

**DIAGNOSTICS OF COCONUT LEAF BEETLE
BRONTISPA LONGISSIMA (GESTRO) AND ITS
IMPORTANCE AS AN INVASIVE SPECIES**

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ABSTRACT: The coconut hispine beetle *Brontispa longissima* (Gestro) (Coleoptera: Chrysomeloidea: Chrysomelidae) is redescribed with its essential diagnostic taxonomics illustrated. The diagnostic characters enabling its authentic identification namely frontoclypeus without deep cavities, pedicel one-third as long as scape, elytron narrowly emarginated at apex near sutural angle and male-female sexual dimorphism have been highlighted. As this species which is native to Indonesia is spreading to other nearby regions, the diagnostics of this species has become important under plant quarantine situations.

KEY WORDS: Redescription, diagnostics, *Brontispa longissima*, Chrysomelidae, Coleoptera.

The coconut hispine beetle *Brontispa longissima* (Gestro) known as the two-coloured coconut leaf beetle, or the coconut hispine beetle, is one of the most damaging pests of coconut and other palms (palmivorous insects) found almost worldwide where coconut is being cultivated (Creighton, 1973; Lever, 1979). The larvae and adults are found in the partly opened young leaflets of palms. They feed on the soft tissues of the youngest leaf in the throat of the palm, both adult and larvae typically feed on abaxial and adaxial epidermis of the leaves removing tissues of the leaflets and destroying growing points of the palms. This rasping caused longitudinal necrotic patches on the young leaves (Fenner, 1996; Howard, 2000). Injured leaves of coconut seedlings show large, dead patches resulting in coalescing of feeding strips. The infested spears may rot and the palms especially the young ones die from severe infestation (Kalshoven, 1981; Stapley, 1980). In case of older palms affected leaves dry up, resulting in stunting of the palm and reduced nut production. Prolonged attacks on young palms lead to death.

It is a native of Indonesia (Aru Islands, Maluku Province, Papua Province). There are reports that it is spreading various other regions like Australia (Darwin, Broome, Moa Island, Cooktown, Cairns, Innisfail, Marcoola and Townsville), many Pacific Islands, Malaysia, Singapore, Cambodia, Laos, Thailand, Vietnam, the Maldives, Philippines, Myanmar and China (Hainan, Guangdong and Taiwan provinces, with Hainan Islands, the worst affected) (Nakamura et al., 2006). It has now become an increasingly serious pest across various coconut growing regions in the Pacific.

Occurrence of *B. longissima* in the neighbouring countries of India is indicative of its threat as an invasive pest of coconut (Fig. A). Hence taxonomic studies were undertaken along with redescrptions, morphometrics and illustrated diagnostics encompassing sexual dimorphism and other essential diagnostic characters, and these are presented herein.

MATERIALS AND METHODS

Specimens from Vietnam were subjected to detailed studies at Network Project on Insect Biosystematics, Division of Entomology, IARI, New Delhi, India.

Leica MZ 16A has been used for microphotography. Line diagrams were prepared using Wild M8 Heerburgg fitted with a drawing tube. Scanning Electron Microscopy (SEM) was done on Zeiss EVO MA10 and images were taken at 20 kV EHT and 50 Pa, between 121 and 132x after drying the specimens and cleaning in ultrasonic cleaner for 30 sec, followed by graded series of 30, 50, 70, 90 and 100% ethyl alcohol.

RESULTS AND DISCUSSION

Genus *Brontispa* Sharp

Brontispa Sharp, 1904: 924; Gressitt, 1960: 104.

Brontispa Weise, 1905: 300; Gressitt, 1960: 104.

Planispa Chujo, 1937: 223; Gressitt, 1960: 104.

Brontispa longissima (Gestro)

Oxycephala longissima Gestro, 1885: 162; Gressitt, 1960: 104.

Brontispa froggatti Risbec, 1934: 7-10; Gressitt, 1960: 104.

Diagnosis: Colour-black except fuscous prothorax, legs and mouthparts; Body flat dorsally and ventrally, with elongate antennae and short stout legs. Antennae black 11-segmented with last 4 segments glabrous. Frontoclypeus with distinct erect golden hairs without deep cavities; (Fig. 1).

Redescription:

Head as long as broad slightly, median portion nearly squarish, parallel sided and slightly raised than eyes, interantennal process produced anteriorly, 0.5x as long as scape, with a deep groove arising at apex and reaching base of head, laterally with a irregular raised sculptured pattern (Figs. 2, 3). **Eyes** black, visible dorso-ventrally, 1.22x longer than wide, embracing frontoclypeus. **Antenna** 0.3x as long as body, scape 2.5x as long as pedicel, scape stout thickest just before apex, antennomere 2, 3 and 4 subequal, 1.4x longer than wide, antennomere 5, 6 subequal, 2x as long as wide and 1.25x shorter than antennomere 2, 3, and 4, antennomere 7 2.75x longer than wide and longest than other antennomeres but 0.73x shorter than scape, antennomere 8, 9, 11 glabrous, subequal, 2.5x longer than wide, antennomere-10 1.75x longer than wide, antennomere-11 roundly pointed at apex (Fig. 4). **Mouth parts** fuscous yellow with short visible labial and maxillary palps, frontoclypeus 1.5x longer than wide, narrow at middle, finely punctured with erect long dense fine hairs without deep cavities (Figs. 5, 6).

Prothorax suboblong, 1.09x as long as broad, 1.83x wider at base than apex, widest at prominent shoulders, with hook like spine laterally at base. Surface testaceous with big punctures, nonuniformly scattered, almost flat with shallowly lowered lateral margins. Anterior margin strongly convexed and posterior margin moderately sinuate (Figs. 7, 8, 9, 10). **Scutellum** triangular, smooth testaceous with scutellar striae (Fig. 11).

Elytra flattened with scutellar striae, 3.25x longer than wide, 2.6x widest at base than apex, widest at middle, emarginated at apex with two strongly raised ridges (Figs. 12, 13, 14).

Legs fuscous yellow, short stout, with globular thick femur and short slender tibiae, tarsi broad, extremely flat basally densely pubescent, tarsi each with segments 1-3 subequal in length, claws pointed, curved stout diverging at 180°, with golden buff (Fig. 15).

Male. **HL** (inc. interantennal process)-0.96 mm, **HL** (exc. interantennal process)-0.8 mm, **HW** (widest at eyes)-0.96 mm, **HW** (at base)-0.8 mm, **PL**-1.76 mm, **PW** (at apex)-0.8 mm, **PW** (at shoulders)-1.44 mm, **PW** (at base)-1.44 mm, **EL**-6.72 mm, **EW** (at base)-1.76 mm, **EW** (at widest)-1.92 mm, **EW** (at apex)-0.8 mm, **BL** (inc. interantennal process)-9.44 mm, **BL** (exc. interantennal process)-9.12 mm.

Female. **HL** (inc. interantennal process)-0.96 mm, **HL** (exc. interantennal process)-0.8 mm, **HW** (widest at eyes)-1.12 mm, **HW** (at base)-0.96 mm, **PL**-1.92 mm, **PW** (at apex)-0.96 mm, **PW** (at shoulders)-1.76 mm, **PW** (at base)-1.76 mm, **EL**-8.32 mm, **EW** (at base)-2.08 mm, **EW** (at widest)-2.56 mm, **EW** (at apex)-0.8 mm, **BL** (inc. interantennal process)-10.72 mm, **BL** (exc. interantennal process)-10.40 mm.

Specimens studied: 4♀, Vietnam: Bentre Province, 5.i.2009, Coll. Joseph Jebaraj, on coconut; 4♂, with same data.

Hosts: The beetle attacks more than 20 palm species with Coconut (*Cocos nucifera*) being the most favoured one. Other hosts include Royal palm (*Roystonea sp.*), Alxendra palm (*Archontophoenix alexandrae*), Sago palm (*Metroxylon sagu*), California fan palm (*Washingtonia filifera*), Maxican fan palm (*W. robusta*), Bottle palm (*Hyophorbe lagenicaulis*), Chinese fan palm (*Livistonia chinensis*), Madagascar palm (*Chrysalidocarpus lutescens*) and Areca nut palm (*Areca catechu*).

Conclusion: The morphometric analysis of different characters at high resolutions and the illustrations given herein will aid in quick and reliable separation of sexes and will enable quick and authentic identification of *Brontispa longissima*, in particular under plant quarantine situations. Hence, this would help in restricting its anticipated threat to Indian agrobiodiversity.

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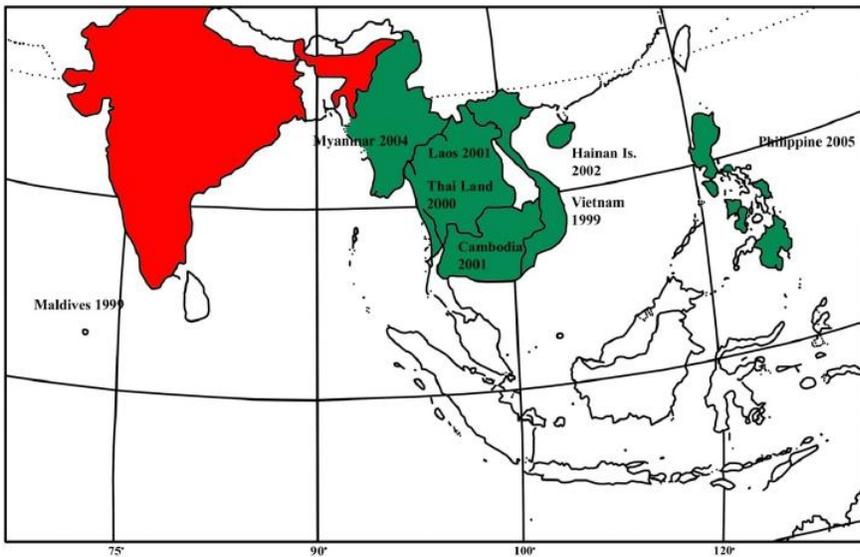
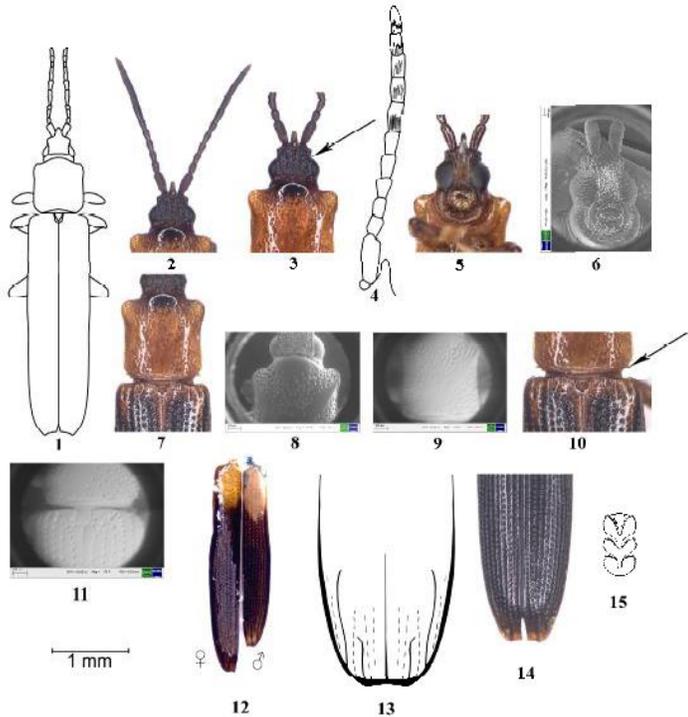


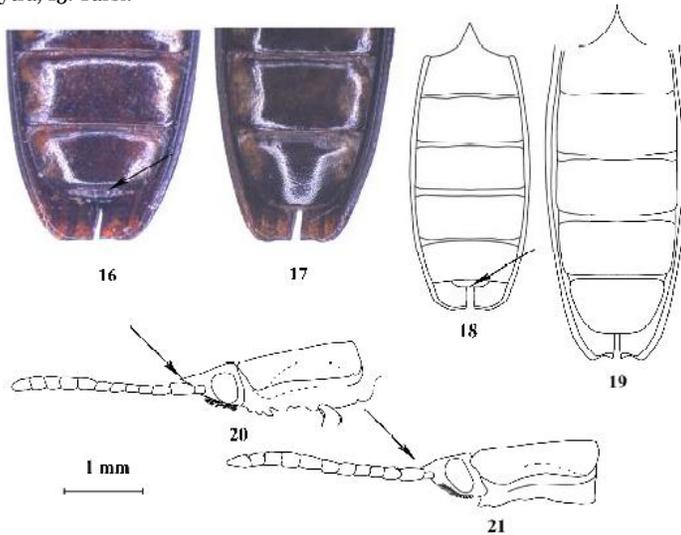
Figure A. Year wise invasion of *B. longissima* (Gestro).

Table 1. Sexual dimorphism in *Brontispa longissima* (Gestro) male and female adult.

Characters	Male	Female
HW (widest at eyes): HL (including interantennal process)	equal	Greater than
HW (at base): HL (excluding interantennal process)	equal	Greater than
Antennae (length wise)	Shorter than female	Longer than male
Abdominal 6 th sternite	Visible (fig. 18)	Invisible (fig. 19)
Interantennal process	Slightly pointing upwards (fig. 16)	Straight (fig. 17)



Figures 1-15. *Brontispa longissima* (Gestro). 1. Adult, 2. Head, 3. Sculptured head showing groove, 4. Antenna, 5-6. Mouth parts, 7-10. Prothorax, 11. Scutellum with scutellar striae, 12-14. Elytra, 15. Tarsi.



Figures 16-21. *Brontispa longissima* (Gestro). 16, 18. Abdomen with sixth abdominal sternite visible in male, 17, 19. Abdomen with sixth abdominal sternite invisible in female, 20. Head with raised interantennal process in male, 21. Head without raised interantennal process in female.