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Redescription of *Hydraena serricollis* WOLLASTON, with special emphasis on intraspecific variability (Coleoptera: Hydraenidae)

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Abstract

Hydraena (s.str.) *serricollis* WOLLASTON, 1864 (Coleoptera: Hydraenidae), endemic to the Canary Islands (Gran Canaria, La Gomera, La Palma and Tenerife Islands) is redescribed. Several populations were found to possess enlarged apical elytral punctures.

Key words: Coleoptera, Hydraenidae, *Hydraena serricollis*, Canary Islands, Spain.

Introduction

Two nominal species of the *Hydraena testacea* species group (= "*Phothydraena*" lineage sensu JÄCH et al. 2000) have been described from the Canary Islands (Spain) so far: *Hydraena serricollis* WOLLASTON, 1864 (from Tenerife) and *H. sinuaticollis* WOLLASTON, 1864 (also from Tenerife). Only one year after their description, these two species were synonymized by their describer (WOLLASTON 1865), who established precedence of the name *Hydraena serricollis* over *H. sinuaticollis*. In the same paper, WOLLASTON (1865) recorded *H. serricollis* for the first time from La Gomera. More than a century later, this species was recorded from two other Canarian islands by BALKE et al. (1990): La Palma and Gran Canaria.

Until today, *Hydraena serricollis* has not been collected from any other than these four islands. A large number of specimens collected recently enabled a detailed comparative study of external and genital characters of several populations from all four islands.

Material and Methods

The material used for this study is deposited in the following collections:

CDL	Coll. Díaz, Universidad de Santiago, Lugo, Spain
CHB	Coll. Hendrich, München/Berlin, Germany
CNU	Coll. Nilsson, Umeå, Sweden
COL	Coll. Oromí, Universidad de La Laguna, Tenerife, Spain
CRCL	Coll. Régil, León, Universidad de León, Spain
CVL	Coll. Valladares, Universidad de León, Spain
ISNB	Institut royal des Sciences naturelles de Belgique, Bruxelles, Belgium
MHNP	Muséum national d'Histoire naturelle, Paris
MICN	Museo Insular de Ciencias Naturales, Tenerife, Spain
MNCN	Museo Nacional de Ciencias Naturales, Madrid, Spain
NHML	The Natural History Museum, London, UK
NMW	Naturhistorisches Museum Wien, Austria

The text of this paper was largely compiled by the first author, who has examined and compared external and genital characters of almost all specimens listed herein. Comparative studies of the

aedeagal characters were carried out by the first author and J.A. Díaz. All line drawings were made by J.A. Díaz. The redescription of *H. serricollis* is based on a draft written by L.F. Valladares. The habitat description (incl. photograph) was provided by J.A. Régil, who initiated this study. The list of associated specimens was compiled by J.A. Régil, R. Blanco and L.F. Valladares (Polyphaga).

The soft tissue of a single male from Gran Canaria (Barranco Tabuquillos) was digested and the DNA isolated using a standard extraction protocol (I. Ribera laboratory, Institut de Biologia Evolutiva, Barcelona), and stored in the DNA collection of the MNCN, ref. no. MNCN/ADN 7280. The extracted specimen (voucher number IBE-AF70), plus the aedeagus mounted in DMHF (prior to the extraction), are kept in the MNCN with the same reference number. Only one fragment (692 bp encompassing the 3' end of the mitochondrial gene rrnL, the full tRNA-LEU, and the 5' end of nad1) was sequenced and is made publicly available (GenBank accession numbers: FN394324: 16S, FN394325: tRNA-Leu, FN394326: nad1). See RIBERA et al. (2001) for details of the primers used and the sequencing conditions.

World checklist of the *Hydraena testacea* species group

1)	*Hydraena atrata* DESBROCHERS DES LOGES, 1891	Western Europe, North Africa
2)	*Hydraena chersonesica* JÄCH, DÍAZ & PRZEWOŹNY, 2007	Ukraine (Crimea)
3)	*Hydraena hernandoi* FRESNEDA & LAGAR, 1990	Spain, Morocco
4)	*Hydraena isabelae* CASTRO & HERRERA, 2001	Spain
5)	*Hydraena paganettii* GANGLBAUER, 1901	Central and Eastern Europe, Western Asia
6)	*Hydraena pallidula* SAINT-CLAIRE DEVILLE, 1909	Algeria
7)	*Hydraena putearius* JÄCH & DÍAZ, 2000	Arabian Peninsula
8)	*Hydraena serricollis* WOLLASTON, 1864	Canary Islands
9)	*Hydraena testacea* CURTIS, 1830	Western Europe, North Africa

Hydraena serricollis WOLLASTON, 1864

Hydraena serricollis WOLLASTON 1864: 88. – WOLLASTON 1865. – GEMMINGER & HAROLD 1868. – MARSEUL 1871. – KNISCH 1924. – ORCHYMONT 1940. – PALM 1967. – BERTHÉLEMY 1986. – BALKE 1990. – BALKE et al. 1990. – MALMQVIST et al. 1993, 1995. – HANSEN 1998. – NILSSON et al. 1998. – JÄCH et al. 2000. – MACHADO & OROMÍ 2000. – CASTRO & HERRERA 2001. – JÄCH 2004 – JÄCH et al. 2007.

Hydraena sinuaticollis WOLLASTON 1864. – WOLLASTON 1865. – KNISCH 1924. – WINKLER 1925. – ORCHYMONT 1940. – BERTHÉLEMY 1986. – HANSEN 1998. – JÄCH 2004.

TYPE LOCALITY: Small stream, flowing through the wood of the "Agua Garcia", southeast of Tacoronte, northeastern Tenerife, Canary Islands, Spain (see also ORCHYMONT 1940: Fig. 18).

TYPE MATERIAL: **Syntypes**: total number of syntypes not specified in original description: "it is tolerably abundant" (WOLLASTON 1864: 89). Five syntypes are deposited in the NHML ("I am sending all the syntypes I could find, 5 of them", R. Booth, email of 13.V.2009), they were all examined by M.A. Jäch. The first one (♀) is labelled: "Type" [round label], "serricollis, Woll." [handwritten], "CANARY IS.: Teneriffe T.V. Wollaston B.M. 1864–80", "SYN- TYPE" [round label], "SYNTYPE Hydraena serricollis Wollaston,1864 det. R.G. Booth 2009" [partly handwritten]. The remaining four syntypes (sex not determined) lack the first two labels. Another syntype (♂) is housed in the MHNP, Coll. Peyerimhoff (see BERTHÉLEMY 1986: 192).

Designation of a lectotype does not appear to be necessary.

SYNONYMY: *Hydraena sinuaticollis* WOLLASTON, 1864 (syn. by WOLLASTON 1865).

TYPE LOCALITY: Icod el Alto, northern Tenerife, Canary Islands.

TYPE MATERIAL: **Holotype** (NHML), by monotypy ("I have seen hitherto but a single example", WOLLASTON 1864: 88), sex not determined, examined by M.A. Jäch in 2009: "Holotype" [round label], "sinuatocollis [= sinuaticollis], Woll." [handwritten], "CANARY IS.: Teneriffe T.V. Wollaston B.M. 1864–80", "HOLOTYPE Hydraena sinuaticollis Wollaston,1864 det. R.G. Booth 2009" [partly handwritten], "Hydraena serricollis det. Jäch 09" [handwritten].

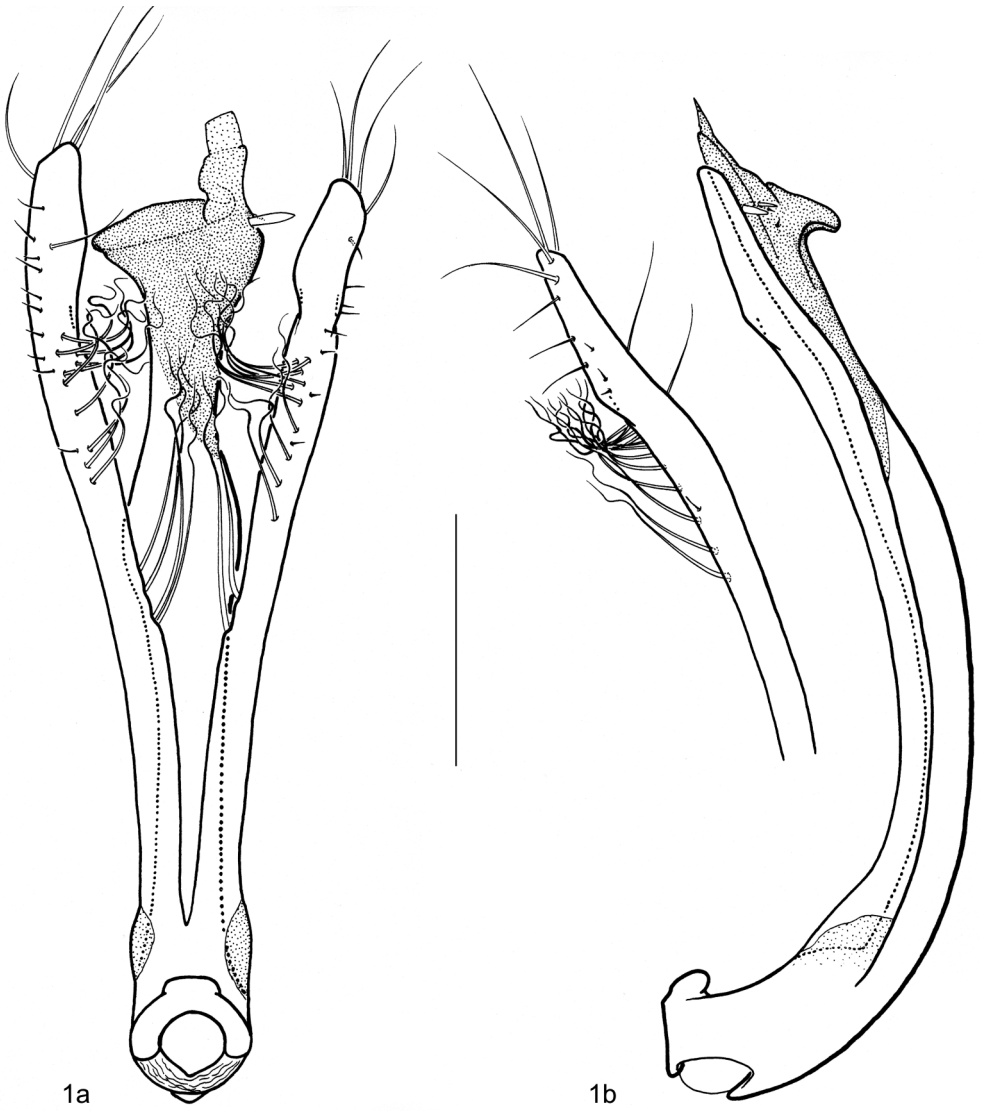

Fig. 1: *Hydraena serricollis*, from Anaga, El Pijaral (Tenerife); aedeagus in a) ventral and b) lateral view (left paramere not illustrated). Scale: 0.1 mm.

ADDITIONAL MATERIAL EXAMINED:

LA GOMERA: 3 ♂♂, 1 ♀ (NMW): El Cedro, 25.I.1983, leg. H. Franz ["Sp. 1503–1508"]; 1 ♂ (NMW): El Cedro, SW Ermita N.S. de Lourdes, 900–1050 m, 24./27.XII.1998, leg. V. Assing; 3 exs. (NMW): Raso de La Bruma, 1000 m, 18.VII.1995, leg. L. Zerche; 1 ♂ (NMW): Presa de la Ola, 19.IX.2008, leg. Régil.

LA PALMA: 16 exs. (NMW): Barlovento, 25.I.1981, 14.II.1985, leg. H. Franz ["Sp. 1449", "Sp. 1557"]; 5 exs. (NMW): Los Tilos, 14.VIII.1966, leg. H. Franz ["Sp. 1100"]; 1 ex. (NMW): Cumbre Nueva, 15.VIII.1966, leg. H. Franz ["Sp. 1103"]; 1 ♂, 1 ♀ (NMW): Garafia, Casa Forestal, 1100 m, 12.–18.VI.1989, leg. M. Balke & L. Hendrich.

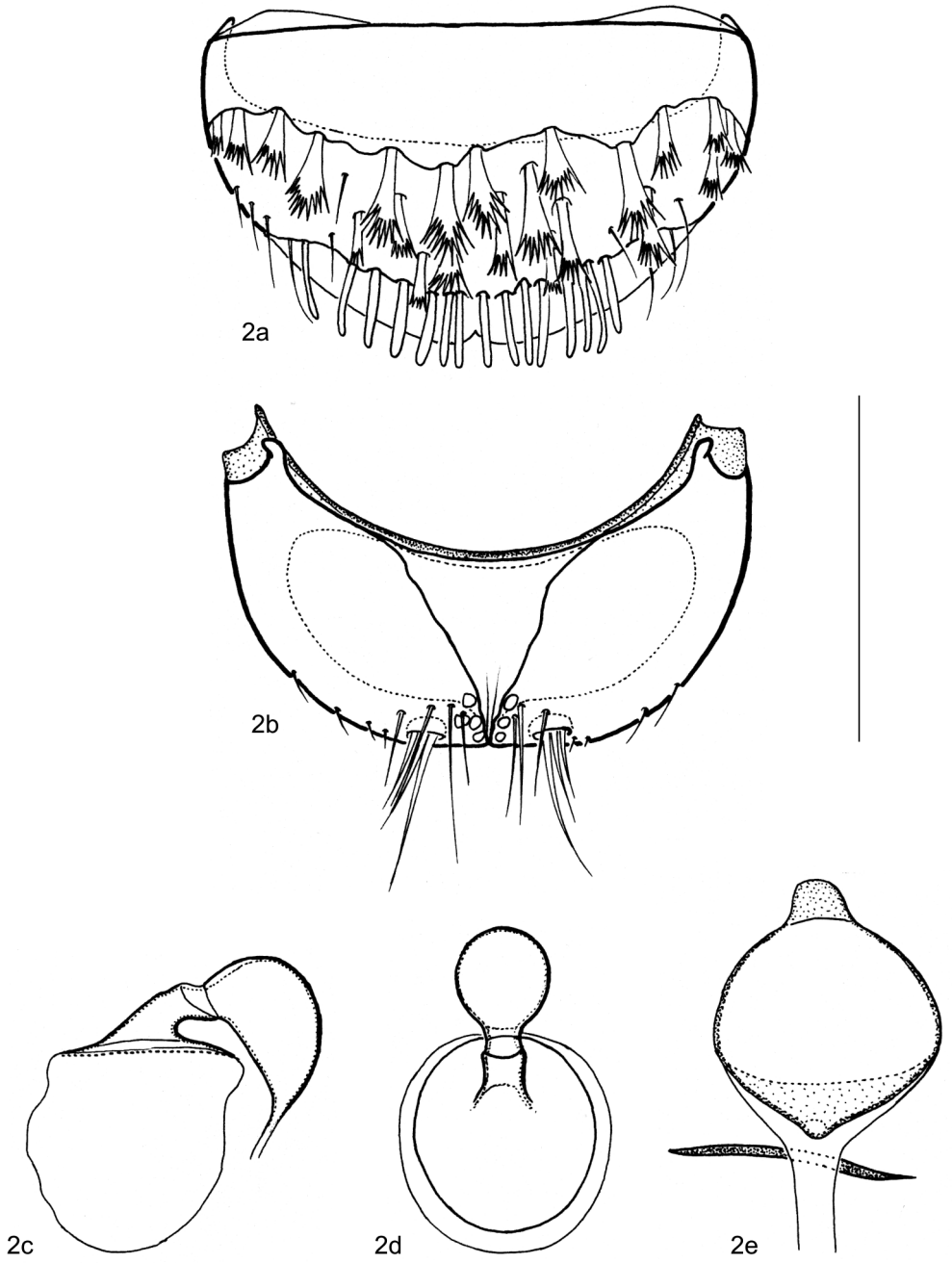

Fig. 2: *Hydraena serricollis*, from Anaga, El Pijaral (Tenerife); a) female tergite X; b) gonocoxite; c–d) spermatheca; e) accessory vaginal sclerite ("pseudospermatheca"). Scale: 0.1 mm.

TENERIFE: 1 ♀ (NMW): Anaga, 4.I.1982; 1 ex. (NMW): Barrio Punta Anaga, Barranco de Iguana, 2.I.1983, leg. H. Franz ["Sp 1494"]; 1 ♂, 2 ♀♀ (NMW): Anaga, El Pijaral, 800–850 m, 4.VII.1995, leg. L. Zerche; 1 ♂ (NMW): Barranco del Río, 1100 m, 9.–10.VI.1989, leg. M. Balke & L. Hendrich; 3 ♀♀ (COL): Agua García, 9.VIII.1984, leg. C.B. Rafael.

GRAN CANARIA: 42 exs. (CRCL: 9 exs.; CVL: 8 exs.; ISNB: 3 exs.; MICN: 4 exs.; MNCN: 8 exs.; NHML: 6 exs.; NMW: 4 exs.): Barranco Tabuquillos, 25.VIII.2005, 12.IX.2008, leg. J.A. Régil; 7 exs. (NMW): ravine near "Cueva de las Niñas", VIII.2005, leg. J.A. Régil; 1 ♀ (CHB): San Bartolomé de Tirajana, Barranco de Tirajana, 800 m, 31.III.–2.IV.1988, leg. M. Balke & L. Hendrich; 1 ♂ (NMW), aedeagus weakly sclerotized: Barranco de Tirajana, 1200 m, 5.–6.VI.1989, leg. M. Balke & L. Hendrich; 3 ♂♂, 4 ♀♀ (CDL): La Montaña, Barranco de Tirajana, 19.V.1995, leg. J.A. Díaz; 2 ♂♂, 2 ♀♀ (CNU): Tirajana, 30.III.1994, leg. A. Nilsson; 1 ♂ (NMW): Siberio, 20.XI.1995, leg. A. Nilsson; 3 ♂♂, 1 ♀ (NMW): Guayadeque, 21.XI.1995, leg. A. Nilsson.

REDESCRIPTION: Length: 1.74–2.15 mm. Colour: General aspect brown. Head dark brown to black, labrum often paler; maxillary palp pale brown, darkened subapically. Pronotum brown, more darkened on disc, anterior and posterior margins (sometimes also lateral margins) pale brown. Elytra brown to dark brown. Legs pale brown.

Head: Margins of labrum slightly upturned. Clypeus densely and finely punctate, at least laterally, sometimes shining medially. Fronto-clypeal suture slightly arcuate. Frons coarsely punctate medially, interstices more or less shining and micropunctate, punctures contiguous laterally. Interocular grooves slightly impressed. Maxillary palp long, second segment twice as long as penultimate one.

Pronotum: Subhexagonal, not cordiform (ratio maximum width/length = 1.17–1.29 mm), anterior margin concave, posterior margin almost straight. Lateral margins slightly convex, strongly narrowing towards posterior margin, lateral edges conspicuously denticulate. Anterior and posterior admedian foveae well developed. Disc coarsely and deeply punctate, intervals glabrous, narrower than a puncture diameter.

Elytra: Elongate, with 12 rows of punctures (seven between suture and humeral callus). One to five apical punctures of lateral row can be enlarged, with conspicuous membrane-like cuticula. Elytral lateral gutter explanate, reaching apex. Lateral rim serrate, teeth larger and more widely separated in anterior half. Elytral apices separately rounded.

Ventral surface: Metaventrite with a pair of glabrous longitudinal striae behind mesocoxae; metaventral plaques thin, converging anteriorly; supplementary plaques reduced to tiny streaks. Intercoxal impression well impressed.

Aedeagus (Figs. 1, 3): Main piece ca. 400 µm long, slender; gently curved in lateral view; distinctly widened subapically and in apical 0.4 (ventral view); subapically obliquely truncate (ventral view), with a short, weakly sclerotized, cylindrical projection of variable length; right side of apex (base of projection) with about four closely set setae: one moderately long seta (ca. 15 µm), which is rather thick and usually slightly curved (rarely almost straight), second seta much shorter and thinner, third and fourth setae minute, hardly visible in compound microscope; phallobase small, symmetrical. The apical part of the main piece is weakly sclerotized, but a distinctly defined distal lobe is absent. Parameres long and slender, symmetrical, inserted ventro-laterally (immediately behind phallobase), almost reaching apex of main piece; ventrally with about 20–30 thin hair-like (sometimes curly) setae of variable length.

Gonocoxite (Figs. 2b, 4b): Transverse, subcrescentic; outer plate divided medially; inner plate short, very slightly surpassing outer plate basally, median cavea large. Apex widely rounded or subtruncate.

Spermatheca and pseudospermatheca as in Figs. 2c–e, 4c–e.

Sexual dimorphism: Sexes very similar. Externally, females are distinguished easily by the long setae on ventrite 5. Males slightly smaller than females (measurements based on material from

Gran Canaria, Barranco Tabuquillos): ♂♂: 1.74–2.11 mm, mean 1.90 mm; ♀♀: 1.88–2.15 mm long, mean 2.02 mm. Ratio maximum width/length of pronotum on average very slightly smaller in males (measurements based on material from Gran Canaria, Barranco Tabuquillos): ♂♂: 1.17–1.25 mm, mean 1.20 mm; ♀♀: 1.19–1.29 mm, mean 1.22 mm.

Female tergite X (Figs. 2a, 4a): Subsemicircular, with a median apical notch; disc covered with squamose setae; trichoid setae confined to posterolateral margin; subapical fringe with about 12–18 vermiform setae.

VARIABILITY: Externally, *Hydraena serricollis* is characterized by the variability of the apical elytral punctures (see Fig. 5). In the specimens from Gran Canaria, the apical 3–5 punctures of the lateral row are almost always becoming gradually larger towards the apex (Fig. 5a), however, in specimens from Guayadeque (Fig. 5b), these punctures are distinctly smaller. In the remaining three islands, the apical punctures are usually small (Fig. 5c, d), although, one male from La Gomera (Presa de la Ola) possesses two enormously enlarged punctures (Fig. 5e).

The aedeagus is generally quite variable in this species (see above). However, examination of numerous specimens did not reveal significant differences. Several aedeagal characters (e.g. the width of the main piece, the length of the tubular apex of the main piece, the curvature of the large seta of the main piece, and the length and setation of the parameres), that seemed to be of taxonomic significance at first sight, are in fact quite variable on all islands.

DISTRIBUTION: Canary Islands: Gran Canaria, La Gomera, La Palma, and Tenerife.

HABITAT: Streams between 450 and 1200 m a.s.l.

Specimens from Barranco Tabuquillos (Gran Canaria) were collected in a small pool of 200 × 120 cm, about 30 cm deep, with sandy bottom, lacking organic matter or macrophytes (Fig. 6). The water beetle fauna associated in this locality was found to include the following 14 species, five of which are Canarian endemics (*):

Hydradephaga: *Gyrinus dejeani* BRULLÉ, 1832, *Agabus biguttatus* (OLIVIER, 1795), *Bidessus minutissimus* (GERMAR, 1824), **Graptodytes delectus* (WOLLASTON, 1864), *Laccophilus hyalinus* (DE GEER, 1774), *Meladema coriacea* CASTELNAU, 1835, and **Stictonectes canariensis* MACHADO, 1987.

Polyphaga: **Limnebius canariensis* ORCHYMONT, 1938, **L. gracilipes* WOLLASTON, 1864, *Ochthebius* (*Asiobates*) *rugulosus* WOLLASTON, 1857, *Hydrochus grandicollis* KIESENWETTER, 1870, *Helochares lividus* (FORSTER, 1771), **Laccobius canariensis* ORCHYMONT, 1940, and *Dryops gracilis* (KARSCH, 1881).

Discussion

The sequenced DNA fragment of the specimen from Gran Canaria (Barranco Tabuquillos) was compared with that of a specimen from Tenerife (voucher number MNCN-AI1093; Chamorga 20.VII.2006, leg. A. Castro), and found to have differences in two positions (one in the rrnL and the second in the nad1). A considerable DNA divergence has also been found recently in *Ochthebius glaber* MONTES & SOLER (ABELLÁN et al. 2007). Unfortunately, the sequenced material from Gran Canaria was in poor condition, and more data would definitely be necessary to draw sound conclusions about the genetic diversity of *Hydraena serricollis*.

The size of the lateral elytral punctures of *Hydraena serricollis* varies on a populational basis. No other morphological distinguishing characters could be detected. The genitalia did not reveal any significant differences between populations. Therefore we regard all specimens examined as belonging to the same taxon.

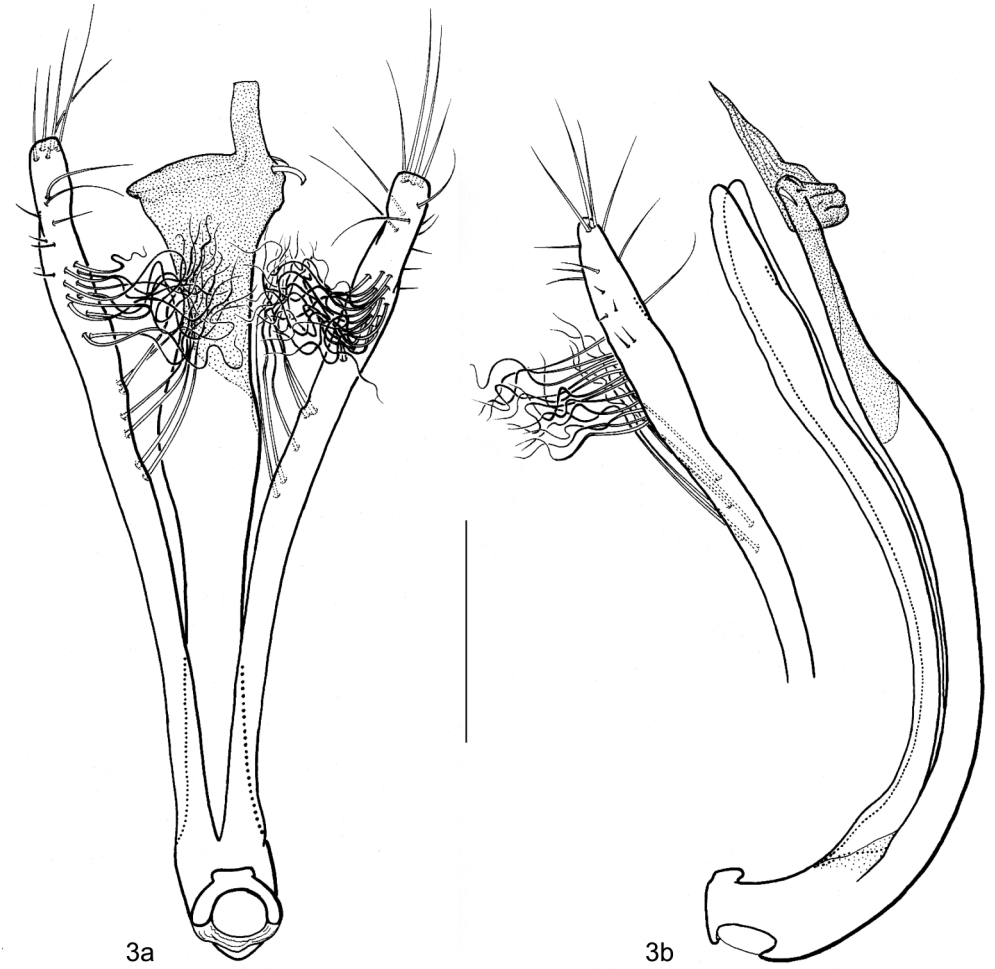

Fig. 3: *Hydraena serricollis*, Barranco de Tirajana (Gran Canaria); aedeagus in a) ventral and b) lateral view (left paramere not illustrated). Scale: 0.1 mm.

Hydraena serricollis has been recorded from all the western Canarian islands except the most southwestern one (El Hierro). This species has never been collected from the eastern islands (Lanzarote, Fuerteventura), which is quite remarkable, because, as other Canarian endemics, it must have a continental origin. A detailed molecular study might clarify the colonization process of this species, which may have followed a route at random or which may have jumped from island to island ("stepping stones" sensu MACARTHUR & WILSON 1967, see also MACHADO 1992).

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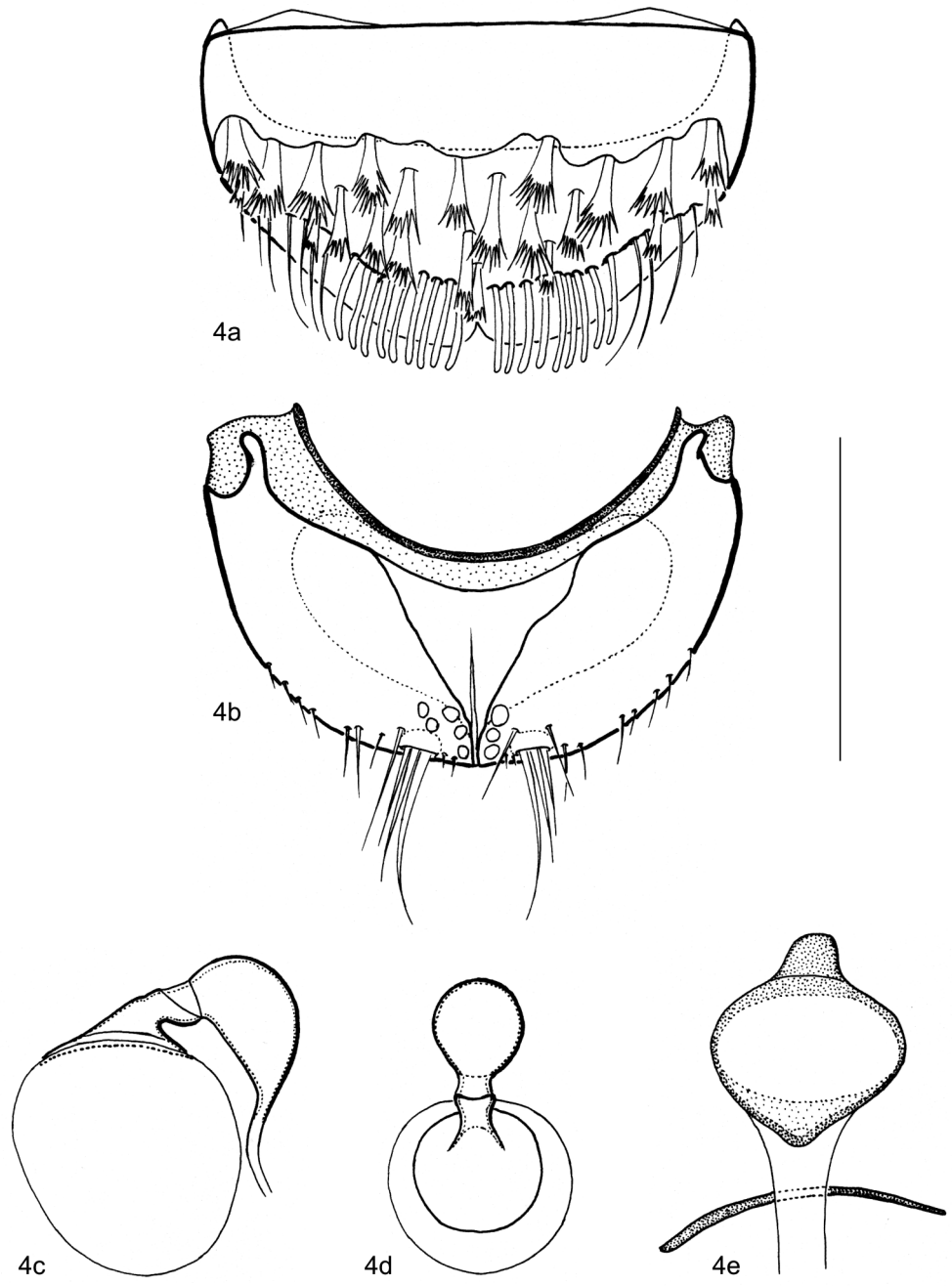

Fig. 4: *Hydraena serricollis*, Barranco de Tirajana (Gran Canaria); a) female tergite X; b) gonocoxite; c–d) spermatheca; e) accessory vaginal sclerite ("pseudospermatheca"). Scale: 0.1 mm.

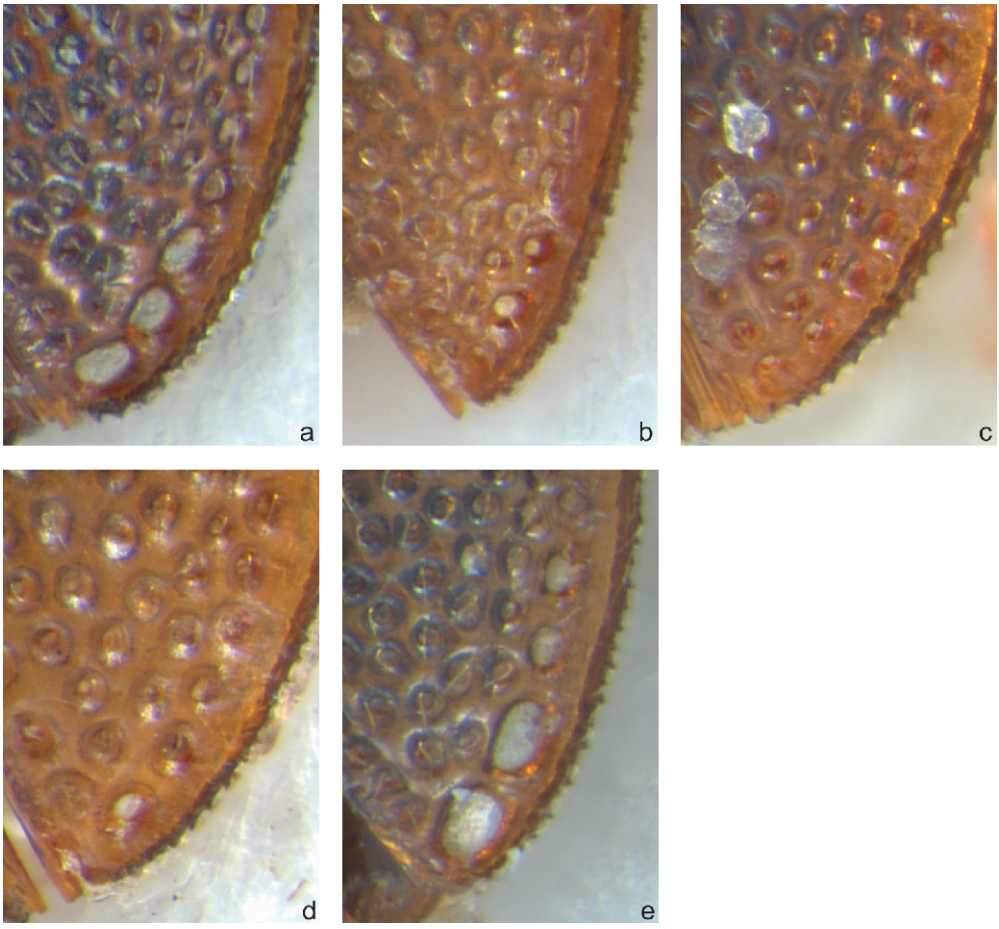

Fig. 5: Elytral apices of *Hydraena serricollis*, dorso-lateral view; a) Gran Canaria, Cueva de las Niñas, b) Gran Canaria, Guayadeque, c) La Palma, Garafia (four phoretic Protozoa on the left), d) La Palma, Barlovento, e) La Gomera, Presa de la Ola.

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The photographs of the elytral punctures were made by H. Schillhammer (Vienna). The habitat photograph was taken by L. Martínez (León).

Fig. 6: Habitat of *Hydraena serricollis*, Barranco de los Tabuquillos (Gran Canaria, Canary Islands); J.A. Régil collecting water beetles.

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