

## *Protomeloe crowsoni*

a new species of a new tribe (Protomeloini) of the blister beetles (Coleoptera, Meloidae), with remarks on a postulated new pheromone (cantharidin)<sup>1</sup>

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### Abstract

A new Brazilian species (*Protomeloe crowsoni*) of the genus *Protomeloe* Abdullah, belonging to a primitive and new tribe (Protomeloini) of the blister beetle family Meloidae is described from two male specimens in the British Museum (Natural History) London. Meloidae appears to have evolved from anthicid ancestors and *Protomeloe* serves to connect Meloidae with Anthicidae in a phylogenetic sense. A new pheromone, 3:6-epoxy-1:2-dimethyl-1:2-dicarboxylic anhydride (Cantharidin) is discovered which appears to be responsible for the gregarious behaviour of Anthicidae and Meloidae and is a sex-attractant for Anthicidae (including Pedilidae *auctt.*) and possibly Protomeloini.

Dr. Roy A. Crowson kindly brought to my notice the two male specimens of a new species of *Protomeloe* Abdullah in the British Museum collection which I have the pleasure of naming in his honour and describing below. After considering the new classification of the family Meloidae proposed by Selander (1964), I am now convinced that my earlier suggestion of placing *Protomeloe* in a new tribe (Protomeloini) should be followed for the reasons given earlier (Abdullah, 1964 b).

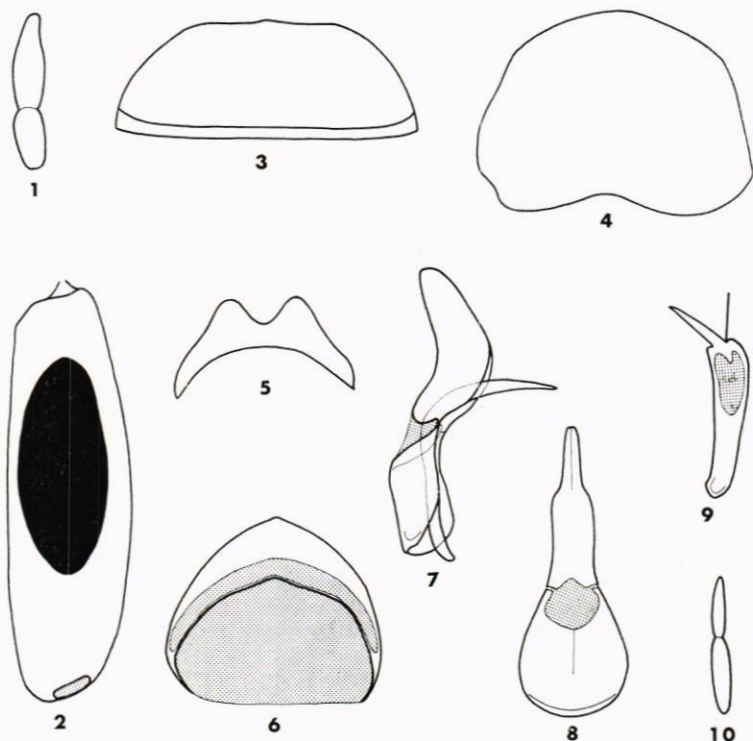
The following additional characters of the genus *Protomeloe* were discovered in the present study: pronotum slightly longer than wide to slightly wider than long; median lobe of the male with one or two hooks, latter recurved or not. A key to the known species follows.

### Key to the species of *Protomeloe* Abdullah

Elytron brown, pit at apex nearly as wide as long; eleventh antennal segment shorter than tenth segment (Fig. 10); lateral lobes of tegmen narrow (Abdullah, 1964 b, Fig. 11); median lobe with two short, recurved apical hooks (Abdullah, 1964 b, Figs. 10—12); Argentina . . . . . *P. argentinensis* Abdullah  
Elytron black with a large central yellow area, pit at apex more than twice wider than long (Fig. 2); eleventh antennal segment longer than tenth segment (Fig. 1);

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Figs. 1—10. *Protomeloe crowsoni*, new species, holotype, male. 1—9: 1, Apical two antennal segments; 2, right elytron, dorsal view; 3, seventh sternite; 4, seventh tergite; 5, eighth sternite; 6, eighth tergite; 7, aedeagus, lateral view; 8, tegmen, ventral view; 9, median lobe, ventro-lateral view. *Protomeloe argentinensis* Abdullah, holotype, male. 10: Apical two antennal segments.

lateral lobes of tegmen wide and laterally compressed (Figs. 7, 8); median lobe with a single, long, nearly straight, hook-like structure at apex (Figs. 7, 9); Brazil ..... *P. crowsoni*, new species

### *Protomeloe crowsoni*, new species

(Figs. 1—9)

*Holotype*. Male (author's No. 647), BRAZIL, Espirito Santo (Schmidt, ex. coll. Fry, 1905), in the British Museum (Natural History) London.

*Colour*. Head rufous but eyes, antennae and palpi fuscous to black; prothorax rufous; legs fulvous, with distal tarsal segments dark brown; elytron black with a large, central area yellow, apical pitted area griseous; ventral abdominal sternites fuscous.

*Vestiture*. Pubescence consisting of short, decumbent, luteous to fulvous hairs; longer, suberect hairs of similar and darker colours present along lateral margins of head, pronotum and elytra; a pitted and roughly rectan-

gular area on apex of each elytron with fine, small hairs. Compared with *P. argentinensis*, denser.

*Punctures.* Fine; sparse, separated by a distance usually greater than diameter of a puncture, coarsest on head.

*Head.* Vertex without a prominent, anteriorly forked median line. Frontoclypeal and clypeolabral sulci distinct. Labrum truncate at apex. Apex of mandible nearly blunt; prostheca narrow, fringed. Apical segment of maxillary palp nearly twice as long as third segment. Antenna with first two segments glabrous, rest scabrous; apical segment longest.

*Thorax.* Pronotum slightly wider than long, without a median sulcus. Shape of elytron as in Fig. 2.

*Abdomen.* Seventh (=fifth visible) sternite entire, very slightly, medially produced at apex (Fig. 3). Seventh tergite roughly four-sided, not appreciably produced at apex (Fig. 4). Eighth sternite deeply emarginate at apex, compared with preceding sternites lighter in colour and less sclerotized (Fig. 5). Eighth tergite entire at apex, with a characteristic crescentic, membranous area just above base (Fig. 6). Aedeagus (tegmen+median lobe) as in Figs. 7-9; lateral lobes (=parameres) of tegmen (parameres+basal-piece) wide and laterally compressed; median lobe with a single, long, nearly straight hook-like structure at apex.

*Measurements in mm.* Total length 5.5. Antennal length: total 2.51; segments I—XI: 0.25, 0.14, 0.21, 0.19, 0.20, 0.20, 0.20, 0.23, 0.24, 0.25, and 0.40 respectively. Maxillary palp: total length 0.47; segments I—IV: 0.04, 0.14, 0.10 and 0.19 respectively. Head: width across eyes 1.02; minimum dorsal interocular distance 0.72. Minimum width of neck 0.23. Pronotum: length 0.87; width at apex 0.41; maximum width=width at middle 1.02; width at base 0.84. Elytron: length 3.51; maximum width 0.96. Front tarsus: total length 0.82; segments I—V: 0.25, 0.15, 0.11, 0.08 and 0.23 respectively. Middle tarsus: total length 0.98; segments I—V: 0.35, 0.16, 0.14, 0.08 and 0.25 respectively. Hind tarsus: total length 1.13; segments I—IV: 0.50, 0.22, 0.14 and 0.27 respectively. Hind tibial spur 0.15.

*Paratype.* 1 male, with the same data as holotype, in the B. M. (N. H.). Differs from the holotype as follows: eyes light brown with blackish tinge. The abdomen is missing from the specimen. The metendosternite or furca is clearly visible in a postero-ventral view. Total length 5.5 mm.

*Remarks.* The only locality data accompanying the specimens is 'Espirito Santo' which could be one of several places in Brazil. Since the locality (20.20 s., 40.10 w.) on the Atlantic coast, north of Rio de Janeiro, is a better known one, I tentatively regard this as the type locality. The other localities are more in the interior, less known and less likely to have been visited.

The female and the immature stages of this species remain to be discovered.

In my earlier paper on *P. argentinensis*, I expressed the view that '... this is the most primitive known species of Meloidae' (Abdullah, 1964 b). I hold to this opinion even after the discovery of this second species of the primitive genus. I think that Selander is right in regarding the presence of two hooks on the median lobe of the aedeagus as a primitive character of Meloinae (Selander, 1964: 1074). However, I disagree with Selander in not regarding



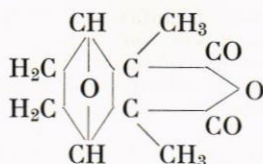
Fig. 11, *Protomeloe argentinensis* Abdullah, holotype, male, in the collection of the California Academy of Sciences, San Francisco. (1 division on the scale= 1 mm).

*Eletica* as the most primitive genus of Meloidae. Whether or not his action in placing of *Eletica* in a new subfamily is justified, I consider there is good reason for placing *Protomeloe* in a distinct subfamily, occupying a more or less intermediate position between Anthicids (including Pedilids) and other Meloids. If it is considered useful to reduce the number of families within the section Heteromera of the superfamily Cucujoidea, one should think of merging the families Anthicidae and Meloidae.

### Cantharidin, a new pheromone

According to the definition of Karlson and Butenandt (1959), pheromones are 'substances which are secreted to the outside of an individual and received by a second individual of the same species, in which they release a specific action, for example a definite behaviour or developmental process'. As noted by Butler (1964), these ectoharmones exclude optical and mechanical releasers as well as token stimuli of host plants. It is highly probable that males of the family Anthicidae which have elytral glands and, by inference, males of Protomeloini secrete a chemical attractant or pheromone which promotes aggregation in the field and brings the two sexes together. The chemical seems to be Cantharidin which is known to occur in Meloidae and which is also known to attract males and to a lesser extent females of anthicid beetles with elytral glands in the species (Abdullah, 1964 b, Table I).

Cantharidin ( $C_{10}H_{12}O_4$ ) is 3:6-epoxy-1:2-dimethyl-1:2-dicarboxylic anhydride:



The formula is by Gadamer and has been confirmed by a synthesis due to Ziegler (Raphael, 1953: 243). Cantharidin has also been synthesized by Stock, Tamelen, Friedman and Burgstahler (1953).

Olfactory sex-attractants of known chemical structure are few. Those which have been isolated from insects other than beetles are: 'Gyptol' (Acree, 1953), an alcohol, 10-acetoxy-1-hydroxy-*cis*-7-hexadecene, produced by the female gypsy moth, *Porthetria dispar* L. (Jacobson, Beroza and Jones, 1960); 'Bombykol', produced by the female silk moth, *Bombyx mori* L. (Butenandt, Beckmann and Hecker, 1961) which is a two fold unsaturated alcohol, the double bonds of which are conjugated as follows:  $[CH_3-CH_2-CH=CH-CH=CH(CH_2)_8-CH_2OH]$  (Butenandt, Beckmann and Stamm, 1961); in the honey bee (*Apis mellifera*), a pheromone 9-oxodec-*trans*-2-enoic acid  $-[CH_3-CO-(CH_2)_5-CH=CH-COOH]-$ , controlling queen-rearing which has been isolated, identified and synthesized (Butler, Callow and Johnston, 1961; Butler, 1964); the pheromone from females of the American cockroach, *Periplaneta americana* L. which is 2,2-dimethyl-3-isopropylidene-cyclopropyl propionate (Jacobson, Beroza and Yamamoto, 1963).

An unidentified pheromone produced by males of an aposematic distasteful lycid beetle, *Lycus loripes* (Chevrolat) has been found by Eisner and Kafatos (1962) in field experiments to attract both sexes of the species. Cantharidin appears to be responsible for the gregarious behaviour of both meloid and anthicid beetles in the field. Selander (1964: 1041) believes that there is a visual element involved in the gregarious behaviour of beetles of the genus *Pyrota* (Meloidae) although he considers it not improbable that one or both sexes produce an attractant chemical. My experiments on the attraction of *Notoxus monoceros* (Anthicidae) to Cantharidin at Frilford Heath (England) and Aberlady Bay (Scotland) (Abdullah, 1964 a), and those of Eisner and Kafatos (1962) on *L. loripes* (Lycidae) in Arizona are good evidence that a chemical olfactory attractant is responsible for the gregarious behaviour. In *Pyrota* (Meloidae), as in the case of mayflies (Speith, 1940), it is possible that aphrodisiacs come into play after the pair have been brought together by sex-attractants which could be visual in nature. Aphrodisiacs are employed by one or other sex to stimulate the opposite sex to copulate and may or may not be identical with the sex-attractant pheromones (Butler, 1964: 68).

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