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HYDRAENIDAE: I. The Taiwanese species of the genus *Hydraena* KUGELANN (Coleoptera)

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Abstract

The Taiwanese species of *Hydraena* KUGELANN (subgen. *Hydraenopsis* JANSSENS) (Coleoptera: Hydraenidae) are reviewed. Twelve new species are described: *Hydraena bilobata*, *H. compressipilis*, *H. curtipalpis*, *H. inopinata*, *H. isolinae*, *H. jengi*, *H. leei*, *H. orchis*, *H. plurifurcata*, *H. porcula*, *H. undulata*, and *H. wangi*. *Hydraena sauteri* d'ORCHYMONT is redescribed.

Key words: Coleoptera, Hydraenidae, *Hydraena*, *Hydraenopsis*, China, Taiwan, taxonomy, new species.

Introduction

The Hydraenini fauna of Taiwan has been more or less unknown until today. Only one species, *Hydraena sauteri* d'ORCHYMONT, was described (after two females) from Taiwan so far (JÄCH 1995).

Thanks to the marvellous activities of three young Taiwanese entomologists (Ming-Luen Jeng, Chi-Feng Lee, Liang-Jong Wang), more than 450 specimens, representing 12 species, were collected in Taiwan (incl. Lanyu Island) since 1988. Remarkably, all these 12 species turned out to be new to science, whereas *Hydraena sauteri* could not be retrieved.

These 12 new species are described below, the types of *Hydraena sauteri* are redescribed.

Acronyms

CSN	Coll. Satô, Nagoya
DEI	Deutsches Entomologisches Institut, Eberswalde
ISNB	Institut royal des Sciences naturelles de Belgique, Bruxelles
NMW	Naturhistorisches Museum, Wien
NTU	National Taiwan University, Department of Entomology, Taipei

Hydraenopsis JANSSENS

The phylogeny of *Hydraena* KUGELANN has never been studied with modern cladistic methods. Attempts to reconstruct the phylogeny of *Hydraena* by PERKINS (1997) were based on similarities in the exocrinal secretion delivery system and number of elytral striae. However, the exocrinal secretion delivery system is a highly specialized feature and its evolution is still far from being understood. It is furthermore highly adaptive and it can be assumed that its composition depends greatly on ecological factors (microhabitats). Using it for phylogenetical purposes would require to increase the knowledge of the exocrinal secretion delivery system fundamentally. The number of elytral striae is generally very variable in *Hydraena*, and may vary even within certain species

(e.g., *H. pygmaea* WATERHOUSE, *H. smyrnensis* SAHLBERG). The type species, *H. riparia* KUGELANN, has 15 striae. Reduction in number of striae occurs in many lineages and is often correlated with irregularity of the striae and/or parameral reduction and/or small body size (e.g., *H. filum* lineage, *H. minutissima* lineage, *H. phallerata* lineage, *H. scythica* lineage, subg. *Haenydra* REY) and it seems possible that the reduced number of striae is in fact an apomorphy. Strial reduction occurs also in *Hydraenopsis*.

Indeed, the differences between *Hydraena* s.str. and *Hydraenopsis* are small but they are constant. So far we did not encounter intermediates, neither in the Old World nor in the New World. A paper on the phylogeny of the subgenera and species groups of *Hydraena* based on a comprehensive character state matrix is in preparation by JÄCH, BEUTEL & DIAZ. Until the publication of that paper we consider *Hydraenopsis* as a subgenus of *Hydraena*.

Hydraena (*Hydraenopsis*) *isolinae* sp.n.

TYPE LOCALITY: Tengji, Kaohsiung Hsien, Taiwan, China.

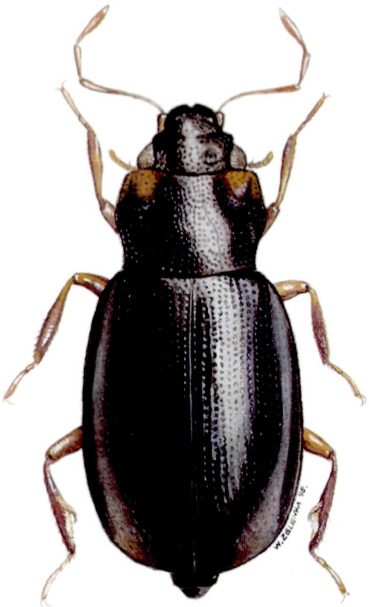
TYPE MATERIAL: **Holotype** ♂ (NMW): "Taiwan 13.7.1990 Kaohsung [= Kaohsiung] Hsien Tangchi / 41 leg. C.F.Lee"; **Paratypes** (NMW, NTU, CSN, ISNB): 1 ♀: "TAIWAN 20.7.1990 Taipei Hsien Wulai / 45 leg. C.F.Lee"; 1 ♀: "TAIPEI TAIWAN Wulai (126) lg. Jeng M.L., 16.IX.93"; 1 ♂: "TAIWAN - Taipei Wulai 12.III. leg.C.F.Lee / 116"; 1 ♂: "Taiwan 23.8.1991 Hsinchu Hsien Daping / 68 leg. M.L.Jang [= Jeng]"; 2 exs. (1 ♂, 1 ♀): "TAIWAN 5.10.1991 Hsinchu Hsien Dala forest Rd. [= Dalu Forest Track] / 92 leg. M.L.Jeng"; 5 exs. (2 ♂♂, 3 ♀♀): TAIWAN Hwalien Tailuker 6.XI.92 Chou & Wang (110)"; 2 ♀♀: "TAIWAN Hwalien Tailuker 6.11.1992 leg. Chou & Wang"; 2 exs. (1 ♂, 1 ♀): "TAIWAN, Hwalien Nanan, Hwang-Ma 25.8.1993 leg. M.L. Jeng"; 129 exs. (65 ♂♂, 58 ♀♀): "TAIWAN, Hwalien Nanan (117) 26.3.1993 leg. M.L. Jeng"; 18 exs. (5 ♂♂, 13 ♀♀): "TAIWAN: Chiayi County Taiping, 1000m, 15.10.1995, leg. M.L. Jeng"; 3 exs. (1 ♂, 2 ♀♀): "TAIWAN: Chiayi County Yunsui - Dapu 25.10.1995, leg. M.L. Jeng"; 1 ♀: "TAIWAN: Chiayi County Taiping, 1000m, 3.5.1996, leg. M.L. Jeng"; 5 ♂♂: "TAIWAN, Taitung Chiun 27.3.1993 leg. M.L. Jeng"; 18 exs. (9 ♂♂, 9 ♀♀): same label data as holotype; 21 exs. (3 ♂♂, 18 ♀♀): "TAIWAN: Kaohsiung Longtoushan Maolin 360m, 7.2.1995, leg. L.J. Wang"; 1 ♂: "TAIWAN Kaoshung Dajin 13.XII.91 leg. Cho Wen-I"; 3 exs. (2 ♂♂, 1 ♀) + ca. 50 exs. in alcohol: "TAIWAN 26.X.1991 Kaoshung Hsien (98) Duona leg.Cho Wen-I".

DESCRIPTION: Habitus (Fig. 1). Usually 1.6 - 1.7 mm long, occasionally 1.4 or 1.8 mm long. Dark brown to black, body appendages, anterior corners of pronotum and elytral apices paler testaceous; anterior and posterior margin of pronotum very slightly paler in a few specimens; terminal segment of maxillary palpi becoming slightly darker toward apical third, but apical tip paler than base.

Labrum deeply excised anteriorly; margins very slightly upturned. Clypeus entirely or at least laterally microreticulate. Fronto-clypeal suture slightly arcuate, distinctly impressed. Middle of frons moderately densely punctate, interstices shining or very superficially shagreened; lateral portions of frons densely or very densely (sometimes rugosely) punctate, interstices smooth or microreticulate; interocular grooves shallow. Eyes large, protruding, more than 20 facets visible in dorsal view. Maxillary palpi distinctly longer than maximum width of head (eyes included); terminal segment about 1.5 times as long as preterminal.

Pronotum slightly cordiform, wider than long; anterior margin concave; anterior angles rounded; lateral margin with sides slightly denticulate and moderately produced at middle, distinctly convergent to anterior angle, sinuately convergent to posterior angle; disc rather flat, moderately densely punctate, foveae hardly perceptible or absent, interstices glabrous; lateral portion of pronotum not distinctly explanate, deflexed, punctation and interstices as on disc.

Elytra with nine rows of punctures between suture and shoulder; punctures small, moderately deeply impressed and arranged in more or less regular, not impressed lines; intervals and interstices flat and glabrous; explanate margin of elytra finely serrate anteriorly and posteriorly, narrow, ended near posterior 0.13.



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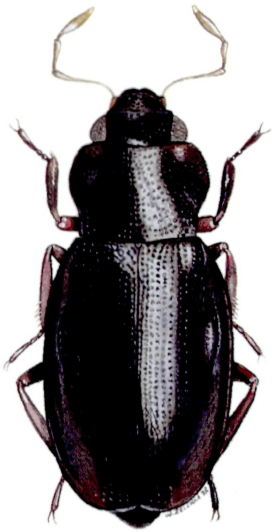

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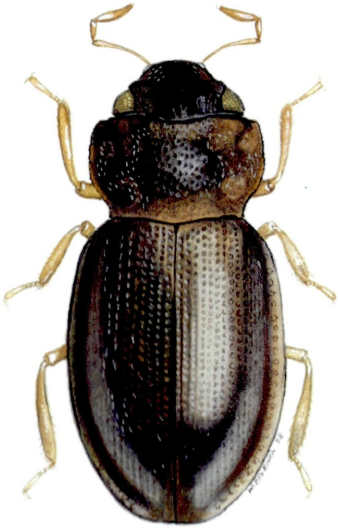

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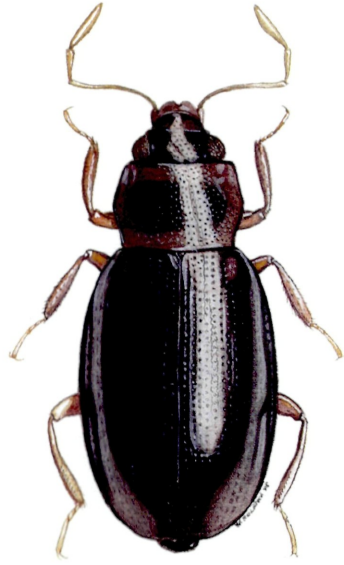

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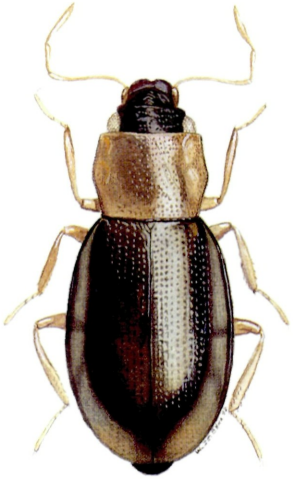
Figs. 1 - 4: Habitus of 1) *Hydraena isolinae*, 2) *H. wangi*, 3) *H. curtipalpis*, 4) *H. porcula*.



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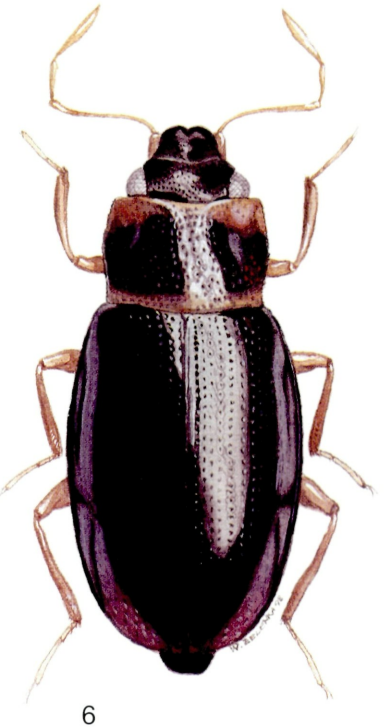

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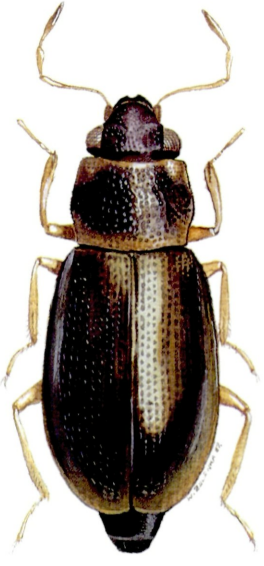

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Figs. 5 - 7: Habitus of 5) *Hydraena leei*, 6) *H. bilobata*, 7) *H. undulata*.

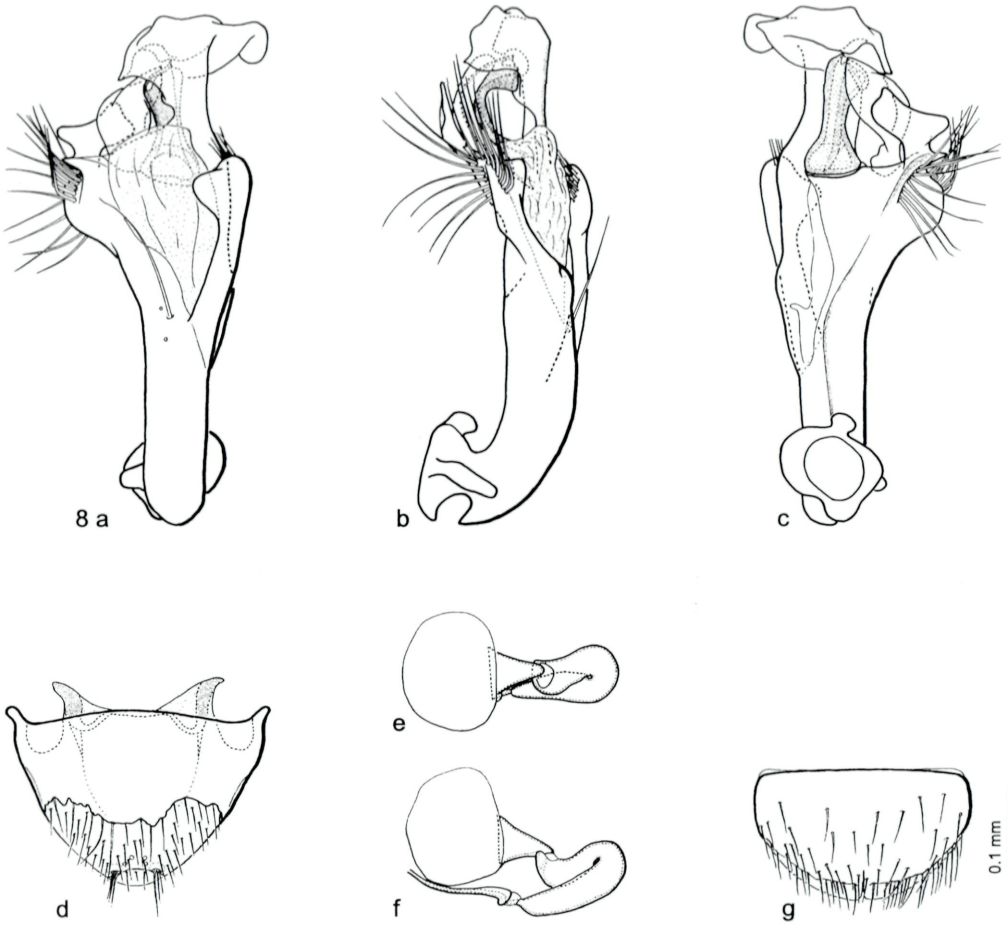


Fig. 8: *Hydraena isolinae*, a - c) aedeagus in dorsal, lateral and ventral view; d) gonocoxite; e - f) spermatheca; g) female tergite X.

Mentum rugosely micropunctate anteriorly, smooth and sparsely punctate posteriorly; submentum shagreened. Genal ridge low, glabrous. Gula not clearly delimited. Prosternum with distinct median keel, which is cranially produced into a short spine. Mesosternum with 5 longitudinal ridges, not deeply impressed transversely between mesosternal disc and mesosternal process, thus angle between mesosternal disc and mesosternal process wide; mesosternal process distinctly narrower than greatest width of mesofemur. Metasternum deeply impressed between metasternal plaques; metasternal plaques confined to posterior half, slender, distinct. Intercoxal segment (= abdominal sternite II) rather flat, trapezoidal, approximately as long as wide (dissection necessary); posterior margin straight; posterior angles acute. First ventrite without glabrous areas behind metacoxal sockets; abdominal sternite VII with large semicircular glabrous area, sternite VIII without hydrofuge pubescence.

Aedeagus (Fig. 8a - c): Main piece with one dorsal seta; phallobase asymmetrical, forming a closed ring. Distal lobe intricately shaped, not clearly delimited from main piece. Left paramere

moderately long and slender, inserted near basal 0.3 of aedeagus, not articulately connected with main piece, apically enlarged, with a group of rather short apical setae; right paramere more or less completely fused to main piece, indicated by two rows of rather long setae.

Gonocoxite (Fig. 8d): Subtriangular; apical area of outer plate rather long; anterior corners of inner plate surpassing condyles of outer plate.

Spermatheca (Fig. 8e, f): Proximal portion crescentic, elongate, attenuate proximally; distal portion cone-shaped.

SECONDARY SEXUAL CHARACTERS: Metasternal plaques of male slightly curved inwards, apically elevated to form a very short ridge; area between metasternal plaques more strongly impressed in male.

Abdominal sternite VII with a fringe of long hairs in female; abdominal sternite VIII of male much larger and with shallow round impression in middle.

Female tergite X (Fig. 8g): Disc with rather few setae; subapical fringe of setae with acute apices; hyaline apical margin notched medially.

Anterior femur of male with a conspicuous oblique ledge on ventral side of proximal third. Posterior tibia with a distinct brush of hairs along inner side of posterior two thirds.

DISTRIBUTION: Widely distributed in Taiwan. Known from six counties so far.

ECOLOGY: This species was collected hygropetric habitats, wet rocks in dry river beds, small pools besides streams and rivers, between 200 and 1000 m s.s.l.

ETYMOLOGY: Named in memory of Isolina Freire, late grandmother of the junior author.

Hydraena (*Hydraenopsis*) *inopinata* sp.n.

TYPE LOCALITY: Small pools (filled with decaying leaves) besides Chenyulan Stream (upper branch of Juosui River), near Dongpu, ca. 1000 a.s.l., Nantou Hsien, Taiwan, China.

TYPE MATERIAL: **Holotype** ♂ (NMW): "1993 / TAIWAN-Nantou Chenyulan Stream 2.II. leg.M.L.Jeng / 114".

DIFFERENTIAL DIAGNOSIS: 1.8 mm long. Externally, the holotype of *H. inopinata* can hardly be distinguished from males of *H. isolinae*. Elytra slightly more elongate and parallel-sided. Metasternal plaques of male reduced to narrow ridges, becoming gradually more prominent posteriorly. Abdominal sternite VIII of male without round impression in middle.

Aedeagus (Fig. 9a - c): Very similar to that of *H. isolinae*. It differs from the latter by the more acute apex of the main piece, by the different shape of the right margin of the main piece (e.g., small hook near distal end of presumed remnant of right paramere) (best seen in dorsal and ventral view), by the left paramere being more strongly widened apically and by several differences in the morphology of the distal lobe.

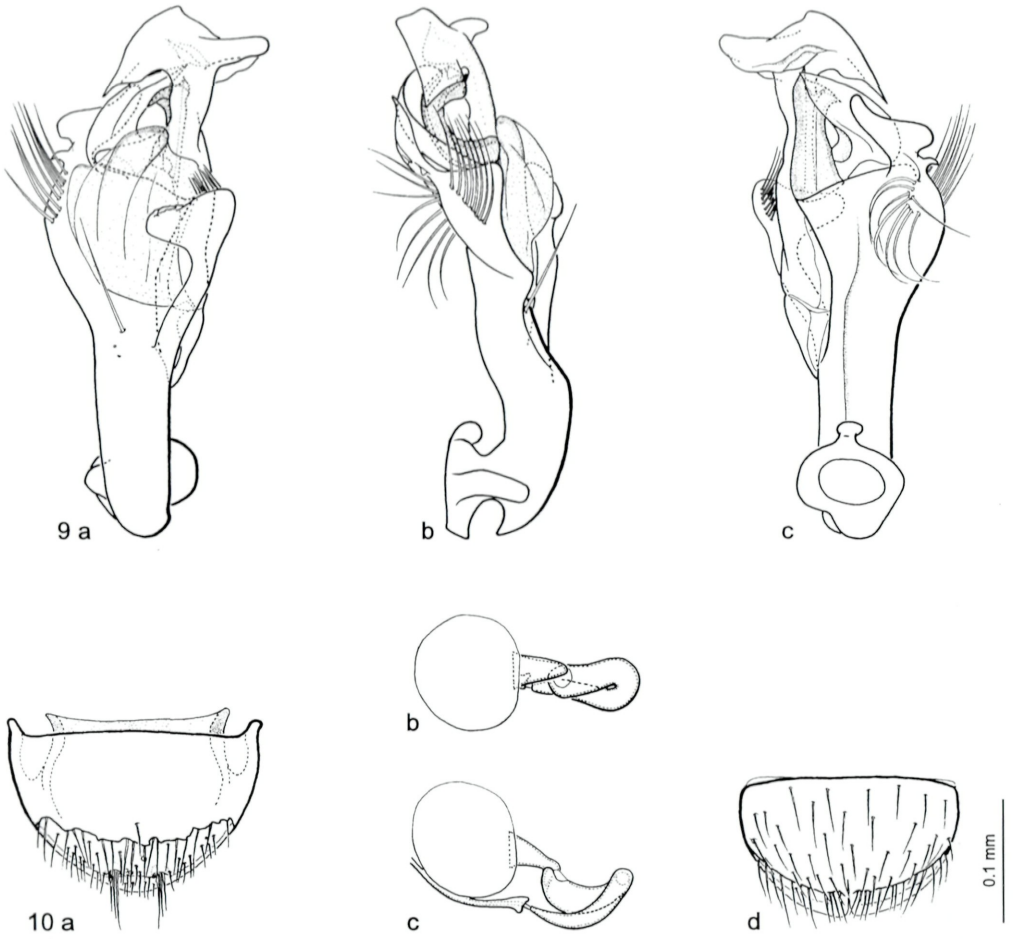
DISTRIBUTION: So far known with certainty only from the type locality.

ETYMOLOGY: Inopinatus (Latin, unexpected). The discovery of this species which is so closely related to the very common *H. isolinae* was rather unexpected.

Hydraena sp. ? *inopinata*

Material examined: 1 ♀ (NMW): "TAIWAN Hwalien Tailuker 6.11.1992 leg. Chou & Wang"; 1 ♀ (NMW): "TAIWAN: Chiayi County Yunsui - Dapu 25.10.1995 leg. M. L. Jeng".

These females might belong to *H. inopinata* because their pygidial sclerites and their spermatheca (see Fig. 10a - d) resemble *H. isolinae*.



Figs. 9 - 10: 9) *Hydraena inopinata*, a - c) aedeagus in dorsal, lateral and ventral view. 10): *Hydraena* sp. ? *inopinata*, a) gonocoxite; b - c) spermatheca; d) female tergite X.

They definitely belong to a species which is closely related to *H. isolinae*. Externally (e.g., size, coloration), they are very similar to females of *H. jengi*, described below, but their pygidial sclerites and the spermatheca are different.

Hydraena (*Hydraenopsis*) *orchis* sp.n.

TYPE LOCALITY: Small mud pools on squashy track to Shao Tien Chi, ca. 400 m a.s.l., Lanyu Island, Taitung Hsien, Taiwan, China.

TYPE MATERIAL: **Holotype** ♂ (NMW): "TAIWAN: 24.III.1998 Taitung Co. Lanyu Isl., Shaotienchi leg. M.L. Jeng". **Paratypes** (NTU, NMW): 13 exs. (12 ♂♂, 1 ♀), same locality data as holotype.

DIAGNOSIS: 1.5 - 1.6 mm long. Very closely related to *H. isolinae* and *H. inopinatus*. The close relationship is indicated by the morphology of the aedeagus, by the presence of the conspicuous ledge on the male profemur and by the presence of a brush of hairs on the male

metatibia. It can be distinguished from these two species by the coloration (brown, pronotal margins broadly yellowish, maxillary palpi entirely yellow, frons darker brown), by the punctation on pronotum and elytra being coarser, and by the male metatibia being dilated in posterior two thirds (dilation becoming gradually smaller apically).

Metasternal plaques reduced to ridges as in *H. inopinatus*, shorter than in *H. inopinatus*. Abdominal sternite VIII of male without round impression in middle.

Female tergite X (Fig. 11g): Subapical fringe of setae with acute apices; hyaline apical margin notched medially.

Aedeagus (Fig. 11a - c): Main piece with one well developed dorsal seta and with a few additional very short setae; phallobase asymmetrical, forming a closed ring. Distal lobe intricately shaped, not clearly delimited from main piece. Left paramere short and inconspicuous, with a few apical and lateral setae; right paramere more or less completely fused to main piece, indicated by two rows of rather long setae.

Gonocoxite (Fig. 11d): Subtriangular; apical area of outer plate short; anterior corners of inner plate surpassing outer plate.

Spermatheca (Fig. 11e, f): Proximal portion crescentic, very long and multisinuate; distal portion long, tubular.

DISTRIBUTION: So far known only from the type locality.

ETYMOLOGY: Orchis (Latin, orchid). The type locality, Lanyu Island, is known as Orchid Island in English.

Hydraena (*Hydraenopsis*) *jengi* sp.n.

TYPE LOCALITY: Huwei, Chiayi Hsien, Taiwan, China.

TYPE MATERIAL: **Holotype** ♂ (NMW): "TAIWAN Chia-I Huwei 26.II.92 leg. M.L.Jeng"; **Paratypes**: 1 ♂: "TAIWAN 19.2.1991 Nantou Fongh wang [= Fong Hwang] Valley / 50 leg. M.L.Jang [= Jeng]"; 1 ♀: "TAIWAN 4.8.1991 Yunlin Hsien Tsaoling / 65 leg. M.L. Jang [= Jeng]"; 6 exs. (2 ♂♂, 4 ♀♀): same locality data as holotype; 6 exs. (4 ♂♂, 2 ♀♀): "TAIWAN: Chiayi County Taiping, 1000m 15.10.1995, leg. M. L. Jeng"; 1 ♂: "TAIWAN: Chiayi County Yunsui - Dapu 25.10.1995, leg. M. L. Jeng"; 3 exs. (2 ♂♂, 1 ♀): "TAIWAN: Chiayi County Taiping, 1000m 3.5.1996, leg. M. L. Jeng"; 2 ♂♂: "TAIWAN 1991 Tainan Hsien (99) / Dzen wen Res. leg. Jeng 28.X."; 1 ♂: "TAIWAN 14.7.1990 Khaohshung Hsien Shanping / 42 leg. C.F.Lee".

DESCRIPTION: 1.4 - 1.5 mm long. Brown, clypeus, frons and pronotal disc darker brown; anterior and posterior margin of pronotum occasionally paler; maxillary palpi unicoloured yellowish.

Labrum deeply excised anteriorly; margins very slightly upturned. Clypeus finely punctate and smooth medially, microreticulate laterally. Fronto-clypeal suture slightly arcuate, distinctly impressed. Frons more densely and more strongly punctate than clypeus, interstices shining; interocular grooves not perceptible. Eyes large, protruding, more than 20 facets visible in dorsal view.

Pronotum slightly cordiform, wider than long; anterior margin concave; anterior angles rounded; lateral margin with sides slightly denticulate and moderately produced at middle; disc rather flat, moderately densely punctate, foveae hardly perceptible or absent, interstices glabrous; lateral portion of pronotum not distinctly explanate, deflexed, punctation and interstices as on disc.

Elytra subparallel; with nine rows of punctures between suture and shoulder; punctures small, moderately deeply impressed and arranged in more or less regular, not impressed lines; intervals and interstices flat and glabrous; explanate margin of elytra finely serrate anteriorly and posteriorly, narrow, ended near posterior 0.13.

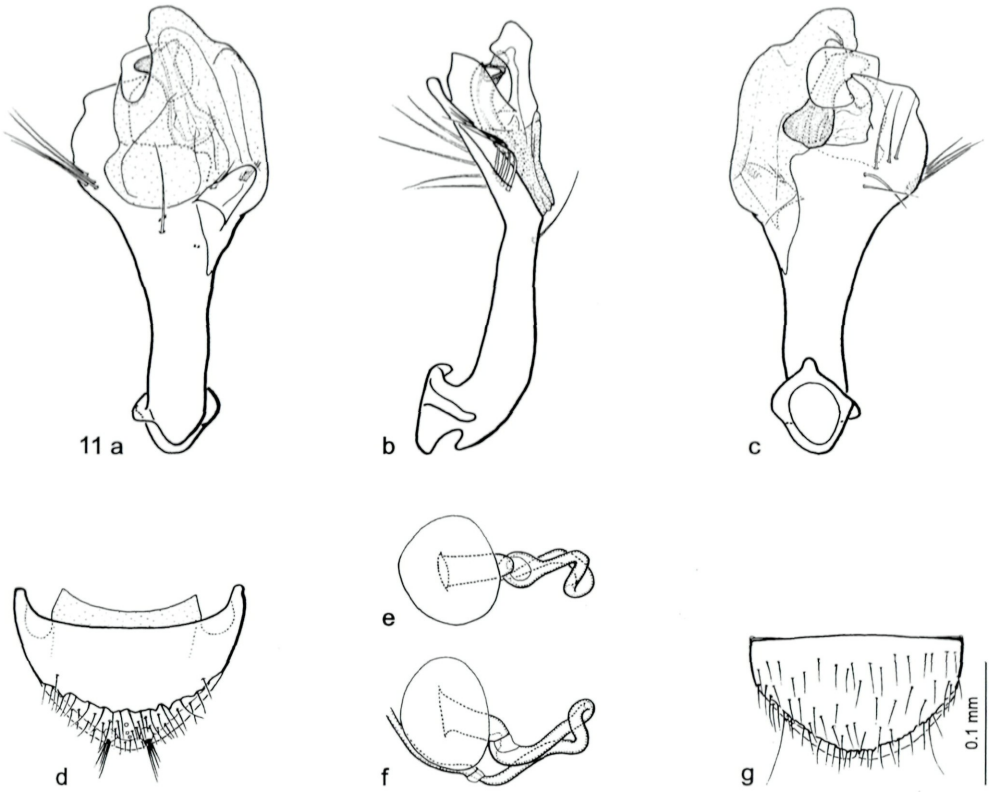


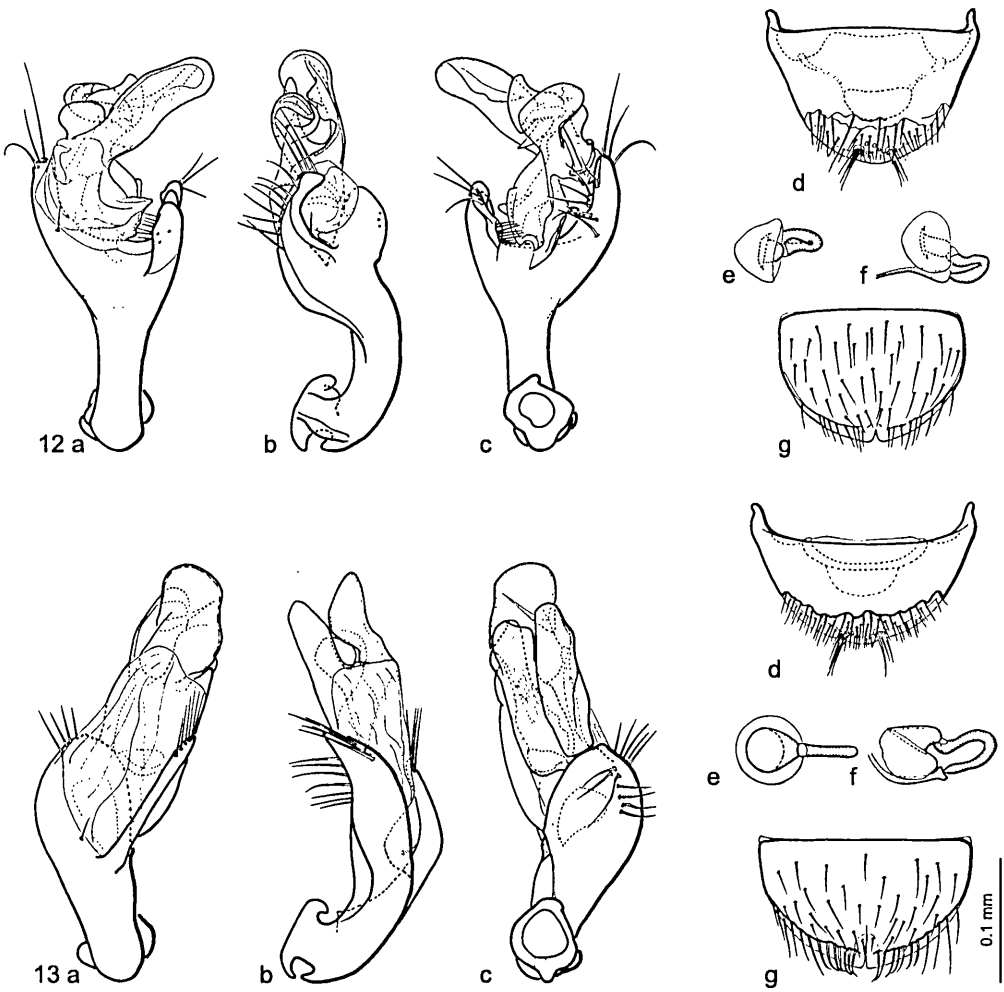
Fig. 11: *Hydraena orchis*, a - c) aedeagus in dorsal, lateral and ventral view; d) gonocoxite; e - f) spermatheca; g) female tergite X.

Mentum sparsely micropunctate; submentum shagreened. Genal ridge low, glabrous. Gula not clearly delimited. Prosternum with distinct median keel, which is cranially produced into a short spine. Mesosternum with 5 longitudinal ridges; not deeply impressed transversely between mesosternal disc and mesosternal process, thus mesosternal process projecting from mesosternal disc in a wide angle; mesosternal process narrow. Metasternum moderately deeply impressed between metasternal plaques; metasternal plaques confined to posterior half, very slender, ridge-like. Intercoxal segment (= abdominal sternite II) rather flat, trapezoidal, slightly wider than long (dissection necessary); posterior margin straight; posterior angles acute. First ventrite without glabrous areas behind metacoxal sockets; abdominal sternite VII with large semicircular glabrous area, sternite VIII without hydrofuge pubescence.

Aedeagus (Fig. 12a - c): Main piece with one dorsal seta; phallobase asymmetrical, forming a closed ring. Distal lobe intricately shaped, not clearly delimited from main piece. Left paramere moderately long, moderately wide, curved inward, inserted near basal 0.4 of aedeagus, not articulately connected with main piece, apically tapering, with ca. 12 moderately long setae; right paramere shorter than left one, inserted at same level of aedeagus, with ca. 10 setae.

Gonocoxite (Fig. 12d): Subtrapezoidal; inner plate with grooves and one cavea.

Spermatheca (Fig. 12e, f): Proximal portion crescentic, elongate; distal portion more or less tubular, distal margin reflexed.



Figs. 12 - 13: 12) *Hydraena jengi*, a - c) aedeagus in dorsal, lateral and ventral view; d) gonocoxite; e - f) spermatheca; g) female tergite X. 13) *Hydraena wangi*, a - c) aedeagus in dorsal, lateral and ventral view; d) gonocoxite; e - f) spermatheca; g) female tergite X.

SECONDARY SEXUAL CHARACTERS: Male mesosternal process slightly more slender.

Metasternal plaques of male almost completely reduced.

Abdominal sternite VIII of male much larger, produced medially.

Female tergite X (Fig. 12g): Disc moderately densely covered with setae; subapical fringe of setae not with blunt apices; hyaline apical margin notched medially.

Legs of male without significant sexual characters.

DIFFERENTIAL DIAGNOSIS: Externally, *Hydraena jengi* can be distinguished from *H. isolinae* and *H. inopinata* easily by the smaller size, coloration, absence of interocular grooves, absence of sexual characters on legs.

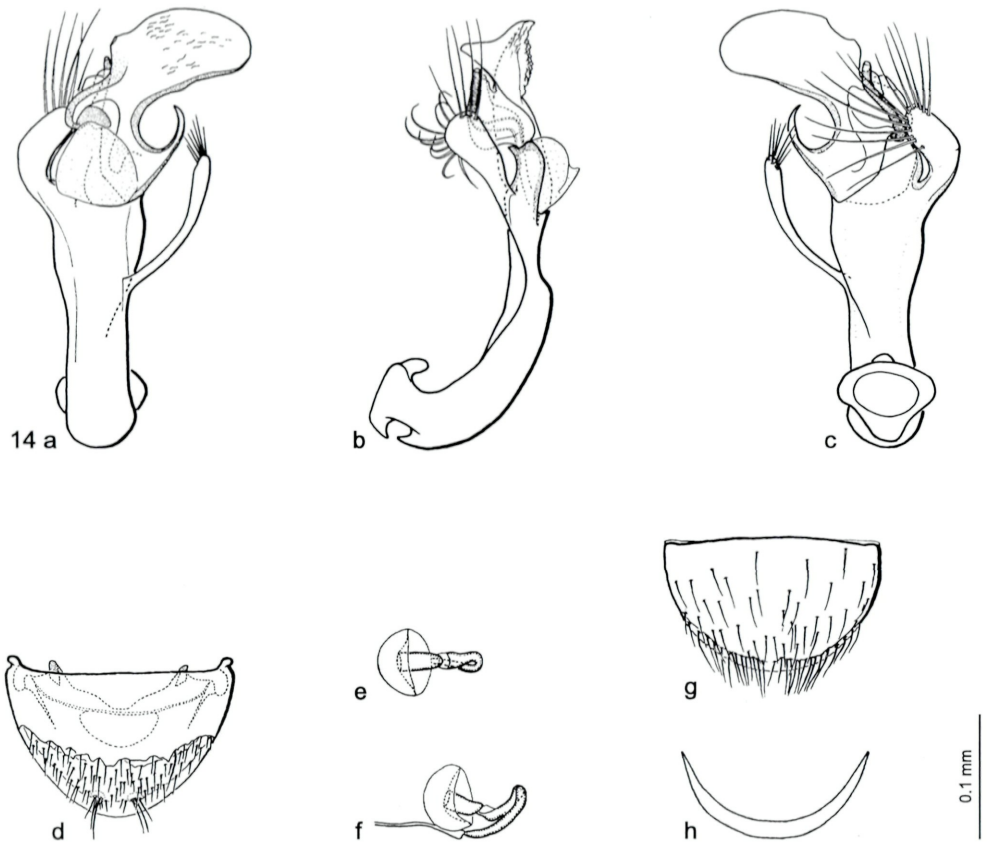


Fig. 14: *Hydraena curtipalpis*, a - c) aedeagus in dorsal, lateral and ventral view; d) gonocoxite; e - f) spermatheca; g) female tergite X; h) crescent-shaped sclerite.

DISTRIBUTION: So far known from five counties in the southern half of Taiwan.

ECOLOGY: As in *H. isolinae*.

ETYMOLOGY: Named for Ming-Luen Jeng.

Hydraena (*Hydraenopsis*) *wangi* sp.n.

TYPE LOCALITY: Maolin, Longtou Shan, Kaohsiung Hsien, Taiwan, China.

TYPE MATERIAL: **Holotype** ♂ (NMW): "TAIWAN: Kaohsiung Longtoushan Maolin 360m, 7.2.1995 leg. L.J. Wang"; **Paratypes** (NMW, NTU): 23 exs. (12 ♂♂, 11 ♀♀): same locality data as holotype.

DIAGNOSIS: Habitus (Fig. 2). Externally (especially in body shape), this species is not unsimilar to *H. isolinae*. However, it can be distinguished from the latter by a number of significant characters:

1.4 - 1.5 mm long; body appendages (except tip of terminal segment of maxillary palpi) and anterior corners of pronotum darker; elytra with a very conspicuous elongate elevation on lateral

declivity extending from anterior 0.3 to posterior 0.4; abdominal sternite VIII of male without round impression in middle; legs of male without significant sexual characters.

Aedeagus (Fig. 13a - c): Main piece with one dorsal seta; phallobase asymmetrical, forming a closed ring. Distal lobe intricately shaped, very long, not clearly delimited from main piece. Left paramere long, slender, straight, inserted near basal 0.3 of aedeagus, not articulately connected with main piece, with a group of apical setae; right paramere more or less completely fused to main piece, indicated by two rows of setae.

Gonocoxite (Fig. 13d): Semicircular, inner plate with grooves and cavea.

Spermatheca (Fig. 13e, f): Proximal portion crescentic, elongate; distal portion more or less cone-shaped.

SECONDARY SEXUAL DIMORPHISM: Metasternal plaques of male very narrow.

Abdominal sternite VIII of male much larger, produced medially.

Female tergite X (Fig. 13g): Disc moderately densely covered with setae; subapical fringe of setae not with blunt apices; hyaline apical margin notched medially.

Legs of male without significant sexual characters.

DIFFERENTIAL DIAGNOSIS: This species is distinguished from all other species of the genus known to me by the conspicuous elytral elevation.

DISTRIBUTION: So far known only from the type locality.

ETYMOLOGY: Named for Liang-Jong Wang.

Hydraena (*Hydraenopsis*) *curtipalpis* sp.n.

TYPE LOCALITY: Small mud pools besides Laonong stream, near confluence with Weijin sream, Mei-shan, Kaohsiung Hsien, Taiwan, China.

TYPE MATERIAL: **Holotype** ♂ (NMW): "TAIWAN Kaohsung [= Kaohsiung] Meishan Weijin stream / 1.XI.1992 (106) leg. Jeng & Chou"; **Paratypes** (NMW, NTU): 20 exs., same locality data as holotype.

DESCRIPTION: Habitus (Fig. 3). 1.5 - 1.6 mm long. Brown, frons (especially lateral parts) darker brown, anterior and posterior margin of pronotum occasionally slightly paler; maxillary palpi yellowish, tips usually paler (almost whitish).

Labrum deeply excised anteriorly, strongly deflexed (usually not visible in dorsal view); margins very slightly upturned. Clypeus punctate, interstices usually dull and micropunctate medially, always microreticulate laterally. Fronto-clypeal suture slightly arcuate, distinctly impressed. Frons entirely microreticulate, moderately densely punctate medially, rugosely punctate laterally; interocular grooves well developed. Eyes moderately large, with about 20 facets visible in dorsal view. Maxillary palpi short, approximately as long as maximum width of head (eyes included); terminal segment about twice as long as preterminal.

Pronotum strongly cordiform, distinctly wider than long; anterior margin bisinuate; anterior corners more or less rectangular; lateral margin with sides slightly denticulate; disc moderately convex, moderately densely to densely punctate, posterior foveae shallowly impressed, interstices superficially or distinctly microreticulate; lateral portion of pronotum deflexed, gibbous medially, punctation as on disc, microreticulation of interstices more distinctly pronounced.

Elytra elongately oval; with nine rows of punctures between suture and shoulder; punctures small, densely arranged, moderately deeply impressed and arranged in regular, not impressed lines; intervals and interstices flat or very slightly convex, not microreticulate and not glabrous;

explanate margin of elytra finely serrate (especially anteriorly and posteriorly), wide, reaching elytral apex; elytral apices well developed, covering pygidium entirely.

Mentum sparsely and submentum densely micropunctate. Genal ridge distinct, matt. Gula not clearly delimited. Prosternum with distinct median keel, which is cranially produced into a short spine. Mesosternum with 5 longitudinal ridges, moderately deeply impressed transversely between mesosternal disc and mesosternal process; angle between mesosternal disc and mesosternal process comparatively small. Metasternum moderately deeply impressed between metasternal plaques; metasternal plaques hardly perceptible, short, very narrow, ridge-like. Intercoxal segment (= abdominal sternite II) trapezoidal; posterior margin straight; posterior angles acute. First ventrite without glabrous areas behind metacoxal sockets; abdominal sternite VII with large semicircular non-pubescent area, sternite VIII without hydrofuge pubescence.

Aedeagus (Fig. 14a - c): Main piece with one very short dorsal seta; phallobase more or less symmetrical, forming a closed ring. Distal lobe intricately shaped, not clearly delimited from main piece. Left paramere long, slender, curved, inserted near basal 0.37 of aedeagus, not articulately connected with main piece, with a group of apical setae; right paramere rather short, inserted at about basal 0.55, strongly curved, with about 14 apical setae.

Gonocoxite (Fig. 14d): Subtriangular, sides evenly rounded; apical area of outer plate rather long; inner plate with grooves and cavea.

Spermatheca (Fig. 14e, f): Proximal portion crescentic, elongate; distal portion tubular.

SECONDARY SEXUAL CHARACTERS: Abdominal sternite VIII of male much longer.

Female tergite X (Fig. 14g): Disc moderately densely covered with setae; subapical fringe of setae not with blunt apices; hyaline apical margin not notched medially. Articulated with crescent-shaped sclerite (Fig. 14h) the homology of which we were not able to trace down.

Ventral margin of anterior femur of male slightly emarginate in basal third, with a short and inconspicuous ledge at distal end of emargination.

DIFFERENTIAL DIAGNOSIS: *Hydraena curtipalpis* is the most distinctive Taiwanese species. Its peculiar habitus and expecially its remarkably short maxillary palpi differentiate it from any other species known so far. Other distinctive characters are the deflexed labrum, the well impressed interocular grooves, the strongly cordiform pronotum, the wide elytral margin (wide epipleura), well developed elytral apices (pygidium concealed), the prominent genal ridge, and the emarginate ventral margin of the anterior male femur.

DISCUSSION: The short maxillary palpi (and several other peculiar characters mentioned above) could be an adaptation to the unusual habitat (mud pools) and might be considered as apomorphies.

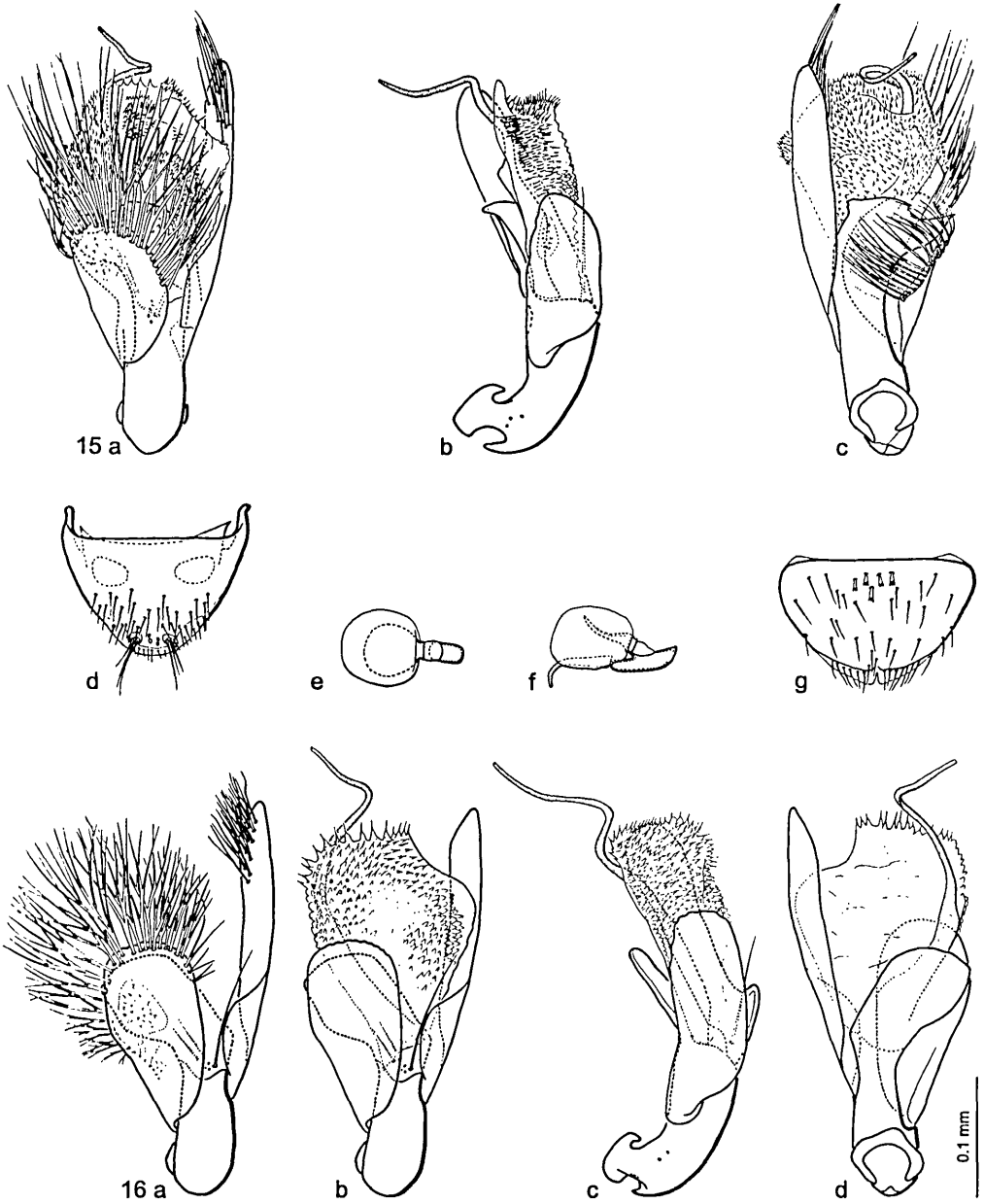
Some of the characters of *H. curtipalpis*, e.g. well impressed interocular grooves, cordiform pronotum, prominent genal ridge, small angle between mesosternal disc and mesosternal process, are reminiscent of *Hydraena* s.str. However, due to other (phylogenetically more important) characters, *H. curtipalpis* is a typical member of *Hydraenopsis*.

DISTRIBUTION: So far known only from the type locality.

ETYMOLOGY: Curtus, 3 (Latin, short), and palpus (Latin, palp); referring to the short maxillary palps.

Hydraena (*Hydraenopsis*) *porcula* sp.n.

TYPE LOCALITY: Fushan, Taipei Hsien, Taiwan, China.



Figs. 15 - 16: 15) *Hydraena porcula*, a - c) aedeagus in dorsal, lateral and ventral view; d) gonocoxite; e - f) spermatheca; g) female tergite X. 16) *Hydraena plurifurcata*, aedeagus, a) dorsal view, distal lobe not illustrated, b) same view, parameral setae not illustrated, c) lateral view, parameral setae not illustrated, d) ventral view, parameral setae not illustrated.

TYPE MATERIAL: **Holotype** ♂ (NMW): "TAIWAN 23.8.1990 Taipei Hsien Fuhshan / 46 leg. M.L.Jang [= Jeng]"; **Paratypes** (NMW, NTU, CSN, ISNB): 10 exs. (5 ♂♂, 3 ♀♀): same locality data as holotype; 2 ♂♂: "TAIWAN X.1989 Taipei Hsien Wulai / 21 leg. Lee Chi-Feng"; 2 exs. (1 ♂, 1 ♀): "TAIWAN 27.7.1990 Taipei Hsien Wulai / 43 leg. M.L.Jang [= Jeng]"; 3 exs. (1 ♂, 2 ♀♀): "TAIPEI TAIWAN Wulai (125) lg.Jeng M.L., 16.IX.93"; 1 ♀: "TAIWAN: Taoyuan Fushing Gauyaw 18.4.1995, leg. L.J.Wang"; 2 exs. (1 ♂, 1 ♀): "TAIWAN: Tao yuan Fuhsing Changhsing 9.5.1995 leg. Wang"; 1 ♀: "TAIWAN 1991 Hsinchu Hsien Chingchen / 96 leg. M.L.Jeng"; 2 ♂♂: "TAIWAN 19.2.1991 Nantou Fongh wang [= Fong Hwang] Valley / 50 leg. M.L.Jang [= Jeng]"; 1 ♂: "TAIWAN 16.8.1991 Nantou Hsien Shitou / 67 leg. M.L.Jang [= Jeng]"; 1 ♂: "TAIWAN 2.7.1989 Nantou Hsien Ao wanda / 33 leg. Lee Chi-Feng"; 1 ♂: "TAIWAN: Chiayi County Yunsui - Dapu 25.10.1995, leg. M. L. Jeng"; 1 ♂: "TAIWAN: Chiayi County Taiping, 1000m, 15.10.1995, leg. M. L. Jeng"; 18 exs. (13 ♂♂, 5 ♀♀) "TAIWAN: Chiayi County Taiping, 1000 m 3.5.1996, leg. M. L. Jeng"; 1 ♀: "TAIWAN Chia-I 1992 Kuang-hwa 26.II. leg. M.L. Jeng"; 13 exs. (6 ♂♂, 7 ♀♀): "TAIWAN Chia-I Huwei 26.II.92 leg. M.L.Jeng"; 1 ♂: "TAIWAN 6.9.1989 Chiaih Hsien Chu-Chi / 32 leg. Lee Chi-Feng"; 1 ♀: "TAIWAN 1991 Tainan Hsien (100) / Dzen wen Res. leg. Jeng 28.X."; 4 exs. (2 ♂♂, 2 ♀♀): "TAIWAN 14.7.1990 Khaoshung [= Kaohsiung] Hsien Shanping / 42 leg. C.F.Lee"; 1 ♂: "TAIWAN Kaohsung [= Kaohsiung] Meishan Weijin stream / 1.XI.1992 (105) leg. Jeng & Chou"; 3 exs. (2 ♂♂ [both without aedeagus], 1 ♀): "TAIWAN Kaohsung [= Kaohsiung] Dajin 13.XII.91 leg. Cho Wen-I"; 2 exs. (1 ♂, 1 ♀): "TAIWAN Kaohsung [= Kaohsiung] Maolin 16.I.92 leg. Cho Wen-I".

DIAGNOSIS: Habitus (Fig. 4). 1.4 - 1.6 mm long. Although *Hydraena porcula* and *H. jengi* do not belong to the same species group, they are not unsimilar in general appearance (size, body form, coloration). *Hydraena porcula* can be distinguished from *H. jengi* by the following characters: coloration more reddish brown; punctures of dorsal surface smaller and less distinctly impressed; fronto-clypeal suture not distinctly impressed in middle; genal ridge more or less completely absent; mesosternal process distinctly wider (in both sexes about as wide as mesofemur); metasternal plaques slightly wider, but not clearly delimited (sometimes hardly discernible).

Aedeagus (Fig. 15a - c): Main piece with three dorsal setae; phallobase asymmetrical, not completely closed proximally. Distal lobe intricately shaped, with numerous conspicuous spinules, not clearly delimited from main piece, with a conspicuous, pigtail-like flagellum. Parameres articulately connected with main piece, inserted near basal 0.3 of aedeagus. Left paramere elongate, almost reaching apex of distal lobe, with a group of apical setae; right paramere short and ovoid, with a row of conspicuous, rather long, furcate, setae.

Gonocoxite (Fig. 15d): Subtriangular; inner plate with a pair of caveae.

Spermatheca (Fig. 15e, f): Proximal portion saccoid; distal portion discoidal.

SECONDARY SEXUAL CHARACTERS: Abdominal sternite VIII of male much larger.

Female tergite X (Fig. 15g): Disc sparsely covered with elongate setae and with few squamose setae; apices of subapical setae acute; hyaline apical margin excised medially.

Male metatibia dilated in posterior half.

DISTRIBUTION: Widely distributed in Taiwan. Known from seven counties so far.

ECOLOGY: as in *H. isolinae*.

ETYMOLOGY: Porcula (Latin, little pig); referring to the pigtail-like aedeagal flagellum. In addition, the word porcula has close affinities with China as the word porcelain (= china) is derived from the same stem.

Hydraena (*Hydraenopsis*) *plurifurcata* sp.n.

TYPE LOCALITY: Small stream near Shenmi Lake, ca. 1200 m a.s.l., Ilan Hsien, Taiwan, China.

TYPE MATERIAL: **Holotype** ♂ (NMW): "TAIWAN-Ilan 1993 Shenmi Lake 8.II. leg.M.L.Jeng / 115".

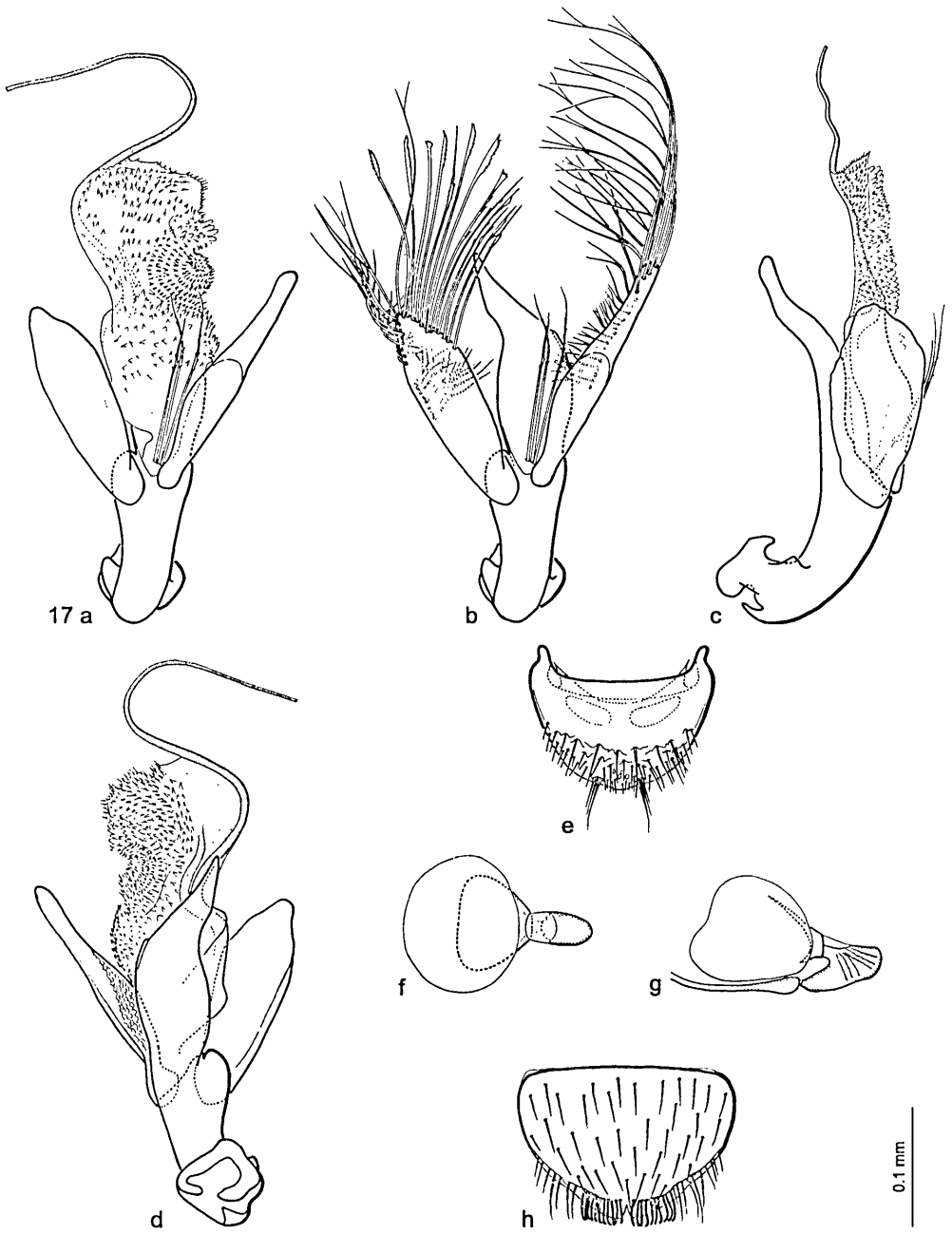


Fig. 17: *Hydraena compressipilis*, a - d) aedeagus, a) dorsal view, parameral setae not illustrated, b) same view, distal lobe not illustrated, c) lateral view, parameral setae not illustrated, d) ventral view, parameral setae not illustrated; e) gonocoxite; f - g) spermatheca; h) female tergite X.

DIAGNOSIS: 1.6 mm long. Externally and genitalically *H. plurifurcata* is very similar to *H. porcula*. Externally, it can be distinguished from *H. porcula* by the slightly more cordiform pronotum.

Aedeagus (Fig. 16a - d): Main piece with three dorsal setae; phallobase slightly asymmetrical, not closed proximally. Distal lobe rather hyaline, with numerous conspicuous spinules, with a conspicuous, long flagellum. Parameres articulately connected with main piece, inserted near base of aedeagus (right one more close to base than left one). Left paramere elongate, approximately reaching apex of distal lobe, with a group of subapical setae on inner side; right paramere short and oval, with a row of conspicuous, rather long, plurifurcate, setae.

Female unknown.

DISTRIBUTION: So far known only from the type locality.

ETYMOLOGY: Plures (Latin, more) and furcatus, 3 (Latin, furcate); named in reference to the plurifurcate aedeagal setae.

Hydraena (*Hydraenopsis*) *compressipilis* sp.n.

TYPE LOCALITY: Gongliao, Taipei Hsien, Taiwan, China.

TYPE MATERIAL: **Holotype** ♂ (NMW): "TAIWAN: Taipei Hsien Gongliao 29.5.1995 leg. L.J. Wang"; **Paratypes** (NMW, NTU, ISNB): 27 exs. (6 ♂♂, 21 ♀♀): same locality data as holotype; 22 exs. (8 ♂♂, 14 ♀♀): "TAIWAN Taipei Gongliao 14.3.1993 leg. L. J. Wang"; 1 ♂: "TAIWAN 27.7.1990 Taipei Hsien Wulai / 43 leg. M.L.Jang [= Jeng]"; 5 exs. (2 ♂♂, 3 ♀♀): "Taiwan: Taoyuan Fuhsing Gauyaw 9.5.1995 leg. C.F. Lee"; 1 ♂: "Taiwan: Taoyuan Fuhsing Gauyaw 18.4.1995 leg. L.J. Wang"; 2 exs. (1 ♂, 1 ♀): "TAIWAN Hsinchu O-Mei 18.X.92 M.L.Jeng (109)"; 3 exs. (2 ♂♂, 1 ♀): "TAIWAN Taichung Wufeng 140m, 28.3.1995 / 50, leg. L.J. Wang & S.C. Kang"; 6 ♂♂: "TAIWAN: Chiayi County Yunsui - Dapu 25.10.1995, leg. M. L. Jeng".

DIAGNOSIS: 1.55 - 1.70 mm long. Similar to *H. jengi* (especially in coloration and in density, size and depth of dorsal punctation) from which it can be differentiated externally by the larger size, by the not markedly cordiform pronotum, by the completely flattened genal ridge, by the distinctly wider mesosternal process, by the sparsely pubescent under side, by the comparatively wide metasternal plaques, and by the secondary sexual dimorphism.

Aedeagus (Fig. 17a - d): Main piece with three dorsal setae, these setae spinulate in apical third; phallobase asymmetrical, not completely closed proximally. Distal lobe intricately shaped, elongate, not strongly sclerotized, with numerous conspicuous spinules and papillae, with a conspicuous, long, bisinuous (ventral and dorsal view) flagellum. Parameres articulately connected with main piece, inserted near dorsal setae of main piece. Left paramere elongate, slender, reaching apex of main piece, with a row of furcate setae becoming gradually longer toward apex; right paramere shorter, oval, with a row of conspicuous, moderately long, furcate, setae, and with a row of setae which are apically conspicuously flattened and spinulate or serrate.

Gonocoxite (Fig. 17e): Inner plate with a pair of caveae.

Spermatheca (Fig. 17f, g): Proximal portion saccoid, surface somewhat wrinkled; distal portion discoidal.

SECONDARY SEXUAL CHARACTERS: Mesocoxal process slightly more slender in male.

Abdominal sternite VIII of male much larger.

Female tergite X (Fig. 17h): Disc moderately densely covered with elongate setae; apices of median subapical setae blunt; hyaline apical margin excised medially.

Male profemur with denticle near base of anterior face. Posterior margin of metafemur slightly angulate medially.

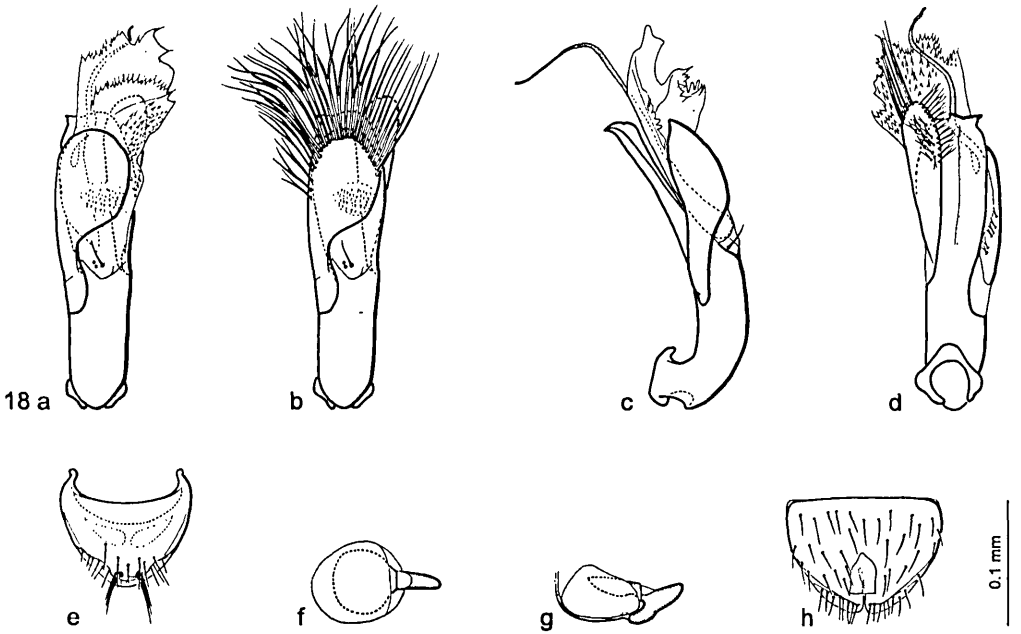


Fig. 18: *Hydraena leei*, a - d) aedeagus, a) dorsal view, parameral setae not illustrated, b) same view, distal lobe not illustrated, c) lateral view, parameral setae not illustrated, d) ventral view, setae of right paramere not illustrated; e) gonocoxite; f - g) spermatheca; h) female tergite X.

DISTRIBUTION: So far known from five counties in northern and central Taiwan.

ETYMOLOGY: Compressus, 3 (Latin, compressed) and pilus (Latin, hair); referring to the conspicuously flattened aedeagal setae.

Hydraena (*Hydraenopsis*) *leei* sp.n.

TYPE LOCALITY: Gongliao, Taipei Hsien, Taiwan, China.

TYPE MATERIAL: **Holotype** ♂ (NMW): "TAIWAN: Taipei Hsien Gongliao 29.5.1995 leg. L.J. Wang"; **Paratypes** (NMW, NTU): 1 ♂: same locality data as holotype; 1 ♀: "TAIWAN X.1989 Taipei Hsien Wulai / 21 leg. Lee Chi-Feng"; 1 ♂: "TAIWAN: Taipei Hsien Gongliao (light trap) 31.7.1994 leg. L.J. Wang"; 1 ♂: "TAIWAN 10.8.1990 Keelung City Nuannuan / 47 leg. M.L.Jang [= Jeng]"; 2 ♀♀: "TAIWAN Hsinchu O-Mei 18.X.92 M.L.Jeng (108)"; 1 ♂: "TAIWAN 19.2.1991 Nantou Fongh wang [= Fong Hwang] Valley / 50 leg. M.L.Jang [= Jeng]".

DESCRIPTION: Habitus (Fig. 5). 1.25 - 1.35 mm long. Elytra brown, pronotum and body appendages paler brown or yellowish, head darker brown; maxillary palpi unicoloured.

Labrum deeply excised anteriorly; margins very slightly upturned. Clypeus finely punctate and smooth medially, microreticulate laterally. Fronto-clypeal suture slightly arcuate, not or hardly noticeably impressed in middle. Frons more densely and more strongly punctate (especially laterally) than clypeus, interstices shining; interocular grooves more or less obsolete. Eyes moderately large, protruding, more than 20 facets visible in dorsal view.

Pronotum slightly cordiform, wider than long; anterior margin concave; anterior angles rounded; lateral margin with sides slightly denticulate and moderately produced at middle; disc rather

flat, moderately densely punctate, foveae obsolete, interstices glabrous; lateral portion of pronotum deflexed, punctation and interstices as on disc.

Elytra subparallel; with nine rows of punctures between suture and shoulder; punctures small, moderately deeply impressed and arranged in more or less regular, not impressed lines; intervals and interstices flat and glabrous; explanate margin of elytra finely serrate anteriorly and posteriorly, narrow.

Mentum sparsely micropunctate; submentum shagreened. Genal ridge obsolete, indicated by a transverse glabrous band. Gula not clearly delimited. Prosternum with distinct median keel, which is cranially produced into a short spine. Mesosternum with 5 longitudinal ridges; not deeply impressed transversely between mesosternal disc and mesosternal process, thus mesosternal process projecting from mesosternal disc in a wide angle; mesosternal process wide, about as wide as greatest width of mesofemur. Metasternum moderately deeply impressed medially; metasternal plaques more or less reduced. Intercoxal segment (= abdominal sternite II) trapezoidal, wider than long; posterior margin straight; posterior angles acute. First ventrite without glabrous areas behind metacoxal sockets; abdominal sternite VII with large semicircular glabrous area, sternite VIII without hydrofuge pubescence.

Aedeagus (Fig. 18a - d): Main piece with one dorsal seta; phallobase asymmetrical, not closed proximally. Distal lobe intricately shaped, with numerous conspicuous spinules and with a conspicuous, long flagellum. Parameres articulately connected with main piece. Left paramere elongate, not reaching apex of aedeagus, inserted near basal 0.4 of aedeagus, with several groups of setae in apical half, some of which are furcate; right paramere shorter, inserted near basal 0.3 of aedeagus, apial half distinctly enlarged, with a row of conspicuous, rather long setae, many of which are furcate.

Gonocoxite (Fig. 18e): Lateral margins strongly curved; inner plate with a pair of caveae.

Spermatheca (Fig. 18f, g): Proximal portion saccoid; distal portion discoidal.

SECONDARY SEXUAL CHARACTERS: Metasternal plaques of male completely reduced.

Abdominal sternite VIII of male much larger.

Female tergite X (Fig. 18h): Disc moderately densely covered with elongate setae; apices of subapical setae acute; anterior margin deeply excised, proximal half of excision covered by roof-like lid.

Male foretibia with a small denticle of variable size near base. Posterior face of foretibia faintly emarginate in apical third. Hind tibia hardly noticeably dilated in posterior half.

DIFFERENTIAL DIAGNOSIS: Externally, *Hydraena leei* can be distinguished from all other Taiwanese species by the small size and by the pale, unicolored pronotum.

DISTRIBUTION: So far known from three counties in northern and central Taiwan.

ETYMOLOGY: Named for Chi-Feng Lee.

Hydraena (*Hydraenopsis*) *bilobata* sp.n.

TYPE LOCALITY: Shitou, ca. 800 m a.s.l., Nantou Hsien, Taiwan, China.

TYPE MATERIAL: **Holotype** ♂ (NMW): "NANTOU TAIWAN Shitou (124) leg.Lee C.F., VI.1993"; **Paratypes** (NMW, NTU): 19 exs. (9 ♂♂, 10 ♀♀): same locality data as holotype; 1 ♀: "TAIWAN 29.3.1990 Nantou Hsien Shitou / 37 leg. C.F.Lee"; 5 exs. (3 ♂♂, 2 ♀♀): "TAIWAN 16.8.1991 Nantou Hsien Shitou / 66 leg. M.L.Jang [= Jeng]"; 4 exs. (1 ♂, 3 ♀♀): "TAIWAN: Chiayi County Taiping, 1000m 3.5.1996, leg. M.L. Jeng"; 2 ♀♀: "TAIWAN Kaohsung [= Kaohsiung] Meishan Weijin stream / 1.XI.1992 (104) leg. Jeng & Chou".

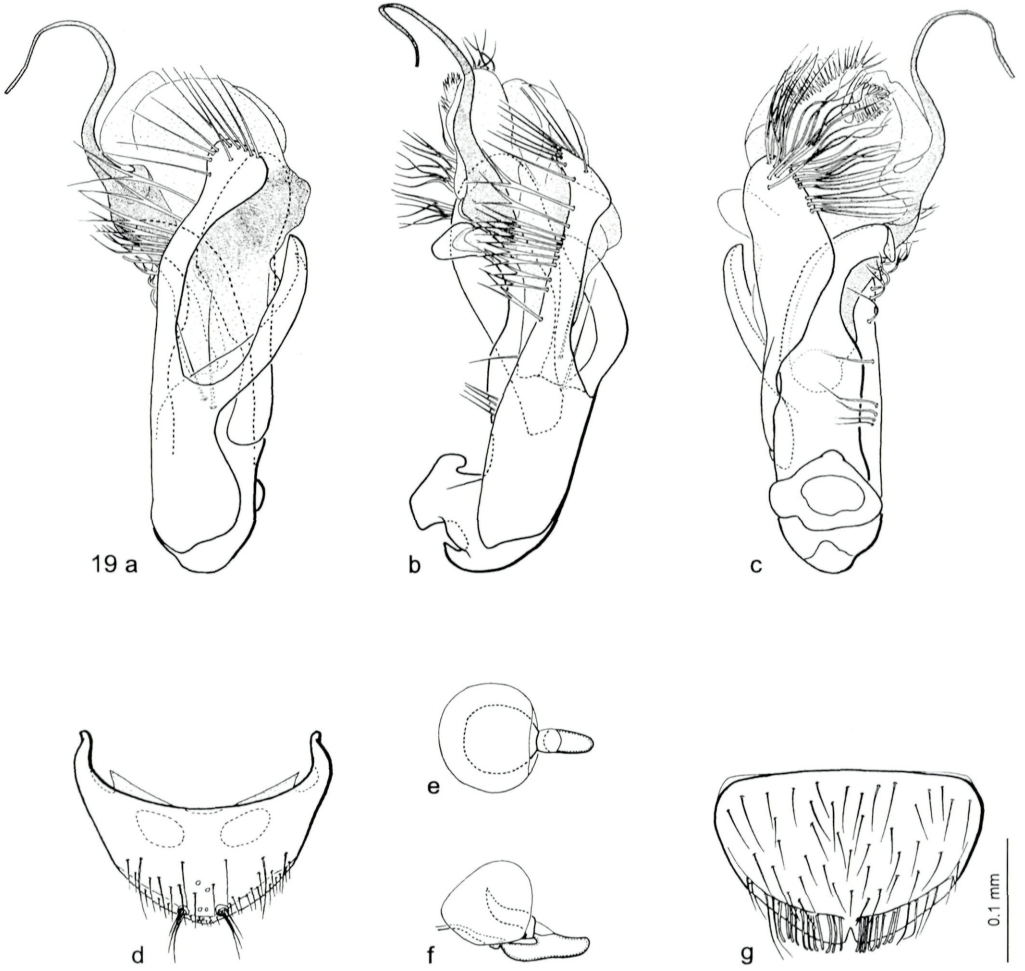


Fig. 19: *Hydraena bilobata*, a - c) aedeagus in dorsal, lateral and ventral view; d) gonocoxite; e - f) spermatheca; g) female tergite X.

DESCRIPTION: Habitus (Fig. 6). 1.8 - 1.9 mm long. Head very dark brown, almost black, pronotum and elytra brown to dark brown, body appendages, anterior and posterior margins of pronotum testaceous; lateral margin of pronotum sometimes paler than disc; maxillary palpi unicolored.

Labrum deeply excised anteriorly; margins very slightly upturned. Clypeus finely punctate and smooth medially, microreticulate laterally. Fronto-clypeal suture slightly arcuate, impressed, obsolete or faintly impressed medially. Frons moderately densely punctate, interstices shining or very superficially shagreened; interocular grooves absent. Eyes large, protruding, more than 30 facets visible in dorsal view. Maxillary palpi distinctly longer than maximum width of head (eyes included); terminal segment about twice as long as preterminal.

Pronotum not markedly cordiform, wider than long, anteriorly narrower than posteriorly; anterior margin concave; anterior angles rounded; lateral margin with sides slightly denticulate and slightly

produced at middle, slightly convergent to anterior and posterior angle; disc moderately convex, moderately densely punctate, foveae absent, interstices shining; lateral portion of pronotum deflexed, punctation and interstices more or less as on disc.

Elytra with nine rows of punctures between suture and shoulder; punctures small, only very shallowly impressed and arranged in more or less regular, not impressed lines; intervals and interstices flat and glabrous; explanate margin of elytra finely serrate anteriorly and posteriorly, narrow, ended before apex.

Mentum sparsely punctate medially, shagreened along margins; submentum completely shagreened. Genal ridges reduced to transverse glabrous torus. Gula not clearly delimited. Prosternum with distinct median keel, which is cranially produced into a short spine. Mesosternum with 5 longitudinal ridges, deeply impressed transversely between mesosternal disc and mesosternal process, thus angle between mesosternal disc and mesosternal process small; mesosternal process wide, almost as wide as greatest width of mesofemur. Metasternum shallowly impressed between metasternal plaques; comparatively sparsely pubescent, with partly distinct punctation; metasternal plaques confined to posterior half, moderately wide, not distinctly delimited, convergent anteriad. Intercoxal segment (= abdominal sternite II) rather flat, trapezoidal; posterior margin straight; posterior angles acute. First ventrite without glabrous areas behind metacoxal sockets; abdominal sternite VII with large semicircular glabrous area, sternite VIII without hydrofuge pubescence.

Aedeagus (Fig. 19a - c): Main piece with two dorsal setae; phallobase asymmetrical, closed proximally. Distal lobe intricately shaped, composed of several lobes and a long curved flagellum. Parameres articulately connected with main piece. Left paramere inserted near dorsal setae of main piece, elongate, enlarged apically, surpassing apex of main piece, with a number of moderately long, furcate setae in apical part; right paramere longer, inserted near phallobase, strongly bilobate, right branch surpassing apex of left paramere, with a row of moderately long, partly furcate setae, left branch shorter, not reching apex of left paramere, without setae.

Gonocoxite (Fig. 19d): Inner plate with a pair of caveae.

Spermatheca (Fig. 19e, f): Proximal portion saccoid; distal portion discoidal.

SECONDARY SEXUAL CHARACTERS: Abdominal sternite VIII of male much larger.

Female tergite X (Fig. 19g): Disc moderately densely covered with elongate setae; apices of median subapical setae blunt; hyaline apical margin excised medially.

Posterior margin of male metafemur very slightly angulate medially. Male metatibia very slightly dilated in posterior half (dilation becoming gradually smaller apically).

DIFFERENTIAL DIAGNOSIS: *Hydraena bilobata* is a rather distinctive species easily recognized by its large size, by the shape of the pronotum, by the glabrous dorsal surface and the small and shallowly impressed elytral punctures.

Hydraena bilobata is superficially similar to *H. compressipilis* (general appearance, coloration, ventral pubescence, male metafemur), but can be distinguished externally from the latter readily by the larger size, by the anterior pronotal margin being narrower than the posterior margin, by the male profemur and the male metatibia.

DISTRIBUTION: So far known from three provinces in the southern half of Taiwan.

ETYMOLOGY: Bilobatus (Latin, bilobed); referring to the conspicuously bilobate right paramere.

Hydraena (*Hydraenopsis*) *undulata* sp.n.

TYPE LOCALITY: Kenting, Pingtung Hsien, Taiwan, China.

TYPE MATERIAL: **Holotype** ♂ (NMW): "1993 / TAIWAN-Pingtung Kenting 12.III leg. M.L. Jeng (112)"; **Paratypes** (NMW, NTU): 2 exs. (1 ♂, 1 ♀): "TAIWAN: 2.X.1997 Hwalien Co. Shofong, Sueylien leg. M.L. Jeng" (NMW); 1 ♀: "TAIWAN: Chiayi County Yunsui - Dapu 25.10.1995, leg. M.L. Jeng"; 14 exs. (7 ♂♂, 7 ♀♀): "TAIWAN 1991 Tainan Hsien (99) / Dzen wen Res. leg. Jeng 28.X."; 1 ♂: "TAIWAN: 29.4.1988 Pingtung Hsien Kenting / 2 leg. Chao-Shang Tseng"; 13 exs. (9 ♂♂, 4 ♀♀): same locality data as holotype.

DIAGNOSIS: Habitus (Fig. 7). 1.45 - 1.65 mm long. Elytra yellowish brown, head almost black, pronotal disc dark brown, pronotal margins and body appendages paler yellowish; apical two third of maxillary palpi (except whitish tip) brown.

Labrum deeply excised anteriorly; margins very slightly upturned. Clypeus punctate and smooth medially, microreticulate laterally. Fronto-clypeal suture slightly arcuate, more or less distinctly impressed. Frons moderately densely punctate, interstices glabrous; interocular grooves obsolete or very shallow. Eyes large, protruding, ca. 30 facets visible in dorsal view.

Pronotum not cordiform, wider than long; anterior and posterior margin approximately equally wide; anterior margin concave; anterior angles rounded; lateral margin with sides slightly denticulate and moderately produced at middle; disc rather flat, moderately densely punctate, foveae hardly perceptible or absent, punctures rather strongly impressed, interstices glabrous; lateral portion of pronotum deflexed, punctation and interstices more or less as on disc.

Elytra subparallel; with nine rows of punctures between suture and shoulder; punctures moderately large, rather strongly impressed and arranged in more or less regular, not impressed lines; intervals and interstices flat and glabrous; explanate margin of elytra finely serrate anteriorly and posteriorly, narrow, not reaching apex.

Genal ridge low, glabrous. Gula not clearly delimited. Prosternum with distinct median keel, which is cranially produced into a short spine. Mesosternum with 5 longitudinal ridges; moderately deeply impressed transversely between mesosternal disc and mesosternal process; mesosternal process sexually dimorphic. Metasternum moderately deeply impressed between metasternal plaques; metasternal plaques confined to posterior half, sexually dimorphic. Intercoxal segment (= abdominal sternite II) trapezoidal to subtriangular, rounded anteriorly, slightly wider than long (dissection necessary); posterior margin straight; posterior angles acute. First ventrite without glabrous areas behind metacoxal sockets; abdominal sternite VII with large semicircular glabrous area, sternite VIII without hydrofuge pubescence.

Aedeagus (Fig. 20a - d): Main piece with one dorsal seta; phallobase asymmetrical, forming a closed ring. Distal lobe not clearly delimited from main piece. Parameres articulately connected with main piece. Right paramere long and slender, inserted near basal 0.25 of aedeagus, with a latero-apical row of setae; left paramere (Fig. 20d) inserted near basal 0.17 of main piece, boot-shaped, with a row of conspicuous, rather long, furcate, curly setae.

Gonocoxite (Fig. 20e): Subtrapezoidal; caveae variable, paired or single.

Spermatheca (Fig. 20f, g): Proximal portion crescentic, moderately long, attenuate proximally; distal portion cone-shaped, surface wrinkled.

SECONDARY SEXUAL CHARACTERS: Male mesosternal process more slender.

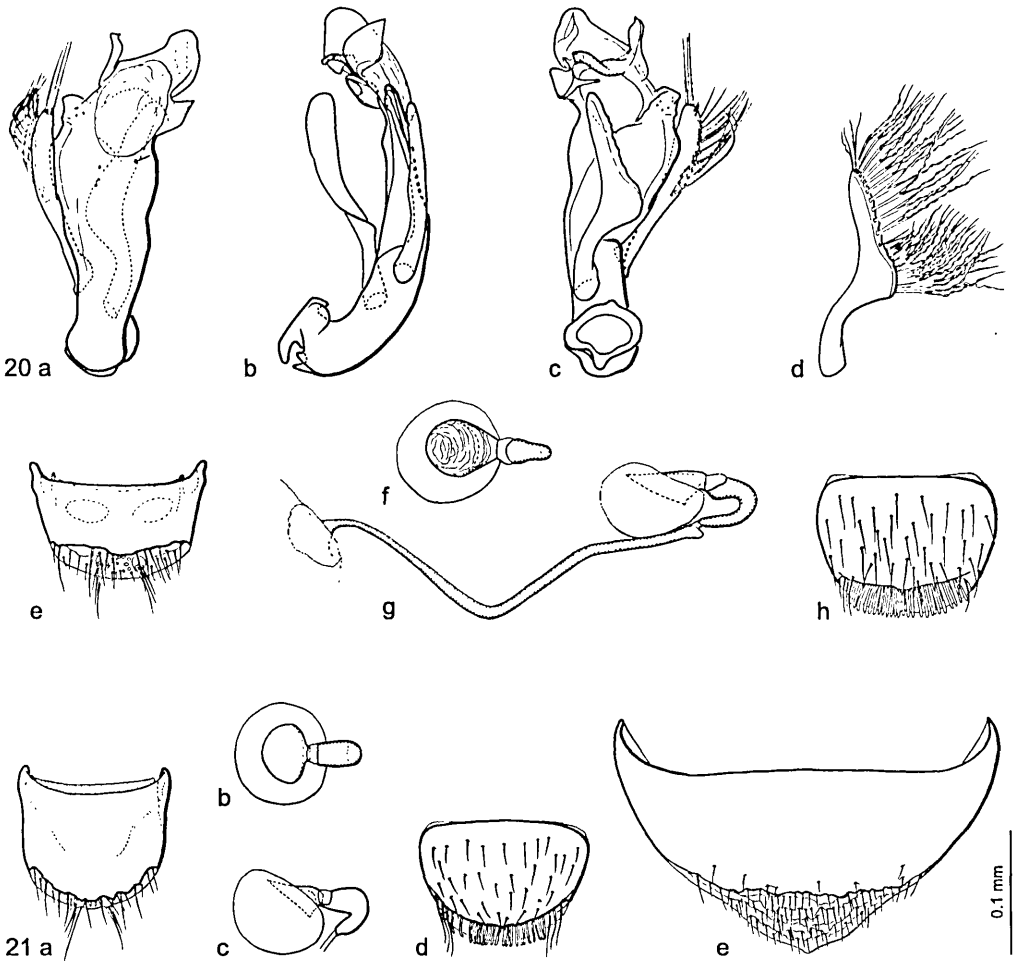
Metasternal plaques of male almost reduced to very thin prominent keels.

Abdominal sternite VIII of male much larger.

Female tergite X (Fig. 20h): Disc sparsely covered with setae; apices of subapical setae rounded; hyaline apical margin very slightly emarginate medially.

Male profemur with small denticle near base of anterior face.

DIFFERENTIAL DIAGNOSIS: Externally, *Hydraena undulata* can be distinguished from the remaining Taiwanese species by the combination of coloration, pronotal shape and comparatively coarse punctation.



Figs. 20 - 21: 20) *Hydraena undulata*, a - c) aedeagus, a) dorsal view, setae of left paramere not illustrated, b) lateral view, parameral setae not illustrated, c) ventral view, setae of left paramere not illustrated; d) left paramere; e) gonocoxite; f - g) spermatheca; h) female tergite X. 21) *Hydraena sauteri*, a) gonocoxite; b - c) spermatheca; d) female tergite X; e) female sternite VIII.

DISTRIBUTION: Widely distributed in Taiwan. Known from four counties so far.

ECOLOGY: as in *H. isolinae*.

ETYMOLOGY: Undulatus, 3 (Latin, undulate, curly); referring to the curly setae of the left paramere.

Hydraena (*Hydraenopsis*) *sauteri* d'Orchymont

Hydraena sauteri d'Orchymont 1913: 1. - Knisch 1924. - Pu 1951, 1956. - Jäch 1995.

TYPE LOCALITY: Pingtung County, southern Taiwan.

TYPE MATERIAL: A lectotype was designated by JÄCH (1995). The lectotype (ISNB) and the paralectotype (DEI) were examined by the authors.

DIAGNOSIS: 1.4 mm long. Female sternite VIII (Fig. 21e) conspicuously acuminate, setose and rugosely sculptured apically. Gonocoxite (Fig. 21a): Conspicuously quadrate. Female tergite X (Fig. 21d): Disc sparsely covered with setae; apices of median subapical setae rounded; hyaline apical margin not interrupted medially. Spermatheca (Fig. 21b, c): Proximal portion crescentic, short, attenuate proximally; distal portion flat cone-shaped, almost discoidal.

Male unknown.

DIFFERENTIAL DIAGNOSIS: We are not able to distinguish *H. sauteri* externally from *H. miyatakei* SATÔ which is widely distributed in Japan, NE China and in the Russian Far East. They are at least very closely related. Gonocoxite more transverse in *H. miyatakei*, anterior margin of outer plate more deeply emarginate.

Hydraena hunanensis PU is - according to the original description (PU 1951) - also closely related and might even be a senior synonym of *H. miyatakei* or a junior synonym of *H. sauteri*. So far we were not able to study type material of *H. hunanensis*.

Hydraena sauteri can be distinguished from all other *Hydraena* species known from Taiwan so far by the conspicuous female sternite VIII.

Externally, *H. sauteri* is not unsimilar to *H. jengi* and to *H. undulata*. It can be distinguished from *H. jengi* by the more parallel-sided pronotum and the flatter lateral pronotal margin. From *H. undulata* it can be distinguished by the less coarsely punctate pronotum, by the less distinctly parallel-sided elytra and by the unicoloured maxillary palpi.

DISTRIBUTION: So far known only from the type locality.

Discussion

The 13 species now known from Taiwan seem to be endemic to this island. With the exception of *H. sauteri*, which is closely related to the widely distributed *H. miyatakei* none of the species reveals close affinities to any of the described East Asian species. However, it should be mentioned that the *Hydraena* fauna of Mainland China and the Ryukyu Archipelago is still very poorly known.

All 13 species belong to *Hydraenopsis*. *Hydraena* s.str. which is very common in Japan and Mainland China is obviously absent from Taiwan.

The following species are phylogenetically united and probably form a monophyletic lineage: *H. curtipalpis*, *H. inopinata*, *H. isolinae*, *H. jengi*, *H. orchis*, and *H. wangi* (*H. isolinae* lineage). They share the following characters: parameres not articulately connected with main piece; main piece with one long dorsal seta; terminal setae of female tergite X tapering apically; spermatheca with crescentic proximal portion; mesosternal process slender. The following species (*H. bilobata*, *H. compressipilis*, *H. leei*, *H. plurifurcata*, *H. porcula* - *H. porcula* lineage) share the following characters: parameres articulately connected with aedeagus; main piece with 1 - 3 dorsal setae; parameres with furcate setae; phallobase not completely closed proximally; spermatheca with saccoid proximal portion; mesosternal process wide. *Hydraena undulata* is rather similar to the *H. porcula* lineage, but differs by the ring-shaped phallobase, by the undulate setae of the left paramere, by the crescentic proximal portion of the spermatheca, by the distinctly wrinkled distal portion of the spermatheca, and by the wider mesosternal process.

A key to the Taiwanese species shall be published later, after more material has been examined and after both sexes of all species are known.

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References

JÄCH, M.A. 1995: Hydraenidae (Coleoptera). - In: Water Beetles of China, pp. 173-180. - Jäch, M.A. & Ji, L. (eds.). - Zoologisch-Botanische Gesellschaft in Österreich and Wiener Coleopterologenverein, Wien, 410 pp.

KNISCH, A. 1924: Hydrophilidae. - In Schenkling, S. (ed.): Coleopterorum Catalogus. - Berlin: Junk, W., 306 pp.

d'ORCHYMONT, A. 1913: H. Sauter's Formosa-Ausbeute. Hydrophilidae (Col.). - Supplementa Entomologica II: 1-18, 1 pl.

PERKINS, P. 1997: Life on the effective bubble: exocrine secretion delivery system (ESDS) and the evolution and classification of beetles in the family Hydraenidae (Insecta: Coleoptera). - Annals of Carnegie Museum 66 (2): 89-207.

PU, C.-L. [Z.], 1951: The genus *Hydraena* Kugel. of China (Coleoptera, Hydraenidae). - Lingnan Science Journal 23 (4): 279-290, 1 pl.

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