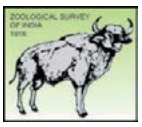
ISSN (Online) : 2581-8686
ISSN (Print) : 0375-1511

Rec. zool. Surv. India: Vol. 123(iS2)/169-176, 2023
DOI: 10.26515/rzsi/v123/iS2/2023/172513



Morphology of three species belonging to genus *Cletomorpha* Mayr, 1866 (Hemiptera: Coreidae) with special reference to male genitalia

Susmita Khanra, Swetapadma Dash* and Amartya Pal

Zoological Survey of India, M-Block, New Alipore, Kolkata-7000531, West Bengal,
(Email:susmitakhanra.7258@gmail.com, oasisnainital@gmail.com, amartyapal08@gmail.com)

Abstract

A study on morphological characters of three Indian species pertaining to genus *Cletomorpha* Mayr, 1866, has been undertaken with detailed illustration of male genitalia. A taxonomic key and checklist to Indian species of *Cletomorpha* is also provided.

Keywords: Taxonomy, Coreidae, *Cletomorpha,* West Bengal, morphometry, genitalia.

Introduction

The genus *Cletomorpha* Mayr, 1866 (Hemiptera: Coreidae) includes 22 species; out of them, four are distributed in India: *C. raja* Distant, 1901; *C. hastata* (Fabricius, 1787); *C. benita* Kirby, 1891; and *C. walker* Kirby, 1891 (Distant, 1902; Pravakar, 2013; Coreoidea Species File, 2023). This genus is widely distributed in the Ethiopian and Indo-Malayan regions. Distant (1902) mentioned 5 species in this genus including two Indian species, *C. raja* and *C. hastata*. Another species, *C. walkeri* was reported by Prabakar (2013). Paulson *et al.* (2020) recorded one of the species of *Cletomorpha, C. benita* as a pest from Vadodara, Gujarat. In very recent study Kushwaha *et al* (2023) provides redescription of *C. benita*. However, there is no detailed study of genitalia of this particular species *C. benita*. The present paper aims to study comparative morphological characters with male genitalia of the three Indian species of this genus *Cletomorpha* Mayr, 1866. Another Indian species *C. walkeri* has been studied from literature only.

Material and Methods

The specimens were collected from shrubs with the help of an insect net. The collected bugs were put in the glass vials, containing 70% ethyl alcohol in the field. After returning to the laboratory of Zoological Survey of India the bugs were stretched, air dried, pinned and stored in the insect cabinet for taxonomic study. Identification of the species was made following the keys and characters as given by Distant (1902), Bergroth (1924), and Blotte (1935). All the studied specimens were from the National Zoological Collection of Zoological Survey of India, Kolkata, specifically from West Bengal (Mahananda Wild Life Sanctuary, Buxa Tiger Reserve and Bethuadahari Wildlife Sanctuary). The photographs were taken using Leica M205A stereomicroscope with a coupled Leica DMC 4500 camera and processed in LAS V4.12 software to perform morphometric measurements. Male genitalia were dissected following the methodology given by Ahmad (1986).

The internal contents were cleared after thoroughly washing it in distilled water for 2–3 times and with the help of fine forceps. All measurements are given in millimetres. List of abbreviations used B – blade, BP – basal plate, C – conjunctiva, GP – gonoporal process, OM – outer margin, P – pivot, St – stem, T – theca, V – vesica, VAM – ventroanterior margin, VPM – ventroposterior margin, VSA – ventral sclerotized appendages.

*Author for correspondence : oasisnainital@gmail.com
Article Received on: 10.04.2023 Accepted on: 15.06.2023

Results

Taxonomic Account

Family Coreidae Leach, 1815

Subfamily Coreinae Leach , 1815

Genus *Cletomorpha* Mayr, 1866

1866. *Cletomorpha*: Mayr Zoologischer Theil, Zweiter Band, 1. Abtheilung, B. Part 2. 120

***Cletomorpha hastata* (Fabricius, 1787)**

1787. *Cimex hastata:* Fabricius. *Mant*. 2:287

Material examined: 2 male, Laltang Tower, Laltang Beat, South Range, Mahananda Wild Life Sanctuary, Darjeeling, 26.811818N, 88.524573E, 25.iii.2018, Coll: M.E.Hassan & party.

Male genitalia:
Outer margin of pygophore is subrounded, Ventroanterior part is concave, middle portion is broad then substraight, ventroanterior margin is bilobed having a small prominent notch in middle (Figure: 4) ; Paramere long and slender, upper outer margin of stem subrounded and lower portion is straight and inner margin "U" shaped, hairs present on stem, blade long and thin (Figure: 5); aedaegus highly sclerotized with broad phallosoma and small leaf shaped conjunctiva, vesica sclerotized , moderately thick with two long coil. (Fig 6)

***Cletomorpha raja* Distant, 1901**

1901. *Cletomorpha raja* : Distant. *Ann. Mag. Nat. Hist*. 7 7(41):423-424

Material examined: 1 male, camp 12, SRVK Beat, Damanpur East Range, Buxa Tiger Reserve, Alipurduar, West Bengal, 26.37763N, 89.35463E, 27.iii.2018, Coll. M.E. Hassan & party

Male genitalia:

Outer margin of pygophore is rounded with a concavity posteriorly, ventroposterior margin bilobed with wavy middle (Figure: 10); Paramere elongated, upper portion of stem with small hairs, upper outer margin is rounded and lower outer margin and inner margin of stem is concave, blade short and thick.(Figure: 11); aedaegus sclerotized and narrow towards apex, phallosoma large and conjunctiva with a pair of triangular ventral appendages, vesical with two short and broad coils.(Figure: 12)

***Cletomorpha benita* Kirby, 1891**

1891.*Cletomorpha benita*: Kirby, *Journal of the Linnean Society, Zoology* 24 149– 150:96-97.

Material examined: 1 male, Pundia Beat, West Range, Mahananda Wildlife Sanctuary, Darjeeling, West Bengal, 26.834898N, 88.350541E, 8.xi.2017, Coll. M.E. Hassan & party; 3 male, station 1(near gate), Bethuadahari Wildlife Sanctuary, Nadia, West Bengal, 23.597834N, 88.392702E, 6.xii.2021, Coll.S. Khanra.

Male genitalia:
Pygophore with outer margin substraight, becomes a little broad posteriorly. Ventro-posterior margin or lip bilobed with very strong median inflexion, hair present on posterior margin (Figure: 16); Paramere elongated, blade long and thick, broad in middle, outer and inner margin sinuate. Stem elongated, prominent hair present upper portion of stem, sub straight in medial front portion and roundish in medial back portion, lower part of stem is straight (Figure: 17). Aedaegus with Phallosoma long and thin, Conjunctiva with two sclerotized ventral appendages; vesica with two coils and a pair of long leaf shaped highly sclerotized ventral appendages present near vesica. Basal plate with pivot (Figure: 18).

The genus *Cletomorpha* Mayr, 1866 is distinguished from its closely allied genus *Cletus* Stal 1860 by presence of acutely and exteriorly produced connexival segment. Among the four Indian species of this genus *C.raja* and *C. hastata* is redescribed by Gupta and Singh, 2013. These two species is widely distributed in India. Paulson *et al.* (2020) recorded *C. benita* as a pest from Vadodara, Gujarat and Kushwaha *et al* (2023) reported this species from Mizoram. The present study reported *C. benita* first time from West Bengal. Among the four Indian species of genus *Cletomorpha*, three species such as *C.raja, C.hastata, C.benita* are available in National Zoological Collection of Zoological Survey of India, another one *C. walkeri* have been studied from literature only. Main distinguishing character of different species of *Cletomorpha* is marking present on corium. In case of *C. raja* a broad whitish band present on corium, but in *C. hastata* only a pale fascia present on corium which differ from *C. benita* having three prominent macular spot on corium and in C. walker only a single spot present on corium. Genital structure

is also different among these species. Outer margin of pygophore of *C. raja* is more or less oval shaped and having prominent concavity posteriorly which is absent in other two species. Besides outer margin of *C. benita* is rounded and *C. hastata* is sub straight. Anterior portion of blade of paramere of *C. hastata* is more curved compared to other two species. In case of *C. benita* hair numerous in number and distributed in the two third region upper outer margin of paramere stem. But in *C. raja* hair is comparatively less, shorter and distributed in the one third region upper outer margin of paramere stem.

Key to the species of *Cletomorpha* Mayr, 1866 of India

1 Anterolateral side of pronotum without spine ---------- 2

\- Anterolateral side of pronotum with several short strong spines ---------- ***C. hastata*** **(Fabricius, 1787)**

2 Corium having spot ---------- 3

\- Corium having a prominent band ---------- ***C. raja*** **Distant, 1901**

3 Corium having three macular spot ---------- ***C. benita*****/Kirby, 1891**

\- Corium having a single spot ---------- ***C.walkeri*****/Kirby, 1891**

Table 1. A checklist of Indian species of *Cletomorpha*Mayr, 1866

SL No.	Species name	Distribution (India)	Distribution (Elsewhere)
1	*C. raja* Distant, 1901	Assam, (Distant 1902, Basu&Mitra, 1994, Basu et al, 1999, 2000, Basu&Mitra 2003), Himachal Pradesh (Gupta & Singh 2013), Manipur (Basu & Mitra 2004),Meghalaya (Basu*et al*, 1999,2000 Basu & Mitra 2003) Sikkim (Distant 1902, Basu & Mitra, 1994, Basu *et al*, 1999, 2000, Basu & Mitra 2003,) Tripura (Basu*et al*, 2000), Uttrakhand (Gupta & Singh 2013), West Bengal (Basu&Mitra, 1994, Basu*et al*, 1999, 2000, Basu&Mitra2003, Gupta & Singh 2013, Pravakar 2013)	Myanmar (Distant 1902, Basu *et al,*1999, 2000, Basu & Mitra 2003, Gupta & Singh 2013), Pakistan (Gupta & Singh 2013).
2	*Cletomorpha hastata* **(Fabricius, 1787)**	Chhattisgarh (Hassan *et al,* 2019), Himachal Pradesh (Gupta & Singh 2013, Hassan et al, 2019), Haryana (Gupta & Singh 2013), Maharashtra (Distant, 1902, Basu *et al* 1999, Gupta & Singh 2013, Pravakar 2013, Hassan et al, 2019), Madhya Pradesh (Hassan *et al,* 2019), Meghalaya (Basu*et al,* 1999) Punjab (Gupta & Singh 2013), West Bengal (Distant, 1902, Basu*et al* 1999, Gupta & Singh 2013, Pravakar 2013, Hassan *et al,* 2019)	Bangladesh. (Ahmad & Rub 2006), Pakistan (Distant 1902, Basu*et al*, 1999, Ahmad & Rub 2006,Gupta & Singh, 2013, Hassan *et al*, 2019),
3	*Cletomorpha benita* Kirby 1891	Gujarat (Paulson *et al.* 2020), Mizoram Kushwaha *et al* (2023), West Bengal (new record).	Malaysia ,Myanmar (China 1926), Indonesia (Blote 1935),
4	*Cletomorpha walkeri* Kirby 1891	West Bengal (Distant 1908,Pravakar 2013).	Myanmar (Distant 1908), Sri Lanka (Pravakar 2013).

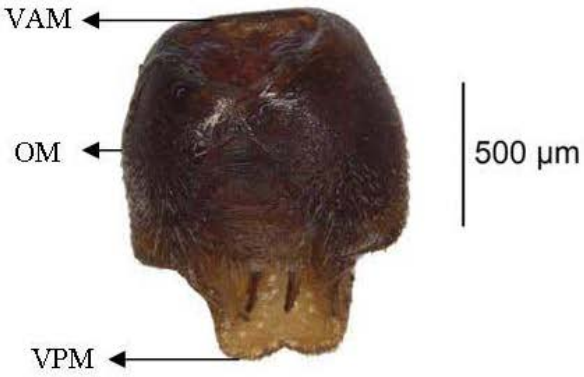
Table 2. Comparison of The Morphological Characters of Indian Species of Genus *Cletomorpha* Mayr, 1866

Characters	***Cletomorpha raja***	***Cletomorpha hastata***	***Cletomorpha benita***	***Cletomorpha walkeri***
Basal part of antennae	Without any spine.	With a spine.	With a spine.	With a spine.
Anterolateral part of Pronotum	Without spine.	With a number of small acute spines.	Without spine.	Without spine.
Pronotal angle	Acutely produced spine & its apices recurved.	Spine small acute and straight.	Spine acute and slightly bent downward.	Very acute and straight.
corium	With very prominent transverse band.	With a pale fascia.	With three prominent macular spot.	With a single spot.
Ventral part of Abdomen	Having scattered spot.	Having patch.	Having clumsy spot.	Having scattered spot.

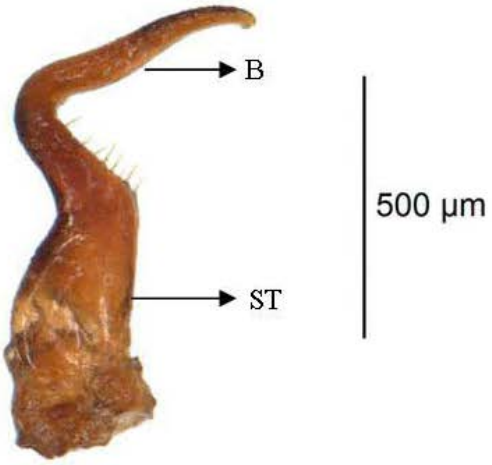
1

2

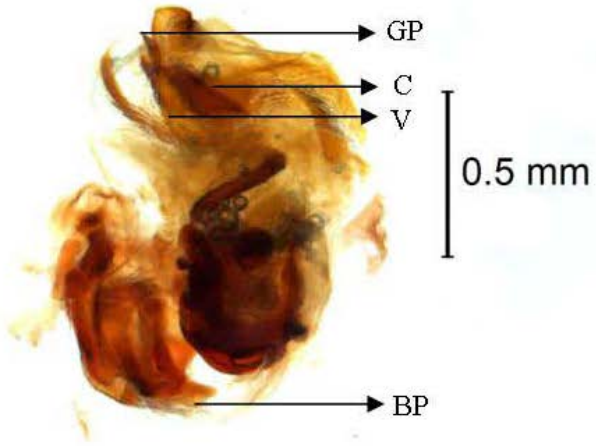
3



4

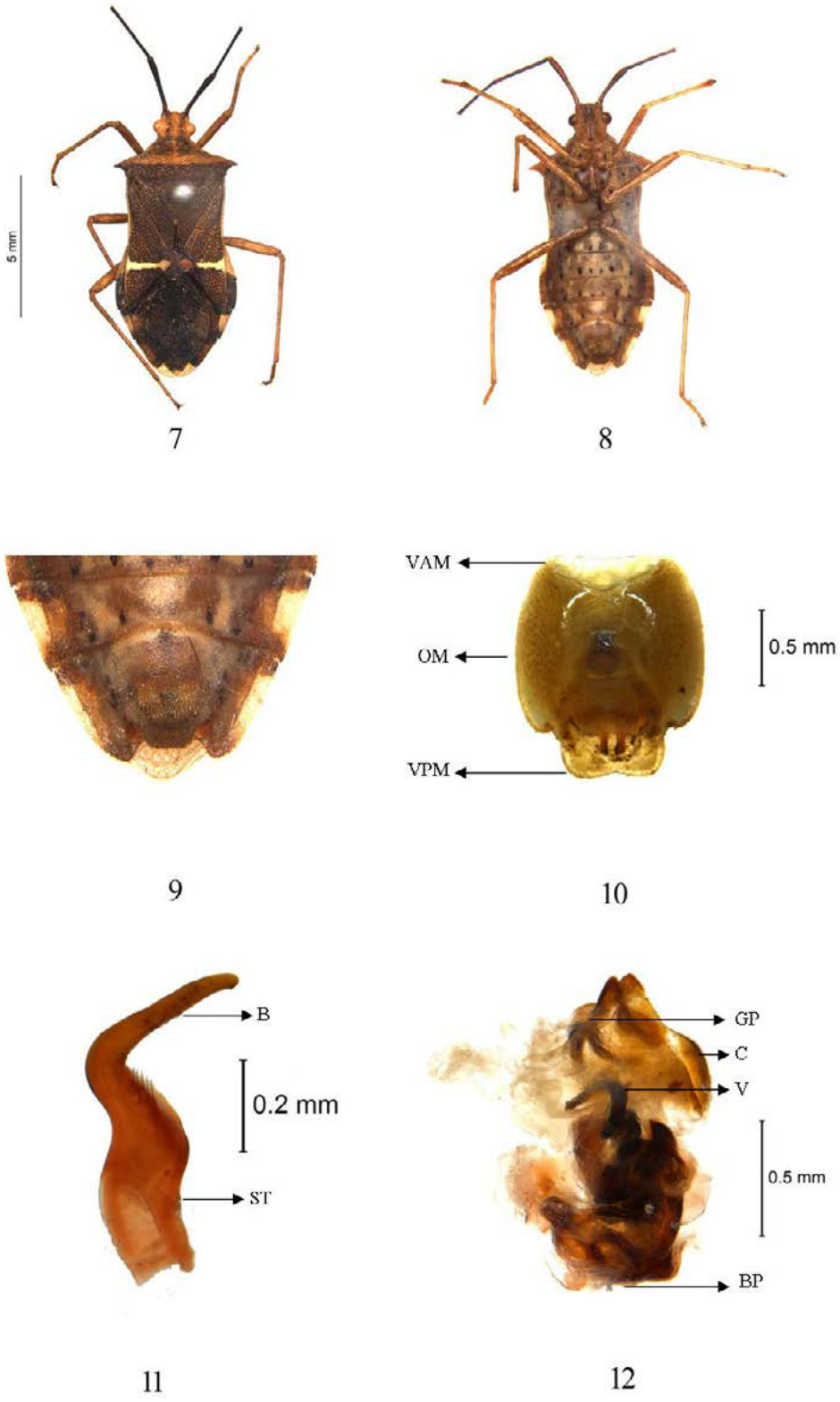


5



6

Figures 1-6. *Cletomorpha hastata* (Fabricius, 1787). 1. Habitus (Dorsal view). 2. Habitus (Ventral view). 3. External genitalia. 4. Pygophore. 5. Paramere. 6. Aedaegus.

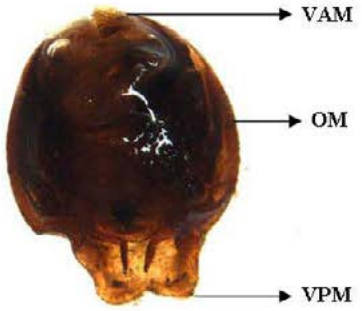


Figures 7-12. *Cletomorpha raja* Distant, 1901**.** 7. Habitus (Dorsal view). 8. Habitus (Ventral view). 9. External genitalia. 10. Pygophore. 11. Paramere. 12. Aedaegus.

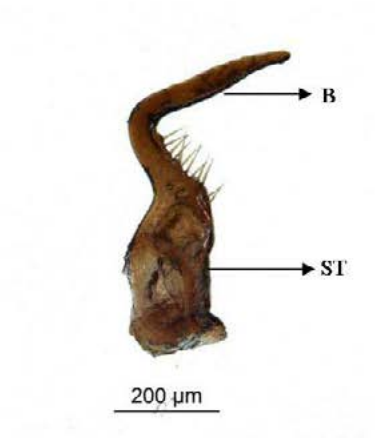
13

14

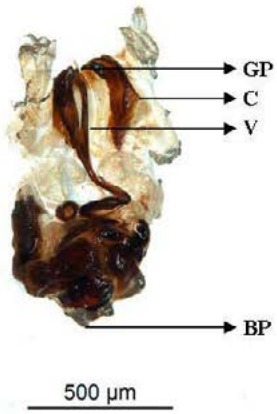
15



16



17



18

Figures 13-18. *Cletomorpha benita* Kirby, 1891**.** 13. Habitus (Dorsal view). 14. Habitus (Ventral view). 15. External genitalia. 16. Pygophore. 17. Paramere. 18. Aedaegus.

Discussion

The genus *Cletomorpha* Mayr, 1866 is distinguished from its closely allied genus *Cletus* Stal 1860 by presence of acutely and exteriorly produced connexival segment. Among the four Indian species of this genus *C.raja* and *C. hastata* is redescribed by Gupta and Singh, 2013. These two species is widely distributed in India. Paulson *et al.* (2020) recorded *C. benita* as a pest from Vadodara, Gujarat and Kushwaha *et al* (2023) reported this species from Mizoram. The present study reported *C. benita* first time from West Bengal. Among the four Indian species of genus *Cletomorpha*, three species such as *C.raja, C.hastata, C.benita* are available in National Zoological Collection of Zoological Survey of India, another one *C. walkeri* have been studied from literature only. Main distinguishing character of different species of *Cletomorpha* is marking present on corium. In case of *C. raja* a broad whitish band present on corium, but in *C. hastata* only a pale fascia present on corium which differ from *C. benita* having three prominent macular spot on corium and in C. walker only a single spot present on corium. Genital structure is also different among these species. Outer margin of pygophore of *C. raja* is more or less oval shaped and having prominent concavity posteriorly which is absent in other two species. Besides outer margin of *C. benita* is rounded and *C. hastata* is sub straight. Anterior portion of blade of paramere of *C. hastata* is more curved compared to other two species. In case of *C. benita* hair numerous in number and distributed in the two third region upper outer margin of paramere stem. But in *C. raja* hair is comparatively less, shorter and distributed in the one third region upper outer margin of paramere stem.

Acknowledgements

The authors are grateful to Dr. Dhriti Banerjee, Director, Zoological Survey of India for encouragements and laboratory facilities. We are greatly thankful to Dr. C. Raghunathan, Divisional-in-charge, Entomology Division, Zoological Survey of India for his valuable suggestions and support. Authors are also thankful to all the officers and staffs of Hemiptera section for their helpful co-operation.

References

Ahmad, I. 1986. A fool-proof technique for inflation of male genitalia in Hemiptera (Insecta). Pakistan Journal of Entomology 1(2): 111-112.

Ahmad, I. and Rub, N. 2006. New Records and Redescription of a Gonocerine Squash Bug *Cletomorpha hastata* (F.) (Hemiptera: Coreidae) from Indo-Pakistan Subcontinent and its Cladistic Relationships. *Pakistan J.* Basu, R.C. Bal, A. and Mitra, S. C. 1998. Insecta: Hemiptera: Coreoidea. Zool. Surv. India Fauna of Meghalaya 4: 361-389: Basu, R.C. and Mitra, S.C. 2003. Insecta: Hemiptera: Heteroptera: Coreoides. Zool. Serv. India Fauna of Sikkim, II : 498-508.

Blöte, H.C. (1935). Catalogue of the Coreidae in the Rijksmuseum van NatuurlijkeHistorie. Part II. Coreinae, First Part. ZoölogischeMededeelingen, 18: 209.

Coreoidea SF Team. *Coreoidea Species File Online*. Version 5.0/5.0. [retrieval date]. <http://Coreoidea.SpeciesFile.org>. Use http://Coreoidea.SpeciesFile.org to bookmark this website.

Distant, W.L. (1902). The Fauna of British India, including Ceylon and Burma. Rhynchota. Taylor and Francis, London,

Distant, W. L. 1908, Rhynchota Vol.IV. Homoptera and Appendix (Pt). In: Bingham, C. T (Ed). The Fauna of British India Including Ceylon and Burma. Taylor and Francis, London. 15+501 pp.

Gupta, R. and Singh, D. 2013. Studies on two Indian species of genus *Cletomorpha*/Mayr (Hemiptera: Coreidae). *journal of Insect science* 26 **(2)**: Hassan, M.E. Biswas, B. Saha, P.C. Mukherjee, P. Praveen, K. 2019. Insecta: Hemiptera: Heteroptera, Zool. Surv. India. Fauna of Maharashtra, 20(3): 41-87.

Kushwaha, S. Jahan, S. Khare, P. Dubey, A. K. 2023. Redescription of Cletomorpha benita Kirby, 1891 (Hemiptera: Heteroptera: Coreidae) first time from Northeast India with an updated checklist from world. International Journal of Global Science Research **10**: 2004-2008

Prabakar, D. (2013). The biogeographic distribution of species of the superfamily Coreoidea :Hemiptera in India. *Records of the Zoological Survey of India*, 113 **(4)**, 103–128.

Paulson, L. Thakkar, B & Parikh, P. 2020 Diversity of Agriculturally Important Insect In and Around Vadodara, Gujarat, India. *International Journal of Zoology and Research (IJZR)*, 10: 15-28.