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***Amurodytes belovi* nov.gen. et nov.sp. from eastern Russia (Coleoptera, Dytiscidae, Hydroporinae)**

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A b s t r a c t: *Amurodytes belovi* nov.sp. of the family Dytiscidae is described from the Zeya Nature Reserve in the Far East of Russia – the type locality – and the Bolshoy Amalat River in Buryatia, East Siberia, with a distance of about 900 km between them. It belongs to the *Deronectes*-group of genera ("Deronectina") (Hydroporini) and at first glance resembles some species of *Oreodytes* SEIDLITZ 1887. However, it cannot be placed in any known genus of the Deronectina, because a unique combination of characters distinguishes it from all the other species of the tribe, and therefore it is described in a new genus. The most prominent features of the species are the following: cordiform pronotum, broadly exposed interlaminary bridge of metacoxae, and parallel metacoxal lines; both sexes with most antennomeres flattened ventrally, in males even semicircular in cross-section; males with broadly expanded protibiae, without sucker cups on pro- and mesotarsomeres, and with unusually narrow distal portion of the median lobe of the aedeagus. The hind wings of all specimens studied are extremely reduced and at least these specimens were certainly incapable of flight (brachypterous). The habitus, the genitalia and some other structures of the new species are illustrated, the systematic position of the new genus is broadly discussed and a modified key to genera of the Deronectina – including *Amurodytes* nov.gen. and *Oreodytes* – is provided.

K e y w o r d s: Coleoptera, Dytiscidae, Hydroporinae, Deronectina, *Amurodytes*, new genus, new species, brachypterous, description, key to genera.

Introduction

In the course of identifying the Dytiscidae material stored at the Department of Entomology of Lomonosov Moscow State University, we came by one specimen of an unknown species from the Far East of Russia. Four more specimens from the same series were subsequently found in the Zoological Museum of Lomonosov Moscow State University, and one more female from Transbaikalia (south-eastern Siberia) was later found in the Zoological Institute of the Russian Academy of Sciences, St. Petersburg. The new species shows superficial similarity to some members of the Holarctic genus *Oreodytes* SEIDLITZ 1887, but has other features unlike those in any of the known species of that genus. The genus *Oreodytes* was not placed in the *Deronectes*-group of genera (Deronectina) by NILSSON & ANGUS (1992) in their reclassification of the group, but it is clear from further studies of RIBERA (2004), RIBERA et al. (2008), and ANGUS (2010) that excluding *Oreodytes* from this group renders it paraphyletic. Detailed studies showed

that the new species cannot be placed also in any other known genus of the Deronectina, to which, however, it clearly belongs. Thus, the new taxon is described below in a new genus as *Amurodytes belovi* nov.gen. et nov.sp.

Material and methods

The following abbreviations are used in the text for collections where the type material is stored:

- CHF.....coll. H. Fery, Berlin, Germany; property of the Naturhistorisches Museum Wien, Vienna, Austria
- DEUM.....Department of Entomology, Faculty of Biology, Lomonosov Moscow State University, Moscow, Russia (V.Y. Savitsky)
- ZISPZoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia (A.G. Kirejtshuk)
- ZMUM.....Zoological Museum, Lomonosov Moscow State University, Moscow, Russia (N.B. Nikitsky)

Other abbreviations of terms used in the text are TL (total length), MW (maximum width), and hw (handwriting).

Lack of more material made it impossible for us to study the new species more thoroughly, in particular to make SEM photos and to dissect some specimens totally to study the development of the hind wings and the muscles attached to the metendosternite in more detail – things which urgently need to be done in the future if further material becomes available.

The photo of the habitus (Fig. 1) was made using a Canon PowerShot S50 camera and a Leica MZ 6.5 microscope. The genitalia were studied wet with an Olympus SZX16 stereomicroscope. The genitalia and other structures were photographed with a Nikon Coolpix 995 camera attached to the stereomicroscope, and then the photos were treated with CombineZP Image Stacking Software. Drawings of the genitalia and the metendosternite were made with the aid of photos taken with the same equipment.

Authors' remarks and complementary data are given in square brackets. In descriptions of details of the ventral surface the meanings of terms like "upper" and "lower" are reversed. For instance, the new species has the part between the metacoxal processes prolonged backward and at the same time also upward; however, this is described as "downward", because the beetle is lying upside down when the ventral surface is studied under a microscope.

The term "prosternal process" (or "prosternal apophysis") is in use with different meanings. We follow LAWRENCE et al. (2000) and denote as the "process" only the part of the prosternum which is situated more or less behind the middle of the procoxae (i.e. the part often also named the "blade"). We use also the terms "metaventricle" and "abdominal ventrite" instead of "metasternite" (or "metasternum") and "abdominal sternite", the latter terms being incorrect, e.g. according to LAWRENCE et al. (2000). The "metendosternite" (BALFOUR-BROWNE 1961, 1967 and LAWRENCE et al. 2000) is termed "metathoracic furca" in ŘÍHA (1955) and "metafurca" in BALKE (2005). The terminology denoting the orientation of the male genitalia follows MILLER & NILSSON (2003).

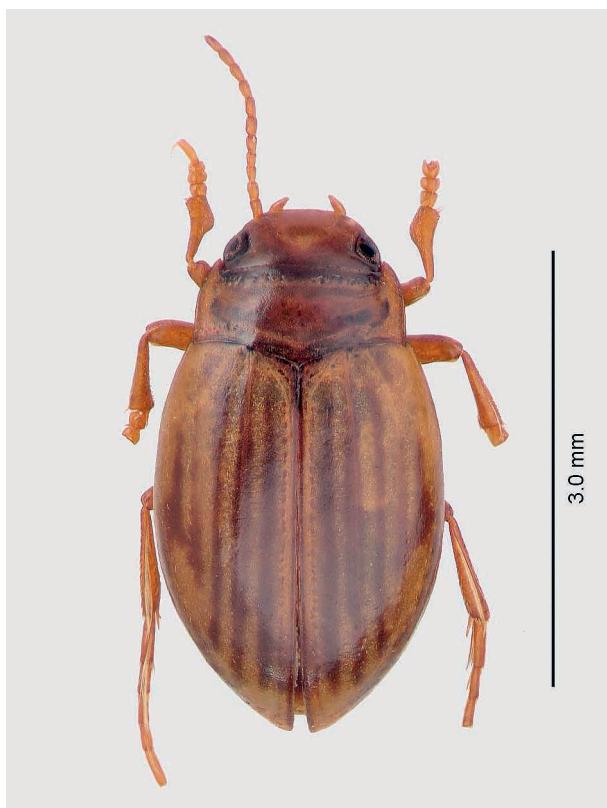


Fig. 1. Habitus of *Amurodytes belovi* nov.sp. (paratype stored in ZMUM).

Taxonomy

Amurodytes nov.gen.

Type species: *Amurodytes belovi* nov.sp., by monotypy.

Diagnosis

The new genus is distinguished from all other genera of the tribe Hydroporini and in particular from the Deronectina by the following combination of characters: pronotum indistinctly, but perceptibly cordiform, with weak sublateral longitudinal impressions, but without a distinct sublateral longitudinal stria on each side; elytron vittate, without preapical spine; venter microreticulate, thus matt; interlaminary bridge of metacoxae broadly exposed (Fig. 2); sucker cups on male pro- and mesotarsi absent; anterior surface of metatibia with one longitudinal row of spiniferous punctures, not covered with small, non-spiniferous punctures; parameres more or less triangular, lacking apical hook (Fig. 11). Other features of the single member of this genus are listed below; however, we believe that these are not of generic importance: metacoxal lines parallel (Fig. 2); both

sexes with the majority of antennomeres flattened ventrally, in males semicircular in cross-section (Fig. 6), in females weaker so; distal portion of median lobe of aedeagus unusually long and narrow (Figs 9-10); hind wings strongly reduced in the specimens studied (Figs 7-8).

E t y m o l o g y: From the Amur River, in the basin of which the holotype of the type species was found, and *dytes*, latinised from the Greek δύτες (diver). The gender of the generic name is masculine.

***Amurodytes belovi* nov.sp.**

T y p e l o c a l i t y: Russia, Far East, Amur Oblast, Zeya Nature Reserve; exact coordinates not known, but approximately around 54.08N, 126.90E. The guard point named "52nd km" is within 1 km east of the road joining Zeya town and Zolotaya Gora village, 52 km from Zeya by this road; the type specimens were collected east of the road, probably in the Bolshaya Erakingra River, which belongs to the Zeya part of the Amur basin (V. Belov, pers. comm.).

T y p e m a t e r i a l: **H o l o t y p e:** ♂, "Zeyskiy [= Zeya, from Zeya River] zapov. [zapovednik = nature reserve] / kordon 52-y km [= "52nd km" guard point] / 14.VII.1978 / Belov" [printed photographically except "14" (hw Vassili Belov)], "Oreodytes / rivalis Gyll. / det. E. Berlov, 1983" [hw Eduard Berlov, Irkutsk], "Holotype / Amurodytes belovi sp.n. / H. Fery & P.N. Petrov det. 2013" [red, printed] (ZMUM).

P a r a t y p e s: 1♂, provided with a handwritten label, text same as in holotype (hw Pyotr Petrov); specimen originally on glue card mounted on same pin as that of holotype (ZMUM). 1♂, 1♀, labelled as holotype, but without Berlov's determination label (CHF). 1♂, "Zeyskiy zapov. / kordon 52-y km / 15.VII.1978 / Belov" [printed photographically except "15" (hw Vassili Belov)]; behind "Belov" also name "Kurbatov", this, however, crossed out] (DEUM). 1♀, "Sev. Buryatiya [severnaya Buryatiya = northern Buryatia] / r. B. Amalat [reka Bol'shoy Amalat = Bolshoy Amalat River], verkh. [verkhov'ya = upper reaches] / 22.6.1967 Kabakov" [hw Oleg Kabakov], "Oreodytes septentrionalis [sic!] / (Gyll.) / det. O.N. Kabakov" [hw Kabakov except for last line (printed)], "Zoological Institute / St. Petersburg / coll. Kabakov" [printed], "Oreodytes / ? belovi / sp.n. ?, / P. Petrov det. 2006" [hw Petrov except for last line (printed); co-ordinates estimated to ca. 54.10N 113.35E, locality situated ca. 900 km W of locus typicus] (ZISP). **N o t e s:** All paratypes are provided with our red printed labels. Locality labels are transcribed here from the Russian Cyrillic text, with explanations of abbreviations, comments, and English translations given in square brackets; slashes indicate line breaks.

Description

H a b i t u s: Body shape in dorsal view more or less oval (Fig. 1); outline with strong discontinuity between pronotum and elytra, although base of pronotum and base of elytra subequal in width. In lateral view body rather flat. Dorsal surface weakly matt, almost shiny, brownish yellow, with spots on head and pronotum and vittae on elytra dark brown; ventral surface matt and mostly dark brown.

H e a d: Between eyes with two diffuse dark brownish spots, fused with similar transverse stripe on vertex. Two shallow, but rather large longitudinal clypeal grooves present anteromedially between eyes. Entire surface microreticulate with fine polygonal meshes, becoming progressively larger near eyes and vertex. Frons and vertex with very sparse punctation, punctures smaller than meshes, distance between punctures equal to about 5-10 mesh diameters; clypeal grooves with a few coarser punctures; head alongside inner margin of eyes with stripe of rather coarse punctures; coarser punctures with indistinct setae; else setae absent. Length of antenna around one third of total body length. Anten-

nomeres dorsally microreticulate, not punctate except for single coarse punctures on apices of antennomeres.

P r o n o t u m: With narrow lateral bead dark brown, disc medially diffusely brownish; dark vertex of head visible through anterior margin of pronotum. Shape of pronotum slightly cordiform, because sides of pronotum very weakly rounded medially (more or less parallel), shortly before posterior angles very weakly constricted, and behind these angles diverging over short distance; posterior angles acute and slightly deflected backwards; greatest width of pronotum near middle of lateral margin. Sublateral stria on each side absent. Sublateral longitudinal impressions distinct in posterior half; pronotum shortly behind anterior margin and shortly before posterior margin weakly transversely impressed, thus disc of pronotum more or less surrounded by impressions and appearing somewhat vaulted. Lateral bead narrow, especially narrow anteriorly, becoming slightly broader posteriad. Reticulation of surface similar to that on head, meshes larger on disc, smaller near sides; smaller punctures still sparser than on head; surface behind anterior margin with transverse puncture line of coarse punctures, this line interrupted in middle; similar puncture line before posterior margin, this one very broadly interrupted in middle. Larger punctures provided with one seta, else setae absent. Centre of disc with longitudinal scratch.

E l y t r a: Each elytron with five distinct dark brown longitudinal vittae (Fig. 1); vittae 2 and 4 almost reaching base of elytron, although rather diffusely limited and lighter anteriorly; vittae 1, 3 and 5 ending rather far before base of elytron, vitta 5 considerably shorter than other vittae; beneath posterior end of vitta 5, short remnant of sixth vitta present; sublateral seventh vitta confined to posterior 2/3 of elytron. Suture narrowly darkened; stripe between suture and sutural puncture line darkened in posterior third. Elytra oval elongate, with sides almost evenly rounded and maximum width around middle of elytral length; without preapical spine; at shoulders width of both elytra together subequal to width of pronotum at hind angles; dorsal surface of elytra more or less evenly, but weakly convex; elytral margin in lateral view slightly ascending to humeral angle, epipleura visible until shoulders. Elytron with reticulation and punctation with smaller punctures similar to that of head and pronotum; additionally provided with numerous, but rather indistinct very small punctures in intersections of meshes; beside suture with indistinct and rather irregular line of slightly coarser punctures (sutural line); on disc with two somewhat irregular puncture lines between vittae 2-3 and 4-5, diameter of punctures about two mesh diameters, inner line more prominent; more laterally with additional, but very irregular and indistinct puncture lines. Hind wings (Figs 7-8) extremely reduced to (transparent if in wet state) lobes about 0.5 mm long and 0.2 mm wide (see comments in special section below).

M e t e n d o s t e r n i t e: Unusually shaped (Fig. 14) in comparison with those figured for other *Deronectina* species on plate VIII in ŘíHA (1955); different also from those of all other species figured in that work: In dorsal view anteromedially with distinct wide and deep V-shaped incision (in other *Deronectina* species with narrower and more or less U-shaped or oval incision); more sclerotised parts (given as darker in Fig. 14) slender and in particular lateral branches (= rfl = "ramus lateralis furcae"; cf. ŘíHA 1955: plate IV) rather short; insertion of furcolateral muscle (= ifl = "insertio muscularis furco-lateralis") obliquely orientated and rather small. In general, metendosternite appearing slender, reduced in part and less robust than those known in other *Deronectina* species.

V e n t r a l s u r f a c e: Predominantly dark brown except for lighter brownish gula, prosternal process, metaventricle, lateral half of epipleura, intralinear space of metacoxal lines, first abdominal ventrite, middle area and hind margin of abdominal ventrites 2-5, and last ventrite to large extent; mouthparts, including maxillary and labial palpi, antennae, and legs still lighter, yellowish brown. Head ventrally behind eye without crease, at most indicated by weak transverse impression; genae reticulated, without punctures; gula smooth with some coarse punctures near lateral margins. Prosternum anteromedially strongly vaulted, in front of procoxae without protuberance and transverse ridges (file), but distinctly reticulated; prosternal process not lanceolate, more or less triangular, rather short (length/width ca. 1.5), apex rounded (Fig. 3); process with low longitudinal carina, surface with some coarse punctures, near lateral margins with a few very coarse strongly impressed punctures and some setae. Declivity of prosternum weak, before procoxae more or less straight; process (blade) only weakly inclined. Tip of prosternal process reaching anteromedial metaventral process, but only contacting it on surface (Fig. 3); however, metaventral process at tip descending step-like and here contacting posterior part of mesoventral fork as well as underside of apex of prosternal process.

Mesocoxal cavities closed, contact between meso- and metaventral keels complete, thus without diastema between them (cf. ZIMMERMAN & SMITH 1975: 678, footnote; ZIMMERMAN 1985: 102). Anteromedial metaventral process rather narrow, tip without furrow for reception of prosternal process (not "necessary" because prosternal process not reaching over metaventral process). Epipleura without oblique subhumeral carina. Width of metacoxal plate (= WC) unusually great compared to width of metaventral "wing", i.e. lateral lobe of metaventricle (= WV): WC/WV ca. 5/1 (formerly termed WC/WS; cf. fig. 3 in PETROV et al. 2010: 43). Metacoxal lines more or less parallel, not reaching posterior margin of metaventricle; each metacoxal process obliquely cut, making their joint hind margin incised (Fig. 2); posteriorly beside midline broadly and without step prolonged back- and downward into fully exposed interlaminary bridge (Fig. 2). Carina present on posterior three quarters of underside of elytra, more prominent in distal quarter, slightly elevated before vanishing shortly before elytral apex; carina not provided with ligula (as e.g. in *Graptodytes* SEIDLITZ 1887, or *Hygotus* STEPHENS 1828).

Legs with anterior and posterior pro- and mesotarsal claws similar, evenly curved, not prolonged, anterior claws slightly thicker than posterior ones. Anterior margin of profemur somewhat emarginated in distal quarter. Metafemur along midline with about 10 setiferous punctures, else with very few additional setiferous punctures; setae rather long, but not very conspicuous. Anterior face of metatibia with line of spiniferous punctures over entire length; non-setiferous punctures absent. Metatarsi not punctate; metatarsomere 5 only 1.5 times as long as metatarsomere 4. Natatorial setae on metatibiae and metatarsomeres present, but on metatibiae rather sparse; no such setae present on mesotibia.

Entire venter – including elytral epipleura – microreticulate; meshes rather small, polygonal, mostly weakly impressed; diameter of meshes on abdominal ventrites 2-5 greater; metaventricle, metacoxal plates and abdominal ventrites 1 and 6 largely covered with many very small punctures in intersections of meshes, but also on lines of meshes; some shallow larger punctures (diameter equal to that of meshes) present on centre and before hind margin of metaventricle and on intralinear space of metacoxal lines. Metacoxal plates and sides of abdominal ventrites 1-5 provided with weakly impressed wrin-

kles. Setae on ventral surface sparse, some of them present on prosternum before procoxae, on prosternal process, on centre of metaventrite and on intralinear space of metacoxal lines. Centre of abdominal ventrites 2-5 provided with small tuft of setae (on ventrite 2 strongly reduced); one or two setose punctures present on abdominal ventrites 3-5, lying on imaginary line on each side of midline, obliquely diverging anteriad from apex of abdomen to shoulders.

♂♂: Different views of antenna as in Figs 6a-c; antennomere 4 shorter than antennomeres 3 and 5; antennomeres 5-10 distinctly dilated, antennomeres 6-11 ventrally flattened and in cross-section more or less semicircular; antennomere 5 flattened only in distal half; underside of antennomeres 6-10 with slight longitudinal impression parallel and close to sides; distally on both sides slightly lobed, thus shape in dorsal view somewhat resembling that of broadened protarsomere (Fig. 5); underside of antennomeres 5-11 appearing dull, because provided with numerous punctures and/or small elongate protuberances; apparently, only laterodistal angles of mid antennomeres provided with some indistinct setae.

Note: We cannot exclude that also short setae are present which are attached to the surface of the underside of the antennomeres; this cannot, however, be stated with certainty, because a detailed study could result in damage, which we wanted to avoid in view of the small number of specimens at our disposal.

Protibia curved, narrow in basal half, broadly expanded in distal half (Fig. 4), resembling that of some *Oreodytes*, e.g. *O. shorti* SHAVERDO & FERY 2006; sides of protibia parallel in distal third, here with inner margin sharp and provided with row of dense short strong spines; surface of protibia at inner apical angle with long slightly curved spine, ventrally in middle of anterior margin with other long spine. Mesotibia only slightly broadened distally. Pro- and mesotarsomeres dilated, their underside appearing similar to that of medial antennomeres (Fig. 5), covered with short narrow longitudinal protuberances; setae very indistinct, perceptible only near anterolateral angles (as in antennomeres, short setae attached to underside of tarsomeres could also be present, but no detailed study was performed, so as to avoid damaging any type specimen); none of pro- or mesotarsomeres provided with sucker cups.

Median lobe of aedeagus symmetrical, very narrow and acutely pointed both in ventral (Fig. 9) and in lateral view (Fig. 10); rather evenly curved in lateral view. Parameres (lateral lobes of aedeagus) not hooked, more or less triangularly shaped, with distal portion rather narrow, rounded and provided with setae apically (Fig. 11).

♀♀: Protarsomeres slightly less dilated than in males; protibia also broadened distally, but less than in males; mesotibia weakly dilated distally. Gonocoxa as in Fig. 12 gonocoxosternum as in Fig. 13. Antennomeres 5-10 also dilated, but less so than in males; antennomeres 5-11 flattened and provided with elongate protuberances, but less distinct and in cross-section not appearing so distinctly semicircular as in males.

Measurements: Holotype: TL: 3.6 mm, MW: 2.0 mm; paratypes: TL: 3.4-3.7 mm, MW: 1.9-2.0 mm.

Note: The holotype lacks the last three tarsomeres of the left mid-leg.

Variability: Due to the small number of specimens studied we cannot say much about the variability of the species. The main differences between the five specimens studied are the intensity of the dark spots and vittae and their contrast to the lighter back-

ground of the dorsum. The elytral vittae can also be somewhat longer than in the holotype and in part more confused. The underside of some specimens is darker than that of the holotype, largely more or less blackish brown. In some specimens the cordiform shape of the pronotum is less prominent. The prosternal process appears in some specimens less carinate and almost flat. A slight inclination to the normal position of the prothorax can result in a small gap between the prosternal process and the anteromedial ventral process.

Notes: In all specimens studied the hind wings are as strongly reduced as in the holotype.

Distribution: Russia; so far known only from the Far East (Amur Oblast) and Transbaikalia (Buryatia Republic). The distance between the two localities is about 900 km. The two localities belong to two different basins of two great rivers: the Amur (which flows into the Pacific Ocean) and the Lena (which flows into the Arctic Ocean). It is surprising that the species has never been found or recognised as new species, but we cannot explain this fact, except for the suggestion that it might have a peculiar way of life (see below). If both locality data are correct, then the new species should be widely distributed in south-eastern Siberia and southern Far East of Russia.

Ecology: Very little is known so far. The only paratype with ecological data was apparently collected in a highland river (the Bolshoy Amalat), and the species probably lives in rather rapidly flowing waters, like many other members of *Deronectina*. The collector of the rest of the type series recalls that there was only one body of water in the type locality (the Bolshaya Erakingra River), and therefore the holotype and the other four paratypes were most probably collected in this river: a clean, shallow (except after rain), rapidly flowing river, 5–6 m wide, with a rocky/gravel to sandy bed and no macrophytes (V. Belov, pers. comm.).

The antennomeres and the pro- and mesotarsi have both a similarly structured ventral surface. We are not sure about the function of this surface structure, but one might speculate that these help the beetle to attach itself to the surface of gravels or rocks or some kind of vegetation, and that not only the legs, but also the antennae are used for preventing the beetle from being washed away in strongly running waters.

Etymology: The new species is named after the entomologist and translator Vassili Belov, formerly of DEUM, who collected the holotype and most of the paratypes. The specific epithet is a noun in the genitive case.

Notes on the hind wings and metendosternite of *Amurodytes belovi* nov.sp.

Brachypterous or partly brachypterous forms are well-known in Hydradephaga, in particular in stygobiont species. Several publications on flight capacity are available, over which KEHL & DETTNER (2007) give a good survey. As mentioned in the Description, the length of the hind wings of the new species (Figs 7–8) is so strongly reduced in all specimens studied that we can be sure that at least these have been absolutely unable to fly. The new species apparently lives in aboveground waters, rather than underground, and we do not know whether it includes only brachypterous specimens or not. However, the specimens studied definitely have the wings reduced to an extreme degree, which is unknown to us in any other species of *Deronectina*.

As mentioned in the section Description, the metendosternite (Fig. 14) is unusually

shaped in comparison with those known in other Deronectina. A comparison with the diverse metendosternites figured in ŘÍHA (1955) and our own studies of several other species of Deronectina show that so far no other hydradephagan species is known to have such a slender metendosternite and a V-shaped anteromedial incision with small and obliquely oriented insertions of muscles (= "ifl" in Fig. 14) in this structure. According to ŘÍHA (1955: 352, 353) the metendosternite is the organ within the metathorax to which the muscles of the hindlegs are attached, and it seems likely that a species with an unusually slender metendosternite might possess only weak muscles of the hind legs, and thus should not be a good swimmer.

On the other hand, we do not believe that reduced hind wings and a reduced metendosternite can be used for assessment of the correct systematic position of a species, because such a reduction should be considered nothing else but an adaption to some – still unknown – lifestyle (see also our speculations about the function of the underside of the antennomeres and the pro- and mesotarsi under Ecology).

Systematic position of *Amurodytes* nov.gen.

Originally we had the intention to assign the new species to one of the known genera of Deronectina, so as not to describe a new genus hastily, without sufficient reasons. If simply applying the key to genera of NILSSON & ANGUS (1992: 277), the new species keys formally to *Stictotarsus* ZIMMERMANN 1919; the differences of the new species from all known *Stictotarsus* are, however, so striking that we felt obliged to study numerous species of the Deronectina in order to find a satisfying systematic position for the new species. The result of these studies (see below) was that we could not place the new species in any of the existing genera, and thus a new genus had to be erected.

In our studies we have included also Nearctic taxa, but do not treat those of the Southern Hemisphere (see arguments in WOLFE 1985: 151, NILSSON & ANGUS 1992: 276). As a first step, it could be rather easily excluded that the new species belongs to any of the seven tribes of Hydroporinae other than Hydroporini (i.e. Bidessini, Hydrovatini, Hygrotini, Hyphydrini, Laccornini, Methlini, or Vatelini). It is, however, rather difficult to show to which group of genera the new one belongs, in particular because so far no such groups have been defined, except the Deronectina. And even for this group of genera no generally accepted synapomorphies have been found.

NILSSON & ANGUS (1992: 276) defined their Deronectina group of genera (without *Oreodytes*) by two assumed synapomorphies: "(1) mesosternal [= mesoventral] fork and anteromedial process of metasternum [= metaventre] not connected [better "not contacting", because in any case not rigidly connected], and (2) male pro- and mesotarsomeres 1-3 without adhesive discs ventrally". The second synapomorphy excludes *Oreodytes* from the group. The first one is worth a discussion, because the species of the *Stictotarsus roffii*-group and two species treated today in the genus *Boreonectes* ANGUS 2010 show that contact. NILSSON & ANGUS (1992: 277) argued: "In our opinion, the meso- and metasternal [= metaventral] contact found in these species is secondary, as indicated by the distribution of other characters."

According to the studies of RIBERA (2004) and RIBERA et al. (2008) (see also ANGUS 2010) it is beyond doubt that *Oreodytes* must be included in the Deronectina. This is why the second synapomorphy of NILSSON & ANGUS (1992) cannot be applied any more. We believe, however, that the shape of the hind margin of the metacoxal processes can be

used (at least preliminarily) to separate the Deronectina (including *Oreodytes*) from the rest of the Hydroporini. In the Deronectina this hind margin is incised medially, which means that each process is obliquely cut and both margins are converging anteriorly. LARSON et al. (2000: 138) describe this feature for the Nearctic species of the genera *Oreodytes*, *Nebrioporus* RÉGIMBART 1906, and *Stictotarsus* as follows: "Metacoxal processes ... with hind margins incised along medial line so the medial line does not extend as far posterad as level of hind margins of lateral lobes." These lateral lobes are not broadly rounded, but have instead the obliquely cut hind margins always more or less straight. The new species has metacoxal processes which group it together with the other Deronectina.

There exist five other genera in Hydroporini with incised metacoxal processes (*Graptodytes*, *Metaporus* GUIGNOT 1945, *Porhydrus* GUIGNOT 1945, *Rhithrodytes* BAMEUL 1989, and *Stictonectes* BRINCK 1943), but in these genera the incision is comparatively very deep and the lateral lobes of the processes are broadly rounded over the entire margin, so that these lobes have more or less the shape of one half of a circle or an ellipse. The situation in the stygobiont *Siettitia* ABEILLE DE PERRIN 1904, *Iberoporus* CASTRO & DELGADO 2001, and in *Etruscodytes nethuns* MAZZA, CIANFERONI & ROCCHI 2013 (the only species of the genus) is somewhat unclear, because on the one hand they are probably closely related to *Graptodytes* or *Rhithrodytes* (cf. RIBERA & FAILLE 2010: 12 for the first two genera), but on the other hand have metacoxal processes with a hind margin which resembles that of species of the *longulus*-group of *Hydroporus* CLAIRVILLE 1806 (sinuate right and left of the medial line; see below).

The other genera of the tribe Hydroporini have the hind margins of the metacoxal processes either conjointly truncate or angularly prominent medially or sinuate right and left of the medial line; these genera are *Haideoporus* YOUNG & LONGLEY 1976, *Heterosternuta* STRAND 1935, *Hydrocolus* ROUGHLEY & LARSON 2000, *Hydroporus*, *Lioporeus* GUIGNOT 1950, *Neoporus* GUIGNOT 1931, *Sanfilippodytes* FRANCISCOLO 1979, *Stygoporus* LARSON & LABONTE 1994, and *Suphrodytes* DES GOZIS 1914 (recently again synonymised under *Hydroporus* in BERGSTEN et al. 2013). We had no opportunity to study specimens of *Psychopomporus felipi* JEAN, TELLES & K.B. MILLER 2012, a species in which the shape of the metacoxal processes is not sufficiently characterised in the original description.

Below we list not all, but the most striking characters which separate the new species from other Deronectina.

- Although body shape, colouration and shape of male protibiae of the new species resemble those of some members of *Oreodytes*, the absence of sucker cups on male pro- and mesotarsi and the absence of a sublateral longitudinal stria on each side of the pronotum doubtlessly exclude the new species from that genus.
- *Deronectes* SHARP 1882 has the anterior face of the metatibiae densely covered with punctures, the metafemora densely punctate, metatarsomere 5 about twice as long as metatarsomere 4 and the elytra neither vittate nor maculate; thus, it is strongly separated from the new species.
- The ventral surface of the new species is slightly shining, but entirely reticulated and covered with small punctures in most intersections of the lines of the meshes; larger punctures are absent. These features exclude the new species from *Scarodytes* DES GOZIS 1914.

- The parameres of the new species are rounded apically and by no means hooked, thus the new species cannot belong to *Nebrioporus* or *Scarodytes*. In addition *Nebrioporus* species have the elytra provided with a preapical spine, which is absent in the new species.
- Species of *Boreonectes* (a genus which combines species formerly placed in *Stictotarsus*) and *Trichonectes otini* GUIGNOT 1941 (the only species of the genus) also lack sucker cups on male pro- and mesotarsi, apical hooks at the apex of the parameres, and sublateral longitudinal impressions on the pronotum. However, while *Boreonectes* and *Trichonectes* species have the interlaminary bridge of the metacoxa concealed, *Amurodytes belovi* nov.sp. has that bridge broadly exposed. The metafemora are entirely and densely punctate in *Boreonectes*, but not so in both *T. otini* and *A. belovi* nov.sp.
- *Boreonectes* species have the pronotum normally shaped, with posterolateral angles either obtuse or broadly rounded (*B. panaminti* (FALL 1923) and *B. coelamboides* (FALL 1923)), while the new species has a cordiform pronotum with the hind angles acute. Additionally, *Boreonectes* species have the epipleuron not visible in lateral view until shoulder, while it is visible in the new species.
- *Trichonectes otini* has a unique character which isolates it from all other Deronectina species: large parts of the dorsum and venter are covered with relatively large punctures each of which is provided with a single long seta.

What remains are the members of the genus *Stictotarsus*. NILSSON & ANGUS (1992) divided this genus into three groups: the *S. griseostriatus*-group (the members of which are now in *Boreonectes*), *S. duodecimpustulatus*-group and *S. roffii*-group.

- The eight members of the *S. duodecimpustulatus*-group have the anterior face of the metatibiae more or less entirely covered with punctures, and the metafemora also entirely and densely punctate. Three of the members (*S. duodecimpustulatus* (FABRICIUS 1792), *S. procerus* (AUBÉ 1838), and *S. maghrebinus* MAZZOLDI & TOLEDO 1998) additionally have the antennomeres densely punctate, the median lobe of the aedeagus strongly asymmetric, and the parameres (lateral lobes) of unequal shape. *Amurodytes belovi* nov.sp. has neither densely punctate metatibiae, metafemora and antennomeres nor an asymmetric aedeagus. Additionally, these three species and four others (*Stictotarsus bertrandi* (LEGROS 1956), *S. grammicus* (SHARP 1882), *S. neomexicanus* (ZIMMERMAN & SMITH 1975), and *S. titulus* (LEECH 1945) have the pronotum not cordiform, as in *A. belovi* nov.sp. The eighth species of that group – *Stictotarsus minipi* (LARSON 1991) – shows some external affinities with the new species, in particular a cordiform pronotum and males with strongly broadened protibiae (cf. fig. 108 in LARSON et al. 2000). The systematic position of this species is not clear, but the punctate metatibiae and metafemora, as well as the shape of the metacoxal lines (diverging anteriorly in *S. minipi*, parallel in *A. belovi* nov.sp.) exclude the possibility that the two species are closely related.
- The 10 members of the *S. roffii*-group have the anterior face of the metatibiae more or less entirely covered with punctures, pronotum not cordiform, relatively broad, almost quadratic prosternal process, pronotum not impressed sublaterally, epipleuron not visible in lateral view until shoulder, and metaventre and metacoxal plates with very prominent wrinkles. The new species has a triangular and not a quadratic prosternal process and shows only some very weakly impressed wrinkles on the venter.

Other features are already discussed in more detail above. **Notes:** Weakly impressed wrinkles can be found in many *Deronectina*, but also in members of other *Hydroporinae*. As far as we have observed, only in the members of the *S. roffii*-group these wrinkles are very strongly impressed.

Additionally, we have performed a preliminary cladistic analysis using numerous morphological characters of several members of *Deronectina*. The details of this analysis are omitted here, but the results suggest that *Amurodytes belovi* nov.sp. is the sister group of all other *Deronectina* genera except *Oreodytes*. Further details of this analysis will be presented in a future paper.

Key to the *Deronectes*-group genera (*Deronectina*)

The following key to genera is a modification of the key given by NILSSON & ANGUS (1992). It includes not only the new species, but also the genus *Oreodytes*, which was excluded from the *Deronectina* by NILSSON & ANGUS (1992), but – according to RIBERA (2004) and RIBERA et al. (2008) – must be included in this group.

- 1 Male pro- and mesotarsomeres 1-2 with distinct sucker cups. Pronotum sublaterally on each side with longitudinal stria..... *Oreodytes*
- Male pro- and mesotarsomeres 1-2 without distinct sucker cups, at most with sucking setae (trumpet-like). Pronotum sublaterally without longitudinal stria, at most with wrinkles..... 2
- 2 Dorsal surface uniformly ferrugineous (except in *D. latus*-group members, with anterior half of elytra slightly paler) to black. Metacoxal processes with interlaminary bridge exposed. Metatibia with anterior surface covered with spiniferous punctures. Metatarsomere 5 about twice as long as tarsomere 4 *Deronectes*
- Elytra in most species vittate or maculate. Metacoxal processes with interlaminary bridge concealed or not. Anterior surface of metatibia with longitudinal row of spiniferous punctures or covered with small, non-spiniferous punctures; if covered with spiniferous punctures, then interlaminary bridge concealed. Metatarsomere 5 about 1.5 times as long as tarsomere 4..... 3
- 3 Paramere apically without sclerotised hook. Elytron without subapical spine. Ventral surface densely punctate 4
- Paramere apically with sclerotised hook. Elytron with subapical spine or not. Ventral surface densely punctate or shiny or microreticulate with sparse, coarse punctures..... 7
- 4 Pronotum slightly cordiform. Metacoxal lines parallel. Antennomeres 5-10 flattened ventrally, especially in males semicircular in cross-section. Eastern Palaearctic genus (south-eastern Siberia and Far East of Russia)..... *Amurodytes* nov.gen.
- Pronotum not cordiform¹. Metacoxal lines diverging anteriorly. Male antennomeres not semicircular in cross-section 5
- 5 Underside of head with area between eye and crease with punctures or strong sculpture *Stictotarsus*
- Underside of head with area between eye and crease without punctures or sculpture 6
- 6 Large punctures on elytra with one long seta *Trichonectes*
- Punctures on elytra simple *Boreonectes*
- 7 Elytron without subapical spine. Ventral surface shiny and with sparse larger punctures *Scarodytes*

¹ Except in *Nebrioporus canaliculatus* (NICOLAI 1822) and *Stictotarsus minipi*, which (also due to several other characters) are both known as rather enigmatic within their genera; their systematic position shall, however, not be discussed here.

- Elytron with subapical spine (in *N. melanogrammus* (RÉGIMBART 1899) only females with spine). Except in *N. kilimandjarensis* (RÉGIMBART 1906) and *N. melanogrammus*, ventral surface dull from fine and dense punctation or from microreticulation between coarse punctures *Nebrioporus*

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Zusammenfassung

Amurodytes belovi nov.sp. wird aus dem Seja Natur-Reservat im Fernen Osten Russlands, der Typus-Lokalität, und dem etwa 900 km weiter westlich gelegenen Bolschoj-Amalat-Fluss in Burjatien (Ost-Sibirien) beschrieben. Die Art gehört in die *Deronectes*-Gattungsgruppe ("Deronectina") des Tribus Hydroporini und ähnelt auf den ersten Blick einigen Arten der Gattung *Oreodytes* SEIDLITZ 1887. Eine ungewöhnliche Kombination mehrerer Merkmale unterscheidet sie jedoch von diesen und allen anderen Arten der Gattungsgruppe und auch denen des Tribus und sie kann deshalb nur in einer neuen Gattung, *Amurodytes* nov.gen., beschrieben werden. Zu erwähnen sind insbesondere die folgenden Merkmale: herzförmiges Pronotum; Metacoxalfortsätze distal in der Mitte verlängert und hier deutlich exponiert; parallele Metacoxallinien; in beiden Geschlechtern mit ventral abgeflachten Fühlergliedern, bei den Männchen sogar mit mehr oder weniger halbkeisförmigem Querschnitt; männliche Vordertibien stark verbreitert; Pro- und Mesotarsomeren ohne Saugnäpfchen; Mittellobus des Aedeagus distal ungewöhnlich schlank. Die Hinterflügel sind bei sämtlichen vorhandenen Exemplaren extrem stark reduziert, sodass zumindest bei diesen davon ausgegangen werden muss, dass sie völlig flugunfähig sind (brachypter). Der Habitus, die Genitale und einige weitere Merkmale der neuen Art werden illustriert und die systematische Position der neuen Gattung ausführlich diskutiert. Ein modifizierter Bestimmungsschlüssel für die Deronectina-Gattungen wird angeboten, der sowohl die neue Gattung *Amurodytes* nov.gen. als auch die Gattung *Oreodytes* enthält.

References

- ANGUS R.B. (2010): *Boreonectes* gen. n., a new genus for the *Stictotarsus griseostriatus* (DE GEER) group of sibling species (Coleoptera: Dytiscidae), with additional karyosystematic data on the group. — *Comparative Cytogenetics* 4 (2): 123-131.
- BALFOUR-BROWNE F. (1961): The metendosternite in the Coleoptera. — *The Journal of the Linnean Society of London* 44: 337-354.
- BALFOUR-BROWNE F. (1967): A study of the metathorax and its principal muscles in dytiscid beetles. — *Proceedings of the Royal Entomological Society of London. Series A, General Entomology* 42(10-12): 155-166.
- BALKE M. (2005): Dytiscidae LEACH, 1915 [sic!], pp. 90-116. — In: BEUTEL R.G. & R.A.B. LESCHEN (volume eds), *Coleoptera, beetles, Volume 1: Morphology and systematics (Archostemata, Adephaga, Myxophaga, Polyphaga partim)*, xii + 567 pp. — In: KRISTENSEN, N.P. & BEUTEL R.G. (eds), *Handbook of zoology, Arthropoda: Insecta* 4 (38). — Berlin: Walter de Gruyter.

- BERGSTEN J., NILSSON A.N. & F. RONQUIST (2013): Bayesian tests of topology hypotheses with an example from diving beetles. — *Systematic Biology* **62** (5): 660-673.
- KEHL S. & K. DETTNER (2007): Flugfähigkeit der in Deutschland vorkommenden adephagen Wasserkäfer (Coleoptera, Hydradephaga). (Flight ability of the adephagan water beetles (Coleoptera, Hydradephaga) of Germany.) — *Entomologie Heute* **19**: 141-161.
- LARSON D.J., ALARIE Y. & R.E. ROUGHLEY (2000): Predaceous diving beetles (Coleoptera: Dytiscidae) of the Nearctic Region, with emphasis on the fauna of Canada and Alaska. — Ottawa: NRC Research Press, 982 pp.
- LAWRENCE J.F., HASTINGS A.M., DALLWITZ M.J., PAINE T.A. & E.J. ZURCHER (2000): Beetles of the world. A key and information system for families and subfamilies. Version 1.0 for Microsoft Windows. — Canberra: CSIRO publishing. [Compact Disc]
- MAZZA G., CIANFERONI F. & S. ROCCHI (2013): *Etruscodytes nethuns* n.gen., n.sp.: the first phreatic water beetle from Italy (Coleoptera: Dytiscidae: Hydroporinae). — *Italian Journal of Zoology* **80** (2): 233-241.
- MILLER K.B. & A.N. NILSSON (2003): Homology and terminology: Communicating information about rotated structures in water beetles. — *Latissimus* **17**: 1-4.
- NILSSON A.N. & R.B. ANGUS (1992): A reclassification of the *Deronectes*-group of genera (Coleoptera: Dytiscidae) based on a phylogenetic study. — *Entomologica Scandinavica* **23**: 275-288.
- PETROV P.N., SHAPOVALOV M.I. & H. FERY (2010): A new species of *Ilybius* ERICHSON, 1832 (Coleoptera: Dytiscidae) from the North Caucasus. — *Russian Entomological Journal* **19** (1): 41-45.
- RIBERA I. (2004): Are Iberian endemics Iberian? A case-study using water beetles of family Dytiscidae (Coleoptera). — *Graellsia* **59** (2-3) (2003): 475-502.
- RIBERA I. & A. FAILLE (2010): A new microphthalmic stygobitic *Graptodytes* SEIDLITZ from Morocco, with a molecular phylogeny of the genus (Coleoptera, Dytiscidae). — *Zootaxa* **2641**: 1-14.
- RIBERA I., VOGLER A.P. & M. BALKE (2008): Phylogeny and diversification of diving beetles (Coleoptera: Dytiscidae). — *Cladistics* **24**: 563-590.
- ŘÍHA P. (1955): Studies on the metathoracic furca of the Palearctic Dytiscidae (Coleoptera). — *Acta Entomologica Musei Nationalis Pragae* **30**: 341-398.
- WOLFE G.W. (1985): A phylogenetic analysis of plesiotypic hydroporine lineages with an emphasis on *Laccornis* DES GOZIS (Coleoptera: Dytiscidae). — *Proceedings of the Academy of Natural Sciences of Philadelphia* **137**: 132-155.
- ZIMMERMAN J.R. (1985): A revision of the genus *Oreodytes* in North America (Coleoptera: Dytiscidae). — *Proceedings of the Academy of Natural Sciences of Philadelphia* **137**: 99-127.
- ZIMMERMAN J.R. & A.H. SMITH (1975): A survey of the *Deronectes* (Coleoptera: Dytiscidae) of Canada, the United States and northern Mexico. — *Transactions of the American Entomological Society* **101**: 651-722.

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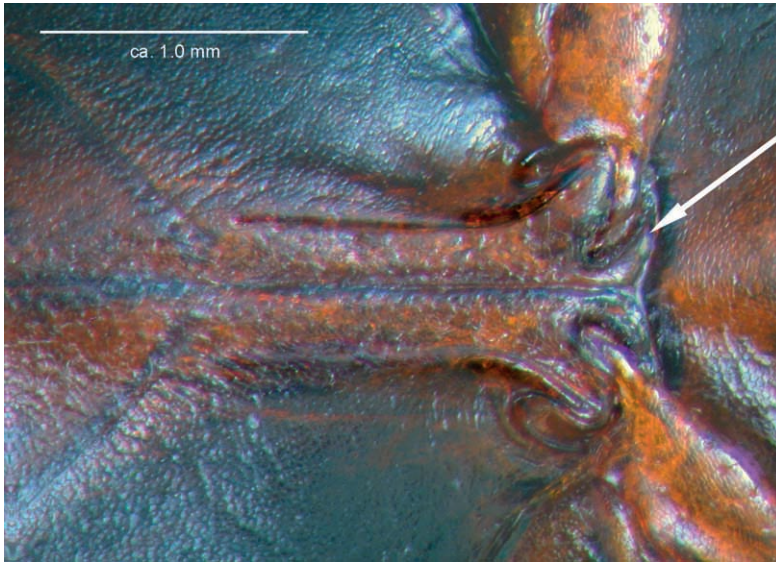


Fig. 2. *Amurodytes belovi* nov.sp.: metacoxal lines and broadly exposed interlaminary bridge of metacoxae (arrow).

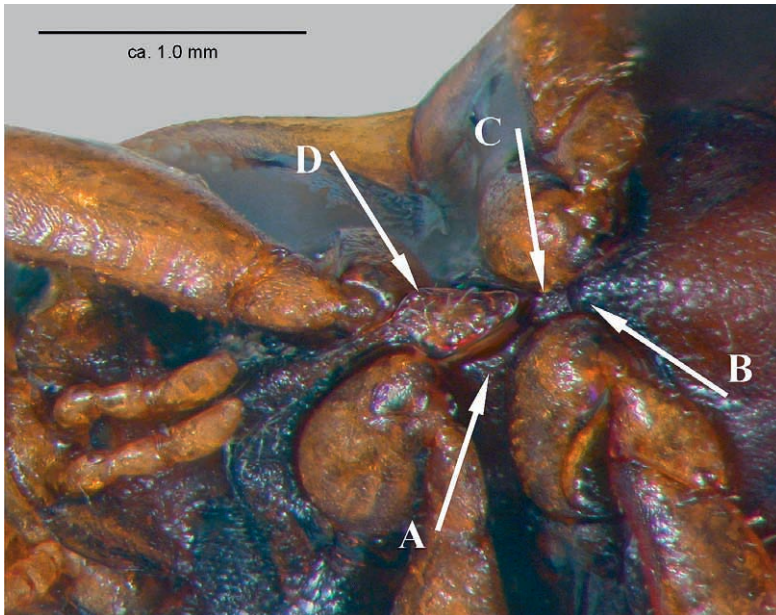


Fig. 3. *Amurodytes belovi* nov.sp.: details of prosternal and anteromedial metaventral processes; prothorax not in natural position, somewhat bent downward to show details: (A) uppermost part of mesoventral fork, (B) apex of anteromedial metaventral process, (C) forward prolongation of anteromedial metaventral process, level lower than that of apex of metaventral process, hidden by prosternal process (D) if prothorax in normal position.



Figs 4-5. *Amurodytes belovi* nov.sp.: (4) right male protibia and tarsus in dorsal view, (5) right male protibia, tarsus and antenna in ventral view.

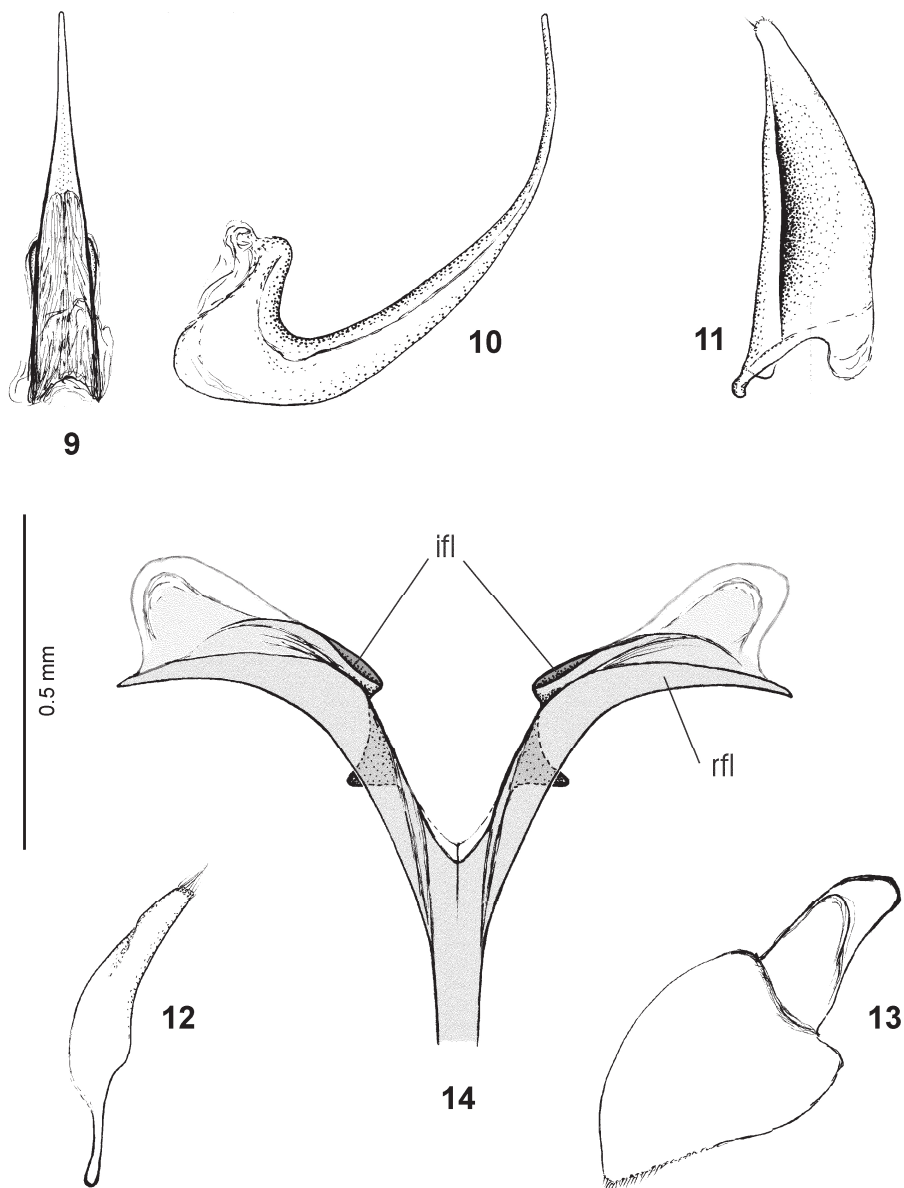


Fig. 6. *Amurodytes belovi* nov.sp.: different aspects of antenna (antennomeres 2-11): (a) ventral view, (b) lateral view, (c) dorsal view.

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Figs 7-8. *Amurodytes belovi* nov.sp.: aspect of pterothorax and abdomen, with elytra and right hind wing raised up; head, prothorax, last two abdominal ventrites and inner parts of metathorax and abdomen removed: (7) low magnification, (8) higher magnification.



Figs 9-14. *Amurodytes belovi* nov.sp.: (9) median lobe of aedeagus in ventral view, (10) median lobe in lateral view, (11) left paramere (lateral lobe), (12) gonocoxa, (13) gonocoxosternum, (14) metendosternite in dorsal view.

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