Generic keys for the identification of larval Dytiscidae from Argentina (Coleoptera: Adephaga)

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Claves genéricas para la identificación de las larvas de Dytiscidae de la Argentina (Coleoptera: Adephaga)

■ **RESUMEN.** Se presentan claves genéricas para la identificación de las larvas de Dytiscidae de la Argentina. Un total de 27 géneros de Dytiscidae son reconocidos en la Argentina, comprendidos en 16 tribus y siete subfamilias. Veintidós de los 27 géneros fueron incluidos en las claves. Los restantes cinco géneros no pudieron ser incluidos porque sus larvas son desconocidas (*Bidessonotus* Régimbart, *Brachyvatus* Zimmermann, *Hemibidessus* Zimmermann, *Neobidessus* Young) o son conocidas muy imperfectamente (*Cybister* Curtis). Las claves se presentan en inglés y español. Se incluyeron caracteres morfológicos y de la quetotaxia, y se puso énfasis en incluir caracteres fácilmente visualizables e identificables. Sin embargo, debido al pequeño tamaño de muchas larvas de Dytiscidae, algunos de los caracteres mencionados en las claves (especialmente los de la quetotaxia) son difíciles de visualizar a través de la observación con el microscopio estereoscópico. Por lo tanto, se recomienda el uso del microscopio compuesto para la identificación.

PALABRAS CLAVE. Escarabajos buceadores. Dytiscidae. Larvas. Claves. Argentina.

■ **ABSTRACT.** Generic keys for the identification of larvae of Dytiscidae from Argentina are presented. A total of 27 dytiscid genera are recognized in Argentina, included in 16 tribes and seven subfamilies. Twenty-two of the 27 genera are included in the keys. The remaining five genera could not be included because their larvae are unknown (*Bidessonotus* Régimbart, *Brachyvatus* Zimmermann, *Hemibidessus* Zimmermann, *Neobidessus* Young) or remain poorly known (*Cybister* Curtis). The keys are presented in English and Spanish. Morphological as well as chaetotaxic characters were included, and an emphasis was made to include easily seen and identifiable characters. However, due to the small size of many dytiscid larvae, some of the characters mentioned in the keys (especially the chaetotaxic ones) are difficult to visualize through the observation with a stereoscopic microscope. Therefore, the use of a compound microscope for the identification is recommended.

KEY WORDS. Diving-beetles. Dytiscidae. Larvae. Keys. Argentina.

INTRODUCTION

Diving beetles (Dytiscidae) are a very specious and diverse group of aquatic coleopterans. The family is cosmopolitan, with representatives all around the world, from both polar regions to the equator (Galewski, 1971). However, the greater

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number of species is found in tropical and subtropical areas (Nilsson, 2001; Ribera *et al.*, 2004; Balke, 2005). Some species have a very wide distributional range, including several zoogeographic regions; others, on the contrary, have a very restricted distribution, or are endemic of islands or particular areas. Some others have a circumpolar distribution, and even others inhabit great altitudes up to 4700 masl in mountainous areas. Dytiscids exploit almost every continental waters (Wilson, 1923; Trémouilles, 1998; Balke, 2005). In general, they are found in larger numbers in lentic habitats, both permanent and temporary. In lotic habitats they are most frequently found in the wetted margins, where the water current is slow or absent and there is an accumulation of sediments and organic debris. They are always less abundant in waters with large populations of fish (Watts, 1978). Diving beetles live in association with the aquatic vegetation, and for that, are much more numerous in the marginal zones of the water bodies, where the water is shallow and the emergent and/or submergent vegetation is particularly abundant. They also use the terrestrial vegetation when inhabiting floodplain ponds or temporary rain pools. Both larvae and adults are active throughout the year, though are much less numerous in the winter than in the summer (Watts, 1978). The larvae pass through three morphologically similar instars except for the size. They are predaceous and generally very voracious, eating practically every prey (most commonly arthropods or annelids) of a suitable size (Balke, 2005).

The family Dytiscidae is included in the order Coleoptera, suborder Adephaga. With approximately 4000 described species (Nilsson, 2001, 2003, 2004; Nilsson & Fery, 2006; Jäch & Balke, 2008), dytiscids are the most specious group of aquatic beetles in the world. The classification followed here is that of Miller (2001, 2002, 2005) and Nilsson (2001) (Table I), in which the family is divided in 10 subfamilies, 27 tribes and about 175 genera. About half of the species are included in the morphologically diverse subfamily Hydroporinae (some 2000 species). The rest is divided in the remaining nine subfamilies as follows (approximate numbers): Agabinae (370 species), Colymbetinae (130 species), Copelatinae (540 species), Coptotominae (5 species), Dytiscinae (380 species), Hydrodytinae (4 species), Laccophilinae (400 species), Lancetinae (22 species) and Matinae (8 species). Seven (70%) out of the 10 subfamilies are present in Argentina, only Coptotominae, Hydrodytinae and Matinae are absent. Similarly, 16 (59%) out of the 27 tribes and 27 (15%) out of the 175 genera are represented in Argentina (Table I). Dytiscidae includes some 113 species in Argentina (approximately 3% of the total number of species) (Table I), though almost surely this number will be increased with further studies. Twenty-three (81%) out of the 27 Argentinean dytiscid genera are known as larvae (Table I). Only four genera remain unknown: *Bidessonotus* Régimbart, *Brachyvatus* Zimmermann, *Hemibidessus* Zimmermann and *Neobidessus* Young, all included in the tribe Bidessini. A special case is the genus *Cybister* Curtis, which is cosmopolitan in distribution and the larva is known only from European material.

Besides their inherent biological interest, dytiscids play an important role within the aquatic ecosystems, as predators of species of economic or medical importance and as indicators of environmental conditions (Larson, 1975). Also, they are a component in the diet of different groups. Diving beetles are a very interesting group from a limnological point of view, though rarely appear in large biomasses (Trémouilles *et al.*, 1995). The deficient knowledge of the larvae of aquatic beetles in general, and of Dytiscidae in particular, has serious consequences for other disciplines of biological investigation, such as studies on biodiversity, ecology, and limnology. These problems are due in many cases to the impossibility of identifying the larvae collected in the field (Archangelsky, 1997).

One of the most important problems derived from the deficient knowledge on the larvae of Dytiscidae in Argentina is the lack of keys of identification. As a consequence, the dytiscid fauna from Argentina has been usually identified with keys from other regions

Table I. Genera of Dytiscidae, number of species in Argentina, larvae described, and source. I-III under the column "Larvae described" refer to larval instars. Information in the column "N° species" was taken from Young (1974, 1981), Trémouilles & Bachmann (1980, 1981), Bachmann & Trémouilles (1981, 1982), Trémouilles (1984, 1989, 1995, 1996, 1998, 2000), Trémouilles *et al*. (1995), Balke (1992), Miller (2000, 2005), Nilsson (2001), Torres *et al*. (2008), Michat, pers. obs.

Taxon	N° species	Larvae described	Source
DYTISCIDAE			
AGABINAE			
AGABINI			
Leuronectes Sharp	1	I, II, III	Michat & Archangelsky (in prep.)
COLYMBETINAE			
COLYMBETINI			
Bunites Spangler	1	I	Michat (2005)
Rhantus Dejean	9	I, II, III	Alarie *et al*. (in prep.)
COPELATINAE			
COPELATINI			
Agaporomorphus Zimmermann	1	II, III	M. C. Michat collection
Copelatus Erichson	7	I, III	M. C. Michat collection
DYTISCINAE			
ACILIINI			
Thermonectus Dejean	6	I, II, III	Michat & Torres (2005b)
AUBEHYDRINI			
Notaticus Zimmermann	1	III	Miller *et al*. (2007)
CYBISTRINI			
Cybister Curtis	1	III	Fiori (1949)
Megadytes Sharp	9	I, II, III	Michat (2006b)
HYDATICINI			
Hydaticus Leach	3	I, II, III	Michat & Torres (2006a)
HYDROPORINAE			
BIDESSINI			
Amarodytes Régimbart	2	I, II, III	Michat & Alarie (2006)
Anodocheilus Babington	2	I, II, III	Michat & Torres (2006b)
Bidessonotus Régimbart	1	-	
Brachyvatus Zimmermann	1	-	
Hemibidessus Zimmermann	1	-	
Hypodessus Guignot	1	I, II, III	Michat & Alarie (2008)
Liodessus Guignot	7	I, II, III	Alarie *et al*. (2007)
Neobidessus Young	1	-	
HYDROPORINI			
Laccornellus Roughley & Wolfe	1	I	Alarie & Michat (2007b)
HYDROVATINI			
Hydrovatus Motschulsky	3	I, II, III	Michat (2006a)
HYPHYDRINI			
Desmopachria Babington	11	I, II, III	Michat & Archangelsky (2007)
Pachydrus Sharp	2	I, II, III	Michat & Torres (2008)
METHLINI			
Celina Aubé	7	I, II, III	Michat *et al*. (2007)
VATELLINI			
Derovatellus Sharp	3	III	Spangler (1966)
Vatellus Aubé	2	I, II, III	Michat & Torres (2005a)
LACCOPHILINAE			
LACCOPHILINI			
Laccophilus Leach	13	I, II, III	Michat (2008)
LANCETINAE			
LANCETINI			
Lancetes Sharp	16	I, II, III	Michat *et al*. (2005)

of the world, constructed for a different fauna and therefore problematic when applied to our fauna. Among the most common issues are: 1) the genus to be identified is not present in the key (this is a serious problem because it frequently leads to an erroneous identification), 2) the Argentinean genera are mixed with many others that are not present here and make the identification process difficult, and 3) some diverse and widespread genera may show morphological variation (or may be paraphyletic), and those species from other zoogeographical regions may present characters that differ from those of Argentinean species. To fill this gap, in the present paper we provide generic keys for the identification of the larvae of Dytiscidae from Argentina.

MATERIAL AND METHODS

The material used for preparing the keys was collected in several collecting trips to different parts of Argentina (1997-2008). The visited provinces were Buenos Aires, Chubut, Córdoba, Corrientes, Entre Ríos, Formosa, Jujuy, La Rioja, Misiones, Salta and Tucumán. For the genera which we did not have access to material (*Derovatellus* Sharp and *Notaticus* Zimmermann), data were taken from the literature. As mentioned above, 27 dytiscid genera are known from Argentina (Table I). Few other genera, known from bordering countries, could be present here. However, as their presence has not been documented so far, they are not treated in this paper.

Larvae were cleared in lactic acid, dissected and mounted on glass slides with polyvinyl-lacto-glycerol or Hoyer's medium. Observation (at magnifications up to 1000×) and drawings were made using an Olympus CX31 compound microscope equipped with a camera lucida. Drawings were scanned and digitally edited. The material is held in the larval collections of M. C. Michat (Laboratorio de Entomologia, Universidad de Buenos Aires, Argentina) and M. Archangelsky (LIESA, Universidad Nacional de La Patagonia, Esquel, Argentina).

The nomenclature used in the keys for structures as well as for setae and pores follows that employed in previous papers dealing with the larval morphometry and chaetotaxy of members of the family Dytiscidae (Nilsson, 1988; Alarie & Harper, 1990; Alarie *et al.*, 1990, 2000, 2001, 2002; Alarie, 1991, 1995, 1998; Alarie & Michat, 2007a; see also references in Table I). The reader is referred to those papers for a complete guide of the morphometric and chaetotaxic terms commonly applied to dytiscid larvae.

RESULTS

Key to larval instars

1. Egg bursters present (Figs. 1-18); temporal spiniform setae absent .... Instar I
   Egg bursters absent; temporal spiniform setae generally present (Figs. 49-51, 54, 60-64) 2

2. Spiracles on lateral margin of mesothorax and abdominal segments I-VII absent … …..... Instar II
   Spiracles on lateral margin of mesothorax and abdominal segments I-VII present (Fig. 66) ..... Instar III

Key to instar I

1. Nasale present (Figs. 1-9) 2
   Nasale absent (Figs. 10-18) 12

2. Occipital suture present (Fig. 2) 3
   Occipital suture absent (Figs. 1, 3-9) 4

3. Tracheal trunks not projected from the apex of the siphon; pore PAk absent ……..... *Amarodytes* Régimbart
   Tracheal trunks projected from the apex of the siphon (Figs. 41-42); pore PAk present ……..….. *Celina* Aubé

4. Nasale subtriangular (Figs. 1-5) 5
   Nasale with lateral margins subparallel (Figs. 6-9) 8

5. Cardo not fused to stipes (Fig. 27); lateral margins of prementum with elongate spinulae (Fig. 31); seta AB15 present; pore ABc present .... *Laccornellus* Roughley & Wolfe
Cardo fused to stipes (Fig. 28); lateral margins of prementum without spinulae (Fig. 32); seta AB15 absent; pore ABc absent 6

6. Third antennomere with a ventroapical spinula (Fig. 19); distribution: Salta Province ..... *Hypodessus* Guignot
Third antennomere without a ventroapical spinula (Fig. 20) 7

7. Length of last abdominal segment more than 0.65 times head width; length of urogomphus more than 3.20 times head width; length of first urogomphomere less than 1.20 times length of second ..... *Anodocheilus* Babington
Length of last abdominal segment less than 0.60 times head width; length of urogomphus less than 2.80 times head width; length of first urogomphomere more than 1.30 times length of second ..... *Liodessus* Guignot

8. Nasale with lateral projections (Figs. 6-7) 9
Nasale without lateral projections (Figs. 8-9) 11

9. Lateral projections of nasale short, unifid apically (Fig. 6) .... *Pachydrus* Sharp
Lateral projections of nasale very elongate, bifid apically (Fig. 7) 10

10. Length of fourth antennomere 1/4 length of third (Fig. 21) ..... *Vatellus* Aubé
Length of fourth antennomere almost 1/2 length of third (Fig. 22) ..... *Derovatellus* Sharp

11. Prementum much longer than broad (Fig. 33); second labial palpomere broad, robust, rounded apically (Fig. 33); pores PAm and PAo present .... *Desmopachria* Babington
Prementum about as long as broad (Fig. 34); second labial palpomere slender, pointed apically (Fig. 34); pores PAm and PAo absent ..... *Hydrovatus* Motschulsky

12. Anterior margin of frontoclypeus deeply sinuate (Figs. 10, 55-58); urogomphi reduced to small ventral tubercles (Fig. 71) ..... *Megadytes* Sharp 13
Anterior margin of frontoclypeus evenly curved (Figs. 11-18); urogomphi well developed (Figs. 72-77) 16

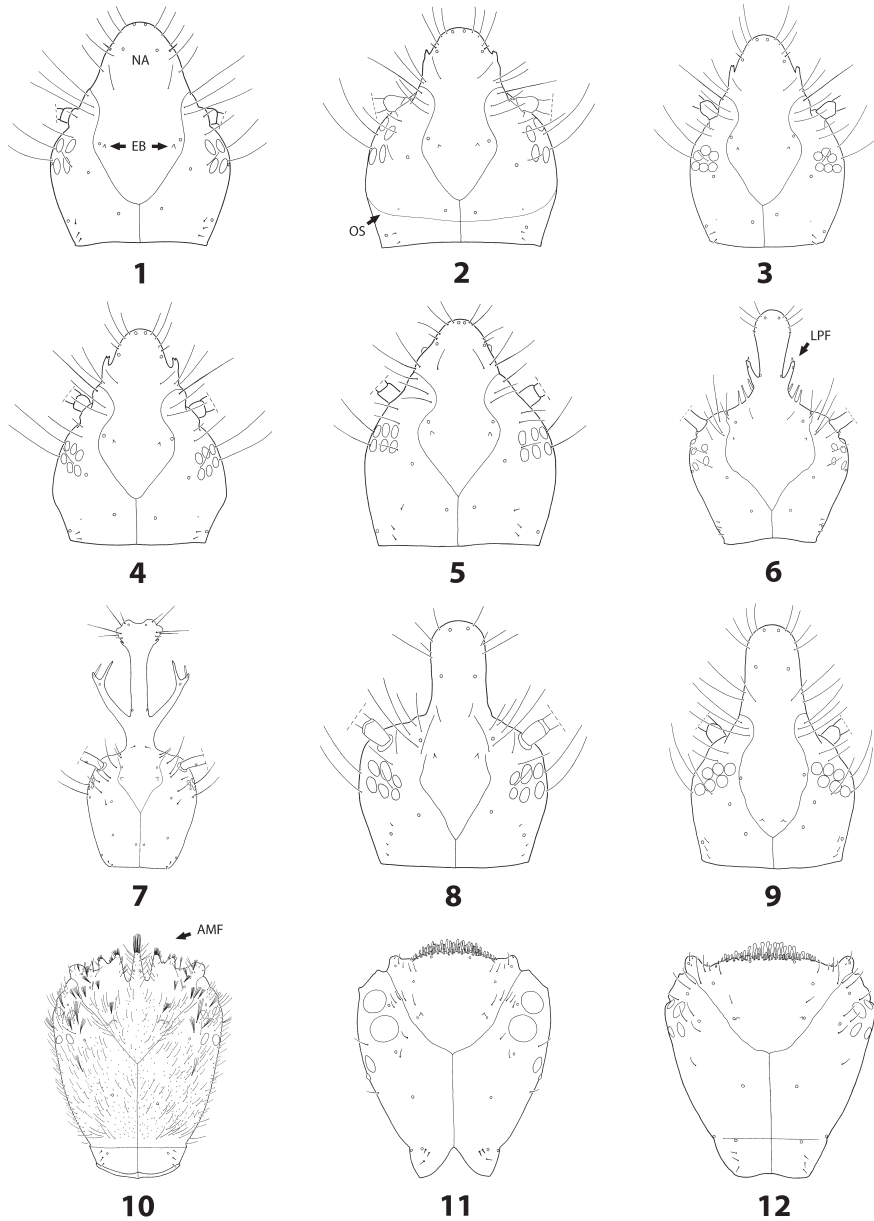
13. Median projection of frontoclypeus sharp apically, almost glabrous (Fig. 57); mandible regularly curved, without a ring of setae on distal third (Fig. 57) ..... *M. (Trifurcitus)* Brinck
Median projection of frontoclypeus truncate apically, with numerous apical setae (Figs. 55-56, 58); mandible with distal third more strongly projected inwards, bearing a ring of elongate setae (Figs. 55-56, 58) 14

14. Emargination between median projection and each lateral projection of frontoclypeus very narrow (Fig. 58) .... *M. (Megadytes)* Sharp
Emargination between median projection and each lateral projection of frontoclypeus wide (Figs. 55-56) 15

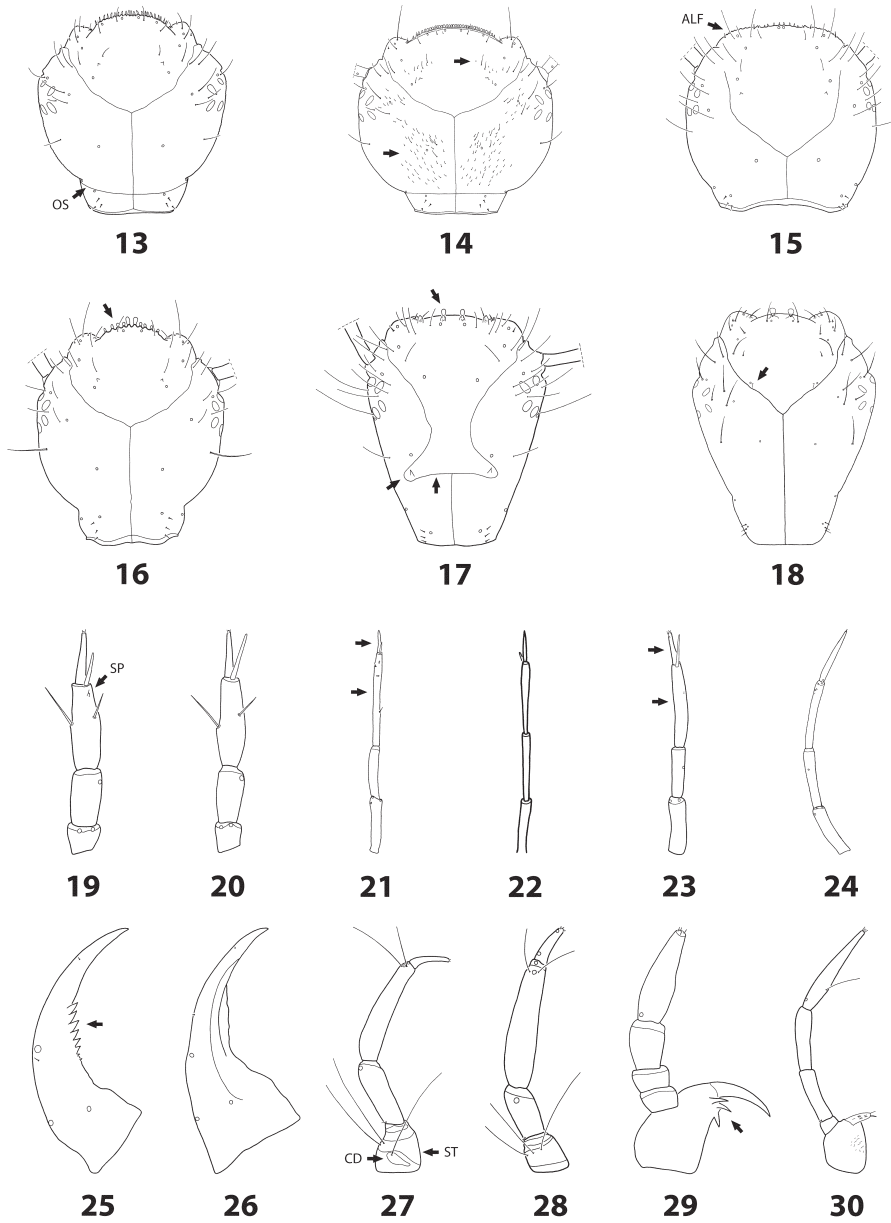
15. Lateral projections of frontoclypeus simple (Fig. 56) .... *M. (Bifurcitus)* Brinck
Lateral projections of frontoclypeus bifid (Fig. 55) ..... *M. (Paramegadytes)* Trémouilles & Bachmann

16. Last abdominal segment with a lateral row of natatory setae (Fig. 43); prothorax with a ventral sclerite 17
Last abdominal segment without a lateral row of natatory setae (Figs. 44-48); prothorax without ventral sclerites 19

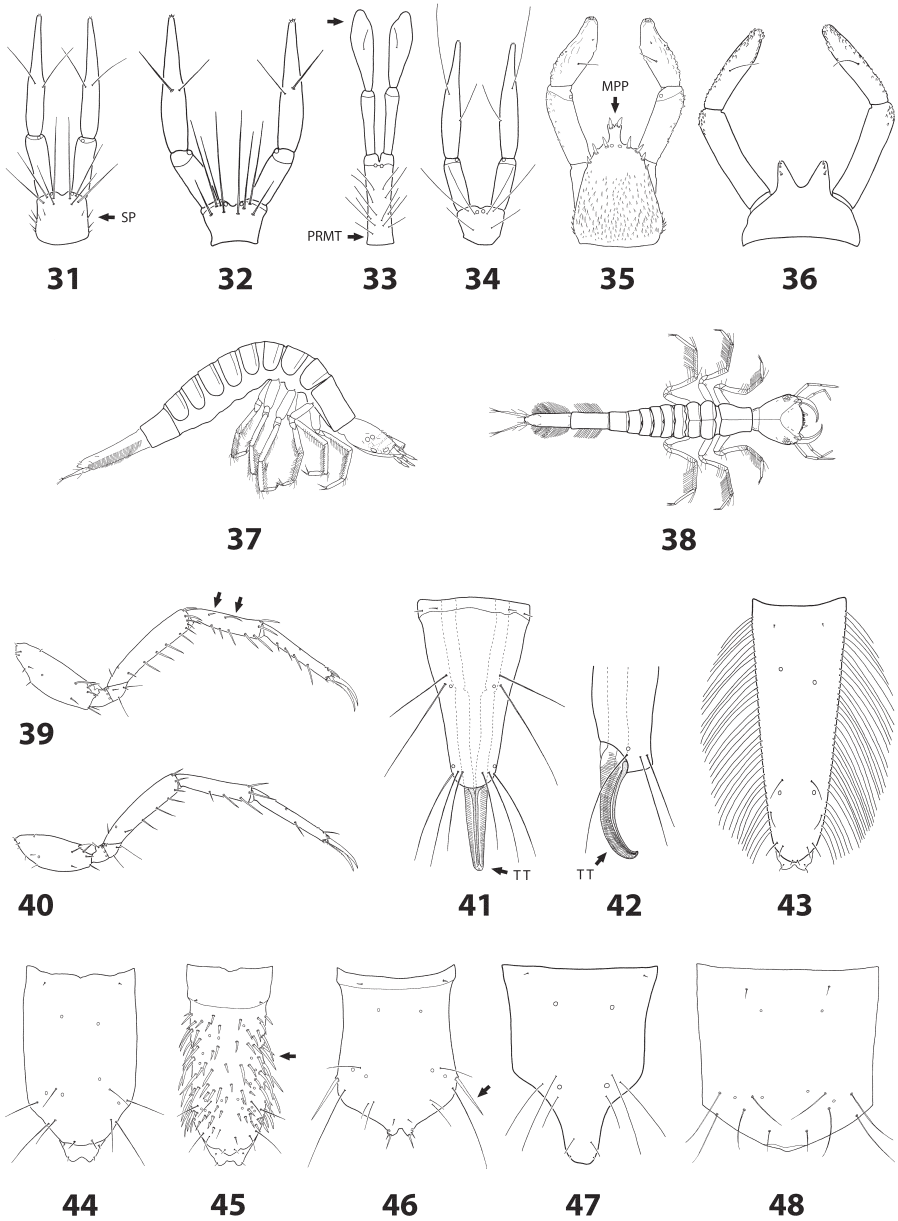
17. Median process of prementum absent (Fig. 65) .... *Notaticus* Zimmermann
Median process of prementum present



Figs. 1-12. Dytiscidae, first-instar larva, head, dorsal view. 1, *Laccornellus lugubris* (Aubé); 2, *Amarodytes duponti* (Aubé); 3, *Anodocheilus maculatus* Babington; 4, *Hypodessus cruciatus* (Régimbart); 5, *Liodessus flavofasciatus* (Steinheil); 6, *Pachydrus obesus* Sharp; 7, *Vatellus haagi* Wehncke; 8, *Desmopachria concolor* Sharp; 9, *Hydrovatus caraibus* Sharp; 10, *Megadytes glaucus* (Brullé); 11, *Thermonectus succinctus* (Aubé); 12, *Hydaticus tuyuensis* Trémouilles. AMF: anterior margin of frontoclypeus (margen anterior del frontoclípeo), EB: egg bursters (ovirruptores), LPF: lateral projections of frontoclypeus (proyecciones laterales del frontoclípeo), NA: Nasale, OS: occipital suture (sutura occipital). Fig. 1 modified from Alarie & Michat (2007b); Fig. 2 modified from Michat & Alarie (2006); Fig. 3 modified from Michat & Torres (2006b); Fig. 4 modified from Michat & Alarie (2008); Fig. 5 modified from Alarie *et al*. (2007); Fig. 6 modified from Michat & Torres (2008); Fig. 7 modified from Michat & Torres (2005a); Fig. 8 modified from Michat & Archangelsky (2007); Fig. 9 modified from Michat (2006a); Fig. 10 modified from Michat (2006b); Fig. 11 modified from Michat & Torres (2005b); Fig. 12 modified from Michat & Torres (2006a).



Figs. 13-30. Dytiscidae, first-instar larva. 13-18, head, dorsal view: 13, *Rhantus calileguai* Trémouilles; 14, *Bunites distigma* (Brullé); 15, *Copelatus* sp.; 16, *Leuronectes curtulus* Régimbart; 17, *Laccophilus obliquatus* Régimbart; 18, *Lancetes marginatus* (Steinheil). 19-24, antenna, ventral view: 19, *Hypodessus cruciatus*; 20, *Anodocheilus maculatus*; 21, *Vatellus haagi*; 22, *Derovatellus floridanus* Fall; 23, *Laccophilus obliquatus*; 24, *Lancetes marginatus*. 25-26, mandible, dorsal view: 25, *Copelatus* sp.; 26, *Leuronectes curtulus*. 27-28, maxilla, ventral view: 27, *Laccornellus lugubris*; 28, *Anodocheilus maculatus*. 29-30, maxilla, dorsal view: 29, *Copelatus* sp.; 30, *Laccophilus obliquatus*. ALF: anterolateral lobes of frontoclypeus (lóbulos anterolaterales del frontoclípeo), CD: cardo, OS: occipital suture (sutura occipital), SP: spinula (espínula), ST: stipes (estipes). Fig. 14 modified from Michat (2005); Figs. 17, 23, 30 modified from Michat (2008); Figs. 18, 24 modified from Michat *et al.* (2005); Fig. 19 modified from Michat & Alarie (2008); Figs. 20, 28 modified from Michat & Torres (2006b); Fig. 21 modified from Michat & Torres (2005a); Fig. 22 modified from Spangler (1966); Fig. 27 modified from Alarie & Michat (2007b).



Figs. 31-48. Dytiscidae, first-instar larva. 31-36, labium, dorsal view: 31, *Laccornellus lugubris*; 32, *Anodocheilus maculatus*; 33, *Desmopachria concolor*; 34, *Hydrovatus caraibus*; 35, *Thermonectus succinctus*; 36, *Hydaticus tuyuensis*. 37, *Thermonectus succinctus*, habitus, lateral view. 38, *Hydaticus tuyuensis*, habitus, dorsal view. 39-40, metathoracic leg, anterior view: 39, *Bunites distigma*; 40, *Rhantus calileguai*. 41-42, *Celina parallela* (Babington), last abdominal segment: 41, dorsal view; 42, lateral view. 43-48, last abdominal segment, dorsal view: 43, *Thermonectus succinctus*; 44, *Rhantus calileguai*; 45, *Bunites distigma*; 46, *Leuronectes curtulus*; 47, *Laccophilus obliquatus*; 48, *Lancetes marginatus*. MPP: median process of prementum (proceso medio del prementum), PRMT: prementum, SP: spinula (espínula), TT: tracheal trunks (troncos traqueales). Fig. 31 modified from Alarie & Michat (2007b); Fig. 32 modified from Michat & Torres (2006b); Fig. 33 modified from Michat & Archangelsky (2007); Fig. 34 modified from Michat (2006a); Figs. 35, 37, 43 modified from Michat & Torres (2005b); Figs. 36, 38 modified from Michat & Torres (2006a); Figs. 39, 45 modified from Michat (2005); Figs. 41-42 modified from Michat *et al.* (2007); Fig. 47 modified from Michat (2008); Fig. 48 modified from Michat *et al.* (2005).

(Figs. 35-36) 18

18. Body bent medially, gibbous in lateral view (Fig. 37); the two anterodorsal stemmata very large (Fig. 11); median process of prementum simple (Fig. 35) ..... *Thermonectus* Dejean
Body not bent medially, not gibbous in lateral view (Fig. 38); the two anterodorsal stemmata similar to the others (Fig. 12); median process of prementum bifid (Fig. 36) ..... *Hydaticus* Leach

19. Occipital suture present (Figs. 13-14) 20
Occipital suture absent (Figs. 15-18) 21

20. Frontoclypeus and parietals with additional setae (Fig. 14); tibia with additional anterodorsal setae (Fig. 39); last abdominal segment with many additional setae (Fig. 45); distribution: Jujuy and Tucumán Provinces, at altitudes higher than 2000 m ..... *Bunites* Spangler
Frontoclypeus and parietals without additional setae (Fig. 13); tibia without additional anterodorsal setae (Fig. 40); last abdominal segment without additional setae (Fig. 44); distribution: all throughout Argentina, from sea level to high altitudes ..... *Rhantus* Dejean

21. Mandibles without closed channel, with robust denticles on internal margin (Fig. 25); internal margin of stipes with three robust denticles (Fig. 29); anterolateral lobes of frontoclypeus inconspicuous (Fig. 15) ..... *Copelatus* Erichson
Mandibles with closed channel, without robust denticles on internal margin (Fig. 26); internal margin of stipes without robust denticles (Fig. 30); anterolateral lobes of frontoclypeus well developed (Figs. 16-18) 22

22. Last abdominal segment elongate, longer than head width (Fig. 73) ..... *Agaporomorphus?* Zimmermann
Last abdominal segment short, shorter than half of head width (Figs. 46-48) 23

23. Anterior margin of frontoclypeus with 10 spatulate setae (Fig. 16); last abdominal segment with a robust additional seta on lateral margin (Fig. 46) ..... *Leuronectes* Sharp
Anterior margin of frontoclypeus with two spatulate setae (Figs. 17-18); last abdominal segment without additional setae (Figs. 47-48) 24

24. Frontoclypeus truncate posteriorly, with the egg bursters placed on posterolateral angles (Fig. 17); length of fourth antennomere 1/3 length of third (Fig. 23); pore ABc absent ..... *Laccophilus* Leach
Frontoclypeus acute posteriorly, with the egg bursters placed on lateral margins (Fig. 18); length of fourth antennomere similar to that of third (Fig. 24); pore ABc present ..... *Lancetes* Sharp

Key to instars II-III

1. Nasale present (Figs. 49-54) 2
Nasale absent (Figs. 55-64) 12

2. Tracheal trunks projected from the apex of the siphon (Figs. 41-42) ..... *Celina* Aubé
Tracheal trunks not projected from the apex of the siphon 3

3. Nasale subtriangular (Figs. 49-50) 4
Nasale with lateral margins subparallel (Figs. 51-54) 8

4. Cardo not fused to stipes (Fig. 27); lateral margins of prementum with elongate spinulae (Fig. 31) ..... *Laccornellus* Roughley & Wolfe
Cardo fused to stipes (Fig. 28); lateral margins of prementum without spinulae (Fig. 32) 5

5. Third antennomere with a ventroapical spinula (Fig. 19) 6
Third antennomere without a ventroapical spinula (Fig. 20) 7

6. Pore PAk present; larva predominantly

testaceous to light brown, colour pattern of the head as in Fig. 49; distribution: Salta Province ..... *Hypodessus* Guignot
Pore PAk absent; larva predominantly dark brown, colour pattern of the head as in Fig. 50; distribution: Misiones Province ..... *Amarodytes* Régimbart

7. Length of last abdominal segment more than 0.85 times head width; length of first urogomphomere less than 0.95 times length of second ..... *Anodocheilus* Babington
Length of last abdominal segment less than 0.70 times head width; length of first urogomphomere more than 1.05 times length of second ..... *Liodessus* Guignot

8. Occipital suture absent (Figs. 51-52) … 9
Occipital suture present (Figs. 53-54) …. 10

9. Nasale with lateral projections (Fig. 51); femora with natatory setae on ventral margin (Fig. 67) ..... *Pachydrus* Sharp
Nasale without lateral projections (Fig. 52); femora without natatory setae on ventral margin (Fig. 68) ..... *Hydrovatus* Motschulsky

10. Nasale without lateral projections (Fig. 53); prementum much longer than broad (Fig. 33) ..... *Desmopachria* Babington
Nasale with lateral projections (Fig. 54); prementum about as long as broad 11

11. Length of fourth antennomere 1/5-1/6 length of third (Fig. 21) ..... *Vatellus* Aubé
Length of fourth antennomere somewhat more than 2/5 length of third (Fig. 22) ..... *Derovatellus* Sharp

12. Anterior margin of frontoclypeus deeply sinuate (Figs. 55-58); urogomphi reduced to small ventral tubercles (Fig. 71) ..... *Megadytes* Sharp 13
Anterior margin of frontoclypeus evenly curved (Figs. 59-64); urogomphi well developed (Figs. 72-77) 16

13. Median projection of frontoclypeus sharp apically, almost glabrous (Fig. 57); mandible regularly curved, without a ring of setae on distal third (Fig. 57) ..... *M. (Trifurcitus)* Brinck
Median projection of frontoclypeus truncate apically, with numerous apical setae (Figs. 55-56, 58); mandible with distal third more strongly projected inwards, bearing a ring of elongate setae (Figs. 55-56, 58) 14

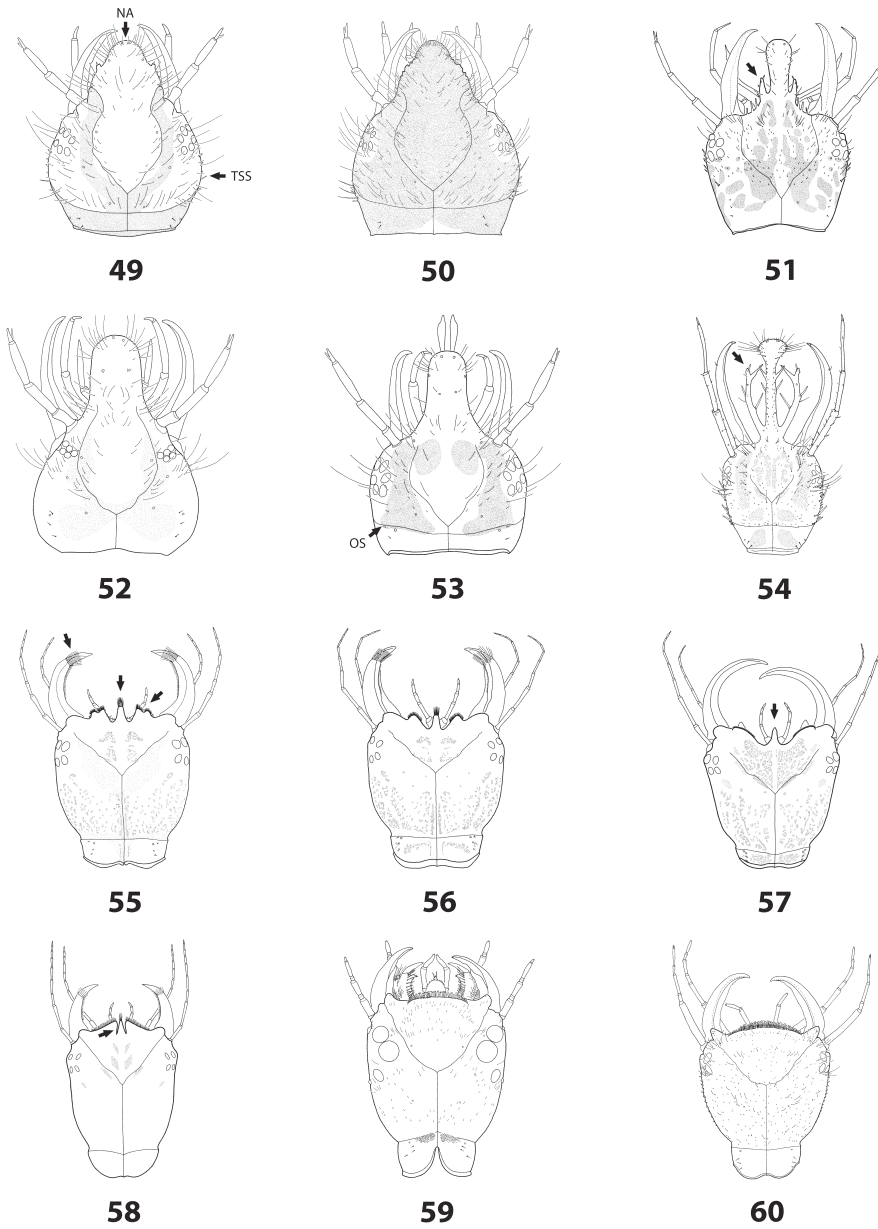
14. Emargination between median projection and each lateral projection of frontoclypeus very narrow (Fig. 58) ..... *M. (Megadytes)* Sharp
Emargination between median projection and each lateral projection of frontoclypeus wide (Figs. 55-56) 15

15. Lateral projections of frontoclypeus simple (Fig. 56) ..... *M. (Bifurcitus*) Brinck
Lateral projections of frontoclypeus bifid (Fig. 55) ..... *M. (Paramegadytes)* Trémouilles & Bachmann

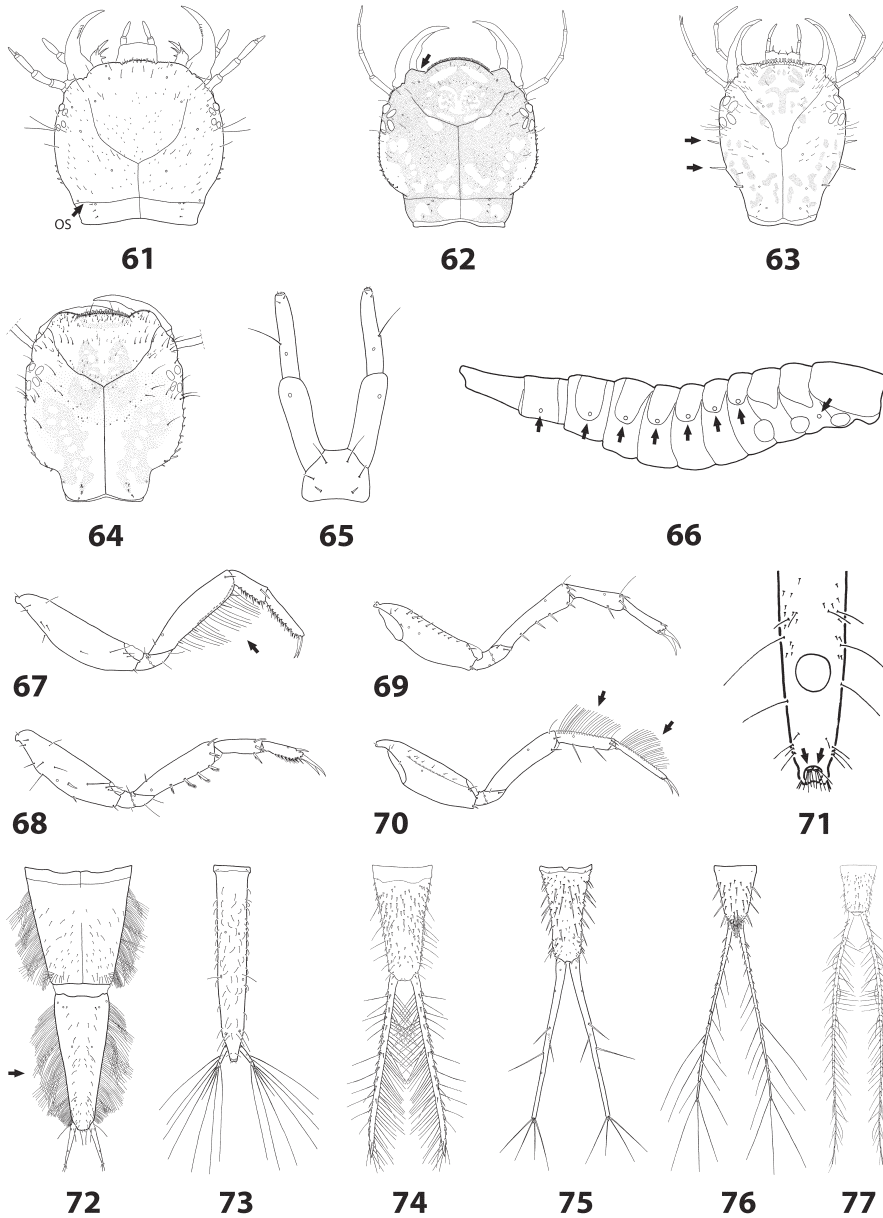
16. Last abdominal segment with a lateral row of natatory setae (Fig. 72); prothorax with a ventral sclerite 17
Last abdominal segment without a lateral row of natatory setae (Figs. 73-77); prothorax without ventral sclerites 19

17. Median process of prementum absent (Fig. 65) ..... *Notaticus* Zimmermann
Median process of prementum present (Figs. 35-36) 18

18. Body bent medially, gibbous in lateral view (Fig. 37); the two anterodorsal stemmata very large (Fig. 59); median process of prementum simple (Fig. 35) ..... *Thermonectus* Dejean
Body not bent medially, not gibbous in lateral view (Fig. 38); the two anterodorsal stemmata similar to the others (Fig. 60); median process of prementum bifid (Fig. 36) ..... *Hydaticus* Leach



Figs. 49-60. Dytiscidae, third-instar larva, head, dorsal view. 49, *Hypodessus cruciatus*; 50, *Amarodytes duponti*; 51, *Pachydrus obesus*; 52, *Hydrovatus caraibus*; 53, *Desmopachria concolor*; 54, *Vatellus haagi*; 55, *Megadytes glaucus*; 56, *Megadytes magnus* Trémouilles & Bachmann; 57, *Megadytes robustus* (Aubé); 58, *Megadytes marginithorax* (Perty); 59, *Thermonectus succinctus*; 60, *Hydaticus tuyuensis*. NA: nasale, OS: occipital suture (sutura occipital), TSS: temporal spiniform setae (setas espiniformes temporales). Fig. 49 modified from Michat & Alarie (2008); Fig. 50 modified from Michat & Alarie (2006); Fig. 51 modified from Michat & Torres (2008); Fig. 52 modified from Michat (2006a); Fig. 53 modified from Michat & Archangelsky (2007); Fig. 54 modified from Michat & Torres (2005a); Figs. 55, 56, 57 modified from Michat (2006b); Fig. 58 modified from Ferreira-Jr. (1995); Fig. 59 modified from Michat & Torres (2005b); Fig. 60 modified from Michat & Torres (2006a).



Figs. 61-77. Dytiscidae, third-instar larva. 61-64, head, dorsal view: 61, *Copelatus* sp.; 62, *Rhantus calileguai*; 63, *Laccophilus obliquatus*; 64, *Lancetes marginatus*. 65, *Notaticus fasciatus* Zimmermann, labium, ventral view. 66, *Rhantus calileguai*, body, lateral view. 67-68, prothoracic leg, anterior view: 67, *Pachydrus obesus*; 68, *Hydrovatus caraibus*. 69-70, prothoracic leg, posterior view: 69, *Leuronectes curtulus*; 70, *Laccophilus obliquatus*. 71, *Megadytes glaucus*, urogomphi, ventral view. 72-77, last abdominal segment and urogomphi, dorsal view: 72, *Thermonectus succinctus*; 73, *Agaporomorphus* sp.; 74, *Rhantus calileguai*; 75, *Leuronectes curtulus*; 76, *Laccophilus obliquatus*; 77, *Lancetes marginatus*. OS: occipital suture (sutura occipital). Figs. 63, 70, 76 modified from Michat (2008); Figs. 64, 77 modified from Michat *et al*. (2005); Fig. 65 modified from Miller *et al*. (2007); Fig. 67 modified from Michat & Torres (2008); Fig. 68 modified from Michat (2006a); Fig. 72 modified from Michat & Torres (2005b).

19. Occipital suture present (Figs. 61-62)...20
Occipital suture absent (Figs. 63-64) 22

20. Mandibles without closed channel, with robust denticles on internal margin (Fig. 25); internal margin of stipes with three robust denticles (Fig. 29); anterolateral lobes of frontoclypeus inconspicuous (Fig. 61) .... *Copelatus* Erichson
Mandibles with closed channel, without robust denticles on internal margin (Fig. 26); internal margin of stipes without robust denticles; anterolateral lobes of frontoclypeus well developed (Fig. 62) 21

21. Head width less than 2.30 mm in instar II and less than 3.50 mm in instar III; distribution: all throughout Argentina, from sea level to high altitudes ..... *Rhantus* Dejean
Head width more than 2.50 mm in instar II and more than 3.70 mm in instar III; distribution: Jujuy and Tucumán Provinces, at altitudes higher than 2000 m ..... *Bunites* Spangler

22. Length of last abdominal segment greater than head width (Fig. 73) .... *Agaporomorphus?* Zimmermann
Length of last abdominal segment smaller than head width (Figs. 75-77) 23

23. Urogomphi short, less than twice head width, without secondary setae (Fig. 75); tibia and tarsus without natatory setae (Fig. 69) ..... *Leuronectes* Sharp
Urogomphi elongate, more than twice head width, with numerous secondary setae (Figs. 76-77); tibia and tarsus with natatory setae on dorsal margin (Fig. 70) 24

24. Lateral margin of parietal with 2-3 elongate, spiniform, temporal setae (Fig. 63); urogomphi less than 3.30 times head width ..... *Laccophilus* Leach
Lateral margin of parietal with several (more than 6) short, spiniform, temporal setae (Fig. 64); urogomphi more than 3.60 times head width ..... *Lancetes* Sharp

Clave para estadios larvales

1. Ovirruptores presentes (Figs. 1-18); setas espiniformes temporales ausentes .... Larva I
Ovirruptores ausentes; setas espiniformes temporales generalmente presentes (Figs. 49-51, 54, 60-64) 2

2. Espiráculos ausentes en el margen lateral del mesotórax y de los segmentos abdominales I-VII ..... Larva II
Espiráculos presentes en el margen lateral del mesotórax y de los segmentos abdominales I-VII (Fig. 66) .... Larva III

Clave para larvas I

1. Nasale presente (Figs. 1-9) 2
Nasale ausente (Figs. 10-18) 12

2. Sutura occipital presente (Fig. 2) 3
Sutura occipital ausente (Figs. 1, 3-9) 4

3. Troncos traqueales no proyectados desde el ápice del sifón; poro PAk ausente ..... *Amarodytes* Régimbart
Troncos traqueales proyectados desde el ápice del sifón (Figs. 41-42); poro PAk presente ..... *Celina* Aubé

4. Nasale subtriangular (Figs. 1-5) 5
Nasale con márgenes laterales subparalelos (Figs. 6-9) 8

5. Cardo no fusionado al estipes (Fig. 27); márgenes laterales del prementum con espínulas largas (Fig. 31); seta AB15 presente; poro ABc presente .... *Laccornellus* Roughley & Wolfe
Cardo fusionado al estipes (Fig. 28); márgenes laterales del prementum sin espínulas (Fig. 32); seta AB15 ausente; poro ABc ausente 6

6. Espínula ventroapical del tercer

antenómero presente (Fig. 19); distribución: provincia de Salta .... *Hypodessus* Guignot
Espínula ventroapical del tercer antenómero ausente (Fig. 20) 7

7. Longitud del último segmento abdominal más de 0.65 veces el ancho de la cabeza; longitud del urogonfo más de 3.20 veces el ancho de la cabeza; longitud del primer urogonfómero menos de 1.20 veces la longitud del segundo .... *Anodocheilus* Babington
Longitud del último segmento abdominal menos de 0.60 veces el ancho de la cabeza; longitud del urogonfo menos de 2.80 veces el ancho de la cabeza; longitud del primer urogonfómero más de 1.30 veces la longitud del segundo ..... *Liodessus* Guignot

8. Nasale con proyecciones laterales (Figs. 6-7) 9
Nasale sin proyecciones laterales (Figs. 8-9) 11

9. Proyecciones laterales del nasale cortas, simples apicalmente (Fig. 6) .... *Pachydrus* Sharp
Proyecciones laterales del nasale muy largas, bífidas apicalmente (Fig. 7) 10

10. Longitud del cuarto antenómero 1/4 de la longitud del tercero (Fig. 21) .... *Vatellus* Aubé
Longitud del cuarto antenómero casi 1/2 de la longitud del tercero (Fig. 22) .... *Derovatellus* Sharp

11. Prementum mucho más largo que ancho (Fig. 33); segundo palpómero labial ancho, robusto, redondeado apicalmente (Fig. 33); poros PAm y PAo presentes .... *Desmopachria* Babington
Prementum aproximadamente tan largo como ancho (Fig. 34); segundo palpómero labial delgado, aguzado apicalmente (Fig. 34); poros PAm y PAo ausentes .... *Hydrovatus* Motschulsky

12. Margen anterior del frontoclípeo profundamente sinuado (Figs. 10, 55-58); urogonfos reducidos a pequeños tubérculos ventrales (Fig. 71).... *Megadytes* Sharp 13
Margen anterior del frontoclípeo regularmente curvado (Figs. 11-18); urogonfos bien desarrollados (Figs. 72-77) 16

13. Proyección media del frontoclípeo aguzada apicalmente, casi glabra (Fig. 57); mandíbula regularmente curvada, sin un anillo de setas en el tercio distal (Fig. 57) ..... *M. (Trifurcitus)* Brinck
Proyección media del frontoclípeo truncada apicalmente, con muchas setas apicales (Figs. 55-56, 58); mandíbula con el tercio distal más fuertemente proyectado hacia adentro, llevando un anillo de setas largas (Figs. 55-56, 58) 14

14. Emarginación entre la proyección media y cada proyección lateral del frontoclípeo muy angosta (Fig. 58)..... ..... *M. (Megadytes)* Sharp
Emarginación entre la proyección media y cada proyección lateral del frontoclípeo ancha (Figs. 55-56) 15

15. Proyecciones laterales del frontoclípeo simples (Fig. 56) .... *M. (Bifurcitus)* Brinck
Proyecciones laterales del frontoclípeo bífidas (Fig. 55) ..... *M. (Paramegadytes)* Trémouilles & Bachmann

16. Último segmento abdominal con una hilera lateral de setas natatorias (Fig. 43); protórax con un esclerito ventral 17
Último segmento abdominal sin una hilera lateral de setas natatorias (Figs. 44-48); protórax sin escleritos ventrales 19

17. Proceso medio del prementum ausente (Fig. 65) ..... *Notaticus* Zimmermann
Proceso medio del prementum presente (Figs. 35-36) 18

18. Cuerpo arqueado medialmente, giboso

en vista lateral (Fig. 37); los dos stemmata anterodorsales muy grandes (Fig. 11); proceso medio del prementum simple (Fig. 35) ..... *Thermonectus* Dejean
Cuerpo no arqueado medialmente, no giboso en vista lateral (Fig. 38); los dos stemmata anterodorsales similares a los demás (Fig. 12); proceso medio del prementum bífido (Fig. 36) .... *Hydaticus* Leach

19. Sutura occipital presente (Figs. 13-14) … 20
Sutura occipital ausente (Figs. 15-18) 21

20. Frontoclípeo y parietales con setas adicionales (Fig. 14); tibia con setas adicionales anterodorsales (Fig. 39); último segmento abdominal con muchas setas adicionales (Fig. 45); distribución: provincias de Jujuy y Tucumán, en altitudes mayores a 2.000 m .... *Bunites* Spangler
Frontoclípeo y parietales sin setas adicionales (Fig. 13); tibia sin setas adicionales anterodorsales (Fig. 40); último segmento abdominal sin setas adicionales (Fig. 44); distribución: en toda la Argentina, desde el nivel del mar hasta grandes altitudes .... *Rhantus* Dejean

21. Mandíbulas sin surco cerrado, con dentículos robustos en el margen interno (Fig. 25); margen interno del estipes con tres dentículos robustos (Fig. 29); lóbulos anterolaterales del frontoclípeo inconspicuos (Fig. 15) .... *Copelatus* Erichson
Mandíbulas con surco cerrado, sin dentículos robustos en el margen interno (Fig. 26); margen interno del estipes sin dentículos robustos (Fig. 30); lóbulos anterolaterales del frontoclípeo bien desarrollados (Figs. 16-18) 22
22. Último segmento abdominal largo, de longitud mayor que el ancho de la cabeza (Fig. 73)..... .....*Agaporomorphus*? Zimmermann
Último segmento abdominal corto, de longitud menor que la mitad del ancho de la cabeza (Figs. 46-48) 23

23. Margen anterior del frontoclípeo con 10 setas espatuladas (Fig. 16); último segmento abdominal con una seta adicional robusta en el margen lateral (Fig. 46) ..... *Leuronectes* Sharp
Margen anterior del frontoclípeo con dos setas espatuladas (Figs. 17-18); último segmento abdominal sin setas adicionales (Figs. 47-48) 24

24. Frontoclípeo truncado posteriormente, con los ovirruptores ubicados en los ángulos posterolaterales (Fig. 17); cuarto antenómero de 1/3 de la longitud del tercero (Fig. 23); poro ABc ausente .... *Laccophilus* Leach
Frontoclípeo aguzado posteriormente, con los ovirruptores ubicados en los márgenes laterales (Fig. 18); cuarto antenómero de longitud similar al tercero (Fig. 24); poro ABc presente ..... *Lancetes* Sharp

Clave para larvas II-III

1. Nasale presente (Figs. 49-54) 2
Nasale ausente (Figs. 55-64) 12

2. Troncos traqueales proyectados desde el ápice del sifón (Figs. 41-42) .... *Celina* Aubé
Troncos traqueales no proyectados desde el ápice del sifón 3

3. Nasale subtriangular (Figs. 49-50) 4
Nasale con márgenes laterales subparalelos (Figs. 51-54) 8

4. Cardo no fusionado al estipes (Fig. 27); márgenes laterales del prementum con espínulas largas (Fig. 31) .... *Laccornellus* Roughley & Wolfe
Cardo fusionado al estipes (Fig. 28); márgenes laterales del prementum sin espínulas (Fig. 32) 5

5. Espínula ventroapical del tercer antenómero presente (Fig. 19) 6

Espínula ventroapical del tercer antenómero ausente (Fig. 20) 7

6. Poro PAk presente; larva predominantemente testácea a marrón clara, patrón de coloración de la cabeza como en la Fig. 49; distribución: provincia de Salta .... *Hypodessus* Guignot
Poro PAk ausente; larva predominantemente marrón oscura, patrón de coloración de la cabeza como en la Fig. 50; distribución: provincia de Misiones .... *Amarodytes* Régimbart

7. Longitud del último segmento abdominal más de 0.85 veces el ancho de la cabeza; longitud del primer urogonfómero menos de 0.95 veces la longitud del segundo ..... *Anodocheilus* Babington
Longitud del último segmento abdominal menos de 0.70 veces el ancho de la cabeza; longitud del primer urogonfómero más de 1.05 veces la longitud del segundo .... *Liodessus* Guignot

8. Sutura occipital ausente (Figs. 51-52) … 9
Sutura occipital presente (Figs. 53-54) ... 10

9. Nasale con proyecciones laterales (Fig. 51); fémures con setas natatorias en el margen ventral (Fig. 67) .... *Pachydrus* Sharp
Nasale sin proyecciones laterales (Fig. 52); fémures sin setas natatorias en el margen ventral (Fig. 68) ..... *Hydrovatus* Motschulsky

10. Nasale sin proyecciones laterales (Fig. 53); prementum mucho más largo que ancho (Fig. 33) ..... *Desmopachria* Babington
Nasale con proyecciones laterales (Fig. 54); prementum aproximadamente tan largo como ancho 11

11. Longitud del cuarto antenómero 1/5-1/6 de la longitud del tercero (Fig. 21) …… ..... *Vatellus* Aubé
Longitud del cuarto antenómero algo más de 2/5 de la longitud del tercero (Fig. 22) ..... *Derovatellus* Sharp

12. Margen anterior del frontoclípeo profundamente sinuado (Figs. 55-58); urogonfos reducidos a pequeños tubérculos ventrales (Fig. 71) .... *Megadytes* Sharp 13
Margen anterior del frontoclípeo regularmente curvado (Figs. 59-64); urogonfos bien desarrollados (Figs. 72-77) 16

13. Proyección media del frontoclípeo aguzada apicalmente, casi glabra (Fig. 57); mandíbula regularmente curvada, sin un anillo de setas en el tercio distal (Fig. 57) .... *M. (Trifurcitus)* Brinck
Proyección media del frontoclípeo truncada apicalmente, con muchas setas apicales (Figs. 55-56, 58); mandíbula con el tercio distal más fuertemente proyectado hacia adentro, llevando un anillo de setas largas (Figs. 55-56, 58) 14

14. Emarginación entre la proyección media y cada proyección lateral del frontoclípeo muy angosta (Fig. 58) .... *M. (Megadytes)* Sharp
Emarginación entre la proyección media y cada proyección lateral del frontoclípeo ancha (Figs. 55-56) …15

15. Proyecciones laterales del frontoclípeo simples (Fig. 56) .... *M. (Bifurcitus)* Brinck
Proyecciones laterales del frontoclípeo bífidas (Fig. 55) ..... *M. (Paramegadytes)* Trémouilles & Bachmann

16. Último segmento abdominal con una hilera lateral de setas natatorias (Fig. 72); protórax con un esclerito ventral 17
Último segmento abdominal sin una hilera lateral de setas natatorias (Figs. 73-77); protórax sin escleritos ventrales 19

17. Proceso medio del prementum ausente

(Fig. 65) .... *Notaticus* Zimmermann
Proceso medio del prementum presente (Figs. 35-36) 18

18. Cuerpo arqueado medialmente, giboso en vista lateral (Fig. 37); los dos stemmata anterodorsales muy grandes (Fig. 59); proceso medio del prementum simple (Fig. 35) ..... *Thermonectus* Dejean
Cuerpo no arqueado medialmente, no giboso en vista lateral (Fig. 38); los dos stemmata anterodorsales similares a los demás (Fig. 60); proceso medio del prementum bífido (Fig. 36) ..... *Hydaticus* Leach

19. Sutura occipital presente (Figs. 61-62) … 20
Sutura occipital ausente (Figs. 63-64) 22

20. Mandíbulas sin surco cerrado, con dentículos robustos en el margen interno (Fig. 25); margen interno del estipes con tres dentículos robustos (Fig. 29); lóbulos anterolaterales del frontoclípeo inconspicuos (Fig. 61) ..... *Copelatus* Erichson
Mandíbulas con surco cerrado, sin dentículos robustos en el margen interno (Fig. 26); margen interno del estipes sin dentículos robustos; lóbulos anterolaterales del frontoclípeo bien desarrollados (Fig. 62)..... 21

21. Ancho de la cabeza menor que 2.30 mm en la larva II y menor que 3.50 mm en la larva III; distribución: en toda la Argentina, desde el nivel del mar hasta grandes altitudes ....….. *Rhantus* Dejean
Ancho de la cabeza mayor que 2.50 mm en la larva II y mayor que 3.70 mm en la larva III; distribución: provincias de Jujuy y Tucumán, en altitudes mayores a 2.000 m .... *Bunites* Spangler

22. Longitud del último segmento abdominal mayor que el ancho de la cabeza (Fig. 73) ..... *Agaporomorphus*? Zimmermann
Longitud del último segmento abdominal menor que el ancho de la cabeza (Figs. 75-77) 23

23. Urogonfos cortos, menos del doble del ancho de la cabeza, sin setas secundarias (Fig. 75); tibia y tarso sin setas natatorias (Fig. 69) ..... *Leuronectes* Sharp
Urogonfos largos, más del doble del ancho de la cabeza, con muchas setas secundarias (Figs. 76-77); tibia y tarso con setas natatorias en el margen dorsal (Fig. 70) 24

24. Margen lateral del parietal con 2-3 setas espiniformes temporales largas (Fig. 63); urogonfos de menos de 3.30 veces el ancho de la cabeza ..... *Laccophilus* Leach
Margen lateral del parietal con varias (más de 6) setas espiniformes temporales cortas (Fig. 64); urogonfos de más de 3.60 veces el ancho de la cabeza ..... *Lancetes* Sharp

DISCUSSION

When using the keys presented here, the following considerations should be kept in mind:

1. The larvae of four genera of the tribe Bidessini (*Bidessonotus*, *Brachyvatus*, *Hemibidessus* and *Neobidessus*) are unknown. In Argentina, the genus *Bidessonotus* is known only from Jujuy Province, where Torres *et al*. (2008) reported the finding of an unidentified species. The only species of *Brachyvatus* present in Argentina (*B. acuminatus* (Steinheil)) is known only from Buenos Aires and Entre Ríos Provinces (Trémouilles, 1995; Torres *et al.*, 2007). However, it is possible that this species is also present in other provinces of NE Argentina. *Hemibidessus* is represented in Argentina by a single species (*H. spangleri* Miller), recorded from Buenos Aires and Santa Fe Provinces (Trémouilles, 1995; Miller, 2000). A single species of

Neobidessus (*N. curticornis* (Régimbart)) is present in Argentina, in Salta Province (Young, 1981; Trémouilles, 1995, 1998). As the four genera mentioned above belong to the tribe Bidessini, probably their larvae are morphologically very similar to those of the other Bidessini genera (included in the keys). As a consequence, when a larva of Bidessini coming from any of the provinces mentioned above is identified, the possibility that it belongs to one of the unknown genera should not be discarded.

2. The genus *Cybister* could not be included in the keys due to the lack of material and of adequate larval descriptions in the literature. Only *C. puncticollis* (Brullé) has been recorded from Argentina, from Chaco, Formosa and Santa Fe Provinces (Trémouilles & Bachmann, 1980; Michat, pers. obs.). The larvae of *Cybister* will surely be identified as *Megadytes* Sharp with the keys presented here, and within *Megadytes*, will probably be identified as any of the subgenera with the exception of *Trifurcitus* Brinck.

3. For some genera we did not have access to material of all larval instars (Table I). However, those genera were included in all the keys, extrapolating characters from the known instars. This procedure is supported by the great stability exhibited by the characters used among the larval instars.

4. Even though distributional data for the Argentinean genera of Dytiscidae are not yet known in detail, this aspect can be used as an additional criterion to help in the identification process. Therefore, in some couplets distributional data were used in combination with morphological data to separate genera.

5. Due to the small size of many dytiscid larvae, it is very useful that the identification be done using a compound microscope rather than a stereoscopic microscope. Unfortunately, this procedure requires an additional effort because the larvae need to be mounted on slides, and preferably cleared previously (see Material and Methods). However, it is impossible to visualize some of the characters mentioned in the keys (especially the chaetotaxic ones) through the observation with a stereoscopic microscope. In the construction of the keys, an emphasis was given to include easily seen and identifiable characters, but this was impossible in some cases due to the great morphological similarity of some groups.

6. The genus *Agaporomorphus* was included in the keys on the basis of some larval specimens collected in Misiones Province, where the genus is known to be present. However, according to the size of the larvae, the possibility that they belong to a recently discovered (Michat, pers. obs.), unidentified genus of the subfamily Laccophilinae instead of *Agaporomorphus* cannot be discarded. For this reason, a question mark is included in the keys after *Agaporomorphus*. Further sampling is needed before making a definitive conclusion about this matter.

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LITERATURE CITED

1. ALARIE, Y. 1991. Primary setae and pores on the cephalic capsule and head appendages of larval Hydroporinae (Coleoptera: Dytiscidae: Hydroporinae). *Can. J. Zool.* 69: 2255-2265.
2. ALARIE, Y. 1995. Primary setae and pores on the legs, the last abdominal segment, and the urogomphi of larvae of Nearctic Colymbetinae (Coleoptera: Adephaga: Dytiscidae) with an analysis of their phylogenetic relationships. *Can. Entomol.* 127: 913-943.
3. ALARIE, Y. 1998. Phylogenetic relationships of Nearctic Colymbetinae (Coleoptera: Adephaga: Dytiscidae) based on chaetotaxic and porotaxic analysis of head capsule and appendages of larvae. *Can. Entomol.* 130: 803-824.
4. ALARIE, Y., M. ARCHANGELSKY, A. N. NILSSON & C. H. S. WATTS. 2002. Larval morphology of the genus *Lancetes* (Coleoptera: Adephaga: Dytiscidae): the hypothesis of sister-group relationship with the subfamily Dytiscinae revisited. *Can. Entomol.* 134: 467-501.

5. ALARIE, Y. & P. P. HARPER. 1990. Primary setae and pores on the last abdominal segment and the urogomphi of larval Hydroporinae (Coleoptera: Adephaga: Dytiscidae), with notes on other dytiscid larvae. *Can. J. Zool.* 68: 368-374.
6. ALARIE, Y., P. P. HARPER & A. MAIRE. 1990. Primary setae and pores on legs of larvae of Nearctic Hydroporinae (Coleoptera: Dytiscidae). *Quaest. Entomol.* 26: 199-210.
7. ALARIE, Y. & M. C. MICHAT. 2007a. Primary setae and pores on the maxilla of larvae of the subfamily Hydroporinae (Coleoptera: Adephaga: Dytiscidae): ground plan pattern reconsidered. *Coleopt. Bull.* 61: 310-317.
8. ALARIE, Y. & M. C. MICHAT. 2007b. Phylogenetic analysis of Hydroporinae (Coleoptera: Dytiscidae) based on larval morphology, with description of first instar of *Laccornellus lugubris*. *Ann. Entomol. Soc. Am.* 100: 655-665.
9. ALARIE, Y., M. C. MICHAT, M. ARCHANGELSKY & H. M. BARBER-JAMES. 2007. Larval morphology of *Liodessus* Guignot, 1939: generic characteristics, descriptions of five species and comparisons with other members of the tribe Bidessini (Coleoptera: Dytiscidae: Hydroporinae). *Zootaxa* 1516: 1-21.
10. ALARIE, Y., A. N. NILSSON, L. HENDRICH & C. H. S. WATTS. 2000. Larval morphology of four genera of Laccophilinae (Coleoptera: Adephaga: Dytiscidae) with an analysis of their phylogenetic relationships. *Insect Syst. Evol.* 31: 121-164.
11. ALARIE, Y., C. H. S. WATTS & A. N. NILSSON. 2001. Larval morphology of the tribe Matini (Coleoptera: Dytiscidae: Colymbetinae): descriptions of *Batrachomatus daemeli*, *Matus bicarinatus*, and *Allomatus nannup* and phylogenetic relationships. *Can. Entomol.* 133: 165-196.
12. ARCHANGELSKY, M. 1997. Studies on the biology, ecology, and systematics of the immature stages of New World Hydrophiloidea (Coleoptera: Staphyliniformia). *Bull. Ohio Biol. Surv.* 12(1): 1-207.
13. BACHMANN, A. O. & E. R. TRÉMOUILLES. 1981. El género *Lancetes* en la Argentina continental (Coleoptera, Dytiscidae). *Physis, Secc. B* 39(97): 103-118.
14. BACHMANN, A. O. & E. R. TRÉMOUILLES. 1982. El género *Bunites* Spangler (Coleoptera, Dytiscidae), nuevo para la Argentina. *Physis, Secc. B* 40(99): 109-110.
15. BALKE, M. 1992. Taxonomische Untersuchungen an neotropischen Wasserkäfern der Gattung *Rhantus* Dejean (Insecta: Coleoptera: Dytiscidae). *Reichenbachia* 29(6): 27-39.
16. BALKE, M. 2005. Dytiscidae Leach, 1815. *In:* Beutel, R. G. & Leschen, R. A. B. (Eds.), *Handbook of Zoology, volume 4, Arthropoda: Insecta. Part 38. Coleoptera, volume 1: Morphology and Systematics (Archostemata, Adephaga, Myxophaga, Polyphaga (partim)*. Walter de Gruyter, Berlin, New York, pp. 90-116.
17. FERREIRA-JR., N. 1995. Description of the larvae of *Megadytes fallax* (Aubé) and *M. marginithorax* (Perty) (Coleoptera: Dytiscidae). *Coleopt. Bull.* 49: 313-318.
18. FIORI, G. 1949. Contributi alla conoscenza morfologica ed etologica dei coleotteri. III. Le larve dell'*Acilius sulcatus* L. e del *Cybister lateralimarginalis* De Geer (Dytiscidae). *Boll. Ist. Entomol. Univ. Bologna* 17: 234-264.
19. GALEWSKI, K. 1971. A study on morphobiotic adaptations of European species of the Dytiscidae (Coleoptera). *Pol. Pis. Entomol.* 41: 487-702.
20. JÄCH, M. & M. BALKE. 2008. Global diversity of water beetles (Coleoptera) in freshwater. *Hydrobiologia* 595: 419-442.
21. LARSON, D. J. 1975. The predaceous water beetles (Coleoptera: Dytiscidae) of Alberta: systematics, natural history and distribution. *Quaest. Entomol.* 11: 245-498.
22. MICHAT, M. C. 2005. Larval morphology and phylogenetic relationships of *Bunites distigma* (Brullé) (Coleoptera: Dytiscidae: Colymbetinae: Colymbetini). *Coleopt. Bull.* 59: 433-447.
23. MICHAT, M. C. 2006a. The phylogenetic position of *Hydrovatus* Motschulsky: evidence from larval morphology of *H. caraibus* Sharp (Coleoptera: Dytiscidae: Hydroporinae). *Insect Syst. Evol.* 37: 419-432.
24. MICHAT, M. C. 2006b. Descriptions of larvae of *Megadytes* (Coleoptera: Dytiscidae: Dytiscinae): The hypothesis of monophyletic origin revisited. *Eur. J. Entomol.* 103: 831-842.
25. MICHAT, M. C. 2008. Description of the larvae of three species of *Laccophilus* Leach and comments on the phylogenetic relationships of the Laccophilinae (Coleoptera: Dytiscidae). *Zootaxa* 1922: 47-61.
26. MICHAT, M. C. & Y. ALARIE. 2006. The larvae of *Amarodytes duponti* (Aubé) (Coleoptera: Dytiscidae: Hydroporinae), with comments on Bidessini larval morphology and chaetotaxy. *Zootaxa* 1351: 1-13.
27. MICHAT, M. C. & Y. ALARIE. 2008. Morphology and chaetotaxy of larval *Hypodessus cruciatus* (Régimbart) (Coleoptera: Dytiscidae: Hydroporinae), and analysis of the phylogenetic relationships of the Bidessini based on larval characters. *Stud. Neotr. Faun. Env.* 43: 135-146.
28. MICHAT, M. C., Y. ALARIE, P. L. M. TORRES & Y. S. MEGNA. 2007. Larval morphology of the diving beetle *Celina* and the phylogeny of ancestral hydroporines (Coleoptera: Dytiscidae: Hydroporinae). *Invert. Syst.* 21: 239-254.
29. MICHAT, M. C. & M. ARCHANGELSKY. 2007. Descriptions of larvae of *Desmopachria* Babington (Coleoptera: Dytiscidae: Hydroporinae): the *D. vicina* Sharp species group. *Coleopt. Bull.* 61: 264-276.
30. MICHAT, M. C., M. ARCHANGELSKY & P. L. M. TORRES. 2005. Descriptions of the preimaginal stages of *Lancetes marginatus* (Steinheil) and *L. biremis* Říha (Coleoptera: Dytiscidae), and comparative notes with other *Lancetes* larvae. *Stud. Neotr. Faun. Env.* 40: 129-142.
31. MICHAT, M. C. & P. L. M. TORRES. 2005a. Larval morphology of *Macrovatellus haagi* (Wehncke) and phylogeny of Hydroporinae (Coleoptera: Dytiscidae). *Insect Syst. Evol.* 36: 199-217.
32. MICHAT, M. C. & P. L. M. TORRES. 2005b. Larval morphology of *Thermonectus succinctus* (Aubé 1838) (Coleoptera: Dytiscidae: Dytiscinae), with biological notes and chaetotaxic analysis. *Aquat. Insects* 27: 281-292.
33. MICHAT, M. C. & P. L. M. TORRES. 2006a. *Hydaticus tuyuensis* Trémouilles (Coleoptera: Dytiscidae): larval morphology and phylogenetic relationships within Dytiscinae. *Hydrobiologia* 563: 479-492.
34. MICHAT, M. C. & P. L. M. TORRES. 2006b. The unknown larva of *Anodocheilus* Babington (Coleoptera: Dytiscidae: Hydroporinae: Bidessini): description of *A. maculatus* Babington and chaetotaxic considerations. *Trans. Am. Entomol. Soc.* 132: 431-444.
35. MICHAT, M. C. & P. L. M. TORRES. 2008. On the systematic position of the diving-beetle genus *Pachydrus* (Coleoptera: Dytiscidae: Hydroporinae): evidence from larval chaetotaxy and morphology. *Eur. J. Entomol* 105: 737-750

36. MILLER, K. B. 2000. Revision of the Neotropical genus *Hemibidessus* Zimmermann (Coleoptera: Dytiscidae: Hydroporinae: Bidessini). *Aquat. Insects* 23: 253-275.
37. MILLER, K. B. 2001. On the phylogeny of the Dytiscidae (Insecta: Coleoptera) with emphasis on the morphology of the female reproductive system. *Insect Syst. Evol.* 32: 45-92.
38. MILLER, K. B. 2002. Revision of the subfamily Hydrodytinae Miller (Coleoptera: Dytiscidae) with description of a new genus. *Insect Syst. Evol.* 33: 1-8.
39. MILLER, K. B. 2005. Revision of the New World and south-east Asian Vatellini (Coleoptera: Dytiscidae: Hydroporinae) and phylogenetic analysis of the tribe. *Zool. J. Linn. Soc.* 144: 415-510.
40. MILLER, K. B., Y. ALARIE & M. F. WHITING. 2007. Description of the larva of *Notaticus fasciatus* (Coleoptera: Dytiscidae) associated with adults using DNA sequence data. *Ann. Entomol. Soc. Am.* 100: 787-797.
41. NILSSON, A. N. 1988. A review of primary setae and pores on legs of larval Dytiscidae (Coleoptera). *Can. J. Zool.* 66: 2283-2294.
42. NILSSON, A. N. 2001. *World Catalogue of Insects, volume 3: Dytiscidae (Coleoptera)*. Apollo Books, Stenstrup, Denmark.
43. NILSSON, A. N. 2003. World Catalogue of Dytiscidae - corrections and additions, 1 (Coleoptera: Dytiscidae). *Koleopt. Rdsch.* 73: 65-74.
44. NILSSON, A. N. 2004. World Catalogue of Dytiscidae - corrections and additions, 2 (Coleoptera: Dytiscidae). *Koleopt. Rdsch.* 74: 157-174.
45. NILSSON, A. N. & H. FERY. 2006. World Catalogue of Dytiscidae - corrections and additions, 3 (Coleoptera: Dytiscidae). *Koleopt. Rdsch.* 76: 55-74.
46. RIBERA, I., A. N. NILSSON & A. P. VOGLER. 2004. Phylogeny and historical biogeography of Agabinae diving beetles (Coleoptera) inferred from mitochondrial DNA sequences. *Mol. Phyl. Evol.* 30: 545-562.
47. SPANGLER, P. J. 1966. A new species of *Derovatellus* from Guatemala and a description of its larva (Coleoptera: Dytiscidae). *Coleopt. Bull.* 20: 11-18.
48. TORRES, P. L. M., S. A. MAZZUCCONI & M. C. MICHAT. 2007. Los coleópteros y heterópteros acuáticos del Parque Nacional El Palmar (Provincia de Entre Ríos, Argentina): lista faunística, diversidad y distribución. *Rev. Soc. Entomol. Argent.* 66 (3-4): 127-153.
49. TORRES, P. L. M., S. A. MAZZUCCONI, M. C. MICHAT & A. O. BACHMANN. 2008. Los coleópteros y heterópteros acuáticos del Parque Nacional Calilegua (Provincia de Jujuy, Argentina). *Rev. Soc. Entomol. Argent.* 67 (1-2): 127-144.
50. TRÉMOUILLES, E. R. 1984. El género *Rhantus* Dejean en la Argentina (Coleoptera, Dytiscidae). *Physis, Secc. B* 42(102): 9-24.
51. TRÉMOUILLES, E. R. 1989. Contribución para el conocimiento del género *Thermonectus* Dejean en la Argentina y áreas limítrofes (Coleoptera, Dytiscidae). *Rev. Soc. Entomol. Argent.* 46: 95-115.
52. TRÉMOUILLES, E. R. 1995. Dytiscidae: Methlinae-Hydroporinae. *In:* Castellanos, Z. A. de (dir.), *Fauna de Agua Dulce de la República Argentina* 37(1), PROFADU, La Plata, pp. 1-82.
53. TRÉMOUILLES, E. R. 1996. Revisión del género *Hydaticus* Leach en América del Sur, con descripción de tres nuevas especies (Coleoptera, Dytiscidae). *Physis, Secc. B* 52(122-123): 15-32.
54. TRÉMOUILLES, E. R. 1998. Dytiscidae. *In:* Morrone, J. J. & S. Coscarón (dirs.). *Biodiversidad de artrópodos argentinos. Una perspectiva biotaxonómica,* Ediciones Sur, La Plata, pp. 210-217.
55. TRÉMOUILLES, E. R. 2000. Observaciones sobre el género *Leuronectes* Sharp, aspectos de su morfología y distribución geográfica (Coleoptera, Dytiscidae, Agabini). *Rev. Mus. Argent. Cienc. Nat., n.s.* 2: 195-202.
56. TRÉMOUILLES, E. R. & A. O. BACHMANN. 1980. La tribu Cybisterini en la Argentina (Coleoptera, Dytiscidae). *Rev. Soc. Entomol. Argent.* 39: 101-125.
57. TRÉMOUILLES, E. R. & A. O. BACHMANN. 1981. Distribución del género *Notaticus* en la Argentina (Coleoptera, Dytiscidae). *Physis, Secc. B* 39(97): 101-102.
58. TRÉMOUILLES, E. R., A. OLIVA & A. O. BACHMANN. 1995. Insecta Coleoptera. *In:* Lopretto E. C. & G. Tell (eds.), *Ecosistemas de aguas continentales, metodologías para su estudio*, Ediciones Sur, La Plata, pp. 1133-1197.
59. WATTS, C. H. S. 1978. A revision of the Australian Dytiscidae (Coleoptera). *Aust. J. Zool. (Suppl. Ser.)* 57: 1-166.
60. WILSON, C. B. 1923. Water beetles in relation to pondfish culture, with life histories of those found in fishponds at Fairport, Iowa. *Bull. Bur. Fish.* 39: 232-345.
61. YOUNG, F. N. 1974. Review of the predaceous water beetles of genus *Anodocheilus* (Coleoptera: Dytiscidae: Hydroporinae). *Occas. Pap. Mus. Zool., Univ. Mich.* 670: 1-28.
62. YOUNG, F. N. 1981. Predaceous water beetles of the genus *Neobidessus* Young from South America (Coleoptera: Dytiscidae). *Coleopt. Bull.* 35: 317-340.