PASSALIDAE: NEW LARVAL DESCRIPTIONS FROM TAIWAN, PHILIPPINE ISLANDS, BRUNEI AND IVORY COAST

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ABSTRACT

The larvae of *Didimus africanus* (Percheron), *D. haroldi* Kuwert, *D. alvarodoi* (?) Corella, *D. parastictus* (Imhoff), *D. nachtigali* Kuwert, *Erionomus planiceps* (Esch.), *E. pilosus* Arrow, *Taeniocerus pygmaeus* (Kaup) and *Comacupes basalis* (Smith) are described for the first time. Larvae of *Leptaulax bicolor* (F.), *L. dentatus* (F.) and *Aceraius grandis* (Burm.) are redescribed and compared with previous descriptions based on Indian specimens.

Passalid larval literature is summarized to date; a total of 120 species (29 Old World) are now described.

RESUMEN

Se describen las larvas de *Didimus africanus* (Percheron), *D. haroldi* Kuwert, *D. alvaradoi*(?) Corella, *D. parastictus* (Imhoff), *D. nachtigali* Kuwert, *Erionomus planiceps* (Esch.), *E. pilosus* Arrow, *Taeniocerus pygmaeus* (Kaup) *y Comacupes basalis* (Smith) por primera vez. Se redescriben las larvas de *Leptaulax bicolor* (F), *L. dentatus* (F) y *Aceraius grandis* (Burm.), comparándolas con descripciones previas basadas en especimenes de la India. La literatura sobre larvas de pasálidos se resume hasta la fecha; un total de 120 especies, 29 del Viejo Mundo, son ahora conocidas.

This article summarizes the knowledge concerning passalid beetle larval taxonomy and adds new larval descriptions. Schuster & Reyes-Castillo (1981) summarized the literature to that date, a total of 22 species. They added 69 more species descriptions, redescribed 6 species and provided a key to New World genera. Since then, Paulian & Lumaret (1979) have described 3 species from Madagascar; Quintero & Reyes-Castillo (1983) described 2 species of *Oileus* and redescribed the remaining 3 species in the genus; Costa and da Fonseca (1986) have described 14 and redescribed 7 species from Brazil with excellent drawings; Reyes-Castillo et al. (1987) described 2 Mexican species of the new genus *Xylopassaloides*; and Schuster (1988) described *Petrejoides reyesi* Schuster. This brings the total species described to 113, perhaps 1/6 of the world total. Only 22 Old World species have been described. Here we describe 7 more Old World species and redescribe 3 others. The methods and terminology (see Figs. 1 & 3) are the same as in Schuster & Reyes-Castillo (1981). Collection locality and date follow the

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species name including the initials of which author collected the specimens. This is followed by the number of individuals examined of each instar, with the range in head widths (mm) for that instar.

AULACOCYCLINAE

Comacupes basalis (Smith) 1852 PHILIPPINE IS., Mindoro, S. of San Teodoro 18XII79 JCS 2III4.7-4.8

This species is known only from the Philippine Is. (Gravely 1914). The larva conforms to the key characteristics for the subfamily (Schuster & Reyes Castillo 1981): retinaculum present, antenna sub-bifurcate, trochanter-femoral stricture with setae. The uncus of the lacinia is bifid. The primary setal pattern is quite complex (Fig. 1). The labrum is bordered by many long setae. The frons has only short setae. Many short hairs occur behind and below the antennae. The dorsal setal pattern is characterized by short (0.25mm) primary setae. Up to 12 setae can occur in a transverse row on the abdominal tergites. A single seta occurs on each lateral lobe below the level of the spiracles on each abdominal segment, similar to those mentioned for *Aulacocyclus edentulus* (MacLeay) (Schuster & Reyes-Castillo 1981). These we here call pleural seta (PS). The 12 AR setae are all dorsal, as in *A. edentulus* (Schuster & Reyes-Castillo 1981). The ventral abdomen is bare except for the abundant hairs on the raster. The anus is T-shaped.

Taeniocerus pygmaeus (Kaup) BRUNEI 22km S.W. Telisai (rd. to Labi) 20XI80 W.D. Edmonds 44III2.0-2.3, 4III.5-1.6

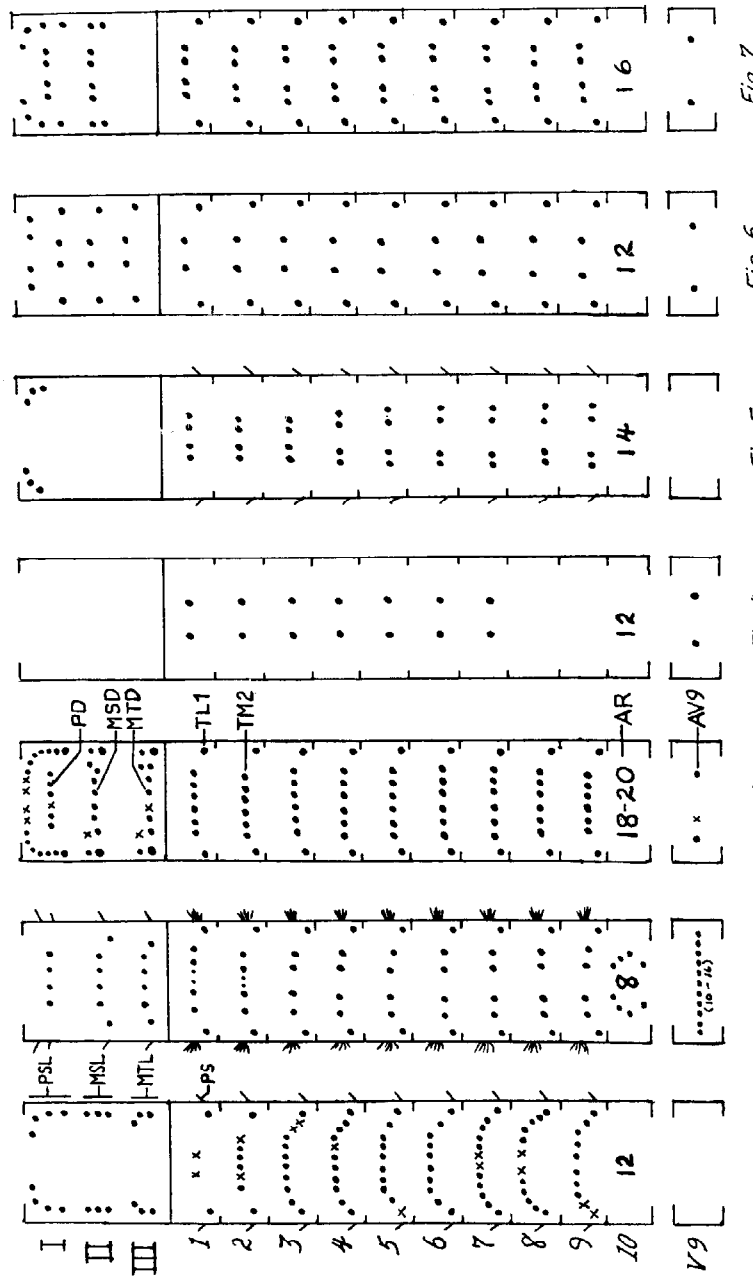
This species occurs in peninsular Malaya, Sumatra and Borneo. The uncus of the lacinia is entire. As in other Aulacocyclinae, a retinaculum is present, the antennae are sub-bifurcate and the leg stricture possesses setae. Head width distributions were: 2.0-2.05: 6, 2.1-2.15: 27, 2.2-2.25: 10, 2.3: 1. The internal coxae have 2-5 setae. The frons is bare except for short (<0.1mm) setae in lateral corners. One pair of strong, and 2 pairs of weaker, post-antennal setae on the head (HPA) are present. Sclerotized pronotal shields are reduced to sunken points 0.3mm diameter or absent. The thorax has 1 or 2 pleural setae at spiracle level as well as approximately 5 long PS setae on each pleural bulge (Fig. 2). Other hairs to 0.5mm occur on each abdominal segment, especially near TL setae. The basic pattern includes 2 pairs of TD setae, but frequently a third seta is present mesally. Usually 8 (37/44) anal ring setae occur, 6 in the dorsal hemisphere (Fig. 2). Each ventral abdominal segment is crossed by 10-16 long (0.8mm) setae, though somewhat shorter posteriorly. The raster has short setae (instars II and III are quite similar). Most unusual is the difference in size of the spiracles. Measured vertically in instar III, their dimensions on abdominal segments 1-8 are (mm): 0.25, 0.15, 0.1, 0.1, 0.1, 0.15, 0.2, 0.2.

This description agrees with that of *T. bicuspis* Kaup (Gravely 1919) with respect to the presence of pleural thoracic setae, though differing in number. Gravely's brief description indicates fewer dorsal setae, 6 anal ring setae, and lack of any other hairs!

PASSALINAE

Aceraius grandis (Burmeister) 1847. TAIWAN, Ku Kuan 3I80 JCS 7III6.2-7.0, 6II4.7-4.9, 2I3.3-3.5

This species occurs from India to Taiwan and the Sunda Is. Previous descriptions of the larvae of this species refer to Indian specimens (Gravely 1916, Gardener 1935). The Indian specimens seem to be quite similar to those from Taiwan; however, the previous descriptions apparently refer only to the second and third instars.



Figs. 1-7. Dorsal setal patterns of Old World passalid larvae. Roman numerals refer to thoracic segments, arabic numerals to abdominal segments. PSL = lateral prothoracic setae, MSL = lateral mesothoracic setae, MTL = lateral metathoracic setae, PS = pleural setae, PD = dorsal prothoracic setae, MSD = dorsal mesothoracic setae, MTD = dorsal metathoracic setae, TL = lateral abdominal tergal setae, TM = mesal abdominal tergal setae, AR = anal ring setae, AV9 = ventral setae on ninth abdominal sternite. Fig. 1: *Comacupes basalis*, Fig. 2: *Taeniocerus pygmaeus*, Fig. 3: *Acervius grandis*, Fig. 4: *Leptaulax dentatus*, Fig. 5: *L. bicolor*, Fig. 6: basic pattern of *Didimus*, Fig. 7: basic pattern of *Eriomomus*.

The uncus of the lacinia is bifid. The primary setal pattern includes 1-3 long setae in each lateral angle of the frons, 5-7 very long HPA setae in a vertical row, 3 pairs of TM setae forming a transverse row on abdominal tergites 2-6, occasionally on tergites 1 or 7, and, in the third instar, occasionally on tergite 8. The anal ring has 18-20 setae in all instars. Usually a pair of short AV9 setae is present. The anus is a single transverse slit. A hair pile occurs over most of the body. The raster is quite hairy. The first instar larva differs strikingly from the others (Fig. 3). It has a more complete setal pattern in that there are 3 pairs of TM setae on abdominal segments 1-9 as well as on each thoracic segment (1 or 2 individual setae may be lacking in the latter site). In addition, there are a single pair of TL and 2 pairs (the anterior seta shorter) of MSL and MTL setae. The anterior corner of the pronotum has 7-9 PSL setae, with the weakest ones located more mesally. Usually, 3 pair of PD, MSD, and MTD setae are present, often with a short extra pair slightly anterior to the outer MSD and MTD setae.

Leptaulax dentatus (Fabr.) 1792 PHILIPPINE IS., Luzon, Los Baños, University of the Philippines 14XII79 JCS 5III4.3-4.6

This species occurs from India to the Philippines, Sunda Is., Moluccas, New Guinea and Australia. The larva was originally very briefly described by Gravely (1916) from 4 Indian specimens. He mentions only the distribution of some hairs and setae. In our specimens the uncus of the lacinia is entire. The mandibles are without a retinaculum, as in all other Passalinae we describe here. The frons and HPA setae are all short (<0.2mm), not clavate. The primary setal pattern (Fig. 4) includes only a single pair of TM setae on tergites 1-7 [sometimes lacking on tergite 7 or present as far as tergite 8, according to Gravely (1916)]. The anal ring has 12 setae (13 in one specimen). No AV9 setae are present. The mid-ventral raster is bare; a few short (<0.2mm) hairs are present laterally. Hairs are scarce on the body. The coxae have one (rarely 2) internal setae each. The anus is T shaped.

Leptaulax bicolor (Fabr.) 1801 PHILIPPINE IS., Mindoro, S. of San Teodoro 18XII79JCS 1III3.5, 3II2.2-2.3

This species also is found from India to the Philippines, Sunda Is., Moluccas, New Guinea and Australia. It was originally described by Candeze (1861) with redescriptions by Gravely (1916) and Gardner (1935) of Indian specimens. Gravely (1916) divided the species into 2 varieties: *L. bicolor* s. str. and *vicinus* (Hope), the latter from the Andaman Is. Gravely apparently worked with all instars, Gardner with only third instars.

The uncus of the lacinia is bifid. According to Gravely (1916), the first instar of *L. bicolor* s. str. has a single long HPA seta, lacking in other instars and reduced in variety *vicinus*. Our specimens have 2 stout, short (<0.1mm) clavate setae as well as various thinner clavate setae behind the antennae. He implied a lack of dorsal thoracic setae early in development with ". . . in a specimen little over 15mm . . . a single pair of rather small dorsal hairs has appeared on each thoracic segment." Dorsal thoracic setae were also mentioned by Gardner (1935); however, none are present on our specimens. We agree in the presence of 3 PSL setae (sometimes 2 PSL according to Gardner), as well as the basic primary setal pattern (Fig. 5) of 2 pair of TM setae on tergites 1-9 plus a single pair of short, dorsally directed pleural setae on the lateral lobes just below the spiracle line on abdominal segments 1-8 or 1-9. This latter seta in our specimens is clavate. The anal ring has 14 setae. The raster is bare. On our specimens there are no other setae or hairs on the body larger than 0.1mm except on the legs, prosternum and mouthparts. There are 2 internal coxal setae. Gravely (1916) and Gardner (1935), however, mentioned what is apparently a pair of AV9 setae. Our specimens are smaller than those of Gravely and Gardner. Gravely (1916) mentioned associated adults 29mm long, whereas our adults measure approximately 18mm. *L. bicolor* is geographically very wide ranging; therefore, without examination of further specimens from different

areas, it is impossible to determine if we are dealing with more than 1 species or a highly variable single species.

Didimus Kaup

Our 5 species have the uncus of the lacinia entire, frons, HPA and most thoracic setae very short (<0.1mm). A basic setal pattern seems characteristic of the genus (Fig. 6). The trochanter-femoral constriction is bare except for 1 dorsal hair. The tergum has scattered secondary setae <0.1mm long. The raster and ventral abdomen are bare; the prosternum has a few hairs. The anus is T- or Y-shaped. The species differ in the number of internal coxal setae, head capsule width and some setae. The basic anal ring setal number is 12. The following key may be used to separate our species:

KEY TO LARVAE OF *DIDIMUS*

1 Internal coxa with 3 setae, 4 small setae between major TM setae, TM 1-6 setae long ..... *D. africanus*
1′ Internal coxa with <3 setae, no small setae between major TM setae, TM 1-9 setae long 2
2 Internal coxa with 1 seta, meso- and metanota with 1 pair MSL and MTL setae; instar II head width 2.1- 2.2mm ..... *D. nachtigali*
2′ Internal coxa with 2 setae, meso- and metanota with 2 pairs MSL and MTL setae; instar II head width >2.4mm 3
3 Long PD, MSD, and MTD setae present, instar II head width 2.7mm, instar III head width >4.2mm ..... *D. haroldi*
3′ Long PD, MSD, and MTD setae absent, instar II head width <2.7mm, instar III head width <4.2mm 4
4 Pronotum with 5 pairs of short PSL setae ..... *D. parastictus*
4′ Pronotum with 0-3 pairs of short PSL setae ..... *D. alvaradoi* (?)

Didimus africanus (Percheron, 1844) IVORY COAST, Tai National Pk. 2VIII80 PRC 2III3.8

This species occurs in west and east tropical Africa. The internal coxal area has 3 setae. The diameter of PSL setae becomes smaller mesally, with at least 3 definite thick setae near the external anterior corner of the shield. The only other notal setae are a pair of MSL and MTL setae. Long TM setae are present on abdominal tergites 1-6, with short truncated setae on the other segments. Internal to the TM setae are 2 pair of very short, pointed, thinner (but thicker than other body hairs) setae. A pair of short, truncated TL setae occurs on each abdominal tergite.

Didimus parastictus (Imhoff, 1843) IVORY COAST, Tai National Pk. 2VIII80 PRC 7III3.6-3.8, 2II2.6

This species occurs in west tropical Africa. The internal coxa has 2 setae. The PSL setae resemble those of *D. africanus* with at least 5 setae thicker than the others in each anterior lateral corner of the shield. Two pairs of MSL and MTL setae are also present. A pair of TM setae is usually complete on each abdominal tergite with TL setae on tergite 9 only. Seven larvae had 12 AR setae, 1 had 11, 1 had 10. Second and third instars were essentially the same; both possessed metanotal bars. One red egg in early stage of development was found.

D. nachtigali Kuwert (1891) IVORY COAST, Tai Nat. Pk. 30VII80 PRC 2II2.2, 1I1.4; 5VIII80 PRC 1III3.2, 1II2.2

This species occurs in tropical east and west Africa. The internal coxa has only 1 seta. MTD setae are lacking, this being the principal difference from what is probably the basic pattern for the genus. All instars had the same setal pattern. Metanotal bars were present only on instar I. Two red-brown eggs 1.9 x 1.5mm were found.

D. haroldi Kuwert 1898 IVORY COAST, Tai National Pk., VIII80 PRC 3III4.3-4.4, 2II2.7

This species occurs in tropical east and west Africa. The internal coxa has 2 setae. It differs from the basic setal pattern in lacking PSL setae, possessing an extra pair each of MSL and MTL setae and all lateral setae are reduced to stubs except TL9. Instar II lacked MTD setae, possessed metanotal bars, but otherwise was the same as instar III.

D. alvaradoi (?) Corella IVORY COAST., Tai National Pk. 30VII80 PRC 1II2.5, 2I1.7-1.8

This species is known from Spanish Guinea. The internal coxa has 2 setae. It differs from the basic setal pattern in lacking: (1) PSL setae in instar II; (2) PD, MSD, and MTD setae in instars I and II (except for remnants of MTD in instar II); (3) TSL 1-8 setae in instar II (reduced to stubs in instar I). It also has 2 pair of stubby MSL and MTL setae. Metanotal bars are present in instar I.

Erionomus Kaup

Our 2 species have the uncus of the lacinia entire. Frons setae are <0.01mm long. Two to 4 HPA setae longer than the antenna are oriented in a vertical row; smaller thick setae are also present. The basic setal pattern is that of Fig. 7. Raster and venter are bare, prosternal hairs are <0.01mm long. The anus is Y or T shaped.

E. planiceps (Esch.) IVORY COAST, Tai National Pk 5VIII80 PRC 2III7.0, 2I3.1,3.2; 31VII80 PRC 1II4.5, 1I3.1

This species occurs in east, equatorial, and west Africa. It has 3-4 long HPA setae, 3 or 4 internal coxal setae, and scattered secondary setae (<0.2mm) dorsally. All instars have the basic dorsal setal pattern, with occasional additions of another pair of internal TM, PD and MSD, as well as an occasional extra pair of MSL setae, especially in later instars. Metanotal bars are present in instars I and II. The anal ring contains 18 setae (17-19 in instar I).

E. pilosus Arrow IVORY COAST, Tai National Pk. 3VIII80 PRC II2.6 1II (molting)

This species occurs in west and equatorial Africa. The instar II head width is not given because it was in ecdysis when it died. The specimens have 2-3 long HPA setae, 2-3 internal coxal setae, but no secondary setae dorsally. They have the basic *Erionomus* dorsal setal plan. The anal ring contains 16 setae. A brown egg 3.1 x 3.6mm with embryo undeveloped was found.

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DESCRIPTION OF *DASYHELEA CHANI* NEW SPECIES (DIPTERA: CERATOPOGONIDAE) FROM LEAVES OF THE WATER LETTUCE (*PISTIA STRATIOTES*) IN FLOIRDA

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Abstract

Dasyhelea chani new species (Diptera: Ceratopogonidae), whose immature stages are found on leaves of the water lettuce, *Pistia stratiotes* L., is described in the pupal and adult stages.