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Description of the larva of Cuban specimens of *Pachydrus obniger* (CHEVROLAT, 1863) (Coleoptera: Dytiscidae)

Y. ALARIE & Y.S. MEGNA

Abstract

The third instar of the Antilles endemic species *Pachydrus obniger* (CHEVROLAT, 1863) (Coleoptera: Dytiscidae) is described and illustrated. This species has turned out as very similar to *P. globosus* (AUBÉ, 1838) in terms of larval morphology and it is postulated that *P. obniger* might represent a junior synonym of *P. globosus*.

Key words: Coleoptera, Dytiscidae, Hydroporinae, Hyphydrini, larva, chaetotaxy, Cuba.

Introduction

The dytiscid genus *Pachydrus* SHARP is comprised of nine species worldwide, all distributed in tropics and subtropics of the Western Hemisphere (BISTRÖM et al. 1997; NILSSON 2001). In terms of classification, *Pachydrus* is included in the tribe Hyphydrini that constitutes a large and diverse group of insects in warm temperate to tropical regions of the world. Hyphydrini currently contains 331 species in 16 genera (NILSSON 2001, 2003). Recent studies based on larval morphology supported a placement of *Pachydrus* within Hyphydrini as a sister taxon to other hyphydrine genera (ALARIE et al. 1997; ALARIE & CHALLET 2006; MICHAT & TORRES 2005).

The larval morphology of most *Pachydrus* species is poorly known. Worldwide, the larvae of two species have been described (SPANGLER & FOLKERTS 1973; ALARIE et al. 1997). The recent discovery of the larvae of *Pachydrus obniger* (CHEVROLAT 1863) in Cuba provided the impetus for this study. More specifically this paper aims at describing the third instar of *P. obniger* and to position this species in the actual context of the larval morphology of the genus *Pachydrus*.

Material and Methods

The methods, terminology, and format of this paper follow those of recent studies on larval morphology of the Hyphydrini (ALARIE et al. 1997; ALARIE & WATTS 2005; ALARIE & CHALLET 2006). Larval specimens (n = 3) were disarticulated and mounted on standard glass slides with Hoyer's medium. Examination at magnifications of 80–800x was done using an Olympus BX50 compound microscope equipped with Nomarsky differential interference optics. Voucher specimens are deposited in the research larval collection of Y.A. (Laurentian University, Department of Biology, Sudbury, Ontario, Canada).

The characters and terms used in the morphometric analysis are are defined as follows:

Head length (HL): total head length including the frontoclypeus measured medially along the epicranial stem.
Head width (HW): maximum width measured posterior to the stemmata.

Length of frontoclypeus (FCL): from apex of the nasal to the back of the ecdysial suture.
Spatula width (SpW): maximum width of the rounded and broader apex of the frontoclypeus.
Frontoclypeus narrowest width (FCNW): narrowest distance of the frontoclypeus as measured anterior to bases of the lateral horns.
Horn width (HrW): greatest transversal distance measured ventrally between the tips of the lateral horns.
Occipital foramen width (OcW): maximum width measured along the dorsal margin of the occipital foramen.
Length of antenna: derived by adding the length of each individual antennomere; comparison among antennomeres was made using the capital letter **A** with a number corresponding to the segment considered (e.g. **A1** for **antennomere 1**); **A3'** is used as an abbreviation for the lateral elongation of antennomere 3.
Length of maxillary palpus: derived by adding the length of each individual palpomere.
Length of labial palpus: derived by adding the length of each individual palpomere.
Length of legs: derived by adding the length of each individual segment including the longest claw; the length of each segment was taken at the longest point except for the trochanter which includes only the proximal portion (the length of distal portion being included in the femoral length).
Dorsal length of last abdominal segment (LLAS): includes the whole sclerite measured dorsally along the mid-line from the anterior margin to the posterior margin; **siphon** refers to the dorsal prolongation of the eighth abdominal segment (= last abdominal segment); the length of the siphon was determined by measuring the difference between the dorsal and ventral lengths of the segment.
Length of urogomphus: derived by adding the length of each individual urogomphomere; comparison between the two urogomphomeres was made using the abbreviation **Uro** (e.g. **Uro1** for urogomphomere 1); **Uro2'** is used as an abbreviation for the length of urogomphomere 2 measured from its proximal margin to the point of insertion of primary seta UR8.

The individual measurements defined above were used in calculating several ratios aiming at characterizing the body shape. Most of the ratios used in this paper are similar to those mentioned in the previous papers dealing with larval morphology of Hyphydrini (cf. above) and, as such, are not defined herein. However, two new ratios are introduced in this paper:

Spatule width (SpW)/frontoclypeus narrowest width (FCNW): used for characterizing the shape of the apical portion of the frontoclypeus.
Horn width (HrW)/head width (HW): used for characterizing the relative elongation of the lateral horns on the frontoclypeus.

Primary and secondary setae and pores were distinguished on the cephalic capsule, head appendages, legs, last abdominal segment, and urogomphi. The setae and pores are coded according to the systems proposed by ALARIE et al (1990) for the legs, ALARIE & HARPER (1990) for the last abdominal segment and urogomphi, and ALARIE (1991) for the cephalic capsule and head appendages.

		Pglo (from ALARIE et al. 1997) (n = 5)	Pobn (n = 2)
Segment	Sensillar series		
ProCO	D	6–8	5–7
ProTR	Pr	1	1
ProFE	AD	1	1
	AV	0–2	0
	AV (NS)	24–29	27–30
	PV	7–9	7–8
	Total	32–39	35–39

ProTI	AV	1–2	2–3
	PD (NS)	1	0
	Total	2–3	2–3
ProTA	AV	5–7	5–6
MesoCO	D	6–9	7–10
MesoTR	Pr	1–2	1–2
MesoFE	AD	1	1
	AV	8–10	4–9
	AV (NS)	31–39	40–41
	PV	8–10	9–10
	Total	51–59	55–60
MesoTI	AV	5–6	5–6
	PD (NS)	1	1
	Total	6–7	6–7
MesoTA	AV	5–8	5
MetaCO	D	5–8	5
MetaTR	Pr	1–2	1
MetaFE	AD	1	1
	AV	11–13	7–16
	AV (NS)	38–45	40–43
	PV	10–12	10–13
	Total	61–68	61–70
MetaTI	AV	6–8	5–6
	PD (NS)	1	1
	Total	7–9	6–7
MetaTA	AV	6–9	6–9

Tab. 1: Number of secondary setae on the legs of third instar of *Pachydrus*. AD = anterodorsal, AV = anteroventral, CO = coxa, D = dorsal, FE = femur, NS = natatory setae, PD = posterodorsal, Pr = proximal, PV = posteroventral, TA = tarsus, TI = tibia, TR = trochanter, n = number of specimens studied, range = total number of secondary setae on segment; Pglo = *P. globosus* (SAY), Pobn = *P. obniger*.

Pachydrus SHARP, 1882

DIAGNOSIS: The larvae of *Pachydrus* can readily be distinguished from other genera of Hyphydrini known as larvae by the following combination of characters: frontoclypeus narrow apically, with lateral branches (Fig. 1), with lateroventral spine-like projections; antennomere 1 subequal in length to antennomeres 2 and 3 in instar III; antennomere 3 without ventroapical spinula, with primary pore ANf; prementum about as long as broad, with primary setae LA3, LA4, LA5 inserted distally; labial palpomere 2 with primary seta LA10 inserted medially,

shorter than palpomere 1 in instar III; primary seta TI7 (based on instar III) short, spiniform on protibia, elongated, setiform on meso- and metatibiae; natatory setae on ventral margin of femora and dorsal margin of tibiae (Figs. 3–4); abdominal segments 6–8 sclerotized ventrally in instar III; siphon lacking ventral secondary seta; urogomphus shorter than last abdominal segment; urogomphomere 1 shorter than HW; primary seta UR8 inserted proximally on urogomphomere 2 (Uro2'/Uro2 < 0.50) (Fig. 4).

Pachydrus obniger (CHEVROLAT, 1863)

MATERIAL EXAMINED: The larvae studied were collected in association with adults at the following localities: **Cuba**: Cauto Cristo, Granma, 25 km north of Bayamo, 10.VIII.2004, 17.VIII.2004; Chalons, 6 km west of Santiago de Cuba, 06.III.2005. The identification is firm as *P. obniger* represents the only species of *Pachydrus* found in Cuba (PECK 2005).

DESCRIPTION, Instar III (n = 2): Colour (Fig. 1): Dorsal surface of head capsule predominantly dark brown with a diffuse mottled color pattern posteriorly; occiput and mesal part of frontoclypeus yellow; head appendages creamy white to pale yellow except proximal 2/3 of antennomere II, antennomeres III and IV piceous; thoracic terga predominantly dark brown; pronotum with one median and one lateral yellow maculae posteriorly; legs yellow to pale brown; abdominal terga predominantly dark brown; terga VI and VII slightly paler; tergum VIII dark yellow posteriorly; urogomphomere I dark brown; urogomphomere II pale yellow.

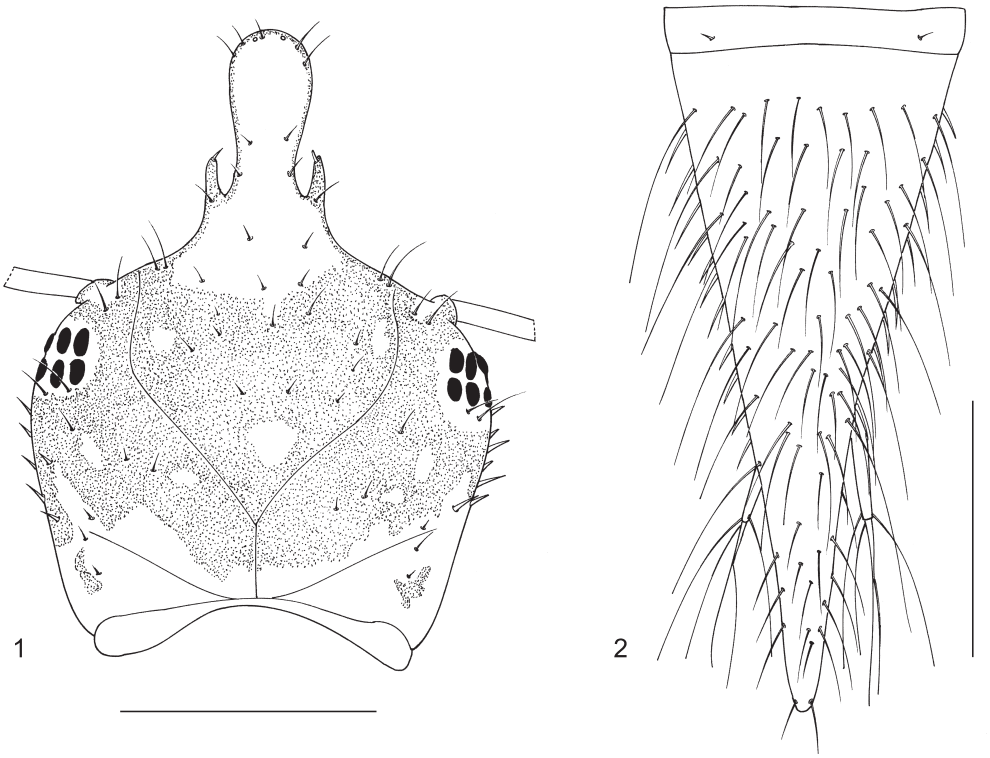
Head (Fig. 1): HL = 1.12–1.13 mm (mean = 1.12 mm); HW = 0.88–0.93 mm (mean = 0.91 mm); FCL = 0.96 mm (mean = 0.96 mm). Cephalic capsule: HL/HW = 1.20–1.28; HW/OcW = 1.36–1.48; frontoclypeus narrow apically, SpW/FCNW = 1.39–1.41, with lateral horn visible dorsally (HrW/HW = 0.25–0.27), with several spiniform projections lateroventrally; primary seta FR6 elongated. Antenna slightly shorter than HW (length of antenna/HW = 0.78–0.85); antennomeres I, II, III subequal in length, A2/A3 = 0.96–1.02; A3'/A4 = 1.00, antennomere 3 lacking ventroapical spinula. Labium: Prementum about as long as broad, length of maxillary palpus/length of labial palpus = 1.37–1.39, palpomere 2, 0.72 times length of palpomere 1. Chaetotaxy and porotaxy: Pore ANf present; primary setae LA3, LA4, LA5 inserted distally on prementum; seta LA10 inserted medially on labial palpomere 2.

Legs (Figs. 3–4): Metathoracic legs 2.60 times HW; position and number of secondary setae as in Tab. 1; natatory setae present on ventral of femora and dorsal margin of tibiae respectively; primary seta TI7 short, spiniform on protibia, elongated, setiform on meso- and metatibiae; setae simple.

Abdomen (Fig. 2): LLAS = 1.12–1.16 mm (mean = 1.14 mm); segments 6–8 fully sclerotized; segment 8 longer than HW, LLAS/HW = 1.24–1.27, not constricted posterior to insertion of urogomphi; siphon lacking ventral secondary seta.

Urogomphus (Fig. 4): Total length of urogomphus = 0.49 mm (length of urogomphomere 1 = 0.30 mm); 0.52–0.54 times HW (length of Uro1/HW = 0.32–0.34) and 0.42–0.43 times LLAS (length of Uro1/LLAS = 0.26–0.27); urogomphomere 1 longer than urogomphomere 2, Uro1/Uro2 = 1.65; seta UR8 proximally articulated on urogomphomere 2, Uro2'/Uro2 = 0.41–0.43.

MATERIAL EXAMINED: Larvae and adults of *P. obniger* were collected from temporary and permanent lagoons characterized by muddy bottom and abundance of organic detritus. Contrary to the two permanent habitats sampled, which were characterized by an abundance of aquatic vegetation [*Salvinia* sp., *Cyperus rotundus* L., *Typha domingensis* (PERS.) and *Eichornia crassipes* (MART.)], the temporary lagoon was open and lacked vegetation. Water temperatures varied from 25°–32°C.

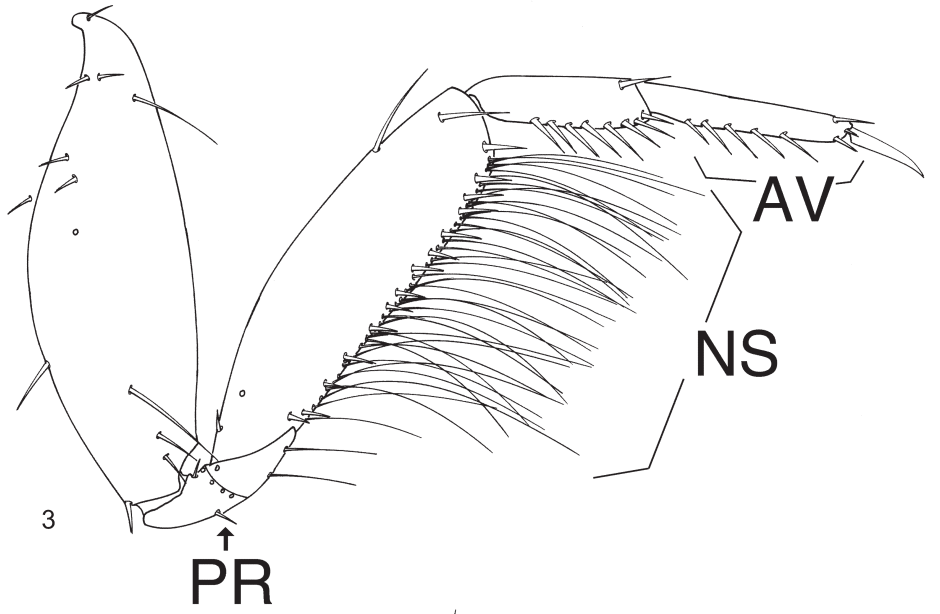


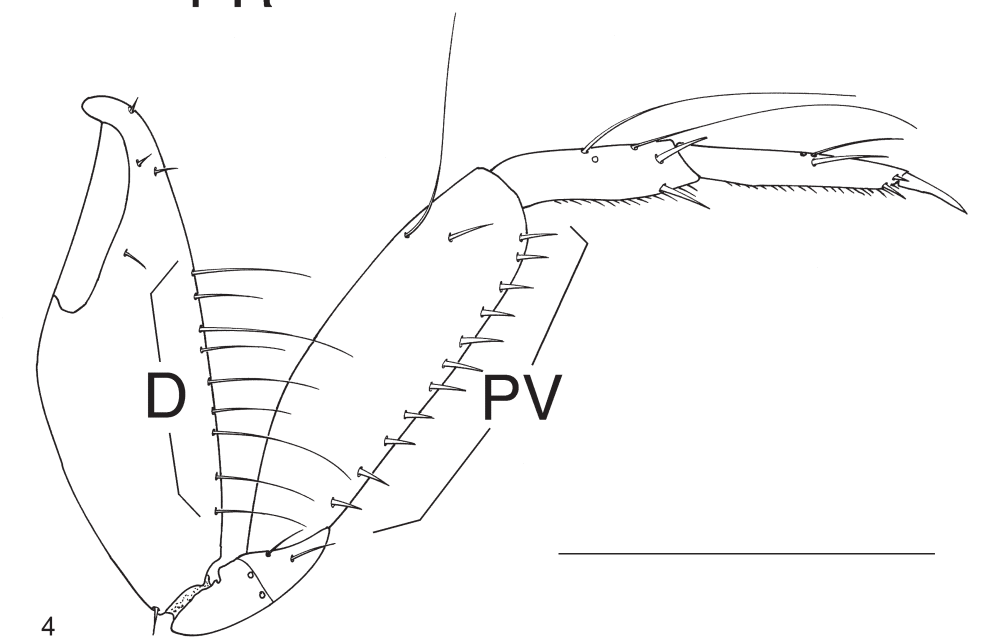
Figs. 1–2: *Pachydrus obniger*, dorsal aspect, third instar: 1) cephalic capsule; 2) last abdominal segment. Scale bar = 0.50 mm.

Discussion

The larvae of *Pachydrus* are among the most unusual and distinctive currently known among hyphydrine larvae. Of particular note is the presence of an anteroventral row of natatory setae on the femora (Fig. 3), an unique feature within the Hydroporinae. BERTRAND (1963) reported a similar condition for a larva identified as "Hydroporinae type 1", which presumably belonged to the genus *Heterhydrus* FAIRMAIRE.

Little is known of the larval morphology of the species of *Pachydrus*. With this contribution, the larvae of three species are described: *P. obniger*, *P. globosus* (AUBÉ, 1838) (ALARIE et al. 1997), and *P. princeps* (BLATCHLEY, 1914) (SPANGLER & FOLKERTS 1973). Whereas comparison with *P. princeps* is difficult owing to the more superficial description provided, larvae of *P. obniger* and *P. globosus* turned out as being fairly similar morphologically in all important structural details. Indeed, the size and proportions of most larval structures, as well as chaetotaxy of the legs (Tab. 1) and urogomphi are almost identical, which suggests that *P. obniger* might represent a junior synonym of *P. globosus*. This statement is reinforced by the geographic distribution of these species. Whereas *P. obniger* is the only species of *Pachydrus* found in Cuba, both species are known to occur in Puerto Rico (ALARIE et al. 1997; PECK 2005). Further work including a generic revision based on adult morphology is required.





Figs. 3–4: Metathoracic leg of *Pachydrus obniger*, third instar: 3) anterior surface, 4) posterior surface; AV = anteroventral, D = dorsal, NS = natatory setae, PR = proximal, PV = posteroventral. Scale bar = 0.50 mm.

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Resumen

Se ilustra y describe el tercer instar de la especie endémica de las Antillas Grandes *Pachydrus obniger* (CHEVROLAT, 1863). Se demuestra que la morfología larval de esta especie es muy similar a *P. globosus* (AUBÉ, 1838) y se postula que *P. obniger* pudiera representar un sinónimo de *P. globosus*.

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Dr. Yves ALARIE
Department of Biology, Laurentian University, Ramsey Lake Road, Sudbury, Ontario, Canada P3E 2C6
(yalarie@laurentian.ca)

Yoandri Suárez MEGNA
Departamento de Biología, Museo de Historia Natural "Charles Ramsden", Facultad de Ciencias Naturales, Universidad de Oriente, Santiago de Cuba, Cuba (ysuarez@cnt.uo.edu.cu)