-anteriorly longitudinally slightly grooved, above elevated, medially swollen, smooth and not granulate, humeral angles slightly triangulate but more or less rounded, sides internally antero-laterally swollen following groove, posteriorly sides thinly raised and erect, slightly curved internally following depression and groove, anterior lobe much shorter than posterior lobe from sides above much elevated, medially deeply grooved, scutellum not apically produced, legs long and slender, fore and mid femur slightly incrassated, somewhat curved much shorter than hind femur. Distant (1904, 1910) listed two species *viz abdominalis* and *fuliginosus* of the genus *Biasticus* from Oriental region under the division Harpactoraria (presently treated as tribe Harpactorini Amyot and Serville) and placed *flavus* under the genus *Harpactor* Laporte. Matsumura (1913) described this species as *Harpactor flavinotum* but next year Horvath (1914) considered it as *Rhinocoris flavidorsum*, a new name for *flavinotum* (nomen hybridum). Following Bergroth (1914), Esaki, (1926) treated the above species under *Rhinocoris*. Truong *et al*., (2015) erroneously called Matsumura's species as *Biasticus flavinotus* instead of *B. flavinotum*. Later Hsiao *et al.*, 1981; Maldonado- Capriles,(1990); Weirauch (2008); Mukherjee and Hassan, (2016) and Truong (2016) all followed Stål mentioning *flavus* under *Biasticus*. The present species was originally known from India, Myanmar, China, Hong Kong, Japan and Vietnam and the record from Azad Kashmir, Pakistan is certainly a new one.

MATERIALS AND METHODS

Two males and two females were collected from Kohala Road, Azad Kashmir in July, 1984 and were easily determined by us as *Biasticus flavus* (Distant). The measurements were taken following Ahmad *et al.*, (2002) and male and female genitalia were dissected and inflated following the technique of Ahmad (1986), Ahmad and Mc Pherson, (1990 and 1998). The inflated genital components were placed in microvials with glycerine and pinned with the specimens. All measurements are given in millimeters and all illustrations are to the given scales.

Biasticus flavus (Distant)
(Figs. 1,2)

Harpactor flavus Distant, 1903: 206; 1904: 336.
Harpactor flavinotum Matsumura, 1913: 172
Rhinocoris flavus Bergroth, 1914: 362.
Rhinocoris flavidorsum Horvath, 1914: 660.

Biasticus flavus Hsiao *et al.*, 1981: 538; Maldonado- Capriles, 1990:171; Truong, 2016:249; Mukherjee & Hassan, 2016: 574.
Biasticus flavinotus Matsumura, 1913: 172; Truong *et al*., 2015: 101

Colouration

Very variable, live specimens with head and anterior pronotal lobe shining black; posterior lobe shining yellow; connexival joints, hemelytra, dorsum of abdomen, venter, legs black; collected specimens dull bronze, generally with two or three marginal spots; eyes light brown; ocelli pale.

Head

Subelongate as long as pronotum, unarmed clothed with short setae; anteocular region equal to postocular region; antennae with basal segment shorter than fore femur, subequal to second and third segments together and 1.5x of fourth segment, length of segment I 3.1 (3.1-3.2), II 1.3 (1.2-1.3), III 1.7 (1.7-1.9), IV 2.0 (1.7-2.1); antennal formula II< III< IV< I; labium with basal segment longer than anteocular region, shorter than second, third shortest, length of segment I 1.0 (1.0-1.1) II 1.4 (1.2-1.4), III 0.4 (0.3-0.4); labial formula III< I< II; length of anteocular region of head excluding eyes, 0.6 (0.6-0.8); length of postocular region of head including eyes, 0.6 (0.6-0.8); width of head, 1.3; interocular distance, 0.5 (0.5-0.6); interocellar distance, 0.3 (0.3-0.4).

Thorax

Pronotum as long as broad, unarmed, collar process subacute directing laterally, anterior lobe longitudinally impressed with deep median longitudinal sulcus, posterior lobe 1.75x longer than anterior lobe, antero-lateral and postero-lateral margins plane, humeral angles broadly rounded, posterior angles somewhat triangular, posterior margin slightly concave, length of pronotum 2.6 (2.4-2.6), width 2.7 (2.9-3.1); scutellum triangular with apex subrounded, length of scutellum, 0.8(0.8-1.0), width 1.1 (0.9-1.4); fore and mid femur slightly incrassated, somewhat curved much shorter than hind femur with vertical long setae; membrane of hemelytra passing beyond the last abdominal segment in both male and female; distance apex scutellum-apex abdomen, 4.4 (4.4-5.3); apex abdomen-apex membrane, 1.0 (1.0-1.6); base scutellum-apex clavus, 1.2 (1.1-2.2); apex clavus-apex corium, 2.4 (2.1-3.0); apex corium-apex membrane, 2.4 (2.4-3.2).

Abdomen

Posterior margin of seventh abdominal sternum in male deeply concave and rounded; connexiva well exposed at repose, connexival joints subroundly produced; in female seventh abdominal sternum with posterior margin concave and sinuate, lateral angles rounded. Total length in male, 10.8 (10.8-11); in female 12.6 (12.6-14.8).

Male genitalia

Pygophore (Figs.2**A,B**) with ventral rim convex medially projected above with two process not wide directing postreiorly, dorsal rim moderately concave medially as well as laterally medially slightly projected above; paramere (Fig.2**C**) with blade weakly curved apically rounded, stem substraight, outer and inner margins sinuate; inflated aedeagus (Figs. 2**D,E**) having a pair of apical membranous conjuntival appendages directing laterally with rounded apices, five small spines on either sides of apical conjuntiva, vesica straight not passing membranous conjunctival appendages.

Female genitalia

Female terminalia (Fig.**2F**) with first gonocoxae broader than long, apically acute, inner margins anteriorly convex posteriorly concave, lateral margins sinuate; eighth paratergites with posterior margins somewhat convex; ninth paratergites completely fused much shorter than first gonocoxae; genital chamber (Fig.2**G**) having a pair of short and uncoiled pseudospermathecae.

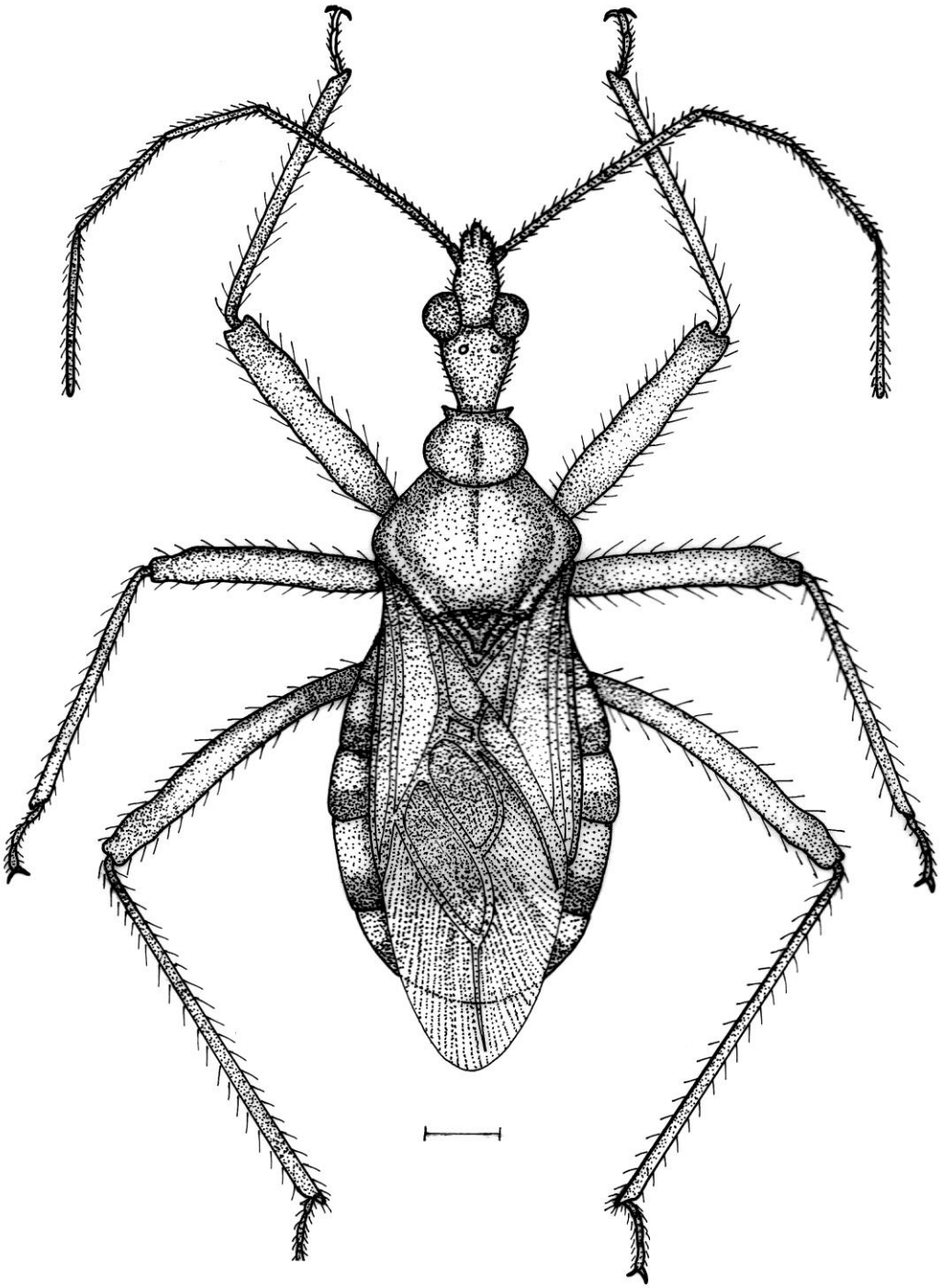
Material examined

2 ♂, 2 ♀, Pakistan: Azad Kashmir: Kohala Road on grass; leg. Kamaluddin; 14-07-1984 lodged at NHMUK.

Comparative note

This species is closely allied to *abdominalis* Reuter in having anteocular region equal or subequal to postocular region, humeral angles broadly rounded, scutellum broader than long but it can easily be separated from it in having first antennal segment 1.5x of fourth segment, pronotum as long as broad with posterior angles somewhat triangular and posterior lobe is 1.75x as long as anterior lobe, first gonocoxae broader than long in contrast to first antennal

segment subequal to fourth segment, pronotum broader than long with posterior angles subnodulose and posterior lobe is 2x as long as anterior lobe, first gonocoxae as long as broad in *abdominalis*.



1 mm

Fig.1. *Biasticus flavus* (Distant), entire specimen, dorsal view

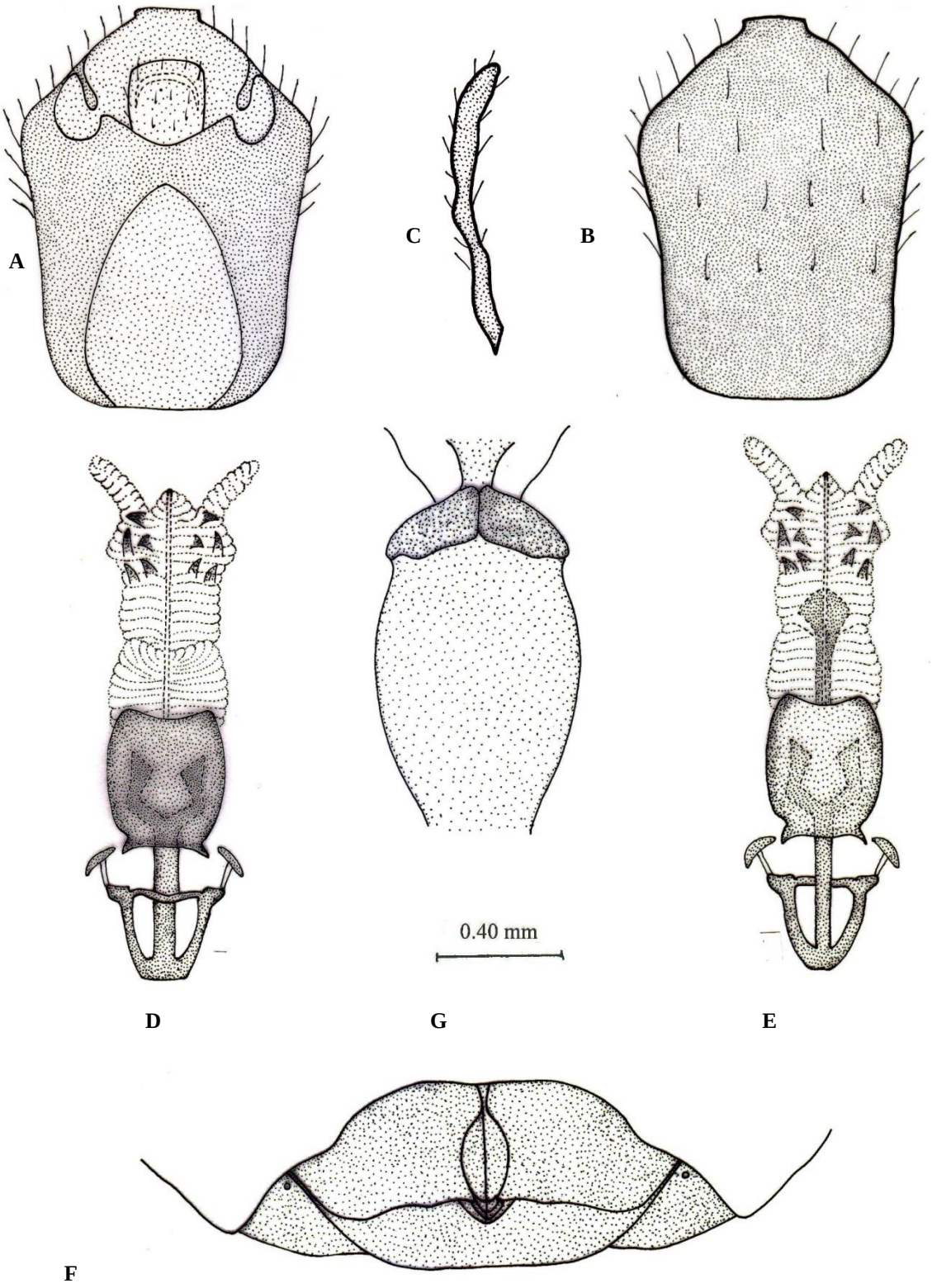


Fig. 2. *Biasticus* flavus; A, Pygophore, dorsal view; B, Pygophore, ventral view; C,Paramere, inner view; D, Inflated aedeagus, dorsal view; E, Inflated aedeagus, ventral view; F, Female terminalia, ventral view; H, Genital chamber, ventral view.

DISCUSSION

Biasticus Stål is closely allied to *Sphedanolestes* Stål in general body plan and genital structures. The two genera can be distinguished by body shape and male genital characters: Body elongate, pygophoral process never wide, parameres never entirely bent in *Biasticus* and body oblong, pygophoral process wide and parameres distinctly bent in *Sphedanolestes*.

Based on the external morphological and genital characters, it appears that *B. flavus* and *B. abdominalis* are more closely related to each other than to the other species. Labium with basal segment reaching posterior margins of eyes longer than anteocular region, anterior longitudinal elevation to posterior pronotal lobe well pronounced legs somewhat longly pilose. *B. flavus* can be separated from *B. abdominalis* by having head as long as pronotum, first antennal segment shorter than fore femur, posterior pronotal angles triangular, posterior pronotal lobe not quite twice as long as anterior lobe in comparison to head shorter than pronotum, first antennal segment subequal in length to fore femur, posterior pronotal angles subnodulose, posterior pronotal lobe twice as long as anterior lobe in *abdominalis* (Distant, 1904, Mukherjee and Hassan, 2016). In the present study all the distinguishing characters along with the description of male and female genitalia of the above species are given which were entirely unknown.

Reduviids cause important mortality factors by consuming a wider array of prey and should be conserved and augmented for their utilization in biocontrol programmes (Shaefer, 1988; Schaefer and Ahmad, 1987, Ambrose, 1999). The faunal research of the family reduviidae in Pakistan is insufficient and unknown. Hence there is an absolute need for a complete comprehensive reassessment of the family's higher level classification and phylogenetic relationship.

REFERENCES

Ahmad, I. (1986). A fool proof technique for inflation of male genitalia in Hemiptera (insecta). *Pakistan J. Ent. Kar*., 1: 111-112.

Ahmad, I. and J. E. McPherson (1990). Male genitalia of the type species of *Corimelaena* White, *Galgupha* Amyotand Serville and *Cydnoides* Malloch (Hemiptera: Cydnidae: Corimelaenidae) and their bearing on classification. *Ann. Entomol. Soc. Am*., 83: 162-170.

Ahmad, I. and J.E. McPherson (1998). Additional information on male and female genitalia of *Parabrochymena* Larivier and *Brochymena* Amyot and Serville (Hemiptera: Pentatomidae). *Ann. Entomol. Soc. Am*., 91(6): 800-807.

Ahmad, I., H. Afzal, S. A. Rizvi, S. Kamaluddin and M. A. Azmi (2002). A new Tropicorine stink bug species of the genus *Tropicoris* Hahn (Heteroptera: Pentatomidae: Pentatominae) from Nepal and its cladistic relationship. *Proceedings of the Pakistan Congress of Zoology*, 22:31-36. 807.

Ambrose, D.P (1999). *Assassin Bugs.* Science Publishers, Inc., Enfield, New Hampshire, U.S.A. 337 pp.

Bergroth, E. (1914). H. Sauter's Formosa-Ausbeute; Hemiptera Heteroptera I. Aradidae, Phyrrhocoridae, Myodochidae, Tingidae, Reduviidae, Ochtheridae. *Entomol. Mitt*., 3: 353-364.

Distant, W.L. (1903). Rhynchotal notes. XVI. Heteroptera: Family Reduviidae, Apiomerinae, Harpactorinae, and Nabidae. *Ann. Mag. Nat. Hist*., 7(11): 203-213, 245-258.

Distant, W.L. (1904). *The fauna of British India including Ceylon and Burma, Rhynchota* Vol. II (Heteroptera); (London: Taylor and Francis Ltd.), pp. 1-503.

Distant, W.L (1910). The fauna of British India, Rhynchota. 5. Heteroptera, 5: xii + 362.

Esaki, T (1926). A review of Mr. Tamao Fukui's illustrated monograph of Japanese Reduviidae (In Japanese). Kontyu, 1:87-89.

Horváth, G. (1914). Reduviidae nova africanae. *Ann. Mus. Natl. Hung*., 12: 109-145.

Hsiao, T., R. S. Zhi, Z. L. Yi, J. H. Li, Z. H. Guang and L. S. Li (1981). *A handbook for the determination of the Chinese Hemiptera-Heteroptera*, Vol. II: iii+588; 589-623; 624-654; 85 pls.(1978).

Maldonado-Capriles, J. (1990). Systematic catalogue of the Reduviidae of the world (Insecta: Heteroptera). *Caribbean J. Sci*., (special ed.). 694 pp.

Matsumura, S. (1913-1919). *Thousands insects of Japan*. Tokyo additions to thousand insects of Japan. 1: 1-184.

Mukherjee, P. & M. E. Hassan **(**2016). Three new records of Assassin Bugs from Andaman and Nicobar Islands, India. *Munis Entomology & Zoology*, 11 (2): 573-575.

Putchkov, V.G. and P.V. Putchkov (1985). A catalogue of the Assassin-bugs Genera of the World (Heteroptera: Reduviidae). *Vestnik Zool*., 1985, 112 pp.

Schaefer, C.W. (1988). Reduviidae (Hemiptera: Heteroptera) as agents of biological control; In: *Bicovas,* K.S. Ananthasubramanian, P. Venkatesan and S. Sivaraman (eds.). *Loyola College, Madras*. 1: 27-33.

Schaefer, C.W. and I. Ahmad (1987). Parasites and predators of Pyrrhocoreidae (Hemiptera) and possible control of

cotton stainers *Phonoctonus* spp., (Hemiptera: Reduviidae). *Entomophaga*, 32: 269-275.

Truong, X.L., W. Cai, M. Tomokuni and T. Isikawa (2015). The assassin bug subfamily Harpactorinae (Hemiptera: Reduviidae) from Vietnam: an annotated checklist of species. *Zootaxa* 3931(1): 101-116.

Truong, X. L. (2016). The species diversity of assassin bugs (Heteroptera:Reduviidae) and their preys in Central Highlands of Vietnam. *Biological Forum-An International Journal*, 8(2):247-252.

Weirauch, C. (2008). Cladistic analysis of Reduviidae (Heteroptera: Cimicomorpha) based on morphological characters. *Systematic Entomology*, 33: 229-274.

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