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Author(s): R. Antonio Gómez and Kelly B. Miller

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Prionohydrus, a New Genus of Noterini Thomson (Coleoptera: Noteridae) From South America With Three New Species and Its Phylogenetic Considerations

R. ANTONIO GÓMEZ^{1,2} AND KELLY B. MILLER²

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ABSTRACT A new genus of Noterini, *Prionohydrus* Gómez and Miller gen. n., and three new species are described from South America: *Prionohydrus matogrossensis* Gómez and Miller sp. n. from Brazil and *Prionohydrus marc* Gómez and Miller sp. n. and *Prionohydrus ubercornis* Gómez and Miller sp. n. from Venezuela. The new genus was scored for characters presented in a recent phylogenetic analysis of the family, and key morphological characters are illustrated, including male and female genitalia. A parsimony analysis of these data resulted in a single, most parsimonious solution, with members of the new genus resolved as sister to *Mesonoterus* Sharp with moderate support. *Prionohydrus* is similar to *Mesonoterus* and can be distinguished from this and other Noterini based on a combination of the following: 1) distal attachment of protarsus to protibia; 2) posterior protibial spine present; 3) single, weakly curved, apical protibial spur present; 4) last abdominal tergum with large medial spine flanked by numerous setae; 5) posterior mesotibial spur strongly serrate; 6) anterior metatibial spur strongly serrate; 7) prosternal process narrow, rounded apically, and widest near the middle; 8) prosternum longitudinally broad and glabrous; 9) weak, angular setae along posterodistal margin of metafemur present; 10) pronotal bead moderately broad; 11) cluster of setae at apex of medial metacoxal lobe present; and 12) antenna of males expanded, from slightly incrassate to strongly incrassate.

RESUMEN Un nuevo género de Noterini, *Prionohydrus* Gómez and Miller gen. n., y tres nuevas especies se describen de Sur America: *Prionohydrus matogrossensis* Gómez and Miller sp. n. de Brasil y *Prionohydrus marc* Gómez and Miller sp. n. y *Prionohydrus ubercornis* Gómez y Miller sp. n. de Venezuela. El nuevo género fue marcado para los caracteres brindados en un análisis filogenético reciente de la familia, y caracteres morfológicos claves son ilustrados, incluyendo la genitalia del macho y de la hembra. Un análisis de parsimonia de estos datos resultó en una sola, solución más parsimoniosa, con miembros del nuevo género resueltos como hermanos de *Mesonoterus* Sharp con soporte moderado. *Prionohydrus* es similar a *Mesonoterus* y puede ser distinguido de este y otros Noterini basado en una combinación de los siguientes: 1) atadura distal del protarso a la protibia; 2) espina posterior protibial presente; 3) un solo, espolón apical protibial presente, débilmente curvado; 4) último tergo abdominal con una espina medial grande flanqueada por numerosas setas; 5) espolón posterior mesotibial fuertemente serrado; 6) espolón anterior metatibial fuertemente serrado; 7) proceso prosternal estrecho, apicalmente redondeado, más ancho cerca del medio; 8) prosterno longitudinalmente ancho y glabro; 9) setas débiles, angulares presentes a lo largo de la margen posterodistal del metafémur; 10) tira pronotal moderadamente amplia; 11) grupo de setas presente en el ápice del lóbulo medial metacoxal; y 12) antena de los machos dilatada, de débilmente encrasada a fuertemente encrasada.

KEY WORDS Neotropical, burrowing water beetle, morphology, taxonomy

Noteridae Thomson is a small family of aquatic Aedeophagan beetles with 14 genera and ≈250 species (Nilsson and Van Vondel 2005) that occur worldwide, with the greatest biodiversity occurring in the tropics.

Many South American noterids, in particular, are poorly known and rather speciose (Nilsson 2005) despite being quite common in many aquatic habitats and frequently collected in large numbers. However, only a few of the genera occurring in the Neotropics have been revised since first being described: *Notomicrus* Sharp by Young (1978), *Suphisellus* Crotch north of Colombia by Young (1979), and *Suphis* Aubé by Grosso (1994). In addition, Young (1985) presented a key to the species of American *Hydrocanthus*

¹ Corresponding author: R. Antonio Gómez, Graduate Interdisciplinary Program in Entomology and Insect Science, 1040 E. 4th St., PO Box 210077, Tucson, AZ 85721-0077 (e-mail: ragomez@email.arizona.edu).

² Department of Biology, Museum of Southwestern Biology, University of New Mexico, MSC03 2020, Albuquerque, NM 87131-0001.

Table 1. Character states per taxon as coded for in the matrix and phylogenetically analyzed

	000000001 1234567890	111111112 1234567890	222222223 1234567890	3333 1234
<i>Amphizoa lecontei</i>	10000-0000	0000000110	0000000000	0001
<i>Hygrobia hermanni</i>	00000-0000	0000000110	0000000000	0001
<i>Matus bicarinatus</i>	0000000000	0000000110	0000000100	0001
<i>Agabus seriatus</i>	0000000000	0000000110	0000000100	0001
<i>Laccornis oblongus</i>	0000000000	0000000110	0000000100	0001
<i>Notomicrus</i> sp.	0100000000	1101000110	0001000000	0001
<i>Speonoterus bedosae</i>	0100000000	1??1000110	000100000?	????
<i>Tonerus wheeleri</i>	1110010100	1111100110	0100000000	0001
<i>Neohydrocoptus bivittis</i>	1100010000	1111100110	0100000011	1100
<i>Neohydrocoptus subvittulus</i>	1100010000	1111100110	0100000011	1100
<i>Neohydrocoptus</i> sp. (Zambia)	1100010000	1111100110	0100000011	1100
<i>Pronoterus</i> sp.	1110010010	1111100110	1110101020	1010
<i>Mesonoterus crassicornis</i>	1110010000	1111101001	1100001030	1110
<i>Mesonoterus grandicornis</i>	1110010000	1111101001	1100001030	1110
<i>Prionohydus matogrossensis</i>	1110010000	1111101101	1110101030	1110
<i>Prionohydus marc</i>	1110010000	1111101101	1110101030	1110
<i>Prionohydus ubercornis</i>	1110010000	1111101101	1110101030	1110
<i>Noterus clavicornis</i>	1100010001	1111112101	1100000000	1010
<i>Noterus laevis Sturm</i>	1100010001	1111112101	1100000000	1010
<i>Renotus deyrolle</i>	1110010100	1??1112001	110000100?	????
<i>Canthydrus morsbachi</i>	1110110120	1111112001	1100011000	1010
<i>Canthydrus luctuosus</i>	1110110120	1111112001	1100011000	1010
Noteridae gen. nov.	1110010110	1111112001	1100111020	1010
<i>Suphisellus puncticolis</i>	1111000110	1111112001	1100111020	1010
<i>Suphisellus</i> sp.	1111000110	1111112001	1100111020	1010
<i>Hydrocanthydrus sharpi</i>	1110110101	1111112001	1100111000	1010
<i>Hydrocanthydrus iricolor</i>	1110110101	1111112001	1100111000	1010
<i>Hydrocanthydrus debilis</i>	1110110101	1111112001	1100111000	1010
<i>Hydrocanthydrus</i> sp. (Zambia)	1110110101	1111112001	1100111000	1010
<i>Suphis cimicoides</i>	1110001100	1111012000	1100010020	1110
<i>Suphis fluviatilis</i>	1110001100	1111012000	1100010020	1110
<i>Stolius</i> sp. 1	1110010100	1111112001	1100011000	0011
<i>Stolius</i> sp. 2	1110010100	1111112001	1100011000	0011

Character 17 was treated as additive.

Say. *Mesonoterus* Sharp currently is being revised (Gómez et al., in progress) since last treated by Guignot (1948) who produced a key to the species of the genus, but while pursuing this revision, specimens of a new genus of Noterini Thomson were discovered among *Mesonoterus*- and *Pronoterus* Sharp-determined material with a unique character combination that did not match any current generic definitions in the group. The goals of this investigation are the description of a genus of noterid new to science with three new species and determination of its placement in the current classification of the family based on the analysis recently presented by Miller (2009).

Materials and Methods

Measurements. For the species descriptions, measurements were taken using an ocular scale on a SteREO Discovery.V8 microscope (Carl Zeiss Inc., Thornwood, NY). Measurements of intact specimens were taken, and an attempt was made to measure the smallest and largest available specimens. The measurements include total length (TL), greatest width (GW), greatest length of the pronotum (PL), greatest width of the pronotum (PW), greatest width of the head (HW), distance between the eyes (EW), greatest length of the metafemur (FL), greatest width of the metafemur (FW), and greatest width of the prosternal process (SW). These measurements also are provided as ratios to give some indication of shape.

Illustrations. All illustrations initially were made using a drawing tube or a photograph. These illustrations then were scanned, and line drawings were created digitally based on the initial drawings.

Taxon Sampling. The materials and methods closely follow those of Miller (2009). Exemplar taxa included in the cladistic analysis are shown in Table 1. Specimens examined and coded for the characters provided herein were the same as those examined for analysis by Miller (2009), excluding specimens of *Prionohydus* Gómez and Miller. Specimens of *Prionohydus* were examined from the Florida State Arthropod Collection (FSCA, M.C. Thomas) and the University of Kansas Snow Entomological Collection (SEMC, A.E.Z. Short). Holotypes and several paratypes of two of the three new species are deposited in the Universidad Central de Venezuela, Maracay, Venezuela (MIZA, L. Joly). The holotype and several paratypes of the third new species are deposited in the FSCA. Several paratypes are distributed among the FSCA, the SEMC, and the senior author's research collection housed in the Museum of Southwestern Biology Division of Arthropods (MSBA, K.B.M.). See Miller (2009) for a detailed explanation of the taxa included in the cladistic analysis. Exemplars from Dytiscidae, Amphizoidae, and Paelobiidae were included in the analysis as outgroup taxa, and the cladogram was rooted in between Noteridae and these other dytiscoids as several studies have resolved noterids as sister to a clade containing these dytiscoids (Beutel et al. 2006).

We note here that what Miller (2009) regarded as *Liocanthhydrus* Guignot in his analysis was misidentified as that genus. *Liocanthhydrus* appears instead to be a probable senior synonym of *Siolius* Balfour-Browne based on examination of types of both genera, including the type species (M. Toledo, personal communication). *Liocanthhydrus* sensu Miller (2009) is actually an undescribed genus. No taxonomic action is taken here, and a paper addressing the problem is currently in preparation. References below to "Noteridae gen. nov." refer to this new genus (*Liocanthhydrus* sensu Miller, 2009), and not *Liocanthhydrus* Guignot.

Morphology. Examination of morphological characters, particularly dissection of male and female genitalia closely followed Miller (2001). Female dissections differed slightly in that dissected abdomens were rinsed in deionized water after clearing with hot potassium hydroxide (KOH) for 10 min instead of glacial acetic acid. Female genitalia also were examined in deionized water after staining with Chlorazol Black and ultimately stored in microvials filled with glycerine. Illustrations of female genitalia were made of genitalia placed in deionized water on a depression slide shortly after dissecting. Orientation of the male genitalia follows the fundamental anatomical position as recommended by Miller and Nilsson (2003).

Parsimony Analysis. The character matrix was extracted from Table 1 of (Miller 2009) in WinClada (Nixon 2002) with character states and terminals added to accommodate the new taxa. The data were analyzed using NONA (Goloboff 1995) as implemented by Winclada. The commands "hold 10000," "hold/60," "mult*100," and "max*" were used to find the most parsimonious solutions. Character state optimizations were examined using WinClada, and trees were viewed and summarized in WinClada. Bremer support values (Bremer 1994) were calculated in NONA by using the commands "hold 10000," "suboptimal = 10," and "bsupport = 10." Bootstrap support values were calculated in NONA with 1,000 replications and saving the consensus of each replication, sampling $\approx 10\%$ of the character data.

Characters. Of the 34 adult characters examined in this analysis, 33 are adapted directly from Miller (2009) with illustrations provided herein and referenced when applicable. Character 23 is new to this analysis and was added to account for previously unknown serration in the posterior mesotibial spur of some ingroup taxa. Coded states are provided in Table 1. See Miller (2009) for a detailed explanation of all other characters and their states, including details on the historic use of many of these characters for classification across the group as well as use in previous phylogenetic analyses (Beutel and Roughley 1987, Belkaceme 1991, Beutel et al. 2006). These papers are recommended for additional illustrations of these characters as well as further explanation of homology assessments made. All characters were coded as nonadditive, except character 17, which was treated as additive.

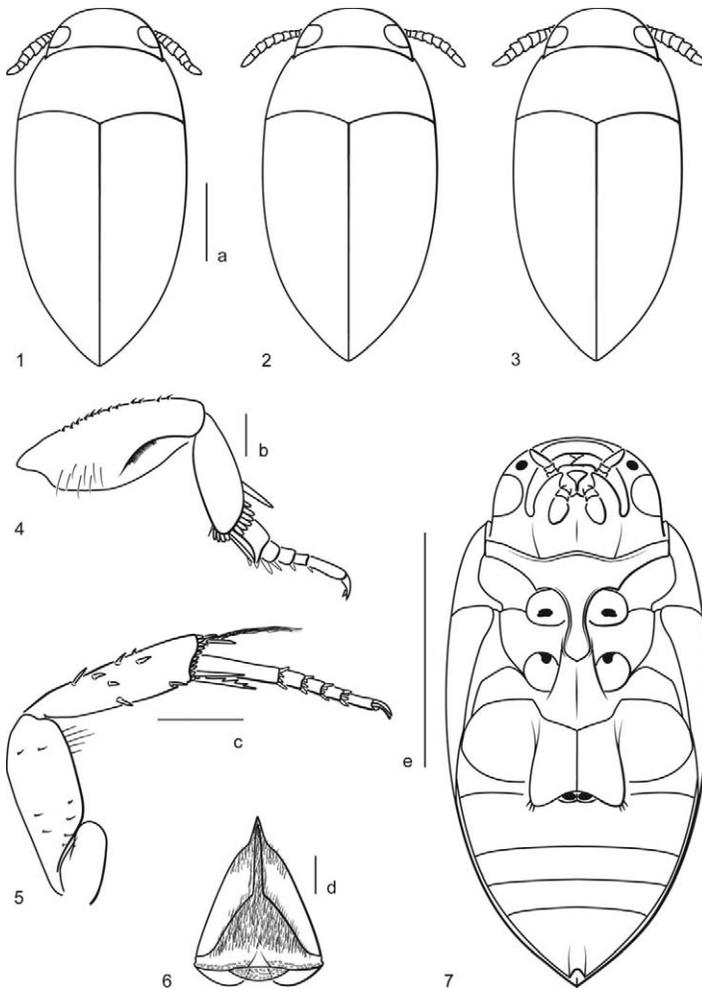
Head. 1. *Midgular apodeme* (char. 2, Beutel and Roughley 1987): (0) absent, (1) present (Fig. 7). 2. *Scapae* (char. 1, Beutel and Roughley 1987): (0) simple,

(1) pseudosegmented (Fig. 8A). 3. *Sensorial field at apex of labial palp* (char. 20 Belkaceme 1991; char. 18 Beutel et al. 2006): (0) rounded, (1) elongate and narrow.

Prothorax. 4. *Crease at posterolateral angles of pronotum*: (0) absent, (1) present. 5. *Lateral pronotal margins*: (0) not serrate, (1) serrate. 6. *Pronotum lateral bead*: (0) narrow, (1) broad. 7. *Prosternum*: (0) longitudinally broad (Fig. 7), (1) longitudinally extremely short, abruptly curved. 8. *Prosternal process*: (0) narrow, apically pointed or rounded, widest near middle (Fig. 7), (1) broad, apically broadly truncate, widest at or very near apex. 9. *Prosternal setae*: (0) absent or inconspicuous (Fig. 7), (1) prominent series of stiff setae medially, (2) extensive field of stiff setae over most of prosternum and prosternal process. 10. *Anteromedial apex of prosternum*: (0) not produced into hook, (1) produced as prominent hook.

Metathorax. 11. *Paramedian angle on anterior metacoxal phragma* (char. 8, Beutel and Roughley 1987): (0) absent, (1) present. 12. *Anterior portion of medial metacoxal phragma* (char. 9, Beutel and Roughley 1987): (0) not extending anteriorly beyond origin of metacoxal furca, (1) extending anteriorly beyond origin of furca. 13. *Metafurca fusion with metacoxa*: (0) not fused, (1) fused laterally with metacoxa forming complete ring. 14. *Noterid platform*: (0) absent, (1) present (Fig. 7). 15. *Extension of noterid platform onto metaventricle*: (0) not extended onto metaventricle, (1) extended onto metaventricle (Fig. 7).

Legs. 16. *Attachment of protarsus to protibia*: (0) apically (Fig. 4), (1) laterally. 17. *Apical protibial spurs*: (0) Multiple elongate spines, (1) a single, moderately large curved spine (Fig. 4), (2), a single, extremely robust, curved spine. 18. *Posterior protibial spur* (char. 28, Belkaceme 1991; char. 33, Beutel et al. 2006): (0) absent, (1) present (Fig. 4). 19. *Protibia dorso-apical angle* (char. 35, Beutel et al. 2006): (0) not distinct, rounded (Fig. 4), (1) distinct, angulate. 20. *Fringe of short setae along dorsal and anterior apical margins of protibia*: (0) absent, (1) present (Fig. 4). 21. *First tarsomere on male pro- and mesotarsi* (char. 6, Beutel and Roughley 1987; char. 50, Beutel et al. 2006): (0) not elongate or apically expanded, (1) elongate and apically expanded (incrassate) (Fig. 4). 22. *Short, curved setae along posterior margins of protarsomeres I-III* (char. 16, Belkaceme 1991; char. 37, Beutel et al. 2006): (0) absent, (1) present (Fig. 4). 23. *Posterior mesotibial spur*: (0) not serrate, (1) serrate. This character was not included by Miller (2009). Members of *Prionohydrus* and *Pronoterus* have the posterior mesotibial spur serrate. *Prionohydrus* has this spur strongly serrate and similar in shape to that of its serrate anterior metatibial spur. These taxa were all coded with the same state in the parsimony analysis for this character because despite the differences in shape, the variation does appear to be homologous, which also applies to character 25. *Pronoterus* is unique in that two posterior mesotibial spurs are serrate as well as two anterior metatibial spurs, although more minutely serrate. This was not coded in the analysis as it would be treated as an autapomorphy. This char-



Figs 1-7. *Prionohydrus* species. 1-3) Dorsal habitus showing male antennal shape. 1) *P. matogrossensis*, 2) *P. marc*, 3) *P. ubercornis*. 4) *P. matogrossensis*, left front leg, anterior aspect. 5) *P. matogrossensis*, left hind leg, posterior aspect. 6) *P. marc*, abdominal tergum VIII, dorsal aspect. 7) *P. matogrossensis*, ventral habitus. Scale bar a = 0.5 mm for Figs. 1-3. Scale bar b and e = 0.10 mm for Figs. 4 and 6. Scale bar c = 0.25 mm for Fig. 5. Scale bar e = 1 mm for Fig. 7.

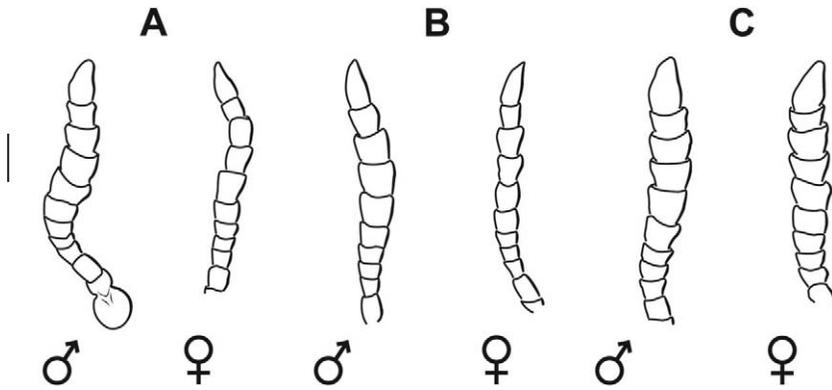
acter was included because it appears that it may not be entirely correlated with a serrate metatibial spur because members of *Suphisellus*, *Hydrocanthus*, and *Noteridae* gen. nov. do not share both character states. 24. *Metacoxal fusion with metaventricle* (char. 7, Beutel and Roughley 1987): (0) not fused with metaventricle laterally (Fig. 7), (1) fused with metaventricle laterally, suture obscured. 25. *Anterior metatibial spur*: (0) not serrate, (1) serrate (Fig. 5). See comments above for character 23. 26. *Series of elongate, closely placed setae at antero-ventral angle of metafemur*: (0) absent, (1) present. 27. *Cluster of setae at apex of medial metacoxal lobe* (char. 69, Beutel et al. 2006): (0) absent, (1) present (Fig. 7). 28. *Metacoxa*: (0) not expanded anteriorly in broad lobe, (1) expanded anteriorly in broad lobe.

Abdomen. 29. *Apex of pygidium*: (0) unmodified, (1) with narrowed, upcurved apex, (2) with deep longitudinal depression and retractable hook, (3) apically narrowed, with medial spine (Fig. 6).

Female Genitalia. 30. *Apex of gonocoxa*: (0) simple, (1) bilobed. 31. *Laterotergites*: (0) not extremely long, (1) extremely long, anterior portion expanded (Fig. 18A). 32. *Lateral margin of gonocoxae*: (0) not dentate, (1) dentate (Fig. 18A). 33. *Gonocoxae*: (0) apically rounded, (1) together elongate, sharply pointed (Fig. 18A). 34. *Laterotergites*: (0) not extending posteriorly beyond bases of gonocoxae (Fig. 18A), (1) extending posteriorly beyond bases of gonocoxae.

Results

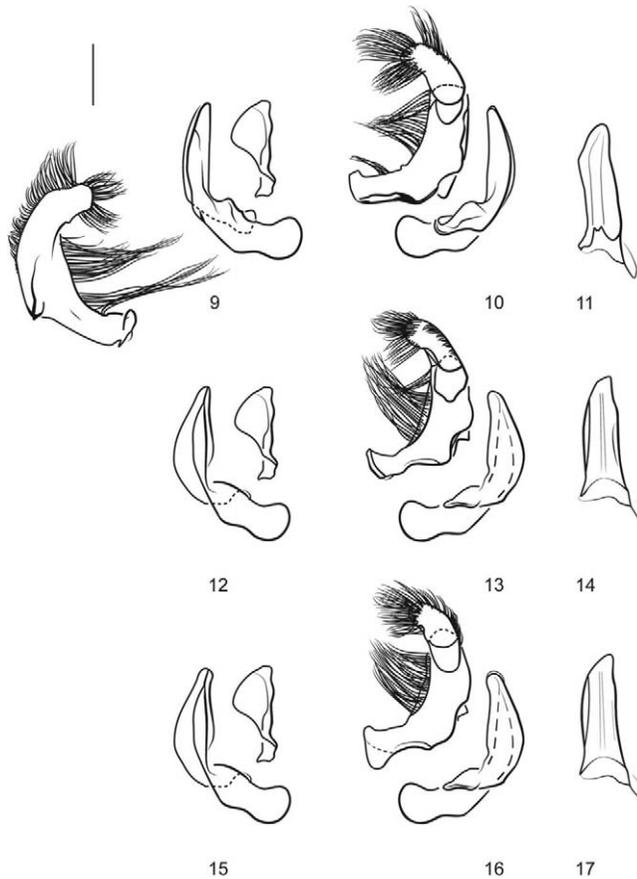
The analysis resulted in one most parsimonious solution (Fig. 20; L, tree length: 60; CI, consistency index: 63; RI, retention index: 91). The inclusion of *Prionohydrus* (see discussion) did not significantly change the topology from that of Miller (2009). *Noteridae* is resolved as monophyletic with high support. The groups *Noterinae*, *Noterini*, *Notomicrinae*, *Neohydrocoptini*, and each genus tested were recovered



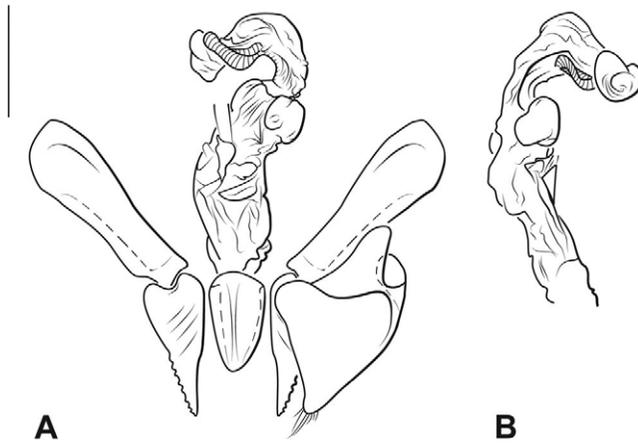
Figs 8. *Prionohydrus* species, male and female left antenna, dorsal aspect. A: *P. matogrossensis*. B: *P. marc.* C: *P. ubercornis*. Scale bar = 0.10 mm.

as monophyletic following the classification of Miller (2009). The new genus, *Prionohydrus*, is resolved as monophyletic as well as its sister group, *Mesonoterus*,

and the clade that contains these two genera is sister to the remaining members of the Noterini (Fig. 20). Support values for this solution are somewhat low.



Figs 9–17. *Prionohydrus* species. 9–11) *P. matogrossensis*, male genitalia; 9) left lateral lobe, median lobe, and right lateral lobe, right lateral aspect; 10) median lobe and left lateral lobe, left lateral aspect; 11) median lobe, ventral aspect; 12–14) *P. marc.*, male genitalia; 12) median lobe and right lateral lobe, right lateral aspect; 13) median lobe and left lateral lobe, left lateral aspect; 14) median lobe, ventral aspect; 15–17) *P. ubercornis*, male genitalia; 15) median lobe and right lateral lobe, right lateral aspect; 16) median lobe and left lateral lobe, left lateral aspect; 17) median lobe, ventral aspect. Scale bar = 0.10 mm.

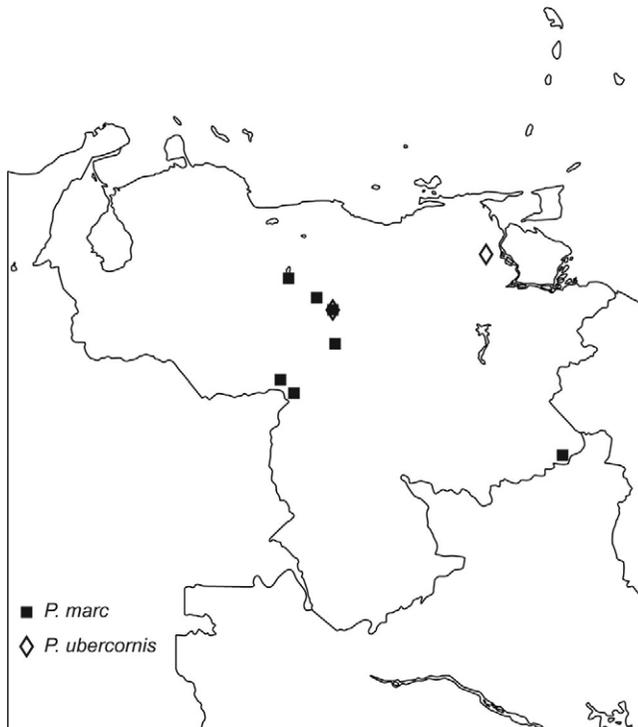


Figs 18. *P. matogrossensis*, female genitalia. A: ventral aspect. B: dorsal aspect of "soft" parts. Scale bar = 0.25 mm.

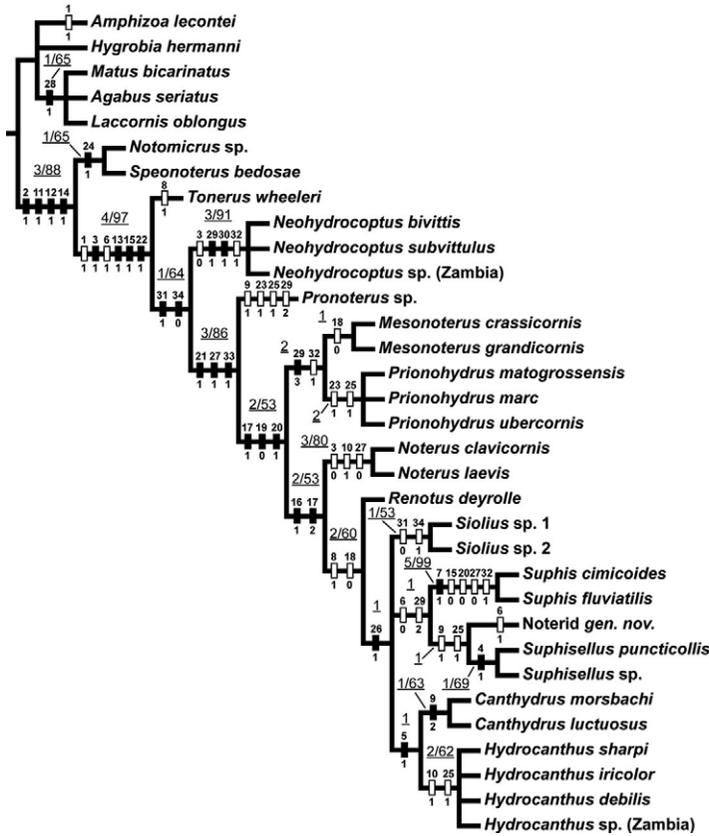
However, the evidence for a close relationship between these two genera is convincing, and they do share a distinctive synapomorphy (see discussion). Support values across the topology, in general, are relatively high for clades containing genera; however, relationships among the deeper nodes are still equivocal, similar to the findings of Miller (2009) and Beutel et al. (2006). The inclusion of *Prionohydus* altered the support values across the tree slightly causing some bootstrap support (bs) values to fall below 50% and vice versa (Fig. 20).

Discussion

The parsimony analysis resolved *Prionohydus* as sister to the largely Neotropical genus *Mesonoterus* (Nilsson 2005) with moderate support (Fig. 20). One possible change to the classification would be the expansion of *Mesonoterus* to encompass the variation observed in *Prionohydus*, but the unique character combination of this taxon strongly supports the erection of a new genus (see Diagnosis and Description). Furthermore, erecting a new genus



Figs 19. Distribution of *Prionohydus* in Venezuela.



Figs 20. Single cladogram resulting from parsimony analysis based on 34 adult morphological characters (L: 60, CI: 63, RI: 91) with characters mapped using “fast” optimization. Underlined numbers are Bremer branch support values and bootstrap values (shown when calculated at >50%). Zero-length branches are shown collapsed.

would call attention to the two clades in addition to maintaining the historical precedent within Noteridae of circumscribing genera based on a unique combination of characters. *Prionohydrus* lacks some of the diagnostic characters of *Mesonoterus* (e.g., the absence of the posterior protibial spur), but more significantly, possesses apomorphies such as the strongly serrate posterior mesotibial spur and strongly serrate anterior metatibial spur. These particular characters are not only absent in *Mesonoterus*, but the strong degree of serration of these spurs is unique to *Prionohydrus* among examined taxa.

Modification of Key to the Subfamilies, Tribes, and Genera of Noteridae of Miller (2009). The key presented in Miller (2009) can easily be modified to include the new taxon described herein. Illustrations presented here as well as those in Miller (2009) should aid in identification of the genus.

Prionohydrus keys to couplet 10 in Miller (2009), fitting *Hydrocanthus* Say better than “*Canthydrus*.” We note that Miller (2009) mistakenly placed *Canthydrus* Sharp as one of the two choices in couplet 10, but this is clearly incorrect as members of *Canthydrus* do not have a serrate anterior metatibial spur, which was noted correctly by Miller (2009) in his list of characters and their

states as well as in other portions of the paper. A simple modification to couplet 9 allows for correct identification of *Canthydrus*, which in turn allows for *Prionohydrus* to replace “*Canthydrus*” in couplet 10. The following three couplets replace couplets 9 and 10:

- 9a. Prosternum medially with extensive field of prominent setae *Canthydrus*
- 9a'. Prosternum medially without extensive field of prominent setae 9b
- 9b. Anterior metatibial spur serrate 10
- 9b'. Anterior metatibial spur not serrate 11
- 10. Anterior metatibial spur minutely but distinctly serrate; posterior protibial spur absent *Hydrocanthus*
- 10'. Anterior metatibial spur strongly serrate with large teeth (Fig. 5); posterior protibial spur present (Fig. 4) *Prionohydrus* Gómez and Miller, gen. n.

***Prionohydrus* Gómez and Miller, New Genus**

Type Species. *Prionohydrus matogrossensis* Gómez and Miller, new species by present designation.

Diagnosis and Description. This genus is resolved as a member of the Noterinae Thomson and of its largest

tribe, the Noterini, based on the following combination of diagnostic characters: 1) the metafurca and the metacoxa are fused laterally in a narrow band, forming a complete ring; 2) the medial portion of the metacoxae, the noterid platform, extends anteriorly onto the metaventrite (Fig. 7); 3) an enlarged, curved, prominent protibial spur is present, but relatively small and not strongly curved ([as in *Mesonoterus*] [Fig. 4]); 4) the dorso-apical angle of the protibia is rounded (Fig. 4); 5) a distinct setal fringe is present along the protibia ([reduced in length in *Priono-hydrus*] [Fig. 4]); 6) the laterotergites are elongate and broadly expanded anteriorly, not extending beyond the base of the gonocoxae posteriorly (Fig. 18); and 7) the gonocoxae are pointed apically and dentate (Fig. 18).

The genus has the following combination of characters in addition to those listed above (see "Diagnosis and Description") that make the genus distinct within Noterini: 1) a distal attachment of the protarsus to the protibia; 2) the protibia with a single posterior spur in addition to the single, weakly curved, apical protibial spur (Fig. 4); 3) a modification of the last abdominal tergum with a large medial spine that is flanked by numerous setae (Fig. 6) and appears to be correlated with an elongate spinous process on the last abdominal sternum (Fig. 7); 4) the anterior metatibial spur is strongly serrate (Fig. 5); 5) the posterior mesotibial spur is also strongly serrate and is similar in appearance to that of the anterior metatibial spur; 6) the shape of the prosternal process is narrow, rounded apically, and widest near the middle (Fig. 7); 7) the prosternum is longitudinally broad and is glabrous (Fig. 7); 8) weak, angular setae along the posterodistal margin of the metafemur are present (Fig. 5); 9) the pronotal bead is moderately broad; 10) a cluster of setae at the apex of the medial metacoxal lobe is present (Fig. 7); and 11) the antenna of the males is expanded, ranging from slightly incrassate to strongly incrassate (Fig. 8A-C).

Priono-hydrus, like *Mesonoterus*, retains several pleiomorphies within the larger Noterini but possesses the following apomorphies, the first two of which *Mesonoterus* lacks: 1) the posterior mesotibial spur is serrate; 2) the anterior metatibial spur is serrate; 3) the pygidium is modified, with a medial spine and a fringe of setae (a synapomorphy of *Mesonoterus* discovered by Miller (2009), which it shares with *Priono-hydrus*); and 4) the gonocoxae are dentate (an apomorphy that *Mesonoterus* also has as well as other genera in the family, presumably for aid in endophytic oviposition).

Priono-hydrus is most similar to the genera *Pronoterus* and *Mesonoterus*, and some species in *Suphisellus*, in particular, appear phenetically similar when viewed dorsally. From *Pronoterus*, *Priono-hydrus* differs in 1) the lack of a distinct dorso-apical protibial angle; 2) the protibia is without numerous spines; 3) the presence of a setal fringe along the protibia; 4) the last abdominal tergum is not modified into a large, robust, and retractable claw; 5) the meso and metatibial spurs are strongly serrate, not minutely serrate; 6) the gono-

coxae are dentate; and 7) the prosternum is glabrous, without a prominent series of stiff setae medially.

Priono-hydrus can be distinguished from *Mesonoterus* by the following characters: 1) the protibia bears a single posterior protibial spur, which *Mesonoterus* lacks; 2) the prosternum is glabrous, whereas *Mesonoterus* has small setae over much of this surface; 3) the posterior meso and metatibial spurs are serrate; 4) the microsculpture of the gula is characterized with weakly transverse sculpticells, whereas this region in *Mesonoterus* is characterized by strongly transverse sculpticells; 5) the male left lateral lobe is less expanded apically and lacks a subapical constriction (Figs. 9 and 10, 13, 16); 6) the male median lobe generally is rounded apically (Figs. 9-17), not subtruncate (see Guignot (1948) for illustrations of male genital morphology); 7) the ventral sclerite of the female genitalia is distinctly enlarged and robust in *Priono-hydrus* (Fig. 18A, B); and 8) the pygidium of *Priono-hydrus* is more pointed and triangulate apically (Fig. 6), whereas the pygidium of *Mesonoterus* is narrowly rounded apically. Otherwise, *Mesonoterus* is similar in most characters and is very similar in overall size and shape. Most *Mesonoterus*, however, have stronger punctation, except *M. grandicornis* Régimbart, which is very similar to *Priono-hydrus* species in being nearly impunctate.

Etymology. This genus is named *Priono-hydrus* from the Greek word prionotos, meaning "jagged" or "toothed," referring to the strongly serrate posterior mesotibial and anterior metatibial spurs, and hydrus, which is a common root for genus names in Hydradephaga.

Distribution and Habitat. This Neotropical genus is known from several localities in Venezuela and one site in Brazil. Also, the two known species from Venezuela are sympatric in San Nicolasito, one of two known collection sites for one of these species, *Priono-hydrus ubercomis* Gómez and Miller (Fig. 19). Specimens have been collected in small bodies of standing water as well as llanos streams, or morichales. Morichal refers to the Moriche palm, *Mauritia flexuosa* L., which grows along the margins of canals and rivers in the llanos region in central Venezuela and serves as the root for the name given to this habitat.

Key to the Species of *Priono-hydrus* Gómez and Miller, New Genus

1. Ventral surfaces dark red-brown; male (Fig. 1) and female antennal shapes as in Fig. 8A; left and right sides of median lobe subequal in height (Figs. 9 and 10); distribution Brazil. . . . *matogrossensis* Gómez and Miller, sp. n.
- 1'. Ventral surfaces light yellow-brown; male and female antennal shapes as in Figs. 2 and 3, 8B, C; left and right sides of median lobe unequal in height; left side taller than right (Figs. 12 and 13, 15, 16); distribution Venezuela. . . . 2
2. Male and female antennae strongly expanded; male and female antennae similar in shape (Fig. 8C); eyes smaller (HW/EW < 1.7), (Fig. 3);

apex of median lobe slightly expanded and rounded in lateral aspect (Figs. 15 and 16); apex of left lateral lobe less elongate and slightly broader (Fig. 16)

- *P. ubercornis* Gómez and Miller, sp. n.
- 2'. Male antennae only slightly expanded; female antennae conspicuously less expanded than male antennae (Fig. 8B); eyes larger (HW/EW >1.7), (Fig. 2); apex of median lobe less rounded, more pointed in lateral aspect (Figs. 12 and 13); apex of left lateral lobe more elongate and slightly narrower (Fig. 13)
- . . . *Prionohydrus marc* Gómez and Miller, sp. n.

***Prionohydrus matogrossensis* Gómez and Miller, new species**

(Figs. 1 and 4; 5; 7; 8A; 9–11; 18A, B)

Type Locality. Brazil, Mato Grosso, Jacaré Parque Nacional Xingu.

Diagnosis. The antennae of males are strongly expanded (incrassate), and the antennae of females are slightly expanded (Fig. 8A). The male genitalia are distinctive with the left and right sides of the median lobe approximately equal in height when viewed laterally (Figs. 9 and 10), and the apex of the median lobe is somewhat narrowly rounded in ventral aspect (Fig. 11).

Description. Measurements (in mm). TL = 2.10–2.32, GW = 1.12–1.17, PL = 0.50–0.52, PW = 1.05–1.07, HW = 0.73–0.75, EW = 0.45–0.46, FW = 0.17–0.19, FL = 0.47–0.49, SW = 0.10–0.11, TL/GW = 1.87–1.98, PL/PW = 0.47–0.48, HW/EW = 1.62–1.63, FW/FL = 0.36–0.38, GW/SW = 10.6–11.2.

Habitus. (Fig. 1) Elongate, lanceolate, broadest at anterior third of elytra; lateral outline continuous between pronotum and elytron; anteriorly rounded and posteriorly angulate, strongly attenuated apically.

Coloration. Head and pronotum dull red-brown; elytron dull red-brown, darker in coloration. Ventral surfaces dark red-brown except visible abdominal sterna red-brown, lighter in coloration; antennae and palpi yellow; legs light red-brown.

Structure and Sculpture. Head, pronotum, and elytron dull, densely covered with moderately impressed isodiametric sculpticells. Head with very fine, inconspicuous, irregular punctation lateral to the eyes; eyes medium in size (Fig. 1, HW/EW = 1.62–1.63). Pronotal punctation similar to that of head; pronotal bead narrow posteriorly, evenly expanded anteriorly to broad anterior apex. Elytral punctation similar to that of head and pronotum except for two subtle paramedian rows of fine punctures. Prosternum anteriorly broad, medially broadly convex, covered with fine isodiametric cells except for weakly transverse cells anteromedially; prosternal process flat and somewhat broad, broadly rounded apically (Fig. 7). Metaventricle medially moderately broad, with fine isodiametric cells; medial lobe of metacoxa evenly rounded with a cluster of setae apically, surface similar to metaventricle (Fig. 7). Front leg with profemur short and broad, with protibia short and rounded dorso-

apically, with moderately large apical spur and moderately large posterior spine, with shortened fringe of setae along apical margin (Fig. 4); middle leg dissimilar in size, mesotibia longer, with several moderately large spines, posterior mesotibial spur strongly serrate; hind leg with femur short and broad (FW/FL = 0.36–0.38), with weak angular setae, metatibia long and somewhat broad, with several moderately large spines, smaller in size than mesotibial spines, anterior metatibial spur strongly serrate (Fig. 4).

Male Genitalia. Median lobe with moderately large, rounded, asymmetrical basal lobe, ventral margin in lateral aspect nearly linear, ventral margin in lateral aspect broadly curved, left and right sides of median lobe subequal in height (Figs. 9 and 10); in ventral aspect, moderately narrow, apically weakly narrowed to rounded apex (Fig. 11). Right lateral lobe, small, distinctly curved, with well-sclerotized base (Fig. 9); left lateral lobe large, heavily setose, with a somewhat elongate, rounded apex, with a deep groove best seen in left lateral view (Figs. 9 and 10).

Female Genitalia. Gonocoxosternite large and broad, medial margin narrowly rounded and with several small setae, with elongate, narrowly rounded posterior lobe; gonocoxa long, moderately broad, dentate anteroventrally, pointed apically; laterotergites elongate, broad, weakly convex ventrally, not extending beyond gonocoxa posteriorly (Fig. 18A). Bursa moderately broad and short; ventral sclerite large, robust, broadly truncate apically; spermathecal duct broad and elongate; spermatheca nearly globular, heart-shaped (Fig. 18B); fertilization duct slender and well sclerotized (Fig. 18A).

Variation. Males with pro- and mesotarsi expanded, pro- and mesotarsomere I with a single, moderately large, round adhesive seta, and with series of short, curved setae along posterior margin; females with pro- and mesotarsi not expanded and without adhesive setae.

Etymology. The species name is derived from the name of the state of the type locality, Mato Grosso.

Distribution and Habitat. This species is only known from the type locality.

Material Examined. Holotype in FSCA: male labeled, “BRASIL: Mato Grosso, Jacaré, P. N. Xingu, xi. 1965 Alvarenga e Bokermann/HOLOTYPIC: *Prionohydrus matogrossensis* Gómez and Miller, 2012 [red label with double black line border].” PARATYPES, 58 total, 22 with same label data as holotype; 17, same but “Jacaré Parque Nacio-, nal Xingu xi. 1965, Alvarenga & Bokermann”; 17 same but “Jacaré-Parque Nat., Xingu xi.65 BLT, MALvarenga e WCABokermann”; 2 same but “Jacaré-Parque Nat., Xingu xi.65 MALvarenga e WCABokermann.” All paratypes with: “PARATYPE: *Prionohydrus matogrossensis* Gómez and Miller, 2012 [red label with double black line border].”

***Prionohydrus marc* Gómez and Miller, new species**
(Figs. 2 and 6, 8B, 12–14)

Type Locality. Venezuela, Bolívar State, 6° 13' 4.6" N, 67° 14' 26.4" W, 60 m ≈ 25 km E. El Burro.

Diagnosis. The antennae of males are moderately expanded (incrassate), and the antennae of females are slightly expanded, less so than females of *P. matogrossensis* (Fig. 8B). The male genitalia are diagnostic with the left and right sides of the median lobe conspicuously unequal in height when viewed laterally (Figs. 12 and 13). The median lobe is more pointed apically than *P. ubercornis* in lateral aspect (Figs. 12 and 13), and the apex of the median lobe in ventral aspect is narrowly rounded, subangulate subapically (Fig. 14). The apex of the male left lateral lobe is slightly elongate and moderately broad (Fig. 13).

Description. Measurements (in mm). TL = 2.10–2.29, GW = 1.07–1.10, PL = 0.50–0.51, PW = 1.03–1.07, HW = 0.67–0.75, EW = 0.37–0.40, FW = 0.17–0.18, FL = 0.43–0.45, SW = 0.11–0.12, TL/GW = 1.96–2.08, PL/PW = 0.47–0.48, HW/EW = 1.81–1.87, FW/FL = 0.39–0.40, GW/SW = 9.16–9.72.

Habitus. (Fig. 2) Elongate, lanceolate, broadest at anterior third of elytra; lateral outline continuous between pronotum and elytron; anteriorly rounded and posteriorly angulate, strongly attenuated apically.

Coloration. Head and pronotum light orange-brown, elytron dark orange-brown. Ventral surfaces light yellow-brown, antennae and palpi yellow, legs light yellow-brown to dark yellow-brown.

Structure and Sculpture. Head, pronotum, and elytron dull, densely covered with moderately impressed isodiametric sculpticells. Head with very fine, inconspicuous, irregular punctation lateral to the eyes; eyes medium-large in size (Fig. 2, HW/EW = 1.81–1.87). Pronotal punctation similar to that of head; pronotal bead narrow posteriorly, evenly expanded anteriorly to broad anterior apex. Elytral punctation similar to that of head and pronotum except for two subtle paramedian rows of fine punctures. Prosternum anteriorly broad, medially broadly convex, covered with fine isodiametric cells except for weakly transverse cells anteromedially; prosternal process flat and somewhat broad, broadly rounded apically. Metaventre medially moderately broad, with fine isodiametric cells; medial lobe of metacoxa evenly rounded with a cluster of setae apically, surface similar to metaventre. Front leg with profemur short and broad, with protibia short and rounded dorso-apically, with moderately large apical spur and moderately large posterior spine, with shortened fringe of setae along apical margin; middle leg dissimilar in size, mesotibia longer, with several moderately large spines, posterior mesotibial spur strongly serrate; hind leg with femur short and broad (FW/FL = 0.39–0.40), with weak angular setae, metatibia long and somewhat broad, with several moderately large spines, smaller in size than mesotibial spines, anterior metatibial spur strongly serrate.

Male Genitalia. Median lobe with moderately large, rounded, asymmetrical basal lobe, ventral margin in lateral aspect slightly sinuate, ventral margin in lateral aspect broadly curved, left and right sides of median lobe conspicuously dissimilar in height; apex in lateral aspect pointed, not rounded as in *P. ubercornis* (Figs. 12 and 13); in ventral aspect, median lobe, moderately

narrow, with a narrowly rounded apex, with a weak angle occurring subapically (Fig. 14). Right lateral lobe, small, distinctly curved, with well sclerotized base (Fig. 12); left lateral lobe large, heavily setose, with a somewhat elongate, rounded apex, with a deep groove (Fig. 13).

Female Genitalia. Female genitalia was examined but no discernible differences were observed between female genitalia of *P. marc* and *P. matogrossensis*, and this species was scored with the same character states as other members of the genus.

Variation. Males with pro- and mesotarsi expanded, pro- and mesotarsomere I with a single, moderately large, round adhesive seta, and with series of short, curved setae along posterior margin; females with pro- and mesotarsi not expanded and without adhesive setae.

Etymology. This species is named in honor of the primary author's participation in an undergraduate research program, the Minority Access to Research Careers, program at the University of New Mexico.

Distribution and Habitat. This species is known from multiple collection sites in central Venezuela, with a large number of specimens collected near Calabozo and from Aguaro-Guariquito National Park, both in Guárico State. Specimens also have been collected from a single site in southeastern Venezuela (Fig. 19). Label data indicate that specimens of *P. marc* come to lights, and they also indicate the following habitats: "morichal," "rocky morichal," "marshy area," "pond & lagoon," "Rio Aguaro," a river, and "Lago de Los Patos," a lake.

Material Examined. HOLOTYPE in MIZA: male labeled, "VENEZUELA: Bolívar State, 6° 13' 4.6" N, 67° 14' 26.4" W, 60 m ca. 25 km E. El Burro, 12.i.2009; leg. Short et al., rocky morichal; VZ09-0113-01X/SEMC0876545, KUNHM-ENT/HOLOTYPE: *Prionohydrus marc* Gómez and Miller, 2012 [red label with double black line border]. PARATYPES, 62 total, one labeled same as holotype except "SEMC0876544." 13 labeled "VENEZUELA: Guárico State, 8° 6.226' N, 66° 26.228' W, 52 m UCV San Nicolasito Field Station; Rio Aguaro; 10.i.2009, leg. Short, Miller, Joly, Garcia, & Camacho; VZ09-0110-01A" with the following specimen numbers from the barcode labels: "SEMC0852534, SEMC0855720, SEMC0852496, SEMC0855716, SEMC0855732, SEMC0855731, SEMC0852498, SEMC0852492, SEMC0855717, SEMC0852559, SEMC0852557, SEMC0855733, SEMC0855719." Three labeled "VENEZUELA: Apure State, 6° 30.900' N, 67° 32.604' W, 68 m Btw Orinoco & Cinaruco Rivers, 17.i.2009; Short, Miller, Camacho, VZ09-0117-01X; morichal" with the following specimen numbers from the barcode labels: "SEMC0852318, SEMC0852294, SEMC0852373." 21 labeled "VENEZ.: Edo. Guarico, Calabozo.15-VII-1961, Biol.Station, light trap, C.Bordon leg." Four labeled "VENEZUELA: Guárico State, 8° 8.296' N, 66° 24.459' W, San Nicolasito Field Station, 10.i.2009; leg. Short & Miller, VZ09-0110-02X; morichal" with the following specimen numbers from the barcode labels: "SEMC0855233, SEMC0855138, SEMC0855177,

SEMC0855379." Two labeled "VENEZUELA: Bolívar State, 7° 20.992' N, 66° 17.904' W, 62 m Btw. Caicara and Los Pijiguaos, 11.i.2009; Short, Miller, & Garcia, VZ09-0111-02X; pond & lagoon" with the following specimen numbers from the barcode labels: "SEMC0855463, SEMC0855467." 10 labeled "VENEZUELA/CALABOZO (Edo. GUÁRICO)/ Estación Biol. leg. 15-7-61." Three labeled "VENEZUELA, Guar., 15 km.S., Calabozo, II-9-13-1969, P.&P Spangler/Collected in Lago de Los Patos." One labeled "VENEZUELA, Edo. Guarico, Galabozo-Est. Biologica, 23.vi.1963 L. Chordon." Four labeled "VENEZUELA: Bolívar State, 04° 41.878' N, 61° 04.246' W, 815 m, Gran Sabana, N. Santa Elena, marshy area long Rt. 10; leg. Short, Tellez & Camacho, 17.vii.2010; VZ10-0717-03A" with the following specimen numbers from the barcode labels: "SEMC0908555, SEMC0908563, SEMC0908564, SEMC0908662." All paratypes with: "PARATYPE: *Prionohydrus marc* Gómez and Miller, 2012 [red label with double black line border]."

Prionohydrus ubercornis Gómez and Miller, new species
(Figs. 3, 8C, 15-17)

Type Locality. Venezuela, Monagas State, 9° 16.398' N, 62° 56.246' W, south of Maturín.

Diagnosis. The antennae of males are strongly expanded (incrassate) more so than males of *P. matogrossensis*, and the antennae of females are also strongly expanded, similar in shape to that of males (Fig. 8C). The male genitalia are diagnostic with the left and right sides of the median conspicuously unequal in height when viewed laterally (Figs. 15 and 16). The median lobe is more rounded apically than *P. marc* in lateral aspect (Figs. 15 and 16), and the apex of the median lobe in ventral aspect is gently curved to the right (Fig. 17). The apex of the male left lateral lobe is less elongate and moderately broad (Fig. 16).

Description. Measurements (in mm). TL = 2.10-2.20, GW = 1.05-1.07, PL = 0.47-0.5, PW = 1.02-1.05, HW = 0.73-0.75, EW = 0.46-0.47, FW = 0.18-0.19, FL = 0.43-0.45, SW = 0.11-0.12, TL/GW = 2.00-2.05, PL/PW = 0.46-0.47, HW/EW = 1.58-1.59, FW/FL = 0.41-0.42, GW/SW = 8.91-9.54.

Habitus. (Fig. 3) Elongate, lanceolate, broadest at anterior third of elytra; lateral outline continuous between pronotum and elytron; anteriorly rounded and posteriorly angulate, strongly attenuated apically.

Coloration. Head and pronotum light orange-brown, elytron dark orange-brown. Ventral surfaces light yellow-brown, antennae and palpi yellow, legs light yellow-brown to dark yellow-brown.

Structure and Sculpture. Head, pronotum, and elytron dull, densely covered with moderately impressed isodiametric sculpticells. Head with very fine, inconspicuous, irregular punctation lateral to the eyes; eyes medium in size (Fig. 1, HW/EW = 1.58-1.59). Pronotal punctation similar to that of head; pronotal bead narrow posteriorly, evenly expanded anteriorly to broad anterior apex. Elytral punctation similar to

that of head and pronotum except for two subtle paramedian rows of fine punctures. Prosternum anteriorly broad, medially broadly convex, covered with fine isodiametric cells except for weakly transverse cells anteromedially; prosternal process flat and somewhat broad, broadly rounded apically. Metaventrite medially moderately broad, with fine isodiametric cells; medial lobe of metacoxa evenly rounded with a cluster of setae apically, surface similar to metaventrite. Front leg with profemur short and broad, with protibia short and rounded dorso-apically, with moderately large apical spur and moderately large posterior spine, with shortened fringe of setae along apical margin; middle leg dissimilar in size, mesotibia longer, with several moderately large spines, posterior mesotibial spur strongly serrate; hind leg with femur short and broad (FW/FL = 0.41-0.42), with weak angular setae, metatibia long and somewhat broad, with several moderately large spines, smaller in size than mesotibial spines, anterior metatibial spur strongly serrate.

Male Genitalia. Median lobe with moderately large, rounded, asymmetrical basal lobe, ventral margin in lateral aspect slightly sinuate, ventral margin in lateral aspect broadly curved, left and right sides of median lobe conspicuously dissimilar in height; apex in lateral aspect slightly rounded (Figs. 15, 16); in ventral aspect, median lobe, moderately narrow, apically gently narrowed to the right in a narrowly rounded apex (Fig. 17). Right lateral lobe, small, distinctly curved, with well sclerotized base (Fig. 15); left lateral lobe large, heavily setose, with a somewhat broad, rounded apex, with a deep groove (Fig. 16).

Female Genitalia. Female genitalia was examined but no discernable differences were observed between female genitalia of *P. ubercornis* and *P. matogrossensis*, and this species was scored with the same character states as other members of the genus.

Variation. Males with pro- and mesotarsi expanded, pro- and mesotarsomere I with a single, moderately large, round adhesive seta, and with series of short, curved setae along posterior margin; females with pro- and mesotarsi not expanded and without adhesive setae.

Etymology. This species name is derived from the German word über, meaning "over, beyond," and cornis, which is derived from the Latin word cornua, meaning "horn."

Distribution and Habitat. This species is known from two distant localities in Venezuela (Fig. 19). Label data indicate the following habitats: "morichal" and "Morichal margin."

Material Examined. HOLOTYPE in MIZA: male labeled, "VENEZUELA: Monagas State, 9° 16.398' N, 62° 56.246' W, 22 m, 2.ii.2010; S. of Maturin, leg. Short, Garcia, & Joly, Morichal margin; VZ10-0202-02A/ SEMC0893246, KUNHM-ENT/HOLOTYPE: *Prionohydrus ubercornis* Gómez and Miller, 2012 [red label with double black line border]." PARATYPES, eight total, two labeled same as holotype except "SEMC0893277" and "SEMC0893182." Six labeled "VENEZUELA: Guárico State, 8° 8.296' N, 66° 24.459'

W, San Nicolasito Field Station, 10.i.2009; leg. Short & Miller VZ09-0110-02X; morichal' with the following specimen numbers from the barcode labels: "SEMC0855235, SEMC0855108, SEMC0855106, SEMC0855135, SEMC0855157, SEMC0855136." All paratypes with: "PARATYPE: *Prionohydrus ubercornis* Gómez and Miller, 2012 [red label with double black line border]."

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References Cited

- Belkaceme, T. 1991. Skelet und Muskulatur des Kopfes und Thorax von *Noterus laevis* Sturm. Ein Beitrag zur Morphologie und Phylogenie der Noteridae (Coleoptera: Adephaga). Stuttg. Beitr. Naturk. D. Ser. A 462: 1-94.
- Beutel, R. G., and R. E. Roughley. 1987. On the systematic position of the genus *Notomicrus* Sharp (Hydradephaga: Coleoptera). Can. J. Zool. 65: 1898-1905.
- Beutel, R. G., M. Balke, and W. E. Steiner. 2006. The systematic position of Meruidae (Coleoptera, Adephaga) and the phylogeny of the smaller aquatic adephagan beetle families. Cladistics 22: 102-131.
- Bremer, K. 1994. Branch support and tree stability. Cladistics 10: 295-304.
- Goloboff, P. 1995. NONA computer program, version 2.0. Published by the author, Tucumán, Argentina.
- Grosso, L. E. 1994. Revisión de las especies Neotropicales del género *Suphis* Aubé, con la descripción de *S. ticky* n. sp. (Coleoptera - Noteridae). Acta Zool. Lilloana 42: 225-238.
- Guignot, F. 1948. Vingt-cinquième note sur les hydrocanthares. Rev. Fr. Entomol. 15: 96-100.
- Miller, K. B. 2001. On the phylogeny of the Dytiscidae (Coleoptera) with emphasis on the morphology of the female reproductive tract. Insect Syst. Evol. 32: 45-92.
- Miller, K. B. 2009. On the systematics of Noteridae (Coleoptera: Adephaga: Hydradephaga): phylogeny, description of a new tribe, genus and species, and survey of female genital morphology. Syst. Biodivers. 7: 191-214.
- Miller, K. B., and A. N. Nilsson. 2003. Homology and terminology: communicating information about rotated structures in water 1-4 beetles. Latissimus 17.
- Nilsson, A. N. 2005. Family Noteridae (Coleoptera, Adephaga), pp. 87-153. In A. N. Nilsson and B. J. Van Vondel (eds.), World catalogue of insects: Amphizoidae, Aspidytidae, Haliplidae, Noteridae and Paelobiidae (Coleoptera, Adephaga), vol. 7. Apollo Books, Stenstrup, Denmark.
- Nilsson, A. N., and B. J. Van Vondel. 2005. World catalogue of insects: Amphizoidae, Aspidytidae, Haliplidae, Noteridae and Paelobiidae (Coleoptera, Adephaga), vol. 7. Apollo Books, Stenstrup, Denmark.
- Nixon, K. C. 2002. WinClada computer program, 1.00.08. Published by the author, Ithaca, NY.
- Young, F. N. 1978. The New World species of the water-beetle genus *Notomicrus* (Noteridae). Syst. Entomol. 3: 285-293.
- Young, F. N. 1979. Water beetles of the genus *Suphisellus* Crotch in the Americas north of Colombia (Coleoptera: Noteridae). Southwest. Nat. 24: 409-429.
- Young, F. N. 1985. A key to the American species of *Hydrocanthus* with descriptions of new taxa (Coleoptera: Noteridae). Proc. Acad. Natl. Sci. Phila. 137: 90-98.

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