

A new species of *Berosus* (Coleoptera Hydrophilidae) from Venezuela

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Summary

A new species of *Berosus* (Coleoptera Hydrophilidae) is described from Venezuela : Apure. The male genitalia characters place it in the *subtilis*-complex *sensu* OLIVA, 1989. Characters of external morphology (dorsal sculpture, colour pattern, lateral depressions on first apparent urosternite) also correspond with those described for this species-complex.

Keywords : Coleoptera Hydrophilidae, *Berosus*, Neotropical fauna, wetlands.

Introduction

The genus *Berosus* is one of the most numerous among the Hydrophilidae, and it is represented in all the major regions of the world. In South America, a large number of species has been described, some of them by the author (OLIVA, 1989, 1993, 1998). One interesting feature of the species of *Berosus* is that some are very widespread and others appear to be quite localized. As a rule, widespread species are "pioneer" species exploiting new or rejuvenated habitats, while restricted species are associated, as far as collecting data show, with a special type of habitat. A few species show an intermediate condition : they are moderately widespread and associate with special, but fairly abundant, types of habitats. All these three types of geographical distribution may appear within a single species-complex.

The species-complexes suggested in 1989, based on the general structure of male genitalia, are still useful to study this large and varied genus. The male genitalia of the Hydrophiloidea are of the primitive trilobed type. In the genus *Berosus*, the whole organ has a subcylindrical or compressed shape, in contrast with the less specialized, depressed shape of the genera *Hemiosus* and *Derallus*. The basal piece is open on its tergal face; the base is symmetrical as a rule. The paramera can be flexed upon the basal piece, and in some species-complexes they have inner

membranous appendices (OLIVA, 1989, 1993). The median lobe sometimes is open at the apex, sometimes has a secondary opening; in some rare cases it has dorsal and tergal appendices, never a pair of lateral appendices as in *Hemiosus*.

Material and methods

I received from Lic. Mauricio M. GARCIA, of Venezuela, a series of specimens which proved an undescribed species. The material, fixated in 75% ethanol, was dry-mounted on cardboard triangles. Male genitalia were dissected out and kept in glycerine in microvials of polyethene tube, pinned through by the same pin which holds the specimen. Stoppers were made out of small lengths of turned soft wood.

Measurements were taken under a Zeiss IV/b stereomicroscope.

All the Hydrophilidae Berosinae are very convex in shape, and in the natural attitude of the living insect, the head is declivous. However, no species of the genus *Berosus* that I have examined so far has the ability of rolling up, as stated by HANSEN (1991). The difference between the position of head, prothorax and main body mass when the beetle is walking out of the water and when it is swimming is no greater than may be observed, for instance, in the most common genera of Dermestidae, when the beetle is active and when it has been alarmed by a touch.

To achieve some sort of uniformity in a long series of papers dealing with this genus, the body length has been taken from the frons to the elytral apex. The body width was taken at two points, one between the humeral humps (humeral width) and the other at the broadest part of the outline in dorsal aspect (maximum width). A simple ratio, used before (OLIVA, 1989, 1993, 1998) was calculated to offer some description of the shape :

Body length

maximum width – humeral width

Description of new species

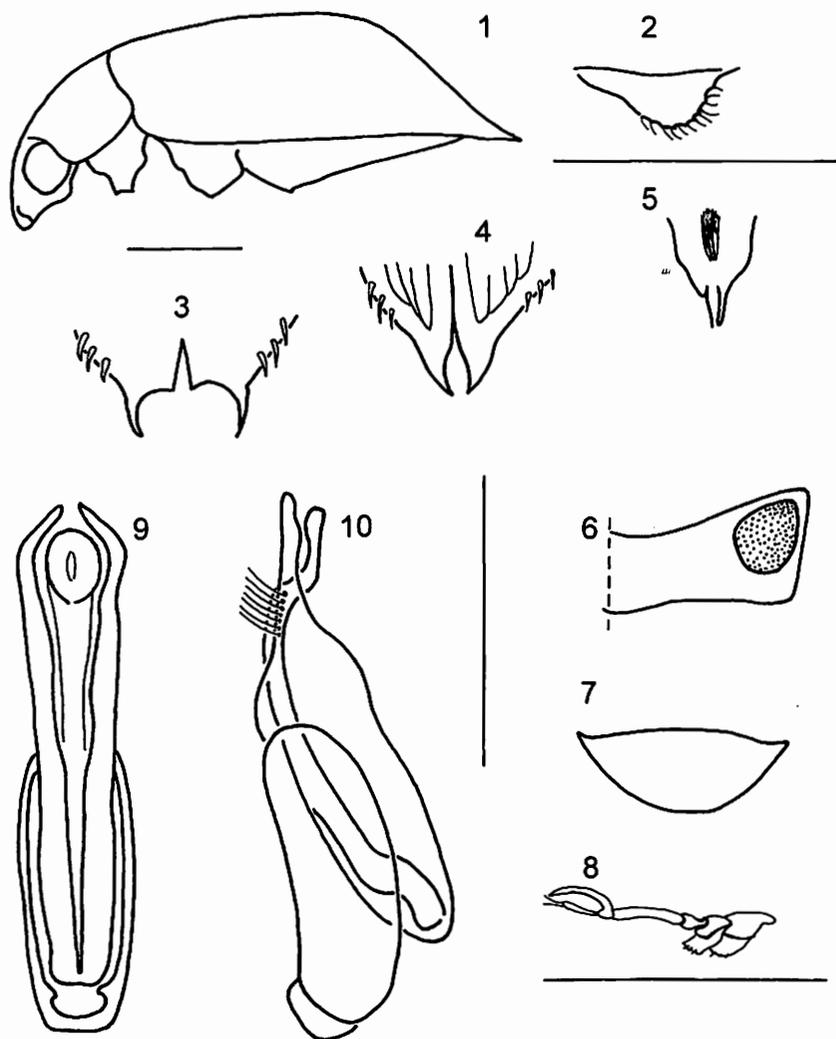
Berosus apure sp. n.

Size moderate : length of male holotype= 4.2 mm; of male Paratype= 4.4; length of females= 4.5-4.8 mm. Shape weakly convex, elongate in dorsal view (Fig. 1). Length / heigh ratio= 2.62 (holotype), 2.26 (male paratype); 3.0, 3.0, 3.06 and 2.93 (females). Length / (maximum width – humeral width) = 10.5 (holotype); 11.0 (paratype); females : 9.4-15.0. The small number of specimens makes statistical treatment non-significant.

Eyes prominent in both sexes. OI= 2.0 (males); 2.0-2.3 (females).

Dorsum testaceous, with small darker areas following the usual pattern : base of frons, two stripes on each side of the medial line on the pronotum, and several small rounded spots on the elytra. Venter testaceous. Legs entirely testaceous in type material.

Head sparsely and finely punctured; punctures on head about as large as one ommatidion. Pronotum with punctures somewhat larger than one ommatidion, dense (spaces smaller than puncture diameter). Background smooth in males, reticulate in



Figs 1-10. *Berosus apure* sp. nov. 1 : habitus, lateral view (schematic). 2 : mesosternal process, lateral view. 3 : elytral apices (male), dorsal view. 4 : elytral apices (female), dorsal view. 5 : metasternal process, ventral view. 6 : left half of first apparent urosternite, indicating place of lateral depression. 7 : fifth apparent urosternite, ventral view. 8 : male protarsus. 9 : male genitalia, tergal view. 10 : idem, lateral view. All the scale-bars = 1 mm.

females. Elytra with narrow, well-impressed striae; interstriae flat, narrow, with punctures a little coarser than those on the pronotum, irregularly uniseriate to triseriate, in the posterior half bearing spine-like hairs. Background reticulate in both sexes, shining in males, somewhat matt in females. Elytral apices with sex dimorphism; in males with an emargination shaped as a quarter of a circle, the inner angle

laid as a straight angle, the outer forming a triangular spine (Fig. 3); in females produced and with a shallow apico-internal emargination, so that the apex forms an acute triangular point (Fig. 4). Mesosternal process (Fig. 2) laminar, without a definite tooth, with the ventral edge convex, finely serrated. Metasternal process (Fig. 5) with strongly raised posterior angle and rounded postero-lateral angles; median depression small, shallow. First apparent urosternite carinate only between posterior coxae; lateral depressions large, rounded (Fig. 6). Fifth urosternite without apical notch (Fig. 7). Lateral edges of apparent urosternites smooth. Femoral pubescence taking up the basal 2/3 of femora; the apical limit weakly convex. Fore tarsi of males (Fig. 8) with adhesive soles on the two apparent basal segments, of which the first is about twice as long as the second. Claws weakly arched.

Male genitalia (Fig. 9-10) : General shape compressed. Basal piece about 2/3 of total length. Paramera broad in basal 2/3, edges convex in lateral view, with a row of long fine hairs; apical 1/3 abruptly narrowed, weakly sinuated, acuminate as in figure 10. Median lobe a little shorter than the paramera, subcylindrical, in lateral view describing a broad curve, convex towards the tergal aspect; apex abruptly curved towards the sternal aspect, in sternal view broadened into a disk-like shape (Fig. 9).

Material examined : Male holotype, female allotype and two female paratypes at the Museo de Artrópodos de la Universidad del Zulia, Maracaibo, Venezuela. One paratype of each sex at the Museo argentino de Ciencias naturales, Buenos Aires, Argentina. Venezuela : Estado de Apure : Municipio de Achagua : Samán de Apure, 3.X.1999, leg. M. GARCÍA and E. GÓMEZ.

Discussion

This species corresponds to the *subtilis*-complex (OLIVA, 1993 : 199). Females would key to couplet 71 which corresponds to *B. ruffinus* ORCHYMONT, 1946, while males would key to *B. subtilis* KNISCH, 1921, if the lack of pronotal micropunctuation in the new species is disregarded. Both described species have a mesosternal process with large, strongly curved anterior tooth, which should allow to distinguish them from *B. apure* sp. n.

Rather than adding to the extant dichotomic key, the author offers here a character matrix (Table 1) for the *subtilis*-complex (OLIVA 1989, 1993). Characters common to all species of this complex are : dorsal surface without metallic sheen, general shape weakly convex, in dorsal aspect regular due to weakly raised humeral humps; spine-like elytral hairs, large lateral depressions on the first apparent urosternite (this character could not be checked for *B. domitus* SPANGLER, 1966), male genitalia compressed, paramera forming a dihedral angle with their sternal edges, acuminate or emarginate at the apex, without inner membranous appendices (as present in the *truncatipennis*-complex), median lobe subcylindrical, with the apex not modified or else swollen abruptly. A complete cladistic-type treatment for all the species described so far from South America is planned.

New keys, however, will have to be provided by taxonomists, since Neotropical species formerly unknown to science keep appearing, and many researchs are undertaken by ecologists and other non-taxonomists. The publication of updated keys every ten years or less would be useful for the whole scientific community. This

appears not feasible in actual practice, as both the number of taxonomists and the resources assigned to them decrease.

Table 1

SPECIES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
<i>B. domitus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
<i>B. ruffinus</i>	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	1
<i>B. speciosus</i>	0	0	1	1	0	1	1	1	1	1	0	1	0	0	0	0	1
<i>B. subtilis</i>	1	1	0	1	0	0	1	1	1	1	1	1	0	0	1	0	0
<i>B. spectatus</i>	1	1	0	0	0	0	1	1	1	1	0	1	0	0	0	0	1
<i>B. unguidentatus</i>	0	0	0	1	0	0	1	1	1	1	1	1	1	1	1	0	0
<i>B. apure</i>	0	0	0	1	1	1	1	1	1	1	0	1	1	0	1	0	1

Legend : 1 : Pronotum with micropunctures (males). 2 : Pronotum with micropunctures (females) 3 : Pronotum reticulate (males) 4 : Pronotum reticulate (females) 5 : Elytra reticulate (males) 6 : Elytra reticulate (females) 7 : Elytral apex modified from primitive shape (produced, emarginate or both) (males) 8 : Elytral apex modified (females) 9 : Elytral apex emarginate (males) 10 : Elytral apex emarginate (females) 11 : Sutural angle produced and acute (males) 12 : Sutural angle produced and acute (females) 13 : Mesosternal process without anterior tooth 14 : Claws bifid. 15 : Median lobe shorter than the paramera. 16 : row of hair-bearing punctures on the paramera merged into a single large puncture bearing a long, thick arista. 17 : Apex of median lobe strongly swollen. The character "reticulate" has been taken as "1" only when the reticulation is extensive and well-defined.

The State (Estado) of Apure is located in southwestern Venezuela (Fig. 11). It is limited on the north by the river Apure, a tributary of the Orinoco. The greater part of the southern limits (coincident with the Venezuela-Colombia frontier) follow the course of the Arauca and the Meta. The territory of Apure state is placed broadly between parallels 6°N and 8°N. The land is largely flat, and it is crossed from West to East by several important tributaries of the Orinoco (of which the main ones are the Arichuma, the Arauca, the Cunaviche, and the Cinaruco). Achaguas, head of the municipality of that name, is sited on the Arichuna. The original vegetation of the whole area was of the savanna type; rainfalls exceed 1,000 mm per year. Human population is rather low.

El Samán de Apure (marked in the map with a star) is close to the northern limit of the state, and thus placed in the middle of the large river plain which makes up most of northwestern Venezuela. This plain is ringed in by mountain chains : the coastal chains (N); the Cordillera de Mérida (NW), the highlands of eastern Colombia (SW); the Guyana Mesa (SE).

Other species of Hydrophilidae Berosinae found at the same locality were : same data as new species : *Berosus minimus* KNISCH, 1921; *B. patruelis* BERG, 1887; *B. truncatipennis* CASTELNAU 1840; *Derallus angustus* SHARP, 1882; *D. paranensis* OLIVA, 1981. Same locality, 28/X/1998, leg. M. GARCÍA : *Berosus minimus*; *B. patruelis*; *B. truncatipennis*, *Derallus angustus*, *D. paranensis*. All these species are common in recent (caused by rain or floods) or rejuvenated (flood, human-associated

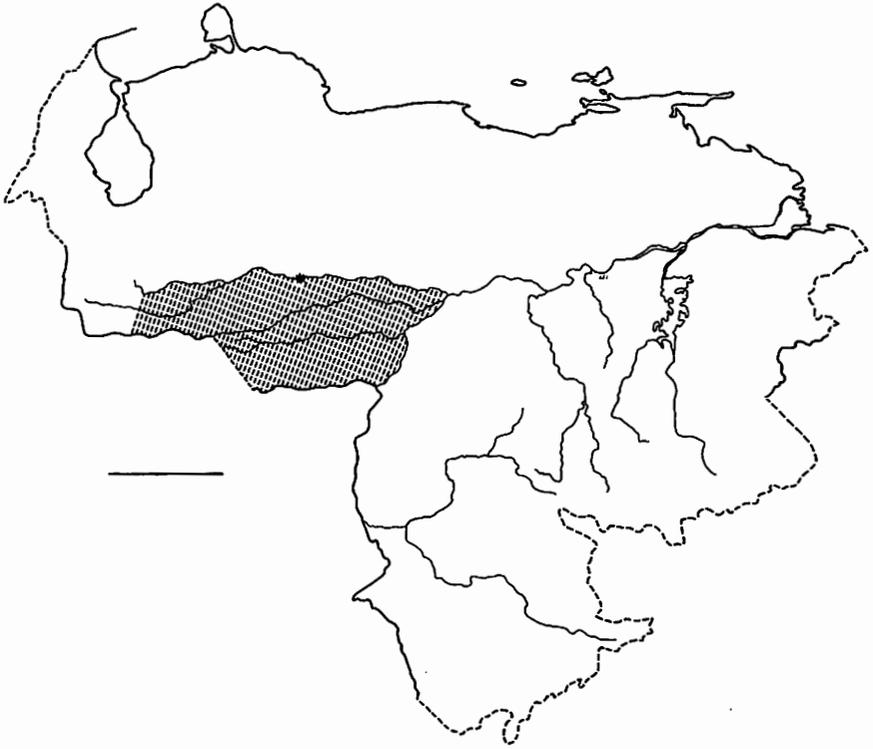


Fig. 11. Map of Venezuela. Dashed : State of Apure. Star : Samán de Apure. Scalebar = 100 km.

alterations in habitat) bodies of water, all over the greater part of South America. The southern limit of distribution is the delta of the Paraná river, save for *B. truncatipennis*, the most southern captures of which occur a little further to the north (Argentina : Entre Ríos : Victoria). Three species, *B. truncatipennis*, *B. minimus* and *D. angustus*, are remarkable for having a truly Neotropical distribution, which extends to Central America; the other ones are found only in South America.

In 1997, the same species of *Berosus* were collected at the same locality, with two additions : *B. marquardtii* KNISCH, 1921 and *B. zimmermanni* KNISCH, 1921. The first was already known from Mato Grosso in Brazil; the second extends from the same locality as far south as Argentina : Entre Ríos : Primero de Mayo (latitude a little S of 32°S).

The faunal association of Hydrophilidae Berosinae found in Apure is not unlike that found in northeastern Argentina, in the Chaco plain or in the so-called Mesopotamia, a local term for the three provinces (Misiones, Corrientes, Entre Ríos) which lay between the rivers Paraná and Uruguay. There is a difference in the latitudinal values, for in Argentina one might find *Berosus truncatipennis* as far south as 33°S, and *B. minimus*, *B. patruelis*, *Derallus angustus*, and *D. paranensis* about 34°S. One can conjecture that widespread species follow the course of rivers, colonizing the

marginal pools produced by seasonal floods. Species with a restricted distribution, like *B. apure* n.sp., might find the mountains an effective barrier; this may stem from some difference in the behaviour of the adults.

Acknowledgements

Very special thanks are extended to Lic. M.M. GARCIA for communicating the most interesting material. The author completed this paper as a Career Researcher of the CONICET (Consejo nacional de investigaciones científicas y tecnológicas).

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