

## RECORDS OF GENUS *AULACOPHORA* CHEVROLAT, 1836 (LUPERINI: GALERUCINAE: CHRYSOMELDIAE) FROM SINDH, PAKISTAN

S. A. Talpur<sup>1</sup>, I. Khatri<sup>2\*</sup>, M. A. Rustamani<sup>3</sup> and Z. Ahmed<sup>4</sup>

<sup>1-3</sup> Department of Entomology, Sindh Agriculture University Tandojam, Pakistan

<sup>4</sup> Department of Zoology, Federal Urdu University of Arts, Science & Technology, Karachi, Sindh, Pakistan

\*Corresponding Author

**ABSTRACT:** The study on collection of genus *Aulacophora* Chevrolat, 1836 was carried out from various parts of Sindh Province of Pakistan, that revealed occurrence of three species of genus, including; *Aulacophora foveicollis* P. H. Lucas, 1849, *Aulacophora impressa* (Fabricius, 1801) and *Aulacophora intermedia* Jacoby, 1892. Each species is provided with habitus images, genitalia and distributional map.

**Keywords:** leaf beetles, galerucinae, alticini, flea beetles, *Aulacophora*.

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### INTRODUCTION

Genus *Aulacophora* Chevrolat is considered as the voracious feeder of cucurbits and cause serious damage in case of avoidance (Gressitt 1955; Gressitt and Kimoto 1963; Sharma and Bhalla 1964; Kimoto 1966; Wilcox 1972; Gabriel 1997; Kimoto *et al.* 1984; Anand and Cox 1986) it has also been reported to feed and 19 plant families (Gressitt and Kimoto 1963; Gabriel 1997; Kimoto *et al.* 1984; FAO 1989; Jolivet 1999; Barroga 1997; Barroga and Mohamedsaid 2002). Genus *Aulacophora* consists of 186 species Worldwide. The genus can be characterized by oblong ovate body, antennae not jointed at insertion, transverse depression on pronotum, open coxal cavities from anterior, 5<sup>th</sup> abdominal male ventrite trilobed, apical spurs present on tibia, tarsal claw bifid. The genus is closely related with genus *Pseudocophora* but it can be distinguished by elytral epipleuron.

The feeding habits of *Aulacophora* and *Diabrotica* are found similar (Maulik, 1936), in Old World both genera are commonly seen in feeding commonly on squash, cucumbers, melons, they highly sensitive to the kairomones released from these host plants. (Metcalf 1986a; Nishida *et al.* 1992). *Aulacophora* possess ability to detoxify the bitter chemicals (tetracyclic triterpenoids) produced by cucurbit plants, further they possess the ability to detoxify and use for the defence against predators (Ferguson and Metcalf 1985; Nishida *et al.* 1990). The genus in Old World has remained restricted on cucurbits (Metcalf 1994), mainly literature in Old World is focused on red pumpkin beetle *A. foveicollis* (Al-Ali *et al.* 1982; Roy & Pande 1991; Khan & Khattak 1992). *A. foveicollis* and *A. indica* are common pests that attack on cucurbits throughout Asia, Africa and Europe (Berti 1990). Both *A. foveicollis* and *A. indica* are reported to overlap in Pakistan and

Afghanistan whereas, former is distributed in west India and later one in the eastern part of India (Wilcox, 1972 and Berti, 1990).

### MATERIALS AND METHODS

Specimen collection sites: Sindh parts of Sindh Province, Pakistan.

Method of collection: At various sites hand net was used to collect specimens from vegetations, and the light trap was installed at various locations of Sindh province.

Methods of Killing and preserving: Killing bottle containing potassium cyanide was used to kill insects and was cleared and legs were settled with the help of pins and, after settling the mounted and labelled with available information.

Method of imaging: For the quality images DSLR camera was fitted on rail, for the various depth of field multiple images taken to cover all parts of the body, staking of images was performed through control ZP software.

Specimens were diagnosed with the help of pertinent literature, and the distributional map was generated with the google earth online by inserting coordinates of particular area. Further, the details are also provided in material examined section of each species. Genitalia was studied with the help of maceration process.

### RESULTS

Tribe Luperini Gistel, 1848

Type genus: *Luperus* Geoffroy, 1762

Genus *Aulacophora* Chevrolat, 1836

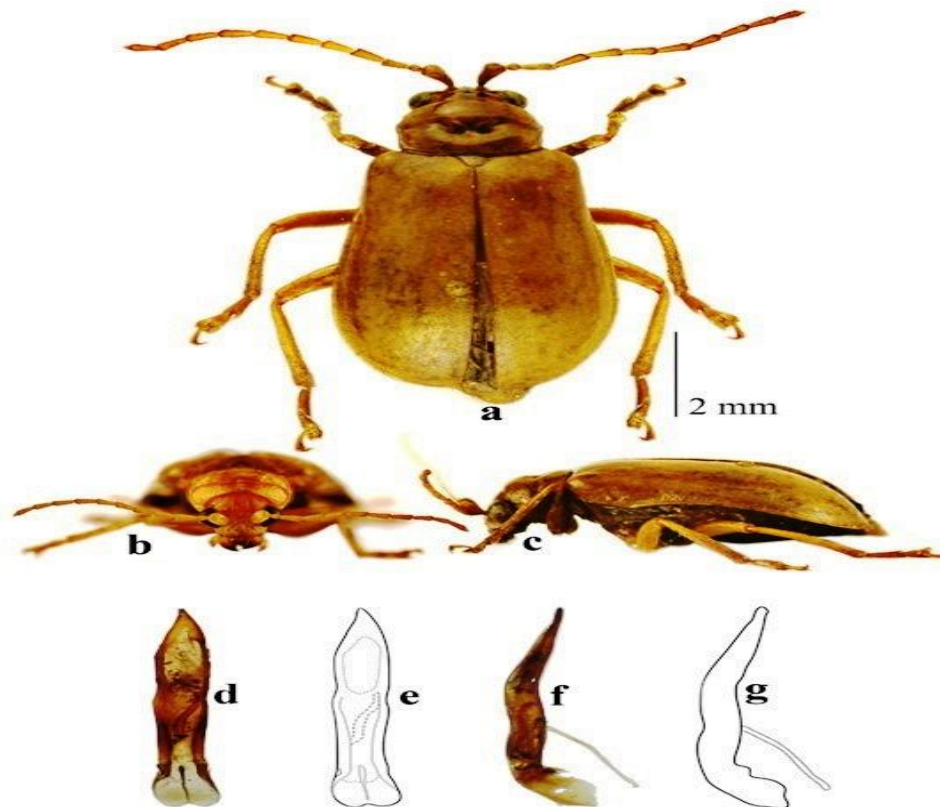
Type Species: *Galeruca quadraria* Olivier, 1808

*Aulacophora foveicollis* P. H. Lucas, 1849 (Plate 01, Fig. 01)

**Description.** General body colour reddish brown. Eyes strongly convex. Pronotum narrow, marginated laterally with transverse depression. Clypeus with scattered fine hairs. Antennae filiform with serration. 1<sup>st</sup> antennal segment enlarged, 2<sup>nd</sup> short, 3<sup>rd</sup> equal to 4<sup>th</sup> and 5<sup>th</sup> equal to 4<sup>th</sup> segment. Dull scutellum with impunctate or convex appearance, the shape seemingly weekly-triangular. Forewing with fine punctures, without spots and appearance brownish. Prothorax broad with fine punctures. Posterior femur normal without swollen appearance. Tarsal claw internally toothed or bifid, 3<sup>rd</sup> segment of tarsae emarginated moderately. Apex of aedeagus cuspidated on dorsal side with straight or wavey appearance. Gonopore of aedeagus with semi-oval.

**Material examined.** *Aulacophora foveicollis* P. H. Lucas, 1849, 17♂, 38♀, PAKISTAN, Sindh Province, Noshero Feroz District, environs, 29.VII.2015, Sohail Ahmed Talpur leg., 26°50'2.60"N, 68° 2'44.96"E, 127 ft. PAKISTAN, Sindh Province, Mirpur Khas District, Sindhri environs, 01.VIII.2016, Sohail Ahmed Talpur leg., 25°29'48.84"N, 68°58'37.72"E, 181 ft. PAKISTAN, Sindh Province, Badin District, Tando Bago environs,

01.VIII.2017, Sohail Ahmed Talpur leg., 24°49'27.64"N, 68°58'37.31"E, 40 ft. PAKISTAN, Sindh Province, Badin District, Talhar environs, 01.VIII.2017, Sohail Ahmed Talpur leg., 24°55'50.50"N, 68°46'38.46" E, 32 ft. PAKISTAN, Sindh Province, Badin District, Matli environs, 04.VII.2015, Sohail Ahmed Talpur leg., 25°17'20.61"N, 68°38'24.08"E, 36 ft. PAKISTAN, Sindh Province, Tando Muhammad Khan District, Tando Muhammad Khan environs, 04.VII.2015, Sohail Ahmed Talpur leg., 25° 7'44.64"N, 68°32'39.21"E, 36 ft. PAKISTAN, Sindh Province, Hyderabad District, Tando Jam environs, 02.VII.2015, Sohail Ahmed Talpur leg., 25°25'40.56"N, 68°32'1.21"E, 75 ft. PAKISTAN, Sindh Province, Thatta District, Gharo environs, 17.VII.2015, Sohail Ahmed Talpur leg., 24°47'18.99"N, 67°35'26.06"E, 23 ft. PAKISTAN, Sindh Province, Tharparkar District, Mithi environs, 07.VII.2013, Sohail Ahmed Talpur leg., 24°46'55.22"N, 69°46'6.20"E, 138 ft. PAKISTAN, Sindh Province, Tharparkar District, Nagarparkar environs, 03.VIII.2015, Sohail Ahmed Talpur leg., 24°23'20.16"N, 70°48'52.82"E, 896 ft. PAKISTAN, Sindh Province, Tando Muhammad Khan District, Shaikh Bhirkio environs, 04.VII.2015, Sohail Ahmed Talpur leg., 25°17'20.61"N, 68°38'24.08"E, 36 ft.



**Plate 01.** *Aulacophora foveicollis* P. H. Lucas, 1849  
 (a) Habitus DW (b) Habitus FV (c) Habitus LV  
 (d, e) Aedeagus DV (f, g) Aedeagus LV

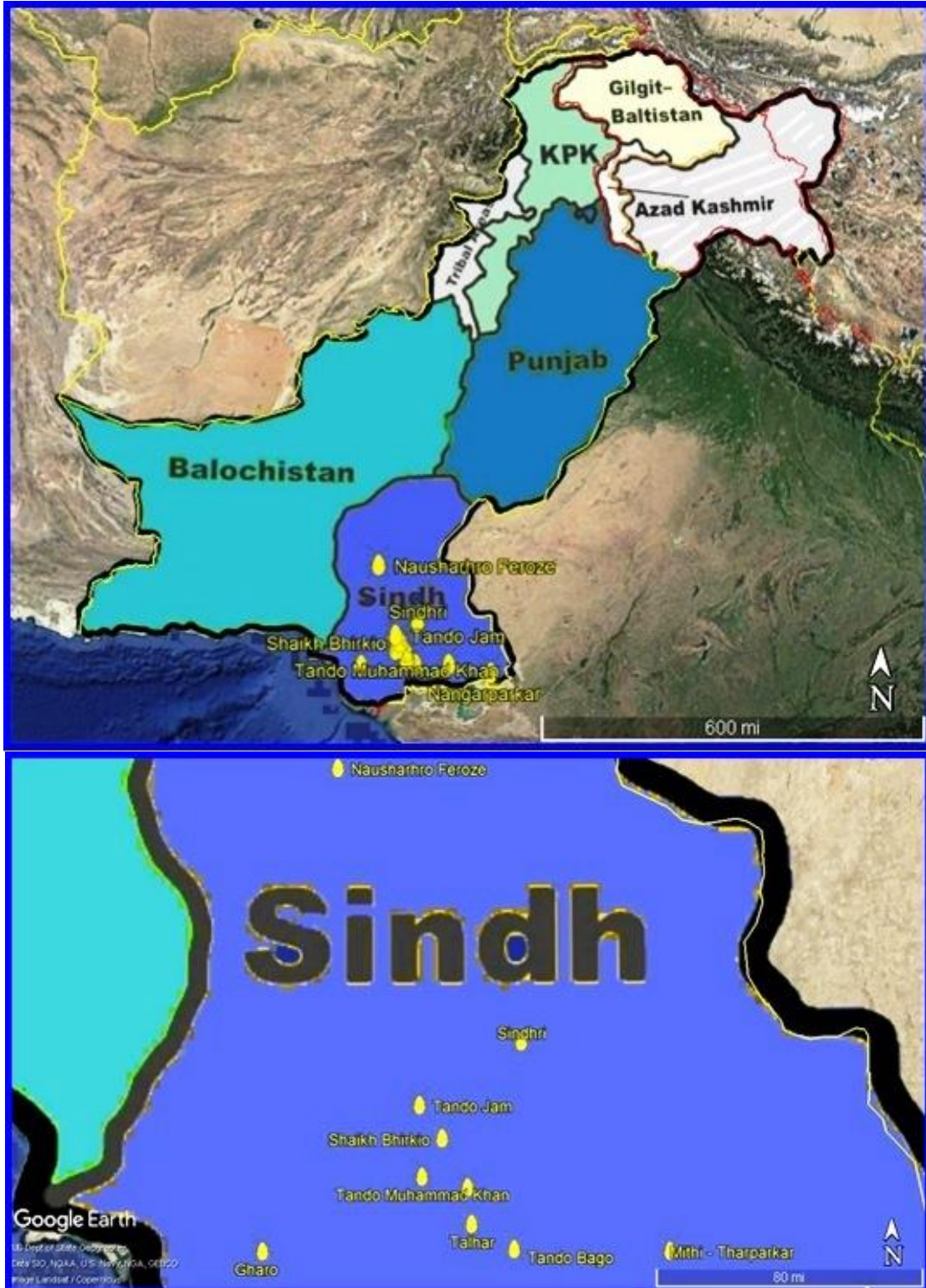


Figure 01. Distributional map of *Aulacophora foveicollis* P. H. Lucas, 1849

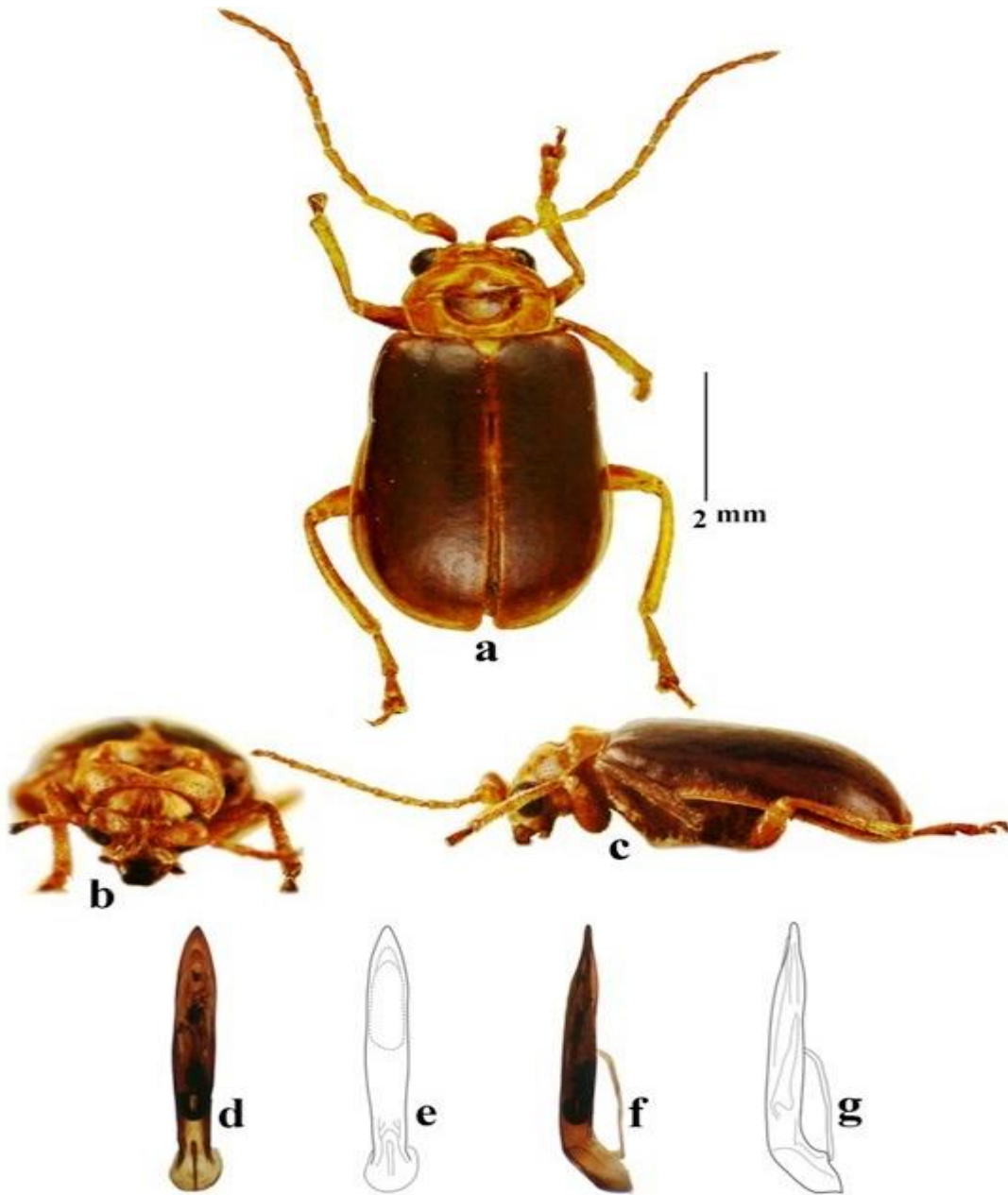
*Aulacophora impressa* (Fabricius, 1801) (Plate 02, Fig. 02)

**Description.** Body appearance redish-brown, black eyes. Eyes convex, Pronotum patches dark brown, transverse depression highly-grooved. Antennal brown and filiform,

size reaches at two-third of the elytron length. Serration of antennae present with 1<sup>st</sup> excavated antennomere with enlarged or finely-punctate. 2<sup>nd</sup> segment reduced, and 3<sup>rd</sup> similar to the 4<sup>th</sup> in size, 5<sup>th</sup> segment also equal to the 4<sup>th</sup>. Antenna separated by frons. Distal segment of antennae broader. Scutellum dull and impunctate or convex in appearance, weakly-triangular. Elytra reddish appearance with fine punctures. Prothorax broader with coarse punctuations and visibly sparse. Posterior femur no swollen. Bifid tarsal-claw, 3<sup>rd</sup> segment of tarsae

emarginated. Aedeagus wavy or straight, dorsally with cuspidate. Gonopore of aedeagus with semi-oval shape and laterally appears slightly curved.

**Material examined.** *Aulacophora impressa* (Fabricius, 1801), 1♂, PAKISTAN, Sindh Province, Tharparkar District, Nagarparkar environs, 03.VIII.2015, Sohail Ahmed Talpur leg., 24°23'20.16"N, 70°48'52.82"E, 896 ft.



**Plate 02.** *Aulacophora impressa* (Fabricius, 1801)  
(a) Habitus DV (b) Habitus FV (c) Habitus LV  
(d, e) Aedeagus DV (f, g) Aedeagu LV



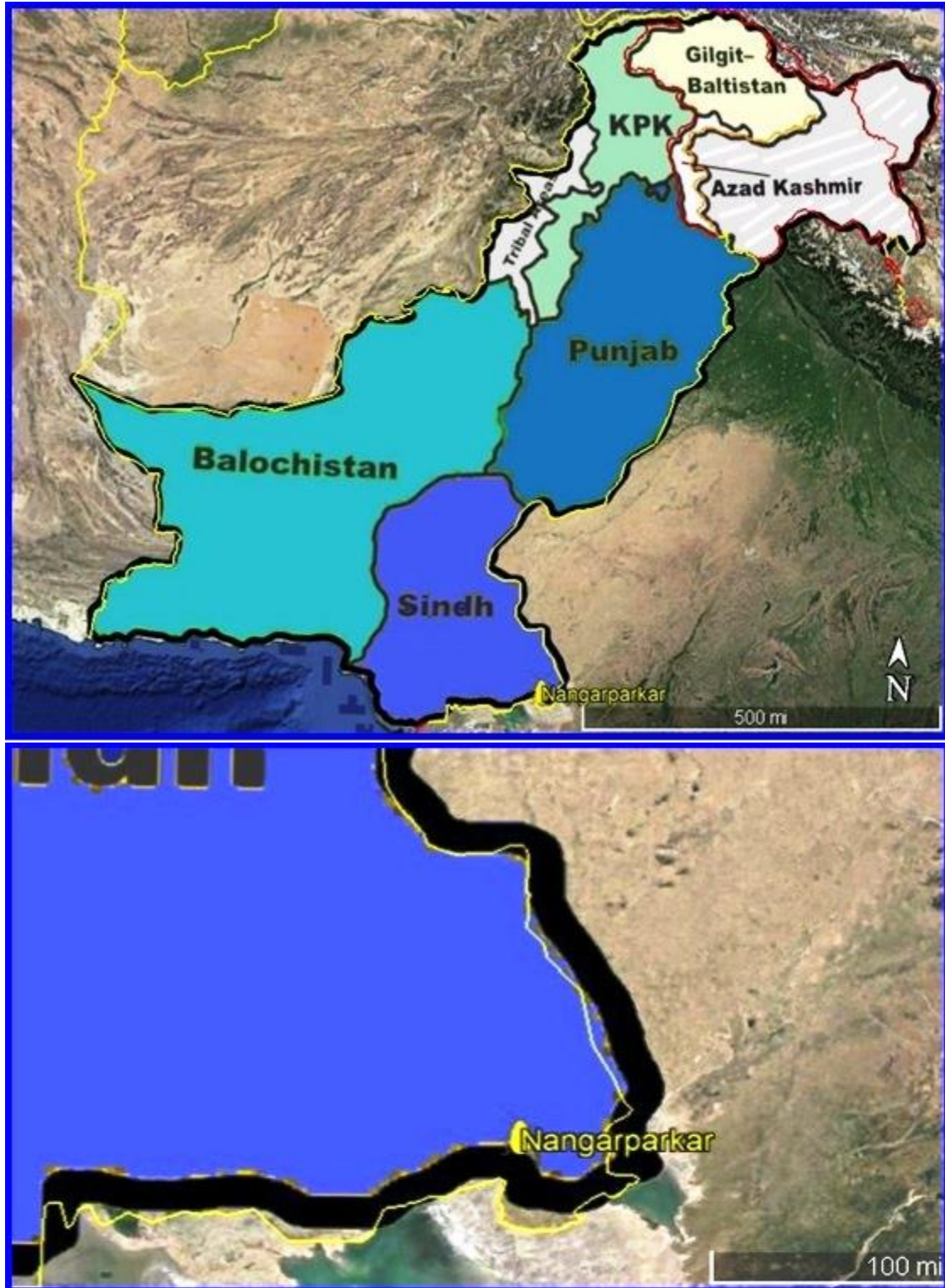


Figure 02. Distributional map of *Aulacophora impressa* (Fabricius, 1801)

*Aulacophora intermedia* Jacoby, 1892 (Plate 03, Fig. 03)

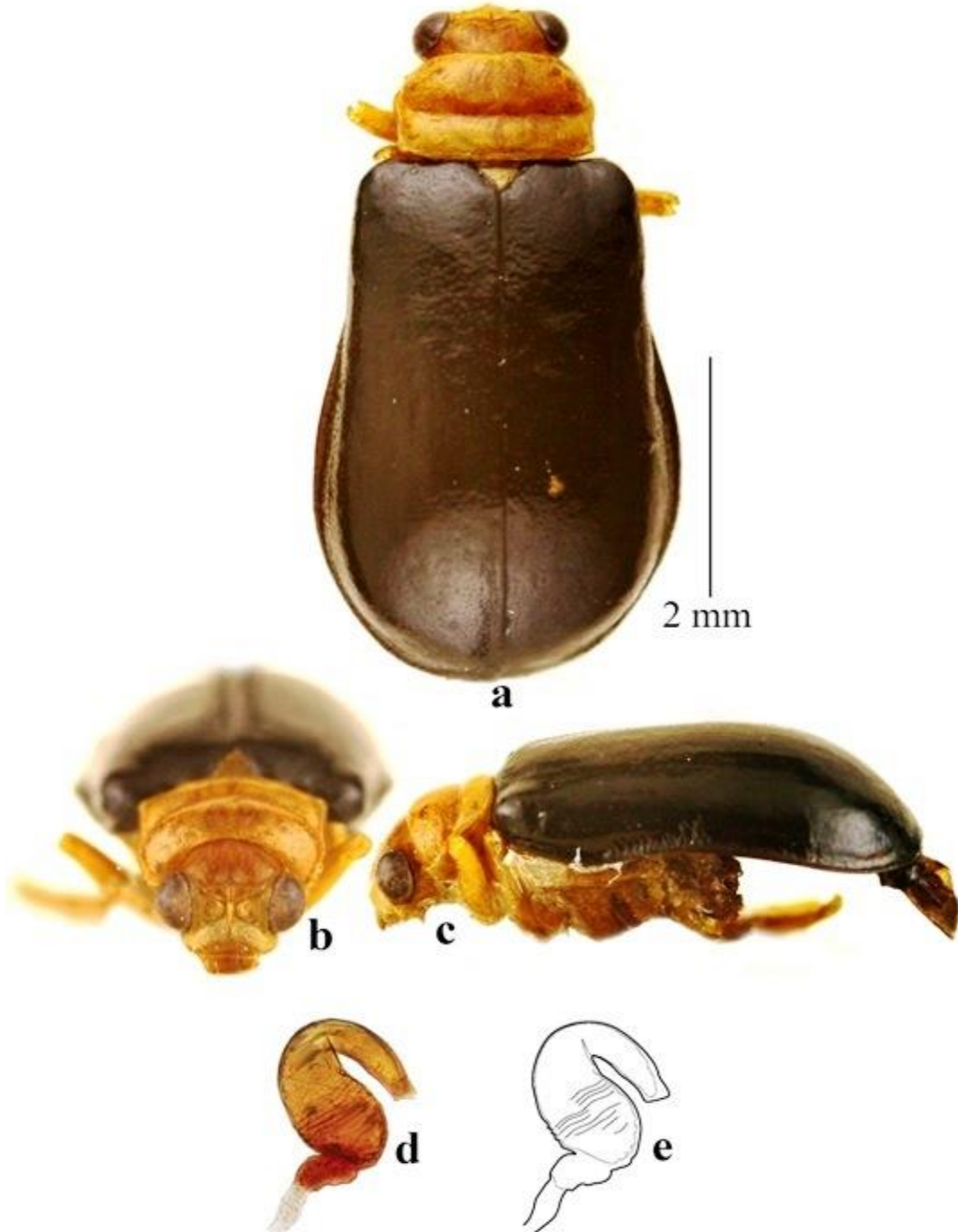
**Description.** Body blackish-brown or dark-brown patches. Pronotum with mid-cleavage. Clypeus with fine

hairs covered densely. Antennae brown and filiform and reaches two-third of the elytron. Serration of antennae present. 1<sup>st</sup> segment of antennae enlarged with short 2<sup>nd</sup> segment, 3<sup>rd</sup> segment similar to the 4<sup>th</sup> and 5<sup>th</sup> segment

equal to the fourth. Antennae separated apart by frons. Distal segment of antennae longer. Scutellum impunctate or convex in appearance with dull look, shape of scutellum sharply-triangular. Punctures of elytra fine, spots on elytra absent with blackish-brown appearance.

Prothorax broader, with coarse punctuations and present sparsely.

**Material examined.** *Aulacophora intermedia* Jacoby, 1892, 1♀, PAKISTAN, Sindh Province, Mirpur Khas District, Sindhri environs, 01.VIII.2015, Sohail Ahmed Talpur leg., 25°29'48.84"N, 68°58'37.72"E, 181 ft.



**Plate 03.** *Aulacophora intermedia* Jacoby, 1892  
(a) Habitus DV (b) Habitus FV (c) Habitus LV  
(d, e) Spermatheca





Figure 03. Distributional map of *Aulacophora intermedia* Jacoby, 1892

## Conclusion

In total 3 species are described with their distributional pattern in Sindh province.

## DISCUSSION

The species of *Aulacophora* can be separated from each other by multiple characters; body colour of *Aulacophora foveicollis*, orange redish and brown, *A. impressa* tint of red and *A. intermedia* black and brown. Abdominal segment dark brown in *A. foveicollis* black in *A. impressa* and brown in *A. intermedia*. Scutellum Colour Light Brown in *A. foveicollis* and *A. impressa* whereas brown in *A. intermedia*. Head dark brown in *A. foveicollis* and *A. impressa* brown in *A. intermedia*. Punctuation of head absent in *A. foveicollis* whereas, sparse and fine in *A. impressa*. Pronotum narrower than elytron in both *A. foveicollis* and *A. intermedia* and highly depressed in *A. impressa*. Punctuation transverse depression present in *A. foveicollis* highly grooved in *A. impressa*, course and dense in *A. intermedia*. Pronotum appearance dull in *A. foveicollis*, shiny in both *A. impressa* and *A. intermedia*. Antenna size two thirds the length of elytron in *A. impressa* and in *A. intermedia* extending beyond the mid of elytron. Antennal first segment in *A. foveicollis* club shaped in *A. impressa* finely punctate and in *A. intermedia* it is enlarged. Scutellum appearance dull in both *A. foveicollis* and *A. impressa* and shiny in *A. intermedia*. Colour of elytra orange red in *A. foveicollis*, dark brown in *A. impressa* and in *A. intermedia* blackish brown. Prothoracic punctuation broader than long in *A. foveicollis* and *A. impressa* narrower than elytra basally in *A. intermedia*.

## REFERENCES

- Al-Ali, A.S. I.K. Al-Neamy., M.S. Alwan (1982) On the biology and host preference of *Aulacophora foveicollis* Lucas (Coleoptera. Galerucidae). Zeitschrift für Angewandte Entomologie, 94:82-86
- Anand, R.K. and M.L. Cox (1986) Taxonomic revision of the genus *Aulacophora* Chevrolat (Coleoptera: Chrysomelidae: Galerucinae). Entomologische Abhandlungen, 50(4): 81-91.
- Barroga, G.F. and M.S. Mohamedsaid (2002). Revision of the genus *Aulacophora* Chevrolat (Coleoptera: Chrysomelidae: Galerucinae) in Sundaland. Serangga, 7(1-2): 15-194.
- Berti, N. (1990). Contribution to the study of Afrotropical Galcrucinae. IX. The genus *Aulacophora* Chevrolat, description of a new genus, *Chosnia* gen. nov. (Colcoptera. Chrysomelidae). Journal of African Zoology, 104: 109-126
- Fabricius, J.C. (1801). Systema Eleutheratorum secundum ordines, genera, species adiectis synonymis, locis, observationibus, descriptionibus. Tomus I. Bibliopolii Academici, Kiliae, 506 pp.
- FAO. Food and Agriculture Organization. 1989. Pest and dis-ease records. Asia and Pacific Plant Prot Comm Quart News-letter, 32(2): 17-19.
- Ferguson, J.E. and R.L. Metcalf (1985). Cucurbitacins: plant-derived defense compounds for diabroticites (Coleoptera: Chrysomelidae). Journal of Chemical Ecology, 11: 311-318
- Gabriel, B.P. (1997). Insects and Mites Injurious to Philippine Crop Plants. College, Laguna, Philippines: National Crop Protection Center, University of the Philippines Los Baños. 172 p. (Revised 2000).
- Gressitt, J.L. (1955). Insects of Micronesia Coleoptera: Chrysomelidae. Insects of Microensia, 17 (1), 1-60. Gressitt, J.L. & Kimoto, S. (1963) The Chrysomelidae (Coleopt.) of China and Korea. Part 2. Pacific Insects Monograph, 1B: 301-1026.
- Jacoby, M. (1892). Description of the new genera and species of the phytophagous Coleoptera obtained by Sign. L. Fea in Burma. Annali del Museo Civico di Storia Naturale di Genova, 32, 869-999.
- Jolivet, P. (1999). Les especes du genre *Aulacophora* Chevrolat sont-elles polyphages comme celles des *Diabrotica* Chevrolat? (Col. Chrysomelidae, Galerucinae). L'Entomologiste 55(6): 251-258.
- Khan, S.M. and N.I. Khattak (1992). Chemical control of red pumpkin beetle *Aulacophora foveicollis* (Lucas) attacking muskmelon crop. Sarhad Journal of Agriculture, 8:363-368.
- Kimoto, S., J.W. Ismay and G.A. Samuelson (1984). Distribution of chrysomelid pests associated with certain agricultural plants in Papua New Guinea (Coleoptera). ESAKIA, 21: 49-57.
- Kimoto, S. (1966). A list of the chrysomelid specimens of Taiwan preserved in the Zoological Museum, Berlin. Esakia, 5, 21- 38.
- Lucas, Pierre Hippolyte (1849). Exploration scientifique de l'Algérie pendant les années 1840, 1841, 1842. Zoologie: Animaux articulés: pt.2 Insectes.
- Maulik, S. (1936). The Fauna of British India, including Ceylon and Burma. Coleoptera, Chrysomelidae, Galerucinae. London: Taylor and Francis.
- Metcalf, R.L. (1994). Chemical ecology of diabroticites. Pp 153- 169 in Jolivet PH . Cox ML. Petitpierre E (eds) Novel Aspects of the Biology of



- Chrysomelidae. NL-Kluwer Academic Publications.
- Metcalf, R.L. (1986). Coevolutionary adaptations of rootworm beetles (Coleoptera: Chrysomelidae) to cucurbitacins. *Journal of Chemical Ecology*, 12:1109-1124.
- Nishida, R. M. Yokoyama., H. Fukami (1992). Sequestration of cucurbitacin analogs by new and Old World chrysomelid leaf beetles in the tribe Luperini. *Chemoecology*, 3:19-24.
- Nishida, R. H. Fukami (1990). Sequestration of distasteful compounds by some pharmacophagous insects. *Journal of Chemical Ecology*, 16:151-164
- Roy, D.C. and Y.D. Pande (1991). Seasonal incidence, host preference and feeding rate of red-pumpkin beetle (*Raphidopalpa foveicollis*) in Tripura. *Indian Journal of Agricultural Sciences*, 61:603-607
- Wilcox, J.A. (1972). Chrysomelidae: Galerucinae (Luperini: Aulacophorina, Diabroticina). In: Wilcox, J.A. (Ed.), *Coleopterorum Catalogus Supplementa. Pars 78(2)*. 2nd Edition. W. Junk, 's-Gravenhang, pp. 221-431.