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**Rediscovery of *Hygrotus (Leptolambus) artus* (FALL, 1919),  
description of *Hygrotus (L.) yellowstone* nov.sp.  
and notes on other species of the genus  
(Coleoptera, Dytiscidae, Hydroporinae, Hygrotini)**

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**A b s t r a c t:** Several mainly Nearctic members of the genus *Hygrotus* STEPHENS, 1828 are dealt with which have been treated by ANDERSON (1983) in his species-group V. *Hygrotus (Leptolambus) yellowstone* nov.sp. is described from north-western and central Wyoming. The identity of *H. (L.) artus* (FALL, 1919) – known also as the "Mono Lake diving beetle" – is established and it is shown neither being extinct nor living in the alkaline Mono Lake, but being instead a species which is quite widely distributed in the Mono County (California). *Hygrotus (L.) medialis* (LECONTE, 1852), and *H. (L.) infacetus* (CLARK, 1862) – since ANDERSON (1983) treated as subjective synonym of *H. (L.) lutescens* (LECONTE, 1852) – are reinstated as valid species. Diagnoses, containing illustrations of the aedeagi and other features, are given for these five species and for *H. (L.) fumatus* (SHARP, 1882), their distributions are mapped and a key to species is presented. Lectotypes are designated for the nominal taxa *Hydroporus medialis* LECONTE, 1852, and *Hygrotus impressifrons* MOTSCHULSKY, 1859; the synonymy of the latter with *H. (L.) lutescens* is confirmed. Altogether, the genus *Hygrotus* includes now 132 species (three of them bitypic) and the subgenus *Leptolambus* 53 species (two of them bitypic). Notes on the occurrence of *H. (L.) nubilus* (LECONTE, 1855) on Hawaii are also given.

**K e y w o r d s:** Coleoptera, Dytiscidae, Hygrotini, *Hygrotus (Leptolambus)*, new species, lectotype, reinstatement, key to species

### Introduction

The genus *Hygrotus* STEPHENS, 1828 includes at present 129 species (three of them bitypic) which are distributed in all zoogeographical regions except the Australian. The rather complicated older history of the generic names used for the species of the genus as it is presently understood is given e.g. in F. BALFOUR-BROWNE (1934) and shall not be repeated here.

The World Catalogue of Dytiscidae (NILSSON 2001) included the following genera in the tribe Hygrotini PORTEVIN, 1929: *Heroceras* GUIGNOT, 1950, *Herophydrus* SHARP, 1880, *Hygrotus* STEPHENS, 1828 (with subgenera *Hygrotus* s. str. and *Coelambus* THOMSON, 1860), *Hyphoporus* SHARP, 1880, and *Pseudhydrovatus* PESCHET, 1924. While BISTRÖM (2002) synonymised the name *Pseudhydrovatus* with *Hydrovatus* MOTSCHULSKY, 1853, the other names were in use until VILLASTRIGO et al. (2017, 2018) published their new classification of the tribe Hygrotini based on a molecular phylogeny of the tribe with

almost half of the described species of Hygrotini. The main results of these investigations are: (1) the genus *Hygrotus* includes now four subgenera: *Coelambus*, *Hygrotus* s. str., *Hyphoporus* and the newly introduced *Leptolambus* VILLASTRIGO et al., 2017; (2) the genera *Heroceras* and *Herophydrus* are synonymised under subgenus *Hygrotus* s. str.; (3) seven Nearctic and one Palearctic species are included in the newly introduced genus *Clemnius* VILLASTRIGO et al., 2017 which includes the subgenera *Clemnius* s.str. and *Cyclopius* VILLASTRIGO et al., 2017.

The taxonomy of the Palearctic members of Hygrotini (except species of *Hyphoporus* and former genera *Heroceras* and *Herophydrus*) was dealt with in FERY (2003) and that of the Nearctic species in ANDERSON (1971, 1976, 1983) who divided the Nearctic members of the genus *Hygrotus* into six groups using external characters and in part the shape of the male genitalia. For practical reasons we use ANDERSON's grouping in the present work although the molecular studies by VILLASTRIGO et al. (2017) support this division only in part. The identity of some *Hygrotus* species needs further investigations, mainly *Coelambus hudsonicus* FALL, 1919 (valid species or subspecies or synonym of *Hygrotus (Leptolambus) novemlineatus* (STEPHENS, 1829)), the only Nearctic member of subgenus *Coelambus*, *Hygrotus (C.) punctilineatus* (FALL, 1919) (possible synonym of the Palearctic *H. (C.) nigrolineatus* (STEVEN, 1808)), and several members of the species-group V in ANDERSON (1983). Our interest in the species of latter species-group was initiated by the lack of any modern record of *Hygrotus (Leptolambus) artus* (FALL, 1919) of which only the holotype is known, although several coleopterists must have searched intensively for this species. ANDERSON (1983: 181) wrote: "I have collected in alkaline Mono Lake and studied collections made by numerous other workers in the area, but I have seen no other examples of this species."

The senior author failed also to collect this species although he performed several collecting activities in California during the last 30 years (1988, 1989, 1990, 2004, 2013) and collected all other *Hygrotus* known from this state. On the other hand, it appeared quite strange that (1) a diving beetle can survive (or even has its normal habitat) in the almost toxic water of the Mono Lake (although several members of *Hygrotus* are known to live in salty water, see VILLASTRIGO et al. (2018)); (2) it has never been collected since its first record in 1932; and (3) it has never been found in any other locality near that of the holotype. This enigmatic taxon found even the interest of more popular media. It has got vernacular names like "Mono Lake beetle" or "Mono Lake diving beetle" and if these names are entered in any browser, many sites can be opened – some of them are quite serious, others offer rather speculative or even incorrect information ("the species was found the last time in 1984"). Most of the contributions declare the species as "extinct" (e.g. ROBISCHON (2007: 259), BOUCHARD et al. (2009: 288), FOSTER (2020: 26)).

Recently, the senior author studied photos of the holotype of *H. artus* and also photos of the respective labels which can be found in the MCZ type database (see also Fig. 7). To his great surprise he found that besides one label with "Mono Co." another label exists with the text "Farrington, Mono Lake"; this label was neither cited by ANDERSON (1983) nor by any other author. He found on the Internet that in fact "Farrington Ranch" existed in the late 19<sup>th</sup> and early 20<sup>th</sup> century, only about 5 km apart from the shores of Lake Mono (Google Earth 2018: ca. 37.908N 119.106W; 2,090 m). This was an enormous stimulus for starting again collecting trips to the respective region and, particularly, not

to collect in the water of the Mono Lake, but in the non-alkaline waters nearby that lake. Several attempts failed, but in August 2017 he was successful and collected five specimens of a *Hygrotus* about 700 m south of the remains of the Farrington Ranch.

The aim of the present work is not giving a complete revision of ANDERSON's species-group V. We restricted our investigations chiefly on material collected in California, in particular on *H. artus*, *H. (Leptolambus) fumatus* (SHARP, 1882) and species which were summarised under *H. (Leptolambus) lutescens* by ANDERSON (1983). Nevertheless, we present also a few notes on other species and, in particular, describe *H. (Leptolambus) yellowstone* nov.sp. from Wyoming. Notes on *Hygrotus (Leptolambus) nubilus* (LECONTE, 1855), which was recently recorded from Hawaii, are also added.

### Material and methods

Specimens were studied with an Olympus SZX16 stereoscopic microscope. Photographs of the habitus and other details of specimens were taken with a Canon EOS 550D digital camera attached to the microscope. Helicon Focus 6.4.1 software was used to combine stacks of photos of the same object at different focal planes. Adobe Photoshop CS5 software was used to retouch micrographs and ink drawings. Label texts of important specimens are cited literally and figured in part. Coordinates and altitudes of localities were found with help of Google Earth. Specimens mounted on tips were unglued and remounted on rectangular glue cards after dissection or study of the ventral surface. Genitalia were studied in wet condition. The original pins and also the original points were kept for historical purposes; in all these cases we have added a label "remounted by H. Fery, 2019" (this is not mentioned under the material listed). Handwritings were identified by using HORN et al. (1990a, b) and comparing with label photographs available in the MCZ type database; some handwritings were identified and/or confirmed by the staff of the MCZ. For additional photos of types and of respective type labels see the MCZ type database which is available under <http://insects.oeb.harvard.edu/mcz/>. In the plates a three-letter-code (e.g. "(art)" for "*artus*") is added to most figure numbers to support the understanding of the reader. The maps in Figs 88 and 89 were made by using "Microsoft Encarta World Atlas 2000". The terminology to denote the genitalia's orientation follows MILLER & NILSSON (2003).

The following abbreviations are used in the text: TL: total length, MW: maximum width of body, TL/MW for the respective ratio, and "loc." for "locality". "ID-label" is used for identification labels mounted by the staff of the MCZ (see example in Fig. 1). Codens used for collections from which material was loaned or finally stored are:

BMNH .....	British Museum of Natural History, London, UK (M. Geiser, C. Taylor)
CHF.....	collection H. Fery (Berlin, Germany; property of the NMW)
CIR.....	collection I. Ribera (Barcelona, Spain)
CLH .....	collection L. Hendrich (Munich, Germany; property of the NMW)
FSCA .....	Florida State Collection of Arthropods, Gainesville, USA (P. Skelley, K. Schnepf)
MCZ.....	Museum of Comparative Zoology, Harvard University, Cambridge, USA (P. Perkins, W. Farnum, C. Maier)
MNB .....	Museum für Naturkunde, Berlin (B. Jaeger)

NMW .....Naturhistorisches Museum Wien, Austria (M.A. Jäch)  
 SDNHM.....San Diego Natural History Museum (J. Berrian)  
 UAT .....University of Arizona, Tuscon, USA (C. Olson)  
 WRMW.....The Wallis Roughley Museum of Entomology, Winnipeg (J. Gibson)  
 ZMUM.....Zoological Museum, Moscow State University, Moscow, Russia (A. Gusakov)

Most specimens studied belong to the collections of the authors; in most cases these depositories are not listed in the text. For the remaining specimens the depository is mentioned after the label data. The order of the material listed under each species is from north-west to south-east.

### Taxonomy

Generally, members of the genus *Hygrotus* have the upper surface provided with a dark pattern on more or less yellowish or light brownish ground. The elytral pattern consists often of distinct vittae which can be interrupted and/or fused in part and can help a reliable determination in several species. Additionally, many species can be easily identified by studying the male genitalia and even more frequently by the shape of the female genitalia (see e.g. HILSENHOFF 1994, FERY 2003).

Our species can be easily distinguished from the externally similar members of ANDERSON's (1983) species-group IV of which the males have the pro- and mesothoracic legs quite characteristically modified and the apex of the median lobe in ventral view blunt. However, the recognition of our species is confounded by their great similarity (also of male and female genitalia in most species), and many characters supposed as being useful for identification turned out as to much varying individually when more specimens are studied. Additionally, identifications can be complicated because on average females are somewhat more oval than males. The only characters which help a reliable separation from at least some of the other species are reticulation on last abdominal ventrite in females, punctuation on lateral part of metaventrite, shape of anterior protarsal claw in males and shape of median lobe in lateral view (the latter only in one species). Characters which can vary and help only in addition to or in combination with other characters are body shape, coloration of elytra (really helpful only in *H. sellatus*) and total length (mainly somewhat overlapping; see Table). In several species their distribution can be used to ascertain a particular determination. Distinctness of elytral puncture lines, shape of prosternal process and some other characters are used by ANDERSON (1983), but vary too much, and thus are not included in our studies.

**N o t e s:** The photos of the median lobes in ventral view (see Figs 51-66) can considerably vary in length although they appear in lateral view more or less of same size. These photos are in a view perpendicular to the apical part of the lobes; thus, strongly curved lobes result as being quite short in ventral view although they may be even bigger than less curved ones.

One result of our studies is the discovery that specimens so far summarised under *H. (L.) lutescens* belong in fact to three different species: *H. (L.) infacetus* (CLARK, 1862), *H. (L.) lutescens* and *H. (L.) medialis* (LECONTE, 1852) (see e.g. ANDERSON (1983), LARSON et al. (2000), and NILSSON & HÁJEK (2020)). Since it seems to be inappropriate

to give for each species a detailed description which would include numerous repetitions, we start with a detailed description of the single new species and give for the other species mainly those characters which are deviating.

***Hygrotus (Leptolambus) yellowstone nov.sp.***

*Coelambus lutescens* (LECONTE, 1852); BRUES 1932: 257 (misidentification).

*Coelambus* sp. "near *artus* FALL"; BRUES 1932: 258.

**Type locality:** Pool in Shoshone Geyser Basin, Yellowstone Park, Wyoming, USA; ca. 44.4N 110.7W; ca. 2,400 m.

**Type material:** **Holotype:** ♂, "Shoshone/Basin/Yel'stone P." [hw Fall], "Hot Springs/1930 Sp. No./C.T. Brues" [printed], "Exped./69" [printed, number hw; this label seems to have been cut off from the second label], label with male gender symbol and question mark. "near artus/possibly that" [hw Fall], "H.C. Fall/collection" [printed], ID-label with "00711248", "Holotype/Hygrotus (*Leptolambus*)/yellowstone sp. n./Challet & Fery det. 2020" [red label, printed] (see Fig. 1) (MCZ). **Paratypes:** 1♂, same label data as holotype, but with additional "VII-5-30" on first label, ID-label with "00711249", fifth label lacking, red label with "Paratype"; 1♂, "Hot Springs Exped./1930 Sp. No. 77/C.T. Brues" [printed, number hw], ID-label with "00743683" (Fig. 13); 1♂, "Hot Springs Exped./1930 Sp. No. 77/C.T. Brues" [printed, number hw], "lutescens?" [hw Fall], ID-label with "00743685" (specimen strongly immature); 1♀, "Hot Springs Exped./1930 Sp. No. 77/C.T. Brues" [printed, number hw], "Coelambus/sellatus/Lec." [hw Fall], ID-label with "00743684" (MCZ); 10♂♂, 4♀♀, "WYO. Fremont County/3 mi. SW Riverton/on Hwy 287 roadside/pool 17.v.1951/GKTodd" [printed] (ca. 42.93N 108.47W; ca. 1,500 m) (FSCA, CHF). All paratypes with a respective red label. **Note:** The holotype and the four "Brues" paratypes are collected at localities in the north-westernmost region of Wyoming which all are situated in the Yellowstone National Park (see the map in BRUES (1932: 190)).

**Description (holotype):**

**Habitus:** elongate oval (Fig. 1), sides of elytra weakly rounded in anterior two thirds, behind more rounded to apex; maximum width near midlength of elytra. Body outline with very slight discontinuity at shoulders. Coloration of dorsal surface cloudy, more or less yellowish to yellowish brown, only little shining; elytra without distinct darker pattern; ventral surface black to large extent (similar to paratype from loc. "69", Fig. 22), appendages yellowish brown.

**Head:** reddish-yellowish brown; vertex centrally and two obliquely oriented stripes reaching from vertex to sides of anterior margin of clypeus darker brownish; between darker stripes a lighter area reaching from frons to anterior margin of clypeus; clypeus centrally behind anterior margin vaguely shining through brownish. Anterior margin of clypeus without rim, distinctly emarginated, here with a fine line parallel to margin (clypeal line in VILLASTRIGO et al. (2017)); second carina in antennal cavity strongly reduced, only short rest near mouthparts perceptible (see VILLASTRIGO et al. (2017)); clypeal grooves distinct, alongside inner margin of eyes with furrow. Punctuation in grooves and near inner margin of eyes rather dense, else less dense; distance between punctures mostly larger than diameter of punctures, between clypeal grooves much larger; vertex with only few small punctures. Surface of head without any reticulation and distinct setae, only in clypeal grooves and in furrow aside eyes a very few very short setae. Antennomeres slightly more yellowish than centre of head, distally progressively darkened beginning with sixth; second antennomere more or less as long as fifth, shorter than third and fourth together; fourth slightly shorter than third.

**Pronotum:** more reddish than head; centrally diffusely brownish; near anterior and posterior margins shining through brownish; rim on sides of pronotum darker brownish. Maximum width of pronotum between obtuse posterior angles; sides almost straight,

converging weakly anteriorly, shortly rounded near anterior angles; thin but distinct rim of same width over entire length. Punctuation slightly denser than on head, near anterior margin still denser; on disk punctures smaller than laterally. Surface of pronotum without reticulation; very few setae near sides.

**Elytra:** generally slightly more yellowish than pronotum; stripe between elytral suture and sutural puncture line more reddish; suture and sutural puncture lines dark brown. Elytra almost entirely transparent, hind wings shining through. Additionally to sutural line, two puncture lines on disk and a third near sides. Punctures of discal lines not deeply impressed, but lines well recognisable in anterior half of elytra; punctures of first (= inner) discal lines rather regularly arranged, those of second line less regular, those of line near sides strongly irregular. Punctuation of elytra between puncture lines relatively fine, more or less uniform, distance between punctures about twice as large as their diameter; near elytral base a few larger punctures interspersed. Surface of elytra largely without reticulation, only near apex traces of some mesh lines perceptible; entire surface with setae, but on disk very sparse and short (only perceptible when adequately illuminated); near sides and particularly near apex setae longer and more distinct. In perpendicular view on upper surface elytral margin only perceptible at shoulders and near apex, because else sides of elytra projecting over margin and obscuring it. In lateral view elytral margin moderately ascending to shoulder; epipleuron not visible until shoulders. **Note:** The holotype and the paratype from loc. "69" appear not to be immature although their elytra are more or less uniformly yellowish.

**Ventral surface:** (Fig. 22, paratype from loc. "69") of head and prothorax reddish-yellowish brown with prosternum prosternal column and process darker brown; rest of venter to large extent black and shiny; epipleura light brownish; lobes of metacoxal processes and hind margins of third to fifth abdominal ventrites narrowly shining through brownish. Legs reddish brown, meso- and metafemora diffusely darkened. Prosternum before procoxae strongly sculptured, prosternal column between procoxae with several very strong transverse carinae; prosternal process narrow, lanceolate, in cross-section roof-like; apex narrowly rounded; sides of process anteriorly broadly flattened. Prosternal process reaching between mesocoxae onto narrow and somewhat excavated anteromedial process of metaventrite. Metaventrite on stripes left and right of midline impunctate, stripes delimited by two irregular puncture lines (similar to paratype from loc. "69", Figs 22, 28); next to these lines with large impunctate area; laterally with about 20 very large densely arranged punctures; before border to metacoxal plates with a single line of punctures plus a few additional punctures. Metepisternum smooth, laterally with some transversely oriented flat elongate punctures; directly behind rim at anterior margin with a series of more longitudinally oriented punctures. Metacoxal plates in anterior two thirds also covered with large punctures, posterior third without punctures. Metacoxal processes with several smaller punctures. Epipleura constricted at level of first abdominal ventrites, in anterior broad part with some punctures; humeral portion of epipleuron with oblique carina delimiting genicular fossa. Metacoxal processes more or less conjointly straight cut off, but near medial line prolonged backwards (interlaminary bridge) and descending to level of second abdominal ventrite. Abdominal ventrites distinctly punctured, but second ventrite medially less so; second to fourth ventrite centrally with a brush of long setae; last abdominal ventrite medially somewhat less punctured; hind margin more or less evenly rounded, limited by some larger punctures, but these not crenulating margin; no bristles

in punctures perceptible. Reticulation on entire venter absent, only metaventricle medially with some traces of meshes.

♂ ♂: Protarsomeres not distinctly broadened, similar to those of females; articles I-III relatively short, almost as broad as long; article V short, more less as short as tarsomere III; anterior claw curved near base, then almost straight; mesotarsomeres distinctly more slender, claws simple. Pro- and mesofemora as well as mesotibia simple, not "curiously modified" as in males of ANDERSON's species group IV (1983: 173, and figs 8-12 on p. 178). Metatarsal claws equal in length.

Median lobe of aedeagus of holotype in lateral and ventral view as in Figs 30 and 51, left paramere as in Fig. 67 (for paratypes see Figs 31, 32, 52, 53, 68). Apex of median lobe in lateral view curved dorsally (in dry condition more curved); distance between apex of lobe and a line prolonging inner surface of condyle relatively large (for estimating distances see greyish lines in Figs 30-41 and 46-50). Lobe in ventral view apically slightly less pointed than in *H. (L.) artus*, *H. (L.) lutescens* and *H. (L.) medialis* (compare Figs 51-53 with Figs 54-64); dorsal surface of lobe slightly tectiform, particularly in middle third. Apex of parameres with three or four very short transparent and inward curved setae, thus not perceptible when observing outer surface of paramere; however, also almost imperceptible when observed in other directions.

♀ ♀: Female paratype from loc. "77" with head distinctly reticulate, except lateral parts of vertex. Last abdominal ventrite laterally and posteriorly with traces of reticulation, else smooth; punctures on ventrite each with a distinct seta, but before hind margin with impunctate area. Hind margin of last ventrite centrally very slightly projecting, almost evenly rounded; left and right of middle with a furrow over about half of margin; in depressions with about 12 punctures, several of them bearing a rather long bristle; punctures very little crenulating border of hind-margin. Pro- and mesotarsomeres similar to those of males, not distinctly more slender; claws simple, longer and evenly curved. Gonocoxae and gonocoxosterna as in Fig. 80.

**M e a s u r e m e n t s:** TL: 2.75-3.1 mm (mean 2.91 mm); MW: 1.5-1.65 mm (mean 1.57 mm); TL/MW: 1.82-1.90 (mean 1.86) (holotype: 2.8 mm/1.5 mm/1.88) (see also the Table). On average, this is the smallest of the species studied, but only little smaller than *H. lutescens* and *H. artus*. Together with *H. fumatus* these three belong to the more elongate species.

**V a r i a b i l i t y:** The specimens from loc. "77" and those from Riverton have the elytra somewhat darkened in posterior half, anteriorly traces of vittae are recognisable, the contrast between lighter and darker areas is weak. The puncture lines on disk of elytra are in some specimens rather diffuse. The reticulation of the head is in the two females from Riverton less extended, the last abdominal ventrite with very few traces of reticulation. The shape of the median lobe of aedeagus and that of the paramere vary little in the specimens from the Yellowstone National Park (compare Figs 30, 51, 67 for the holotype with Figs 31, 52, 68 for the paratype from loc. "77").

In specimens from Riverton the shape of the median lobe can be more evenly curved apically or even slightly curved ventrally (similar to Fig. 41). Additionally, the distance between the grey line and the apex of the lobe can be slightly smaller.

**D i a g n o s t i c r e m a r k s:** The new species can be distinguished from the other species studied in this work by the coarse und sparse punctation of the lateral part of the

metaventricle (about 20 punctures; see Figs 22, 28). The other species have the punctures relatively smaller and more numerous (ca. 35-40; e.g. *H. artus* (Figs 25-27, 29) and *H. medialis* (Figs 23, 24)) and have before the border to the metacoxal plate distinctly more punctures. Additionally, males of the new species can be separated by the shape of the median lobe in lateral view and – less reliable – also in ventral view. Females of *H. yellowstone* nov.sp. have the last abdominal ventrite with posterior margin only weakly punctate and medially weakly projecting backwards; the reticulation is very weak or absent while it is very distinct in *H. lutescens* and *H. infacetus*. The species is also the smallest species of those studied, although rather short specimens can rarely arise also in the others.

**D i s t r i b u t i o n:** So far the new species is only known from the type locality, a nearby other pool and from Riverton which is 230 km more south-east (all in Wyoming) (Fig. 89). The distances between the localities of *H. yellowstone* nov.sp. and those of *H. artus* and *H. lutescens* are about 1,000 km.

**E t y m o l o g y:** The new species is named after the famous Yellowstone National Park in Wyoming, USA, where the species was found first. It is a noun in the nominative singular standing in apposition.

**E c o l o g y:** According to BRUES (1932: 195) the type locality (loc. "69") is a shallow pool with little vegetation "... and the temperature of the water does not rise 32° at any place". It is alkaline with "...a specific gravity of 1.0036 and pH of 8.2." The loc. "77" of the other specimens is described in BRUES (1932: 196) as "...a brownish pool surrounded by low vegetation, the water highly alkaline (pH 9.5) and of moderate salinity (1.0056)." Data on the Riverton pool are unknown.

**N o t e s:** Although the holotype and the one paratype (both from the type locality "69") undoubtedly are not the same as *H. artus*, they are nevertheless important for the determination of the identity of the holotype of *H. artus*: the holotype of the new species has a label "near artus, possibly that" in Fall's handwriting and both specimens lack a distinct pattern of the elytra – same as the specimens of *H. artus* which were recently found by one of us (GC) near the Farrington Ranch. This shows that our specimens should be what FALL (1919) understood under his *Hygrotus artus*. This is of great help considering the fact that the holotype of *H. artus* is more or less totally inappropriate for a reliable identification of specimens assumed to belong to this species.

### ***Hygrotus (Leptolambus) lutescens* (LECONTE, 1852)**

*Hydroporus lutescens* LECONTE, 1852: 208.

*Hydroporus medialis* LECONTE, 1852; LECONTE 1863: 16 (synonymy with *impressifrons*, but with question mark).

*Hydroporus impressifrons* MOTSCHULSKY, 1853: 4 (nomen nudum).

*Hygrotus impressifrons* MOTSCHULSKY, 1859: 165; SHARP 1882: 815; ZIMMERMANN 1920: 75; LENG 1920: 79 (with question mark).

*Coelambus lutescens* (LECONTE, 1852); BRANDEN 1885: 41; ZAITZEV 1915: 291 (synonymy of *impressifrons*; nec ANDERSON (1983: 183)); FALL 1919: 11; LENG 1920: 77; ZIMMERMANN 1920: 68; BRUES 1932: 257 (partim).

*Coelambus impressifrons* (MOTSCHULSKY, 1859); BRANDEN 1885: 40; FALL 1923: 5 (attribution to genus with doubt)

*Hygrotus lutescens* (LECONTE, 1852); LEECH & CHANDLER 1956: 316; ANDERSON 1983: 183; 1985: 17 (partim, in map); CHALLET & BRETT 1998: 46 (partim); LARSON et al. 2000: 166 (partim).



*Hygrotus (Coelambus) lutescens* (LECONTE, 1852); HATCH 1953: 199; NILSSON 2001: 207.

*Hygrotus (Leptolambus) lutescens* (LECONTE, 1852); VILLASTRIGO et al. 2017: 506; NILSSON & HÁJEK 2020: 190.

**Type localities:** *Hydroporus lutescens*: originally, LECONTE's syntype series had San Francisco and San José, California, USA as type locality. Since the lectotype designation by ANDERSON (1983: 184) it is now only San Francisco. *Hygrotus impressifrons*: San Francisco, California, USA.

**Type material:** Lectotype of *Hydroporus lutescens*: ♂, "Cal." [printed], "lutescens 4" [hw LeConte?], "to be design. as/lectotype by/R.D. Anderson" [hw Anderson?], "MCZ Lectotype/Hydroporus/lutescens Lec. 1852", on reverse "applied by RLHawkins/22-II-2018" [red, hw Hawkins], ID-label with "00711252" (Fig. 8) (MCZ). Paralectotype: 1♀, round golden label without text, "Type 5992" [red, printed, number hw?], "H. lutescens/S. Fr & S. J. [= San Francisco and San José] Lec." [hw LeConte], "Hygrotus lutescens (LeC.)/Det. 1980/R.D. Anderson" [printed except "80"], "Jan-Jul. 2004/MCZ Image/Database" [printed and with camera-symbol], ID-label with "00005992", "Paralectotype/Hydroporus/lutescens LeConte, 1852/mounted by Fery 2019" [red, printed] (see Fig. 9) (MCZ). **Notes:** Several further specimens are stored in the MCZ, standing behind the lecto- and paralectotype (see also ANDERSON (1983: 184)). It is, however, not clear whether these belong to the original syntype series and, thus, are here not assumed being paralectotypes. The abdomen of the paralectotype is separated (most probably by Anderson), and both gonocoxae and one gonocoxosternum are present, but distally eaten by dermestids. Lectotype of *Hydroporus impressifrons* (by present designation): ♀, "California" [green, hw Motschulsky], "Hygrotus/impressifrons/Motsch/Californ" [green, hw Motschulsky], "1605" [red, hw?], "Coelambus/lutescens Lec." [hw Zaitzev?], "Hygrotus lutescens/(LeC.), Det. 1981/R. D. Anderson" [printed except "81"], "Lectotype/Hygrotus impressifrons/Motschulsky, 1859/Fery des. 2019" [red, printed] (Fig. 10) (ZMUM).

**Notes on the lectotype of *H. impressifrons*:** This taxon was published twice: as nomen nudum (*Hydroporus impressifrons* MOTSCHULSKY, 1853: 4; name not available), and with available name (*Hygrotus impressifrons* MOTSCHULSKY, 1859: 165). Although the description in the work from 1859 gives no hint that more than one specimen was studied (e.g. variability of any character), it cannot be excluded that Motschulsky has studied more than one specimen. Thus, we must assume that originally a series of syntypes existed. The single specimen stored in the Moscow Museum is a female. The Latin description (p. 165) contains the words "epistoma marginatum" which is not true (see also FALL (1923: 5)). We assume that this is a lapsus and the Latin description should be "epistoma emarginatum" because an "anteriorly bordered clypeus" is not contained in the French description; here can be found instead "La tête est tronquée en avant, distintement émarginée..." (see also the name specific "*impressifrons*"). Otherwise this single specimen fits perfectly the French description by MOTSCHULSKY (1859: 165).

This taxon was only rarely dealt with in the literature. We know of only 17 publications in which it is treated. LECONTE (1863) suspected that this taxon might be *Hygrotus medialis* (under the generic name *Hydroporus*). ZAITZEV (1915: 291, 294) treated it as synonym of *H. lutescens*: "Синонимия эта впервые здесь устанавливается" (= "this synonymy is established here for the first time"). However, his statement seems to have been widely overlooked because this work is in Russian. Else it was treated as valid species (in a few cases with question mark), until ANDERSON (1983) gave it again as synonym of *H. lutescens*. However, except ANDERSON no author after ZAITZEV (1915) seems to have ever studied the type (series) of MOTSCHULSKY's taxon. ANDERSON (1983: 183) claimed to give this name as new synonym of *H. lutescens*, but he also seems to have overlooked ZAITZEV's work. We cannot exclude that once a male of the assumed original syntype series will be detected. Nevertheless, we designate this female as lectotype because the reticulation of the last abdominal ventrite is a character which can

serve a reliable identification – even better than the genitalia of a male. The lectotype lacks the last three tarsomeres of the left protarsus, the last two of the left mesotarsus, the complete right hind-leg; the tarsi of the left hind-leg are loose; the specimen was originally pinned and, thus shows a hole on the right elytron (see Fig. 10).

**Notes:** Two females housed in the MNB have the following label data: "Belmont/Juni." [printed], "impressifrons/Motsch." [most probably hw Schaufuss], "Coll. L.W./Schaufuss" [printed], "impressifrons/Motsch./San Francisco" [hw?]. So far these specimens were assumed to be eventually syntypes of *H. lutescens*. A study of several characters showed, however, that they do not belong to genus *Hygrotus* (e.g. they lack the sub-humeral carina on each epipleuron) but to genus *Sanfilippodytes* FRANCISCOLO, 1979.

**Additional material studied:** **USA: California:** 2♀♀, "U.S.A./California/C. v. Nidek", "Shasta Co./Shasta Lake/12-14 VII 1982", "Hygrotus/lutescens/(LeConte) det./R.E Roughley 1988" [all printed] (ca. 40.69N 122.37W; 250 m) (WRMW); 3♂♂, 4♀♀, "U.S.A., CA: Shasta Co./Pedro Cedro area June/24, 1993 G. Challet" [printed] (40.56N 122.24W; 140 m); 1♂, "CA: Tehama Co., pond/10 mi E Red Bluff at/Hwy 36. IV-26-1981 G. Challet" [printed] (ca. 40.3N 121.9W; 300 m); 1♂, 1♀, "U.S.A., CA: Tehama Co./creek 3 mi N. Red/Bluff @ Hwy 1-5, Apr./27, 1979, G.L. Challet" [printed] (40.23N 122.25W; 125 m); 1♂, "CA: Tehama Co., Crk/at Black Butte Rd/April 29, 1981/G. Challet" [printed] (39.91N 122.28W; 110 m); 3♂♂, 2♀♀, "California, Tehama Co./Hwy 99 W Capay Rd./Sourgrass Creek/IV-27-1979, G. Challet" [printed] (39.85N 122.09W; 50 m); 1♂, "USA/California/C. v. Nidek", "Orland/Butte Co./5/6 VI 1983", "Hygrotus/lutescens/(LeConte) det./R.E Roughley 1988" [all printed] (ca. 39.76N 122.20W; 80 m) (WRMW); 6♂♂, 3♀♀, "CA: Glenn Co., Rd 306/4 mi S Elk Crk., pond/IV-26-1981 G. Challet" [printed] (39.54N 122.53W; 260 m); 3♂♂, 1♀, "U.S.A./California/C. v. Nidek", "Butte Co./Oroville/1-7 VII 1982", "Hygrotus/lutescens/(LeConte) det./R.E Roughley 1988" [all printed] (ca. 39.49N 121.56W; 50 m) (WRMW); 1♀, "U.S.A., CA: Colusa Co./Field II-4, VI-20-1984/R.K. Washino" [printed] (ca. 39.1N 121.74W; 15 m); 1♂, "U.S.A./Calif., 10.2.1996/Sacramento Co./Fair Oaks - Phoenix [= Phoenix Lake?]/Field vernal pools", "WDS A 1205/leg. W.D. Shepard" [all printed] (ca. 38.64N 121.27W; 50 m) (WRMW); 1♀, "Davis Calif/Yolo Co. 6L [? illegible]/VI-9-1973" [printed in part] (ca. 38.54N 122.3W; 15 m); 4♂♂, 5♀♀, "USA: CA. Stanislaus Co./1 mi W Bosso [= Basso] Bridge/Tuolumne Riv. Hwy 132/May 20, 1980 D. Lauck" [printed] (37.64N 120.50W; 50 m) (close to collecting site of *H. medialis* near junction of Hwys 123 and J59; see under this species); 1♂, "Newark/Alameda Co./Calif. 17-11-[19]7336" [hw in part], "in pond" [hw], "Joe Denk/Acc. No. 579" [?] [printed in part] (37.53N 122.04W; 5 m) (SDNHM); 1♀, "Riverdale, Fresno Co./CAL V 30 1970", "B L Villegas Colr" (36.43N 119.86W; 65 m) (UAT); 4♂♂, 2♀♀, "Woodlake, Tulare/Co., Calif./June 23, 1936" [printed], "F.T. Scott/Collector" [printed] (36.41N 119.10W; 140 m) (SDNHM). **Specimens standing together with the lecto- and paralectotype in the collection of the MCZ:** 1 ex, "Cala. [printed], + illegible hw sign", "lutescens 2" [hw?], ID-label 1 with "00711250"; 1 ex, "Cal." [printed], "lutescens 3" [hw?], ID-label with "00711251"; 1 ex, "Cal." [printed], "lutescens 5" [hw?], ID-label with "00711253"; 1 ex, "Cal." [printed], "lutescens 6" [hw?], ID-label with "00711254"; 1♂, "Santa Monica, May 1, 97, S. Cal." [printed], "30." [hw?], "lutescens 7" [hw?], "Hygrotus pedalis (Fall.), Det. 1980, R.D. Anderson" [printed except "80"], ID-label 1 with "00711255" (this is in fact *H. pedalis*); 1♀, round golden label without text, "lutescens 8" [hw?], "Hygrotus sharpi (VdB.), Det. 1980, R.D. Anderson" [printed except "80"], ID-label with "00711256" (this is in fact *H. fumatus* = *H. sharpi*). 1♂, "Cal." [printed], "lutescens 9" [hw?], "Hygrotus lutescens (LeC.), Det. 1980, R.D. Anderson" [printed except "80"], ID-label with "00711257".

**Diagnostic remarks:** This species is on average slightly longer than *H. yellowstone* nov.sp. and slightly shorter than *H. artus*. Together with these two species and *H. fumatus* it belongs to the more elongate species, while *H. medialis*, *H. infacetus* and *H. sellatus* are more oval. We have the following measurements: TL: 2.6-3.25 mm

(mean 2.98 mm), MW: 1.4-1.75 mm (mean 1.60 mm), TL/MW: 1.79-2.00 (mean 1.86) (lectotype: 2.8 mm/1.5 mm/1.87) (see also the Table).

Most specimens studied have the upper surface quite dark; the elytra are somewhat lighter only near base and sides. Vittae on elytra are rarely well recognisable, diffusely delimited and only anteriorly near base if at all (Figs 10, 17, 18). We have, however, found among our material also a very few specimens with more distinct elytral pattern (e.g. Fig. 16); however, these specimens appear to be somewhat immature.

♂♂: The hind-margin of the last abdominal ventrite is evenly rounded in males and shows no peculiarity. Lateral and ventral views of the median lobe of aedeagus of the lectotype are illustrated in Figs 33 and 54, the left paramere in Fig. 72. To demonstrate the variability of the male genitalia median lobes and parameres of two other specimens are illustrated in Figs 34, 35, 55, 56, 73 and 74. The shape of the lobe depends also on maturity (see e.g. Fig. 35 where the distal third is somewhat twisted) and is not useful for a reliable separation from most other species studied.

♀♀: The hind-margin of the last abdominal ventrite in females is centrally quite distinctly projecting backwards. Right and left of the middle, the hind margin is provided with about a dozen coarse punctures, which form a narrow furrow alongside this margin. These punctures crenulate the border of the hind-margin and most of them bear a rather long bristle. Additionally, females have all abdominal ventrites distinctly reticulate – often much more distinct than in specimens of *H. sellatus* studied. Besides the more elongate body shape, this is the most distinctive character of *H. lutescens*. This observation is in total contrast to ANDERSON (1983) who did not only synonymise *H. medialis* with *H. lutescens*, but also found reticulated abdominal ventrites only in *H. sellatus*. The female gonocoxae and a gonocoxosternum of one specimen are given in Fig. 82. We want to remark that on average females are slightly broader than males (also in the other species) what can lead to some kind of confusion.

**D i s t r i b u t i o n:** The species occurs in the Central Valley of California (Figs 88, 89). **N o t e s:** According to the single female *H. medialis* found in the middle part of the Central Valley (Stanislaus Co., near junction of Highways 132 and J59) the distribution areas of the two species overlap here. This observation should be confirmed by further records of *H. medialis*.

***Hygrotus (Leptolambus) medialis* (LECONTE, 1852) (stat. rest.)**

*Hydroporus medialis* LECONTE, 1852: 209.

*Coelambus medialis* (LECONTE, 1852); SHARP 1882: 401; BRANDEN 1885: 41; LENG 1920: 77; ZIMMERMANN 1920: 69.

*Hygrotus (Coelambus) medialis* (LECONTE, 1852); J. BALFOUR-BROWNE 1944: 347 (synonymy of *H. infacetus*).

*Hygrotus medialis* (LECONTE, 1852); LEECH & CHANDLER 1956: 316; ANDERSON 1962: 59.

*Hygrotus lutescens* (LECONTE, 1852); ANDERSON 1983: 183 (synonymy); CHALLET 1987: 13, 2003: 109; CHALLET & BRETT 1998: 46; LARSON et al. 2000: 166 (all partim).

*Hygrotus (Leptolambus) lutescens* (LECONTE, 1852); NILSSON & HÁJEK 2020: 190 (partim).

**T y p e l o c a l i t y:** San Diego, California, USA.

**T y p e m a t e r i a l:** Lectotype (by present designation): ♀, round golden label without text, "Type/5996" [red, hw?], "H. medialis/S. D. [= San Diego], Lec." [hw LeConte], "Hygrotus lutescens/(LeC.), Det. 1980/R.D. Anderson" [printed except "80"], "Jan-Jul. 2004/MCZ Image/Database" [printed and with camera-symbol], ID-label with "00005996", "Lectotype/Hydroporus medialis/LeConte, 1852/Fery des. 2019" [red label, printed] (Fig. 11)

(MCZ). **Paralectotypes:** 1♂, round golden label without text, "medialis 2" [hw?], ID-label with "00711258" (MCZ). 1♀, round golden label without text, "medialis 3" [hw?], "Hygrotus lutescens (LeC.), Det. 1980, R.D. Anderson" [printed except "80"], ID-label with "00711259" (MCZ). All paralectotypes with a respective red label. **Notes:** (1) In NILSSON & HÁJEK (2020: 190) is given that ANDERSON (1983: 184) designated the lectotype of *H. medialis* – this is incorrect. ANDERSON designated the lectotype of *H. lutescens*, but not that of *H. medialis* and also not that of *H. infacetus* and *H. impressifrons*. (2) A female and not a male was selected for the lectotype designation because in females of this species the absence or at least very strong reduction of reticulation on the last abdominal ventrite is more appropriate for a reliable identification than any character in males.

**Additional material studied:** **USA: California:** 1♀, "CA.: Stanislaus Co./ Roadside pond nr Hwys/132 junc. J59. July 25./1983. G. Challet" [printed] (37.66N 120.47W; 70 m) (close to the collecting site of *H. lutescens* at Tuolumne River; see under this species); 5♂♂, 3♀♀, "USA. CA: Inyo Co./Cartago in ponds/August 3, 1996/R.P. Meyer" [printed] (36.32N 118.03W; 1,110 m) (found together with one male of *H. artus*); 1♂, "Calif: Inyo Co., 10 mi N/Shoshone/@ IV-10-[19]70/J.A. Gruwell & J.M./Sheppard" [printed] (36.27N 116.41W; 620 m); 3♂♂, 2♀♀, "U.S.A./CA: Monterey Co./Carmel River @/Robinson Cyn. [= Canyon] July 2./1988 G.L. Challet" [printed] (36.25N 121.81W; 160 m); 1♂, 1♀, "Calif: Monterey Co./Salinas R. @ Hwy 198/August 22, 1980/G. Challet" (36.12N 121.03W; 105 m); 1♂, "CA: Inyo Co./Post Office Sprgs./May 1, 1983/G.L. Challet" [printed] (36.04N 117.22W; 320 m); 2♀♀, "California, Inyo Co./Post Office Springs./@ Ballarat IV-30-[19]82 G. Challet" [printed in part] (36.04N 117.22W; 320 m); 1♀, "USA. Ca. Inyo Co./Armagosa River @/Tecopa Oct. 19./2016 G. Challet" [printed] (35.85N 116.23W; 400 m); 2♀♀, "CA: San Luis Obispo/Co., 1 mi N Piedras/Blanca at Hwy 1. pond/VI-21-1981 G. Challet" [printed in part] (35.68N 121.28W; 10 m); 3♂♂, 6♀♀, "California Hwy 1/San Luis Obispo County/Sept. 20 1978/Santa Rosa Crk." [printed in part] (35.57N 121.08W; 20 m); 1♂, 2♀♀, "Calif: S.L.O. [= San Luis Obispo] Co./Santa Rosa Crk at/Hwy 1, July 25, 1982/G. Challet" [printed] (35.57N 121.08W; 20 m); 1♂, 1♀, "Calif: S.L. Obispo Co./Santa Rosa Crk at/Hwy 1, July 24, 1983/G.L. Challet" [printed] (35.57N 121.08W; 20 m); 1♂, "CAL: San Luis Obispo/Co. Santa Rosa Crk.", "Cambria 1980/G. Challet Nov. 9" [printed] (35.57N 121.08W; 20 m); 2♀♀, "CA: San Luis Obispo Co./Santa Rosa Crk., Cambria/XI-9-1980 G. Challet" [printed] (35.57N 121.08W; 20 m); 8♂♂, 2♀♀, "CA: San Luis Obispo/Co., Cayucas Creek/at Hwy 1. IX-20-1978 G. Challet" [printed] (35.45N 120.91W; 10 m); 1♀, "13.8.[19]79 Pismo. (Cal.) USA/Fluß [= river]" [hw Fery] (35.14N 120.63W; 15 m); 6♂♂, 4♀♀, "USA: CA. San Bernardino [sic!]/Co. Mojave River @ Afton/Canyon near campground/May 16, 2013 G.L. Challet" [printed] (35.03N 116.47W; 550 m); 2♂♂, 1♀, "USA: CA. San Bernardino/Mojave River @ Afton/Canyon May 31, 2018/G.L. Challet" [printed] (35.03N 116.47W; 550 m); 1♂, "California/San Bernardino County/III-4-1979/Mojave River" [printed in part]. (ca. 35.03N 116.47W; 550 m); 2♂♂, 5♀♀, "CA: Santa Barbara Co./Santa Ynez Riv. at/Solvang. July 24, 1983/G.L. Challet" [printed] (34.59N 120.14W; 110 m); 1♀, "U.S.A.: CA: S. Barbara/Co. Santa Ynez Riv/June 27, 1987/G.L. Challet" [printed] (34.59N 120.14W; 110 m); 4♂♂, 1♀, "USA:CA. Santa Barbara/Co.UC Coal Oil Preserve/Mar. 26. 2008, M. [= Michael] Caterino/M. Short & P. Abellan" [printed] (34.41N 119.88W; 10 m); 1♂, "CA: San Bernardino Co./Little Pine Flat/San Bern. Nat. Forest/Aug. 13, 1983 Challet" [printed] (34.31N 117.06W; 1,780 m); 3♂♂, 4♀♀, "USA: CA. San Bernardino/Co. Holcomb Valley 7400'/Caribou Creek 7./2018 G.L. Challet" [printed] (34.30N 116.89W; 2,240 m); 1♀, "U.S.A.: CA: Los Angeles/Co. San Fernando Valley/Mar. 28, 1984/F.W. Pelsue" [printed] (ca. 34.14N 118.42W; 200 m); 2♂♂, 1♀, "Santa Ana River at/Lakeview Ave. [= Avenue]/Orange County, Calif./April 14 1970" [printed in part] (33.86N 117.82W; 75 m); 1♀, "Santa Ana River at/Imperial [Avenue]/Orange County, Calif./Sept. 16 1969" [printed in part] (33.86N 117.79W; 90 m); 1♀, "Santa Ana River at/Imperial [Avenue]/Orange County, Calif./Aug. 19 1969" [printed in part] (33.86N 117.79W; 90 m); 1♂, "Santiago Creek/July 15 1973/Orange County, Calif./G.L. Challet Coll." [printed in part] (33.81N 117.81W; 80 m); 1♂, 1♀, "California/Riverside County/Lake Hemet V-27-1979/G. Challet Coll." [printed] (33.66N 116.67W; 1,320 m); 2♂♂, 1♀, "Pond ¾ mi SE/Lake Hemet, Calif./Riverside Co./IV-26-[19]79" [printed in part] (33.66N 116.67W; 1,320 m); 2♂♂, 1♀, "San Joaquin Marsh/Univ. of Calif. Irvine/Orange County, Calif./Nov. 20 1973" [printed in part] (33.65N 117.86W; 10 m); 1♀, "Seepage/Laguna Hills/Orange County, Calif./April 6 1972" [printed in part] (33.59N 117.71W; 85 m); 4♂♂, 2♀♀, "Wood Canyon/Orange County, Calif./July 13 1973" [printed in part] (33.55N 117.74W; 60 m); 1♀, CA: Los Angeles Co./Santa Catalina Island/Middle Ranch, May 20./1984 G. Challet" [printed], "Aquatic Light/Trap (Cyalume)"

[printed], *Hygrotus lutescens* (LeConte)/det. G.L. Challet 1986" [printed] (ca. 33.35N 118.43W; 200 m) (see CHALLET 1987: 13); 4♀♀, "U.S.A., CA:San Diego/Co. Borrego Springs/Channel & sink Mar/25, 1986, G. Challet" [printed] (33.25N 116.37W; 180 m); 1♂, "Calif., San/Diego Co./Laguna P.C. [= Public Camp]" [printed], "E.L. Sleeper/Collr VII-23-[19]63" [printed at part], "Collected at/Blacklight" [printed] (32.89N 116.45W; 1,670 m); 1♀, "U.S.A., CA: San Diego/Co. Pond @ Kitchen/Creek Rd. & Hwy I-5 Jul./12, 1980, G.L. Challet" [printed] (32.73N 116.43W; 1,020 m); 1♂, "La Mesa/State college/coll: DK Faulkner" [hw], "San Diego Co./Calif. 28 Jan. 1976" [printed, date in hw] (32.78N 117.66W; 110 m) (SDNHM). **Arizona:** 1♂, "Ariz. Apache Co./Chinle, 4 m S, rain/puddle/ix.21.[19]76/813 JRZimmerman" [printed] (36.15N 109.55W; 1,680 m); 1♀, "Ariz. Navajo Co./Jeddito, Jeddito [sic!]/Wash at R. 264/ix.22.[19]76/815 JRZimmerman" [printed] (35.75N 110.14W; 1,880 m); 1♀, "Ariz. Navajo Co./Holbrook, 3 m S/Five Mile Wash/ix.22.[19]76/816 JRZimmerman" [printed] (34.90N 110.16W; 1,550 m); 1♂, 1♀, "U.S.A. AZ: Cochise Co./pond 1 mi So. Apache/Aug. 28 1994 G Challet" [printed] (31.68N 109.14W; 1,350 m); 1♂, "U.S.A. AZ: Cochise/Co. Pond @ Snure Ranch/1.5 mi S Apache Sept./7, 1986 G. Challet" [printed] (31.68N 109.14W; 1,350 m); 2♂♂, 2♀♀, "U.S.A. AZ: Cochise Co./1 mi So. Apache @/Snure Ranch pond X-/8-1991 G.L. Challet" [printed] (idem) (31.68N 109.14W; 1,350 m); 1♀, "U.S.A.: AZ. Cochise Co./Apache Power Rd/VI-18-1981 pond" [printed] (31.68N 109.14W; 1,350 m); 1♂, 3♀♀, "U.S.A.: AZ. Cochise Co./pond on Apache Power/Road VI-16-1981 D. Lauck" [printed] (31.68N 109.14W; 1,350 m); 1♂, "Arizona., Morrison." [printed], "Hydroporus lutescens, teste Horn., Arizona. Morrison." [hw Sharp], "Coelambus medialis, Lec., var." [hw J. Balfour-Browne?, blue ink on white label] (BMNH). 1♀, "Arizona., Morrison." [printed], "Sharp Coll., 1905-313." [printed], "Coelambus medialis, Lec., var." [hw J. Balfour-Browne?, blue ink on white label] (BMNH). **Mexico: Baja California:** 1♀, "Mexico: Baja Cal. Norte/San Pedro Ma[r]tir, Hwy 3./Ojos Negros. V-17-1980/G. Challet" [printed] (31.89N 116.27W; 700 m). 1♀, "BC" [= Baja California; hw?, black margin in part], "Mexico/coll. J. Flohr" [printed], "corvinus/Sh. [= Sharp]" [hw Flohr, black margin], "Hygrotus/lutescens (LeConte)/det. H. Shaverdo 2005" [printed in part] (MNB). 1♂, "BC" [hw Flohr, black margin in part], "Mexico/coll. J. Flohr" [printed] (MNB); 2♀♀, "Mexico/coll. J. Flohr" [printed] (MNB). **Specimens standing together with the lecto- and paralectotypes in the collection of the MCZ:** 1 ex., round golden label without text, "medialis 4" [hw?], "Hygrotus fraternus (LeC.), Det. 1980, R.D. Anderson" [printed except "80"], ID-label with "00711260" (this and the next specimen are in fact *H. (L.) fraternus* (LECONTE, 1852)); 1 ex., round golden label without text, "medialis 5" [hw?], "Hygrotus fraternus (LeC.), Det. 1980, R.D. Anderson" [printed except "80"], ID-label with "00711261"; 2♀♀, each specimen glued onto its own card; upper glue card with "medialis" [pencil, hw?], "medialis 6" [ink, hw?], "medialis 7" [ink, hw?], "Hygrotus lutescens (LeC.), Det. 1980, R.D. Anderson" [printed except "80"], ID-label with "00711262"; 1 ex., "Ariz." [printed], "medialis 8" [hw?], ID-label with "00711263"; some parts of abdomen on separate point; 1 ex., "Ariz." [printed], "medialis 9" [hw?], ID-label with "00711264"; ID-label with "00711265"; 1 ex., "Ariz." [printed], "medialis 11" [hw?], ID-label with "00711266"; 2 exs, both glued onto one card; "Cal." [printed], "medialis 12" [hw?], "medialis 13" [hw?], ID-label with "00711267". **N o t e s:** We have studied also one male with the following data: "32 CANADA B.C./Rd. 5A, Stump Lake/ponds by road/30.6.2000 I.Ribera & A.Cieslak" [printed], "(IR 519)" [voucher number, hw Ribera] (CIR). This specimen was dealt with under the name *Hygrotus lutescens* in the phylogeny of the genus *Hygrotus* in VILLASTRIGO et al. (2017: 511). We want to state that this "*H. lutescens*" is not this species, but instead *H. medialis*. **Additional specimens from the BMNH without exact locality data:** 1 ex., male gender symbol on glue card, "212, Am. bor." [hw Sharp], specimen dissected in large part [most probably by Sharp]; 1♂, "Amer. bor." on glue card [hw Sharp]; 1♂, "U.S. Amer." on glue card [hw Sharp]; 1♂, "212, H. medialis, Am. bor." [hw Sharp]; all four specimens with two additional labels: "Sharp Coll., 1905-313." [printed] and "Coelambus medialis, Lec., Sharp det." [hw J. Balfour-Browne?, blue ink on white label]. According to body shape and elytral pattern, all specimens are most probably *H. medialis*.

**D i a g n o s t i c r e m a r k s:** This species is on average longer than *H. yellowstone* nov.sp. and also slightly longer than *H. artus*. We have the following measurements: TL: 3.0-3.6 mm (mean 3.34 mm), MW: 1.7-2.05 mm (mean 1.87 mm), TL/MW: 1.71-1.84 (mean 1.79) (lectotype: 3.45 mm/1.95 mm/1.77) (see also the Table). The species is not only somewhat more oval, but appears also as having the centre of mass behind the mid

of the body length. This is due to the shape of the pronotum: its width at base is relatively small compared to the maximum width of the elytra, the sides are more converging anterior and the width of the head is relatively smaller than in the other species. However, these characters are considerably varying and cannot be used for a reliable identification. Generally, the specimens studied have the lighter area behind elytral base larger, often extended over the anterior third (e.g. Fig. 20), more rarely over anterior half, and thus the entire upper surface appears lighter than in *H. lutescens* and in particular lighter than in *H. artus*. The dark brownish vittae are recognisable in anterior elytral half, although mostly diffusely delimited and not well contrasting with the brownish yellow ground (Figs 11, 21); they reach more backwards than in *H. lutescens* and confluent more or less only near and behind mid of elytra. The punctuation of the metaventrite is similar to that of *H. lutescens*, *H. artus* and *H. infacetus* (see Figs 23-27, 29).

♂♂: As in *H. lutescens*, the hind-margin of the last abdominal ventrite is evenly rounded in males. Median lobes in lateral and ventral view and parameres of some specimens are illustrated in Figs 38-41, 62-64 and 75-77. The variability of the shape of the median lobe is quite obvious. Of special interest are Figs 40 and 41: this is one and the same lobe – in wet condition in the former and dry in the latter. This shall demonstrate that the shape of the lobes of *H. medialis* (and of all other species studied) can considerable depend on the condition under which they are observed.

♀♀: Also as in *H. lutescens*, the the hind-margin of the last abdominal ventrite is in females somewhat projecting backwards and the furrows with coarse punctures right and left of the middle are present as well as the distinct bristles. However, females have the surface of the last abdominal ventrite without reticulation (in particular the lectotype) or in some specimens at most provided with only a very few traces of such. The gonocoxae and gonocoxosternum of the lectotype are similar to those in Fig. 87. Generally, the shape of the female genitalia varies considerably – not only in different populations, but also individually – as is demonstrated in Figs 85-87 (all specimens collected on same date and at same locality: San Luis Obispo Co., Santa Rosa Creek). Many of the females studied have the outline of the blade of the gonocoxae somewhat emarginate (also in other species; see arrows in Figs 82 and 86).

**D i s t r i b u t i o n:** We have studied *H. medialis* from southern California, Arizona and Baja California (Mexico) (Figs 88, 89). ANDERSON'S (1983: 184) records from Texas, New Mexico, Nevada and Utah (under the name *H. lutescens*) may be also appropriate, but all others should be strongly questioned, in particular, records from central Mexico should relate to *H. infacetus*. As mentioned under *H. lutescens*, the distribution areas of both species overlap in the middle part of the Central Valley. In the Owens River Valley (Inyo Co., Cartago) specimens of *H. medialis* were found together with one male of *H. artus* (see Fig. 88). In a few more northern collecting sites specimens of *H. artus* were found which show slight tendencies to *H. medialis* (see under *H. artus*). Future investigations may turn out that this must be interpreted as hybridisation of both species.

***Hygrotus (Leptolambus) infacetus* (CLARK, 1862) (stat. rest.)**

*Hydroporus infacetus* CLARK, 1862: 180.

*Coelambus infacetus* (CLARK, 1862); BRANDEN 1885: 41.

*Hygrotus (Coelambus) medialis* (LECONTE, 1852); J. BALFOUR-BROWNE 1944: 347 (synonymy of *H. infacetus*).

*Hygrotus lutescens* (LECONTE, 1852); ANDERSON 1983: 183 (synonymy of *H. medialis* and *H. infacetus* with *H. lutescens*); CHALLET & BRETT 1998: 46; LARSON et al. 2000: 166 (all partim).

*Hygrotus (Leptolambus) lutescens* (LECONTE, 1852); NILSSON & HÁJEK 2020: 190 (partim).

Type locality: Mexico.

Type material: Holotype (by monotypy): ♀, "Holo-/type" [white round label with red margin, printed; most probably mounted by J. Balfour-Browne], "H. infacetus/Clark/Mexico." [yellow label, black ink, hw?], "67-56" [printed]. "Hydroporus/infacetus Clark/M.E. Bacchus det. 1980./Holotype" [hw Bacchus?, printed in part], "Hygrotus lutescens/(LeC.)/Det. 1980/R.D. Anderson" [printed except "80"] (see Fig. 12) (BMNH).

Additional material studied: **Mexico:** 1♂, 2♀♀, all glued onto a joint big glue card, on glue card respective gender symbol behind the specimens and "Hydroporus medialis. Lec. DS. [= David Sharp], Jalapa. Mexico. Hoege" [hw Sharp], "Jalapa, Vera Cruz, Höge." [printed], three labels with same text: "Sharp Coll., 1905-313." [printed], "B.C.A. Col. I.2., Coelambus medialis Lec." [printed] (ca. 19.6N 96.9W; 1,300 m) (BMNH); 1♂, 1♀, glued onto a joint big glue card, on glue card "Jalapa. Mexico. Hoege" [hw Sharp], "Jalapa, Vera Cruz, Höge." [printed], two labels with same text: "Sharp Coll., 1905-313." [printed], "B.C.A. Col. I.2., Coelambus medialis Lec." [printed] (ca. 19.6N 96.9W; 1,300 m) (BMNH); 1♂, 2♀♀, "Mexico 2600 m/Tequixquitla/23.2.[19]87 Bosbach/Salzsee" [= salty lake; hw?] (ca. 19.33N 97.65W; 2,350 m) (CLH, NMW); 1♂, "Mexico 2600 m/Tequixquitla/23.2.[19]87 Borbadly [?]/Salzsee" [= salty lake; hw?] (ca. 19.33N 97.65W; 2,350 m) (CLH); 1♀, "Tequixquitla/Salzsee 23.2.[19]87/2600 m NN" [hw?] (ca. 19.33N 97.65W; 2,350 m) (CLH); 1♀, "Mexico city/Höge" [printed], "85356" [printed], "B.C.C. Coll. I. 2./Coelambus/medialis/Lec." [printed] (ca. 19.3N 99.0W) (MNB); 1♀, "V. de México" [printed], "Mexico/coll. J. Flohr" [green, printed] (MNB); 1♂, 1♀, "Mexico/V. de/Mexico [sic!]/coll. Flohr" [first and last lines printed; most probably these specimens and female listed before originally belonging to same series] (MNB). Notes: "V. de Mexico" means "Valle de Mexico", a valley with Mexico City in the western part. 1♂, 1♀, glued onto one joint big glue card; on glue card respective gender symbol behind specimens and "Hydroporus medialis. Lec., Oaxaca. Mexico. Hoege" [hw Sharp], "Oaxaca, Mexico, Hoege." [printed], two labels with same text: "Sharp Coll., 1905-313." [printed], "B.C.A. Col. I.2., Coelambus medialis Lec." [printed] (ca. 17.0N 96.7W; 1,500 m) (BMNH); 1♂, "Mexique" [printed], "Coelambus/infacetus Clk" [hw Régimbart], "Coll. Kraatz/Régimbart det." [printed], "Zimmermann det." [printed; typical label of Alois Zimmermann] (SDEI).

**Diagnostic remarks:** This species is very similar to *H. medialis* and also on average longer than *H. yellowstone* nov.sp. and *H. artus*. The body shape appears to be marginally more elongate than that of *H. medialis*. We have the following measurements: TL: 3.05-3.5 mm (mean 3.27 mm), MW: 1.7-1.9 mm (mean 1.81 mm), TL/MW: 1.7-1.9 (mean 1.81) (holotype: 3.3 mm/1.8 mm/1.83) (see also the Table). The elytral pattern is similar to that of *H. medialis* (see Figs 12 and 19) and diffusely delimited vittae are mostly recognisable in the anterior half of elytra. The sutural and discal lines on elytra are very diffuse and in part almost imperceptible; the punctation on the elytra is rather dense, eventually slightly finer than in *H. medialis*.

♂♂: The median lobe in lateral and ventral view and the left paramere (Figs 36, 65 and 78) are similar to those of *H. medialis*; the one male from Jalapa has the apex of the lobe slightly turned up (ventrally).

♀♀: In contrast to *H. medialis*, the females of which have the abdominal ventrite without reticulation or at most traces of on the last ventrite, females of *H. infacetus* have the last abdominal ventrite distinctly reticulate and the fourth and fifth ventrites at least with traces of reticulation. They resemble in this respect more females of *H. lutescens* and *H. sellatus*. These species have, however, all abdominal ventrites reticulate. Females of *H.*

*infacetus* have also the head distinctly reticulate, while those of *H. medialis* have only traces of such. The gonocoxae and the gonocoxosternum of the holotype are illustrated in Fig. 84.

Although all females studied can easily be separated from females of *H. medialis* found in California and Arizona as well as in Baja California, we must concede that a definite decision whether *H. infacetus* and *H. medialis* are two separate species or belong to only a single one, cannot be made with the few Mexican specimens studied. So far the distinctly reticulate last abdominal ventrite in females is the only obvious differentiating feature. However, after the well-founded splitting of ANDERSON's "*H. lutescens*" into the three species *H. artus*, *H. lutescens* and *H. medialis*, we consider it likely that also *H. infacetus* must be treated a "good" species.

**Distribution:** According to our material studied, this species occurs only in central Mexico (Fig. 89). The closest distance between our localities for *H. medialis* (in Arizona) from those of *H. infacetus* is about 1,800 km. ANDERSON (1983: 184) reports specimens under the name *H. lutescens* also from western Texas and several Mexican states. The respective material should be re-examined in future studies.

### ***Hygrotus (Leptolambus) artus* (FALL, 1919)**

*Coelambus artus* FALL, 1919: 9; LENG & MUTCHLER 1927: 17.

*Hygrotus artus* (FALL, 1919); LEECH & CHANDLER 1956: 316; ANDERSON 1983: 181, 1985: 20; CHALLET & BRETT 1998: 46; LARSON et al. 2000: 166; ROBISCHON 2007: 259 (extinct); BOUCHARD et al. 2009: 288 (extinct); FOSTER & BILTON 2014: 454; VILLASTRIGO et al. 2018: 65; FOSTER 2020: 26 (extinct).

*Hygrotus (Coelambus) artus* (FALL, 1919); NILSSON 2001: 205.

*Hygrotus (Leptolambus) artus* (FALL, 1919); VILLASTRIGO et al. 2017: 504; NILSSON & HÁJEK 2020: 189.

*Coelambus lutescens* (LECONTE, 1852); BRUES 1932: 257 (misidentification of *H. artus*).

**Type locality:** Mono Co., California, USA; according to the holotype labels, near the former Farrington Ranch, close to the south-western shore of the Mono Lake (ca. 37.91N 119.11W; 2,100 m).

**Type material:** Holotype (by monotypy): ♂, "Farrington/Mono/Lake" [ink on white paper, most probably hw Blaisdell], "Mono/Co. Cal./VI-12-[19]17" [printed in part, date hw Blaisdell?], rectangular orange label without text, male gender symbol [printed], "Type artus" [printed in part, species name hw Fall], "M.C.Z./Type/23892" [red, printed in part], "H. C. Fall/Collection" [printed], "Coelambus/artus/Fall" [white label with red margin, hw Fall], "Hygrotus artus/(Fall)/Det. 1980/R.D. Anderson" [printed except "80"], "Jan-Jul. 2005/MCZ Image/Database" [printed and with camera-symbol], ID-label with "00023892", "Hygrotus (Leptolambus)/artus (Fall)/Fery det. 2019" (see Fig. 7) (MCZ). The holotype (as we have received it from the MCZ) was point-mounted and the median lobe (together with several parts of the last three abdominal ventrites) were glued onto a second point, mounted below the upper one (Figs 42, 43). Photos of the holotype can be also found in the MCZ type database. The specimen and the median lobe as well as the remains of the ventrites were unglued by the junior author and remounted on two separate cards.

**Notes** on ANDERSON's treatment of the holotype: The holotype of *H. artus* is in very bad condition. Almost all important diagnostic characters are not anymore recognisable. Additionally, the description of the species in ANDERSON (1983) is absolutely insufficient. Due to these facts we feel obliged to present a rather long section with explanations for how the holotype can have been so strongly altered and with arguments why it, nevertheless, should be the same species as specimens which the senior author



found in August 2017 at the type locality and other specimens from the Mono Lake region.

FALL's original description from 1919 is as follows: "Narrowly subelliptical; fuscotestaceous above, the middle of the front, disk of prothorax and elytral margins narrowly, somewhat paler; tarsi and outer joints of antennae dusky; body black beneath [= ventral surface], integuments polished throughout. Head and thorax [= pronotum] finely sparsely punctate, elytra more closely and less finely punctured, the usual three series of coarse punctures very irregular, visible in basal half. Body beneath rather coarsely, not densely punctate at sides. Length 2.9 mm; width 1.35 mm. Mono Co., California (Blaisdell). The type and only specimen at hand is a male, but the tarsi are quite narrow, the sex being revealed by the visibly modified front claw. The small size, exceptionally narrow form and narrow male tarsi are the diagnostic characters to be relied upon this species."

Apart from the FALL's work, we know of only 15 others dealing with *H. artus*. It was mentioned also in the World Catalogue of Dytiscidae (NILSSON 2001) and its diverse Internet versions published afterwards (the last one being NILSSON & HÁJEK (2020)). However, apparently after FALL (1919) ANDERSON (1983) was the only author who in fact studied the holotype and gave some descriptive notes. The species has also never been found after the collecting of the holotype. It shall be mentioned here that the species is given in the "Red List of threatened animals" (IUCN (1990: 150)) as extinct (with question mark).

According to FALL's description (1919: 9), the specimen was originally "fuscotestaceous above" (which we interpret as brownish yellow, similar to closely related species as e.g. *H. lutescens* and *H. fumatus*). However, the holotype as it is on our desk is entirely black, including all appendages, and, thus, the original coloration cannot be checked anymore (see Figs 7, 25). Additionally, other external features as well as the genitalia are considerably altered and the original body shape is not anymore clearly recognisable because the elytra are somewhat distorted and the right elytron loose. Thus, it is also not clear whether the holotype was a mature specimen or not. We want to point on the fact that FALL (1919) didn't state in any way that the specimen was collected in the water of the Mono Lake, he only wrote "Mono Co., California (Blaisdell.)". Thus, we must assume that Frank Ellsworth Blaisdell (1862-1946) was either the collector of the specimen or that the specimen came from the Blaisdell collection (see FALL (1919: 9)) and Fall kept it finally for his collection.

ANDERSON (1983: 181) wrote: "The specimen was extremely dirty, and when I heated it in water to remove the genitalia it turned fuscopiceous." The term "fuscopiceous" has the meaning of "dark brownish black" and seems to be a "friendly" description of the present colour of the holotype. To our experiences "heating in water" cannot cause such alteration of the colour. We suspect that Anderson heated the holotype for a while in ammonium hydroxide (NH<sub>4</sub>OH), a liquid of which is known that it can considerably darken insects (personal communication by B. Jaeger, MNB). We assume that this is why ANDERSON (1983: 1983) gave only a complete reproduction of FALL's description – he was unable to present with this altered holotype his own adequate description. He merely added some descriptive notes on the prosternal process and the reticulation of the metacoxal plates – these are characters which he could access also with the altered specimen.

There are still several other serious peculiarities and inconsistencies in ANDERSON's (1983) key to the members of his species-group V and in the description of the holotype of *H. artus*. We refrain from dealing with them in detail, but believe it to be necessary to comment ANDERSON's (1983: 181) description of the male genitalia. ANDERSON wrote: "Male genitalia (fig. 13): aedeagus sharply bent at basal guard, then slightly arcuate to thin tip, condylar process long; paramere condylar process elongated, body gently tapered from base to blunt tip, large patch of sensorial setae on inner surface at tip." As can be seen in Figs 43 and 44, the median lobe in lateral view is in fact sharply bent near the usual position of the basal guards (although the guards are lacking), but by no means "then slightly arcuate to thin tip". We cannot explain why ANDERSON did not mention at all the distinct and very surprising ventral situation of the distal fourth of the median lobe. Additionally, his fig. 13 (see our Fig. 45 which is a reproduction of ANDERSON's figure) seems to be mere fantasy – here the median lobe is depicted as sharply bent basally (the position of the guards is incorrect), but then straight to tip and by no means arcuate. The paramere in his fig. 13b is rather elongate, strap-like and not "broadly dilated" as given for group V in the key to species-groups in ANDERSON (1971: 507) and it shows also no "large patch of sensorial setae on inner surface at tip" (ANDERSON (1983: 181)). Additionally, it is remarkable that the aedeagus in his figure is only half as big as those of related species although *H. artus* has a total length which is only about ten to twenty percent smaller than that of *H. lutescens* or *H. medialis*. Finally it must be noted that we were not able to find any traces of the parameres in Anderson's preparation of the holotype's abdomen (see Fig. 42) – how could he figure a paramere although there is no paramere present with the holotype? Two years later ANDERSON (1985: 20) wrote: "Its affinity to the rest of the genus is obscure because of its unique genitalia (fig. 13)". Latter figure is a simple reproduction of fig. 13 in ANDERSON (1983: 178) which does not fit at all the real median lobe of the holotype. Additionally, ANDERSON (1985: 20) specified "*Hygrotus artus* is known only from the alkalikne [sic!] waters of Mono Lake" – without giving any source at all for this information. Thus, ANDERSON (1985) points not only on his no doubt incorrect drawings of the genitalia, but also on the waters of the Mono Lake, and by this certainly contributed considerably to the fact that *H. artus* has never been collected again and remained a mysterious species since its original description.

**Description of the holotype:** What still can be recognised in the holotype is: (1) head and pronotum finely punctured, punctures only shallowly impressed; distance between punctures larger than their diameter; (2) puncture line next to inner margin of eyes very distinct (furrow); (3) head seemingly without reticulation (difficult to observe because surface covered in part with some kind of oily substance); (4) punctures on pronotum slightly coarser, disc almost without punctures; (5) punctures on elytra between puncture lines still coarser, denser and more impressed; distance between punctures almost equalling their diameter; (6) sutural and discal puncture lines very diffuse, only indicated by some irregularly distributed larger punctures in anterior third of elytra, behind not any more recognisable as line; (7) metaventricle centrally very sparsely and finely punctured; rest of metaventricle, metacoxal plates and first and second abdominal ventrites (last three absent) covered with very coarse punctures (Fig. 25).

The shape of the pro- and mesotarsi cannot be checked because only very few rests are still present and all claws are absent. The median lobe is broken near the guards (which are lost) and its shape seems to be considerably altered (at least this cannot be excluded;

see Figs 43, 44, 57); the parameres are lost. The total length of the holotype is ca. 2.9 mm, the width of the left elytra ca. 0.7 mm; thus, the maximum width of the body is estimated to be 1.4 mm. FALL's measurements are 2.9 mm and 1.35 mm what gives a ratio TL/MW of 2.15 – a really extreme value which is a hint on an eventual immature state of the holotype. It results that most characters for identification (according to FALL's original description) are lost – the only well recognisable features are the diffuse elytral puncture lines and the coarse punctures on the venter (Figs 25, 29), which are however less coarse than in *H. yellowstone* nov.sp. (Fig. 28).

The distal situation of the median lobe (Figs 43, 44) in lateral view is very surprising and not found in any related species. When we unglued the lobe we found that it was broken near the strong basal curvature (where the guard originally must have been present) and after relaxing a while in Scheerpeltz solution the sinuation of the median lobe became considerably weaker. We assume that the deformation of the median lobe is also due to ANDERSON's heating of the specimen and that the parameres were clumped together with other parts of the abdomen and destroyed when preparing the median lobe. It shall be noted that guards can easily break and be lost.

Another origin for the sinuation of the median lobe may be that the holotype is possibly an immature specimen. This assumption is supported by the fact that the left elytron is somewhat distorted and appears narrower than the right elytron. Most interestingly, ANDERSON (1983) gave the total length of the holotype, but instead of the maximum body width he gave only the maximum width of the pronotum – another hint on the distortion of the elytra and on the immature condition of the specimen.

Together with ANDERSON's misinterpretation of *H. lutescens* and *H. medialis* (see above) it must be stated that his key to the members of this species-group V largely cannot be used for a reliable identification of any of the included taxa. On the other hand, to save the honour of ANDERSON, it must be said that to our experience members of this species-group are the most difficult of all Nearctic and Palearctic members of subgenus *Leptolambus*.

Despite all these uncertainties considering the identity of the holotype, we are convinced that it is the same species as the specimens found nearby the type locality. In particular, we could study a female (Fig. 14) which in fact was found "in the Mono Lake", to be exact in a warm spring on Paoha Island which is situated in the Mono Lake (see BRUES (1932: 215) for a description of the spring; see under Ecology in the present work). This specimen is no doubt identical with other specimens found nearby that lake and can serve so to speak as reference specimen instead of the highly damaged holotype.

**A d d i t i o n a l m a t e r i a l s t u d i e d:** USA: **California:** 1♀, "CA. Mono Co./Rough Creek/June 30, 1989/G.L. Challet" [printed] (38.32N 119.05W; 2,360 m); 6♂♂, 4♀♀, "CA: Mono Co. nr Bodie/Clearwater Creek/Aug. 24, 1985. G. Challet" [printed] (38.17N 119.19W; 2,100 m); 2♀♀, "CA: Mono Co. Hwy 270/Clearwater Crk nr/Bodie. July 29, 1984/G. Challet" [printed] (38.17N 119.19W; 2,100 m); 1♂, 1♀, "CA: Mono Co. Creek/@ Hwy 270, 5 mi. E./Hwy 395, July 27, 1983 G. Challet" [printed] (38.17N 119.12W; 2,260 m); 1♀, "Hot Springs Exped./1930 Sp. No. 150/C.T. Brues" [printed, number hw], ID-label with "00743682" [locality = Paoha Island in Mono Lake] (MCZ); 1♂, 1♀, "CA: Mono Co./Tioga Pass/VI-20-1982/G. Challet" [printed] (37.93N 119.18W; 2,300 m); 2♂♂, 3♀♀, "USA. Mono Co. Pond/On Old State Hwy, 300 m/So junc. Oil Plant Rd. Aug./1. 2017 G. L. Challet" (ca. 37.907N 119.105W; 2,100 m; see Figs 90, 91).  
**N o t e s:** Several specimens from the following collecting sites at Dehy and Benton Crossing show slight tendencies to *H. medialis*. This are mostly females, are slightly broader and a few have the lighter area at elytral base more extended backwards: 1♀, "30.6.1989 USA California/Mono

Co. creek at Dehy/hot springs, G.L. Challet leg" [printed] (37.68N 118.79W; 2,100 m); 5♂♂, 7♀♀, "U.S.A./CA. Mono Co./Dehy Hot Springs/May 2, 1988/G.L. Challet" [printed] (37.68N 118.79W; 2,100 m) (including two specimens with slight tendencies to *H. medialis*); 7♂♂, 8♀♀, "CA. Mono Co. Dehy/Hot Springs Lake [now called "Warm Lake"]/June 30, 1989/G.L. Challet" [printed] (37.68N 118.79W; 2,100 m) (including two specimens with slight tendencies to *H. medialis*; found together with several *Hygrotus fontinalis* LEECH, 1966); 2♀♀, "25.7.2006 USA CA./Mono Co. pond at/Benton Crossing Rd. and/Sagehen Rd. G. Challet leg." [printed] (37.73N 118.78W; 2,100 m); 23♂♂, 13♀♀, "30.6.1989 USA California/Mono Co., pond 1 mi W/Owens River at Benton/Crossing, G.L. Challet leg." [printed] (37.67N 118.78W; 2,080 m) (including 13 specimens with slight tendencies to *H. medialis*); 5♀♀, "CA: Mono Co. Pond/1 mi W Owens R. on/Benton Crossing Rd./VI-30-1989 G. Challet leg." [printed] (37.67N 118.78W; 2,100 m); 1♂, "Calif., Mono Co./Benton Crossing" [printed in part], "J.A. Gruwell/Coll. VII-25 [19]68" [printed in part], "Hygrotus/pedalis/J.A. Gruwell [19]70" [hw Gruwell?] (37.67N 118.78W; 2,100 m); 2♂♂, "Calif., Mono Co./Benton Crossing" [printed in part], "J.A. Gruwell/Coll. VII-25 [19]68" [printed in part] (37.67N 118.78W; 2,100 m); 4♂♂, "CA: Mono Co. Pond/1 mi W Owens R. on/Benton Crossing Rd./VI-30-1989 G. Challet leg." [printed] (37.67N 118.78W; 2,100 m) (including one specimen with slight tendencies to *H. medialis*); 1♂, 1♀, "CA: Inyo Co. ponds/near Owens Riv./So. Bishop, July 30, 1984, G. Challet" [printed] (37.30N 118.38W; 1,270 m) (both with slight tendencies to *H. medialis*); 1♂, "USA: CA. Inyo Co. pond/adj. Owens River at Hwy/136 August 5, 2013/G.L. Challet" [printed] (36.56N 118.05W; 1,120 m); 1♀, "U.S.A./California/C. v. Nidek", "Owens Lake/Dirty Sock/27/30 V 1978", "Hygrotus/lutescens/(LeConte) det./R.E Roughley 1988" [all printed] (ca. 36.33N 117.95W; ca. 1,100 m) (immature; slight tendencies to *H. medialis*) (WRMW); 1♂, "USA. CA: Inyo Co./Cartago in ponds/August 3, 1996/R.P. Meyer" [printed] (36.32N 118.03W; 1,110 m) (found together with 8 specimens of *H. medialis*).

**Diagnostic remarks:** *Hygrotus artus* is a relatively dark species (Figs 14, 15) with elytral base and sides somewhat lighter; diffusely delimited vittae are only rarely recognisable in the anterior fourth of the elytra. It belongs to the more elongate species and on average it is slightly longer than *H. lutescens*, but shorter than *H. medialis*. We have the following measurements (holotype not included): TL: 2.65-3.4 mm (mean 3.09 mm), MW: 1.4-1.85 mm (mean 1.66 mm), TL/MW: 1.78-1.95 (mean 1.86) (see also the Table). As in other species studied, females are generally slightly less elongate than males.

♂♂: As in *H. lutescens*, the hind-margin of the last abdominal ventrite is evenly rounded in males. The protarsomeres are slightly broader than those of the females. The anterior protarsal claw is bent at base and then more or less straight. Lateral and ventral views of the median lobe of aedeagus of several specimens are given in Figs 46-50 and 57-61 (slightly immature specimen with lobe somewhat twisted in Figs 49 and 60); left parameres in Figs 69-71 (for the holotype see special section above).

♀♀: In contrast to the similar *H. lutescens*, all abdominal ventrites of females are not reticulate. The hind margin of the last abdominal ventrite is centrally only indistinctly projecting backwards and the furrow with coarse punctures along the hind margin is here only shortly interrupted. As in *H. lutescens* these punctures crenulate the border of the hind-margin and bear a rather long bristle. Gonocoxae and gonocoxosternum of the specimen from Paoha are given in Fig. 81.

**Variability:** The species varies considerably in size, but less so in body shape (see Table). The shapes of the median lobe as well as that of the female genitalia vary also considerably. The colouration varies also, but the dark colour is always predominant, mainly because the lighter areas at elytral base and sides are relatively small. We have also observed a variation in the width of the male protarsomeres. Specimens which show slight tendencies to *H. medialis* in coloration and/or body shape

occur in the upper Owens River Valley at Dehy, Benton Crossing and near Bishop; these are listed above in the section Additional material studied.

**E c o l o g y:** BRUES (1932: 215) gave the following data: "In Mono Lake is Paoha Island near the western shore of which a large warm spring arises several hundred feet inland and well above the level of the lake. The overflow from this (No. 150) flows toward the lake as a small stream bordered by grass and tule. The specific gravity of the water is 1.0045 and its pH 8.3, much lower than that of the lake." Near Farrington the species was collected in a small temporary pond (see Fig. 90). This and other nearby ponds (Fig. 91) did not exist because of the lack of rainfall when one of us (GC) visited the region in the years 2014-2016. Anyway, it seems to be clear that the species does not occur in the highly alkaline water of the Mono Lake.

**D i s t r i b u t i o n:** The species has been found in Mono and Inyo Counties (Figs 88, 89). Specimens with slight tendencies to *H. medialis* occur in the Owens River Valley. In one locality (Cartago, same valley) it was found together with several *H. medialis*.

***Hygrotus (Leptolambus) fumatus* (SHARP, 1882)**

*Coelambus fumatus* SHARP, 1882: 400; LENG 1920: 77.

*Hydroporus lutescens* LECONTE, 1852; SHARP 1882: 400.

*Coelambus sharpi* BRANDEN, 1885: 42 (by indication to *Hydroporus lutescens* LECONTE sensu SHARP 1882: 400); FALL 1919: 9; ZIMMERMANN 1920: 72; LENG & MUTCHLER 1927: 17.

*Hygrotus sharpi* (BRANDEN, 1885); LEECH & CHANDLER 1956: 316; ANDERSON 1983: 181; CHALLET & BRETT 1998: 46; LARSON et al. 2000: 166.

*Hygrotus (Coelambus) fumatus* (SHARP, 1882); NILSSON 2001: 206 (synonymy of *sharpi* with *fumatus*).

*Hygrotus (Leptolambus) fumatus* (SHARP, 1882); VILLASTRIGO et al. 2017: 505; NILSSON & HÁJEK 2020: 190.

**T y p e l o c a l i t i e s:** *Coelambus fumatus*: "North America (United States)"; *Coelambus sharpi*: San Francisco, California, USA.

**T y p e m a t e r i a l:** Holotype of *Coelambus fumatus* (by monotypy): ♀, "Holo-/type" [white round label with red margin, printed; most probably mounted by J. Balfour-Browne], "1210" [rectangular white label, hw?], "U.S. America" [small rectangular card, hw Sharp], "Sharp Coll./1905-313." [printed], "Type 216./Coelambus/fumatus/n. sp., Am. bor." [hw Sharp], "Coelambus/fumatus Sharp/M.E. Bacchus det. 1980./Holotype" [hw Bacchus?, printed in part], "Hygrotus sharpi/(VdBr.)/Det. 1980/R.D. Anderson" [printed except "80"]. (Fig. 2). We have mounted an additional label with "Hygrotus (Leptolambus)/fumatus (Sharp, 1882)/Challet & Fery det." [printed] (BMNH). **N o t e s:** The holotype lacks the last ten right antennomeres, the last two left pro- and mesotarsomeres, the last three right metatarsomeres, and the claws of the left metatarsus. Holotype of *Coelambus sharpi* (by monotypy): ♂, "Holo-/type" [white round label with red margin, printed; most probably mounted by J. Balfour-Browne], "Sharp Coll./1905-313." [printed], "Hydroporus/lutescens,/named by Horn/California" [rectangular white label, hw Sharp], "Type 215./Hydroporus/lutescens Lec/California" [rectangular white label, hw Sharp], "Hydroporus/ lutescens Sharp/M.E. Bacchus det. 1980. Holotype" [hw Bacchus?, printed in part], "Coelambus/Sharpi V.d. B./J. Balfour-Browne det." [hw J. Balfour-Browne, printed in part], "Hygrotus sharpi/(VdBr.)/Det. 1980, R.D. Anderson" [printed except "80"] (Fig. 3). We have mounted an additional label with "Hygrotus (Leptolambus)/fumatus (Sharp, 1882)/Challet & Fery det." [printed] (BMNH). **N o t e s:** According to ANDERSON (1983: 181) the holotype of *Coelambus sharpi* should be a female; this is not correct as can be easily recognised by the distinctly broadened pro- and mesotarsi as well as by the genitalia. The specimen lacks the last four right antennomeres, the last four right metatarsomeres, the left metatibia and the complete left metatarsus.

**N o t e s** on SHARP's descriptions: SHARP's (1882: 400) Latin descriptions of *H. fumatus* and *H. lutescens* (the latter placed directly after the former) are almost identical

(except the punctuation of the "hind-coxae"). In the English part the author wrote about *Coelambus fumatus*: "... but is a good deal smaller..." than *Hydroporus lutescens* [sensu SHARP]. He gave for the holotype of *H. fumatus* a TL of "3<sup>7</sup>/<sub>8</sub> mm" (ca. 3.9 mm) and a MW of 2 mm; for *H. lutescens* he gave a TL of 4 mm, and a MW of "2<sup>1</sup>/<sub>8</sub> mm" (ca. 2.1 mm). These total lengths are not considerably different, but our own measurements of the respective specimens show that the size differences are in fact remarkable: *H. fumatus*: TL = 3.7 mm, MW = 1.85 mm (TL/MW = 2); *H. lutescens* [sensu SHARP]: TL = 4.0 mm, MW = 2.0 mm (TL/MW = 2). SHARP (1882: 400) wrote that both species are "extremely closely allied", but strange enough he compared his "*H. lutescens*" mainly with *H. nubilus*. Additionally, he wrote about his single specimen of "*H. lutescens*": "The determination of the name is not certainly correct, as I have seen no typical specimen of this species." **N o t e s**: We believe that BRANDEN (1885) did neither study the holotype of *H. fumatus*, nor SHARP's single specimen of the so-called *H. lutescens*. Most probably, BRANDEN believed only on the basis of SHARP's descriptions that SHARP's "*lutescens*" should not be the same as SHARP's "*fumatus*", but also not the same as LÉCONTE's *H. lutescens*, and thus he believed that SHARP's *lutescens* needed a new name and gave it the name *sharpi*.

**A d d i t i o n a l m a t e r i a l s t u d i e d**: **USA: California**: 2♂♂, 1♀, "USA: CA. Humboldt/Co. Redwood Creek/X-24-1968 R. Whiting" [printed] (41.29N 124.06W; 10 m); 1♀, "USA: CA. Humboldt/Co. McKinleyville/VII-5-1967 Coll. SKT" [printed] (40.93N 124.11W; 40 m); 2♂♂, 2♀♀, "USA: CA. Humboldt Co./Jones Slough, at Arcata/July 18, 1967, P. Fifer" [printed] (40.90N 124.09W; 10 m); 1♀, "USA: CA. Humboldt/Co. Fortuna June/27, 1967 P. Fifer" [printed] (40.60N 124.15W; 20 m); 18 exs: "USA: CA. Humboldt Co/pond 5 mi W Ferndale/@ beach July 6, 1995/Gilbert L. Challet" [printed] (40.58N 124.35W; 1 m); 10 exs: "USA: CA. Humboldt Co./Centerville pond/VI-25-1980 D. Lauck" [printed] (40.58N 124.26W; 15 m); 1♂, 1♀, "USA: CA. Humboldt/Co. van Duzen Riv./X-5-1979 D. Lauck" [printed] (40.53N 124.11W; 20 m); 2♀♀, "16 US California Medocino co./Rd 1. Manchester/Pond S city/23.6.2000 I. Ribera & A. Cieslak" [printed], "AV 23" [hw Ribera] (38.94N 123.69W; 40 m) (CIR); 1♀, "H. P. Chandler/No. 12 5 Exp./9/20/4/Elv. 100", "Berkeley, Cal/19" [printed, hw in part], "Hygrotus/sharpi" [hw?] (37.87N 122.27W; 100 m).

**D i a g n o s t i c r e m a r k s**: Altogether *H. fumatus* is a dark species; vittae are only rarely recognisable in the anterior part of the elytra. The species can be relatively easily identified because it is the biggest member of the species-group and has a relatively elongate body shape (Figs 2, 3) We have the following measurements: TL: 3.7-4.2 mm (mean 3.95 mm), MW: 1.85-2.15 mm (mean 2.01 mm), TL/MW: 1.86-2.05 (mean 1.97) (an exceptional small female with TL = 3.55 mm is not included) (for holotypes see above; see also the Table).

♂♂: The males have the protarsomeres considerably broader than the females and also broader than those of all other members of the species-group; the first two mesotarsomeres are also slightly broadened. The anterior protarsal claw is somewhat thickened and shorter than the posterior one, but it is regularly curved and not bent near base. Both claws are slightly shorter than those of the mesotarsus. The median lobe of aedeagus is very characteristic: in lateral view it is generally evenly curved as in most other members of the species-group, but the apex is slightly sinuate (Figs 37a, 37b; ventral view in Fig. 66). The left paramere is given in Fig. 79.

♀♀: The abdominal ventrites are not reticulate and the apex of the last abdominal ventrite is only little pointed. The gonocoxae and the gonocoxosterna (Fig. 83) are somewhat bigger than those of the other species and the apex of the gonocoxosternum is more rounded, but generally they are quite similar to those of the other species.

**Distribution:** According to our data (which agree with those in ANDERSON (1983: 182)), this is a coastal species which occurs at low altitude in western California north of and near San Francisco (Figs 88, 89).

**Notes:** Data on *H. fumatus* are given in ANDERSON (1983) under the name *H. sharpi*; thus, specimens of this species may be present in several collections under this name and not under *H. fumatus*.

***Hygrotus (Leptolambus) sellatus* (LECONTE, 1866)**

*Hydroporus sellatus* LECONTE, 1866: 365; SHARP 1882: 809.

*Coelambus sellatus* (LECONTE, 1866); BRANDEN 1885: 42; FALL 1919: 11; ZIMMERMANN 1920: 73; LENG 1920: 77.

*Hygrotus sellatus* (LECONTE, 1866); GORDON & POST 1965: 15; ANDERSON 1983: 182; LARSON et al. 2000: 164.

*Hygrotus (Coelambus) sellatus* (LECONTE, 1866); HATCH 1953: 199; NILSSON 2001: 209.

*Hygrotus (Leptolambus) sellatus* (LECONTE, 1866); VILLASTRIGO et al. 2017: 508; NILSSON & HÁJEK 2020: 191.

**Type locality:** "Dakota", USA.

**Type material:** Holotype (by monotypy): According to ANDERSON (1983: 183) the holotype is a female (not studied by us). It is stored in the MCZ. For a photo of the holotype and the labels see the MCZ type database.

This species is here dealt with only shortly because its distribution area is far from that of the other species treated in the present work. We have studied a few specimens from Wyoming and Alberta (Canada) which agree well with the original description by LECONTE (1866: 356): "The pale yellow elytra, with the large black posterior spot, will enable it to be easily recognized". The light area on elytra covers more or less their anterior half; a photo of a specimen from Wyoming, Natrona Co. (Fig. 5), agrees well with the photo of the holotype (see the MCZ type database).

The species is very similar to *H. medialis*, especially to somewhat immature specimens of the latter which have also the basal part of the elytra rather light. The body shapes of both species are also very similar (compare Figs 5 and 11). In addition to the contrasting surface pattern, ANDERSON (1983: 183) presented two other features – females of *H. sellatus* have the head finely and the abdominal ventrites distinctly reticulate. This serves an easy separation of females from those of *H. medialis* which have all abdominal ventrites not reticulate or at most the last one in traces. Females of *H. lutescens* and *H. infacetus* have also (at least the last three) reticulated abdominal ventrites, but differ particularly in coloration of the upper surface. On average, the specimens of *H. sellatus* studied are quite oval (TL: 3.04 mm, MW: 1.70 mm, TL/MW: 1.79). The three species occur in considerably different areas (for details see ANDERSON (1983: 183)). According to our studies a separation of males of the three species is impossible alone with the help of the shape of the male or female genitalia.

**Notes on *Hygrotus (Leptolambus) marklini* (GYLLENHAL, 1813) and *H. (L.) suturalis* (LECONTE, 1850)**

These two species are included in ANDERSON's group V, but are not treated in detail in the present work due to reasons given below. Both species are, nevertheless, included in our key to species.

*Hygrotus marklini* is a Holarctic species, distributed in North America from Arizona, northern New Mexico and the northern Great Plains until Canada and Alaska (see ANDERSON (1983: 183) and LARSON et al. (2000: 163); in both works Nearctic population are given under the name *Hygrotus canadensis*). The taxon is only tentatively included in our key which relates only to Nearctic specimens. We are not sure about the identity of our Nearctic specimens because we have observed considerably variation in coloration, shape of protarsomeres of males, shape of median lobe and parameres, punctuation of dorsal surface etc. as well as differences to Palearctic material. For instance, all Nearctic specimens studied are almost dark reddish brown with diffusely delimited lighter areas near the elytral base and lateral margin (Fig. 4), while Palearctic specimens are much lighter and have often a distinct elytral pattern (see also the photos under *Coelambus canadensis* in the MCZ type database). LARSON & ROUGHLEY (1991: 64) as well as NILSSON & HOLMEN (1995: 36) synonymised *H. canadensis* and *H. marklini* without any argumentation; however, we are not sure about this synonymy and recommend intensive studies of diverse Palearctic and Nearctic populations including molecular methods.

*Hygrotus suturalis* is a quite oval species (Fig. 6), the placement of which in ANDERSON's species-group V is not well founded. The coarse punctures on the elytra and also on the venter are very characteristic. In particular the equal and evenly curved protarsal claws in males separate this species from the other species of the group, except *H. fumatus*. The relatively narrow parameres and the straight distal third of the median lobe (see figs 27F, G in LARSON et al. (2000: 159); figs 15a, b in ANDERSON (1983: 178) are not fully correct) show tendencies to species of ANDERSON's species group VI. We have studied several specimens from Saskatchewan, Canada (see also the photos in the MCZ type database).

### Key to species

The following key to species is based in part on keys in ANDERSON (1983) and LARSON et al. (2000). It includes *H. yellowstone* nov.sp., the rediscovered *H. artus*, the resurrected *H. medialis* and *H. infacetus* and the correctly delimited *H. lutescens*. With regard to *H. marklini*, the key is only applicable to Nearctic specimens.

1. Elytra in anterior half between puncture lines with numerous scattered coarse punctures. Males with protarsal claws evenly curved; parameres relatively narrow (figs 27F, 27G in LARSON et al. (2000: 159)). ..... ***suturalis***
- Punctuation in anterior half of elytra between puncture lines more uniform. Males with protarsal claws evenly curved or not; parameres relatively broad (Figs 67-79). ..... 2
2. Males with anterior protarsal claw evenly curved, not bent basally; median lobe of aedeagus with distal fourth sinuate in lateral view (Figs 37a, 37b); male protarsomeres distinctly broader than those of females. Large and elongate species. Coastal California north of and around San Francisco. .... ***fumatus***
- Males with anterior protarsal claw bent basally, straight distally; shape of median lobe of aedeagus other. Species smaller. Distribution other. .... 3
3. Punctuation on lateral part of metaventrite coarser and sparser (Figs 22, 28). Apex of median lobe of aedeagus in lateral view shortly curved dorsally or not (Figs 30-32). So far known only from central and north-western Wyoming. .... ***yellowstone* nov.sp.**



- Punctuation on lateral part of metaventrite less coarse and sparse (Figs 23-27, 29). Apex of median lobe of aedeagus in lateral view weakly curved dorsally or almost straight (Figs 33-36, 38-40, 46, 48-50) or in some specimens curved ventrally (Figs 41, 47). .....4
- 4. Elytral pattern indistinct, diffusely delimited, mostly appearing rather uniform; altogether darker species, only near base and sides somewhat lighter; vittae not or only weakly recognisable; on average more elongate species. ....5
  - Elytral pattern more distinct, lighter area in anterior part larger; vittae mostly well recognisable; on average more oval species. ....7
- 5. Abdominal ventrites and clypeus of females without reticulation; distributed in Mono and Inyo Counties (California). ..... **artus**
  - Clypeus of females reticulate at least in part; abdominal ventrites reticulate or not. Distribution other. ....6
- 6. Smaller species (TL: 2.6-3.25 mm); abdominal ventrites of females reticulate; hind-margin of last ventrite with distinct bristles; punctures on metaventrite and metacoxal plates relatively large; lighter dot on head reaching from frons until anterior border of clypeus; antennomers 5 to 11 weakly infusate in distal half; distributed in Central Valley, California. .... **lutescens**
  - Greater species (TL: 3.4-4.3 mm); abdominal ventrites of females not reticulate, hind margin of last ventrite without distinct bristles; punctures on metaventrite and metacoxal plates relatively small; lighter dot on head rarely reaching anterior border of clypeus, often present only on frons or interrupted by darker stripe between eyes; antennomers 5 to 11 stronger and almost totally infusate; Holarctic species, in North America distributed from Arizona, northern New Mexico and northern Great Plains until Canada and Alaska. .... **marklini**
- 7. Females with all abdominal ventrites smooth or at most last ventrite with very few traces of reticulation; clypeus also at most with traces of reticulation; distributed in large parts of southern California and in Arizona; according to ANDERSON (1983; under *H. lutescens*) also in other US states, northern Mexico and Canada. .... **medialis**
  - Females with at least last abdominal ventrites distinctly reticulate, clypeus at least in part distinctly reticulate. .... 8
- 8. Dark discal cloud behind middle of elytra distinctly outlined; light and dark coloration on head and pronotum also rather contrasting. Females with all abdominal ventrites distinctly reticulate Distributed in northern prairie US states until Canada, east of Rocky Mountains; until Kansas and New Mexico in south (see ANDERSON (1983: 183); LARSON et al. (2000: 166)). .... **sellatus**
  - Dark discal cloud of elytra not distinctly outlined; also light and dark coloration on head and pronotum less contrasting. Females with last abdominal ventrite reticulate, ventrites I to V not reticulate or only in traces. Distributed in central Mexico. .... **infacetus**

#### Notes on *Hygrotus (Leptolambus) nubilus* (LECONTE, 1855)

FERY & CHALLET (2015) published the first record of *Hygrotus (Leptolambus) nubilus* (LECONTE, 1855) (with the subgeneric name *Coelambus*) from Hawaii (Mauna Kea) and with this the supposed first record of the genus from the Pacific zoogeographical region. In the meantime we have found that *Hygrotus (Leptolambus) medialis* (LECONTE, 1852) (so far treated as junior subjective synonym of *Hygrotus (Leptolambus) lutescens* (LECONTE, 1852)) was recorded from Hawaii in a six-lines note by BEARDSLEY (1975: 583). According to the author the specimens were "determined by P.J. Spangler". The same author reported this species in another short article (1978: 406) as being collected by himself and by J. Maciolek. The latter record was also given in MACIOLEK (1982: 7): "Waiau at 3969 m on Mauna Kea".

We are convinced that the specimens recorded by Beardsley and Maciolek belong in fact to *H. nubilus* and that Spangler's determination was incorrect. On the other hand, we must now concede that our record was not the first of genus *Hygrotus* from Hawaii, that of BEARDSLEY (1975) being 40 years older. Strange enough, BEARDSLEY's (1975, 1978) and MACIOLEK's (1982) records must have been totally overlooked during the last decades.

In our work from 2015 we suspected that *H. nubilus* might have been introduced by birds from North-America, one of the possible species being the golden plover (*Pluvialis fulva* (GMELIN, 1789)) which is known to fly regularly from Alaska to Hawaii and back (see DENNY (2006) and diverse other sources on the Internet). In the meantime we have found an article of BROOKS (1967: 129) which supports our assumption at least in part because this author reports that specimens of *H. nubilus* (with question mark) and its larvae have been found in the stomach of the golden plover. Thus, it seems to be quite reasonable that adults or larvae of *H. nubilus* have been transported between the feathers of the golden plover. See also HÄNEL & JÄCH (2013: 275, 276) where the possibility of transport of water beetles by birds is discussed.

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### Zusammenfassung

Es werden mehrere nearktische Arten der Gattung *Hygrotus* STEPHENS, 1828 behandelt, die ANDERSON (1983) in seine Artengruppe V gestellt hat. *Hygrotus (Leptolambus) yellowstone* nov.sp. wird aus dem Nordwesten und aus dem zentralen Bundestaat Wyoming der USA beschrieben. Die Identität des auch als "Mono-See-Schwimmkäfer" bekannten *H. (L.) artus* (FALL, 1919) wird geklärt, und es wird außerdem gezeigt, dass die Art weder bereits ausgestorben ist, noch im stark alkalischen Wasser des Mono-Sees lebt. Die Art ist dagegen im Mono County (Kalifornien) recht weit verbreitet. *Hygrotus (L.) medialis* (LECONTE, 1852) und *H. (L.) infacetus* (CLARK, 1862) – seit ANDERSON (1983) als subjektive Synonyme von *H. (L.) lutescens* (LECONTE, 1852) behandelt – werden wieder als valide Arten eingesetzt. Für die genannten fünf Arten und außerdem für *H. (L.) fumatus* (SHARP, 1882) werden Beschreibungen, Abbildungen der Aedeagi und anderer differenzierender Merkmale gegeben, ihre Verbreitung in zwei Karten dargestellt und ein Bestimmungsschlüssel angeboten. Für die nominellen Taxa *Hydroporus medialis* LECONTE, 1852, und *Hygrotus impressifrons* MOTSCHULSKY, 1859 wird jeweils der Lectotypus designiert. Die Synonymie des Letzteren mit *H. (L.) lutescens* wird bestätigt. Insgesamt enthält die Gattung *Hygrotus* nun 132 Arten (drei davon bitypisch) und deren Untergattung *Leptolambus* 53 Arten (zwei davon bitypisch). Für die Art *H. (L.) nubilus* (LECONTE, 1855), die einer anderen Artengruppe angehört, werden einige Anmerkungen zum Vorkommen auf Hawaii gemacht.

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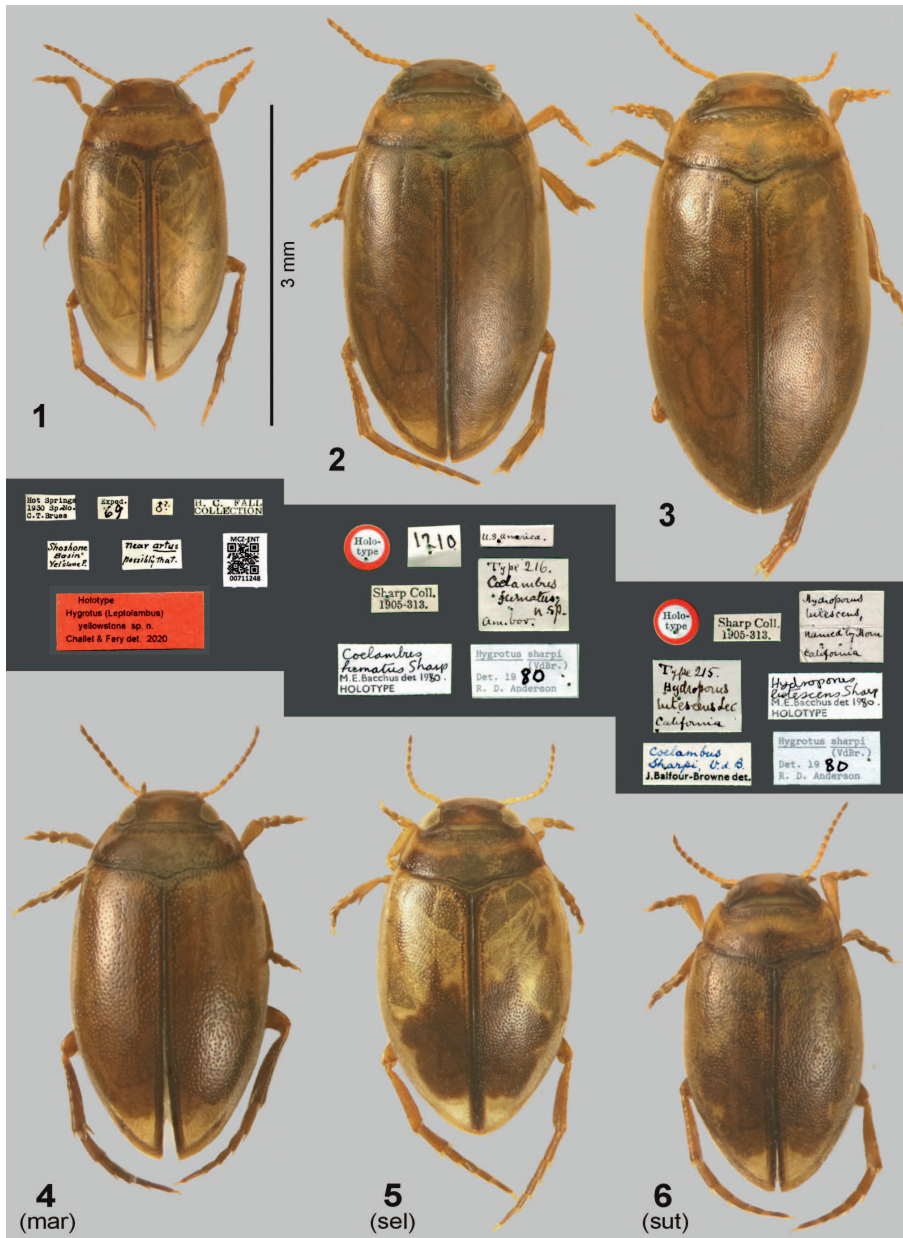
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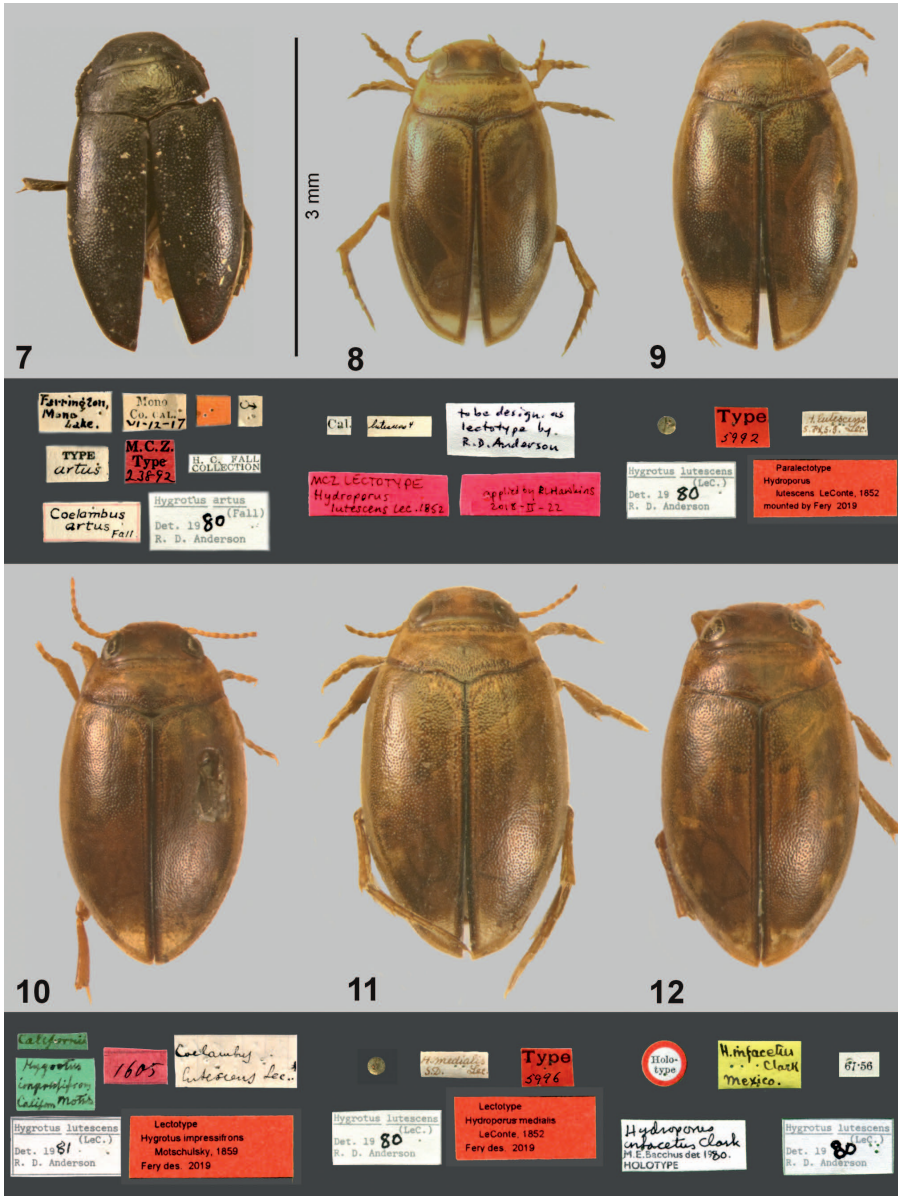
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**Table 1:** Measurements: TL: total length; MW: maximum width; n: number of specimens measured;  $\approx$  >: "tendency to".

<i>Hygrotus</i> ( <i>Leptolambus</i> )	TL (mm) range (mean)	MW (mm) range (mean)	TL/MW range (mean)	n
<i>yellowstone</i> nov.sp.	2.75-3.1 (2.91)	1.5-1.65 (1.57)	1.82-1.90 (1.86)	19
<i>lutescens</i>	2.6-3.25 (2.98)	1.4-1.75 (1.60)	1.79-2.00 (1.86)	41
<i>medialis</i>	3.0-3.6 (3.34)	1.7-2.05 (1.87)	1.71-1.84 (1.79)	77
<i>artus</i> ( $\approx$ > <i>medialis</i> )	2.65-3.3 (3.08)	1.45-1.8 (1.69)	1.8-1.9 (1.83)	18
<i>artus</i>	2.65-3.4 (3.09)	1.4-1.85 (1.66)	1.8-1.95 (1.86)	76
<i>infacetus</i>	3.05-3.5 (3.27)	1.7-1.9 (1.81)	1.70-1.90 (1.81)	16
<i>fumatus</i>	3.7-4.2 (3.95)	1.85-2.15 (2.01)	1.86-2.05 (1.97)	29

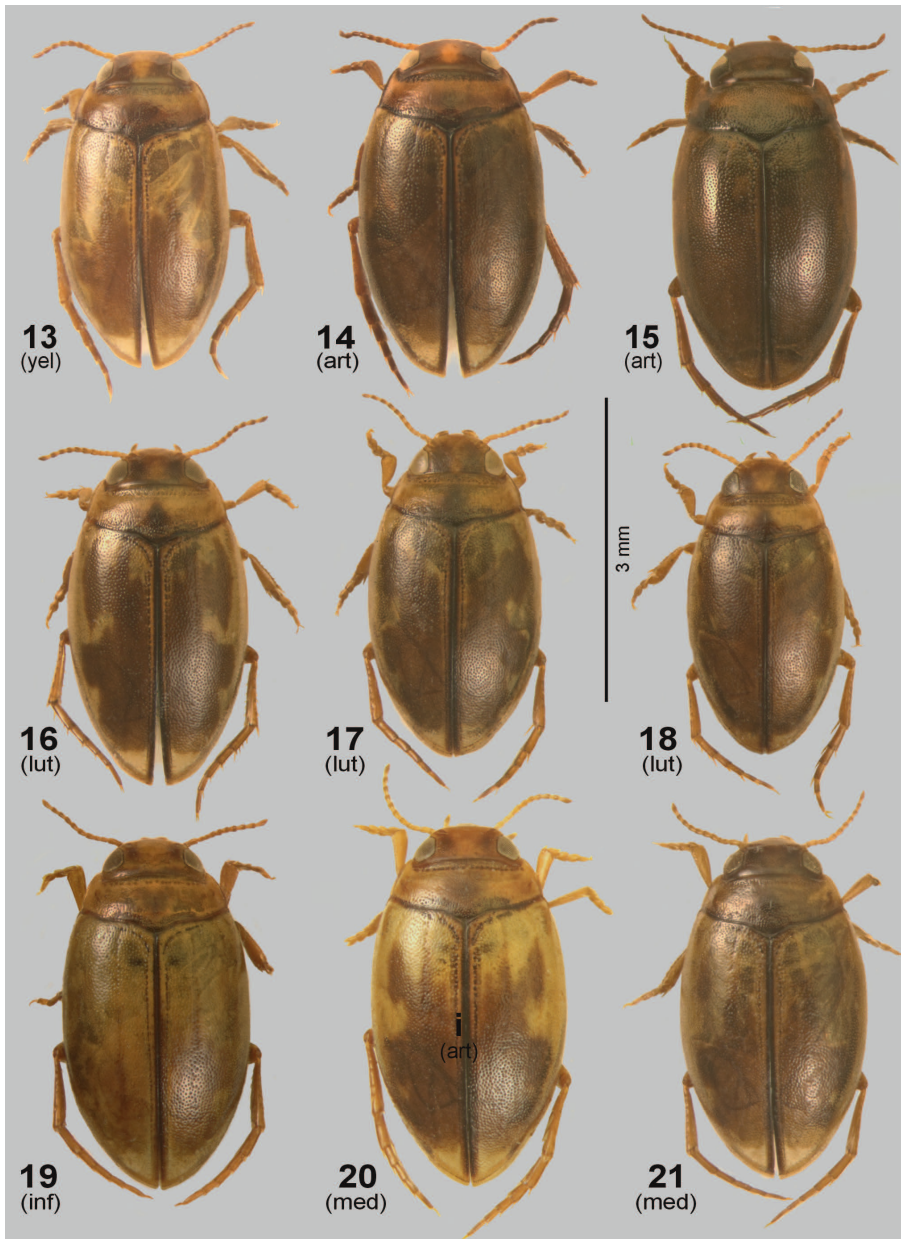


**Figs 1-6.** 1-3. Habitus and labels of: (1) *Hygrotus (L.) yellowstone* nov.sp.; (2) *Coelambus fumatus* SHARP (holotype); (3) *Coelambus sharpi* BRANDEN (holotype; syn. of *H. fumatus*). 4-6 Habitus of: (4) *Hygrotus (L.) marklini* (Canada, Alberta); (5) *Hygrotus (L.) sellatus* (Wyoming, Natrona Co); (6) *Hygrotus (L.) suturalis* (Canada, Saskatchewan, Southend).

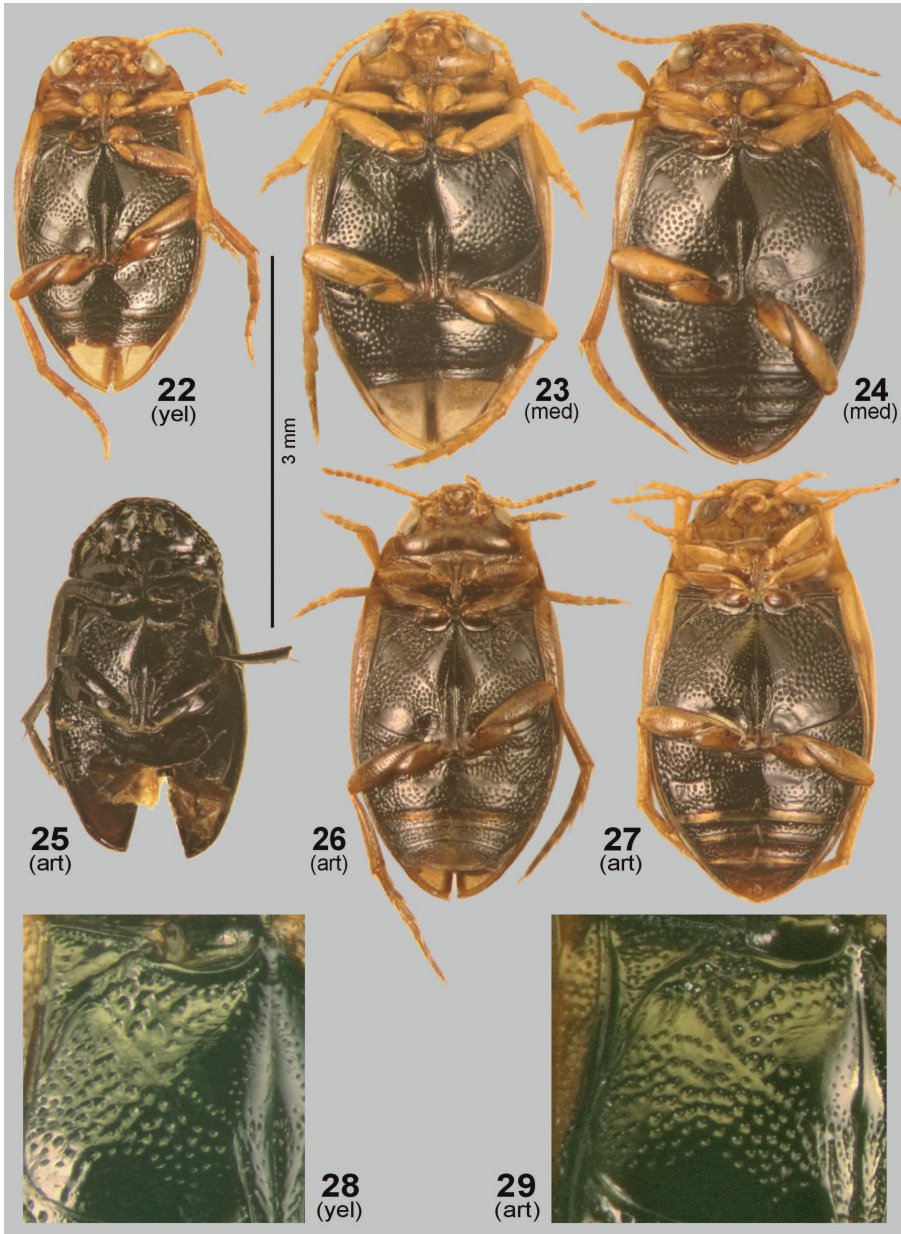


**Figs 7-12.** Habitus and labels of: (7) *Coelambus artus* FALL (holotype); (8) *Hydroporus lutescens* LECONTE (lectotype); (9) *Hydroporus lutescens* LECONTE (paralectotype); (10) *Hygroctus impressifrons* MOTSCHULSKY (lectotype) (syn. of *H. lutescens*); (11) *Hydroporus medialis* LECONTE (lectotype); (12) *Hydroporus infacetus* CLARK (holotype).





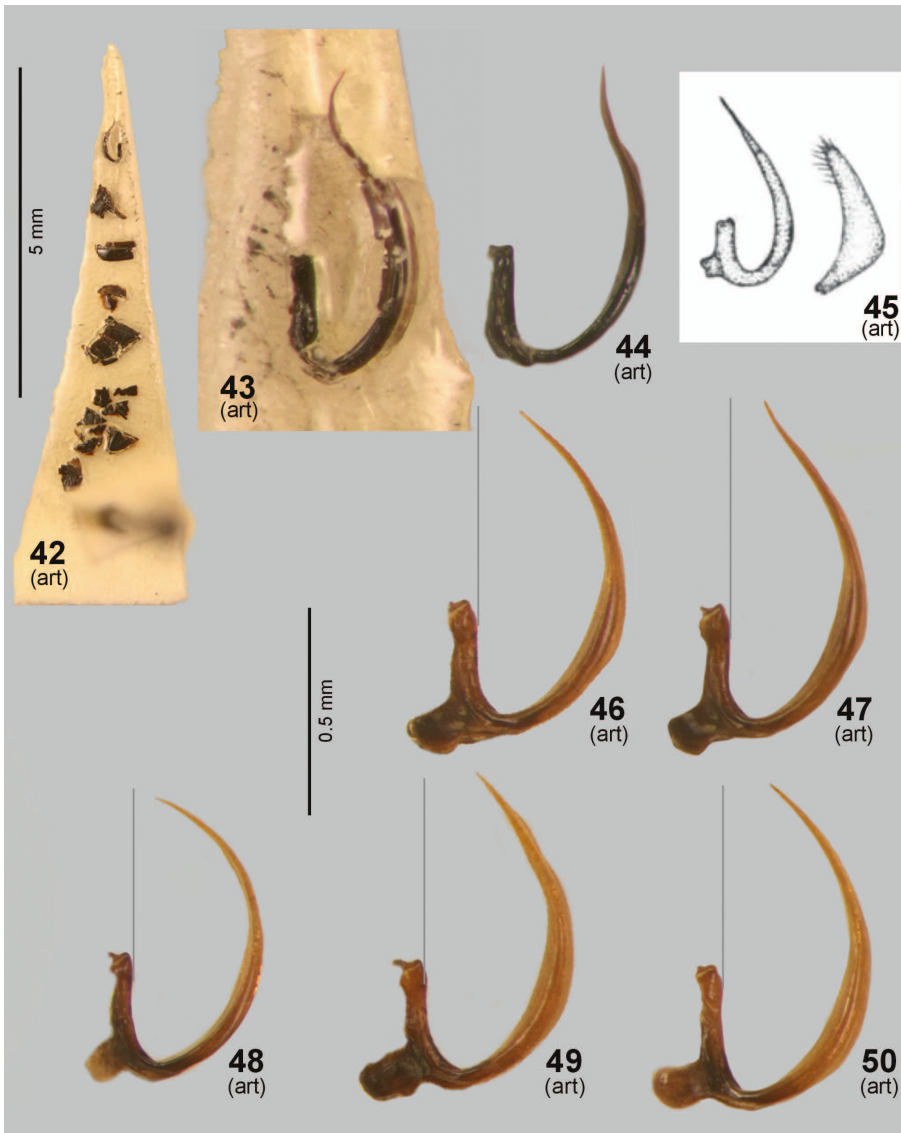
**Figs 13-21.** Habitus of: (13) *Hygrotus (L.) yellowstone* nov.sp. (paratype; loc. "77"); (14) *H. (L.) artus* (Paoha Island); (15) *H. (L.) artus* (Benton Crossing); (16) *H. (L.) lutescens* (Fair Oaks); (17) *H. (L.) lutescens* (Elk Creek); (18) *H. (L.) lutescens* (Oroville); (19) *H. (L.) infacetus* (Tequixquitla); (20) *H. (L.) medialis* (Cayucas Creek); (21) *H. (L.) medialis* (Kitchen Creek).



**Figs 22-29.** 22-27. Ventral surface of: (22) *Hygrotus (L.) yellowstone* nov.sp. (paratype; loc. "69"); (23) *H. (L.) medialis* (Coal Oil Preserve); (24) *H. (L.) medialis* (Mojave River); (25) *H. (L.) artus* (holotype); (26) *H. (L.) artus* (Benton Crossing); (27) *H. (L.) artus* (Farrington); 28-29. Details of ventral surface of: (28) *H. (L.) yellowstone* nov.sp. (paratype; loc. "69"); (29) *H. (L.) artus* (Benton crossing).

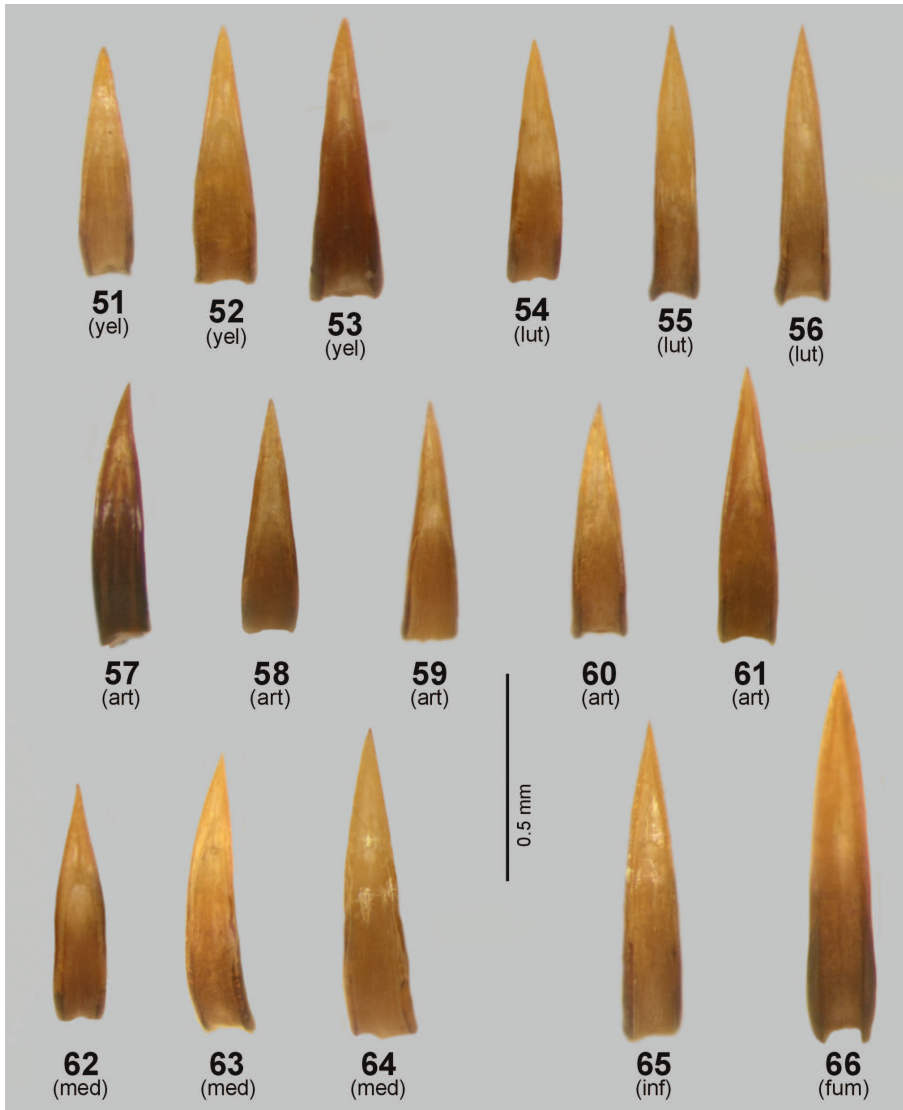


**Figs 30-41.** Median lobe of aedeagus in lateral view of: (30) *Hygroplitis (L.) yellowstone* nov.sp. (holotype); (31) *H. (L.) yellowstone* nov.sp. (paratype; loc. "77"); (32) *H. (L.) yellowstone* nov.sp. (paratype; Riverton); (33) *H. (L.) lutescens* (lectotype); (34, 35) *H. (L.) lutescens* (two exs from Elk Creek); (36) *H. (L.) infacetus* (Tequixquitla); (37a) *H. (L.) fumatus* (Centerville pond); (37b) *H. (L.) fumatus* (idem, details of apex); (38) *H. (L.) medialis* (paralectotype); (39, 40) *H. (L.) medialis* (two exs from Cayucas Creek); (41) *H. (L.) medialis* (see under "lutescens 6"). The greyish lines prolong inner outline of condyles.

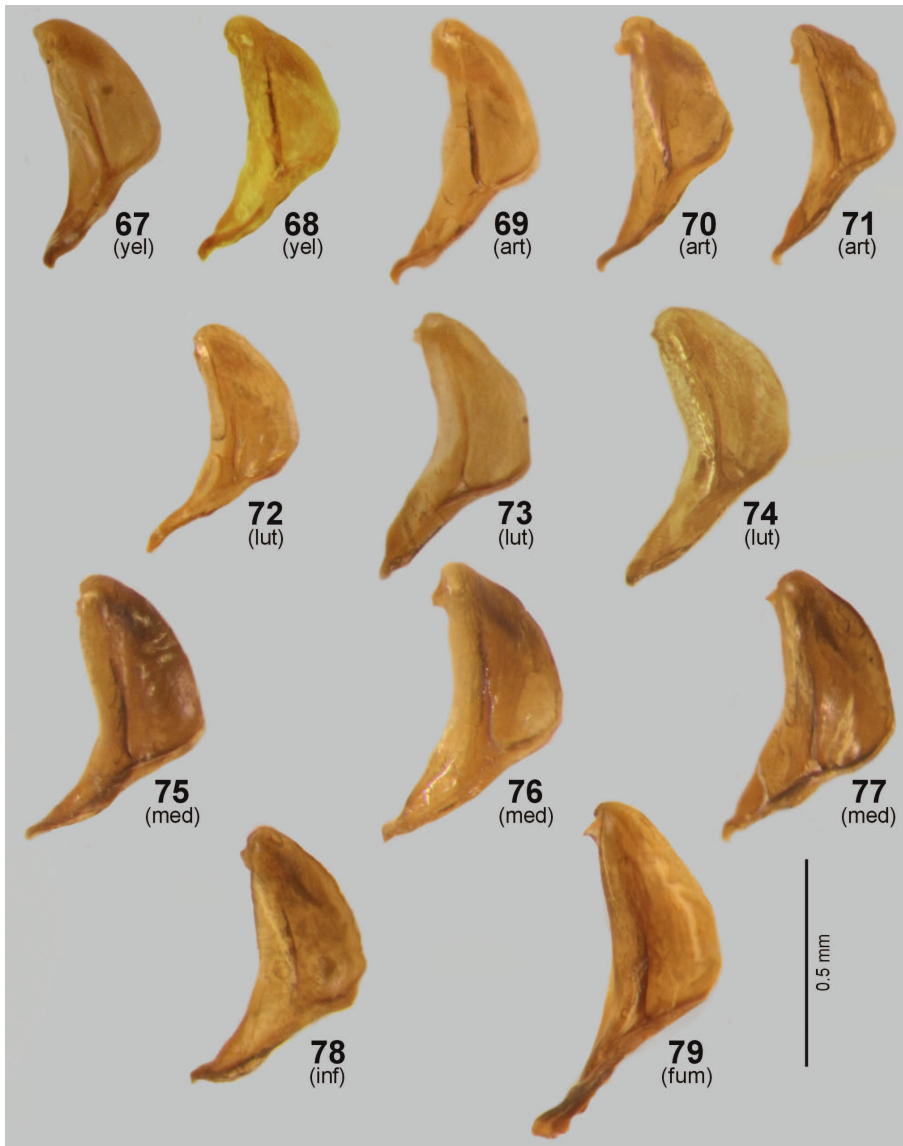


**Figs 42-50.** 42. Preparation of median lobe and remains of last abdominal ventrite of holotype of *Hygroetus (L.) artus* as glued onto point by R.D. Anderson; 43-50. Median lobe of aedeagus in lateral view of *H. (L.) artus*: (43) holotype, tip of Fig. 42 enlarged and turned horizontally; (44) holotype, lobe unglued; (45) reproduction of fig. 13 in ANDERSON (1983), including paramere; (46) ex. from Benton crossing; lobe in wet condition; (47) idem, lobe in dry condition; (48, 49) two exs from Dehy Hot Springs Lake; (50) ex. from Farrington.

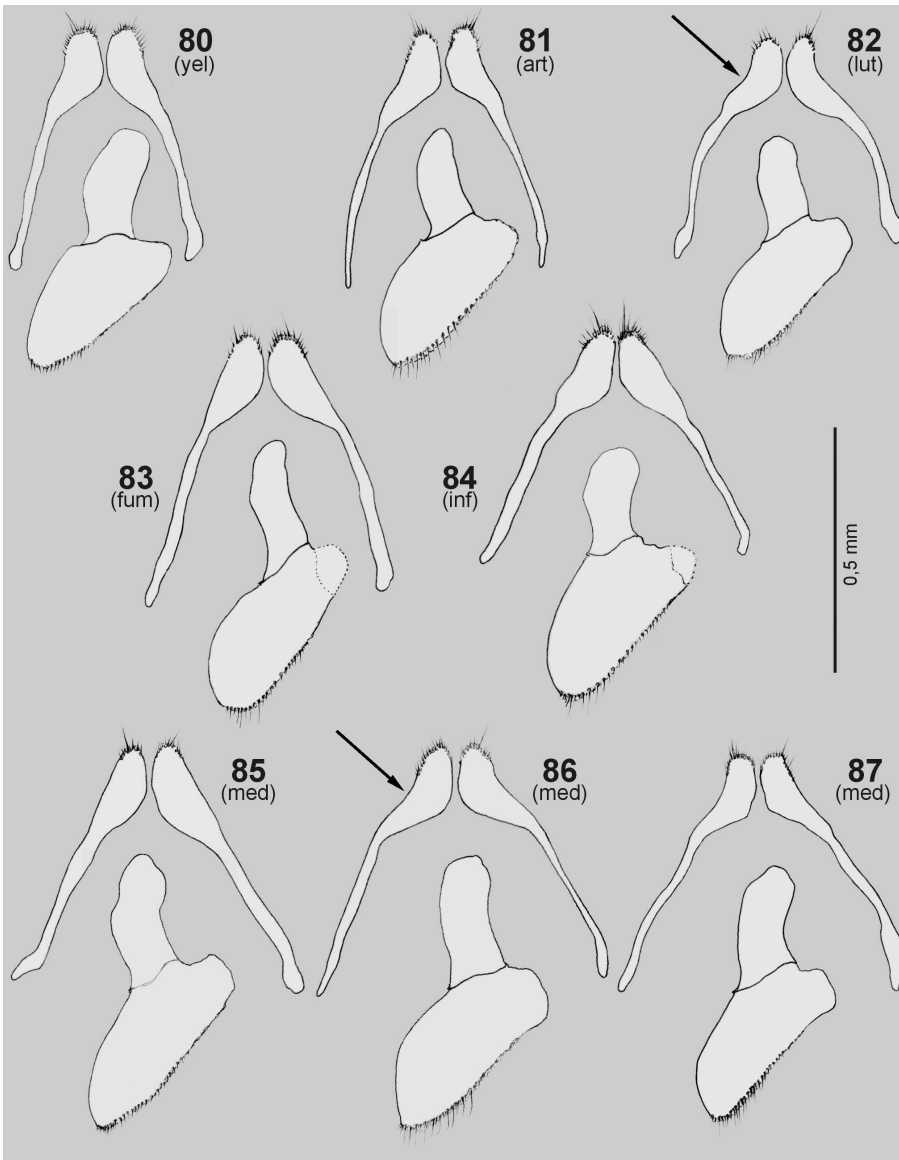




**Figs 51-66.** Median lobe of aedeagus in ventral view of: (51) *Hygroplitis (L.) yellowstone* nov.sp. (holotype); (52) *H. (L.) yellowstone* nov.sp. (paratype; loc. "77"); (53) *H. (L.) yellowstone* nov.sp. (paratype; Riverton); (54) *H. (L.) lutescens* (lectotype); (55, 56) *H. (L.) lutescens* (two exs from Elk Creek); (57) *H. (L.) artus* (holotype); (58) *H. (L.) artus* (Farrington); (59, 60) *H. (L.) artus* (two exs from Dehy Hot Springs Lake); (61) *H. (L.) artus* (Benton Crossing); (62, 63) *H. (L.) medialis* (two exs from Cayucas Creek); (64) *H. (L.) medialis* (see under "lutescens 6"); (65) *H. (L.) infacetus* (Tequixquitla); (66) *H. (L.) fumatus* (Centerville pond).



**Figs 67-79.** Left paramere of: (67) *Hygroplitis (L.) yellowstone* nov.sp. (holotype); (68) *H. (L.) yellowstone* nov.sp. (paratype; loc. "77"); (69) *H. (L.) artus* (Farrington); (70, 71) *H. (L.) artus* (two exs from Dehy Hot Springs Lake); (72) *H. (L.) lutescens* (lectotype); (73, 74) *H. (L.) lutescens* (two exs from Elk Creek); (75) *H. (L.) medialis* (Cayucas Creek); (76) *H. (L.) medialis* (see under "lutescens 6"); (77) *H. (L.) medialis* (Santa Rosa Creek); (78) *H. (L.) infacetus* (Tequixquitla); (79) *H. (L.) fumatus* (Centerville pond).

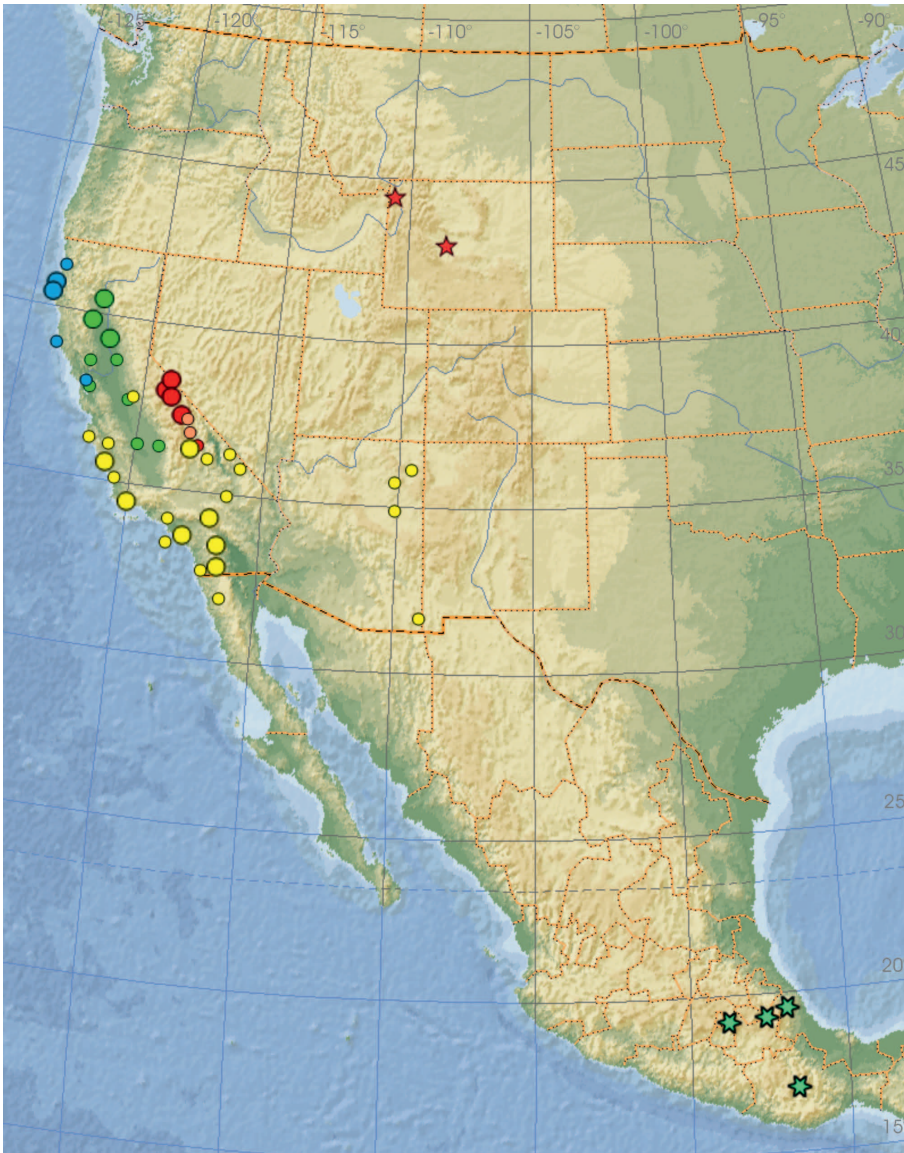


**Figs 80-87.** Gonocoxae and gonocoxosternum of: **(80)** *Hygrotus (L.) yellowstone* nov.sp. (paratype; loc. "77"); **(81)** *H. (L.) artus* (Paoha Island); **(82)** *H. (L.) lutescens* (Elk Creek); **(83)** *H. (L.) fumatus* (holotype); **(84)** *H. (L.) infacetus* (holotype); **(85-87)** *H. (L.) medialis* (three exs from Santa Rosa Creek) (arrows indicate emargination of some gonocoxae).



**Fig. 88.** Distribution in California of: *Hygroplitis (L.) fumatus* (blue circles); *H. (L.) lutescens* (green circles); *H. (L.) artus* (red circles); *H. (L.) medialis* (yellow circles); *H. (L.) artus*, including specimens with slight tendencies to *H. (L.) medialis* (orange circles).





**Fig. 89.** Distribution in California and Mexico of: *Hygrotus (L.) fumatus* (blue circles); *H. (L.) lutescens* (green circles); *H. (L.) artus* (red circles); *H. (L.) medialis* (yellow circles); *H. (L.) artus*, including specimens with slight tendencies to *H. (L.) medialis* (orange circles); *H. (L.) yellowstone* nov.sp. (red stars); *H. (L.) infacetus* (green stars); big circles indicate groups of closely situated localities.



**Fig. 90.** Collecting site of *Hygrotus (L.) artus* near Mono Lake; in the background some mobile cars and right of central pine remains of the Farrington Ranch (the shadow of the pine is visible in Google Earth, version 2016).





**Fig. 91.** One of several ponds alongside Old State Hwy Road, some hundred meters south of the Farrington Ranch; picture taken looking west, mountains of Sierra Nevada in the background. The empty ponds are visible as light stripes in version 2016 of Google Earth and filled with water as dark stripes in version 2011.

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