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Chapter 4

Aquatic beetles of the Kwamalasamutu region, Suriname (Insecta: Coleoptera)

Andrew Short and Vanessa Kadosoe

SUMMARY

We conducted an intensive survey of aquatic beetles in the Kwamalasamutu Region of southwestern Suriname from 18 August to 7 September 2010. Both active collecting (using nets and by hand in aquatic habitats) and passive collecting (flight intercept traps, UV lights, dung baits) resulted in the collection of more than 4000 aquatic beetle specimens. We documented 144 species, distributed among 62 genera in 9 families. Sixteen of these species have been confirmed as new, with an additional 10 likely to be new. Two of these new species, both in the family Hydrophilidae, are described here: *Oocyclus trio* Short & Kadosoe sp.n. and *Tobochares sipaliwini* Short & Kadosoe sp.n. Camps 1 (Kutari) and 3 (Werehpai) had comparatively high species diversity, with 91 and 93 species respectively—although only 48 of these species were shared between the two sites. Camp 2 (Sipaliwini) had the lowest number of species with 68.

INTRODUCTION

Aquatic beetles represent a significant fraction of freshwater macroinvertebrate communities. At present, aquatic beetles are represented by nearly 13,000 described species distributed worldwide (Jäch & Balke 2008)—a guild richer in species than birds. These species are distributed across approximately 25 beetle families within four primary lineages: Myxophaga, Hydradephaga, aquatic Staphyliniformia (Hydrophiloidea & Hydraenidae) and the Dryopoidea (or aquatic Byrrhoids). Ecologically, these beetles play a variety of roles. Members of Myxophaga are small beetles that feed largely on algae as larvae and adults. The Hydradephaga (including the diving and whirligig beetles) are largely predators as adults and larvae; many aquatic Staphyliniformia are largely predators as larvae but scavengers as adults; the dryopoids are largely scavengers or eat algae as both larvae and adults.

Aquatic insects in general (including some groups of aquatic beetles) are often used to assess water quality in freshwater rivers and streams. The dryopoids are most frequently used for this purpose because they are most commonly found in these habitats and rely on highly oxygenated waters. Aquatic beetle communities are also effectively used to discriminate among different types of aquatic habitat (e.g. between lotic and lentic). However, in order to utilize aquatic insects as effective indicators of watershed health, these communities must be both 1) known and identifiable, and 2) have adequate information about their water quality tolerances. As neither of these criteria is met in the Guiana Shield region of South America, gaining more knowledge about both the diversity and ecology of these species is exceedingly

The RAP Bulletin of Biological Assessment meets all criteria for the description of species new to science, as specified by the International Commission on Zoological Nomenclature (ICZN). Paper copies of the RAP Bulletin are deposited in the library of Conservation International, Arlington, VA, USA; the Middleton Library at Louisiana State University, Baton Rouge, LA, USA; and the North Carolina Museum of Natural Sciences in Raleigh, NC, USA. The print run of this issue of the RAP Bulletin consisted of 500 copies. —BJO, LEA, THL, October 2011

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helpful if macroinvertebrates are to play a role in water quality monitoring.

No prior surveys in Suriname have focused on aquatic beetles, and the fauna of the country, as well as the Guiana Shield region in general, remains very poorly known. Regionally, recent survey efforts of varying intensity in Venezuela, Guyana, and French Guiana have contributed to knowledge of the fauna (e.g. Short & Garcia 2011, Queney 2006, 2010, Short & Gustafson 2010a, b), but it is still a long way from being completed. In Venezuela alone, more than 50 new species have been described in the last five years, with at least twice that number of confirmed new species still awaiting description (Short, unpub. data). A preliminary review of the literature suggests approximately 75 aquatic beetle species are known from Suriname (Hansen 1999, Miller 2005, Nilsson 2001, Nilsson & van Vondel 2005, Short & Hebauer 2006, Short & Fikáček 2011, Ochs 1964, Spangler & Steiner 1983, Young 1971).

Here, we report on the findings of an intensive survey of aquatic beetles in the Kwamalasamutu region of southwestern Suriname, including the descriptions of two new species.

METHODS AND STUDY SITES

We collected aquatic beetles at all three main sites on the RAP (Site 1: Kutari; Site 2: Sipaliwini; Site 3: Werehpai). We also collected small, incidental samples at Iwana Samu.

Field methods

We employed a variety of passive and active collecting techniques to assemble as complete a picture of the aquatic beetle communities of the region as possible. Passive techniques are advantageous because they often allow large amounts of material to be collected in quantitative ways at one time and with little effort, but they provide little ecological or habitat data—and thus we do not gain new insights into the water quality requirements of insects collected in this manner. In contrast, active collecting methods (i.e. by hand) provide a richer source of information on the microhabitat and water quality requirements of species, but are more time intensive and qualitative, and may suffer from collector bias. Our survey focused on adult beetles, and although a few larvae were collected, they are not included in our results or analysis.

Traps and other passive methods. On most nights, we collected in the evening hours until approximately 10 p.m. at a UV light mounted on a white sheet erected on the periphery of each camp. We also used flight intercept traps (FITs) to sample the beetle fauna. These traps collect flying insects, including dispersing aquatic beetles. At Site 1 we used two FITs, each composed of a 2-meter wide by 1.5- meter high screen, with aluminum pans filled with soapy water as a collecting trough. At Sites 2 and 3, we used three FITs of slightly smaller dimensions. At all three camps, we examined the by-catch of dung traps set for the purpose of collecting Scarabaeinae, and set several dung traps of our own.

Active methods. For active collection of swimming insects, we used a large aquatic insect net to probe larger and deeper pools and river margins. We also targeted insects that float on the water's surface using small metal strainers to collect in micropools and marginal areas. We also collected in several 'niche' habitats, including the phytotelmata of *Heliconia* spp. at Site 3, the rock face seeps and damp soil on the inselberg at Site 2, and damp leaf litter at Site 3. For the latter, we submerged leaf packs in a tub of water and collected the insects that floated to the surface.

Site 1: Kutari. N 02°10'31", W 056°47'14", 200–250 m, 18–24 August 2010

Most collecting was conducted in streams and flooded forest that intersected the first 1.5 km of trails cut from camp. The majority of the terrain in the sampled area consisted of seasonally inundated forest, with a few patches of terra firme. Most sampled habitats included seasonally flooded forest, including muddy swamp-like areas, and flooded low-lying areas between hills that likely draw down to form streams. Most sampling sites were full of detritus. One stream in particular had substantially more sand/non-mud substrate than the others and was particularly rich in aquatic beetle taxa. The frequency of specimens arriving to the UV light was very uneven: most nights were relatively poor in diversity, but the evening of 20 August (when most of the light-trap diversity was collected) was a notable exception.

Habitats of note:

There were no particular habitat features of this site that were not present at the other sites.

Site 2: Sipaliwini. N 02°7'24", W 056°36'26", 200–250 m, 27 August–2 September 2010

All collecting was conducted at stream and swamp areas along a trail cut, approximately three kilometers in length, between camp and a small granite outcrop. Unlike the Kutari site, no expanses of flooded forest were observed. Several streams expanded slightly into adjacent forest, but only narrowly so as to give the appearance of a broader drainage rather than a swamp. Several larger ravines with more sand/gravel substrate were present in addition to the more typical detritus-filled streams. A stream that originated at the base of the granite outcrop and flowed around it was composed of both detritus and sandy substrate and was particularly high in beetle diversity.

Habitats of note:

There was a low, sloping granite outcrop (or inselberg) approximately three kilometers from the site. Parts of the outcrop were covered in scrubby vegetation. Algae and evaporation stains, as well as eroded grooves in the rock indicate seeps are present for part of the year. We were able to find one small seep with algae that had a very high density of beetles (Fig. 1 A-B).

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Site 3: Werehpai. N 02°21'47", W 056°1'52", 200–250 m, 3–7 September 2010

Most collecting was conducted along an existing 3.5-km trail between the Sipaliwini River and the Werehpai caves. The camp area along the Sipaliwini was an abandoned farm site with secondary forest and an extremely dense understory, although this transitioned into more typical undisturbed forest relatively quickly along the trail. No flooded forest areas were observed at this site, although there was evidence that such areas exist during wetter times of the year (see habitats of note, below). Several small streams (<3 m) crossed the trail, some with detritus substrate and others with sand. Although the Werehpai cave area is an impressively large rock formation, it is not an inselberg, and no wet rock habitats or seepages were observed.

Habitats of note:

- About 1 km along the trail to the Werehpai caves, there is a c. 100-meter stretch where there were a few dozen water-filled depressions which varied from less than 1 m across to 5 m across, and a depth of very shallow to nearly 1 m. At higher water levels, the flooding of a nearby stream might result in a flooded forest habitat in which these pools are connected. All of these pools were full of detritus and had incredible densities of aquatic beetles.
- Near the Werehpai caves, there was a small (2–3 meter wide), <1-meter deep meandering stream with a sandy substrate. The largely sand substrate distinguished this creek from most other streams we sampled during the expedition. A large number of very interesting species were found in this particular stream, and this may be due to the substrate type.
- Along part of the existing trail near the camp, a number of *Heliconia* plants were in bloom. We examined several of these inflorescences for beetles. We did not observe any *Heliconia* in bloom at the other sites.

Sample and specimen processing

Forty-nine samples were collected during the expedition, each representing a different stream, habitat, or trapping event. Most specimens were collected directly into 95% ethanol. Samples were subsequently mounted, labeled and databased. When long series of a single species were collected

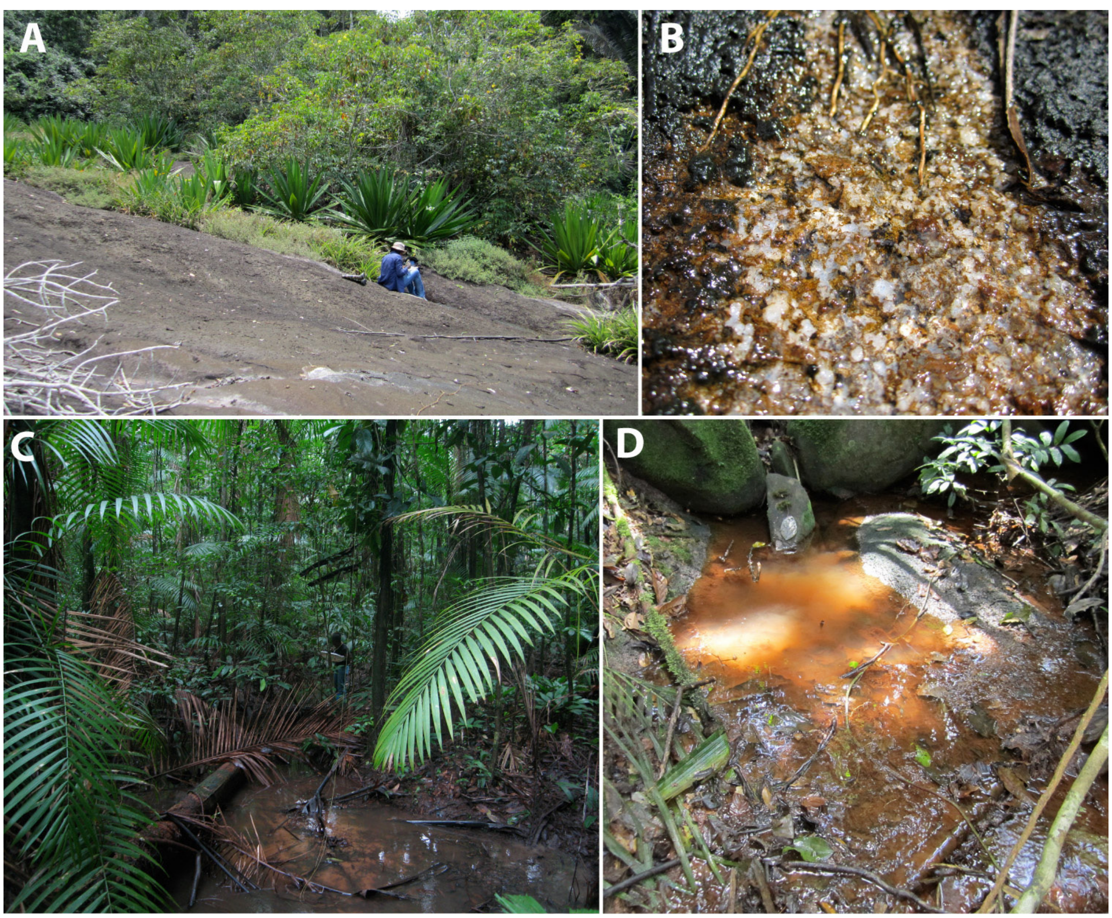

Figure 1. Selected aquatic habitats. A-B) Sipaliwini site, inselberg habitat; C) Kutari site, sandy stream; D) Sipaliwini site, stream at base of inselberg.

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from the same locality, only a portion of the specimens were mounted, and the remainder preserved in 80% ethanol. Total specimen counts given herein only reflect the mounted portion of the samples, so the abundance of the more common species is underreported.

RESULTS AND DISCUSSION

In total, 144 species of aquatic beetles in 62 genera were found, representing an extremely rich community, particularly given the relative homogeneity of the habitat examined (Appendix; Fig. 2). The Kutari and Werehpai sites had relatively high species diversity (91 and 93 species respectively), while the Sipaliwini site had only 68 species. Similarly, the Kutari and Werehpai sites had much higher numbers of site-unique species (32 and 23 respectively), while Sipaliwini had only seven (Table 1).

Of the 144 species recorded, 62 (43%) were found at only one of the three sites, whereas only 27 (18.7%) were found at all three. Based on both the number of shared species and Jaccard's index, the aquatic beetle communities found at the Sipaliwini and Werehpai sites were the most similar, while those found at Sipaliwini and Kutari the most dissimilar (Table 2). At the generic level, all three sites exhibited more comparable levels of diversity, with between 39 and 46 genera found per site.

We have confirmed that at least 16 of the species found are new to science (Appendix). One of these has already been described since the expedition (*Cetiocyon incantatus* Fikáček & Short 2010), and two are described here. We estimate that an additional 10–15 species are likely to be new to science, but additional research is needed to confirm their identities.

Not surprisingly, the fauna is typical of lowland Guiana Shield forest. Some taxa such as the genera *Siolius* Balfour-Browne, 1969*, Guyanobius* Spangler, 1986*, Fontidessus* Miller & Spangler, 2008, and *Globulosis* García, 2001 are either endemic or largely restricted to the Guiana Shield. The fauna was very similar to what is known from southern Venezuela (south of the Orinoco River) and Guyana. The species found on and around the inselberg at the Sipaliwini site are restricted to this habitat type, and all likely have a very restricted range (perhaps endemic to the region and its periphery). Despite the presence of the inselberg at the Sipaliwini site, no species of Myxophaga were found. We suspect the isolation or lack of running water over rock contributed to the absence of this group.

Some taxa that we had initially expected to find were conspicuously absent. Not a single specimen of the common water scavenger beetle genus *Berosus* Leach, 1817 was found, despite having a high diversity in the region (more than 35 species are known from Venezuela, Oliva & Short, unpub. data). Many *Berosus* prefer the open waters of marshes and savannahs, and the absence of the genus during the RAP survey may be due to the vast unbroken forest that characterizes the Kwamalasamutu region. Other species that are often common and widespread in northern South America, such the ubiquitous *Tropisternus collaris* (Fabricius, 1775) and *T. lateralis* (Fabricius, 1775), also share these open-water habitats and were also not found during the survey.

Species of note

Cetiocyon incantatus Fikáček & Short, 2010: One specimen of this new species was collected from dung at Camp 1. Three specimens, also from Suriname, were already known from flight intercept traps, but this new record provided the first ecological information as to its habits. It is the first and currently only record for the genus *Cetiocyon* in the New World (Fikáček & Short, 2010).

Tropisternus phyllisae Spangler & Short, 2008: This species, only described three years ago, was known from a pair of specimens collected in 1962 along "Krakka-Phedra road", in the northern region of the country. A single specimen was collected in detrital pools at the Werehpai camp.

Tropisternus surinamensis Spangler & Short, 2008: This species, previously known from only a single female specimen, was described from the same locality as *T. phyllisae*. Specimens were taken together with *T. phyllisae* in this instance as well.

Hydrophilidae: "New genus 1": This genus, with two undescribed species, is in the tribe Acidocerini, and likely near the genera *Tobochares* or *Agraphydrus* Régimbart, 1903. It was found along the margins of sandy streams at both Sipaliwini and Werehpai camps. We are also aware of

Table 1. Aquatic beetle diversity by site.

	Specimens	Genera	Species	Site-unique species
Site 1/ Kutari	1501	46	91	32
Site 2/ Sipaliwini	1321	39	68	7
Site 3/ Werehpai	1586	43	93	23
Total	**4408**	**62**	**144**	**-**

Table 2. Species similarity between sites.

Sites	Shared Species	Non-Shared Species	Total Species	Jaccard's Index
Kutari-Sipaliwini	38	83	121	45.8%
Kutari-Werehpai	48	89	137	53.9%
Sipaliwini-Werehpai	50	69	119	72.5%

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specimens of this genus from French Guiana (P. Queney, pers. comm.).

Hydrophilidae: "New genus 2": With a single undescribed species, this new genus is in the tribe Acidocerini, and likely near *Chasmogenus*. Like the other new acidocerine genus, it was taken at sandy streams at Sipaliwini and Werehpai camps. It is also known from French Guiana.

DESCRIPTION OF NEW SPECIES

We have chosen to describe two of the new species we discovered here, as the genera to which they belong already have been recently reviewed for the region. Thus, the species can be described and compared with existing species relatively easily. Some of the other lineages in which we have confirmed new species are quite large, and will require significant further study to place them appropriately.

Genus *Oocyclus* Sharp, 1882

The genus *Oocyclus*, with nearly fifty described species, is found in both the Oriental and New World Tropics. Most species prefer hygropetric habitats, such as waterfalls and rock seepages. The first species from the Guiana Shield region were described last year (Short & Garcia, 2010).

Oocyclus trio Short & Kadosoe sp. n.

Type material: Holotype (male): "SURINAME: Sipaliwini District/ 2 10.973'N, 56 47.235'W, 210 m/ Camp 2, on Sipaliwini River/ leg. Short & Kadosoe; Inselberg/ 29–30. viii.2010; SR10-0829-01A/ 2010 CI-RAP Survey" (Deposited in the National Zoological Collection of Suriname).

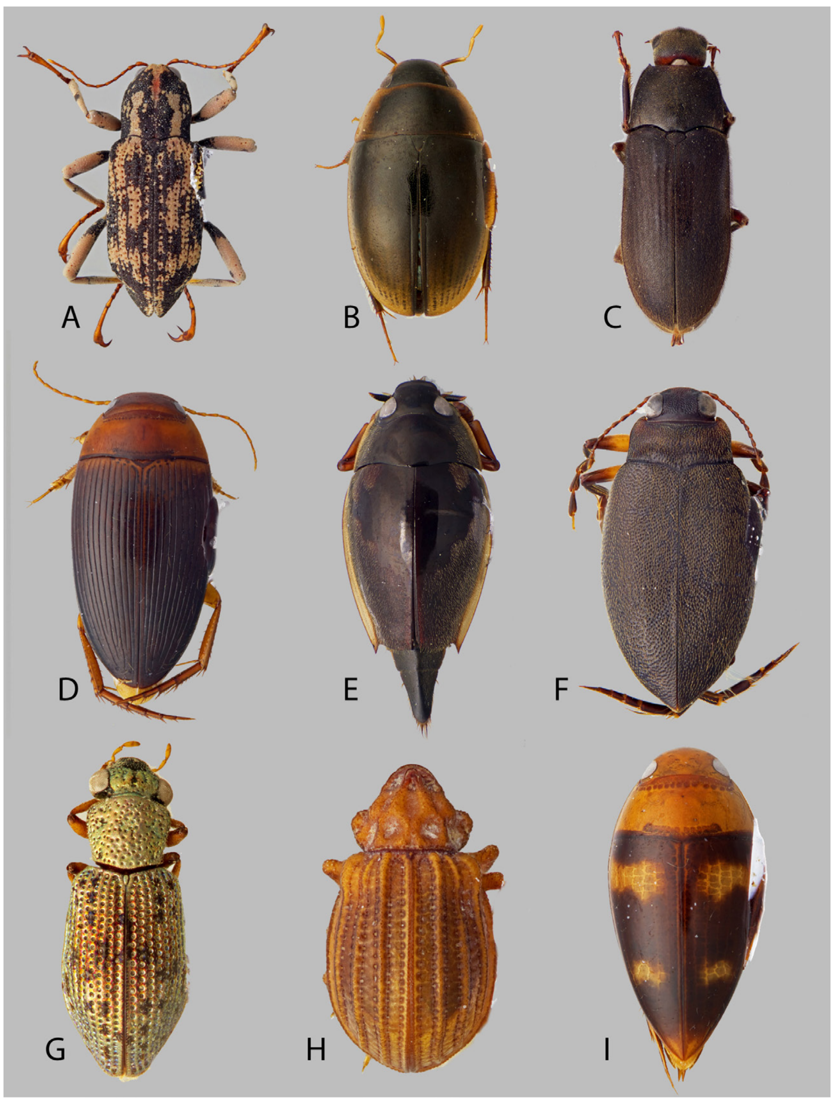

Figure 2. Selected habitus images of aquatic beetle taxa collected in the Kwamalasamutu region. A) *Stegoelmis stictoides*, B) *Enochrus* sp. 2, C) *Pelonomus* sp. 1, D) *Copelatus geayi*, E) *Gyretes* sp. 1, F) *Vatellus tarsatus*, G) *Hydrochus* sp. 5, H) *Epimetopus* sp. 1, I) *Siolius* cf. *bicolor* (Images not to the same scale).

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Paratypes (20): SURINAME: Sipaliwini District: Same data as holotype (13 exs.). Same camp but 1.ix.2010, seep on inselberg, SR10-0901-01A (7 exs.). Paratypes will be divided between the National Zoological Collection in Suriname, the University of Kansas, and the US National Museum of Natural History.

Diagnosis. The combination of the small body size, rounded posterolateral corners of the pronotum, lack of dense rows of setae on the elytra, a conspicuous circular white spot on the posterior third of each elytron, and dark brown abdominal ventrites with long setae will distinguish this species from other New World *Oocyclus*. When using the key of the Venezuelan species (Short & Garcia, 2010), one will arrive at couplet two, and then face choices that all clearly do not fit *O. trio*, as it has a different and distinctive suite of key characters that any of the other known species.

Description. *Size and form.* Body length = 3.7–4.0 mm. Body broadly oval, slightly convex (Fig. 3A). *Color.* Dorsum of head, pronotum, and elytra black, with a faint, irregular green sheen. Pronotal margins broadly pale along entire length except for posterolateral angles. Elytra with faint, indistinct green or bronze maculae; without a row of conspicuous rounded black [=without sheen] spots along suture. Each elytron with a small circular pale spot posteriorly. Maxillary and labial palps yellow; ventral face of head dark brown with stipes distinctly paler reddish brown. Lateral margins of prosternum and epipleura reddish brown, legs light brown to nearly yellow except for the dark brown coxae and basal margin of the femora. Abdominal ventrites dark brown. *Head.* Ground punctation on clypeus and frons moderately fine, distance between punctures 1.0–1.5× the width of one puncture. Systematic punctures on labrum consisting of some scattered indistinct punctures, the lateral ones bearing short setae. Clypeus with a few very indistinct systematic punctures along anterolateral margins, slightly larger than surrounding punctuation. Frons with irregular row of systematic punctures mesad of each eye. Maxillary palps subequal to the width of labrum; palpomere 3 slight shorter than palpomere 2 in length, apical palpomere longer than penultimate. Labial palps about three-quarter as long as width of mentum. Mentum nearly smooth, with scattered moderately fine punctures; subquadrate, anterior margin slightly convex and depressed. *Thorax.* Ground punctation on pronotum and elytra evenly distributed and moderately coarse. Pronotal and elytral surface flat and even, without elevations or grooves. Pronotal systematic punctures with short fine setae, similar in size to ground punctures, mostly blending with larger ground punctures; anterior and posterior series each forming an irregular field. Posterolateral corners of pronotum rounded. Sutural punctation on elytra absent or unmodified from ground punctuation; sutural interval not raised. Rows of systematic punctures on elytra present and moderately distinct, forming loose, rows of slightly larger punctures which may bear fine, short setae. Margins of elytra set with a few sparse setae, but not a dense fringe. Prosternum with a clearly defined median carina; slightly elevated anteromedially, the elevation set with 2 thickened spine-like setae. Elevated process of mesoventrite narrow and elongate, more than three times as long as wide, with 5 coarse spine-like setae. Metaventrite with narrow oval glabrous area posteromedially, ca. twice as long as wide, length of glabrous area ca. half the length of metaventrite. Procoxae with fine short pubescence and set with coarse, short spine-like setae. *Abdomen.* Ventrites with rather dense setae of varying lengths; each ventrite with scattered very long erect setae, distinctly longer than the longest setae on the metaventrite. Aedeagus as in Fig. 3B.

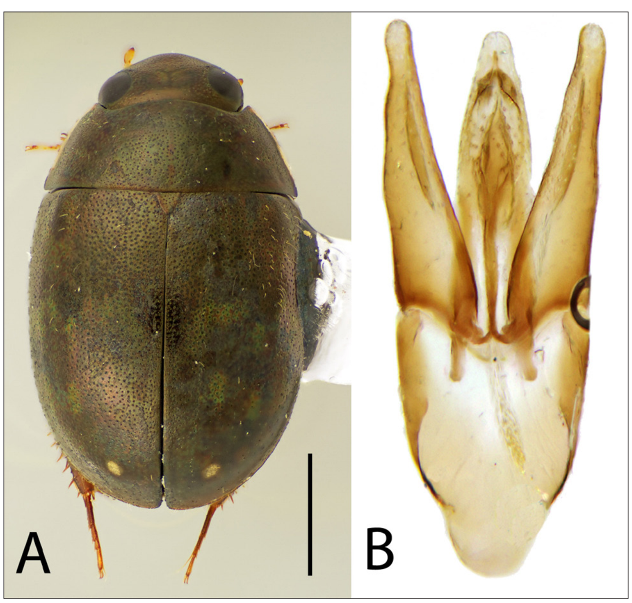

Figure 3. *Oocyclus trio* Short & Kadosoe sp. n. A) Dorsal habitus, scale bar = 1.0 mm, B) Aedeagus.

Habitat. All specimens were collected on and near a small inselberg. Specimens were found by disturbing the sand and detrital margins of a small stream that originated at the base of the inselberg, as well as on a small area of wet, algae covered rock on the inselberg itself.

Etymology. Named after the Trio people, the indigenous ethnic group of the region, who generously allowed us to conduct fieldwork and assisted with this survey on their land.

Genus *Tobochares* Short & Garcia, 2007

The genus *Tobochares* was described to accommodate a single species, *T. sulcatus* Short & Garcia, 2007, found along the northwestern edge of the Guiana Shield in the Venezuelan state of Amazonas. The species described here fits the generic diagnosis of *Tobochares* extremely well, and no modifications to the generic description are necessary with the inclusion of *T. sipaliwini*. *Tobochares sulcatus* generally occurs along the margins of streams and small rivers with granite bedrock with detritus. While the collecting events for the new species here described did not occur in streams flowing over granite, they were found in close proximity to an inselberg.

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***Tobochares sipaliwini* Short & Kadosoe sp. n.**
Type material: Holotype (male): "SURINAME: Sipaliwini District/ 2 10.973'N, 56 47.235'W, 210 m/ Camp 2, on Sipaliwini River/ leg. Short & Kadosoe; Inselberg/ 29–30. viii.2010; SR10-0829-01A/ 2010 CI-RAP Survey" (Deposited in the National Zoological Collection of Suriname). **Paratypes (4): SURINAME: Sipaliwini District:** Same data as holotype (3 exs.). Same camp but 31.viii.2010, sandy forest creek, SR10-0831-01B (1 ex.). Paratypes will be divided between the National Zoological Collection in Suriname, the University of Kansas, and the US National Museum of Natural History.

Diagnosis. Elytra sulcate on basal half only on disc (elytral sulcate on entire length in *T. sulcatus*, with medial series reaching the elytral base). Maxillary palps uniformly pale (apex darkened in *T. sulcatus*). Process of the mesoventrite distinctly elevated into a sharp tooth (process not elevated or acute in *T. sulcatus*). Outer margins of parameres straight (sinuate in *T. sulcatus*).

Description. *Size and form*. Body length = 1.8–2.0 mm. Body elongate oval (Fig. 4A), moderately dorsoventrally compressed. *Color and punctation*. Dorsum of head, pronotum and elytra very dark brown with the lateral margins of pronotum and elytra slightly paler. Anterolateral margins of clypeus with very faint paler preocular patches. Meso- and metathoracic ventrites and visible abdominal sterna dark brown, with prosternum, epipleura, and legs distinctly paler. Ground punctation on head, pronotum and elytra moderately fine. *Head*. Antennae with scape and pedicel subequal in length, and their combined length subequal to antennomeres 3–8. Maxillary palps with palpomeres 2 and 4 subequal in length with palpomere 3 slightly shorter. *Thorax*. Elytra with ten rows of serial punctures which are depressed into grooves in posterior half on the mesal region, to posterior four-fifths on the lateral region. Elevation of mesoventrite forming a lateral carina which is raised into an acute tooth elevated to the same plane as the ventral surface of mesocoxae. Metaventrite with distinct median ovoid glabrous area that is nearly two-thirds as long as the metaventrite length. *Abdomen*. Abdominal ventrites uniformly and very densely pubescent. Apex of fifth ventrite evenly rounded. Aedeagus with basal piece short, ca. one-third as long as parameres. Parameres with inner and outer margins straight in apical half. Dorsal strut slightly extended past the apex of parameres, with gonopore of median lobe situated distinctly below apex of the dorsal strut.

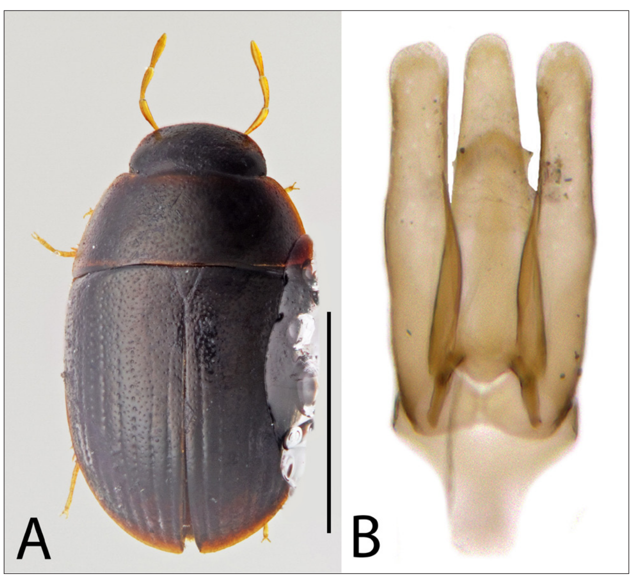

Figure 4. *Tobochares sipaliwini* Short & Kadosoe sp. n. A) Dorsal habitus, scale bar = 1.0 mm, B) Aedeagus.

Habitat. All specimens were collected in small creeks (<2 m wide) with a predominately sand/gravel substrate and with substantial amounts of detritus. The larger series was taken at a stream that originates at the base of a small inselberg.

Etymology. Named after the Sipaliwini River and region, near and in which this new species was found.

CONSERVATION ISSUES AND RECOMMENDATION

The relatively rich water beetle diversity was expected given the diverse complement of aquatic habitats available at each camp. The relatively high number of genera and species, which cover a variety of ecological and habitat types, suggest the area is largely undisturbed. Differences between the communities found at each camp seem likely due to either the presence of rare species ('singletons') or habitats found at some but not all camps. For example, only a few specimens of *Vatellus tarsatus* (LaPorte, 1835) were found at Site 2 in detrital pools, but as this species is very rare and probably patchy in its distribution, our failure to detect it at Sites 1 and 3 does not reflect poorly on those sites. Similarly, the genera *Oocyclus, Fontidessus*, and *Platynectes* Régimbart, 1878 were only collected at Site 2, but these taxa are usually restricted to rock outcrops. Since no outcrops were present in the vicinities of Sites 1 and 3, these species were not found. No substantive differences in the water beetle communities between the sites could be attributed to anthropogenic disturbances. Indeed, the lack of several common groups that typically prefer open habitats (e.g. *Berosus*, *Tropisternus collaris*, *T. lateralis*) — all of which are widespread in South America and known from Suriname — supports the observation of an intact forest landscape.

It is clear that a tremendous amount of basic survey and taxonomy work is needed to gain a complete picture of the aquatic beetle fauna of southern Suriname, as well as the Guiana Shield in general. Additional work in the region should take into account potential variations in seasonality and habitat composition, as the abundance and nature of flooded forest and stream margin habitats changes dramatically over the course of a year. Additional surveys in moderately disturbed or open-canopy sites would clarify whether the lack of certain taxa is due to habitat alteration or other artifacts in their native distributions.

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Appendix. List of aquatic beetles collected on the Kwamalasamutu RAP survey. * = confirmed new species.

Taxon	Total # specimens	Kutari	Sipaliwini	Werehpai
DYTISCIDAE				
Anodocheilus sp. 1	24	X	X	X
Bidessodes sp. 1	15	X		
Bidessodes sp. 2	4	X		
Bidessodes sp. X	115	X	X	
Bidessonotus sp. 1	23		X	X
Celina sp. 1	5	X	X	
Copelatus geayi Régimbart, 1904	43	X	X	X
Copelatus sp. 2	14	X	X	X
Copelatus sp. 3	31	X	X	X
Copelatus sp. 4	16		X	X
Copelatus sp. 5	184	X	X	X
Copelatus sp. 6	125	X	X	X
Copelatus sp. 7	7	X	X	X
Copelatus sp. 8	2		X	X
Copelatus sp. 9	123	X	X	X
Copelatus sp. 10	1	X		
Derovatellus sp. 1	3	X	X	
Desmopachria sp. 1	16	X		
Desmopachria sp. 2	6	X	X	X
Desmopachria sp. 3	15	X	X	X
Desmopachria sp. 4	3	X		X
Desmopachria sp. 5	3	X		
Desmopachria sp. 6	7		X	X
Desmopachria sp. X	188	X	X	X
Fontidessus sp. 1*	128		X	
Hemibidessus sp. 1	26		X	X
Hemibidessus sp. 2	39	X	X	
Hydaticus subfasciatus Laporte, 1835	28	X	X	X
Hydaticus sp. 2	2		X	X
Hydrodessus sp. 1	1	X		
Hydrodessus sp. 2	1	X		
Hydrodessus sp. 3	1	X		
Hypodessus sp. 1	55	X		
Hypodessus sp. 2	14	X	X	
Laccodytes apalodes Guignot, 1955	33	X		
Laccodytes sp. 2	2	X		
Laccodytes sp. 3	1	X		
Laccodytes sp. 4	2	X		
Laccodytes sp. 5	2	X		X
Laccophilus sp. 1	8		X	X
Laccophilus sp. 2	28		X	X
Laccophilus sp. 3	11	X		X

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Taxon	Total # specimens	Kutari	Sipaliwini	Werehpai
Laccophilus sp. 4	1	X		
Laccophilus sp. 5	4	X		X
Laccophilus sp. 6	72	X	X	X
Laccophilus sp. 7	18		X	X
Laccophilus sp. 8	101	X	X	X
Laccophilus sp. 9	97	X	X	X
Pachydrus sp. 1	7		X	X
Platynectes sp. 1	50		X	
Thermonectus sp. 1	7			X
Thermonectus sp. 2	7		X	X
Thermonectus sp. 3	43			X
Thermonectus sp. 4	7			X
Uvarus sp. 1	20	X		
Vatellus tarsatus (LaPorte, 1835)	13			X
Vatellus sp. 2	2	X	X	
DRYOPIDAE				
Dryops sp. 1	29			X
Pelonomus sp. 1	20	X	X	
ELMIDAE				
Cyllepus sp. 1	1			X
Hexacylloepus sp. 1	4	X		X
Hintonelmis sp. 1	2		X	
Hintonelmis sp. 2	3	X		X
Neoelmis sp. 1	57	X	X	X
Neoelmis sp. 2	2	X		
Neoelmis sp. 3	17	X		X
Pagelmis sp. 1	1	X		
Pagelmis sp. 2	4		X	X
Pagelmis sp. 3	1			X
Pilielmis sp. 1	2	X		
Stegoelmis stictoides Spangler, 1990	21	X	X	X
Stenhelmoides sp. 1	65	X	X	
New Genus 1, sp. 1*	1	X		
New Genus 1, sp. 2*	32	X		
EPIMETOPIDAE				
Epimetopus sp. 1	5			X
Epimetopus sp. 2	2			X
GYRINIDAE				
Gyretes sp. 1	27	X		X
Gyretes sp. 2	31	X		X
Gyretes sp. 3	82	X		X
Gyretes sp. 4	11	X	X	
Gyretes sp. 5	2	X		

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Taxon	Total # specimens	Kutari	Sipaliwini	Werehpai
HYDRAENIDAE				
Hydraena paeminosa Perkins, 1980	13		X	X
Hydraena sp. 1*	1			X
Hydraena sp. 2*	1			X
HYDROCHIDAE				
Hydrochus sp. 1	2	X		
Hydrochus sp. 2	6			X
Hydrochus sp. 3	3		X	X
Hydrochus sp. 4	1		X	
Hydrochus sp. 5	2	X		
HYDROPHILIDAE				
Anacaena cf. *suturalis*	152	X	X	X
Australocyon sp. 1	6			X
Cercyon sp. 1	9	X		X
Cercyon sp. 2	17	X		X
Cetiocyon incantatus Fikacek & Short, 2010*	1	X		
Chaetarthria sp. 1	1			X
Chasmogenus sp. X*	248	X	X	X
Derallus intermedius Oliva, 1995	22	X	X	X
Derallus sp. 1	46	X		X
Derallus sp. 2	53	X		X
Derallus sp. 3	25		X	
Derallus sp. 4	2			X
Enochrus sp. 1*	189	X	X	X
Enochrus sp. 2	52		X	
Enochrus sp. 3	92		X	X
Enochrus sp. 4	3		X	X
Enochrus sp. 5	15		X	X
Enochrus sp. 6	123	X	X	X
Globulosis sp. 1	11	X		X
Guyanobius sp. 1	3	X		
Helochares sp. 1*	30	X	X	X
Helochares sp. 2	30	X	X	X
Helochares sp. 3	10	X		X
Helochares sp. 4*	10			X
Helochares sp. 5	1	X		
Hydrobiomorpha sp. 1	2			X
Hydrobiomorpha sp. 2	1	X		
Hydrophilus smaragdinus Brullé, 1837	5			X
Moraphilus sp. 1	7	X	X	
Notionotus shorti Queney, 2010	41		X	X
Oosternum sp. 1	1	X		
Oosternum sp. X	16	X	X	

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Taxon	Total # specimens	Kutari	Sipaliwini	Werehpai
Oocyclus trio Short & Kadosoe, sp.n.*	22		X	
Pelosoma sp. 1	14			X
Pelosoma sp. 2	6	X		
Pelosoma sp. 3	1			X
Pemelus sp.*	1	X		
Phaenonotum sp. 1	16		X	X
Phaenonotum sp. 2	3	X		
Phaenostoma sp. 1	4	X		X
Phaenostoma sp. 2	14			X
Phaenostoma sp. 3	38	X		X
Phaenostoma sp. 4	12	X		
Tobochares sipaliwini Short & Kadosoe, sp.n.*	6		X	
Tropisternus chalybeus	89	X	X	X
Tropisternus phyllisae Spangler & Short, 2008	1			X
Tropisternus setiger	13		X	X
Tropisternus surinamensis Spangler & Short, 2008	23		X	X
New Genus 1, sp. 1*	50	X		X
New Genus 1, sp. 2*	29	X		X
New Genus 2, sp. 1*	4			X
NOTERIDAE				
Notomicrus sp 1.	121		X	X
Notomicrus sp. X	239	X	X	X
Siolius cf. *bicolor*	56	X		X
Suphisellus sp. 1	168	X	X	X
TOTAL:	**4409**	**91**	**68**	**93**
Site-Unique Species:		**32**	**7**	**23**

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