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Revision of the Chinese species of *Hydraena* KUGELANN II. *Hydraena* s.str. from Gansu and Sichuan (Coleoptera: Hydraenidae)

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Abstract

Four new species of *Hydraena* s.str. KUGELANN are described: *Hydraena* (s.str.) *benjaminus* [Sichuan], *H.* (s.str.) *clemens* [Sichuan, ? Hubei], *H.* (s.str.) *geraldneuhauseri* [Gansu], *H.* (s.str.) *verberans* [Gansu, Sichuan]. The family Hydraenidae is recorded from Hubei for the first time. The genus *Hydraena* is recorded from Gansu for the first time. *Hydraena riparia* KUGELANN is recorded from Heilongjiang for the first time.

Key words: Coleoptera, Hydraenidae, Hydraena s.str., new species, China, Gansu, Hubei, Sichuan.

Introduction

Two species of *Hydraena* KUGELANN, 1794 have been recorded from Sichuan so far: *H.* (s.str.) *riparia* KUGELANN, 1794, and *H.* (*Hydraenopsis*) *szechuanensis* PU, 1951. Only one hydraenid, *Ochthebius* (*Asiobates*) *unimaculatus* PU, 1958, was known to occur in Gansu (see JÄCH 2004).

In the present paper, new distributional data are provided for *H. riparia*. Four new species of *Hydraena* s.str., collected between 1996 and 2004, are described from Gansu and Sichuan. One of these new species (or a very closely related one) was found also in Hubei, from where no hydraenids at all have been so far recorded (see JÄCH 2004). However, the species of *Hydraena* s.str., which were collected during the CWBS in Hubei shall not be treated in detail in this paper. They will be described in a forthcoming paper.

Material, acronyms and descriptions of CWBS localities

CASS Chinese Academy of Sciences, Institute of Applied Ecology, Shenyang CWBS China Water Beetle Survey (see http://www.nhm-wien.ac.at/nhm/2Zoo/coleoptera/publications/chinaindex.html or http://www.wasserkaefer.de/projects.htm#Wasserkäfer%20von%20China

- NMW Naturhistorisches Museum Wien
- CWBS loc. 232: Sichuan Province; Ya'an City Region; Tianqüan County; ca. 57 km W Ya'an City, and 4 km W Xingou Village; at foot of Erlang Shan (= Two Wolves Mountain); stream, ca. 2–3 m wide, tributary to Tianqüan He, cold and fast flowing through secondary forest, shaded, unpolluted, ca. 1500 m a.s.l.; 12.VI.1996; leg. L. Ji & M. Wang.
- CWBS loc. 233: Sichuan Province; Ya'an City Region; Tianqüan County; ca. 57 km W Ya'an City, 4 km W Xingou Village; at foot of Erlang Shan; upstream of CWBS loc. 232; small stream, ca. 1–2 m wide, cold and fast flowing through secondary forest, large stones, leaf packs, unpolluted, ca. 1600 m a.s.l.; 13.VI.1996; leg. L. Ji & M. Wang.

- CWBS loc. 235: Sichuan Province; Ya'an City Region; Tianqüan County; ca. 20 km W Tianqüan City; Dayu Xi (= Big Fish Brook) (tributary of Tianqüan He), ca. 4–5 m wide, cold and rather fast flowing through open area, with cobbles, very clean, ca. 1200 m a.s.l.; 13.VI.1996; leg. L. Ji & M. Wang.
- CWBS loc. 325: Gansu Province; Wudu Prefecture; Wen County; Bikou Town; near Dianba Village; river (Zheng Gou), ca. 15 m wide, with boulders, sand and gravel, fast flowing through flat valley with forested slopes, surrounded by agricultural fields, slightly polluted, ca. 950 m a.s.l.; 15.VI.1998; leg. M. Wang.
- CWBS loc. 331: Sichuan Province; Mao County; Jiuding Shan; ca. 10 km SW Mao Xian (= Fengyizhen), above Chashan Village; small spring surrounded by dense vegetation, sandy, densely shaded, ca. 2000 m a.s.l.; 28.VII.1998; leg. L. Ji, H. Schönmann, K. Schönmann & M. Wang.
- CWBS loc. 333: Sichuan Province; Mao County; Jiuding Shan; 8 km NE Mao Xian (= Fengyizhen), surroundings of Research Station of Chengdu Institute of Biology; sandy spring surrounded by dense vegetation, flowing over slate, shaded, 1750 m a.s.l.; 29.VII.1998; leg. L. Ji, H. Schönmann, K. Schönmann & M. Wang.
- CWBS loc. 335: Sichuan Province; Mao County; Jiuding Shan; ca. 7 km NE Mao Xian (= Fengyizhen), surroundings of Research Station of Chengdu Institute of Biology; small stream, running along a narrow road, < 0.5 m wide, sandy, slabs of slate, partly shaded by bushes, ca. 1850 m a.s.l.; 29.VII.1998; leg. L. Ji, H. Schönmann, K. Schönmann & M. Wang.
- CWBS loc. 522: **Hubei Province**; Shennongjia Forest District; ca. 10 km E Muyu, Chaiqi Village; stream, ca. 2–4 m wide, large boulders and gravel, flowing through steep gorge with bushes, ca. 1600 m a.s.l., geology: limestone, sandstone; 9.X.2004; leg. H. Schönmann & M. Wang.
- CWBS loc. 523: **Hubei Province**; Shennongjia Forest District; ca. 3 km N Muyu, Duanjiang Village; stream (right tributary of River Xiangxi), 3–4 m wide, rocks and gravel, shaded by bushes, ca. 1300 m a.s.l., geology: sandstone; 10.X.2004; leg. H. Schönmann & M. Wang.
- CWBS loc. 525: Hubei Province; Shennongjia Forest District; ca. 5 km SW Muyu; stream (right tributary of River Xiangxi), < 2 m wide, gravel, flowing through steep rocky gorge with bushes, ca. 1350 m a.s.l., geology: sandstone; 10.X.2004; leg. H. Schönmann & M. Wang.
- CWBS loc. 527: Hubei Province; Shennongjia Forest District; ca. 4 km NW Muyu, margin of Shennongjia Nature Reserve; stream, 3–5 m wide, large boulders, ca. 1500 m a.s.l., geology: sandstone; 11.X.2004; leg. H. Schönmann & M. Wang.
- CWBS loc. 528: Hubei Province; Shennongjia Forest District; 10 km E Muyu, ChaiqiVillage, 1 km N of CWBS loc. 522; stream, ca. 1–2 m wide, gravel, large boulders, flowing between bushes, ca. 1700 m a.s.l., geology: sandstone; 12.X.2004; leg. H. Schönmann & M. Wang.
- CWBS loc. 530: Hubei Province; Shennongjia Forest District; Guan Men Shan ("Close-the-door Mountain"), ca. 5 km W Muyu; stream, ca. 1–2 m wide, flowing through forest, ca. 1400 m a.s.l.; 13.X.2004; leg. H. Schönmann & M. Wang.
- CWBS loc. 531: **Hubei Province**; Shennongjia Forest District; ca. 5 km E Muyu, Tong Mu Village; stream, ca. 2–3 m wide, slowly flowing between agricultural fields, ca. 1250 m a.s.l., geology: sandstone, marble; 13.X.2004; leg. H. Schönmann & M. Wang.
- CWBS loc. 533: Hubei Province; Shennongjia Forest District; ca. 20 km SE Muyu, along Muyu Xingshan road; stream, ca. 2–3 m wide (right tributary of River Xiangxi), flowing through agricultural fields, ca. 800 a.s.l.; 14.X.2004; leg. H. Schönmann & M. Wang.
- CWBS loc. 534: Hubei Province; Shennongjia Forest District; ca. 25 km SE Muyu, along Muyu Xingshan road; stream, ca. 2–3 m wide (right tributary of River Xiangxi), stream, ca. 3–5 m wide (right tributary of River Xiangxi), flowing through gorge with bushes, large boulders, little gravel, ca. 750 m a.s.l.; 14.X.2004; leg. H. Schönmann & M. Wang.

- CWBS loc. 537: Hubei Province; Shennongjia Forest District; ca. 30 km E Muyu, Jiu Chong Village; stream, < 1 m wide (left tributary of River Xiangxi), flowing between agricultural fields, ca. 850 m a.s.l., geology: limestone; 16.X.2004; leg. H. Schönmann & M. Wang.
- CWBS loc. 539: Hubei Province; Shennongjia Forest District; ca. 35 km N Muyu, along road to Fang Xian; stream (tributary of Nan He), ca. 2–3 m wide, flowing between abandoned fields and forest, ca. 1600 m a.s.l., geology: sandstone and limestone; 17.X.2004; leg. H. Schönmann & M. Wang.

Hydraena (s.str.) riparia KUGELANN

Material examined: C H I N A (SICHUAN): 9 exs.: CWBS loc. 331; 6 exs.: CWBS loc. 333; 45 exs.: CWBS loc. 335.

DISTRIBUTION: Palearctic, from Ireland to Japan. In China it is also known from Liaoning, Jilin and Heilongjiang (new record).

Hydraena (s.str.) geraldneuhauseri sp.n.

TYPE LOCALITY (CWBS loc. 325): River (Zheng Gou), ca. 15 m wide, with boulders, sand and gravel, fast flowing through flat valley with forested slopes, surrounded by agricultural fields, slightly polluted, ca. 950 m a.s.l.; near Dianba Village; Bikou Town; Wen County; Wudu Prefecture; southern Gansu Province; central China.

TYPE MATERIAL: Holotype σ (CASS): "CHINA: Gansu, 15.6.1998 Wen County, Bikou env. Zheng Gou River, ca. 950m leg. M. Wang (CWBS 325)". Paratypes (NMW): 4 exs. (3 $\sigma \sigma$, 1 $_{\circ}$), same label data as holotype.

DIAGNOSIS: Habitus as in Fig. 1; 1.95–2.10 mm long. Reddish brown to dark blackish brown, frons usually darker (almost black) than remaining body parts.

This species can be distinguished from the other species of the *H. lehmanni* complex by the combination of the following external characters: apical segment of male maxillary palpus strongly vaulted (inflated), mesally flattened; pronotum large and wide, densely and coarsely punctate; elytra wide, densely punctate, with at least seven, partly irregular rows of punctures between suture and shoulder, humeral interval sometimes indistinctly carinate basally; male mesotibia with 2–3 bristles, proximal ones small and inconspicuous, third one large and hooked, with very small excision immediately posterior to spine, posterior corner of small excision slightly produced to form small gibbosity; male metatibia straight, with distinct swelling near apical 0.4; female metatibia very slightly curved.

Male sternite X and spiculum as in Fig. 5e.

Aedeagus (Fig. 5a–d): quite similar to other species of the *H. lehmanni* complex (apical area with three setae, one near apex and two on ventral subapical projection); main piece with conspicuous acute long triangular projection near apical 0.3 (lateral view) and with row of setae near 0.25 of left side; ventral subapical projection (lateral view) rather short; apex of main piece (lateral view) obtuse, not peg-like; flagellum of distal lobe long. Right paramere (lateral view) long, distinctly reaching beyond apex of main piece, dilated in apical 0.6, with subapical dorsal excision, without apical setae; left paramere short and wide, inconspicuously setose.

Female tergite X (Fig. 5i): wide (length/width = ca. 0.5), disc with bifid, trifid and multifid setae.

Gonocoxite (Fig. 5h): very similar to *H. lehmanni* JÄCH & DÍAZ, *H. christoferi* JÄCH & DÍAZ, etc. Lateral margin of outer plate strongly curved, condyles sublateral; basal angles of inner plate strongly produced laterad; cavea moderately large; apex gently emarginate medially.

Spermatheca as in Fig. 5f-g.

DISTRIBUTION: So far known only from the type locality (southern Gansu, central China). It is the first species of *Hydraena* s.str. recorded from Gansu.

Hydraena (s.str.) benjaminus sp.n.

TYPE LOCALITY (CWBS loc. 335): Small stream, < 0.5 m wide, running along a narrow road; sandy, slabs of slate, partly shaded by bushes, ca. 1850 m a.s.l.; Jiuding Shan; surroundings of Research Station of Chengdu Institute of Biology, ca. 7 km NE Mao Xian (= Fengyizhen); Mao County; northern Sichuan Province; central China.

TYPE MATERIAL: **Holotype** ♂ (CASS): "CHINA: Sichuan, 29.7.1998 Mao Xian Co. Jiuding Shan 7 km NE Mao Xian, ca. 1850m Schönmann, Ji & Wang (CWBS 335)". **Paratypes** (CASS, NMW): 11 exs. (6 ♂♂, 5 ♀♀), same label data as holotype.

DESCRIPTION: Habitus as in Fig. 2; 2.10–2.25 mm long. Dark chestnut brown to black; frons often darker than remaining body parts; labrum and body appendages reddish brown.

Labrum deeply excised medially; anterior and lateral margins slightly upturned. Clypeus very densely micropunctate, matt. Fronto-clypeal suture slightly arcuate, very faintly impressed. Frons rather densely punctate, punctures deeply impressed, sharply defined, micropunctate; interstices narrow, glabrous; paraocular grooves very shallow. Eyes moderately large, with about 25 facets visible in dorsal view. Maxillary palpi unicoloured, long, distinctly longer than maximum width of pronotum.

Pronotum subcordiform, strongly constricted anteriorly and posteriorly, distinctly wider than long (length/width = 0.77); anterior margin distinctly emarginate; anterior angles obtuse; lateral rim crenulate/denticulate; lateral angles widely rounded; disc moderately convex, moderately densely or densely punctate; interstices glabrous, rim-like narrow, rarely larger than a puncture diameter; posterior admedian foveae hardly perceptible; sublateral groove distinct, deeply impressed subanteriorly and subposteriorly; lateral portion of pronotum deflexed, slightly convex, very densely punctate.

Elytra elongate suboval; with eight, more or less regular rows of punctures between suture and shoulder (app. 14 rows per elytron); punctures moderately large, deeply impressed (in anterior half of elytra) and rather densely arranged in partly impressed lines; intervals slightly convex, glabrous; ninth (humeral) interval inconspicuously carinate in anterior 0.2; explanate margin of elytra rather wide, more or less strongly serrate in anterior 0.3; elytral apices subacuminate (sexually dimorphic).

Mentum and submentum microreticulate and micropunctate, matt. Two genal ridges well developed; subocular ridge very distinct; an additional oblique genal ridge connects maxillary socket and posterior genal ridge. Gula with moderately large pregular glabrous area. Prosternum impressed in front of procoxae; with prominent median keel. Mesoventrite with seven longitudinal ridges, median ridge very short, not developed in posterior half. Metaventral disc impressed medially (sexually dimorphic); metaventral plaques subparallel, moderately wide, elongate. Intercoxal segment (= abdominal sternite II) subquadrate, posterior angles strongly acuminately produced. First ventrite with weakly developed longitudinal ridge; abdominal sternites VII and VIII sexually dimorphic. Legs sexually dimorphic; mesal face of mesotibia with tiny posteriorly directed spine near distal 0.3, and with very small excision immediately posterior to spine. Metatibia straight.

Aedeagus (Fig. 6a–c): Main piece about 820 µm long, elongate and slender; strongly curved in basal third and slightly sinuous in apical half (lateral view); with four setae, two before apex on

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left side and two very close to insertion of distal lobe; phallobase more or less symmetrical. Distal lobe very long and slender, about 500 μ m long, with moderately long, flagelloid subapical appendage. Right paramere long and slender, inserted near phallobase, reaching base of distal lobe; apex widened, with row of long setae. Left paramere slightly longer than right one; ventrally widened subapically; with a group of apical and a row of subapical setae.

Gonocoxite (Fig. 6d): transverse, apical and lateral margins slightly rounded; apical area of outer plate short, well delimited, basal angles sublateral; inner plate slightly exposed basally, basal angles acuminate, slightly produced; with one moderately large cavea.

Spermatheca (Fig. 6f-g): Proximal portion very short, angulate; distal portion tubular-discoidal.

SECONDARY SEXUAL CHARACTERS: Elytral apices usually more distinctly acuminate in females. Middle of metaventrite more deeply impressed in male. Mesotibial spine of male more distinct, posterior corner of small excision (immediately posterior to spine) slightly produced to form small gibbosity. Metatibia of male hardly noticeably widened mesally around posterior 0.3. Male ventrites 5 and 6 strongly enlarged.

Male sternite X and spiculum resembling *Hydraena jilanzhui* JÄCH & DÍAZ. Sternite X subcordiform, base truncate, basal angles produced laterad, apical margin rounded; not firmly connected with spiculum.

Female tergite X (Fig. 6e): subsemicircular, transverse (length/width = ca. 0.63); disc moderately densely covered with squamose setae, trichoid setae confined to apical and lateral areas; subapical fringe medially with densely set vermiform setae.

VARIABILITY: Punctation of pronotal disc varies from sparse (leaving glabrous spaces, which are distinctly wider than one puncture diameter) to very dense. Humeral interval not always distinctly carinate in anterior 0.2. In one female, elytral punctation less dense and distinctly irregular in cranial third. Female elytra more or less strongly acuminate.

DISTRIBUTION: Known only from the type locality (northern Sichuan, central China).

ETYMOLOGY: Named for Benjamin Maurer (Vienna, Austria).

Hydraena (s.str.) clemens sp.n.

TYPE LOCALITY (CWBS loc. 233): Small stream, ca. 1–2 m wide, cold and fast flowing through secondary forest, large stones, leaf packs, unpolluted, ca. 1600 m a.s.l.; 4 km W Xingou Village, ca. 57 km W Ya'an City; at foot of Erlang Shan; Tianqüan County; Ya'an City Region; central Sichuan Province; central China.

TYPE MATERIAL: Holotype σ (CASS): "CHINA: Sichuan, 13.6.1996 ca. 60 km W Ya'an, 1600m 4 km W Xingou Village leg. Ji & Wang (CWBS 233)". Paratypes (NMW): 3 exs. (2 $\sigma \sigma$, 1 $_{\circ}$), same label data as holotype. The single female lacks its mesotibiae.

ADDTIONAL MATERIAL EXAMINED: About 180 specimens from Hubei (CWBS locs. 522, 523, 525, 527, 528, 530, 531, 533, 534, 537, 539) agree very well with the type material from Sichuan. However, additional studies will be necessary to find out whether some of the differences (e.g. width of aedeagus in ventral view) are adequate to describe a new species.

DIFFERENTIAL DIAGNOSIS: Habitus as in Fig. 3. In general appearance (colouration, body shape, punctation, secondary sexual characters) and variability, this species agrees very well with *Hydraena benjaminus*. It can be distinguished from the latter mainly by its smaller size (2.1–2.2 mm long), by the genitalia, and especially by the mesoventral disc of male.

Sublateral groove less deeply impressed than in *H. benjaminus*. Elytral gutter slightly less widely explanate. Secondary sexual characters more or less as in *H. benjaminus*; metatibia with fringe

of long setae (partly rubbed off in older specimens). Metatibia of male mesally slightly more widened around posterior 0.3. Mesoventral disc of male hardly impressed between plaques, with conspicuous longitudinal median glabrous carina (app. between basal 0.3–0.6).

Male sternite X and spiculum (Fig. 7f): Sternite X subtriangular, base rounded.

Aedeagus (Fig. 7a–c): Distinctly shorter than that of *H. benjaminus*, about 640 μ m long; main piece more straight medially, distinctly curved ventrad apically (lateral view), strongly flattened (ventral view), with three setae, two more or less in the same position as in *H. benjaminus* and one on dorsal margin at base of distal lobe; apex long and acute. Distal lobe very long (longer than main piece), basally strongly flattened, inserted further proximal than in *H. benjaminus*, with very long flagellum. Right paramere short and thin, not reaching base of distal lobe; left paramere distinctly shorter than right one; each paramere with an apical group of barbed long setae.

Female tergite X (Fig. 7e): distinctly longer than in *H. benjaminus* (length/width = 0.84); fringe of blunt subapical setae narrower.

Gonocoxite (Fig. 7d): suboval, approximately as long as wide, thus distinctly longer than in *H. benjaminus* (length/width = 1.03); apical area of outer plate longer; cavea much larger.

Spermatheca as in Fig. 7g-h, quite similar to that of *H. benjaminus*.

DISTRIBUTION: Known with certainty only from central Sichuan (central China). Specimens from south-western Hubei might represent a closely related species.

ETYMOLOGY: Named for Clemens Maurer (Vienna, Austria).

Hydraena (s.str.) verberans sp.n.

TYPE LOCALITY (CWBS loc. 232): Stream, ca. 2–3 m wide, tributary to Tianqüan He, cold and fast flowing through secondary forest, shaded, unpolluted, ca. 1500 m a.s.l.; 4 km W Xingou Village, ca. 57 km W Ya'an City; at foot of Erlang Shan (= Two Wolves Mountain); Tianqüan County; Ya'an City Region; central Sichuan Province; central China.

TYPE MATERIAL: Holotype σ (CASS): "CHINA: Sichuan, 12.6.1996 ca. 60 km W Ya'an, 1500m 4 km W Xingou Village leg. Ji & Wang (CWBS 232)". Paratypes (NMW): 5 exs.: 1 σ , 1 $_{\phi}$, same label data as holotype; 2 $\sigma \sigma$: "CHINA: Sichuan, 13.6.1996 W Ya'an, 20 km W Tianquan Dayuxi stream, 1200m leg. Ji & Wang (CWBS 235)"; "CHINA: Gansu, 15.6.1998 Wen County, Bikou env. Zheng Gou River, ca. 950m leg. M. Wang (CWBS 325)".

DIFFERENTIAL DIAGNOSIS: Habitus as in Fig. 4. 1.75–1.90 mm long. Smaller and more slender than in *Hydraena benjaminus* and *H. clemens*. Pronotal sublateral grooves almost as deeply impressed as in *H. benjaminus*. Elytral striae on disc vary from almost completely regular to distinctly irregular; humeral interval not very distinctly carinate; elytral gutter rather narrow. Metaventral disc very shallowly impressed in both sexes. Protibia of male more strongly curved than in *H. benjaminus* and *H. clemens*; mesotibia of male with two or three spines, posterior one the largest; male metatibia more or less as in *H. benjaminus*.

Male sternite X and spiculum (Fig. 8e): similar to that of *H. clemens*, apical corners more rounded, spiculum thinner.

Aedeagus (Fig. 8a–b): Main piece slender, rather evenly curved (lateral view), about 640 μ m long; with three setae on left side, two very close to apex, one near base of distal lobe; apex pointed and slightly upturned (lateral view); phallobase more or less symmetrical, forming a closed ring. Distal lobe rather large about 640 μ m long, rather amorphic, with long whip-like flagellum. Right paramere long, reaching apex of main piece, wide and flattened, with an apical

group of moderately long setae. Left paramere very short, reduced to a short stump, apex with group of setae (shorter than those of right paramere).

Female tergite X (Fig. 8d): strongly transverse, distinctly shorter than in *H. benjaminus* and *H. clemens* (length/width = 0.64); squamose setae confined to basal margin and trichoid setae confined to apical margin; subapical fringe medially with densely set vermiform setae; basal margin with conspicuous short acute projections.

Gonocoxite (Fig. 8c): subrectangular (length/width = 0.77); outer plate strongly constricted subbasally, apical margin rounded; apical area rather short; inner plate distinctly exposed basally, basal margin concave, corners slightly produced, cavea very large.

Spermatheca (Fig. 8f-g): similar to *H. benjaminus* and *H. clemens*, but discoidal distal portion without tubular part.

DISTRIBUTION: So far known only from central Sichuan and southern Gansu (central China).

ETYMOLOGY: Verberans (Latin), whipping. The epithet refers to the whip-like flagellum of the aedeagal distal lobe.

Unidentified females

Six females from CWBS loc. 232 could not be identified. They probably represent new species. However, due to the absence of males we refrain from formal descriptions.

Hydraena (s.str.) lehmanni complex sp. "Sichuan 2" o

This species (five females examined) represents a rather typical member of the *H. lehmanni* complex. 1.95–2.05 mm long. It deviates significantly from *Hydraena geraldneuhauseri* in the narrower pronotum (if compared with body length), the less densely arranged pronotal and elytral punctation, and the terminal abdominal sclerites and the spermatheca (Fig. 9). Basal corners of inner plate of gonocoxite strongly produced, resembling e.g. *H. lehmanni* JÄCH & DÍAZ and *H. philippi* JÄCH & DÍAZ.

Hydraena (s.str.) benjaminus complex sp. "Sichuan 4" 9

This species (one female examined) belongs to the *H. benjaminus* complex (as defined below). 2.1 mm long. It deviates significantly from all other species of the complex by the terminal abdominal sclerites and the spermatheca (Fig. 10a). Apical area of gonocoxite short, base of pseudostyli not visible in ventral view; basal corners of inner plate strongly produced. Female tergite X distinctly transverse; fringe of blunt setae interrupted medially. Proximal part of spermatheca with tiny projection.

Discussion

The four new species described herein can tentatively be grouped in two lineages.

Due to its aedeagal morphology, *Hydraena geraldneuhauseri* undoubtedly is a member of the *H. lehmanni* complex (see JÄCH & DÍAZ 2005). Externally, it deviates from all other members of this group by the very dense punctation of the upper surface. An unusual feature in this group is the presence of a row of setae on the aedeagal main piece, which might be explained as a result of the partial fusion of the main piece with the left paramere.



Fig. 1: Habitus of Hydraena (s.str.) geraldneuhauseri.



Fig. 2: Habitus of Hydraena (s.str.) benjaminus.



Fig. 3: Habitus of Hydraena (s.str.) clemens.

Fig. 4: Habitus of Hydraena (s.str.) verberans.

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Fig. 5: *Hydraena* (s.str.) *geraldneuhauseri*: a-c) aedeagus in lateral, ventral and dorsal view; d) right paramere, ventral view; e) male sternite X and spiculum; f-g) spermatheca; h) gonocoxite; i) female tergite X.





Fig. 6: *Hydraena* (s.str.) *benjaminus*: a-c) aedeagus in lateral view, apex in ventral view; d) gonocoxite; e) female tergite X; f-g) spermatheca.



Fig. 7: *Hydraena* (s.str.) *clemens*: a–c) aedeagus in lateral and dorsal view; d) gonocoxite; e) female tergite X; f) male sternite X and spiculum; g–h) spermatheca. (Parameral setae omitted in a and c, apex of aedeagus not illustrated in c).



Fig. 8: *Hydraena* (s.str.) *verberans*: a–b) aedeagus in lateral and ventral view; c) gonocoxite; d) female tergite X; e) male sternite X and spiculum; f–g) spermatheca.



Figs. 9–10: Unidentified females of *Hydraena*: 9) *H. lehmanni* complex sp. "Sichuan 2", 10) *H. benjaminus* complex sp. "Sichuan 4": a) gonocoxite; b) female tergite X; c–d) spermatheca.

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The remaining three new species (*Hydraena benjaminus* complex: *H. benjaminus*, *H. clemens*, *H. verberans*) are united by the following characters: upper surface coarsely punctate; elytra elongate-suboval, not distinctly parallel-sided; ninth (humeral interval) of elytra more or less carinate anteriorly; elytral striae largely irregular; maxillary palpi not sexually dimorphic, not darkened apically; similar sexual characters of tibiae; aedeagus rather simple, setal pattern of main piece: 2 + 2 or 2 + 1; distal lobe with flagellum; parameres long or short, never intricately shaped. Especially in Hubei Province, the *H. benjaminus* complex is very speciose.

Phylogenetically, the *Hydraena benjaminus* species complex probably has to be placed near the *H. lehmanni* complex, with which it shares male tibial characters and, as far as *H. geraldneuhauseri* is concerned, dense punctation, irregular elytral striae and humeral carina.

Corrections to "Revision of the Chinese species of *Hydraena* KUGELANN I" (JÄCH & DÍAZ 2005)

Hydraena huitongensis JÄCH & DÍAZ:

Instead of eight paratypes $(2 \ abla \ black, 6 \ black \ classifier \ classifier$

Hydraena jilanzhui JÄCH & DÍAZ:

Instead of 62 paratypes (41 $\sigma\sigma$, 21 $\varphi\varphi$) labelled "CHINA, NW-Hunan 1993 Wulingyuan, N Dayong Zangjiajie, 29.10., 650m leg. Schillhammer (1)" there are in fact only 41 specimens (20 $\sigma\sigma$, 21 $\varphi\varphi$) with this label. In addition, there are 21 paratypes ($\sigma\sigma$) labelled "CHINA, NW-Hunan 1993 Wulingyuan, N Dayong Zangjiajie, 29.10., 650m leg. Schönmann (1)", which were previously not listed.

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