

**Taxonomic revision of the New World species
of the genus *Oosternum* Sharp
(Coleoptera: Hydrophilidae: Sphaeridiinae)
II. The *Oosternum convexum* species group**

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Abstract. The *Oosternum convexum* species group is defined on the basis of external morphological characters. Three species are recognized within the group, all of them endemic to the Cordillera de Talamanca Mts. in Central America: *O. convexum* sp. nov. (Panama, Costa Rica), *O. intermedium* sp. nov. (Costa Rica) and *O. simplex* sp. nov. (Costa Rica). A key to species is provided, along with drawings and SEM photographs of diagnostic characters.

Resumen. El grupo de especies de *O. convexum* es definido sobre la base de los caracteres externos. Se reconocen tres especies en este grupo, todas endémicas de la Cordillera de Talamanca en América Central: *O. convexum* sp. nov. (Panamá, Costa Rica), *O. intermedium* sp. nov. (Costa Rica) y *O. simplex* sp. nov. (Costa Rica). Se presenta una clave para las especies de este grupo y los dibujos o fotografías SEM de los caracteres diagnósticos.

Keywords. Coleoptera, Hydrophilidae, Sphaeridiinae, Megasternini, *Oosternum*, new species, taxonomy, endemism, Neotropical Region, Central America, Cordillera de Talamanca

Introduction

The megasternine genus *Oosternum* Sharp, 1882 contains small to very small terrestrial beetles living mostly in moist leaf litter in tropical and subtropical areas. Based on several external morphological characters, the genus has been divided into ten species groups by FIKÁČEK et al. (2009). Representatives of nine of these species groups occur in the New World,

with the highest number of species known from the northern parts of the Neotropical Region (M. Fikáček, unpubl. data).

This paper is the second of the series of taxonomic revisions of the New World *Oosternum*. It includes a revision of the *Oosternum convexum* group, referred to as ‘*Oosternum* group A’ in the identification key by FIKÁČEK et al. (2009). Here, this species group is erected for three putatively closely related species, which are described and diagnosed in detail.

Material and methods

We have examined 259 specimens of the *Oosternum convexum* species group for this study. All holotypes and some paratypes of each species were dissected. The genitalia were placed on a transparent plastic label below the beetle in water-soluble dimethyl hydantoin formaldehyde resin (DMHF). In the holotype of *O. convexum*, genitalia were mounted on a separate paper-label in a drop of Euparal soluble in 96% alcohol (J. Pedersen, pers. comm.). In some specimens, a mesothoracic leg was cleaned in hot 10% KOH and mounted in the same way as the genitalia.

Label data are cited verbatim, using a slash (/) to divide separate rows and a double-slash (//) to divide separate labels; our notes are mentioned in brackets. All type specimens bear the following type label: ‘HOLOTYPE [or PARATYPE] / *OOSTERNUM* / [*name of the species*] sp. nov. / M. Fikáček det. 2008’. See FIKÁČEK et al. (2009) for additional details on the indication of type specimens.

Drawings of aedeagophores were prepared using a drawing tube attached to an Olympus BX40 compound microscope and photographs were taken by a Nikon Eclipse TS100 compound microscope. Habitus photographs were taken using an Olympus Camedia C-5060 camera attached to an Olympus SZX9 stereo microscope and subsequently edited in Adobe Photoshop 7.0 partly following the procedures described in KAMPSCHROEDER (2004). SEM photographs were prepared in the Laboratory of Electron Microscopy, Section of Biology, Charles University in Prague using a JEOL 6380 LV scanning electron microscope; prior to photographing, specimens were dissected, cleared in hot 10% KOH, and superficial dirt was removed using 30% hydrogen peroxide (see BOLTE (1996) for details).

Morphological terminology and measurements follow FIKÁČEK et al. (2009). Surface structures were examined in diffuse light. The distribution map (Fig. 24) is based on the map of topography of Costa Rica downloaded from http://en.wikipedia.org/wiki/Geography_of_Costa_Rica.

The specimens are deposited in the following collections:

- BMNH Natural History Museum, London, U.K. (M. Barclay);
- CNC Canadian National Collection, Ottawa, Canada (A. Davies, P. Bouchard, A. Smetana);
- FEFU Faculty of Education & Regional Studies, Fukui University, Japan (H. Hoshina);
- FMNH Field Museum of Natural History, Chicago, U.S.A. (A. Newton, M. Thayer);
- INBio Instituto Nacional de Biodiversidad, San Jose, Costa Rica (A. Solis);
- KSEM Natural History Museum, University of Kansas, U.S.A. (A. Short);
- NHMW Naturhistorisches Museum, Wien, Austria (M. Jäch, A. Komarek);
- NMPC National Museum, Prague, Czech Republic (M. Fikáček, J. Hájek);
- SRBC Sergey Ryndevich collection, Baranovichy State Higher Pedagogical College, Belarus;
- ZMUC Zoological Museum, University of Copenhagen, Denmark (A. Solodovnikov).

Taxonomy

Oosternum convexum species group

Differential diagnosis. Eyes very small, separated by 10–11 widths of one eye (Fig. 16); pronotum slightly more convex than elytra, without longitudinal sulci and ridges (Fig. 2); median part of prosternum not demarcated from lateral portions by sharp ridges, only bearing different microsculpture (Fig. 9); elytral interval 2 as wide as interval 3, reaching elytral apex (Fig. 10); elytral series 10 completely absent; lateral margins of elytra with minute denticulation, distinct at least basally (Fig. 11); metathoracic wings absent in all specimens in which this character was examined; preepisternal plate of mesothorax 1.7–2.7× as long as wide (Figs. 19–21); median portion of metaventrite narrow, pentagonal; femoral lines of metaventrite absent (Figs. 19–21).

The species of *O. convexum* group can be easily recognized from other *Oosternum* by the rather convex body, brown to pale brown coloration (Figs. 1–2), very small eyes and finely denticulate elytral margins (distinct especially at elytral base). In all these characters they are similar to *Motonerus apterus* Fikáček & Short, 2006 and *M. oosternoides* Fikáček & Short, 2006, which are also apterous. These two *Motonerus* species can, however, be differentiated from the *O. convexum* group by ventral characters, i.e. the absence of antennal grooves, the median portion of prosternum divided from the lateral parts and bearing an anteromedian excision, very narrow preepisternal elevation of the mesothorax, and absence of anterolateral ridge on the metaventrite (FIKÁČEK & SHORT 2006).

Description. Body in dorsal view elongate oval, widest near midlength; in lateral view highly convex, gradually narrowing posteriad. Elytra unicoloured, without sharply delimited spots.

Head. Each puncture on clypeus and frons bearing fine semi-erected yellowish seta. Anterior margin of clypeus slightly concave with distinct rim. Interocular area not elevated above remaining head surface; interstices between punctures on frons without microsculpture. Eyes extremely small, separated by 10–11 widths of one eye. Mentum 2.3× as wide as long, narrowing anteriorly; anterior margin slightly emarginate; anteromedian part impressed in contrast to lateral and posterior portions; surface of mentum flat, bearing small rounded punctures, interstices without microsculpture (Figs. 17 and 18). Gula wide, gular sutures diverging posteriad, posterior tentorial pits minute. Maxilla of male with sucking disc; maxillary palpus with palpomeres 2 and 4 ca. 1.5× as long as palpomere 3, palpomere 2 strongly widened apically, palpomere 4 spindle-like. Antenna with nine antennomeres, scapus approximately as long as antennomeres 2–6 combined; antennal club compact; antennomere 9 forming distal half of antennal club, indistinctly constricted subapically, blunt at apex.

Prothorax. Pronotum arcuately narrowed anteriorly, slightly emarginate on anterior margin, continuously arcuate on posterior margin, evenly convex (lacking longitudinal sulci), slightly more convex than elytra in lateral view (Fig. 2); lateral margins of pronotum not deflexed, smooth, not serrate, with narrow marginal rim; posterolateral corners forming obtuse angle. Pronotal punctation uniform, nearly similar on whole surface, each puncture bearing fine decumbent yellowish seta; transverse row of punctures on posterior margin of pronotum absent; interstices without microsculpture. Prosternum (Fig. 9) with low and narrow median

carina; mesal part of prosternum not divided from lateral portions, only bearing different microsculpture; anteromedian excision of prosternum absent; pair of deep pits at the border between mesal and lateral prosternal portions absent. Antennal grooves moderately large, not reaching lateral margins of hypomerion; lateral glabrous part of hypomerion very narrow anteriorly, slightly widened posteriorly.

Mesothorax. Scutellar shield small, in shape of equilateral triangle, interstices without microsculpture. Elytron not deflexed laterally, bearing nine punctural series; series 7 and 8 as widely separated from each other as from adjacent series; series 9 arising subbasally; each serial puncture with minute seta (indistinct under stereomicroscope) and with small but distinct denticle on each side of the puncture at least in basal portion of elytron (Fig. 14). Elytra not costate, intervals weakly convex at suture, becoming more convex laterad and posteriad; interval 2 (Fig. 10) as wide as interval 3 (but see Variability under *O. convexum* sp. nov.), as high as intervals 1 and 3 and reaching elytral apex. Interval punctation arranged into series, at least on some intervals; series consisting of minute, slightly transverse punctures, each bearing a fine, decumbent yellowish seta; interstices without microsculpture. Lateral margin of elytron finely denticulate, at least basally. Epipleuron very narrow (Fig. 11), much narrower than pseudepipleuron basally, narrowing posteriad, reaching level of metathorax; pseudepipleuron narrowing posteriad, reaching elytral apex. Preepisternal plate (Figs. 19–21) broadly attached to metaventricle, slightly overlapping its anterior margin, 1.7–2.7× as long as wide; interstices without microsculpture. Grooves for reception of procoxae well developed, not reaching anterior margin of mesocoxal cavities (Figs. 19–21).

Metathorax. Metaventricle (Figs. 19–21) with subpentagonal elevate median portion lacking depression in both sexes; interstices shiny, without microsculpture; lateral portions dull, with fine microsculpture. Anterolateral ridges distinctly developed throughout width of metaventricle, not reaching its anterolateral corner, bent posteriad laterally; femoral lines absent. Metathoracic wings absent.

Legs short; tarsi slightly shorter than tibiae, bearing short and sparse pubescence ventrally. Protibiae not emarginate on outer margin distally.

Abdomen with five ventrites covered with hydrofuge pubescence. Ventrite 1 carinate medially, without additional longitudinal ridges laterally. Ventrites 2–5 flat, without longitudinal ridges.

Male genitalia. Tergite 8 with long narrow anteromedian projection (Fig. 15). Sternite 9 without posteromedian projection, angulate (Fig. 15). Aedeagus (Figs. 3–8) with parameres lacking inner projection, bearing two long setae apically. Phallobase narrow, 2.0–2.3× as long as wide. Median lobe slightly longer than parameres, projecting slightly beyond apices of parameres; lateral margin of median lobe bearing fine setae directed posteriad; corona present, situated at apex of median lobe; apex lacking row of setae.

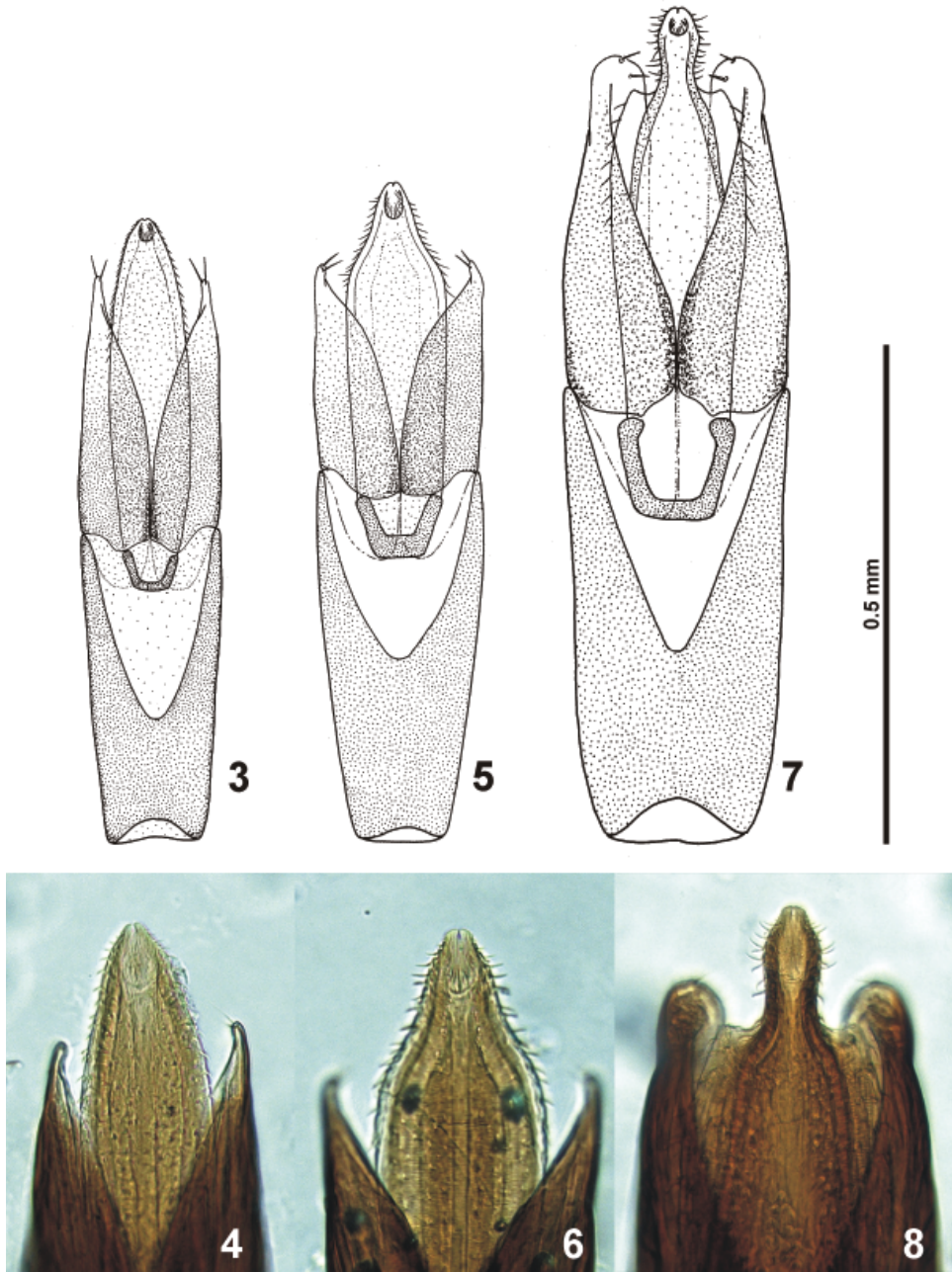
Key to species

- 1 Preepisternal plate of mesothorax 1.7× as long as wide (Fig. 19). Lateral portion of anterolateral ridge of metaventricle sinuate, punctation of median portion of metaventricle coarse (Fig. 19). Aedeagus large (0.75–0.80 mm), median lobe strongly constricted



Figs. 1–2. Habitus of *Oosternum convexum* sp. nov.: 1 – dorsal view, 2 – lateral view. Body length: 1.75 mm.

- subapically, bottleneck shaped (Figs. 7 and 8). Elytra without keels (Fig. 22) or with elevated elytral interval 3 (Fig. 23). *O. convexum* sp. nov.
- Preepisternal plate of mesothorax 1.9–2.7× as long as wide (Figs. 20 and 21). Lateral portion of anterolateral ridge of metaventrite arcuately bent posteriad, punctuation of median portion of metaventrite fine (Figs. 20 and 21). Aedeagus small (0.55–0.65 mm), median lobe at most slightly concave subapically (Figs. 3–6). Elytra without keels (as in Fig. 22). 2
- 2 Median lobe of aedeagus wide, lateral margins slightly concave subapically (Figs. 5–6). Preepisternal plate of mesothorax 1.9–2.2× as long as wide (Fig. 20). *O. intermedium* sp. nov.
- Median lobe of aedeagus narrow, lateral margins convex subapically (Figs. 3–4). Preepisternal plate of mesothorax 2.5–2.7× as long as wide (Fig. 21). *O. simplex* sp. nov.



Figs. 3–8. Aedeagophores. 3, 5, 7 – whole aedeagus; 4, 6, 8 – detail of apical portions of parameres and median lobe. 3–4 – *Oosternum simplex* sp. nov.; 5–6 – *O. intermedium* sp. nov.; 7–8 – *O. convexum* sp. nov.

***Oosternum convexum* sp. nov.**

(Figs. 1, 2, 7–9, 11, 14, 17, 19, 22–24)

Type locality. Panama, Chiriqui Province, 4.5 km SE of Cerro Punta, oak and bamboo forest.

Type material. HOLOTYPE: ♂ (CNC): 'PAN. Chiriqui, 4.5 / km SE Cerro Punta / oak & bamboo forest / 28.V.1977 / S&J Peck'. PARATYPES (205 spec.): **PANAMA:** 11 spec. (CNC, ZMUC, NMPC): same data as holotype; 1 ♂ (ZMUC): 'PAN., Chiriqui, 1700m / 2km. W. Cerro Punta / 24.-28.V.77 S. & J. / Peck. Ber. 376 / litter & carrion'; 1 ♂, 37 spec. (ZMUC, BMNH, FEFU, NHMW, NMPC, SRBC): 'PANAMA: Chiriqui / P. Nac. Volcan Baru / 5.9km E Cerro Punta, 2150m / 14.Jun.1995 R. Anderson / riparian alder forest litter'; 1 spec. (KSEM): 'PANAMÁ: Chiriqui / 5.9 km N Cerro Punta / Par. Nac. Volcan Baru, 2150 m / 8°22'0"N [sic!, = 8°52'0"N], 82°34'0"W / 14 JUN 1995; R. Anderson / PAN2A95 22A / ex: alder forest litter'; 1 ♂, 21 spec. (ZMUC): 'PANAMA: Chiriqui / P. Nac. Volcan Baru / 5.9km E Cerro Punta, 2400m, 14.Jun.1995 R. Anderson / oak ridge-bamboo for. litter'; 1 ♂, 40 spec. (ZMUC, BMNH, FEFU, NMPC): 'PANAMA: Chiriqui / P. Int La Amistad, Las Nubes / 5.3 km W Cerro Punta, 2150m / 15.Jun.1995 R. Anderson / cloud forest litter 95-026'; 1 ♂, 3 spec. (KSEM, NMPC): 'PANAMÁ: Chiriqui / 6.7 km N Cerro Punta / Par. Nac. La Amistad / Las Nubes, 2150m / 8°22'0"N [sic!, = 8°52'0"N], 82°34'0"W / 15 JUN 1995; R. Anderson / PAN2A95 26A / ex: berlese forest litter'; 8 spec. (ZMUC, NMPC): 'PANAMA: Chiriqui, 12 km NE / Santa Clara, Cerro Pando / 2120m, 8°54.74'N 82°43.29'W / 17.Jun.1996 R. Anderson / wet cloud forest litt. 96-134C'; 1 spec. (KSEM): 'PANAMA: Chiriqui / 12 km NE Santa Clara / Cerro Pando, 2120m / 8°54'44"N 82°43'30"W / 17 VI 1996; R. Anderson / PAN2A96-13C / ex: cloud forest litter'; 1 ♂, 11 spec. (ZMUC): 'PANAMA: Chiriqui, 12 km NE / Santa Clara, Cerro Pando / 2000 m, 8°54.74'N 82°43.29'W / 17.Jun.1996 R. Anderson / wet cloud forest litt. 96-135C'; 1 ♂, 1 ♀, 4 spec. (FMNH): 'Cerro Punta (on trail to / Boquete) Chiriqui / Prov., PANAMA / alt. 7000 ft // CNHM Panama / Zool. Exped (1959) / March 1 1959 / H. S. Dybas lgt. // Berlese (B-425) / flood debris on / steep wooded slope'; 1 ♀, 1 spec. (FMNH): 'PANAMA: Chiriqui Prov. / 'Casita Alta', Finca / Lerida nr. Boquete / III. 18. 1959, 6900 ft // Berlese (B-543) / conc. floor debris / in damp ravine / leg. / H. S. Dybas'; 1 ♀ (ZMUC): 'PANAMA: Chiriqui / 30.7 km W Volcan / Hartmann's Finca, 1450m / 14. Jun. 1995 R. Anderson / wet montane trop. fore. litter'. **COSTA RICA:** 4 spec. (KSEM): 'COSTA RICA: Limon / Valle de Silencio, Estacion / 82°57'43"W 09°06'37"N / 2473m, 26-27.ii.2005 / R. Anderson, oak forest litter / CRA105 002'; 3 ♂♂, 50 spec. (INBio, KSEM, NMPC): 'COSTA RICA: Limon Prov. / Valle de Silencio, Estacion / 26-27.ii.2005, 2473 m / 82°57'43"W 09°06'37"N / Oak Forest Litter, R. Anderson'.

Additional material. **COSTA RICA:** 4 ♀♀ (KSEM, NMPC): 'COSTA RICA: Limon Prov. / Valle de Silencio, Estacion / 26-27.ii.2005, 2473 m / 82°57'43"W 09°06'37"N / Oak Forest Litter, R. Anderson'.

Differential diagnosis. Preepisternal plate of mesothorax 1.7× as long as wide (Fig. 19); anterolateral ridges sinuate near lateral margin of metaventricle (Fig. 19); punctuation of median portion of metaventricle coarse (Fig. 19); punctuation of mentum sparse (Fig. 17); number of spines of inner ventral mesotibial series sexually dimorphic (as in Figs. 12 and 13); aedeagus large (0.75–0.80 mm); median lobe bottleneck shaped, strongly constricted subapically; parameres widely rounded apically (Figs. 7 and 8).

Oosternum convexum sp. nov. is easily recognizable from the remaining two species of the group by the distinctly larger and more sclerotized aedeagus with strongly constricted apical portion of the median lobe. Externally it differs from *O. simplex* sp. nov. and *O. intermedium* sp. nov. by the characters given in the identification key and usually also by slightly different coloration of elytra, which are often slightly paler, at least on the base of elytral intervals 2 and 4 (elytra of the other two species are uniformly coloured). Specimens with costate elytra (see Variability) are very distinct from *O. simplex* sp. nov., *O. intermedium* sp. nov. as well as from typical form of *O. convexum* sp. nov. and cannot be confused with any other *Oosternum* species known to us.

Description. Body elongate oval, body length / body width ratio = 1.65. Body length: 1.30–1.80 mm (length of holotype: 1.80 mm); width: 0.80–1.05 mm (width of holotype: 1.05 mm).

Coloration. Dorsal side (Figs. 1 and 2) pale brown, anterior margin of clypeus, lateral margins of pronotum, basal most part of elytral interval 3, humeral area of elytron and lateral elytral margin yellowish brown. Ventral side brown to dark brown, epipleura yellowish brown; femora brown to dark brown basally, yellowish apically; tibiae and tarsi yellowish.

Head. Clypeus with sparse punctation consisting of moderately large punctures; interstices with fine microsculpture. Frons with sparse punctation consisting of large, rounded, uniformly shaped punctures. Eyes separated by 11 widths of one eye. Mentum with sparse punctation (Fig. 17). Submentum with poriferous disc-like areas. Antennal club approximately twice as long as wide.

Prothorax. Punctation of pronotum slightly denser than on head, consisting of rather large, slightly rasp-like punctures. Median carina of prosternum, in lateral view, straight.

Mesothorax. Scutellar shield bearing few minute punctures. Elytral series 1–3 and 5–7 arising basally, series 4, 8 and 9 subbasally; serial punctures fine, rather dense; denticulation of lateral elytral margin distinct throughout elytral length except at apex. Preepisternal plate (Fig. 19) wide, drop-like, 1.7× as long as wide; median part slightly concave, bearing a few large, sparsely distributed setiferous punctures.

Metathorax (Fig. 19). Punctation of median portion of metaventrite coarse and sparse, bearing decumbent setae. Anterolateral ridges angularly bent posteriad laterally. Anepisternum 4.9× as long as wide.

Legs. Inner ventral series of stout spines on metatibiae sexually dimorphic, with more apical spines in male (as in Figs. 12 and 13).

Male genitalia (Figs. 7 and 8). Aedeagus 0.75–0.80 mm long. Parameres 0.7× as long as phallobase, slightly narrowing towards bluntly rounded apex. Phallobase 2.0× as long as wide. Median lobe slightly widened from base towards apical 0.15, then strongly constricted into a narrow, bottleneck-shaped apex; lateral projections wide but developed only subapically.

Variability. Very variable species, especially in body size and coloration of dorsal surface (elytra uniformly pale brown without any trace of paler coloration to distinctly pale at base of all elytral intervals). Four females (see Additional material) differ by a distinctly elevated elytral interval 3 that becomes slightly keel-like subbasally and replaces elytral interval 2 near the anterior third of the elytron (i.e., interval 2 is developed only basally and apically, Fig. 23). These aberrant specimens were collected together with the typical form at the Valle de Silencio (Costa Rica); no intermediates between typical and keeled forms were found. Detailed examination of the aberrant specimens using SEM showed no difference from typical form in other external characters. We therefore consider that these specimens belong to *O. convexum* sp. nov. One male from the Valle de Silencio (deposited in NMPC) differs from the remaining examined specimens by narrow apices of parameres bearing a small subapical denticle; since no other differences were found in external characters of this specimen, even using SEM, we also consider that this specimen belongs to *O. convexum* sp. nov.

Etymology. Referring to the convex body.

Bionomics. All specimens were sifted from leaf litter in oak and oak-bamboo cloud forests and alder riparian forest at altitudes of 1,450–2,500 m a.s.l.

Distribution (Fig. 24). Known from a cluster of several localities in the southern part of the Cordillera de Talamanca Mts. in Panama and Costa Rica. All localities are situated in the southern part of La Amistad International Park.

***Oosternum intermedium* sp. nov.**

(Figs. 5, 6, 13, 16, 20, 24)

Type locality. Costa Rica, San José Province, Estación Cuerici, 4.6 km E of Villa Mills, 09°34'N 83°40'W, 2600 m a.s.l.

Type material. HOLOTYPE: ♂ (INBio): 'COSTA RICA: San Jose Prov. / Estacion Cuerici, 4.6 km E. of / Villa Mills, 19.vi.1997-019E / 09°34'N, 83°40'W, 2600 m / R.S.Andreson, oak for. litter'. PARATYPES (29 spec.): **COSTA RICA:** 1 ♂, 1 ♀ (KSEM): 'COSTA RICA: San Jose Prov. / Cuerici Station, 4.6 km E. of / Villa Mills, 26.vi.1997 (97-036D) / 09°34'N 83°40'W; 2600m / R. Anderson; oak forest litter'; 6 ♂♂, 1 ♀, 8 spec. (INBio, KSEM, NMPC, NHMW): 'COSTA RICA: Cartago / 2.0 km E. Villa Mills / 2750 m, 9°34'0"N, 83°41'50"W / 15 FEB 1998; R. Anderson / CR2A98 002 ex: oak forest litter'; 1 ♂, 1 ♀ (KSEM): 'COSTA RICA: Cartago / 2.0km E. Villa Mills, 2750m / 9°34'N, 83°41'50"W, / 15.ii.1998, R. S. Anderson / oak for. litter CR2A98 002'; 1 ♂, 1 spec. (KSEM): 'COSTA RICA: San Jose Prov. / km 117 Pan-Am. Hwy / 19km N. San Isidro; 15.vii.1998 / 09°28'N 83°42'20"W; 1800m. / R. Andersen [sic!], cloud forest litter'; 3 ♂♂, 1 ♀, 4 spec. (KSEM, ZMUC): 'COSTA RICA: San Jose Prov. / km 117 Pan-Am. Hwy. 97-021C [sic!] / 19km N. San Isidro, 20.vi.1998 / 09°28'N 83°42'20"W; 1800m / R. Anderson; cloud forest litter'.

Differential diagnosis. Preepisternal plate of mesothorax 1.9–2.2× as long as wide (Fig. 20); anterolateral ridges arcuately bent posteriad near lateral margin of metaventricle (Fig. 20); punctation of median portion of metaventricle with moderately sized punctures (Fig. 20); mentum with dense punctation (as in Fig. 18); number of spines of inner ventral mesotibial series sexually dimorphic (as in Figs. 12 and 13); aedeagus small (0.55–0.65 mm); median lobe with slightly concave lateral margins subapically; parameres narrowly pointed apically (Figs. 5 and 6).

Oosternum intermedium sp. nov. is externally very similar to *O. simplex* sp. nov., differing from the latter only by the slightly wider preepisternal plate of the mesothorax. Examination of male genitalia, especially the shape of apical portion of the median lobe, is needed for a reliable identification of both species. For differences from *O. convexum* sp. nov., see under the latter species.

Description. Body elongate oval, body length / body width ratio = 1.65. Body length: 1.20–1.55 mm (length of holotype: 1.55 mm); width: 0.80–0.90 mm (width of holotype: 0.90 mm).

Coloration. Dorsal side uniformly pale brown. Ventral side castaneous, epipleura pale brown; femora, tibiae and maxillary palpi brownish, tarsi and antennae yellowish.

Head. Clypeus with moderately dense punctation consisting of moderately large punctures, interstices without microsculpture. Frons with dense punctation consisting of large, rounded, uniformly shaped punctures. Eyes separated by 10 widths of one eye. Mentum with moderately dense punctation (as in Fig. 18); submentum without poriferous disc-like areas. Antennal club approximately 2.5× as long as wide.

Prothorax. Punctation of pronotum as dense as on head, consisting of rather large, slightly transverse to rasp-like punctures. Median carina of prosternum straight in lateral view.

Mesothorax. Scutellar shield bearing three minute punctures. Elytral series 1–7 reaching elytral base, series 8 and 9 arising subbasally; serial punctures fine and sparse; denticulation of lateral elytral margin distinct mainly basally. Preepisternal plate (Fig. 20) narrow, suboval, 2.2× as long as wide; median part flat, bearing a few moderately large, sparsely distributed setiferous punctures.

Metathorax (Fig. 20). Punctation of median portion of metaventricle sparse, consisting of small setiferous punctures. Anterolateral ridge arcuately bent posteriad. Anepisternum 4.4× as long as wide.

Legs. Inner ventral series of stout spines on metatibiae sexually dimorphic, with more apical spines in males (as in Figs. 12 and 13).

Male genitalia (Figs. 5 and 6). Aedeagus 0.55–0.65 mm long. Parameres 0.6× as long as phallobase, nearly straight on outer margin, arcuately narrowed apicad on inner margin. Phallobase 2.3× as long as wide. Median lobe slightly widened from base towards apical 0.75, then narrowing towards apex, lateral margins slightly concave subapically; lateral projections of median lobe present, wide, but developed only subapically.

Variability. Specimens examined vary slightly in the shape of the preepisternal plate of mesothorax, which is 1.9–2.2× as long as wide. Male genitalia vary slightly in the extent of the constriction of the apical portion of the median lobe (i.e., lateral margins are more or less concave subapically); most males examined except of the holotype are, however, teneral and the observed variability can therefore be artificial.

Etymology. Referring to the shape of the apical portion of the median lobe of the aedeagus, which is slightly constricted and therefore intermediate between *O. simplex* sp. nov. and *O. convexum* sp. nov.

Bionomics. All specimens were sifted from leaf litter in oak forests at altitudes of 1,800–2,750 m a.s.l.

Distribution (Fig. 24). Known only from three closely situated localities in the northern part of the Cordillera de Talamanca Mts., close to the border of the Chirripó National Park.

Oosternum simplex sp. nov.

(Figs. 3–4, 10, 12, 18, 21, 24)

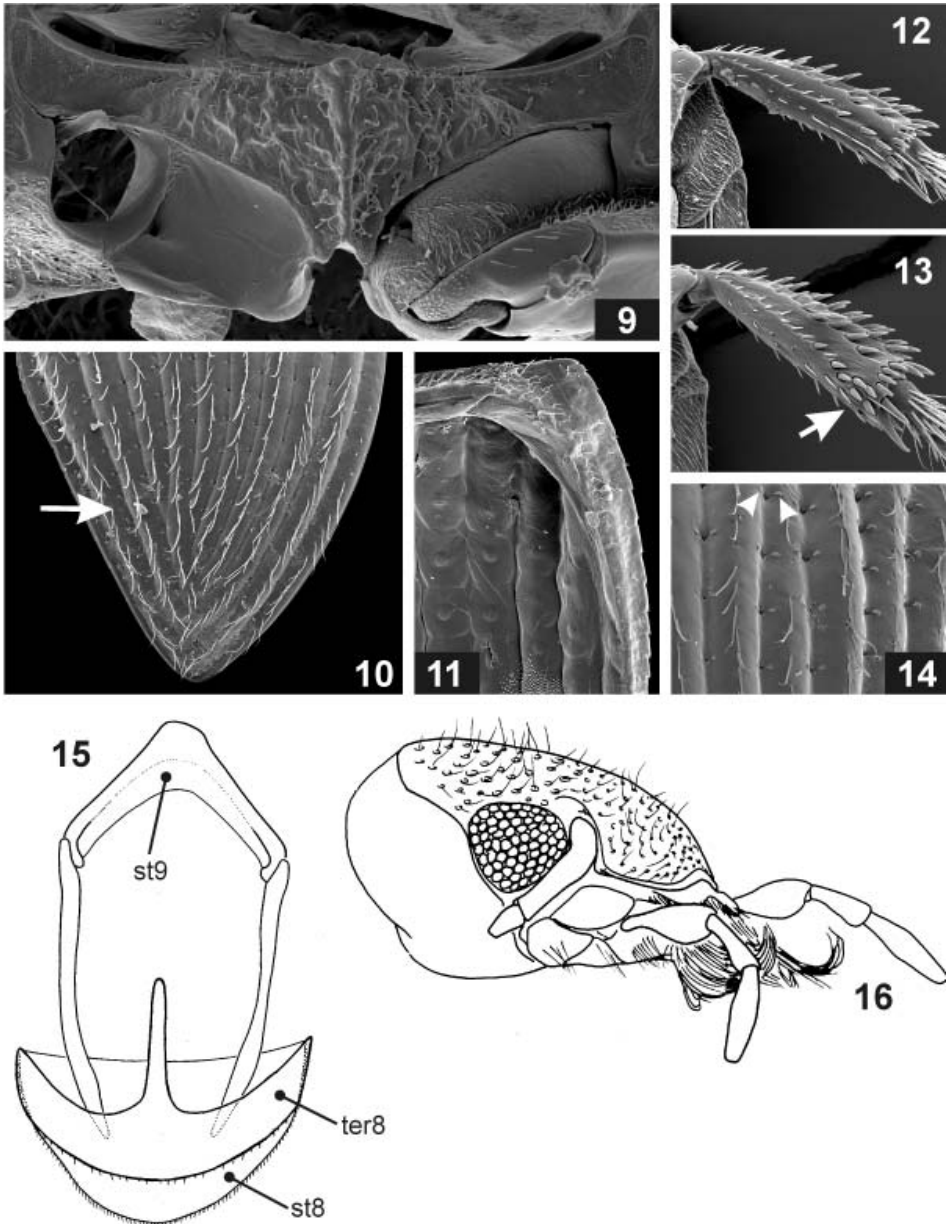
Type locality: Costa Rica, border of San José and Cartago Provinces, 3 km S of El Empalme, 9°42'30"N 83°57'W, 2350 m a.s.l.

Type material. HOLOTYPE: ♂ (INBio): 'COSTA RICA: SanJose/Cart. / km.55, PanAm Hwy, 3 km S. / of El Empalme, R. Anderson / 09°42'30"N, 83°57'W, 2350 m / 8.vi.1997-008B, oak forest litter'. PARATYPES (18 spec.): **COSTA RICA:** 2 spec. (KSEM, NMPC): same label data as holotype; 1 ♀ (KSEM): 'COSTA RICA: S. José/Carta. / Int. Am. Hwy, km 55, 3 km S. / of El Empalme, 2350m, 8.vi.1996 [sic!] / oak forest litter'; R. Anderson / 9°42'30"N, 83°57'W; 97-008C'; 7 ♂♂, 6 spec. (INBio, KSEM, NHMW, NMPC): 'COSTA RICA: Cartago / Esperanza El Guarco, 2600m / 09°41'35"N, 83°52'04"W / 26-27-III-2003, R. Anderson / berlese oak forest litter'; 2 ♂♂ (KSEM, ZMUC): 'COSTA RICA: San Jose/Cart. Prov. / km 45. Pan-Am. Hwy. (09-007D) / 6 km N. E. El Empalme; 8.vi.1997 / 09°45'N 53°30'W; 1975m / R. Anderson, mixed alder/oak litter'.

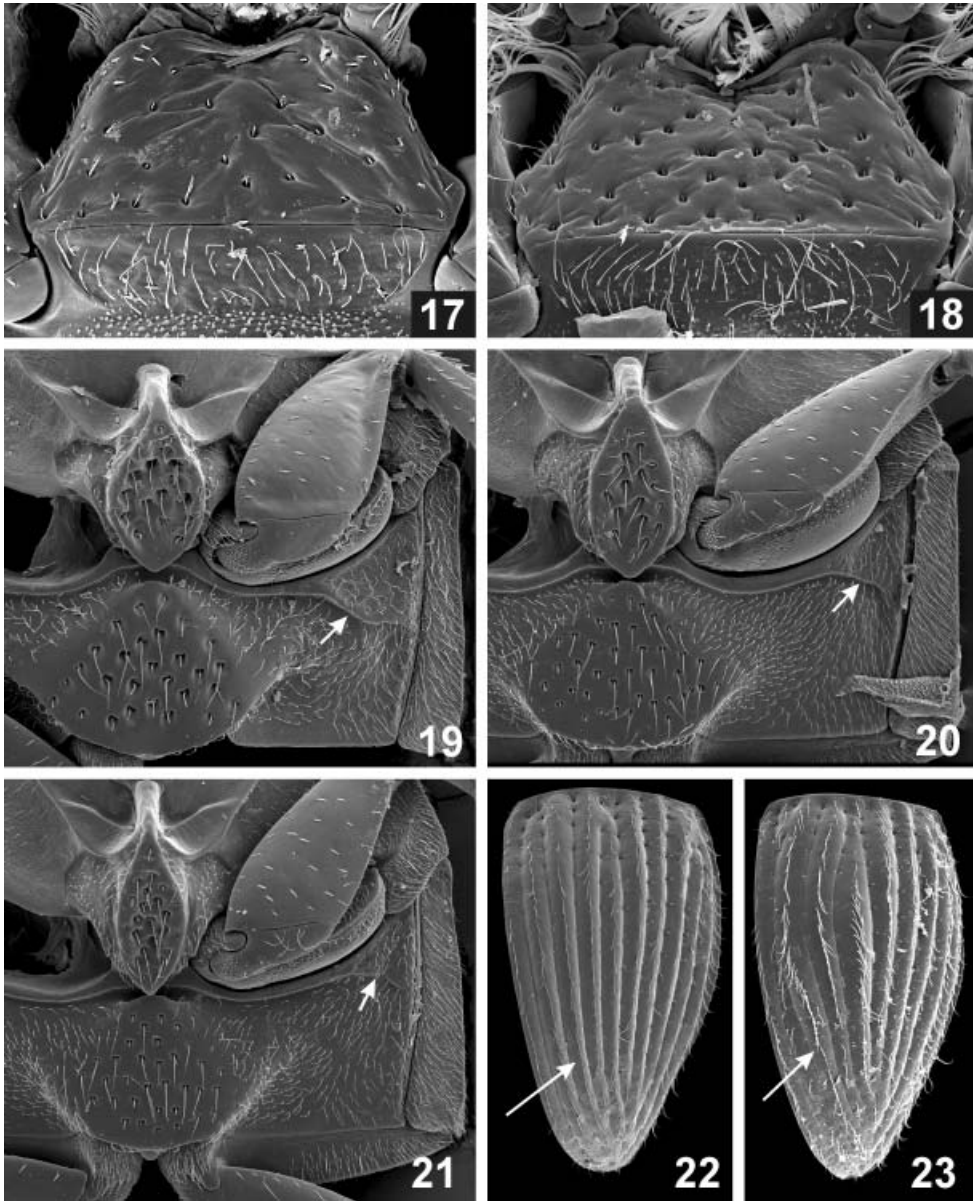
Differential diagnosis. Preepisternal plate of mesothorax 2.5–2.7× as long as wide (Fig. 21); anterolateral ridges arcuately bent posteriad near lateral margin of metaventricle (Fig. 21); punctation of median portion of metaventricle with moderately sized punctures (Fig. 21); mentum with dense punctation (Fig. 18); number of spines of inner ventral mesotibial series similar in both sexes (Fig. 12); aedeagus small (0.60–0.65 mm); median lobe simple, not constricted or concave subapically; parameres narrowly pointed apically (Figs. 3 and 4).

Oosternum simplex sp. nov. is externally very similar to *O. intermedium* sp. nov., differing from the latter only by the narrower preepisternal plate of the mesothorax. Examination of male genitalia, especially the shape of apical portion of the median lobe, is needed for a reliable identification of both species. For differences from *O. convexum* sp. nov., see under the latter species.

Description. Body elongate oval, body length/body width ratio = 1.7. Body length: 1.25–1.55 mm (length of holotype: 1.50 mm); width: 0.80–0.90 mm (width of holotype: 0.90 mm).



Figs. 9–16. Diagnostic characters of the *Oosternum convexum* species group. 9 – prosternum; 10 – elytral apex (arrow: elytral interval 2); 11 – detail of basal portion of epipleuron (note marginal denticulation); 12 – ventral surface of mesotibia (female); 13 – ditto male (arrow: multiplied spines in inner row); 14 – detail of elytral surface (arrows: small denticles at each serial puncture); 15 – terminal abdominal sclerites of male (st8: sternite 8; st9: sternite 9; ter8: tergite 8); 16 – head in lateral view. 9, 11, 14 – *O. convexum* sp. nov.; 10, 12 – *O. simplex* sp. nov.; 13, 15, 16 – *O. intermedium* sp. nov.



Figs. 17–23. Differential characters of species of *Oosternum convexum* group. 17–18 – mentum; 19–21 – meso- and metaventrite (arrow: different shapes of lateral part of anterolateral ridge of metaventrite); 22–23 – right elytron (arrow: elytral interval 3). 18, 20, 22–23 – *O. convexum* sp. nov.; 19, 22 – *O. simplex* sp. nov.; 20 – *O. intermedium* sp. nov.

Coloration. Dorsal side brown, clypeus and lateral margins of pronotum and elytra yellowish brown. Ventral side reddish brown, epipleura yellowish brown; femora, tibiae, maxillary palpi and antennal clubs reddish, tarsi and antennomeres 1–6 yellowish.

Head. Clypeus with moderately dense punctation consisting of moderately large punctures; interstices without microsculpture. Frons with dense punctation consisting of large, rounded, uniform punctures. Eyes separated by 10 widths of one eye. Mentum with moderately dense punctation; submentum without poriferous disc-like areas. Antennal club approximately $2.3\times$ as long as wide.

Prothorax. Punctation of pronotum slightly denser than on head, consisting of moderately large to large, slightly transverse to rasp-like punctures. Median carina of prosternum slightly concave in lateral view.

Mesothorax. Scutellar shield bearing few moderately large punctures. Elytral series 1–7 reaching elytral base, series 8 and 9 arising subbasally; serial punctures fine and sparse; denticulation of lateral elytral margins distinct mainly basally. Preepisternal plate (Fig. 21) narrow, suboval, $2.6\times$ as long as wide; median part flat, bearing a few moderately large, densely arranged setiferous punctures.

Metathorax (Fig. 21). Punctation of median portion of metaventrite sparse, consisting of small setiferous punctures. Anterolateral ridges arcuately bent posteriad. Anepisternum $4.5\times$ as long as wide.

Legs. Inner ventral series of stout spines on metatibia similar in both sexes (Fig. 12).

Male genitalia (Figs. 3 and 4). Aedeagus 0.60–0.65 mm long. Parameres $0.8\times$ as long as phallobase, nearly straight on outer margin, slightly arcuately narrowed towards apex on inner margin. Phallobase $2.2\times$ as long as wide. Median lobe widest in apical 0.4, slightly narrowed both basad and apicad, lateral margins convex subapically; lateral projections of median lobe absent.

Variability. *Oosternum simplex* sp. nov. is rather variable in the shape of the preepisternal plate of the mesothorax. In most specimens the plate is 2.5 – $2.7\times$ as long as wide but one male from Esperanza El Gauco (deposited in KSEM) has the plate $3.4\times$ as long as wide. The specimens are, however, identical in other external characters as well as in the morphology of male genitalia.

Etymology. Referring to the simple (i.e. subapically unstricted) shape of the median lobe of the aedeagus.

Bionomics. The type series was sifted from leaf litter in oak forests at altitudes of 1,975–2,600 m a.s.l.

Distribution (Fig. 24). Known from three nearby localities in the northern part of the Cordillera de Tamanca Mts., ca. 7–10 km from the borders of the Tapanti National Park.

Discussion

All three *Oosternum* species described above share many external morphological characters including some structural features not known in any other *Oosternum*, such as the small denticles situated laterally of each puncture of elytral series (Fig. 14; compare with Figs. 80 and 81 in FIKÁČEK et al. (2009)). It seems therefore probable that all three taxa represent a complex

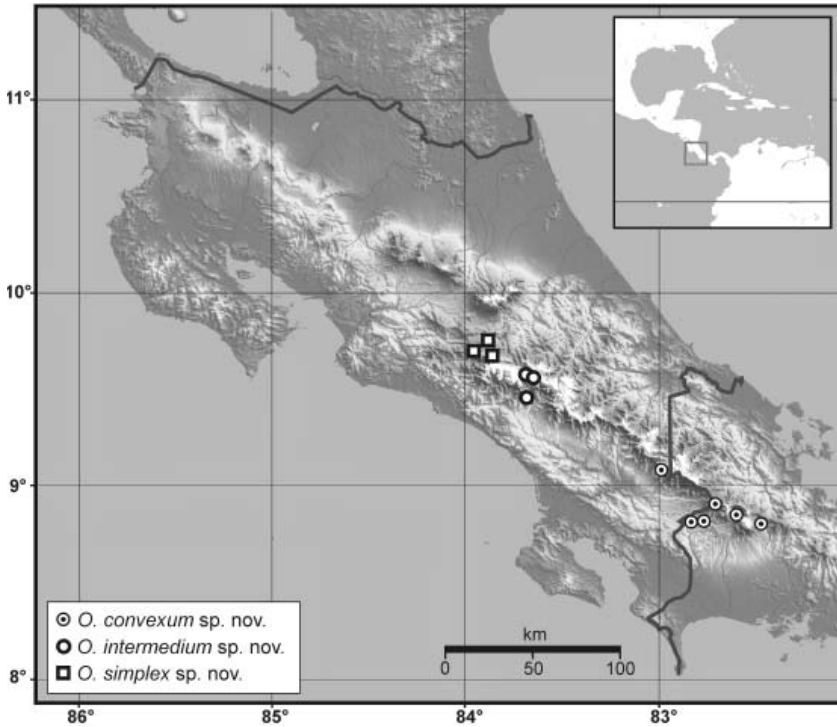


Fig. 24. Distribution of the *Oosternum convexum* species group.

of closely related species. This hypothesis is also supported by the distribution restricted to a single mountain range (Cordillera de Talamanca) in southern Central America.

The high degree of the variability of elytral morphology observed in *O. convexum* sp. nov. is unusual and unknown for any other species of the Sphaeridiinae. Further material is needed to determine if the costate elytra are restricted only to females and if there are specimens with an intermediate elytral morphology. Additional material could also clarify if the distribution of specimens with keeled elytra is restricted to the Valle de Silencio.

Further studies are needed for a better understanding of the taxonomy as well as biogeography of this species group. It is particularly needed to (1) analyse phylogenetic relationships of the *O. convexum* species group with other species groups of the genus, (2) collect additional material from localities in the central part of the Cordillera de Talamanca Mts. as well as in other mountain ranges of the Lower Central American highlands (e.g. the Cordillera Central and Cordillera de Tilaran Mts. in Costa Rica), and (3) collect more material of *O. convexum* sp. nov. which would allow an analysis of the morphological variability of this species. It would also be desirable to examine samples from cloud forests in the Chirripó National Park and the Tapanti National Park, because these protected areas are situated very close to the known localities of *O. intermedium* sp. nov. and *O. simplex* sp. nov., respectively.

Acknowledgements

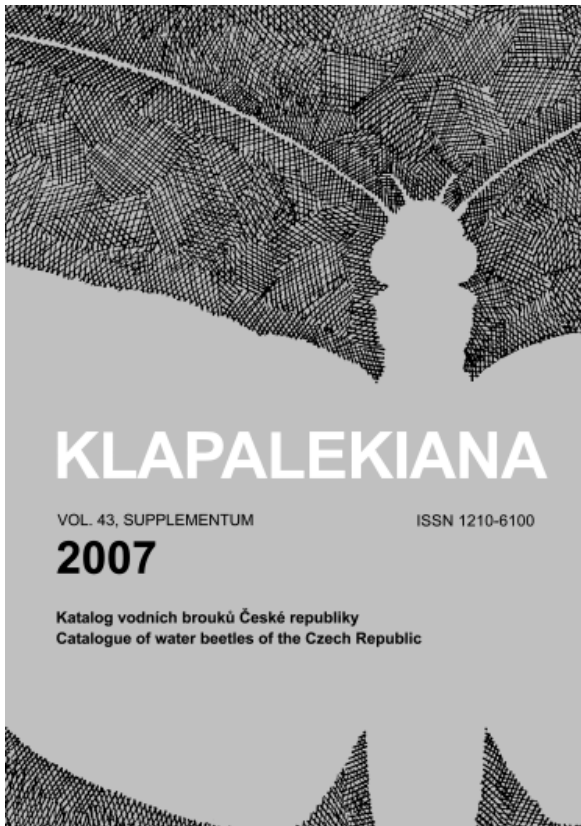
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Catalogue of water beetles of the Czech Republic

BOUKAL D. S., BOUKAL M., FIKÁČEK M., HÁJEK J., KLEČKA J., SKALICKÝ S., ŠTASTNÝ J. & TRÁVNÍČEK D. 2007: Katalog vodních brouků České republiky / Catalogue of water beetles of the Czech Republic (Coleoptera: Sphaeriidae, Gyrinidae, Haliplidae, Noteridae, Hygrobiidae, Dytiscidae, Helophoridae, Georissidae, Hydrochidae, Spercheidae, Hydrophilidae, Hydraenidae, Scirtidae, Elmidae, Dryopidae, Limmichidae, Heteroceridae, Psephenidae). *Klapalekiana* 43 (Supplementum): 1–289 (in Czech and English).



This collaborative work of eight Czech water beetle specialists summarizes the knowledge on the distribution of 401 species from 18 families of water beetles in the Czech Republic. It provides a brief introduction into the history of research on water beetles in the region with an overview of collecting techniques, ecological characteristics and conservation of water beetles in the Czech Republic. The following chapters briefly characterize each family and give an up-to-date check-list and comments on the distribution and ecology of the species, supplemented with detailed records of rare ones. The text is bilingual in Czech and English.

The volume can be ordered from the Czech Entomological Society, Viničná 7, CZ-128 44 Praha 1, Czech Republic (klapagenda@centrum.cz) at CZK 300 (ca. € 12) + postage. For further information please contact David Boukal (boukal@entu.cas.cz) or Jiří Hájek (jiri_hajek@nm.cz).