

# AULACOPHORA INDICA (GMELIN), THE CORRECT NAME FOR THE SQUASH BEETLE IN THE PHILIPPINES (COLEOPTERA: CHRYSOMELIDAE: GALERUCINAE)

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## ABSTRACT

*Aulacophora indica* (Gmelin) is established as the identity of the squash beetle, a well-known pest of cucurbits in the Philippines previously and generally referred to as *Aulacophora similis* (Olivier). A redescription and illustrations of *A. indica* are provided.

**Key words:** *Aulacophora indica*, *Aulacophora similis*, Chrysomelidae, pest of cucurbits.

## INTRODUCTION

In a compendium entitled "*Insects and Mites Injurious to Philippine Crop Plants*", Gabriel (1997) listed *Aulacophora similis* (Olivier) as a pest of cucurbits and solanaceous crops. In the addendum, he stated that this name should be changed to *Aulacophora indica* (Gmelin) following my earlier work (Barroga, 1997). At that time, I adopted *A. indica* simply in accordance with the work of Kimoto (1989), who synonymized *A. similis* with *A. indica*. In the revised edition of Gabriel's book (2000), this note on the change of names was retained in the addendum, with *A. similis* still appearing in the text. This is understandable since my work then still needed verification with the examination of type material. Recently, I have examined the type specimen of *Crioceris testacea* Fabricius. This specimen is the same as the one referred to by the name *A. indica* since the latter is a replacement name for *C. testacea*. I found this specimen to be conspecific with the specimens from the Philippines. Thus, the Philippine specimens should be correctly identified as *A. indica* and not as *A. similis*.

**Abbreviations:** KIEL: Universitets Zoologiske Museum, Copenhagen, Denmark; UPLB-MNH: University of the Philippines Los Baños-Museum of Natural History; VJC: collection from the project of Dr. Venus J. Calilung; GFB: personal collection of Grace F. Barroga.

## Genus *Aulacophora* Chevrolat

*Aulacophora* Chevrolat, 1837, in Dejean, Cat. Col. ed. 3: 402 (Type: *Galleruca quadraria* Olivier; Java); Baly, 1889: 297; Maulik, 1936: 169; Anand & Cox, 1986: 81; Kimoto, 1989: 47; Mohamedsaid, 1994b: 377; Barroga, 2001: 39.

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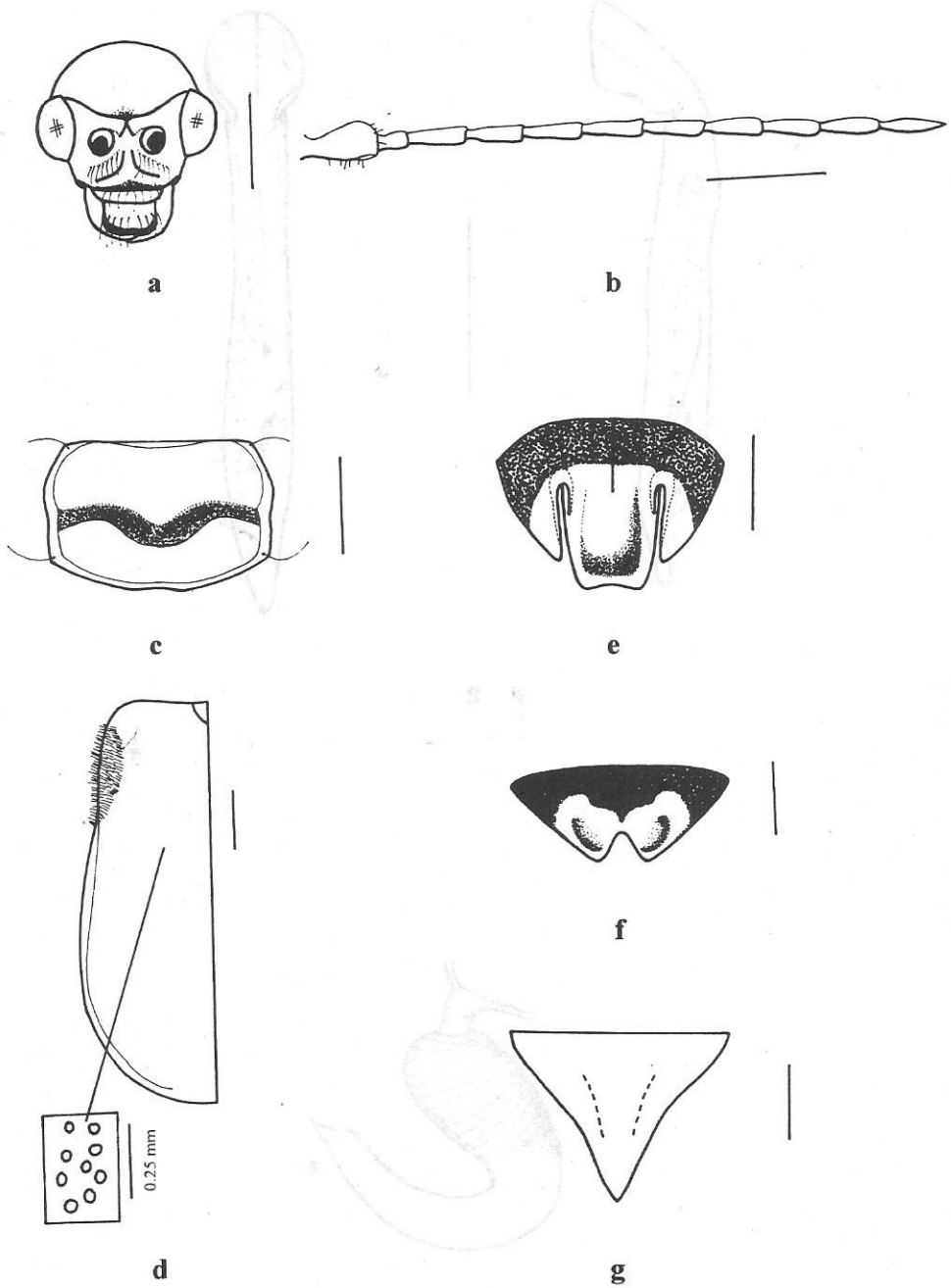
- Raphidopalpa* Chevrolat, 1837, in Dejean, Cat. Col. ed. 3: 402 (Type: *Crioceris abdominalis* Fabricius; India orient.). Invalid type: *Galeruca foveicollis* Lucas, designated by Weise, 1924: 7; Allard, 1888 (1889): 305.
- Aulacophora* (*Ceratia*) Chapuis, 1876: 100 (Type: *Aulacophora* (*Ceratia*) *marginalis* Chapuis; Philippines); Weise, 1892: 396.
- Ceratia*: Weise, 1924: 9.
- Orthaulaca* Weise, 1892: 393 (Type: *Galeruca similis* Olivier).
- Ceratia* (*Orthaulaca*): Weise, 1924: 11.
- Cerania* Weise, 1892: 396 (Type: *Aulacophora cornuta* Baly).
- Ceratia* (*Cerania*): Weise, 1924: 17.
- Pachypalpa* Weise, 1892: 392 (Type: *Galeruca luteicornis* Fabricius).
- Ceratia* (*Pachypalpa*): Weise, 1924: 17.
- Sphaerarthra* Weise, 1892: 396 (Type: *Aulacophora cyanoptera* Boisduval).
- Ceratia* (*Sphaerarthra*): Weise, 1924: 17.

***Aulacophora indica* (Gmelin)**  
(Figures 1a-1g; 2a-2b)

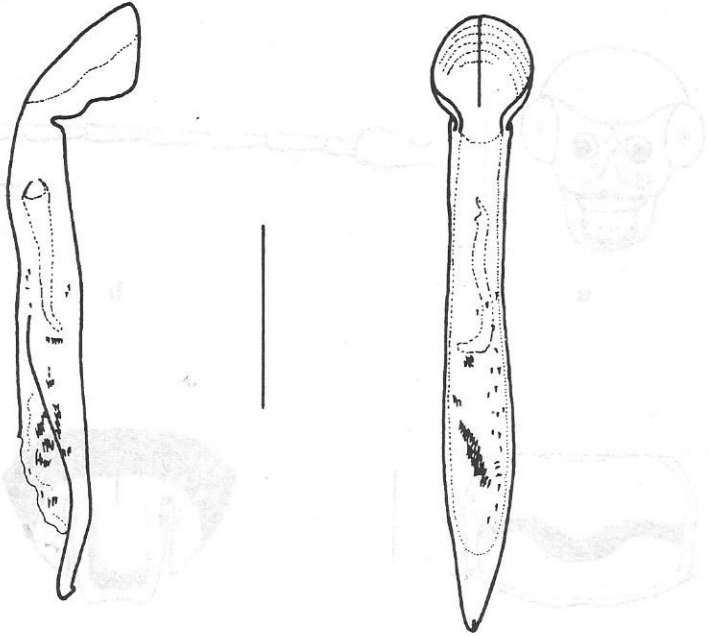
- Cryptocephalus* (*Crioceris*) *indica* Gmelin, 1790, ed. Linnaeus, Syst. Nat., ed. 13, 1 (4): 1720 (India, replacement name for *Crioceris testacea* Fabricius 1787: 87).
- Galeruca similis* Olivier, 1808, Entomologie, 6: 624, fig. (Iles de l'Ocean Indien); Kimoto, 1989: 56 (= *indica*).
- Raphidopalpa femoralis* Motschulsky, 1857, Etud. Ent., 6: 37 (Japan); Baly, 1886: 16 (= *similis*); Weise, 1892: 395 (Philippines); Anand & Cox, 1986: 85 (= *similis*).
- Aulacophora similis*: Baly, 1886: 3, 5, 16 (Manchuria, Japan, N. India, China, Canton, Cochin China, Malay Archipelago); Allard, 1888 (1889): 308 (Hue, Saigon, Mythe, Phnom-Penh, Lourane, Qui-Nhon); Weise, 1924: 8 (= *indica*).
- Rhaphidopalpa flavipes* Jacoby, 1883, Notes Leyden Mus., 5: 202 (Saleyar); Baly, 1886: 17 (= *similis*).
- Rhaphidopalpa coffeae*: Allard, 1888 (1889): 306, 319 (Japan); Weise, 1892: 395 (= *similis*).
- Rhaphidopalpa testacea*: Allard, 1888 (1889): 308, 320 (Celebes).
- Rhaphidopalpa chinensis* Weise, 1892: 395 (Shanghai); Gressitt & Kimoto, 1963: 486 (= *femoralis*).
- Rhaphidopalpa bengalensis* Weise, 1892: 394 (Calcutta); Weise, 1924: 8 (= *indica*).
- Aulacophora indica*: Kimoto, 1989: 56 (Thailand, Cambodia, Laos, Vietnam); Mohamedsaid, 1994b: 381-382, 387, 390, 392, fig. (Peninsular Malaysia); Mohamedsaid, 1994a, Treubia 31: 2, 7-8 (Sabah, Sarawak); Mohamedsaid, 1995: 5 (Sabah); Mohamedsaid, 1996a: 126 (Nepal, Thailand); Mohamedsaid, 1996b: 2 (Java); Mohamedsaid, 1997: 162 (Sarawak); Mohamedsaid, 1998b: 74 (Sarawak); Mohamedsaid, 1998a: 258 (Sarawak); Mohamedsaid, 1999: 250 (Tioman Is.); Barroga, 2001: 42-43, 48 (Bali).

**Redescription.** Yellowish-brown/yellowish/brown; labrum with apical half usually blackish; metasternum, ventrites (except apical part of ventrite 5) black; legs sometimes blackish. Body oblong to oval, moderately to strongly widened posteriorly. Length: 6.5-9.5 mm.

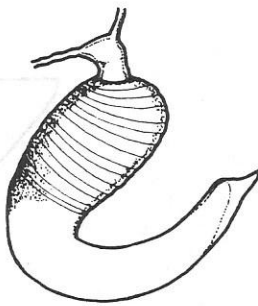
*Head* exserted, distinctly narrower than pronotum. Frontal tubercles dis-



**Figure 1.** *Aulacophora indica* (Gmelin), external morphological characters: a) head; b) antenna; c) pronotum; d) elytron; e) male ventrite 5; f) female ventrite 5; g) female pygidium (scale: 1.00 mm).



a



b

**Figure 2.** *Aulacophora indica* (Gmelin), genitalia: a) penis, lateral and ventral views (scale: 1.00 mm); and b) spermatheca (scale: 0.5 mm).

tinct, not strongly swollen. Eye ovate with entire margins, moderately convex. Antennae 11-segmented; first segment modified in male. Interantennal space carinate. *Mouthparts*. Labrum subquadrate, emarginate, with median, transverse row of setae. Mandibles not entirely covered by labrum. Maxillary palpi: first segment minute, second and third subequal in length, strongly thickened apically, with third segment distinctly more thickened than second, fourth segment shorter than third, conical and pointed at apex. Labial palpi: first segment minute, second cylindrical and longer than first, third somewhat shorter than second, conical and bluntly pointed at apex. *Pronotum* transverse, always distinctly narrower than base of elytra. Lateral sides sinuate, slightly explanate; widest at apical one third. Anterior border very thinly margined at middle, disappearing on sides; anterior corners angulate. Posterior border curved posteriorly, margined, somewhat sinuate at middle portion; posterior corners obtuse. Each corner with setigerous pore. Disc sparsely punctured. Transverse sulcus found after middle of disc, sinuate, depth variable. *Scutellum* triangular, rounded at apex, impunctate, glabrous. *Humerus* prominent and modified in male. Elytra dull, with lateral sides slightly explanate, rounded at apex. Surface slightly convex, without a distinct sub-basal depression; smooth, finely and confusedly punctate. *Hindwing*.  $Cu_{1a}$  present. *Elytral epipleuron* narrow at base, flat, finely punctate, abbreviated before middle of length of elytron. *Underside*. Acetabula open behind. Abdomen with five ventrites. *Legs*. Femora somewhat thickened, but not swollen. Tibiae with apical spurs. First tarsal segment of proleg and mesoleg modified in male. First tarsal segment of metaleg subequal in length to following segments combined, longer than following two segments combined but shorter than half the length of tibia; claw segment shorter than segments 2-4 combined. Claws bifid.

**Sexual Dimorphism.** In male, first antennal segment swollen, triangular, anterior side sharp-edged. Transverse sulcus of pronotum deeper medially. Humerus with erect setae. First segment of fore- and mesotarsus swollen. Ventrite 5 trilobed, with median lobe elongate rectangular, dorsal surface strongly excavated. Pygidium simply rounded at apex. Eighth tergite (internal) with sclerotized area like a joined pair of fangs. In female, transverse sulcus of pronotum of uniform depth. Ventrite 5 deeply emarginate, bilobed. Pygidium triangularly produced. Eighth tergite (internal) U-shaped, strongly, widely emarginate at posterior margin. Eighth sternite (internal) U-shaped, entire at posterior margin.

*Male genitalia.* Tegmen thin and bifid. Spiculum thin and simple. Penis sinuate after base, apical portion somewhat bent inwards, apex hooked (lateral view); base with upper margin entire; sides subparallel (ventral view). Endophallus with spines.

*Female genitalia.* Bursa copulatrix with a pair of chip-like sclerites shortly after middle area. Vaginal palpi with apodemes joined together for a short distance at basal portion. Spiculum gastrale present. Spermatheca with appendix.

**Material examined.** TYPE, *Crioceris testacea* F. (labelled as *Crioceris abdominalis* F.), male (KIEL). OTHER MATERIAL: LUZON: Apayao: Luna, 10 November 1996, S.F. Barroga, 1 (UPLB-MNH). Ilocos Norte: Batac, 23 December 1995, G.F. Barroga, 4 from *Lagenaria vulgaris*, 7 from *Cucurbita maxima*, 4 from *Zea mays*, 1 from *Morus alba* (GFB). Ilocos Norte: Camandingan, Batac, 28 Aug-



ust 1996, G.F. Barroga, 1 (GFB). Isabela, Iligan, 8 May 1952, S. M. Cendaña, 1 (UPLB-MNH). Benguet: Baguio, 12 May 1969, B.P. Gabriel, 1; 30 December 1949, R. Pang, 1; 7 May 1954, S.M. Cendaña, 1; 1500 m, 16 June 1949, C.R. Baltazar, 1 (UPLB-MNH). Benguet: BSU, La Trinidad, 26 August 1995, G.F. Barroga, 1 from Cucurbitaceae (GFB). Zambales: Sta. Cruz, Acoje Mine Site, 1100 ft, 15 May 1977, V.P. Gapud, 1 (UPLB-MNH). Pampanga: Arayat National Park, 11 May 1977, L. Eroles, 1 (UPLB-MNH). Cavite: Indang, 18 July 1954, G.P. Rojo, 4 (UPLB-MNH). Laguna: Mt. Makiling, 24 January 1987, L.T. Pascua, 1; 50 m, 24 August 1946, T.G. Flores, 1; 300 m, 26 January 1958, E.J. Novero, 1 (UPLB-MNH). Laguna: Makiling Botanical Gardens, 22 March 1986, B. Chantana, 2 (UPLB-MNH). Laguna: Agronomy, UP Los Baños, 7 September 1994, G. F. Barroga, 1 (GFB). Laguna: Central Experiment Station, UP Los Baños, 3 December 1977, C.P. Medina, 1; 30 August 1980, D.M. Dimaano, 1; 19 October 1989, V.J. Calilung & E.A. Cosico, 10, 5 from *Cucurbita maxima* (VJC). Laguna: UP Los Baños, 2 February 1986, B. Chantana, 1; 30 August 1976, A.W. Tejada, 1; College of Agriculture, 9 September, 1976 (UPLB-MNH). Laguna: College, Los Baños, 22 September 1989, V.J. Calilung & E.A. Cosico, 5 from *Solanum melongena* (VJC); 1<sup>st</sup> sem, 1996-1997, M.M. Macahiya, 1 (UPLB-MNH); 24 October 1989, E.A. Cosico, 1 from *Solanum melongena* (VJC). Laguna: Los Baños, 6 May 1947, L.B. Uichanco, 3; 10 March 1967, E.R. Laigo, 1; 19 February 1977, S.G. Reyes, 1; 15 m, 6 July 1948, A. Maligaya, 1; 50 m, 22 May 1947, L.B. Uichanco, 2; 20 June 1961, N.B. Galacgac, 2; 3 March 1961, E.C. Manoto, 1 (UPLB-MNH). Laguna: Calauan, 26 October 1989, V.J. Calilung & E.A. Cosico, 1 from *Solanum melongena*; 30 January 1990, V.J. Calilung & E.A. Cosico/V.J. Calilung, 4 from *Citrullus vulgaris* (VJC). Laguna: San Pablo, 16 February 1992, R. Robles, 1 (UPLB-MNH). Laguna: Majayjay, 22 September 1996, M. Cruz, 1 (UPLB-NHM). Quezon: Mamala, 3 September 1994, G.F. Barroga, 4 from *Tithonia diversifolia* (GFB). Quezon: National Botanical Gardens, February 1992, V.J. Calilung & D. Regalado, 2; August 1991, V.J. Calilung & D. Regalado, 1 (VJC). Quezon: Gumaca, 10 June 1952, M. Escritor, 1 (UPLB-MNH). Quezon: Mt. Banahaw, 10 August 1996, G.F. Barroga, 1 from *Tithonia diversifolia* (GFB). Palawan: Puerto Princesa, 19 May 1954, G.B. Viado, 2; 27 May 1958, F. B. Calora, 1; S.M. Cendaña, 1; 29 May 1958, B.V. Travis, 1 (UPLB-NHM). Camarines Sur: Mt. Isarog, October 1991, V.J. Calilung & D. Regalado, 4; December 1991, V.J. Calilung & D. Regalado, 1 (VJC). Camarines Sur: Libmanan, 10 July 1976, L.S. Cuy, 1 (UPLB-MNH). Albay: Mt. Mayon, November 1991, V.J. Calilung & D. Regalado, 1 (VJC). Albay: Philippine Coconut Authority, Banao, Guinobatan, 3 March 1997, G.F. Barroga, 4 from cucurbits (GFB). Sorsogon: Pampang, 28 April 1959, R.M. Ela, 1 (UPLB-MNH). VISAYAS: Leyte: Baybay, 10 m, 3 May 1954, R. Miral, 1 (UPLB-MNH). Leyte: Mt. Pangasugan, Visayas State College of Agriculture, Baybay, 150-200 m, 27 February 1997, G.F. Barroga, 1 (GFB). Samar, Catarman, 17 June 1950, S. Santos Jr., 2 (UPLB-MNH). MINDANAO: Surigao del Norte: Sison, 25 November 1995, G.F. Barroga, 3 from *Cucurbita maxima* (GFB). Agno River, creek sweeping, 12 May 1977, N.G. Fabellar, 4 (UPLB-MNH). Davao: Mt. Apo Science Foundation College, 690 m, 21 November 1989, E.A. Cosico, 3 (VJC). Bukidnon: Musuan, 18 November 1989, E. A. Cosico, 3 (VJC). Cotabato: Mt. Matutum, 1800 ft, 14 July 1954, G.B. Viado, 1 from cucurbits; 14 July 1955, G.B. Viado, 2 (UPLB-MNH). Cotabato: Allah Valley, 6 June 1950, S.M. Cendaña, 1 (UPLB-MNH). Cotabato: Kliman, General Santos, 4 December 1954, G.B. Viado 1 (UPLB-MNH).

**Distribution.** Andaman, Bhutan, Cambodia, China, Fiji, Hainan, India, Indonesia (Bali, Buru, Ceram, Java, Nias, Sumatra), Japan, Korea, Laos, Malaysia (Peninsular Malaysia, Sabah, Sarawak), Micronesia, Myanmar, Nepal, New Guinea, Nicobar, Philippines, Ryukyu Is., Samoa, Siberia, Sri Lanka, Sunda Is., Taiwan, Thailand, Vietnam.

**Host Plants.** Arecaceae (rattan); Asteraceae/Compositae (*Tithonia diversifolia*), Convulvulaceae (*Ipomoea batatas*); Cucurbitaceae (*Citrullus vulgaris*, *Cucumis sativus*, *Cucurbita maxima*, *Lagenaria vulgaris*, *Luffa cylindrica*, *Momordica charantia*); Fabaceae (*Vigna unguiculata*); Moraceae (*Morus alba*); Solanaceae (*Solanum melongena*).

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