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Descriptions of six new species of *Hydraena* s.str. KUGELANN from Japan (Coleoptera: Hydraenidae)

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Abstract

Six new species of *Hydraena* s.str. KUGELANN, 1794 are described from Japan (Honshu and Tsushima): *H. curvipes* (Nagano Pref.), *H. hayashii* (Shimane Pref.), *H. kadowakii* (Tottori Pref., Okayama Pref.), *H. kamitei* (Gifu Pref., Tochigi Pref.), *H. kitayamai* (Osaka Pref.), and *H. tsushimaensis* (Nagasaki Pref.: Tsushima Isl.). The genus *Hydraena* is recorded from the island of Tsushima for the first time. *Hydraena notsui* SATÔ, 1978 is recorded from Honshu for the first time.

Key words: Coleoptera, Hydraenidae, *Hydraena* s.str., taxonomy, new species, Japan, Honshu, Tsushima.

Introduction

Five species of the subgenus *Hydraena* s.str. KUGELANN (sensu TRIZZINO et al., in press) had so far been recorded from Japan (see JÄCH & SATÔ 1988, JÄCH & DÍAZ 1999, JÄCH 2004): three of these species are known only from Honshu (*H. chifengi* JÄCH & DÍAZ, 1999; *H. watanabei* JÄCH & SATÔ, 1988; *H. yoshitomii* JÄCH & DÍAZ, 1999), one is known from Honshu and Hokkaido (*H. riparia* KUGELANN, 1794) and one from Shikoku (*H. notsui* SATÔ, 1978).

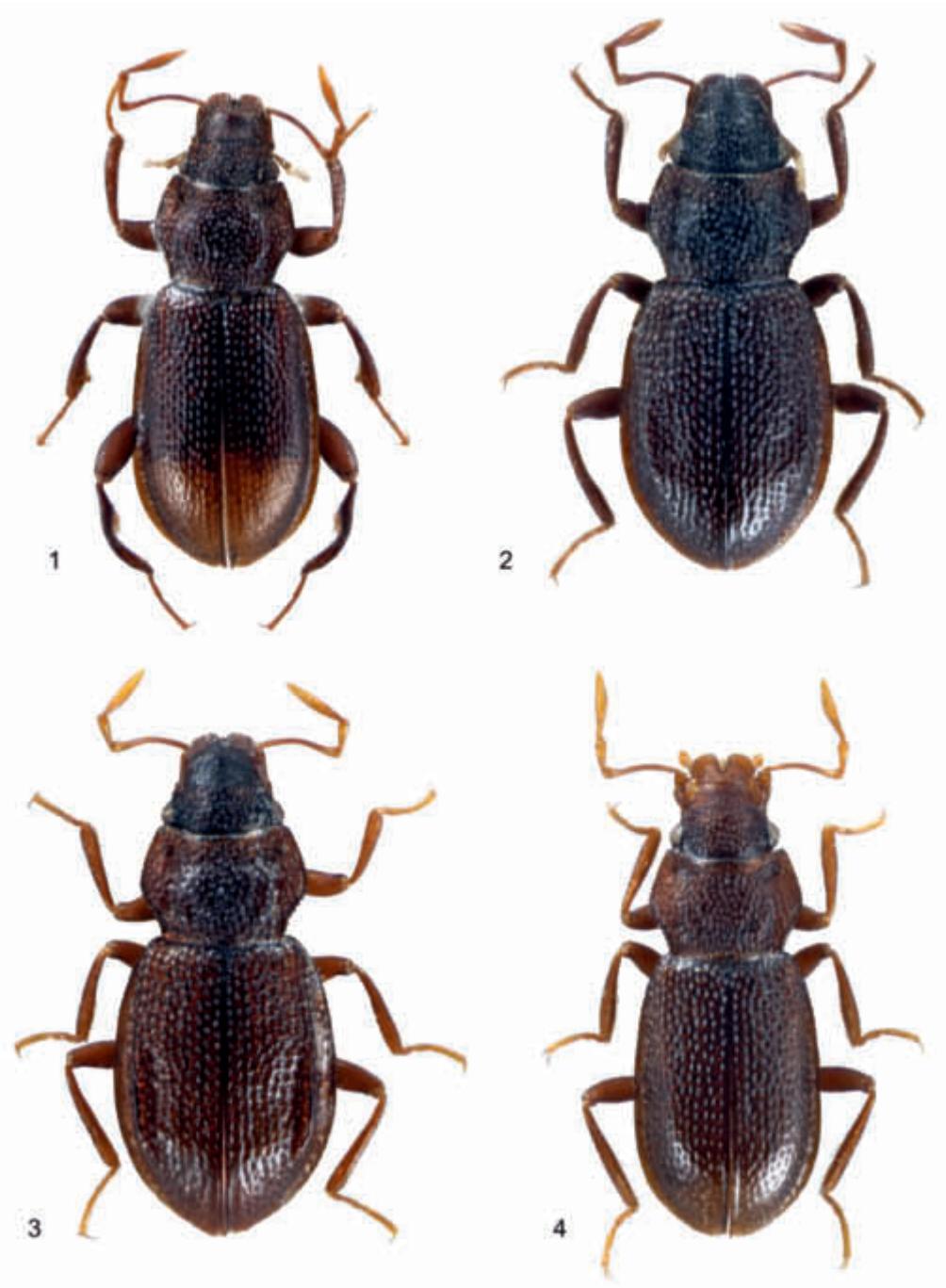
In the last few years, a number of *Hydraena* specimens were collected by several Japanese coleopterists on Honshu and Tsushima (between Kyushu and South Korea). These samples include six unknown species, which are described in the present paper. In addition, some new faunistic records are presented.

Material and Methods

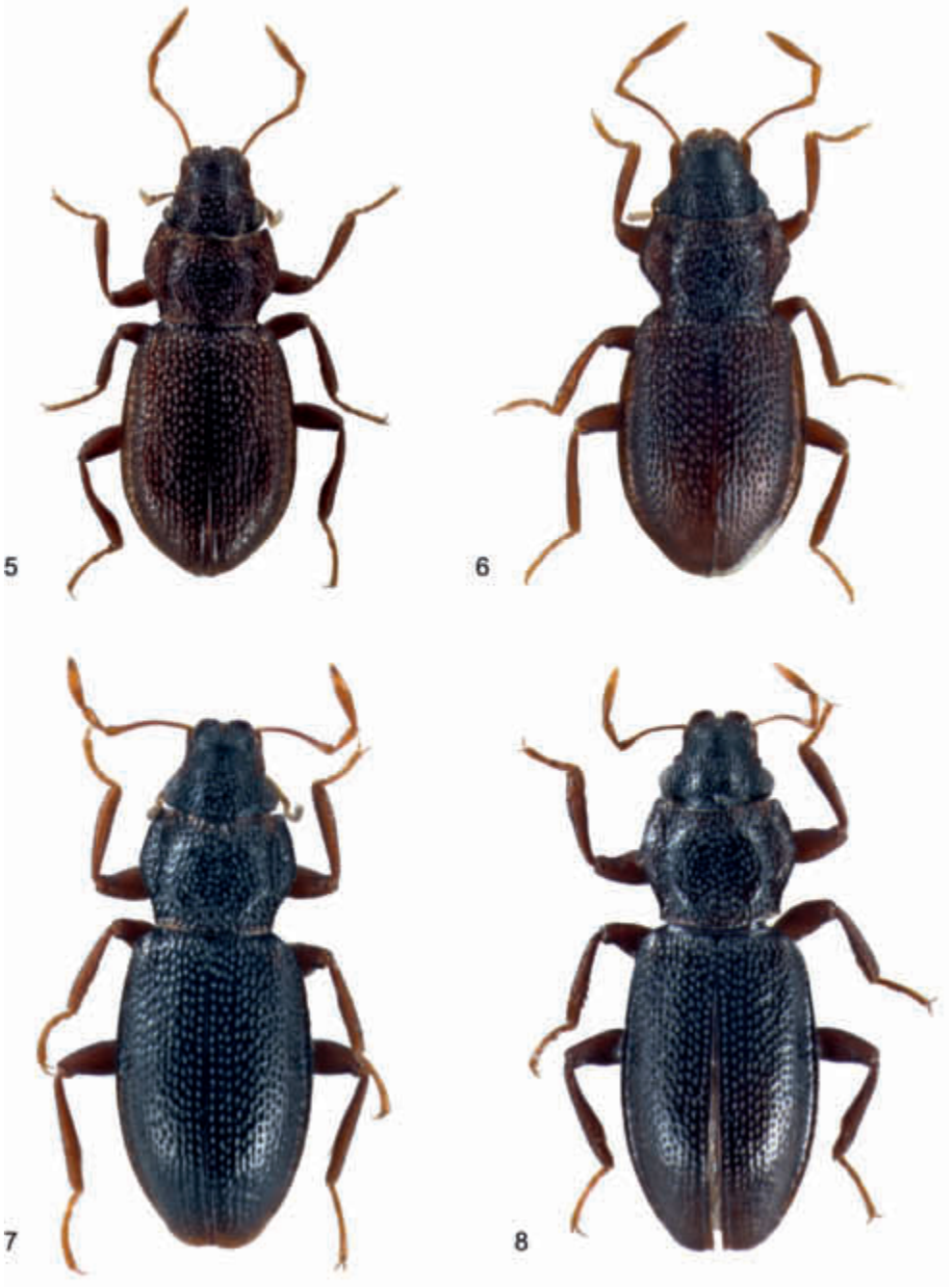
About 150 unidentified specimens of *Hydraena* s.str. from Japan were examined. These were collected by M. Hayashi, T. Ikeda, H. Kadowaki, Y. Kamite, K. Kitayama, Y. Minoshima, N. Ohbayashi, and S. Ota between 1994 and 2012.

All specimens examined are deposited in the following institutions and private collections:

CDL	Coll. J.A. Díaz, Lugo, Spain
CHI	Coll. M. Hayashi, Izumo, Japan
CIS	Coll. T. Ikeda, Sakata, Japan
CKN	Coll. Y. Kamite, Nagoya, Japan
CKO	Coll. Kitayama, Osaka, Japan
CMS	Coll. Y. Minoshima, Sapporo, Japan
EUMJ	Ehime University, Matsuyama, Japan
NMW	Naturhistorisches Museum Wien, Austria



Figs. 1–4: Habitus of 1) *Hydraena curvipes*, male, 2) *H. hayashii*, male 3) *H. hayashii*, female, 4) *H. kamitei*, male.



Figs. 5–8: Habitus of 5) *H. kitayamai*, male, 6) *Hydraena notsui*, male, 7) *H. kadowakii*, male, 8) *H. tsushimaensis*, male, holotype.

Check list of the Japanese species of *Hydraena* s.str.

Hydraena notsui group:	
Hydraena chifengi JÄCH & DÍAZ, 1999	Honshu (Aichi Pref.)
Hydraena curvipes JÄCH & DÍAZ, sp.n.	Honshu (Nagano Pref.)
Hydraena hayashii JÄCH & DÍAZ, sp.n.	Honshu (Shimane Pref.)
Hydraena kamitei JÄCH & DÍAZ, sp.n.	Honshu (Gifu Pref., Tochigi Pref.)
Hydraena kitayamai JÄCH & DÍAZ, sp.n.	Honshu (Osaka Pref.)
Hydraena notsui SATÔ, 1978	Honshu (Shimane Pref., Tottori Pref.), Shikoku
Hydraena yoshitomii JÄCH & DÍAZ, 1999	Honshu (Saitama Pref.)
Hydraena riparia group:	
Hydraena kadowakii JÄCH & DÍAZ, sp.n.	Honshu (Okayama Pref., Tottori Pref.)
Hydraena riparia KUGELANN, 1794	Hokkaido, Honshu (Gifu Pref., Gunma Pref., Nagano Pref.)
Hydraena tsushimaensis JÄCH & DÍAZ, sp.n.	Tsushima
Hydraena watanabei JÄCH & SATÔ, 1988	Honshu (Aomori Pref., Miyagi Pref., Yamagata Pref., Yamanashi Pref.)

Hydraena notsui species group

The *Hydraena notsui* species group was established by JÄCH & DÍAZ (1999: 340). The species of this group are united by the following characters: body length: 1.4–2.0 mm; eyes very small (less than 20 facets visible in dorsal view); frons strongly convex between eyes, apical segment of maxillary palps unicolored; elytral gutter and pseudepipleura wide; elytral apices short; male sternite X subtriangular, not overlapping with spiculum; setal pattern of aedeagal main piece (subapical+dorsal) variable: 4+1, 3+1, 2+1 or 0+1; gonocoxite: apex not emarginate between tufts, inner plate not or very narrowly projecting basally, condyles lateral.

Secondary sexual dimorphism rarely (*H. curvipes*) well developed, maxillary palps never sexually dimorphic.

The phylogenetic relationships of the *H. notsui* group are not yet well understood. DNA sequence analyses suggest possible relationships with the *H. pulchella* group or the *H. holdhausi* group (see TRIZZINO et al., in press).

Four of the six new species described herein belong to this species group.

Hydraena (s.str.) *curvipes* sp.n.

TYPE LOCALITY (Fig. 17): Sachizawa-gawa-Siryu (small tributary of Sachizawa River), 955 m, 35°52'1.848"N 137°41'59.641"E, Kiso-machi (town), Nagano Prefecture, Honshu, Japan.

TYPE MATERIAL: **Holotype** ♂ (NMW): "Japan, Nagano Pref. Kiso-machi Sachizawa-gawa-siryu 12-VII-2008 Y. Kamite & T. Ikeda leg.". **Paratypes**: 1 ♀ (NMW), same label data as holotype; 1 ♀ (NMW), same locality data as holotype, but "28-VII-2007 Y. Kamite leg."; 1 ♂, 1 ♀ (CIS, CKN): same locality data as holotype, but "13-V-2012".

DESCRIPTION: Habitus as in Fig. 1. Body length: 2.0 mm. Dorsum brown, frons at least posteriorly dark brown to black, last segment of palpi unicoloured.

Labrum sparsely micropunctate, deeply excised medially; clypeus more or less densely micropunctate; fronto-clypeal suture almost straight; frons rather densely punctate and partly microreticulate.

Pronotum strongly cordiform, anterior margin concave, lateral margin denticulate and strongly produced at middle; disc rather evenly and densely punctate, interstices more or less shining, sparsely microreticulate, discal foveae shallow; lateral part densely superficially punctate and densely microreticulate, matt.

Elytra subparallel, moderately long; with seven rows of punctures between suture and shoulder; punctures moderately large, densely arranged, deeply impressed, striae not very regular; interstices and intervals smooth and glabrous; explanate margin of elytra wide, lateral rim finely serrate in anterior 0.3.

Metaventral plaques long and slender, metaventral disc impressed between plaques. Intercoxal segment (abdominal sternite II) very wide.

Aedeagus (Fig. 9a–b): Main piece distinctly widened in apical 0.4; apex more or less acute in lateral view, widely rounded in ventral/dorsal view; with one dorsal seta near base of distal lobe. Phallobase more or less symmetrical. Distal lobe moderately long and wide, with well sclerotized, moderately long flagellum. Right paramere almost as long as main piece; ventral margin moderately widened subapically; with apical and subapical setae on ventral margin. Left paramere more or less of same length, with few apical setae.

Male sternite X and spiculum (Fig. 9c): Sternite small and slender, apically truncate, distinctly acuminate basally, not firmly connected with spiculum.

Gonocoxite (Fig. 9g): Subtrapezoidal, posterior margin slightly convex, hardly projecting medially; inner plate with transverse cavea, anterior margin of inner plate rather evenly emarginate, lateral angles slightly longer than condyles.

Female tergite X (Fig. 9h): distinctly transverse, disc moderately densely covered with squamose setae, few trichoid setae near posterior margin; subapical setae vermiform (except for a few trichoid lateral ones); hyaline apical margin narrow.

Two females were dissected, but except for a huge gland, no distinctly sclerotized spermatheca was found.

SECONDARY SEXUAL CHARACTERS: Male femora enlarged; male protibia slightly widened, slightly curved; male mesotibia (Fig. 9d) curved, with several rows of variously long setae (bristles) on mesal and posterior margin, with prominent tooth in apical half of mesal margin, tooth with prominent longitudinal crest with two peg-like setae; male metatibia (Fig. 9e) much longer than in female (Fig. 9f), strongly curved in posterior two thirds, mesal and posterior face with groups and rows of variously long setae. Mesoventral process slightly wider in female. Metaventral disc more deeply impressed between plaques in male, plaques more widely separated in female. Intercoxal segment (abdominal sternite II) wider in female.

DIFFERENTIAL DIAGNOSIS: Externally, males of *Hydraena curvipes* are easily distinguished from all other known Japanese species of *Hydraena* by their peculiar meso- and metatibiae. Females can be recognized by their hind tibia, which is rather distinctly curved.

DISTRIBUTION: So far known only from the type locality (Nagano Prefecture, Honshu, Japan).

ETYMOLOGY: curvipes (Latin: curved leg), referring to the conspicuously curved hind tibia of the male.

Hydraena (s.str.) *hayashii* sp.n.

TYPE LOCALITY (Fig. 18): Small stream in forest, 300 m, 35°32'6.7"N 133°7'30.2"E, Mt. Makuragi, Matsue City, Shimane Prefecture, Honshu, Japan.

TYPE MATERIAL: **Holotype** ♂ (NMW): "Makuragi-san Matsue-shi Shimane Pref. JPN", "11. II. 2006 M. Hayashi leg.". **Paratypes**: 8 exs. (CDL: 1 ♂, 2 ♀♀, CHI, EUMJ, NMW), same label data as holotype; 6 exs. (CHI, EUMJ, NMW): "Shimane Pref.,JPN [Makuragi-san, Matsue-shi: in Japanese characters] 29.I.2006 M.Hayashi leg."; 2 exs. (CKN): "Shimane Pref. JPN 20. VIII. 2003 Y. Kamite leg.", "Makuragi-san Matsue-shi"; 11 exs. (CHI, EUMJ, NMW): "Shimane Pref.JPN Mitarai–taki, Jinji [= Shinji] Riv., Shimane–cho, Matsue", "City; 19.II.2006 M.Hayashi leg.".

DIAGNOSIS: Habitus as in Figs. 2–3. 1.50–1.75 mm long. Very closely related with *Hydraena yoshitomii*. Externally, *H. hayashii* can be distinguished from *H. yoshitomii* by the following characters: punctation of pronotum more dense, interstices more distinctly microreticulate; punctation of elytra denser, more rugose. Sexual dimorphism more or less as in *H. yoshitomii*, but sublateral bulge delimiting elytral depression of female usually more strongly elevated, forming a well developed longitudinal ridge, approximately extending from basal 0.25–0.65.

Aedeagus (Fig. 10a–b): Main piece less curved than in *H. yoshitomii* (lateral view); with one dorsal seta (subapical setae lacking); apex acute, pointing ventrad (lateral view). Distal lobe rather small, medially enlarged, much shorter than in *H. yoshitomii*. Parameres more or less as in *H. yoshitomii*.

Male sternite X (Fig. 10c) subtriangular, not firmly connected with spiculum.

Gonocoxite (Fig. 10d): Superficially similar to that of *H. yoshitomii*; but base distinctly emarginate, inner plate completely projecting basally, cavea distinctly transverse.

Female tergite X (Fig. 10e) less strongly transverse than in *H. yoshitomii*; hyaline apical margin not noticeably emarginate medially.

Spermatheca very small. Distal portion oval, apically produced, gland comparatively large, proximal portion knot-like.

DISTRIBUTION: So far known only from Shimane Prefecture (Honshu, Japan).

ETYMOLOGY: Named for Dr. Masakazu Hayashi (Hoshizaki Wildlife Institue, Izumo City, Shimane Prefecture, Japan), excellent specialist of Donaciinae, who collected the holotype of this species.

Hydraena (s.str.) *kamitei* sp.n.

TYPE LOCALITY: Sandani River, 930 m, 36°2'33.349"N 136°59'1.144"E, Shokawa-cho (town), Takayama City, Gifu Prefecture, Honshu, Japan.

TYPE MATERIAL: **Holotype** ♂ (NMW): "Gifu-Pref. 28. VIII. 2005 Y. Kamite leg", "Sandani Shokawa-cho Takayama-shi" [both labels handwritten]. **Paratypes** (NMW): 2 ♀♀: "Isshiki Shokawa-cho Takayama-shi", "Gifu-Pref. 28. VIII. 2005 Y. Kamite leg" [both labels handwritten]; 1 ♂ (CKN): "*GIFU JPN* Natsumaya Kiyomi-cho", "Takayama-shi 31. VII. 2005 Y. Kamite leg"; 1 ♀ (CKN): "*GIFU JPN* Sandani Shokawa-cho", "Takayama-shi 31. VII. 2005 Y. Kamite leg"; 6 ♂♂, 2 ♀♀ (CMS: 1 ♂, 1 ♀, NMW): "[JAPAN] Mae-zawa, 2.6km NWbN of Mt. Myoujingatake, Yunishigawa, Nikkô-shi, Tochigi pref. (alt. 790m) (N36°57.00´,E139°35.16´) 12. VI. 2007 Yûsuke MINOSHIMA leg.".

DIAGNOSIS: Habitus as in Fig. 4. 1.60–1.80 mm long. Elytra without sublateral longitudinal ridges. Externally, this species agrees quite well with *H. notsui*. Differences between these two species are quite subtle, concerning mainly the coloration, which is somewhat paler brown in the new species (which may however be attributed to tenerality), the shape of the elytra, which are more ovoid (slightly widened in apical third) in *H. kamitei*, the metaventrite, which is not

impressed medially, and the metaventral plaques, which are smaller. From *H. chifengi*, the new species can be distinguished externally by paler brownish coloration, the more elongate body form and the metaventral disc being not impressed medially.

Aedeagus (Fig. 11a–b): Main piece less strongly curved than in *H. yoshitomii*, but more curved than in *H. hayashii* (lateral view); with one dorsal seta, two subapical setae and sometimes with about four microspines near dorsal seta; apex acute, not pointing ventrad (lateral view). Distal lobe composed of a long, slightly sinuous flagellum and a short appendage, which is apically hooked (in dorsal view). Parameres approximately of same length, both distinctly shorter than main piece.

Male sternite X (Fig. 11c) subtriangular, not firmly connected with spiculum, the latter longer and thinner than in *H. hayashii*.

Gonocoxite (Fig. 11d): Quite distinctly subpentagonal, apically acute; inner plate completely projecting basally, cavea not observed.

Female tergite X (Fig. 11e) strongly transverse; hyaline apical margin not noticeably emarginate medially; fringe of subapical vermiform setae very dense.

Spermatheca (Fig. 12f–g): Distal portion large, poorly chitinized, helmet-like; gland probably inside distal portion; proximal portion tube-like; vaginal sclerite not found.

VARIABILITY: In a few specimens the elytra are hardly noticeably impressed near middle.

DISTRIBUTION: So far known only from Gifu and Tochigi Prefectures (Honshu, Japan).

ETYMOLOGY: Named for Yuuki Kamite (Laboratory of Environmental Entomology, Nagoya City Public Health Research Institute, Nagoya City, Aichi Prefecture, Japan), excellent Elmidae specialist, who collected part of the type series.

Hydraena (s.str.) *kitayamai* sp.n.

TYPE LOCALITY: Small stream in forest below Jigokudani Pass, ca. 400 m, 34°54'33"N 135°34'56"E, NNW of Takatsuki-shi (town), Osaka Prefecture, Honshu, Japan.

TYPE MATERIAL: **Holotype** ♂ (NMW): "Japan, Osaka Pref. Takatsuki-shi Togeshita [below], Jigokudani [Pass] 1-VII-2006 Kenji Kitayama leg.". **Paratypes**: 45 exs. (CDL: 2 ♂♂, 2 ♀♀, CKO: 1 ♂, 1 ♀, EUMJ, NMW), same label data as holotype.

DIAGNOSIS: Habitus as in Fig. 5. 1.40–1.60 mm long. Very closely related with *Hydraena hayashii*. Body form and punctation of dorsum more or less as in the latter. Female sublateral elytral bulge wide, less ridge-like than in *H. hayashii*. Male metatibia distinctly widened mesally in distal half.

Aedeagus (Fig. 12a–b): Very similar to *H. hayashii*, from which it can be distinguished by the following characters: main less sinuous in dorsal view, apex less acute and less strongly directed ventrad (lateral view), more acute and produced to left side (dorsal view), dorsal seta more close to apex.

Male sternite X as in Fig. 12c.

Gonocoxite (Fig. 12d): Similar to that of *H. hayashii*; base straight or emarginate, basal condyles more prominent than in the latter, base of inner plate not projecting medially.

Female tergite X (Fig. 12e) not significantly different from *H. hayashii.*

A distinctly sclerotized spermatheca was not found.

DISTRIBUTION: So far known only from the type locality (Osaka Prefecture, Honshu, Japan).

ETYMOLOGY: Named for Kenji Kitayama (Osaka, Japan), Coleoptera specialist, who collected this species.

Hydraena (s.str.) *notsui* SATÔ, 1978

TYPE LOCALITY: Small stream, 30–40 cm wide, flowing through Ryûjin-daira, small marsh near top of Mt. Saragamine, 1271 m, Ehime Prefecture, Shikoku, Japan.

TYPE MATERIAL EXAMINED: **Holotype** ♂ (EUMJ): "[SHIKOKU] Saragamine Ehime Pref. 27. IV. 1975 Y. Notsu leg.". **Paratypes**: 2 exs. (EUMJ: 1 ♀, NMW: 1 ♂), same label data as holotype; 1 ♀ (NMW): "Shikoku 2. XI. 1977 Y. Notsu leg" [handwritten], "Ryujin-daira Mt.Saragamine" [handwritten], "PARATYPE" [red label], "Hydraena notsui M.Satô, '78 [handwritten] DET. M.SATO 1987 [printed, except for "7"]"; 5 exs. (EUMJ): "Ryûjin-daira Mt. Saragamine Ehime Pref., Japan 2. VI,[=XI.] 1977 Y. Notsu leg." [one of these specimens is disarticulated, one carries an additional label: "Hydraena notsui M. Satô [handwritten] DET. M.SATO 1982"].

According to the original description there should be nine paratypes. Eight of these could be located.

ADDITIONAL MATERIAL EXAMINED:

HONSHU (TOTTORI Pref.): 1 ♂ (NMW): "Tottori Pref., Japan Ondakibashi, Senjyo-zan, Kotoura-cho; 29.viii.2006 M. Hayashi leg.", "Tottori Pref.,JPN […Japanese characters…] St.30; 29.viii.2006 M.Hayashi leg."; 1 ♀ (NMW): "Tottori Pref., Japan Kuro-kawa, Kaminakamura, Kotoura-cho; 8.X.2006 M. Hayashi leg.", "Tottori Pref.,JPN […Japanese characters…] 8.X.2006 M.Hayashi leg."; 1 ♂, 2 ♀♀ (NMW, CHI): "Tottori Pref., Japan Kuro-kawa, Kaminakamura, Kotoura-cho; 13.X.2006 M. Hayashi leg." [one of the females in alcohol]; 2 ♀♀ (NMW): "Tottori Pref., Japan Kuro-kawa, Kaminakamura, Kotoura-cho; 30.IX.2006 H.Kadowaki leg." [in alcohol]; 1 ♀ (CKN): "Japan, Tottori–Pref. Kofu–cho Senjyozan 19.IX. 2006 Y. Kamite leg.". (SHIMANE Pref.): 1 ♂ (CHI): "Hii-kawa, Okuizumo-cho, Shimane Pref., Japan 5. XI. 2005 M. Hayashi leg.".

DIAGNOSIS: Habitus as in Fig. 6. 1.50–1.70 mm long. Fronto-clypeal suture slightly curved. Dorsum quite densely punctate, interstices on pronotum microreticulate, on elytra glabrous. Elytra without depression or ridges. Metaventral disc impressed medially. Male legs slightly stronger than in female.

Aedeagus (Figs. 13a–b, d–e): Main piece distinctly angulate subbasally, apex widened (furcate in lateral view); with one dorsal and 3–4 subapical setae. Distal lobe complex, subglobular, rather distinctly sclerotized, with a very short flagellum. Right paramere almost as long as main piece, with numerous apical setae; left paramere distinctly shorter than right one.

Male sternite X and spiculum as in Fig. 13c.

Female tergite X (see JÄCH & DÍAZ 1999: Fig. 5a): Transverse, disc moderately densely covered with squamose setae and with very few trichoid setae near posterior margin; subapical setae vermiform (except for a few trichoid lateral ones); hyaline apical margin entire.

Gonocoxite (Fig. 13f and JÄCH & DÍAZ 1999: Fig. 5b): Subpentagonal, lateral sides more or less distinctly rounded subbasally; apex somewhat acute; anterior margin of inner plate quite variable: fully exposed and regularly concave (Fig. 13f) to medially retracted and V-shaped (JÄCH & DÍAZ 1999: Fig. 5b), lateral angles always exposed; cavea reniform or regularly oval.

DISCUSSION: The number of aedeagal setae is generally not constant in the *H. notsui* group. It even varies within the same population. One of the aedeagi of the material of *H. notsui* from Tottori Prefecture (Honshu) has four subapical setae, all other specimens (incl. the type specimens) have three. Generally, material from Honshu (Tottori and Shimane) agrees very well with the type specimens. Differences in the distal lobes in Figs. 13a–b, d–e are due to slightly different orientations and slight individual variability. We strongly assume that the specimens from Honshu and Shikoku are conspecific.

DISTRIBUTION: This species had so far been known from Shikoku only. It is here recorded from Honshu (Shimane Pref., Tottori Pref.) for the first time.

Hydraena riparia species group

The Japanese species of this group are united by the following characters: body length: 2.1–2.5 mm; eyes large (more than 20 facets visible in dorsal view); frons weakly convex between eyes, apical segment of maxillary palps unicolored or darkened apically; elytral gutter and pseudepipleura moderately wide; elytral apices elongate; male sternite X produced basally, somewhat bottle-shaped, overlapping with spiculum; setal pattern of aedeagal main piece (subapical+dorsal) always 3+1; gonocoxite: apex emarginate between tufts, inner plate distinctly projecting basally, condyles sublateral.

Maxillary palps always sexually dimorphic.

Two of the new species described herein belong to this species group.

Hydraena (s.str.) *kadowakii* sp.n.

TYPE LOCALITY (Fig. 19): River at Uguisu-bashi (bridge), 340 m, 35°25'54.4"N, 133°34' 35.2"E, Kinoto-gawa (river), Daisen-cho (town), Tottori Prefecture, Honshu, Japan.

TYPE MATERIAL: **Holotype** ♂ (NMW): "Tottori Pref., Japan Uguisubashi, Kinoto-gawa, Daisen-cho; 29.viii.2006 M. Hayashi leg.". **Paratypes**: 7 exs. (CHI, CDL: 3 ♀♀, EUMJ, NMW), same label data as holotype; 1 ♂ (NMW): "Tottori Pref. Japan Kuro-kawa, Kaminakamura, Kotoura-cho; 8.X.2006 M. Hayashi leg.", "Tottori Pref.„JPN …… [Japanese characters] 8.X.2006 M.Hayashi leg."; 2 ♀♀ (CHI): "Tottori Pref. Japan Kuro-kawa, Kaminakamura,", "Tottori Pref.„JPN …… [Japanese characters] 9.X.2006 M.Hayashi leg."; 1 ♀ (NMW): "Tottori Pref., Japan Daisenbashi, Syojin-gawa Daisen-cho; 6.viii.2006 H.Kadowaki leg.", "Tottori Pref.„JPN …… [Japanese characters] St.14, 6.viii.2006 H.Kadowaki leg."; 1 ♀ (NMW): "Japan Okayama-Pref. Myoren-gawa Hiruzen, Maniwa-shi 18.IX.2006 Y. Kamite leg."; 1 ♂, 1 ♀ (CKN):"Japan Okayama-Pref. Myoren-gawa Hiruzen, Maniwa-shi 18.IX.2006 S. Ota leg.".

DIAGNOSIS: Habitus as in Fig. 7. 2.1–2.3 mm long. Very closely related with *Hydraena watanabei*. Externally, *H. kadowakii* can be hardly distinguished from *H. watanabei*. The tip of the apical segment of the maxillary palpi is usually darkened in the new species, however, in a few specimens this obscuration is poorly developed; *H. kadowakii* is on average smaller than *H. watanabei*, the elytra are usually less produced apically, and the secondary sexual characters are slightly less distinctly pronounced (male meso- and metatiba as in Fig. 14d–e); punctation of dorsum and width of elytral gutter are somewhat variable in both species and therefore not very significant.

Aedeagus (Fig. 14a–b): Main piece in lateral view more sinuous than in *H. watanabei*, somewhat resembling *H. puetzi* Jäch, but dorsal margin more strongly angulate near middle than in the latter. Seate of main piece more or less as in *H. watanabei* and *H. puetzi.* Distal lobe quite amorphic, with a moderately long, distinctly sclerotized flagellum. Right paranmere distinctly wider than in *H. puetzi*, enlarged part shorter than in *H. watanabei*. Apex of left paramere resembling *H. puetzi*.

Male sternite X and spiculum (Fig. 14c): Sternite elongate, somewhat resembling a vase or a contrabass; apical margin slightly emarginate, not firmly connected with straight spiculum.

Gonocoxite (Fig. 14f): Subquadrate; apex emarginate between tufts, base concave; inner plate projecting basally, basal margin slightly concave, condyles sublateral, almost as long as condyles of outer plate, their apices pointing laterad; cavea transverse. The gonocoxite of *H. watanabei*

(Fig. 16a) differs mainly in the larger size and in the inner plate, including the condyles, projecting more strongly; cavea more transverse.

Female tergite X (Fig. 14g) semicircular, transverse; disc rather sparsely covered with squamose setae basally and with trichoid setae apically; subapical setae vermiform (except for a few trichoid lateral ones). The female tergite X of *H. watanabei* (Fig. 16b) differs in the slightly larger size, in the more irregular border between disc and hyaline margin, and in the lateral vermiform setae being less densely set.

Spermatheca as in Fig. 14h–i; very similar to that of *H. watanabei* (Fig. 16c–d); proximal portion with short longitudinal crest.

DISTRIBUTION: So far known only from Tottori and Okayama Prefectures (Honshu, Japan).

ETYMOLOGY: Named for Hisashi Kadowaki (Unnan, Shimane Prefecture, Japan), eighty year old insect specialist.

Hydraena (s.str.) *tsushimaensis* sp.n.

TYPE LOCALITY (Fig. 20): Saganouchi-gawa (stream), 10 m, 34°27'32.149"N 129°20'33.522"E, Mine–machi (town), Tsushima Island, Nagasaki Prefecture, Japan.

TYPE MATERIAL: **Holotype** ♂ (NMW): "*NAGASAKI JPN* Saganouchi-gawa Mine-machi Tsushima–shi 9. IX. 2005 Y. Kamite leg". **Paratypes**: 1 ♂, 3 ♀♀ (CKN, NMW), same label data as holotype; 1 ♀ (CKN): "*NAGASAKI JPN* Ohkubo Tsushima-shi 9.IX.2005 Y. Kamite leg"; 1 ♀ (CKN): "*NAGASAKI JPN* Nita-gawa Kamiagata-machi Tsushima-shi 10. IX. 2005 Y. Kamite leg"; 20 exs. (EUMJ, NMW): "Funeshi - gawa Tsushima Is. 21 - X - 1994 M.Kimura leg."; 1 ♂ (EUMJ): "Ooboke Kamiagata-chô Tsushima, Japan 22. X. 1994 M. Kimura leg."; 1 ♂, 1 ♀ (EUMJ): "Shitaru, Kamiagata, Tsushima-shi, Nagasaki Pref., Japan 15. X. 2004 M. Kimura leg.", "…… [Japanese characters] 15. X. 2004 M. Kimura leg.".

DIAGNOSIS: Habitus as in Fig. 8. 2.30–2.45 mm long. Very closely related with *Hydraena watanabei* and *H. kadowakii*. Externally, *H. tsushimaensis* agrees very well with *H. watanabei*; the elytra of *H. tsushimaensis* are usually more parallel-sided, less oval; the apical segment of the maxillary palpi is more slender and more symmetrical.

Aedeagus (Fig. 15a–c): Main piece in lateral view more straight than in the related species from Japan (*H. kadowakii*, *H. watanabei*), dorsal sinuation more strongly pronounced. Distal lobe very similar to that of *H. kadowakii*. Right paramere less curved than in *H. kadowakii* more or less as in *H. yoshitomii*.

Male sternite X (Fig. 15c) elongate, narrowed cranially, somewhat resembling a bottle-opener; not firmly connected with spiculum.

Gonocoxite (Fig. 15d): Rectangular, transverse; apex emarginate between tufts, base concave, condyles very long; inner plate projecting basally, condyles shorter than condyles of outer plate, basal margin between condyles variable: straight or strongly projecting medially (as in Fig. 15d) medially; cavea transverse.

Female tergite X more or less identical with that of *H. watanabei* (Fig. 16b), vermiform setae more densely set.

Spermatheca as in *H. watanabei* (Fig. 16c–d) and *H. kadowakii* (Fig. 14h–i); proximal portion with short longitudinal crest.

DISTRIBUTION: So far known only from Tsushima Island (Japan: between Kyushu and South Korea), where this species might be endemic.

ETYMOLOGY: Named for Tsushima Island.

Hydraena (s.str.) cf. *watanabei* JÄCH & SATÔ

MATERIAL EXAMINED:
JAPAN: 1 ♀ (NMW): Gifu Pref.: Sandani, Shokawa-cho, Takayama-shi, 31.VII.2005, leg. Y. Kamite.

This single female was collected between the distribution areas of *H. watanabei* and *H. kadowakii*. According to its gonocoxite (Fig. 16e) and tergite X (Fig. 16f) it is more close to *H. watanabei* (Fig. 16a–b) than to *H. kadowakii* (Fig. 14f–g). However, the lateral margin of tergite X is more regularly curved in the Gifu specimen, in addition, the border between disc and hyaline margin is more regular, and the lateral vermiform setae are densely set. The inner plate of the gonocoxite is less produced than in *H. watanabei*. Spermatheca (Fig. 16g–h) more or less as in *H. watanabei*.

Since we have seen only a single female from this locality and since we don't not know much about the variability of the southern populations of *H. wanatabei* we cannot assign this species to *H. watanabei* with certainty. It might well represent another undescribed species.

Discussion

All Japanese species of *Hydraena* s.str. known so far are confined to the islands of Hokkaido, Honshu, Tsushima, and Shikoku. Remarkably, not a single species of this subgenus has been recorded from Kyushu.

Seven species of *Hydraena* s.str. belong to the *Hydraena notsui* group, the remaining four species are members of the *H. riparia* group.

Within the *H. riparia* group, three species (*H. kadowakii*, *H. tsushimaensis* and *H. watanabei*) are very closely related, replacing each other geographically.

In the *Hydraena notsui* group, the spermatheca is obviously most diverse. Further anatomical studies are required to clarify its morphological variability.

With the inclusion of the six new species described herein, there are now 20 species of *Hydraena* s.l. recorded from Japan (see JÄCH 2004 for a list of the species of *Hydraena* hitherto described from this country). With the exception of two species, *H. miyatakei* SATÔ, 1959 and *H. riparia*, all are endemic to Japan. While *H. miyatakei* is wide-spread in East Asia, *H. riparia* is supposed to have the widest range of all species of the genus (from Ireland to Japan).

The exploration of the subgenus *Hydraena* s.str. in Japan still requires a lot of field work. Most of the species seem to be NRE (Narrow-Range Endemics) [= SRR (Species of Restricted Range) or SORD (Species of Restricted Distribution)]. Due to the fact, that there are no records from many Japanese prefectures, there are probably still numerous species awaiting discovery.

For four Japanese species of *Hydraena* s.str., *H. hayashii*, *H. riparia*, *H. tsushimaensis* and *H. watanabei*, DNA sequence analyses have been carried out (see TRIZZINO et al., in press).

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The habitus photographs were made by M. Brojer and B. Dvorak (NMW).

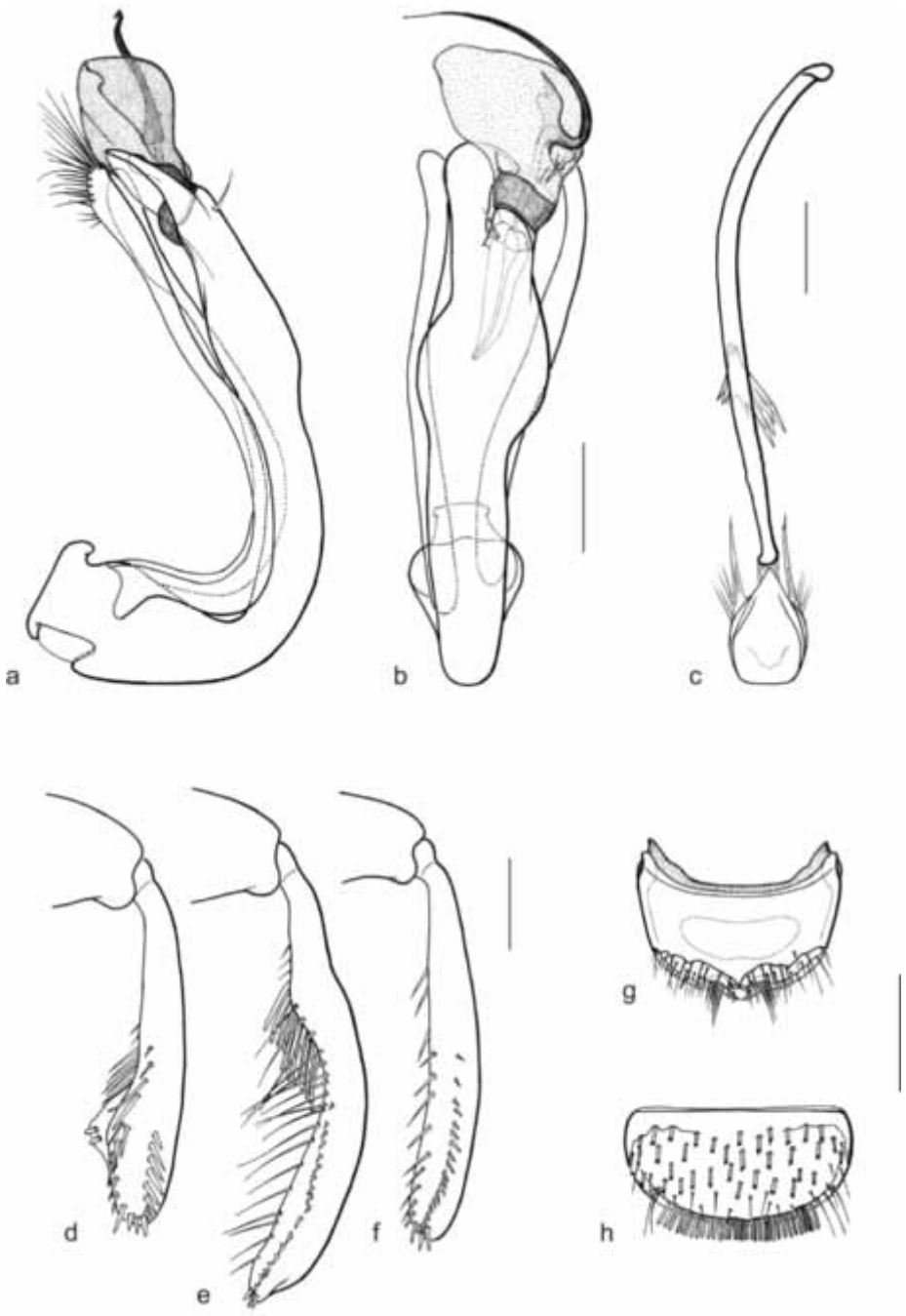

Fig. 9: *Hydraena curvipes*: a–b) aedeagus in lateral (a), dorsal (b) view (a: setae of left paramere not depicted, b: setae of both parameres not depicted); c) male sternite X and spiculum; d) mesotibia, male; e) metatibia, male; f) metatibia, female; g) gonocoxite; h) female tergite X.

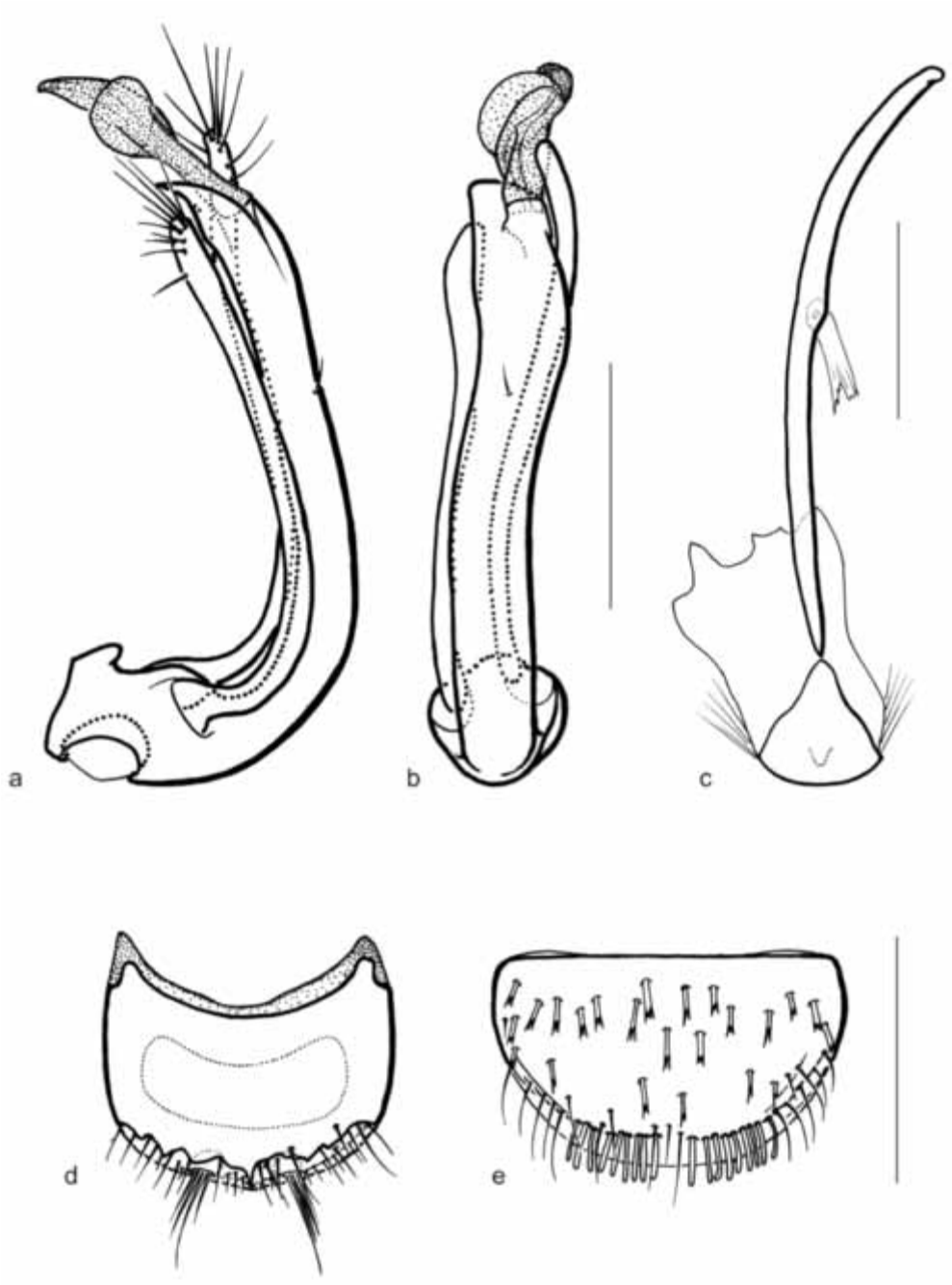

Fig. 10: *Hydraena hayashii*: a–b) aedeagus in lateral (a), dorsal (b) view (b: setae of parameres omitted); c) male sternite X and spiculum; d) gonocoxite; e) female tergite X.

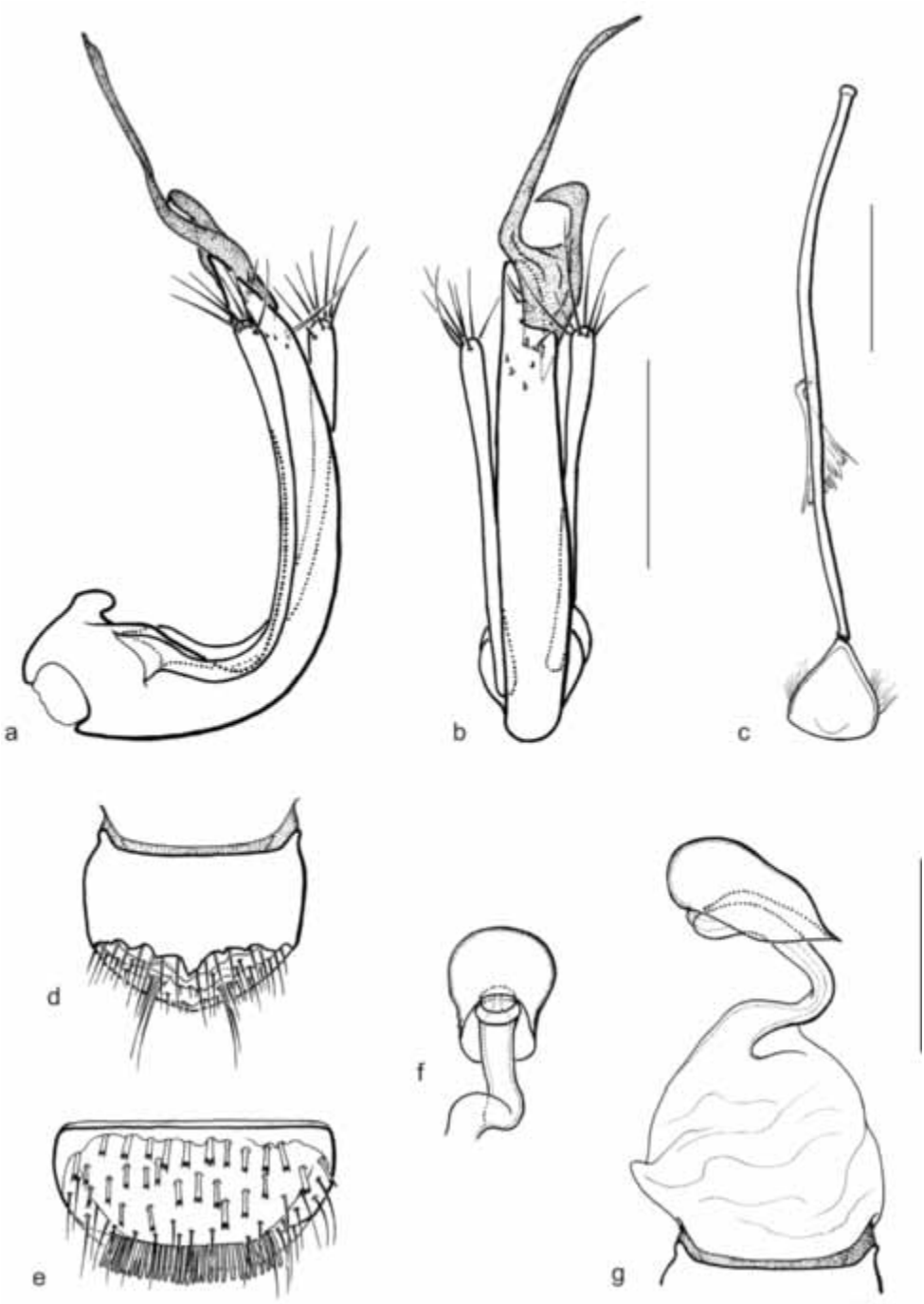

Fig. 11: *Hydraena kamitei*: a–b) aedeagus in lateral (a), dorsal (b) view; c) male sternite X and spiculum; d) gonocoxite; e) female tergite X; f–g) spermatheca.

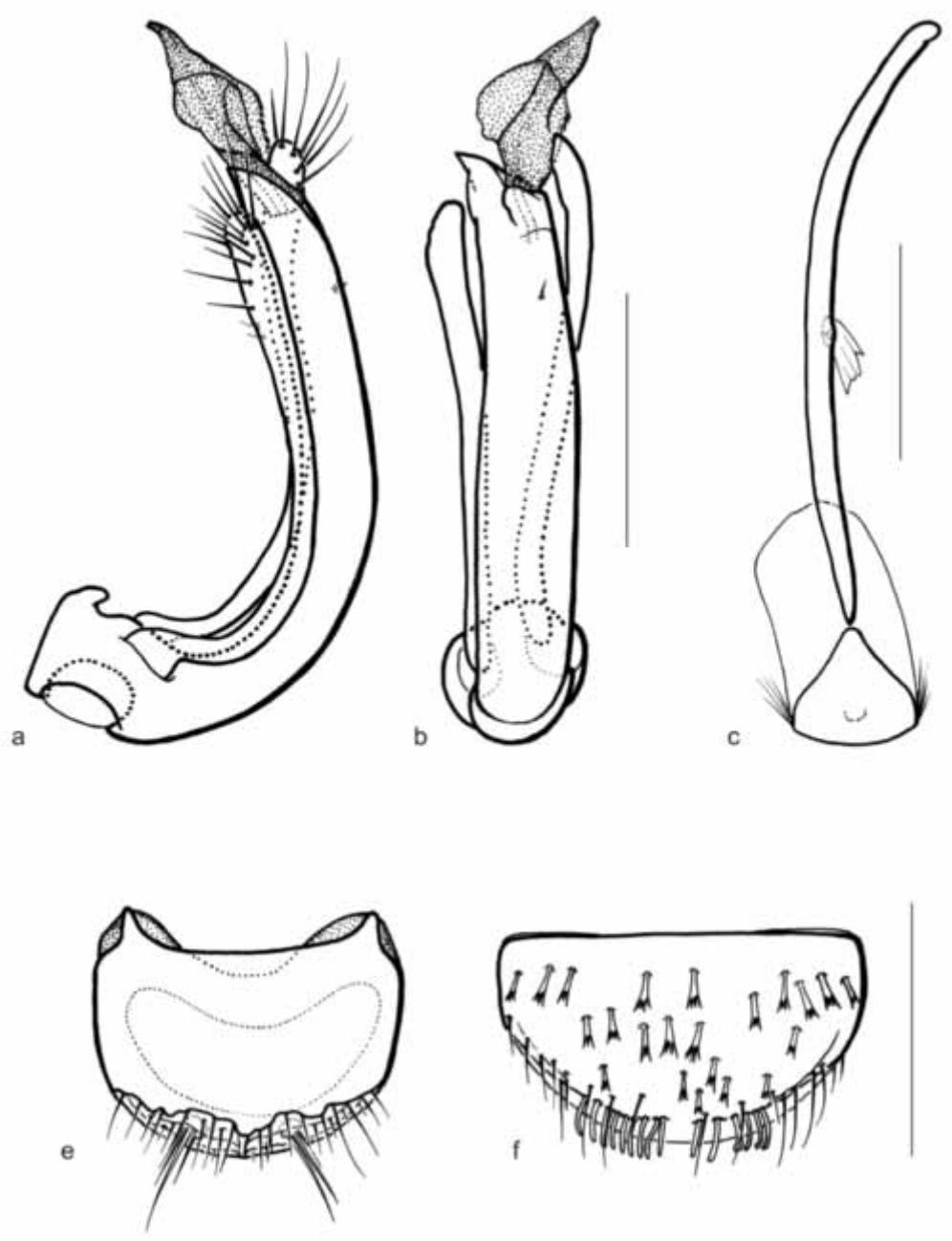

Fig. 12: *Hydraena kitayamai*: a–b) aedeagus in lateral (a), dorsal (b) view (b: setae of parameres omitted); c) male sternite X and spiculum; d) gonocoxite; e) female tergite X.

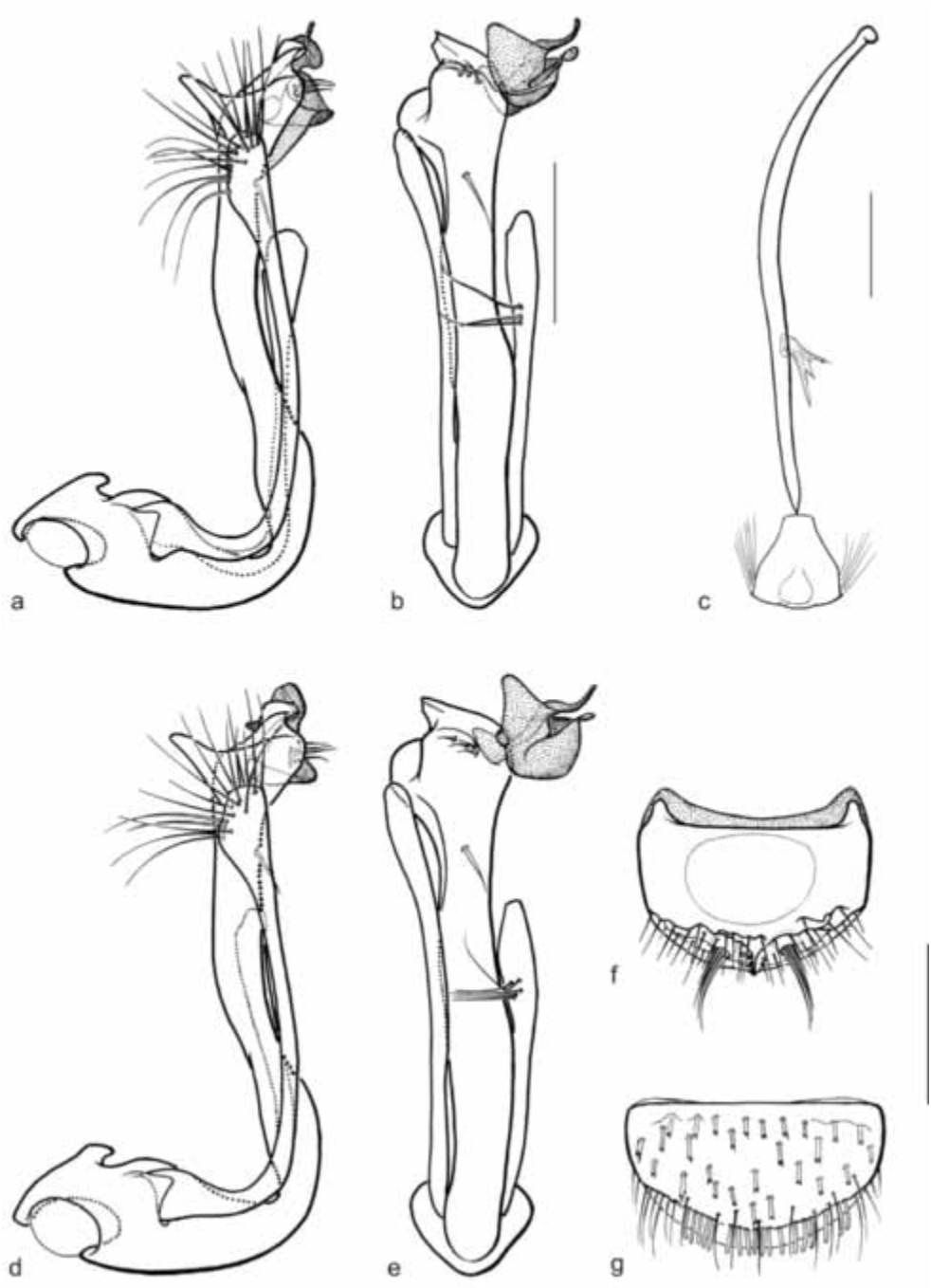

Fig. 13: *Hydraena notsui*; a–c: paratype: a–b) aedeagus in lateral (a), dorsal (b) view (b: setae of parameres omitted); c) male sternite X and spiculum; d–g: specimens from Tottori Prefecture: d–e) aedeagus in lateral (d), dorsal (e) view (e: setae of parameres omitted); f) gonocoxite; g) female tergite X

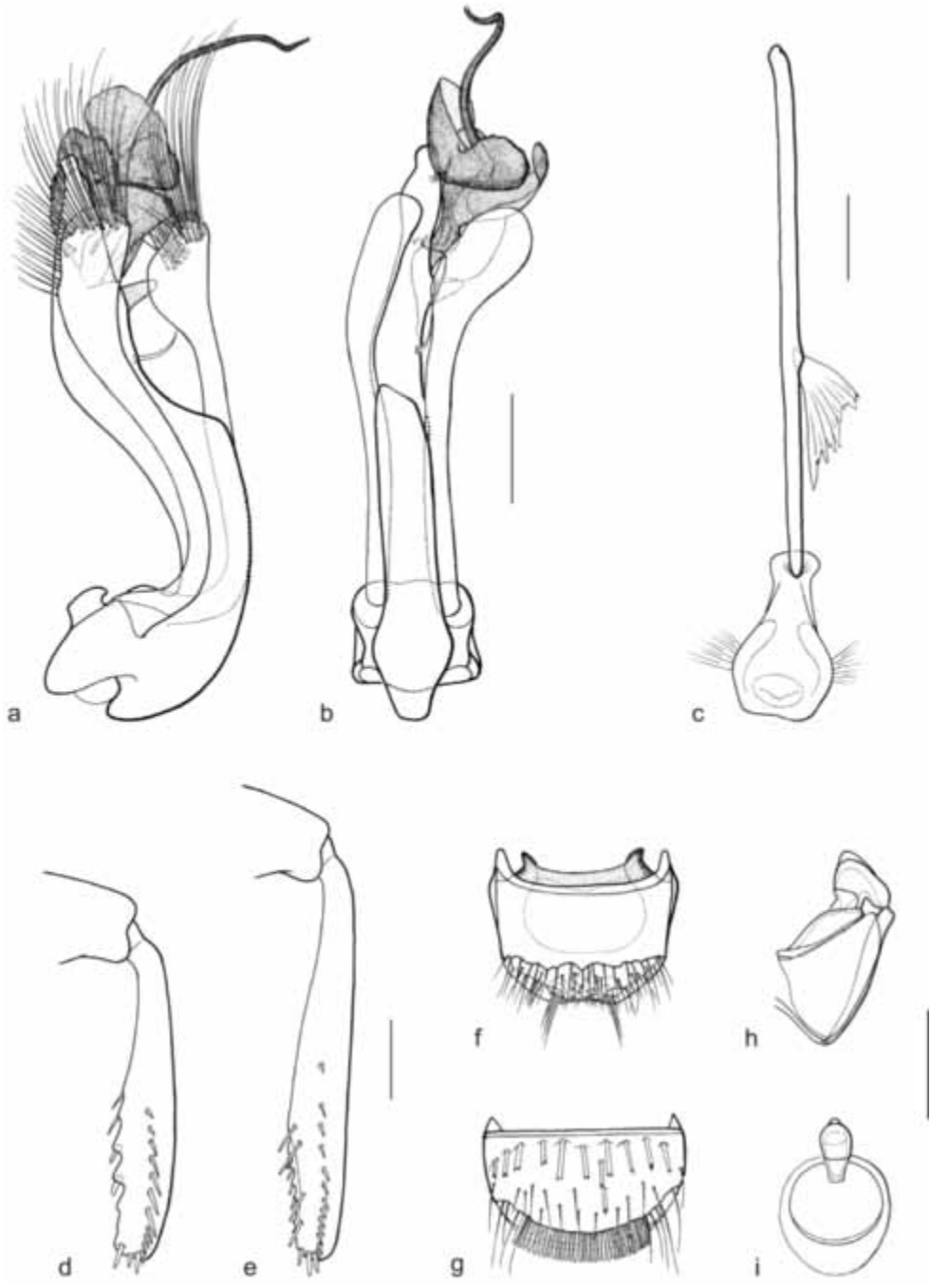

Fig. 14: *Hydraena kadowakii*: a–b) aedeagus in lateral (a), dorsal (b) view (b: setae of parameres not depicted); c) male sternite X and spiculum; d) mesotibia, male; e) metatibia, male; f) gonocoxite; g) female tergite X; h–i) spermatheca.

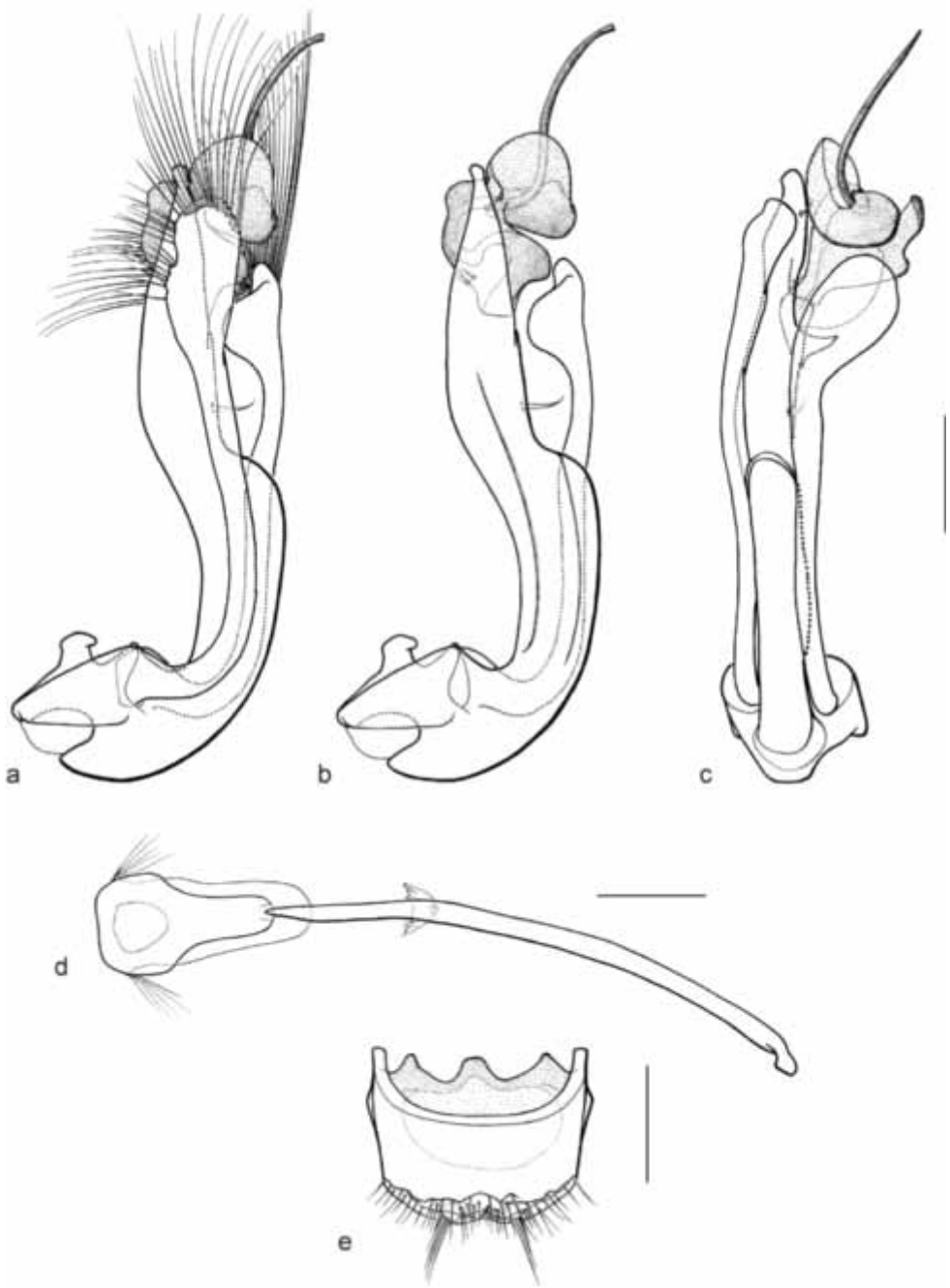

Fig. 15: *Hydraena tsushimaensis*: a–c) aedeagus in lateral (a–b), and dorsal (c) view (b, c: setae of parameres not depicted); d) male sternite X and spiculum; e) gonocoxite.

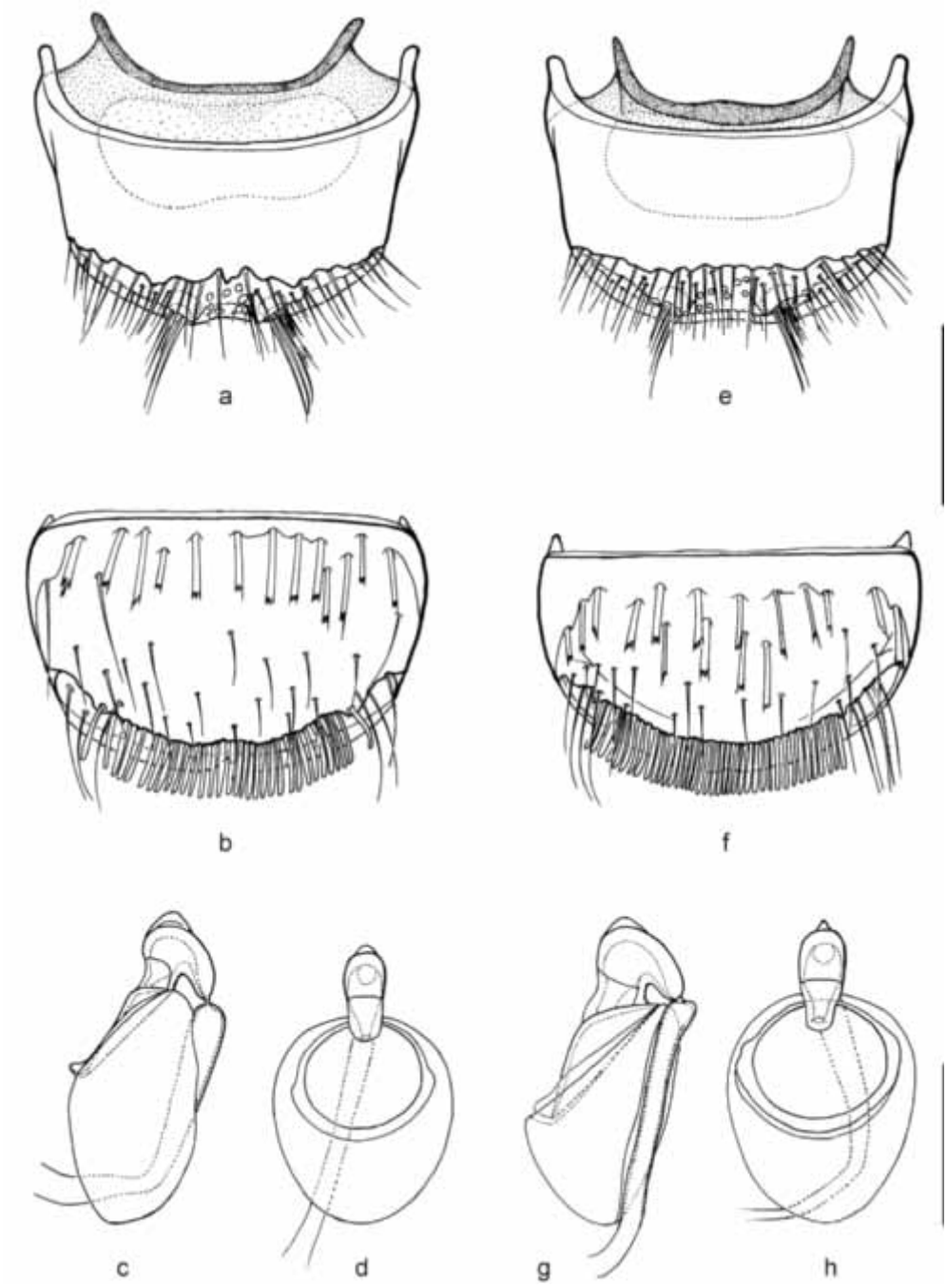

Fig. 16: a–d: *Hydraena watanabei*, Yamanashi Pref.: a) gonocoxite; b) female tergite X; c–d) spermatheca; e–h: *H.* cf. *watanabei*, Gifu Pref.: e) gonocoxite; f) female tergite X; g–h) spermatheca.

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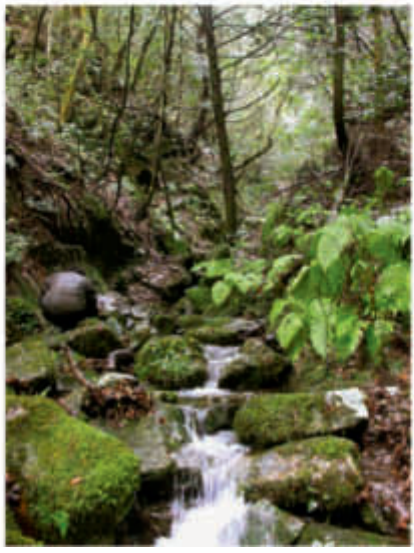

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Figs. 17–18: Type localities of 17) *Hydraena curvipes* and 18) *H. hayashii*.

Figs. 19–20: Type localities of 19) *Hydraena kadowakii* and 20) *H. tsushimaensis*.

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