Koleopterologische Rundschau	76	97–134	Wien, Juli 2006

Taxonomy and ecology of the Lebanese species of the genus *Hydraena* KUGELANN, with descriptions of four new species (Coleoptera: Hydraenidae)

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Abstract

Four new species of *Hydraena* s.str. KUGELANN are described from Lebanon: *Hydraena* (s.str.) *berthelemyana*, *H.* (s.str.) *orthosia*, *H.* (s.str.) *phoenicia*, and *H.* (s.str.) *sidon*. Ecological and distributional data of all nine Lebanese *Hydraena* species are summarized. All species are keyed. The male and female genitalia are illustrated.

Key words: Coleoptera, Hydraenidae, *Hydraena*, new species, Lebanon.

Introduction

Since almost 30 years, the second author, A. Dia, has been co-ordinating comprehensive hydrobiological surveys in Lebanon. In the course of these surveys four new species of *Hydraena* KUGELANN were discovered, which are described herein.

The large number of specimens sampled provided an opportunity to study the ecology and distribution of the Lebanese species of the genus *Hydraena*. Ecological and distributional data of all nine Lebanese *Hydraena* species are summarized. All species are keyed. The male and female genitalia are illustrated.

Material and methods

About 1100 adults of *Hydraena* from Lebanon were studied. The majority of these specimens were sampled by the second author in more than 10 coastal river systems along the western slope of Mt. Lebanon. In addition to the material sampled by the second author, we have examined all historical specimens (types of *H. berytus* JÄCH and *H. furthi* JÄCH) and a few specimens which were collected by R. Ortal in 1982 and by A. van Nieuwenhuizen in 2003.

The Lebanese river systems are mapped in Fig. 1.

The Awali and the Damour Rivers were most thoroughly studied. At each station sampling was conducted from April 1979 to April 1980 (Awali) and from May 1980 to April 1981 (Damour). Twelve Surber samples (each of 250 cm²) were taken from fast flowing reaches at each site. More than 800 adults of *Hydraena* were collected during these two years. Additional information on physiographical and physico-chemical characteristics of various Lebanese river systems were published by ABI-SALEH (1978), DIA (1983, 1984, 1998), and DIA & JÄCH (1992).

The majority of the specimes are housed in the NMW. Some voucher specimens are deposited in the CDS. Some will be deposited in the Museum of the Lebanese University, Beirut.

In at least four cases English and French transcriptions of Lebanese river names deviate from each other:

English:	Awali	Oustouene, Ostuene	Abou Ali	El Kebir
French:	Aouali	Oustouane	Abou Aali	El Kabir

Except when referring to label data, English names were used in this article.

Abbreviations/Acronyms:

CDS	Coll. Díaz, Santiago de Compostela	NMW	Naturhistorisches Museum Wien
e	elevation (m a.s.l.)	t	annual water temperature range (°C)

Taxonomy

(by Jäch, Díaz & Dia)

Only one subgenus, *Hydraena* s.str., is known to occur in Lebanon. Members of the primarily tropical subgenus *Hydraenopsis* JANSSENS have been recorded from Egypt, Israel and Saudi Arabia, but not from Lebanon so far.

Phylogenetically, *Hydraena paganetii* GANGLBAUER is regarded the most basal species, whereas the two members of the *H. gracilis* group, *H. berthelemyana* sp.n. and *H. orthosia* sp.n. are the most derived ones.

Checklist of the Lebanese species of *Hydraena* KUGELANN

1. *H.* (s.str.) *berthelemyana* JÄCH, DÍAZ & DIA sp.n.
2. *H.* (s.str.) *berytus* JÄCH, 1986
3. *H.* (s.str.) *damascena* PIC, 1910
4. *H.* (s.str.) *furthi* JÄCH, 1982
5. *H.* (s.str.) *modili* JÄCH, 1988
6. *H.* (s.str.) *orthosia* JÄCH, DÍAZ & DIA sp.n.
7. *H.* (s.str.) *paganettii* GANGLBAUER, 1901
8. *H.* (s.str.) *phoenicia* JÄCH, DÍAZ & DIA sp.n.
9. *H.* (s.str.) *sidon* JÄCH, DÍAZ & DIA sp.n.

Hydraena (s.str.) *testacea* species group

This species group was formerly treated as a subgenus (*Phothydraena* KUWERT). However, a thorough cladistic analysis (JÄCH et al. 2000) proved that it should be regarded as a species group within *Hydraena* sensu stricto. Subgeneric status does not seem to be justified at present, because the phylogenetic positions of the most basal species of the subgenus *Hydraena* (e.g., *H. monikae* JÄCH & DÍAZ, *H. rugosa* MULSANT) are not resolved satisfactorily.

Hydraena (s.str.) *paganettii* GANGLBAUER, 1901

Hydraena paganettii GANGLBAUER 1901: 322.

DIAGNOSIS: Habitus as in Fig. 3. Length (labrum to elytral apex): 1.55–1.70 mm. Male and female genitalic structures as in Fig. 11. Parameres comparatively large, symmetrical, inserted ventrally. Terminal sternite of male with large hyaline part, not firmly fused with spiculum. Gonocoxite crescent-shaped, with conspicuous longitudinal median groove. Female tergite X with squamose setae, without vermiform setae. “Pseudospermatheca” present.

DISTRIBUTION (Fig. 20): This species ranges from eastern Central Europe to Azerbaydzhan and northern Israel (JÄCH 1986, 2004). *Hydraena paganettii* is thus the most wide-spread *Hydraena* species of Lebanon, where it probably occurs throughout the country.

Basin of Awali: 1 ♀: "LIBANON: Aouali Bas. Ras el Ain St. 9 [A14] O52 25.10.1979 leg. Dia".
Basin of Litani: 2 ♂♂: "Libanon, Ain el Lijeh [spring] Aana [village, eastern slope of Mt. Barouk]. Alt. 1819 m 35 44'22E-33 41'63N 13.XII.2003 Nieuwenhuijzen".

Hydraena (s.str.) *rufipes* species group

The *H. rufipes* species group is obviously related with the *H. grandis* group. The bunch of setae on the apex of the aedeagal main piece (also found in *H. pulchella*) might represent a synapomorphy uniting these groups.

Hydraena (s.str.) *modili* JÄCH, 1988

Hydraena modili JÄCH 1988: 761.

This species was originally placed in the *Hydraena pulchella* species group (JÄCH 1988: 761). Externally, Turkish specimens indeed resemble *Hydraena pulchella* GERMAR and its allies. However, genitalically, *H. modili* is definitely closer to the *H. rufipes* group.

DIAGNOSIS: Habitus as in Fig. 4. Length (labrum to elytral apex): 1.55–1.65 mm. Male and female genitalic structures (Fig. 12) very similar to some Turkish and even some European species, e.g., the Iberian *Hydraena stussineri* KUWERT (see JÄCH & DÍAZ 2000). Aedeagal main piece S-shaped (lateral view); both parameres with curly setae. Female elytra produced and conspicuously excised apically. Gonocoxite with long apodemes forming a closed ring. Female tergite X with squamose and vermiform setae.

Externally, the Lebanese specimens differ from the Turkish ones in the more or less entirely black pronotum and elytra.

DISTRIBUTION (Fig. 20): This species occurs in the Turkish province of Hatay (Antakya) and throughout western Lebanon (JÄCH 1986, 2004), where it is obviously quite rare. *Hydraena modili* probably lives in Syria as well.

Basin of Oustouene: 1 ♂: "LEBANON: Mazraat Basin of Oustouane nr. vill. Mazraat Balde 27.6.1999, leg. Dia (J31) St 14, I30 - I34" [e = 240, t = 15–22].
Basin of El Jaouz: 1 ♂: "LEBANON: 11.9.1999 Basin of El Jaouz stream nr. Tannourine el Faouqa, leg. Dia (S2 + S3) S1 - S4" [e = 1350; t = 8.9–13.2]; 1 ♀: "LEBANON 2003 El Jaouz Basin Ain er Raha stream near Ouadi Tannourine Village [Valley, not Village], 26.V. leg. Dia" [e = 900, t = 8.4–15.8].
Basin of Awali: 1 ♀: "LIBANON: Aouali Bas. Aouali at Jisr Jdaidet ech Chouf 28.4.1979 St6 A35 leg. Dia".

Hydraena (s.str.) *grandis* species group

This species group is characterized by a high aedeagal complexity and by the large body size of its members (this group includes the largest species of the genus).

In Lebanon, this group is represented by four species, two of which are new to science and described herein. All four species seem to be rather closely related to each other sharing several aedeagal synapomorphies.

Hydraena (s.str.) *berytus* JÄCH, 1986

Hydraena berytus JÄCH 1986: 14.

DIAGNOSIS: Habitus as in Fig. 5. Length (labrum to elytral apex): 2.6–2.8 mm (male), 2.3–2.7 mm (female). Male and female genitalic structures as in Fig. 13. Aedeagus highly complex; phallobase conspicuously large; parameres distinctly asymmetrical. Terminal sternite of male very intricately shaped, with v-shaped basal emargination. Gonocoxite large, subtriangular, wider than long, base of inner plate complexly structured. Female tergite X strongly transverse, with squamose setae, without vermiform setae.

DISTRIBUTION (Fig. 21): This species is so far known only from Lebanon (JÄCH 1986, 2004), where it is very widely distributed. One locality (Basin of Hazbani, Ras Naba) is not entered in the map.

Type locality: Beirut, Lebanon (holotype and one paratype in NMW).

Basin of El Kebir: 2 ♀♀: "LEBANON: 23.5.1998 Basin of El Kabir Magl Bal spr. brook in Ouadi Chadra [Ouâdi Oudine, not Chadra] leg. Dia (F.G.)" [e = 1440, t = 11.5–11.6].

Basin of Oustouene: 1 ♂, 1 ♀: "LEBANON: 27.6.1999 Basin of Oustouane [el] Koucha main str. at bridge [Jisr] El Koucha leg. Dia St 15 (J 35 + J 36)" [e = 88, t = 16–24]; 1 ♀: "LEBANON: Mazraat Basin of Oustouane [main stream] nr. vill. Mazraat [el] Balde 27.6.1999, leg. Dia (F.G.)" [e = 240, t = 15–22]; 1 ♀: "LEBANON: 19.7.1998 Basin of Oustouane Kharrar spr. brook nr. Aakar el Aatiqa leg. Dia (F.G.)" [e = 950, t = 12.2–13.0].

Basin of Aarqa: 1 ♀: "LEBANON: 28.5.2000 Basin of Aarqa Houaich str. nr. vill. Houaich leg. Dia (M9 - M12)" [e = 490, t = 12.7–17.2].

Basin of Abou Ali: 1 ♂: "Libanon Abou Ali 23.VI.1996 ca. 500 m downstream Qadicha spring-brook [near village Bcherre], Alt: 1500m" [t = 6.2–14.0].

Basin of El Jaouz: 1 ♂: "LEBANON: 15.6.1999 Basin of El Jaouz Amt Dalli str. [main stream, not Amt Ed-Dalli] nr. vill. Beit Chlala leg. Dia (F.G.) St 4" [e = 610, t = 8.5–20.5]; 1 ♀: "LEBANON: 15.6.1999 Basin of El Jaouz Amt Dalli str. [main stream, not Amt Ed-Dalli] nr. vill. Beit Chlala leg. Dia (F.G.)" [e = 610, t = 8.5–20.5].

Basin of Ibrahim: 1 ♂: "LEBANON 2002 Ibrahim Basin main river Chouane Power Plant 23.VI., leg. Dia" [e = 300, t = 7–19]; 1 ♀: "LIBANON: 12.5.1995 Ibrahim Bas. Zaat 3, Roueiss [Rouais Stream near village Yanouh] leg. Dia" [e = 1015, t = 17–19].

Basin of Damour: 1 ♀: "LIBANON: Damour Bas. Damour St. 25 [Nahr es Safa, St. 24] E144 27.7.1980 leg. Dia"; 1 ♂, 4 ♀♀: "LIBANON: Damour Bas. Damour St. 25 [main river] E149 27.7.1980 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Damour Bas. Damour St. 25 E152 27.7.1980 leg. Dia"; 16 ♂♂, 13 ♀♀: "LIBANON: Damour Bas. Damour St. 25 E153 27.7.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Damour St. 25 E148 27.7.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Damour St. 25 E151 27.7.1980 leg. Dia"; 1 ♂, 4 ♀♀: "LIBANON: Damour Bas. Damour St. 25 E180 27.7.1980 leg. Dia"; 3 ♂♂, 4 ♀♀: "LIBANON: Damour Bas. Damour St. 25 FG 26.6.1980 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Damour Bas. Damour St. 25 FG 10.9.1980 leg. Dia"; 1 ♂: "LIBANON: Damour Bas. Damour St. 25 FG 28.10.1980 leg. Dia"; 1 ♂: "LIBANON: Damour Bas. Damour St. 25 FG leg. Dia"; 2 ♂♂, 5 ♀♀: "LIBANON: Damour Bas. Damour St. 25 C148 8.10.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Damour St. 25 B150 22.8.1980 leg. Dia"; 3 ♀♀: "LIBANON: Damour Bas. Damour St. 25 B151 22.8.1980 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Damour Bas. Damour St. 25 S148 10.9.1980 leg. Dia"; 1 ♂: "LIBANON: Damour Bas. Damour St. 25 S149 10.9.1980 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Damour Bas. Damour St. 25 S151 10.9.1980 leg. Dia"; 5 ♂♂, 4 ♀♀: "LIBANON: Damour Bas. Damour St. 25 S153 10.9.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Damour St. 25 Y148 26.6.1980 leg. Dia"; 1 ♂: "LIBANON: Damour Bas. Damour St. 25 Y149 26.6.1980 leg. Dia"; 2 ♂♂, 1 ♀: "LIBANON: Damour Bas. Damour St. 25 Y150 26.6.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Damour St. 25 Y151 26.6.1980 leg. Dia"; 1 ♂, 3 ♀♀: "LIBANON: Damour Bas. Damour St. 25 Y153 26.6.1980 leg. Dia"; 2 ♂♂: "LIBANON: Damour Bas. Damour St. 25 B148 22.8.1980 leg. Dia"; 1 ♂, 2 ♀♀: "LIBANON: Damour Bas. Damour St. 25 B152 22.8.1980 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Damour Bas. Damour St. 25 C151 8.10.1980 leg. Dia"; 1 ♂: "LIBANON: Damour Bas. Damour St. 25 C153 8.10.1980 leg. Dia"; 1 ♂: "LIBANON: Damour Bas. Damour St. 25 3-150 31.5.1980 leg. Dia"; 3 ♂♂, 1 ♀: "LIBANON: Damour Bas. Damour St. 25 22.8.1980 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Damour Bas. Damour St. 25 FG 27.7.1980 leg. Dia"; 2 ♂♂, 2 ♀♀: "LIBANON: Damour Bas. Damour St. 25 C149 8.10.1980 leg. Dia"; 1 ♂, 5 ♀♀: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 31.5.1980 leg. Dia"; 1 ♂: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 26.6.1980 leg. Dia"; 1 ♂: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 27.7.1980 leg. Dia"; 1 ♂: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 8.10.1980 leg. Dia"; 1 ♂: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 5.11.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 N153

5.11.1980 leg. Dia"; 1 ♂: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 N157 5.11.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 N158 5.11.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 FG 31.5.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 S154 10.9.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Ouadi el Ghaboun St. 27 30.5.1981 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Damour Bas. Ouadi el Ghaboun St. 27 13.6.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Nahr es Safa St. 24 FG 25.3.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Nahr es Safa St. 24 FG 31.5.1980 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Damour Bas. Nahr es Safa St. 24 FG 26.6.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Nahr es Safa St. 24 Y147 22.6.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Nahr es Safa St. 24 Y178 26.6.1980 leg. Dia".

Basin of Awali: 4 ♂♂: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11 15.9.1979 leg. Dia"; 5 ♂♂, 1 ♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11a JLL63 25.7.1979 leg. Dia"; 7 ♂♂, 9 ♀♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11a JLL93 27.7.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11a FG 3.6.1979 leg. Dia"; 2 ♀♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11a FG 5.7.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11a FG 16.8.1979 leg. Dia"; 2 ♂♂, 1 ♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11a FG 25.10.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11a FG 17.11.1979 leg. Dia"; 2 ♂♂, 3 ♀♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11a O63 25.10.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11a J62 3.6.1979 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11a J62 15.9.1979 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11a J63 3.6.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11a N63 17.11.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11a 25.10.1979 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11b 3.6.1979 leg. Dia"; 2 ♂♂, 2 ♀♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11b 25.7.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11b FG 3.6.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11b FG 16.8.1979 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11b FG 15.9.1979 leg. Dia"; 2 ♂♂, 2 ♀♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11b X66 16.8.1979 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11b J67 3.6.1979 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11b JLL65 25.7.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11 15.9.1979 leg. Dia"; 9 ♀♀: "LIBANON: Aouali Bas. Ras el Ain St. 9 O53 25.10.1979 leg. Dia"; 3 ♀♀: "LIBANON: Aouali Bas. Ras el Ain St. 9 FG 24.5.1981 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Ras el Ain St. 9 D54 22.12.1979 leg. Dia"; 1 ♀: "LIBANON 17.4.81 N. el Aouali (13) Nabaa Aazibi"; 1 ♂: „LIBANON 27.7.79 N. el Aouali (16) Ouadi Jezzine"; 2 ♀♀: "LIBANON: Aouali Bas. Aouali at Jisr Jdaidet ech Chouf 10.8.1979 St 6 FG leg. Dia"; 2 ♂♂, 3 ♀♀: "LIBANON: Aouali Bas. Aouali at Jisr Jdaidet ech Chouf 20.10.1979 St 6 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Aouali at Jisr Jdaidet ech Chouf St 6 O36 FG leg. Dia"; 2 ♂♂, 4 ♀♀: "LIBANON: Aouali Bas. Nabaa el Barouk St. 1 JLL11 14.7.1979 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Nahr Aaray St. 16 JLL92 27.7.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nahr Aaray St. 16 X93 18.8.1979 leg. Dia"; 2 ♂♂, 5 ♀♀: "LIBANON: Aouali Bas. Nahr Aaray St. 16 FG 10.6.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nahr Aaray St. 16 FG 27.7.1979 leg. Dia"; 2 ♀♀: "LIBANON: Aouali Bas. Nahr Aaray St. 16 FG 15.8.1979 leg. Dia"; 2 ♂♂, 3 ♀♀: "LIBANON: Aouali Bas. Nahr Aaray St. 16 FG 18.8.1979 leg. Dia"; 4 ♂♂: "LIBANON: Aouali Bas. Nahr Aaray St. 16 FG 22.9.1979 leg. Dia"; 2 ♂♂: "LIBANON: Aouali Bas. Nahr Aaray St. 16 FG 22.6.1981 leg. Dia"; 3 ♂♂, 1 ♀: "LIBANON: Aouali Bas. Nahr Aaray St. 16 JLL93 27.7.1979 leg. Dia"; 2 ♂♂: "LIBANON: Aouali Bas. Nahr Aaray St. 16 S94 22.9.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Ain Chelouf St. 8 FG 29.4.1979 leg. Dia"; 1 ♂, 6 ♀♀: "LIBANON: Aouali Bas. Nabaa Aazibi St. 13b J79 10.6.1979 leg. Dia"; 2 ♀♀: "LIBANON: Aouali Bas. Nabaa Aazibi St. 13b A80 3.5.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Aazibi St. 13 FG 27.6.1979 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Nabaa Mourched St. 7 FG 25.7.1979 leg. Dia"; 2 ♀♀: "LIBANON: Aouali Bas. Nabaa Mourched St. 7 FG 15.9.1979 leg. Dia"; 2 ♀♀: "LIBANON: Aouali Bas. Nabaa Mourched St. 7 17.11.1979 leg. Dia"; 2 ♀♀: "LIBANON: Aouali Bas. Aouali St. 2 FG leg. Dia 10.8.1979"; 1 ♂: "LIBANON: Aouali Bas. Aouali St. 2 X20 18.8.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Aouali St. 19 FG 16.8.1979 leg. Dia"; 3 ♂♂, 1 ♀: "LIBANON: Aouali Bas. Aouali at Jisr Batloun el Kharara 2.6.1979 4[= A4]FG leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Aouali at Jisr Bisri St. 17 FG 6.5.1979 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Nabaa Salman St. 10 FG 25.7.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Salman St. 10 FG 17.11.1979 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Nabaa Salman St. 10 FG 10.4.1980 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Nabaa Salman St. 10 FG 29.6.1980 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Salman St. 10 25.10.1979 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Nabaa Bater ech Chouf St. 12 27.7.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Bater ech Chouf St. 12 FG 27.7.1980 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Aouali Bas. Nabaa Bater ech Chouf St. 12 FG 29.3.1980 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Bater ech Chouf St. 12 FG 30.8.1980 leg. Dia".

Basin of Hazbani: 1 ♀: "LIBANON 9.10.1982 N. [Nahal] Senir - Ras Naba leg. R. Ortal // IES4154 col. 213904".

Hydraena (s.str.) *sidon* JÄCH, DÍAZ & DIA sp.n.

TYPE LOCALITY: Spring-brook (Ras el Ain) near village Aammatour, 850 m a.s.l., Awali river basin, southern Lebanon.

TYPE MATERIAL: **Holotype** ♂ (NMW): "LIBANON: Aouali Bas. Ras el Ain St. 9 O53 25.10.1979 leg. Dia". **Paratypes** (39 exs.; CDS, NMW): 1 ♂, 2 ♀♀: "LIBANON: Aouali Bas. Ras el Ain St. 9 O53 25.10.1979 leg. Dia"; 1 ♂, 3 ♀♀: "LIBANON: Aouali Bas. Ras el Ain St. 9 FG 25.3.1979 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Aouali Bas. Ras el Ain St. 9 FG 3.3.1981 leg. Dia"; 2 ♀♀: "LIBANON: Aouali Bas. Ras el Ain St. 9 FG 4.3.1982 leg. Dia"; 4 ♀♀: "LIBANON: Aouali Bas. Ras el Ain St. 9 III.1982 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Ras el Ain St. 9 O52 25.10.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Ras el Ain St. 9 D52 22.12.1979 leg. Dia"; 2 ♂♂: LIBANON: Aouali Bas. Ras el Ain St. 9 J53 15.6.1979 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Aouali Bas. Ras el Ain St. 9 X59 16.8.1979 leg. Dia"; 1 ♂: LIBANON: Aouali Bas. Ras el Ain St. 9 3.6.1979 leg. Dia"; 1 ♂: LIBANON: Aouali Bas. Ras el Ain St. 9 JLL53 25.7.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Ras el Ain St. 9 JA52 19.1.1980 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Aouali Bas. Ain Chelouf St. 8 FG 29.4.1979 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Aouali Bas. Ain Chelouf St. 8 A49 29.10.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Ain Chelouf St. 8 JA49 19.1.1980 leg. Dia"; 3 ♀♀: "LIBANON: Aouali Bas. Ain Chelouf St. 8 D49 22.12.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Ain Chelouf St. 8 J51 3.6.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Mourched St. 7 FG 25.10.1979 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Nabaa Mourched St. 7 FG 22.12.1979 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Nabaa Mourched St. 7 FG 10.4.1980 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Aouali Bas. Nabaa Bater ech Chouf St. 12 27.7.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Bater ech Chouf St. 12 FG 28.10.1979 leg. Dia".

DIAGNOSIS: Length (labrum to elytral apex): 2.7–2.8 mm (male), 2.3–2.5 mm (female). Habitus as in Fig. 2. This species is very similar and obviously closely related with *H. berytus*. Externally, males of *H. sidon* can be distinguished from *H. berytus* by the following sexual characters: 1) tibial brushes less distinctly developed, more or less confined to tibial swellings; 3) mesotibial swelling quite apparent (almost inexistant in *H. berytus*); 4) metatibia distinctly sinuous medially, medial tooth larger; 5) metaventral plaques very thin, medially separated from each other by more than 10 times their width (distinctly wider in *H. berytus*, medially separated by about three times their width).

Male terminal sternite and spiculum as in Fig. 14e.

Aedeagus (Fig. 14a–c): Main piece more strongly sinuous (lateral view) than in *H. berytus*; apically without distinct lateral extensions (dorsal view). Right paramere longer than in *H. berytus* and more straight (lateral view); left paramere shorter than in *H. berytus*, not reaching dorso-apical bunch of setae of main piece, strongly widened subapically.

Externally, females of *H. sidon* can be distinguished from *H. berytus* by a few very subtle characters: 1) colouration on average darker (almost black); 2) tips of maxillary palpi never darkened; 3) pronotum very slightly wider, on average slightly more densely punctate; 4) metaventral plaques thinner. For exact identification it is recommended to use the gonocoxite (see below).

Female tergite X (Fig. 14d) slightly smaller than that of *H. berytus*, but generally very similar.

Gonocoxite (Fig. 14f–g) can be distinguished from that of *H. berytus* by the following characters: less transverse (length/width: 0.74 in *H. sidon*, 0.70 in *H. berytus*), without distinct baso-lateral projections; sclerotisations of inner plate distinctly projecting basally, forming a closed ring.

Spermatheca as in Fig. 14h–i.

Hydraena monscassius JÄCH from southern Turkey (Hatay) also seems to be related with *H. sidon*. It can be distinguished easily by the less strongly pronounced sexual characters, by the darkened tips of the maxillary palpi and by the male and female genitalia.

VARIABILITY: Gibbosity on vertex, convexity and microsculpture of pronotum, punctation of elytral striae (more or less regular), and elytral apices vary slightly.

DISTRIBUTION (Fig. 21): Known only from the Awali river basin in southern Lebanon, where it occurs sympatrically with its sister species, *Hydraena berytus*.

ETYMOLOGY: Named after the classic Phoenician city of Sidon (Ṣaydā, Saida), now the largest town of southern Lebanon. Here, the Awali River (also spelled Aouali, Auly or Aouleh), the Bostrenus of the classical period, type locality of the new species, reaches the Mediterranean Sea.

Hydraena (s.str.) *damascena* PIC, 1910

Hydraena damascena PIC 1910: 9.

DIAGNOSIS: Habitus as in Fig. 6. Length (labrum to elytral apex): 2.0–2.3 mm. Male and female genitalic structures as in Fig. 15. Aedeagus with a very long flagellum; right paramere very long and thin; left paramere much shorter, with curly setae. Terminal sternite of male strongly attenuate basally. Gonocoxite subsemicircular. Female tergite X with squamose setae, without vermiform setae.

DISTRIBUTION (Fig. 22): This species is so far known from Lebanon, Syria and northern Israel (JÄCH 1986, 2004). In Lebanon it is very widely distributed, occurring also in the Litani catchment area.

Basin of Oustouene: 1 ♂: "LEBANON: 27.6.1998 Basin of Oustouane Kharrar spr. brook nr. Aaqar el Aatiqa leg. Dia (F.G.) St 10" [e = 950, t = 12.2–13.0]; 2 ♂♂, 1 ♀: "LEBANON: 27.6.1999 Basin of Oustouane Koucha main str. at bridge [Jisr] El Koucha leg. Dia St 15 (J 35 + J 36)" [e = 88, t = 16–24].

Basin of El Jaouz: 1 ♂: "LEBANON: 6.4.2000 Basin of El Jaouz str. nr. Ouadi Tannourine leg. Dia (Av 8)" [e = 1000; t = 8.5–14.5]; 1 ♀: "LEBANON: Ain Er Raha Basin of El Jaouz str. nr. Ouadi [Village, not Ouadi] Tannourine 15.6.1999 leg. Dia (F.G.)" [e = 900, t = 8.4–15.8]; 1 ♀: "LEBANON: Ain Er Raha Basin of El Jaouz str. nr. Ouadi [Village, not Ouadi] Tannourine 15.6.1999 leg. Dia S14 + S16 (S 14+S 13)" [e = 900, t = 8.4–15.8]; 2 ♂♂, 1 ♀: "LEBANON: 25.7.1999 Basin of El Jaouz stream nr. Tannourine el Faouqa, leg. Dia (JII3) St 1" [e = 1350; t = 8.9–13.2]; 1 ♂, 1 ♀: "LEBANON: 11.9.1999 Basin of El Jaouz stream nr. Tannourine el Faouqa, leg. Dia (S2 + S3) S1 - S4" [e = 1350; t = 8.9–13.2]; 1 ♂, 1 ♀: "LEBANON: 21.11.1999 Basin of El Jaouz stream nr. Tannourine el Faouqa, leg. Dia (N2 + N4) St1 N1 - N4" [e = 1350; t = 8.9–13.2].

Basin of Ibrahim: 1 ♂: "LIBANON: 25.12.1994 Ibrahim Bas. D5-D8 Zaat 3 Roueiss [Rouais Stream near village Yanouh] leg. Dia" [e = 1015, t = 17–19]; 1 ♀: "LIBANON: Rouais Basin of Ibrahim nr. vill. El Mejdel 8.11.1999, leg. Dia St 2" [e = 1095, t = 8.8–16.0].

Basin of Damour: 1 ♀: "LIBANON: Damour Bas. Nahr es Safa St. 24 Y147 26.6.1980 leg. Dia"; 1 ♂: "LIBANON: Damour Bas. Nahr es Safa St. 25 [St. 24, not 25] Z149 2.1.1981 leg. Dia".

Basin of Awali: 1 ♀: "LIBANON: Aouali Bas. Aouali St. 2 FG 20.10.1979 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Aouali St. 2 FG 30.10.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Aouali at Jisr Batloun el Kharara 10.6.1979 St. 4 [= A4] FG leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Nabaa Batloun el Kharara St. 5 JA32 13.1.1980 leg. Dia"; 3 ♀♀: "LIBANON: Aouali Bas. Aouali at Jisr Jdaidet ech Chouf 10.8.1979 St. 6 FG leg. Dia"; 3 ♂♂, 3 ♀♀: "LIBANON: Aouali Bas. Aouali at Jisr Jdaidet ech Chouf 20.10.1979 St. 6 FG leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Aouali at Jisr Jdaidet ech Chouf 8.12.1979 St. 6 FG leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Aouali at Jisr Jdaidet ech Chouf 2.6.1979 St. 6 J33 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Aouali at Jisr Jdaidet ech Chouf 15.6.1979 St. 6 S39 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Aouali Bas. Nabaa Mourched St. 7 15.9.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Mourched St. 7 FG 3.6.1979 leg. Dia"; 1 ♂, 3 ♀♀: "LIBANON: Aouali Bas. Nabaa Mourched St. 7 FG 25.7.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Mourched St. 7 FG 15.9.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Mourched St. 7 FG 25.10.1979 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Aouali Bas. Nabaa Mourched St. 7 FG 17.11.1979 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Nabaa Mourched St. 7 FG 19.1.1980 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Mourched St. 7a J39 3.6.1979 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Nabaa Mourched St. 7b X46 16.8.1979 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Ras el Ain St. 9 FG 3.6.1979 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Ras el Ain St. 9 FG 25.7.1979 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Aouali Bas. Ras el Ain St. 9 O53 25.10.1979

leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Ras el Ain [Nabaa Salman, not Ras el Ain] St. 10 16.8.1979 leg. Dia"; 4 ♂♂, 2 ♀♀: "LIBANON: Aouali Bas. Nabaa Salman St. 10 FG 25.10.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Salman St. 10 FG 17.11.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Salman St. 10 FG 10.4.1980 leg. Dia"; 1 ♂, 2 ♀♀: "LIBANON: Aouali Bas. Nabaa Salman St. 10 FG 15.8.1981 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Salman St. 10 H26 26.10.1980 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11 15.9.1979 leg. Dia"; 2 ♂♂, 2 ♀♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11a 25.10.1979 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11a D63 22.12.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11a FG 3.6.1979 leg. Dia"; 2 ♂♂, 1 ♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11a FG 5.7.1979 leg. Dia"; 2 ♂♂, 1 ♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11a FG 17.11.1979 leg. Dia"; 7 ♂♂, 7 ♀♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11a JLL63 25.7.1979 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11a JLL134 25.10.1979 leg. Dia"; 11 ♂♂, 5 ♀♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11a N63 17.11.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11a O63 25.10.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11a S62 15.9.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11b 22.4.1979 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11b FG 3.6.1979 leg. Dia"; 3 ♂♂, 4 ♀♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11b FG 16.8.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11b FG7 5.3.1980 leg. Dia"; 3 ♂♂, 4 ♀♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11b JGL67 25.7.1979 leg. Dia"; 1 ♂, 3 ♀♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11b X65 16.8.1979 leg. Dia"; 6 ♂♂, 2 ♀♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11b X66 16.8.1979 leg. Dia"; 2 ♀♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11b J67 3.6.1979 leg. Dia"; 2 ♂♂, 1 ♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11b JLL66 26.7.1979 leg.; 1 ♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11b JLL67 25.7.1979 leg.; 1 ♀: "LIBANON: Aouali Bas. Nabaa Bater ech Chouf St. 12 FG 30.8.1980 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Nabaa Aazibi St. 13 FG 27.6.1979 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Aouali Bas. Nabaa Aazibi St. 13 FG 5.7.1980 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Nabaa Aazibi St. 13b 10.6.1979 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Nabaa Aazibi St. 13b A80 3.5.1979 leg. Dia"; 3 ♂♂, 4 ♀♀: "LIBANON: Aouali Bas. Nabaa Aazibi St. 13b J79 10.6.1979 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Nahr Aaray St. 16 FG 18.8.1979 leg. Dia"; 2 ♀♀: "LIBANON: Aouali Bas. Nahr Aaray St. 16 S9 8.9.1979 leg. Dia"; 2 ♂♂: "LIBANON: Aouali Bas. Nahr Aaray St. 16 S94 22.9.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Aouali at Jisr Bisri St. 17 FG 22.6.1980 leg. Dia".

Basin of Litani: 1 ♂: "LEBANON 2003 Litani Basin, main river, bridge [Jisr] el Khardale 14.VI. leg. Dia" [e = 240, t = 16–22]; 1 ♀: "Libanon, Ain el Lijeh [spring] Aana [village, eastern slope of Mt. Barouk]. Alt. 1819 m 35 44'22E-33 41'63N 13.XII.2003 Nieuwenhuijzen".

Hydraena (s.str.) *phoenicia* JÄCH, DÍAZ & DIA sp.n.

TYPE LOCALITY: Oustouene River at bridge near village Mazraat el Balde, 240 m a.s.l., northern Lebanon.

TYPE MATERIAL: **Holotype** ♂ (NMW): "LEBANON: Mazraat Basin of Oustouane nr. vill. Mazraat Balde 27.6.1999, leg. Dia (F.G.) St 14" [e = 240, t = 15–22]. **Paratypes** (12 exs.; CDS, NMW): 1 ♂, 5 ♀♀: same label data as holotype; 1 ♂, 1 ♀: "LEBANON: Mazraat Basin of Oustouane nr. vill. Mazraat [el] Balde 27.6.1999, leg. Dia (J31) St 14, I 30 – I 34" [e = 240, t = 15–22]; 1 ♀: "LEBANON: Mazraat Basin of Oustouane nr. vill. Mazraat [el] Balde 25.4.1999, leg. Dia (F.G.)" [e = 240, t = 15–22]; 1 ♂, 1 ♀: "LEBANON: 19.7.1998 (JII28) Basin of Oustouane, Taya stream nr. Aakar el Aatiqa leg. A. Dia St 11, I 27 - I 30" [e = 700, t = 10.2–19.5]; 1 ♀: "LEBANON: 27.6.1999 Basin of Oustouane, Taya stream nr. Aakar el Aatiqa leg. A. Dia (J29 + J30) St 14" [e = 700, t = 10.2–19.5].

DIAGNOSIS: Length (labrum to elytral apex): 2.1–2.3 mm. Habitus as in Fig. 7. This species is very similar and obviously closely related with *H. damascena*. Externally, males of *H. phoenicia* can be distinguished from *H. damascena* by the following characters: 1) tips of maxillary palpi more distinctly obscured (hardly noticeably darkened in *H. damascena*); 2) pronotal and elytral punctures slightly stronger, elytral striae less regularly arranged (although slightly variable); 3) mesotibia slightly less curved; 4) metatibia more slender, without significant swelling; 5) metaventral plaques wide, separated from each other by about twice their width (distinctly narrower in *H. damascena*, medially separated by about four times their width).

Male terminal sternite (Fig. 16f) apically emarginate, basally less strongly attenuate than in *H. damascena*.

Aedeagus (Fig. 16a–c): Smaller than that of *H. damascena*; dorsal margin of main piece more irregular (lateral view); setae of main piece arranged in a transverse row; distal lobe less extensive, flagellum distinctly shorter; both parameres distinctly curved (lateral view); right paramere without group of long setae near apical 0.4; setae of left paramere shorter than in *H. damascena*, not curly.

Externally, females of *H. phoenicia* can be distinguished from *H. damascena* by a few subtle characters: 1) tips of maxillary palpi darkened; 2) metaventral plaques slightly larger.

Female tergite X (Fig. 16d) slightly smaller than that of *H. damascena*, without squamose setae.

Gonocoxite (Fig. 16e) slightly narrower than in *H. damascena*, more parallel-sided; apical area smaller; exposed part of inner plate more transverse.

Spermatheca as in Figs. 16g–h.

VARIABILITY: As in many other species of *Hydraena*, the surface structures of the clypeus and pronotum are slightly variable. Elytral punctation of elytral striae rarely almost regular.

DISTRIBUTION (Fig. 22): Known only from the Oustouene river basin in northern Lebanon. Although *H. damascena* and *H. phoenicia* were both found in the Oustouene river basin they were never collected together in the same sample.

ETYMOLOGY: Named after the classic Roman province of Phoenicia.

Hydraena (s.str.) *riparia* species group

A wide-spread and speciose group. Only one species of the *H. riparia* species group occurs in Lebanon.

Hydraena (s.str.) *furthi* JÄCH, 1982

Hydraena furthi JÄCH 1982: 59.

DIAGNOSIS: Habitus as in Fig. 8. Length (labrum to elytral apex): 1.75–2.10 mm. Male and female genitalic structures as in Fig. 17. Aedeagus rather simple, apically obliquely truncate, with short ventral projection (lateral view), with only three setae (two apical, one dorsal); distal lobe flagellum-like. Parameres long and slender, almost symmetrical. Gonocoxite subrectangular. Female tergite X with squamose and vermiform setae.

DISTRIBUTION (Fig. 23): This species is so far known from Lebanon and northern Israel (JÄCH 1986, 2004). In Lebanon it is very widely distributed, occurring also in the Litani catchment area.

Type locality: Beirut, Lebanon (holotype and two paratypes in NMW).

Basin of Oustouene: 1 ♀: "LEBANON: 18.8.1998 Basin of Oustouane Taya stream nr. Aakar el Aatiqa leg. Dia (F.G.) St 11" [e = 700, t = 10.2–19.5]; 2 ♂♂, 1 ♀: "LEBANON: 19.7.1998 (JII28) Basin of Oustouane Taya stream nr. Aakar el Aatiqa leg. Dia St 11, I27 - I30" [e = 700, t = 10.2–19.5]; 1 ♀: "LEBANON: 19.7.1998 Basin of Oustouane Taya stream nr. Aakar el Aatiqa leg. Dia (JII27)" [e = 700, t = 10.2–19.5]; 1 ♂, 1 ♀: "LEBANON: [Jisr] Mazraat Basin of Oustouane nr. vill. Mazraat [el] Balde 27.6.1999 leg. Dia (F.G.) St 14" [e = 240, t = 15–22].

Basin of El Bared: 1 ♂: "LEBANON: Abou Moussa Basin of El Bared Main str. at El Bared Res. [Reservoir] 22.6.1997, leg. Dia (F.G.)" [e = 240, t = 14.5–22.0].

Basin of Abou Ali: 1 ♂: "LIBANON: 16.6.1993 Abou Ali Bas. Bsarma [village Daraya] leg. Dia" [e = 195, t = 9.3–20.0]; 1 ♀: "Libanon Abou Ali 23.VI.1996 ca. 500 m downstream Qadicha spring-brook [near village Bcherre], Alt: 1500m" [t = 6.2–14.0].

Basin of El Jaouz: 1 ♀: "LEBANON: 25.7.1999 Basin of El Jaouz str. nr. Ouadi [village, not Ouadi] Tannourine leg. Dia (JII 7) St 2, JII 4-Z" [e = 1000; t = 8.5–14.5]; 1 ♂, 1 ♀: "LEBANON: 15.6.1999 Basin of El Jaouz Amt Dalli str. nr. vill. Beit Chlala leg. Dia (F.G.) St 4" [e = 610, t = 8.5–20.5]; 1 ♂, 1 ♀: "LEBANON: 25.7.1999 Basin of El Jaouz Amt Dalli str. [main stream, not Amt Dalli] nr. vill. Beit Chlala leg. Dia (JII 16) St 4 I 16" [e = 610, t = 8.5–20.5]; 1 ♀: "LEBANON: 12.7.1999 Basin of El Jaouz main stream nr. Ed Dalli leg. Dia (JII 18) St 5" [e = 605, t = 9.0–15.5]; 1 ♂: "LEBANON: 11.9.1999 Basin of El Jaouz main stream nr. Ed Dalli leg. Dia (S 17) St 17" [e = 605, t = 9.0–15.5].

Basin of Ibrahim: 1 ♀: "LEBANON 2002 Ibrahim Basin main river Chouane Power Plant 23.VI., leg. Dia" [e = 300, t = 7–19].

Basin of Damour: 1 ♀: "LIBANON: Damour Bas. Nahr es Safa St. 24 E144 27.7.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Damour [main river] St. 25 B151 22.8.1980 leg. Dia"; 1 ♂: "LIBANON: Damour Bas. Damour [main river] St. 25 S148 22.8.1980 leg. Dia"; 1 ♂: "LIBANON: Damour Bas. Damour [main river] St. 25 S153 10.9.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Damour St. 25 Y149 26.6.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 27.7.1980 leg. Dia"; 1 ♂: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 B154 22.8.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 B155 22.8.1980 leg. Dia"; 6 ♂♂, 2 ♀♀: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 B156 22.8.1980 leg. Dia"; 1 ♂: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 B158 22.8.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 C157 8.10.1980 leg. Dia"; 3 ♂♂: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 E156 27.7.1980 leg. Dia"; 4 ♂♂, 2 ♀♀: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 E157 27.7.1980 leg. Dia"; 1 ♂: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 E158 27.7.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 FG 25.5.1980 leg. Dia"; 10 ♂♂, 12 ♀♀: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 FG 31.5.1980 leg. Dia"; 2 ♂♂, 2 ♀♀: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 FG 26.6.1980 leg. Dia"; 4 ♂♂, 3 ♀♀: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 FG 13.7.1980 leg. Dia"; 1 ♂: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 FG 27.7.1980 leg. Dia"; 1 ♂, 3 ♀♀: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 FG 10.9.1980 leg. Dia"; 7 ♂♂, 3 ♀♀: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 FG 8.10.1980 leg. Dia"; 13 ♂♂, 6 ♀♀: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 FG 5.11.1980 leg. Dia"; 3 ♂♂: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 N156 5.11.1980 leg. Dia"; 2 ♂♂, 5 ♀♀: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 N157 5.11.1980 leg. Dia"; 4 ♂♂, 1 ♀: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 N158 5.11.1980 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 N159 5.11.1980 leg. Dia"; 2 ♂♂: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 S156 10.9.1980 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 S158 10.9.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 S159 10.9.1980 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 W155 29.11.1980 leg. Dia"; 2 ♂♂, 1 ♀: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 W159 29.11.1980 leg. Dia"; 3 ♂♂, 1 ♀: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 Y157 26.6.1980 leg. Dia"; 1 ♂: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 Y159 26.6.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 3- 157 31.5.1980 leg. Dia"; 1 ♂, 2 ♀♀: "LIBANON: Damour Bas. Damour at Jisr el Quadi St. 26 3- 159 31.5.1980 leg. Dia"; 2 ♂♂, 1 ♀: "LIBANON: Damour Bas. Ouadi el Ghaboun St. 27 FG 13.6.1980 leg. Dia"; 3 ♂♂, 3 ♀♀: "LIBANON: Damour Bas. Ouadi el Ghaboun St. 27 FG 30.5.1981 leg. Dia"; 2 ♂♂: "LIBANON: Damour Bas. Ouadi el Ghaboun St. 27 W60 29.11.1980 leg. Dia"; 1 ♂: "LIBANON: Damour Bas. Ouadi el Ghaboun St. 27 3- 160 31.5.1980 leg. Dia"; 1 ♂: "LIBANON: Damour Bas. Nahr el Hammam St. 28 B168 22.8.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Nahr el Hammam St. 28 C165 8.10.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Nahr el Hammam St. 28 FG 25.5.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Nahr el Hammam St. 28 FG 5.11.1980 leg. Dia"; 2 ♂♂: "LIBANON: Damour Bas. Nahr el Hammam St. 28 S166 10.9.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Nahr el Hammam St. 28 W164 29.11.1980 leg. Dia"; 1 ♂: "LIBANON: Damour Bas. Nahr el Hammam St. 28 W168 10.9.1980 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Damour Bas. Nahr el Hammam St. 28 Y156 26.6.1980 leg. Dia"; 2 ♂♂: "LIBANON: Damour Bas. Nahr el Hammam St. 28 Y164 26.6.1980 leg. Dia"; 2 ♂♂: "LIBANON: Damour Bas. Nahr el Hammam St. 28 Y167 26.6.1980 leg. Dia"; 1 ♂: "LIBANON: Damour Bas. Damour at Jisr ed Damour, ST. 29 B172 22.8.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Damour at Jisr ed Damour, ST. 29 B174 22.8.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Damour at Jisr ed Damour, St. 29 C174 8.10.1980 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Damour Bas. Damour at Jisr ed Damour, ST. 29 C175 8.10.1980 leg. Dia"; 1 ♂: "LIBANON: Damour Bas. Damour at Jisr ed Damour, ST. 29 E172 27.7.1980 leg. Dia"; 10 ♂♂, 3 ♀♀: "LIBANON: Damour Bas. Damour at Jisr ed Damour, St. 29 E174 27.7.1980 leg. Dia"; 2 ♂♂: "LIBANON: Damour Bas. Damour at Jisr ed Damour, ST. 29 FG 25.5.1980 leg. Dia"; 2 ♀♀: "LIBANON: Damour Bas.

Damour at Jisr ed Damour, St. 29 FG 30.7.1979 leg. Dia"; 2 ♂♂, 3 ♀♀: "LIBANON: Damour Bas. Damour at Jisr ed Damour, St. 29 FG 13.7.1980 leg. Dia"; 1 ♂: "LIBANON: Damour Bas. Damour at Jisr ed Damour, ST. 29 FG 22.8.1980 leg.; 3 ♀♀: "LIBANON: Damour Bas. Damour at Jisr ed Damour, St. 29 FG 8.11.1980 leg.; 2 ♂♂, 1 ♀: "LIBANON: Damour Bas. Damour at Jisr ed Damour, St. 29 S171 10.9.1980 leg. Dia"; 2 ♀♀: "LIBANON: Damour Bas. Damour at Jisr ed Damour, St. 29 S172 10.9.1980 leg. Dia"; 1 ♀: "LIBANON: Damour Bas. Damour at Jisr ed Damour, St. 29 S173 10.9.1980 leg. Dia"; 1 ♂: "LIBANON: Damour Bas. Damour at Jisr ed Damour, St. 29 S174 10.9.1980 leg. Dia"; 2 ♂♂, 4 ♀♀: "LIBANON: Damour Bas. Damour at Jisr ed Damour, St. 29 S175 10.9.1980 leg. Dia"; 1 ♀: "LIBANON: 17.7.1997 Basin of Damour, Jisr el Qadi main str. at bridge el Qadi leg. Dia (F.G.)".

Basin of Awali: 1 ♂, 1 ♀: "LIBANON: Aouali Bas. Aouali at Jisr Jdaidet ech Chouf 10.3.1979 St. 6 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Aouali at Jisr Jdaidet ech Chouf 28.4.1979 St. 6 A36 leg. Dia"; 2 ♂♂: "LIBANON: Aouali Bas. Aouali at Jisr Jdaidet ech Chouf 2.6.1979 St. 6 FG leg. Dia"; 4 ♂♂, 5 ♀♀: "LIBANON: Aouali Bas. Aouali at Jisr Jdaidet ech Chouf 10.8.1979 St. 6 FG leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Aouali Bas. Aouali at Jisr Jdaidet ech Chouf 8.9.1979 St. 6 FG leg. Dia"; 3 ♂♂, 1 ♀: "LIBANON: Aouali Bas. Aouali at Jisr Jdaidet ech Chouf 20.10.1979 St. 6 FG leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Aouali Bas. Aouali at Jisr Jdaidet ech Chouf 10.11.1979 St. 6 FG leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Aouali at Jisr Jdaidet ech Chouf 2.6.1979 St. 6 J33 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Aouali at Jisr Jdaidet ech Chouf 10.8.1979 St. 6 X33 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Mourched St. 7 FG 25.7.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Mourched St. 7a J39 3.6.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Mourched St. 7a S39 15.9.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Salman St. 10 FG 3.6.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Nabaa Salman St. 10 FG 15.8.1981 leg. Dia"; 2 ♀♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11 15.9.1979 leg. Dia"; 1 ♀: "S-LIBANON 1979 Aouali-River-Basin 15.9 (St. 11a).; 2 ♀♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11a FG 5.7.1979 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11b FG 16.8.1979 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11b J64 3.6.1979 leg. Dia"; 2 ♀♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11b J65 3.6.1979 leg. Dia"; 2 ♂♂, 2 ♀♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11b J67 3.6.1979 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11b JGL67 25.7.1979 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11b JLL66 26.7.1979 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11b S64 15.9.1979 leg. Dia"; 11 ♂♂, 10 ♀♀: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11b X66 16.8.1979 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Nabaa Abou Kharma St. 11b X67 16.8.1979 leg. Dia"; 4 ♂♂, 1 ♀: "LIBANON: Aouali Bas. Nabaa Bater ech Chouf St. 12 FG 30.8.1980 leg. Dia"; 2 ♂♂: "LIBANON: Aouali Bas. Nahr Aaray St. 16 FG 10.6.1979 leg. Dia"; 2 ♀♀: "LIBANON: Aouali Bas. Nahr Aaray St. 16 J94 10.6.1979 leg. Dia"; 3 ♂♂, 2 ♀♀: "LIBANON: Aouali Bas. Nahr Aaray St. 16 JLL93 27.7.1979 leg. Dia"; 4 ♂♂: "LIBANON: Aouali Bas. Nahr Aaray St. 16 S94 22.9.1979 leg. Dia"; 3 ♂♂: "LIBANON: Aouali Bas. Nahr Aaray St. 16 X934 18.8.1979 leg. Dia"; 2 ♂♂, 3 ♀♀: "LIBANON: Aouali Bas. Aouali at Jisr Bisri St. 17 21.4.1979 leg. Dia"; 2 ♂♂: "LIBANON: Aouali Bas. Aouali at Jisr Bisri St. 17 FG 6.5.1979 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Aouali Bas. Aouali at Jisr Bisri St. 17 FG 21.6.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Aouali at Jisr Bisri St. 17 FG 5.7.1980 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Aouali at Jisr Bisri St. 17 S97 29.9.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Aouali St. 18 FG 6.5.1979 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Aouali St. 18 N100 21.11.1979 leg. Dia"; 2 ♂♂: "LIBANON: Aouali Bas. Aouali St. 19 22.6.1980 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Aouali St. 19 FG 30.7.1979 leg. Dia"; 2 ♂♂: "LIBANON: Aouali Bas. Aouali St. 19 FG 20.8.1979 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Aouali St. 19 FG 22.6.1980 leg. Dia"; 1 ♀: "LIBANON: Aouali Bas. Aouali St. 19 FG 5.7.1980 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Aouali Bas. Aouali St. 19 FG 30.8.1980 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Aouali St. 19 FG 19.9.1980 leg. Dia"; 1 ♂: "LIBANON: Aouali Bas. Aouali St. 19 FG 5.6.1981 leg. Dia"; 1 ♂, 1 ♀: "LIBANON: Aouali Bas. Ouadi Azour St. 23 FG 24.5.1981 leg. Dia".

Basin of Litani: 6 ♂♂, 6 ♀♀: "LIBANON 1987 Sir El Gharbiye leg. Dia; 10.IX. Litani Basin main river" [e = 50, t = 16–26]; 1 ♀: "LIBANON 1988 Sir el Gharbiyé leg. Dia; 17.VII. Litani Basin main river" [e = 50, t = 16–26]; 1 ♀: "LIBANON 1988 Sir el Gharbiye leg. Dia; 26.VIII. Litani Basin main river" [e = 50, t = 16–26]; 5 ♂♂, 8 ♀♀: "LIBANON 1988 Sir el Gharbiyé leg. Dia; 27.IX. Litani Basin main river" [e = 50, t = 16–26]; 3 ♂♂, 2 ♀♀: "LIBANON 1988 Sir el Gharbiyé leg. Dia; 16.X. Litani Basin main river" [e = 50, t = 16–26]; 1 ♂, 4 ♀♀: "LIBANON 1988 Sir el Gharbiyé leg. Dia; 4.XII. Litani Basin main river" [e = 50, t = 16–26].

Hydraena (s.str.) *gracilis* species group (*Haenydra* lineage)

This species group was formerly known as subgenus *Haenydra*. However, a thorough cladistic analysis (JÄCH et al. 2000) proved that the subgeneric status for this highly derived species group is unjustified. The species of the *H. gracilis* group are characterized by the reduced number of elytral striae and by the lack of parameres.

Two species, both new to science, occur in Lebanon. These two species are the most southern ones in this group. Phylogenetically, they belong to a complex of species, which are mainly distributed in Turkey, Armenia and Iran. *Hydraena caucasica* KUWERT, *H. fontiscarsavii* JÄCH, *H. gynaephila* JÄCH, *H. hosseinieorum* BILTON & JÄCH, *H. khnzoriani* JANSSENS, *H. lazica* JANSSENS, *H. nilguenae* (JÄCH), *H. plastica* ORCHYMONT, *H. scitula* d'ORCHYMONT, *H. septemlacuum* JÄCH, *H. sinope* JÄCH, and *H. terraevastatae* JÄCH are typical representatives of this complex. Other species, such as *H. epeirosi* FERRO, *H. jaechiana* (AUDISIO & DE BIASE), *H. vedrasi* ORCHYMONT, or the *H. planata* complex (sensu JÄCH & DÍAZ 2006) might also be closely related.

Hydraena (s.str.) *orthosia* JÄCH, DÍAZ & DIA sp.n.

TYPE LOCALITY: Spring brook near Sir el Danniyeh [village], 950 m a.s.l., El Bared river basin, northern Lebanon.

TYPE MATERIAL: **Holotype** ♂ (NMW): "LEBANON: 30.8.1996 Basin of El Bared, El Ksaim [Sir el Danniyeh, not El Ksaim] spr. brook nr. vill. Sir el Danniyeh, leg. Dia (F.G.)" [e = 1050, t = 7–10]. **Paratypes** (6 exs.; NMW): 1 ♀: "LEBANON: 17.5.1997 Basin of El Bared, El Ksaim spr. brook nr. vill. Sir el Danniyeh, leg. Dia (Ma 12)" [e = 1050, t = 7–10]; 1 ♂: "LEBANON: 29.3.1997 Basin of El Bared spr. brook [Sir el Danniyeh] nr. vill. Sir el Danniyeh leg. Dia (A 10?) A 13" [e = 950, t = 8.5–10.0]; 4 ♀♀: "LEBANON: Ras En Nahr Basin of El Bared stream in Ouadi Jhannam [main tributary] 2.8.1999, leg. Dia (F.G.)" [e = 1800, t = 10.0–15.6].

DIAGNOSIS: 2.1–2.3 mm long (labrum to elytral apex). Habitus as in Fig. 9. The new species is obviously closely related with *H. fontiscarsavii* (Turkey, Iran) and *H. hosseinieorum* (Iran). These species are united by similar male sexual dimorphism and by the aedeagal morphology (aedeagal main piece rather straight, flagellum very long and thread-like). Males of *H. orthosia* are most similar to those of *H. fontiscarsavii*. However, the latter can be distinguished from the new species by the following characters: 1) elytra slightly more ovoid (less parallel-sided), 2) mesotibial expansion very slightly more prominent (length of terminal segment of maxillary palpi and metatibia of *H. fontiscarsavii* too variable to be used as reliable distinguishing character; *H. fontiscarsavii* might be composed of several closely related species). *Hydraena hosseinieorum* differs from *H. orthosia* in the following characteristics: 1) pronotum strongly vaulted, 2) each elytron with distinct subbasal impression, 3) elytral gutter widely explanate. *Hydraena lazica* (NE Turkey), another related species, differs in the elongate elytra, which are apically produced and acuminate, and in the elytral gutter being more widely explanate.

Male terminal sternite and spiculum as in Fig. 18b.

Aedeagus (Fig. 18a): Main piece straight and slender, obliquely truncate apically, attenuate preapically; with four setae: a short one at apical 0.4 on right side and three longer ones on left side (two near apical 0.4, one further proximal near apical 0.3). Phallobase with distinct, tooth-like process. Distal lobe rather amorphous, with a larger apical part, and with a smaller basal part with a very long, entangled flagellum. The aedeagus of the new species can be easily distinguished from those of *H. fontiscarsavii* and *H. hosseinieorum* by the outlines of the main piece (lateral view), especially in the apical third. The aedeagus of *H. lazica* is less straight and has a shorter flagellum.

Externally, females of *H. orthosia* agree quite well with females of *H. fontiscarsavii*. *Hydraena hosseinieorum* and *H. lazica* differ from *H. orthosia* markedly in the widely explanate elytral gutters.

Female tergite X (Fig. 18c) transverse; subsemicircular; disc with subbasal squamose setae and with trichoid setae in distal half; subapical fringe admedially with vermiform setae, and with few trichoid setae laterally; hyaline margin somewhat gibbous medially.

Gonocoxite (Fig. 18d) subtriangular, wider than long, lateral margins strongly convex subbasally, slightly convergent; inner plate slightly asymmetrical, surpassing outer plate basally.

Spermatheca (Figs. 18e–f): not clearly different from *H. hosseinieorum*.

VARIABILITY: As in many other species of *Hydraena*, the surface structures of the clypeus and pronotum are slightly variable. Elytron sometimes with very shallow subbasal impression.

DISTRIBUTION (Fig. 23): Known only from a few localities in the El Bared river basin, northern Lebanon.

ETYMOLOGY: Named in reference to the type locality. Orthosia is the classic name of the El Bared River (also spelled Nahr-el-Berid).

Hydraena (s.str.) *berthelemyana* JÄCH, DÍAZ & DIA sp.n.

TYPE LOCALITY: Stream at bridge near Tannourine el Faouqa [village], 1350 m a.s.l., El Jaouz river basin, northern Lebanon.

TYPE MATERIAL: **Holotype** ♂ (NMW): "LEBANON: 25.7.1999 Basin of El Jaouz stream nr. Tannourine el Faouqa, leg. Dia (Jll3) St 1" [e = 1350; t = 8.9–13.2]. **Paratypes** (75 exs., CDS, NMW): 9 ♂♂, 13 ♀♀, same label data as holotype; 4 ♂♂, 6 ♀♀: "LEBANON: 21.11.1999 Basin of El Jaouz stream nr. Tannourine el Faouqa, leg. Dia (N2 + N4) St 1, N1 - N4" [e = 1350; t = 8.9–13.2]; 1 ♂, 1 ♀: "LEBANON: 15.6.1999 Basin of El Jaouz str. nr. [in, not near] Ouadi Tannourine leg. Dia (J 8) St 2" [e = 1000; t = 8.5–14.5]; 1 ♂, 1 ♀: "LEBANON: 25.7.1999 Basin of El Jaouz str. nr. [in, not near] Ouadi Tannourine leg. Dia (Jll7) St 2 Jll 4-9" [e = 1000; t = 8.5–14.5]; 2 ♀♀: "LEBANON: 25.7.1999 Basin of El Jaouz str. nr. [in, not near] Ouadi Tannourine leg. Dia (Jll8) St 2 FG" [e = 1000; t = 8.5–14.5]; 9 ♂♂, 21 ♀♀: "LEBANON: 11.9.1999 Basin of El Jaouz stream nr. Tannourine el Faouqa, leg. Dia (S2 + S3) S1 - S4" [e = 1350; t = 8.9–13.2]; 2 ♀♀: "LEBANON: 11.9.1999 Basin of El Jaouz, Korsi Spr. brook nr. Tannourine el Faouqa, leg. Dia (S5)" [e = 1550, t = 9.5–10.5]; 1 ♀: "LEBANON Aîn Er Raha Basin of El Jaouz str. nr. Ouadi [Village, not Ouadi] Tannourine 15.6.1999, leg. Dia S 14 + S16 (S 14 + S 13)" [e = 900, t = 8.4–15.8]; 1 ♀: "LEBANON Aîn Er Raha Basin of El Jaouz str. nr. Ouadi [Village, not Ouadi] Tannourine 25.7.1999, leg. Dia (Jll 11) St 3" [e = 900, t = 8.4–15.8]; 1 ♀: "LIBANON: 31.8.1995 Abou Ali Bas. N Sarkis [Nabaa Mar Sarkis, a spring-brook near village Ehden], A17-A20 leg. Dia" [e = 1580, t = 6.3–8.0]; 1 ♀: "LIBANON: 23.10.1994 Ibrahim Bas. Zaat 1, Afga [Afqa] leg. Dia" [e = 1200, t = 8.5–10.0]; 1 ♂: "LIBANON: Rouais Basin of Ibrahim str. nr. vill. El Mejdel 8.11.1999, leg. Dia St 2" [e = 1095, t = 8.8–16.0].

DIAGNOSIS: 2.0–2.3 mm long (labrum to elytral apex). Habitus as in Fig. 10. This species is very similar and obviously closely related with *H. orthosia*. Externally, males of *H. berthelemyana* can be distinguished from *H. orthosia* by the following characters: 1) elytral apices less distinctly declivitous and elytral gutter slightly wider apically, thus elytra appearing longer and more truncate, 2) mesotibial expansion very slightly more close to the apex, 3) metatibia without significant expansion.

Male terminal sternite and spiculum more or less as in *H. orthosia*, sternite more transverse.

Aedeagus (Fig. 19a): Apical part of main piece more slender than in *H. orthosia*, ventral margin strongly convex around apical 0.3; arrangement of setae more or less as in *H. orthosia*, but seta on right side situated further proximal. Distal lobe similar to that of *H. orthosia*.

Externally, females of *H. orthosia* and *H. berthelemyana* cannot reliably be distinguished.

Female tergite X (Fig. 19b) can be distinguished from that of *H. orthosia* by a number of characters: apical corners more distinct; squamose setae larger; disc with irregular ridges; subapical fringe longer; hyaline margin wider, more distinctly convex medially.

Gonocoxite (Fig. 19c) can be distinguished from that of *H. orthosia* by the following characters: apex strongly emarginate; apical part of outer plate smaller; inner plate with large baso-lateral extensions.

Spermatheca (Fig. 19d–e) not significantly different from that of *H. orthosia*.

VARIABILITY: As in many other species of *Hydraena*, the surface structures of the clypeus and pronotum are slightly variable. In very few specimens elytron with very shallow subbasal impression.

DISTRIBUTION (Fig. 23): This species occurs in the following river basins in northern Lebanon: Abou Ali (= Kadisha, or River of Tripolis (= Tarablus), the "Holy River"), El Jaouz, and Ibrahim (the Adonis River of the classical period), which enters the sea south of the classical site of Byblos. These three river basins are situated south of the El Bared basin, and therefore *H. berthelemyana* and *H. orthosia* probably are allopatric, separated from each other by the high mountains between the valleys of the El Bared and the Abou Ali.

ETYMOLOGY: Named for the late Prof. Claude Berthélemy († 1987), excellent specialist of Hydraenidae from Toulouse (France). *Hydraena berthelemyana* was known to Berthélemy since at least 1986, when he sent a sketch of the aedeagus to the first author. Due to Berthélemy's early death this species remained undescribed for 20 years.

Key to Lebanese species of *Hydraena* KUGELANN

1 Upper surface distinctly bicoloured (head and most parts of pronotum black, anterior and posterior margin of pronotum, and elytra yellowish brown); elytral punctures very coarse, deeply impressed and densely arranged (Fig. 3); metaventrite with four longitudinal glabrous plaques; aedeagus: distal lobe rather short, parameres more or less symmetrical (ventral view), inserted ventrally (Fig. 11) ..... ***paganettii*** (*testacea* group)

\- Upper surface not distinctly bicoloured, more or less dark reddish brown to black; elytral punctures not very coarse, less deeply impressed, smaller (Figs. 2–10); metaventrite with two longitudinal glabrous plaques; aedeagus: distal lobe longer, flagellum-like or very complexly shaped, parameres, if present, more or less asymmetrical (ventral view), inserted laterally (Fig. 12–19)..... 2

2 Palpi unicoloured or tips of apical palpomere darkened; elytral striae more or less straight or partly irregular, each elytron with about 7–10 longitudinal striae between suture and shoulder (Figs. 2–8). Male: abdominal apex not conspicuously excised; aedeagus with parameres (Figs. 12–17)..... 3

\- Palpi unicoloured; elytral striae regular and very straight, each elytron with six longitudinal striae between suture and shoulder (Figs. 9–10). Male: abdominal apex conspicuously excised (Figs. 9–10); aedeagus lacking parameres (Figs. 18–19). ..... 8 (*gracilis* group)

3 Length (labrum to elytral apex): 1.55–1.65 mm; tips of apical palpomere darkened; pronotum and elytra rather sparsely punctate; elytra slightly produced apically (Fig. 4). Male: legs without pronounced sexual dimorphism (Fig. 4); aedeagus: thin and strongly S-shaped in lateral view (Fig. 12). Female: elytral apex distinctly excised; gonocoxite with long apodemes forming a closed ring (Fig. 12)..... ***modili*** (*rufipes* group)

- Length (labrum to elytral apex): 1.75–2.80 mm; palpi unicoloured or tips of apical palpomere darkened; pronotum and elytra rather densely punctate; elytra not produced apically (Figs. 1, 5–8). Male: legs with sexual dimorphism more or less well developed (Figs. 1, 5–8); aedeagus: not distinctly S-shaped in lateral view (Figs. 13–17). Female: elytral apex not excised; gonocoxite not with long apodemes (Figs. 13–17)..... 4

4 Length (labrum to elytral apex): 2.00–2.80 mm; palpi unicoloured or tips of apical palpomere darkened (Figs. 1, 5–7); metaventral plaques slender, at middle separated from each other by more than maximum width of one plaque. Male: apex of sternite X emarginate; aedeagus: main piece thick, with a group of apical setae, parameres not equally long (Figs. 13-16). Female: subapical fringe of tergite X without vermiform setae (Figs. 13–16)..... 5
(*grandis* group)

- Length (labrum to elytral apex): 1.75–2.10 mm; tips of apical palpomere darkened (Fig. 8); metaventral plaques slender, at middle separated from each other by more than maximum width of one plaque. Male: sexual dimorphism of legs not pronounced (Fig. 8), apex of sternite X convex; aedeagus: main piece thin, with three setae (two apical, one dorsal), parameres more or less equally long (Fig. 17). Female: subapical fringe of tergite X with vermiform setae (Fig. 17)..... ***furthi***
(*riparia* group)

5 Length (labrum to elytral apex): 2.3–2.8 mm; vertex more or less distinctly vaulted (especially in female) (Figs. 1, 5). Aedeagus with short flagellum (Figs. 13, 14)..... 6

- Length (labrum to elytral apex): 2.0–2.3 mm; vertex more or less flat (Figs. 6–7). Aedeagus with long flagellum (Figs. 15, 16)..... 7

6 Tips of maxillary palpi usually darkened (Fig. 5). Male: metatibia not distinctly sinuous medially, medial tooth of metatibia smaller (Fig. 5); aedeagus (Fig. 13): main piece less strongly sinuous (lateral view), apically with distinct lateral extensions (dorsal view). Female: gonocoxite more transverse, with distinct baso-lateral projections, inner plate not distinctly projecting basally (Fig. 13)..... ***berytus***

- Tips of maxillary palpi never darkened (Fig. 2). Male: metatibia distinctly sinuous medially, medial tooth of metatibia larger (Fig. 2); aedeagus (Fig. 14): main piece more strongly sinuous (lateral view), apically without distinct lateral extensions (dorsal view). Female: gonocoxite less transverse, without distinct baso-lateral projections, inner plate distinctly projecting basally, forming a closed ring (Fig. 14)..... ***sidon***

7 Tips of maxillary palpi hardly noticeably obscured (Fig. 6). Male: mesotibia slightly more curved, metatibia wider, with significant swelling (Fig. 6), metaventral plaques narrow, separated from each other by about four times their width at midlength; aedeagus (Fig. 15) larger, dorsal margin of main piece less irregular (lateral view), setae of main piece not arranged in a transverse row, distal lobe larger, flagellum distinctly longer; both parameres less distinctly curved (lateral view), right paramere with group of long setae near apical 0.4, setae of left paramere longer, curly. Female: tergite X with squamose setae, gonocoxite slightly wider, less parallel-sided; apical area larger; exposed part of inner plate less transverse (Fig. 15) .... ***damascena***

- Tips of maxillary palpi more distinctly obscured (Fig. 7). Male: mesotibia slightly less curved, metatibia more slender, without significant swelling (Fig. 7), metaventral plaques wider, separated from each other by about twice their width at midlength; aedeagus (Fig. 16) smaller, dorsal margin of main piece more irregular (lateral view), setae of main piece arranged in a transverse row, distal lobe less extensive, flagellum distinctly shorter; both parameres distinctly curved (lateral view), right paramere without group of long setae near apical 0.4, setae of left paramere shorter, not curly. Female: tergite X without squamose setae, gonocoxite slightly narrower, more parallel-sided; apical area smaller; exposed part of inner plate more transverse (Fig. 16)..... ***phoenicia***

8 Male: mesotibial expansion less close to the apex, metatibia significantly widened (Fig. 9); aedeagus: apical part of main piece wider, ventral margin not strongly convex around apical 0.3 (Fig. 18). Female: apical corners of tergite X less distinct, squamose setae smaller, disc without irregular ridges, subapical fringe shorter, hyaline margin narrower and less distinctly

convex medially; apex of gonocoxite not strongly emarginate; apical part of outer plate larger (Fig. 18) ..... ***orthosia***

- Male: mesotibial expansion very slightly more close to the apex, metatibia significantly widened (Fig. 10); aedeagus: apical part of main piece more slender, ventral margin strongly convex around apical 0.3 (Fig. 19). Female: apical corners of tergite X more distinct, squamose setae larger, disc with irregular ridges, subapical fringe longer, hyaline margin wider and more distinctly convex medially; apex of gonocoxite strongly emarginate (Fig. 19).. ..... ***berthelemyana***

Ecological Notes

(by A. Dia)

All specimens collected were confined to the benthos (medium rubble, small bolders, cobbles, gravel, sand, moss, leaf litter detritus, and filaments of green algae encrusting the substrate).

Hydraena furthi (478 exs.: 207 exs. in Damour and 117 exs. in Awali Basin; 54 exs. in other river systems) is the dominant species. It occurs at elevations from 40 to 1500 m a.s.l. and accounts for 37.8 % of the total number of *Hydraena* specimens collected. It is eurythermous (12–29° C) and eurytope (main river, tributaries) but appears to be a lowland species that lives at intermediate elevations, from epipotamal to rhithral. Density (ind./m^2) was highest in the following stations: D3 (Damour at Jisr el Quâdi, see Fig. 26, 61 ind./m^2), D4 (Damour at Jisr Damour) and A16b (spring-brook Abou Kharma at Awali, 34 ind./m^2).

Hydraena berytus (304 exs.: 150 exs. in Awali, 143 in the Damour, and 11 in other rivers) is also similar in abundance to *H. furthi*. It is found in crenal and rhithral (50–1500 m a.s.l.) and accounts for 30.85 % of the total number of *Hydraena* adults collected. Current velocities, where this species was found, range between 11 and 117 cm/s. It is eurytope (main river, tributaries) but prefers the head waters with a density of 90 ind./m^2 (D2) and 15 ind./m^2 (A16a). It appears to be a cool-adapted species (water temperature: 11–24° C). It is associated with *H. modili*, *H. furthi* and *H. phoenicia* in the station Mazraat el Balde (Oustouene River), with *H. damascena*, *H. furthi*, and *H. modili* at Jisr Jdaidet ech Chouf (A6, Awali River), and with *H. paganettii*, *H. damascena*, and with its sister species, *H. sidon*, in the station Ras el Ain (A14, Awali River). It occurrs during most of the year (9 months: April–December) but is more abundant during the drier months (June–December).

Hydraena damascena (168 exs.) occurs within 88 to 1819 m a.s.l. and accounts for 17.6 % of the total number of *Hydraena* specimens collected. It is rheophilic (current velocity range: 21–76 cm/s) in crenal and rhithral. *Hydraena damascena* was found to be associated with *H. berthelemyana* and *H. modili* in Tannourine el Faouqa Stream and Ain er Raha Stream (El Jaouz River). It was also found associated with *H. berytus* and *H. furthi* in some stations (system of rheocrene springs and upper streams) in southern Lebanon. It is an eurytope species (main river, tributaries) but prefers the head waters (water temperature: 10–23° C) (density = 30 ind./m^2 at spring-brook Nabaa Abou Kharma, A16).

Hydraena berthelemyana (76 exs.) is found from crenal to epirhithral and is a cool-adapted species (water temperature: 9–16° C). It was found at elevations between 900 and 1580 m a.s.l. in rheocrene springs and many streams (current velocity range: 13–76 cm/s) in summer and autumnal periods. It is dominant in upstream Tannourine el Faouqa with a density of 102 ind./m^2.

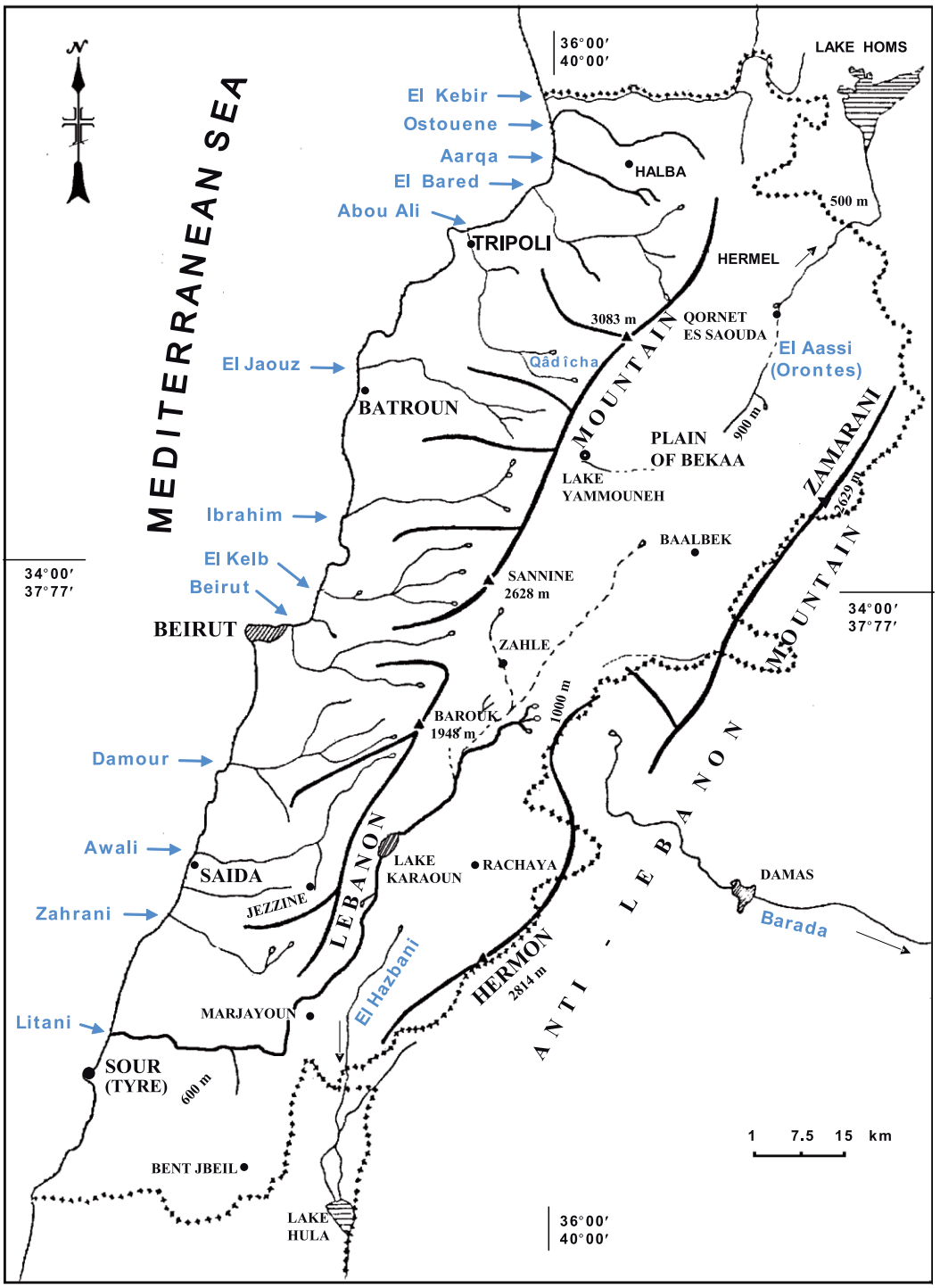
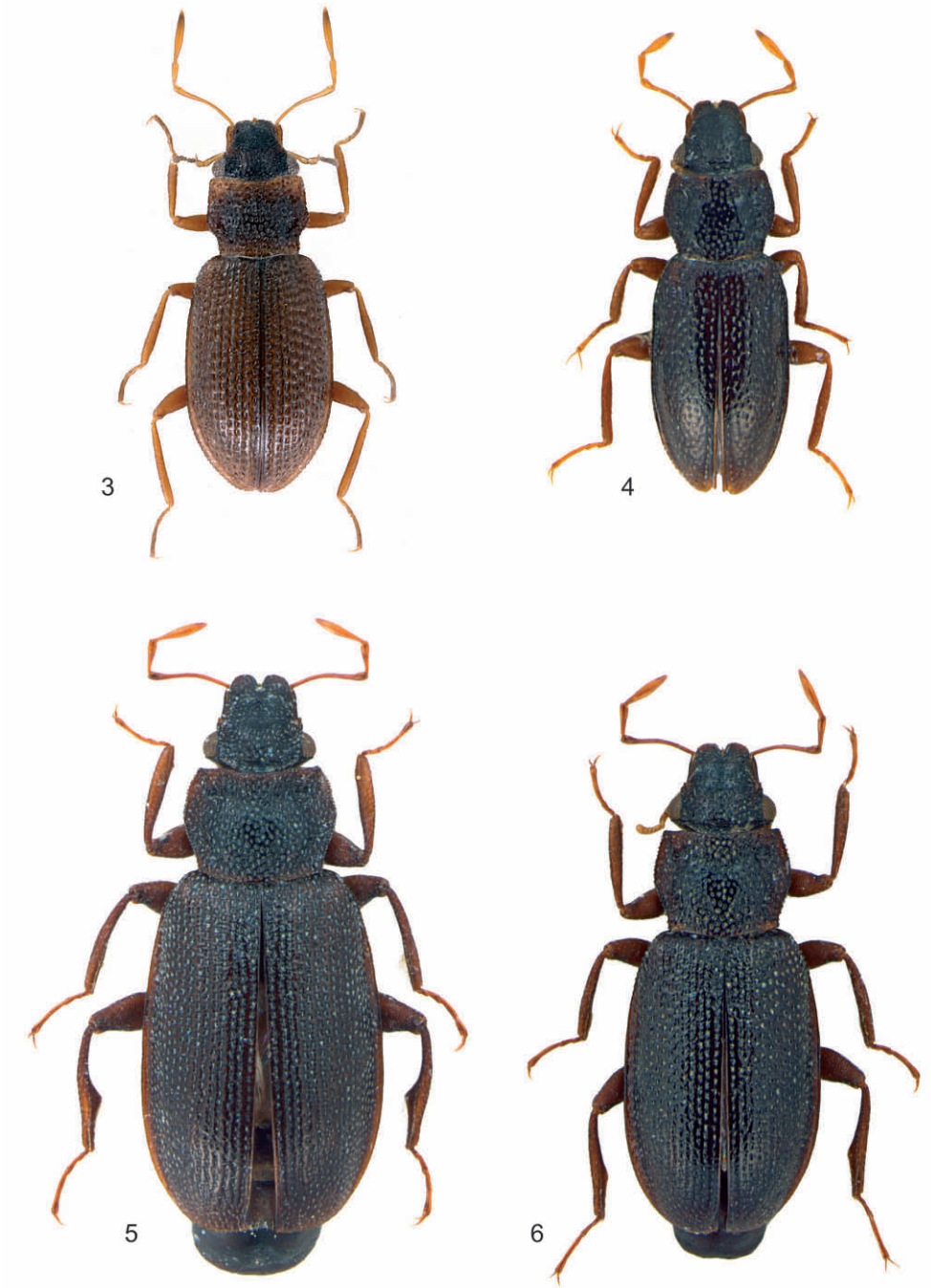
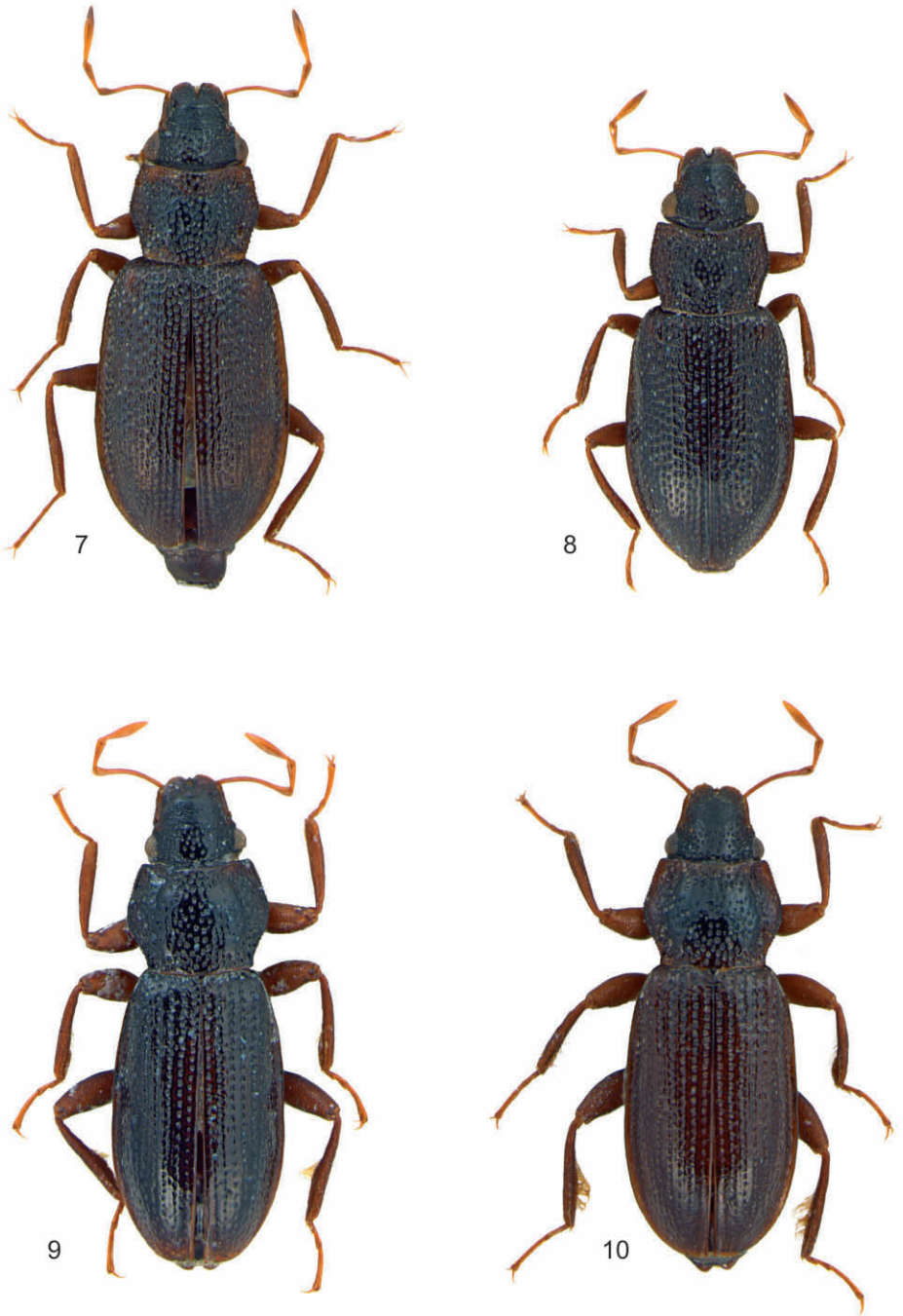


Fig. 1: Lebanese river systems.

Fig. 2: Habitus of *H.* (s.str.) *sidon*, paratype.



Figs. 3–6: Habitus of 3) *H.* (s.str.) *paganettii*, 4) *H.* (s.str.) *modili*, 5) *H.* (s.str.) *berytus*, 6) *H.* (s.str.) *damascena*.



Figs. 7–10: Habitus of 7) *H.* (s.str.) *phoenicia*, holotype, 8) *H.* (s.str.) *furthi*, 9) *H.* (s.str.) *orthosia*, holotype, 10) *H.* (s.str.) *berthelemyana*, paratype.

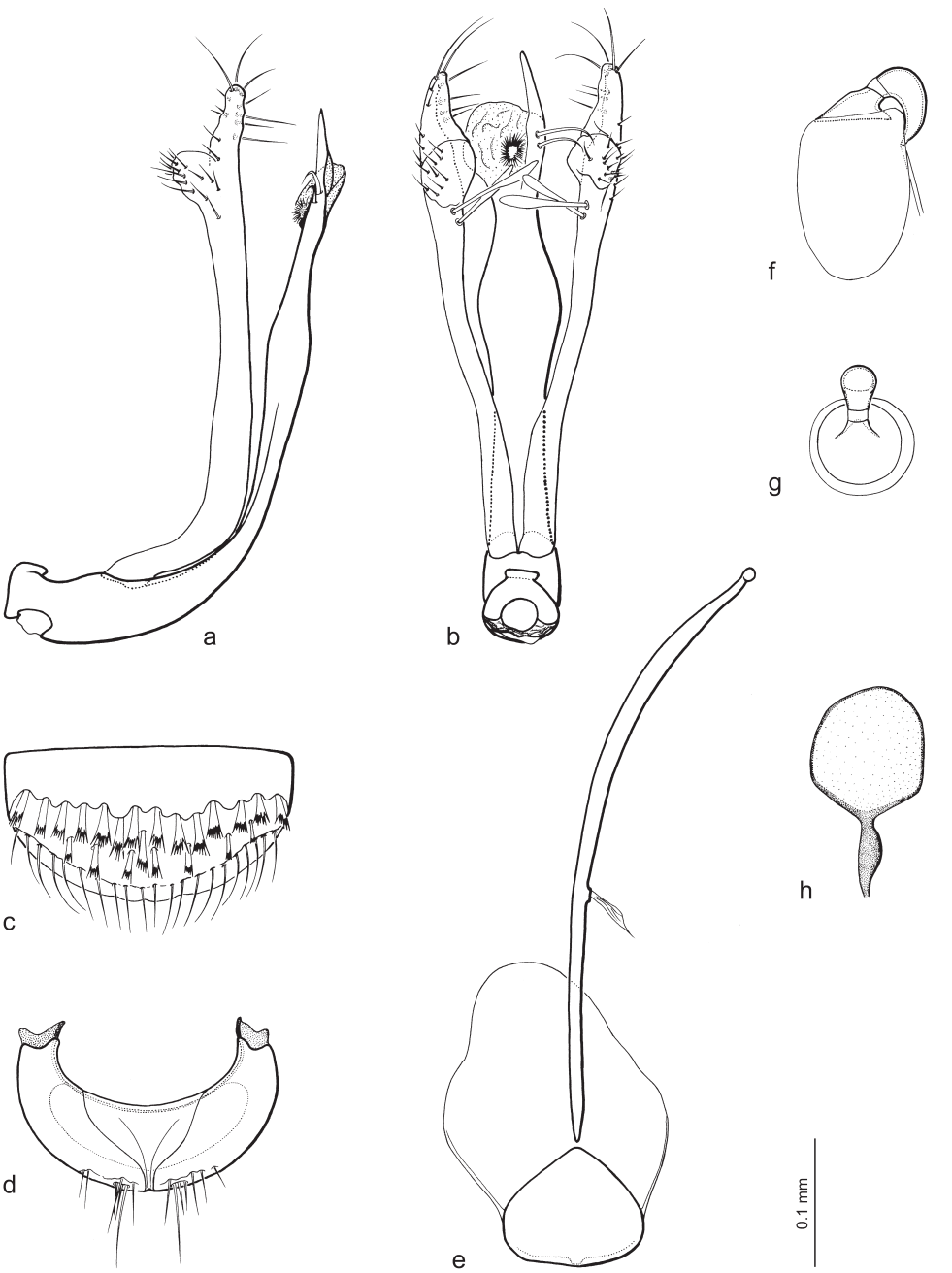


Fig. 11: *Hydraena* (s.str.) *paganettii*: a–b) aedeagus in lateral and ventral view; c) female tergite X; d) gonocoxite; e) male sternite X and spiculum; f–g) spermatheca; h) accessory vaginal sclerite ("pseudospermatheca").

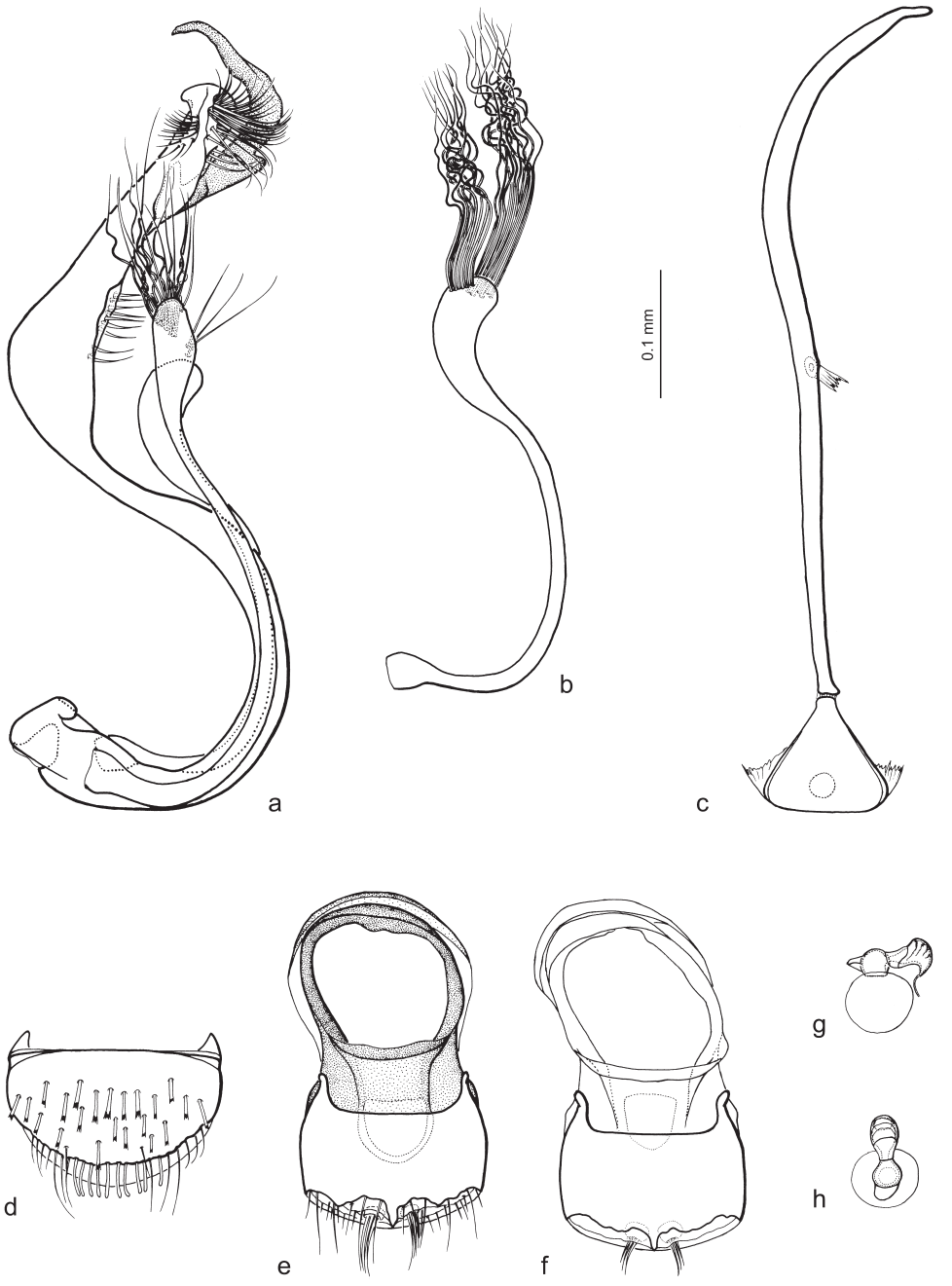


Fig. 12: *Hydraena* (s.str.) *modili*: a) aedeagus in lateral view, setae of left paramere omitted; b) left paramere in lateral (right) view; c) male sternite X and spiculum; d) female tergite X; e–f) gonocoxite, e) Lebanese specimen, f) paratype from Turkey (setae partly omitted); g–h) spermatheca.

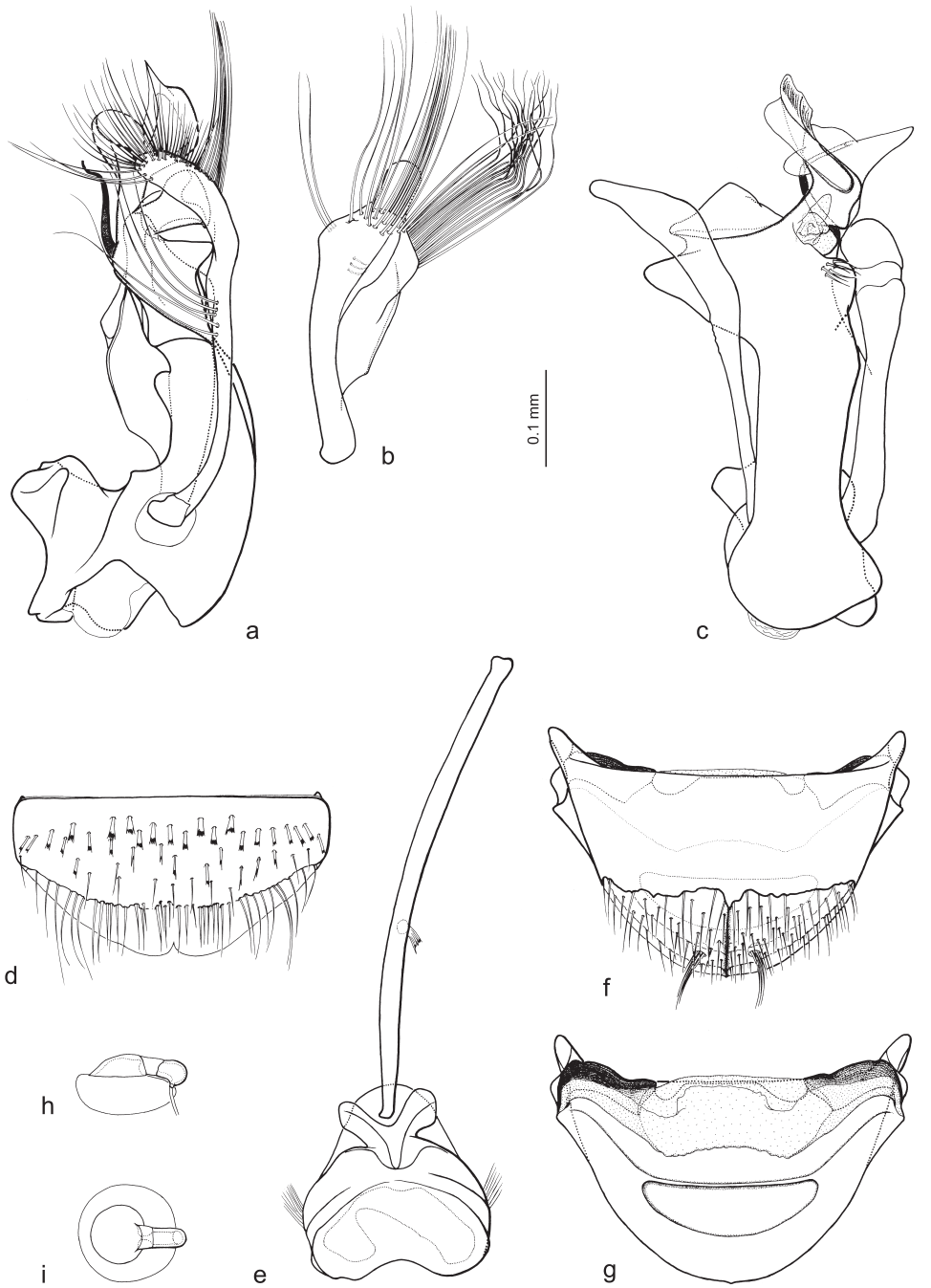


Fig. 13: *Hydraena* (s.str.) *berytus*: a) aedeagus in lateral view, setae of left paramere omitted; b) left paramere in lateral (left) view; c) aedeagus, dorsal view, parameral setae omitted; d) female tergite X; e) male sternite X and spiculum; f–g) gonocoxite in ventral and dorsal view; h–i) spermatheca.

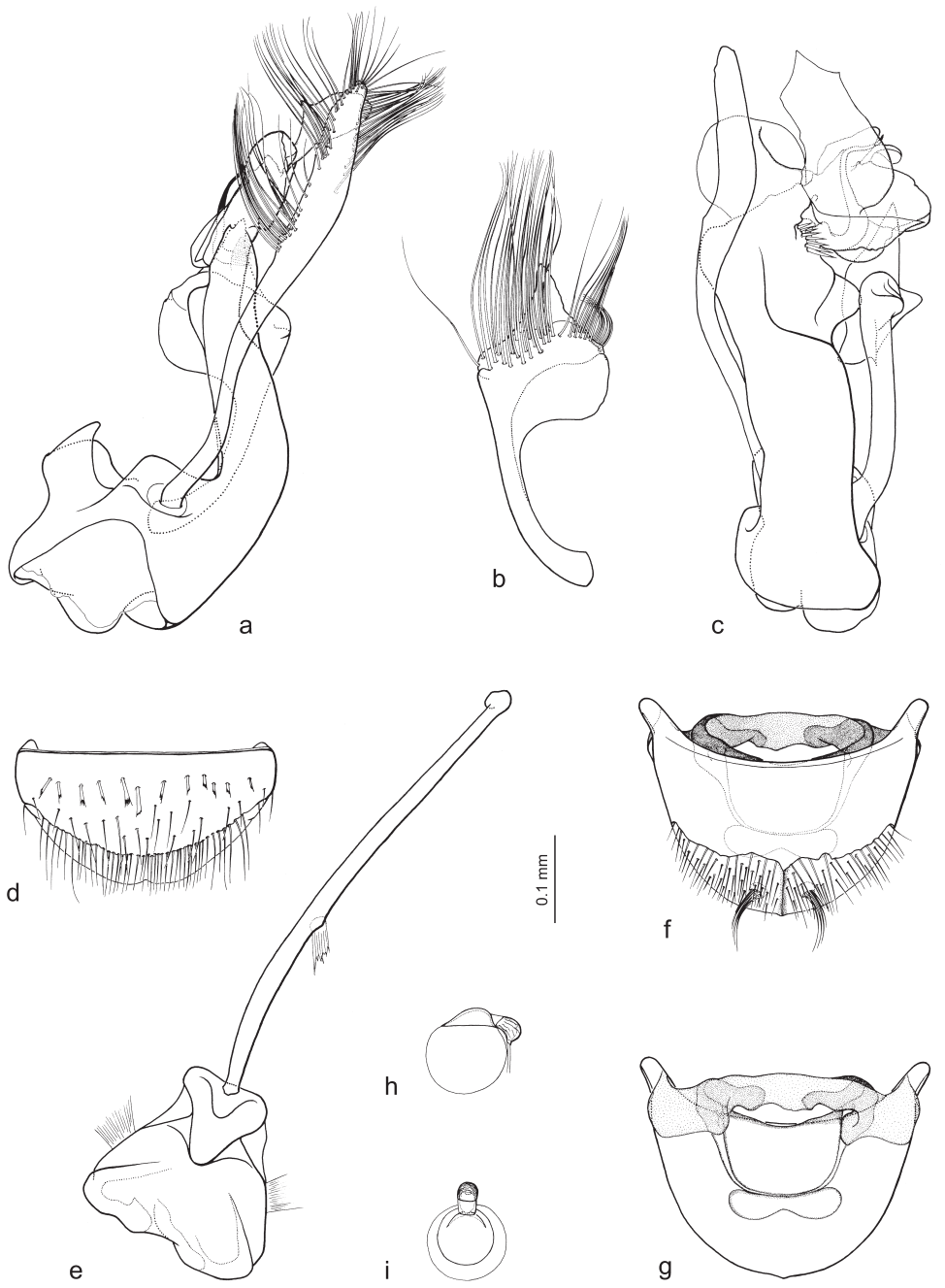


Fig. 14: *Hydraena* (s.str.) *sidon*: a) aedeagus in lateral view, setae of left paramere omitted; b) left paramere in lateral (left) view; c) aedeagus, dorsal view, parameral setae omitted; d) female tergite X; e) male sternite X and spiculum; f–g) gonocoxite in ventral and dorsal view; h–i) spermatheca.

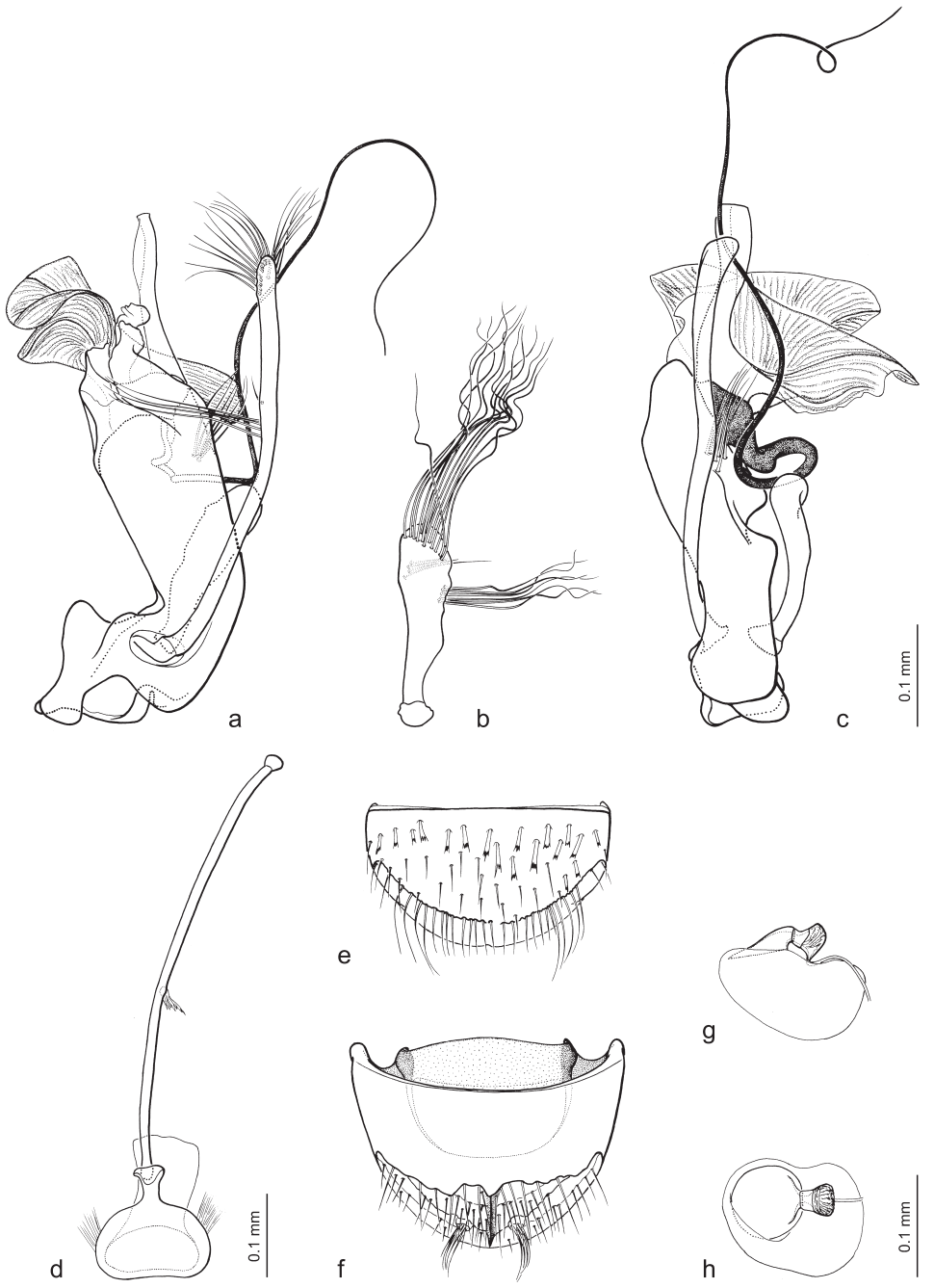


Fig. 15: *Hydraena* (s.str.) *damascena*: a) aedeagus in lateral view, setae of left paramere omitted; b) left paramere in lateral (left) view; c) aedeagus, dorsal view, parameral setae omitted; d) male sternite X and spiculum; e) female tergite X; f) gonocoxite; g–h) spermatheca.

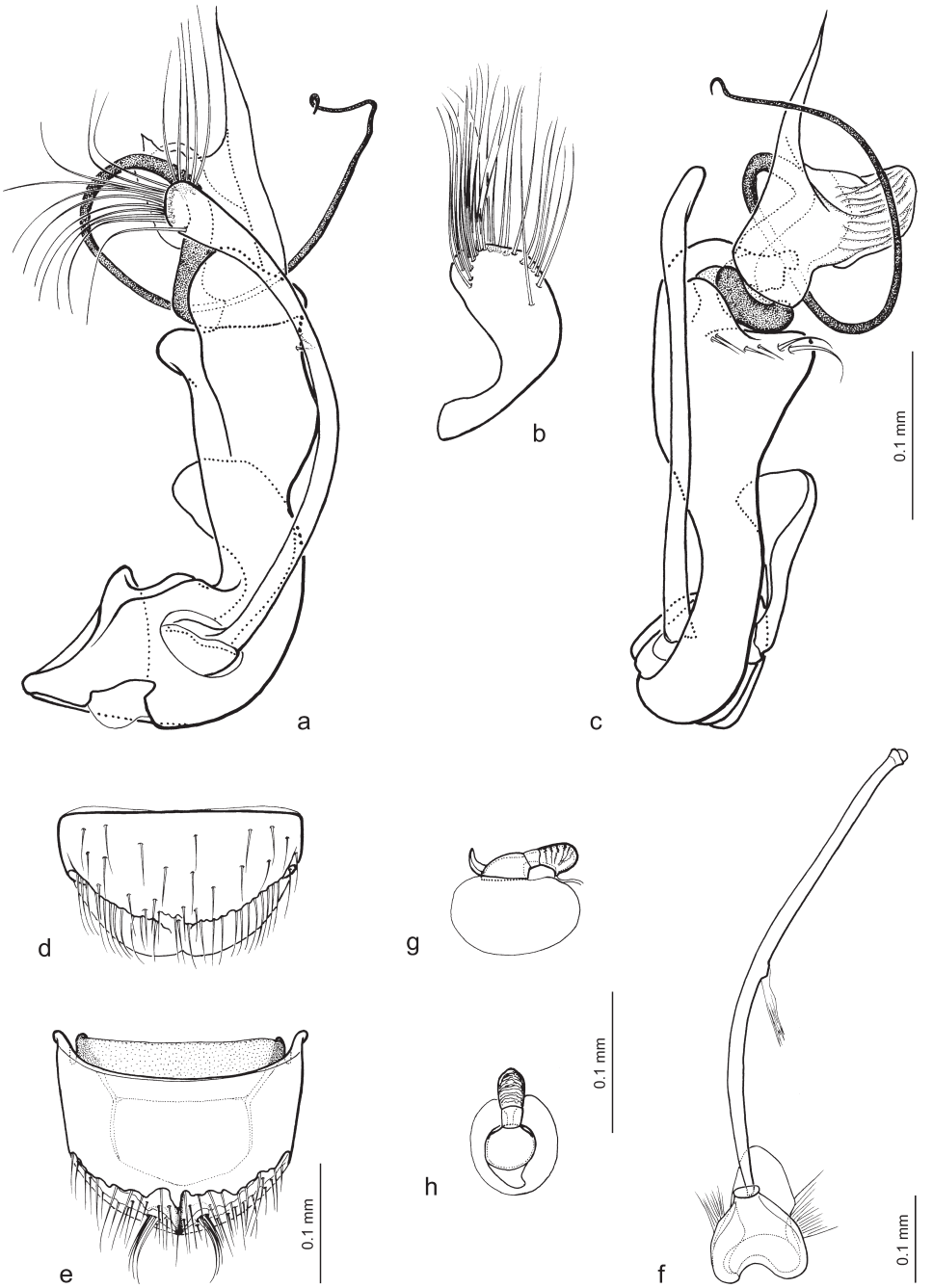


Fig. 16: *Hydraena* (s.str.) *phoenicia*: a) aedeagus in lateral view, setae of left paramere omitted; b) left paramere in lateral (right) view; c) aedeagus, dorsal view, parameral setae omitted; d) female tergite X; e) gonocoxite; f) male sternite X and spiculum; g–h) spermatheca.

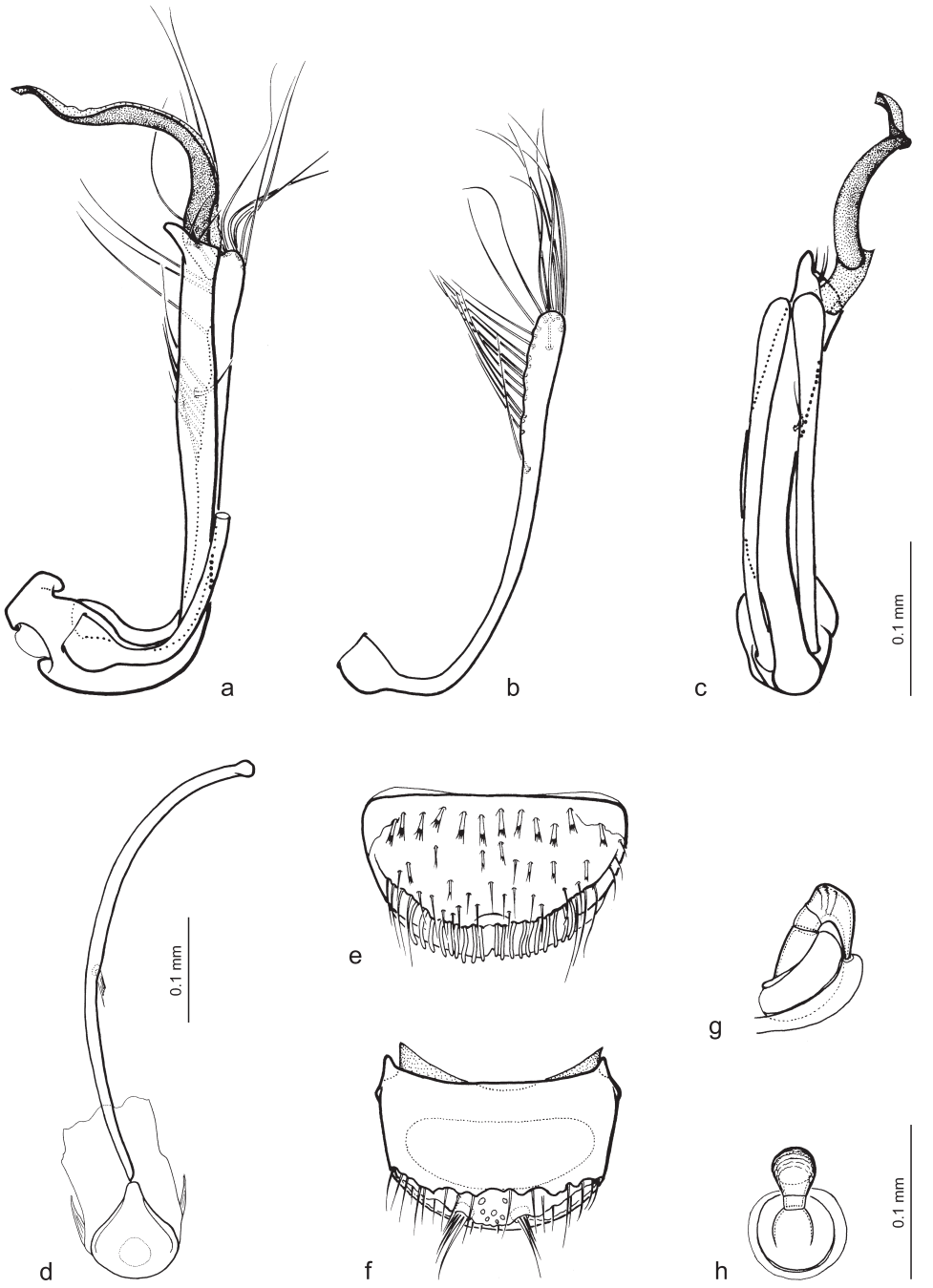


Fig. 17: *Hydraena* (s.str.) *furthi*: a) aedeagus in lateral view, apex of right paramere omitted; b) right paramere in lateral view; c) aedeagus, dorsal view, parameral setae omitted; d) male sternite X and spiculum; e) female tergite X; f) gonocoxite; g–h) spermatheca.

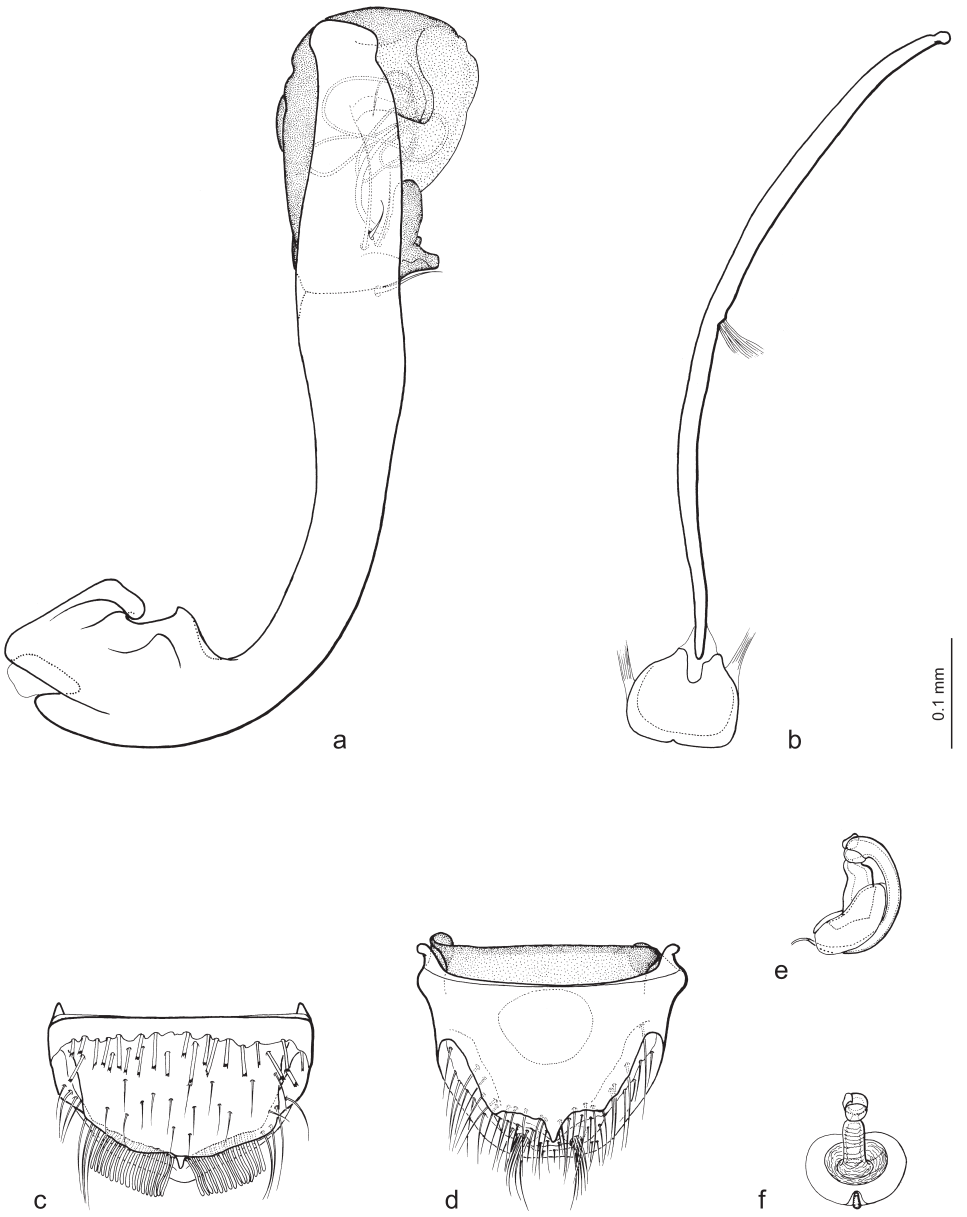
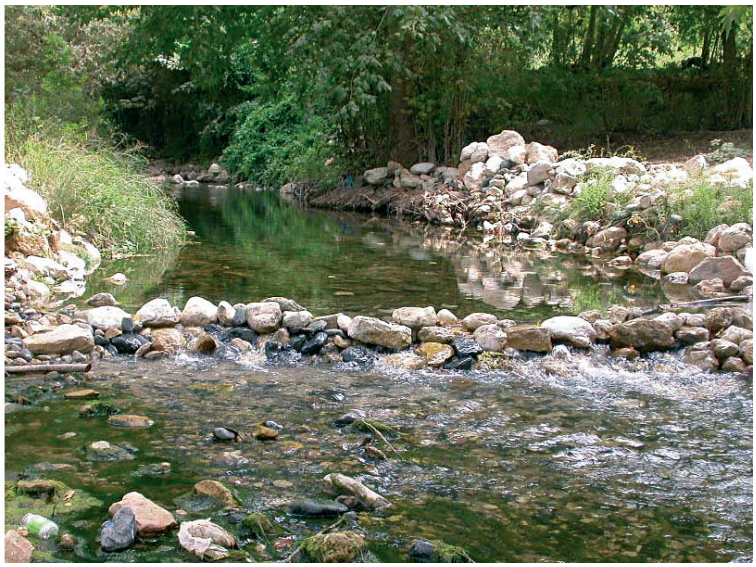


Fig. 18: *Hydraena* (s.str.) *orthosia*: a) aedeagus in lateral view; b) male sternite X and spiculum; c) female tergite X; d) gonocoxite; e–f) spermatheca.

Fig. 19: *Hydraena* (s.str.) *berthelemyana*: a) aedeagus in lateral view; b) female tergite X; c) gonocoxite; d–e) spermatheca.

Figs. 20–23: Geographical distribution of the species of *Hydraena* in Lebanon.



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Figs. 24–25: Sampling Stations: 24) El Jaouz River at village Beit Chlala, habitat of *Hydraena berytus* and *H. furthi*; 25) spring-brook near village Afqa (river system of Ibrahim), habitat of *Hydraena berthelemyana* and *H. berytus*.

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Figs. 26–27: Sampling Stations: 26): Damour River at Jisr [bridge] el Quâdi (D3 = st26), habitat of *Hydraena berytus* and *H. furthi*; 27): Nabaa Mourched, spring-brook near village El Mokhhtara (river system of Awali) (Sta12 = st7), habitat of *Hydraena berytus*, *H. damascena*, *H. furthi*, and *H. sidon*.

The surrounding vegetation belongs to the Supra-Mediterranean series (*Quercus calliprinos*, *Q. infectoria*, *Q. cerris* and *Platanus orientalis*). The mean annual rainfall is 1200 mm.

The high discharge springs (upper Ibrahim and Abou Ali) correspond to the resurgence of subterranean rivers belonging to a system of karstic caves (Cenomanien limestone).

The spring of El Jaouz (Korsi) belongs to a karstic area (Jurassic). Discharge: 0.012 m^3/S (at low water, July–October) to 0.3 m^3/S (at high water). The stream of El Jaouz has hard waters rich in dissolved matter (conductivity: 250–445 µS; pH: 8.0–8.3; $CaCO_3$: 138–230 mg/l, alkalinity: 160–255 mg/l). Dissolved O_2 levels were at or near saturation at all stations, with a range of 70–99 %.

The Ibrahim stream (Afqa Spring, see Fig. 25, and about one kilometer downstream of Rouais Spring) has moderately hard waters rich in dissolved matter (conductivity: 200–350 µS; pH: 7.95–8.20; $CaCO_3$: 120–144 mg/l, alkalinity: 120–150 mg/l). Dissolved O_2 levels were at or near saturation at all stations, with values ranging from 80–90%. Discharge: 0.9 m^3/S at low water (July–October); annual mean value: 2.8 m^3/S. Width (low water): 2–3 m. Slope: 14%.

The stream of Abou Ali (Mar Sarkis Spring) has moderately hard water rich in dissolved matter (conductivity: 140–160 µS; pH: 7.8; $CaCO_3$: 90–118 mg/l, alkalinity: 110 mg/l). Dissolved O_2 levels were at or near saturation, with values ranging from 75–80 %. Discharge of the spring: annual mean value: 0.5 m^3/S.

Hydraena sidon (36 exs.) is a stenothermous species (water temperature: 13.5–15.0° C); which is found in crenal and epirhithral (800–850 m a.s.l.). It is restricted to the Awali river basin (rheocrene springs and headwater) with a current velocity range of 5–59 cm/s. It is abundant in little spring-brooks of Ras el Ain, A14 (density = 11 ind./m^2) and in Ain Chelouf, A13 (density = 7 ind./m^2). It was found to be associated with *H. paganettii*, *H. damascena* and its sister species, *H. berytus* in the station A14 (Ras el Ain) and with *H. damascena*, *H. furthi*, and *H. berytus*, in the station A17 (Bater ech Chouf).

Hydraena phoenicia (13 exs.) was found in one river system (Oustouene). It is obviously stenothermous (17–20° C), rheophilic (current velocity range: 62–76 cm/s), and lives in the rhithral. *Hydraena phoenicia* appears to be a lowland to mid-altitude species (240–700 m a.s.l.). At Mazraat el Balde, it is associated with *H. modili*, *H. berytus* and *H. furthi*. Remarkably, *H. damascena* and *H. phoenicia* were never collected together in the same sample although both are found in the Oustouene river basin. The ecological factors, which separate them are not known exactly. It is however suspected, that the combination of current velocity, water temperature, and maybe discharge may play an important role.

The surrounding vegetation belongs to the Eumediterranean and the Thermo-Mediterranean series (*Ceratonia*, *Pistacia*, *Quercus calliprinos*, *Q. infectoria*, *Cupressus sempervirens*, *Pinus pinea*). The mean annual rainfall is 800–900 mm. Geologically, the area is underlain by strata of the Cretaceous and Jurassic series.

The Oustouene River has hard waters rich in dissolved matter (conductivity: 390–630 µS; pH: 7.9–8.3; Ca+Mg: 65+70 mg/l; alkalinity: 269–340 mg/l).

Hydraena orthosia (7 exs.) was found in crenal and epirhithral in upstream reaches (950–1800 m a.s.l.) of the El Bared basin. It is a cool-adapted, hemi-stenothermous species restricted to the head waters (water temperature: 8.0–15.6° C).

The surrounding vegetation belongs to the Supra-Mediterranean series (*Quercus calliprinos*, *Q. infectoria*, *Q. cerris* and *Platanus orientalis*), and the montane Mediterranean series (*Cedrus libani*, *Quercus cedrorum*, *Q. brantii*, *Juniperus excelsa*). The mean annual rainfall is 1000–1100 mm.

Ksaim (spring-brook about two km southeast of the village of Sir el Danniyeh) rises under the talus and is collected in the lower part of the Cenomanien (Middle Cretaceous) strata. Discharge: 0.25 m^3/S at low water (July–October) and 2 m^3/S in spring 2006.

The spring-brook of Sir el Danniyeh flows through a village (Sir el Danniyeh), which has been built on limestone of the Aptian (Cretaceous) formation, and in places on the residual brown clay of weathered basaltic tuffs.

Sir el Danniyeh (spring) is a lower outlet along the fault system that formed Ksaim Spring. It is fed by the same source, but appears to have a much greater flow than the upper spring. The discharge is 0.34 m^3/S at low water.

The El Bared River has moderately hard waters rich in dissolved matter (conductivity: 200–300 µS; pH: 7.7–8.3; $CaCO_3$: 60–100 mg/l; alkalinity: 100–200 mg/l). Dissolved O_2 levels were at or near saturation at all stations, with values ranging from 80–95 %.

Hydraena modili (4 exs.) is a hemi-stenothermous (water temperature: 12–20°C), rhithrobiontic, rheophilic species (current velocity range: 46–73 cm/s). It was found at elevations between 240 and 1350 m a.s.l., associated with *H. berytus* in the station Mazraat el Balde (Oustouene River) and with *H. berthelemyana* in the Tannourine el Faouqa stream.

Hydraena paganettii (3 exs.) was collected between 850 and 1819 m a.s.l. The number of specimens sampled does not allow detailed conclusions on the ecology of this species in Lebanon. It was found to be associated with *H. berytus*, *H. damascena* and *H. sidon*.

	Elevation (m a.s.l.)	Distance from source (km)	Stream width (m)	Annual water temparature range (° C)
Basin of El Kebir				
Magl el Bal, little spring-brook in Ouâdi Audine	1440		1–2	9.5–11.0
Basin of Oustouene				
main course				
at bridge Jisr [bridge] Mazraat near village Mazraat el Balde	240	30	2–4	15–22
at bridge Jisr [bridge] el Koucha	88	20	3–4	16–24
tributaries				
Kharrar, spring-brook near village Aakar el Aatiqa	950		1–2	12.2–13.0
Taya, stream at bridge Jisr [bridge] Taya near village Aakar el Aatiqa	700	2	0.5–3.0	10.2–19.5
Basin of Aarqa				
Houaich, stream near village Houaich	480	5	1–2	12.7–17.2
Basin of El Bared				
main course				
at El Bared Reservoir	240	10	8–10	14.5–22.0

Tributaries				
Ouâdi Ras En Nahr, stream in Ouâdi Jhannam	1800	4	2–3	10.0–15.6
El Ksaim, spring-brook near village Sir el Danniyeh	1050		4–5	7–10
Sir el Danniyeh, spring-brook near village Sir el Danniyeh	950		2–5	8.5–10.0
Basin of Abou Ali				
main course				
at village Daraya	195	23	5–7	9.3–20.0
tributaries				
Mar Sarkis, spring-brook near village Ehden	1580		1–2	6.3–8.0
Qâdîcha, stream near village Bcherre	1500	0.5	3–4	6.2–14.0
Basin of El Jaouz				
main course				
at village Beit Chlala (see Fig. 24)	610	10	3	8.5–20.5
near spring-brook Ed Dalli	605	10.5	4–5	9.0–15.5
tributaries				
Korsi, spring-brook near village Tannourine el Faouqa	1525		1	9.5–10.5
Tannourine el Faouqa, stream at bridge near village Tannourine el Faouqa	1350	2	2–3	8.9–13.2
Ouâdi Tannourine, stream near village Tannourine el Faouqa	1000	5	2–4	8.5–14.5
Ain Er Raha, stream near village Tannourine et Tahta	950	10	2–3	8.4–15.8
Basin of Ibrahim				
main course				
at Chouane power plant	300	18	8–10	7–19
tributaries				
Afqa, spring-brook near village Afqa (see Fig. 25)	1200			8.5–10.0
Rouais, stream near village El Mejdel	1095	1.5	6–10	8.8–16
Rouais, stream near village Yanouh	1015	3	6–10	9–17
Basin of Damour				
main course				
D1 Nahr es Safa, spring-brook near village Ain Zhalta = st24	1000		3–5	10–13
D2 Damour = st25	950	2	2–4	9–17
D3 Jisr [bridge] el Quâdi = st26 (see Fig. 26)	260	18	6–8	11.5–23.0
D4 Jisr [bridge] ed Damour = st29	40	28	6–8	12–26
tributaries				
D5 Ouâdi el Ghâboun (temporary) = st27	260	10	4–6	11.5–24.0
D6 Nahr el Hammam = st28	45	15	4–6	13.5–22.0
Basin of Awali				
main course				
A1 Nabaa el Barouk near village Barouk = st1	1080		2–4	9.5–11.0
A2 near village Barouk = st2	1064	1	2–4	9–17
A4 Jisr [bridge] Batloûn el Kharara near village Barouk = st4	980	4	2–4	9–18
A5 Jisr [bridge] Jdaidet ech Choûf = st6	710	11	4–6	11–19
A6 Jisr [bridge] Bisri = st17	380	28	6–8	9–29
A7 Awali power plant = st18	230	30	6–10	9.5–26.0

A8 Joun power plant = st19	50	44	3–5	12–29
tributaries				
Sta11 Nabaa Batloûn el Kharara, small spring-brook = st5	960		2–3	12.0–14.5
Sta12 Nabaa Mourched, spring-brook near village El Mokhhtara = st7 (see Fig. 27)	800		3–4	13.5–15.0
Sta13 Ain Chelouf (temporary), spring-brook near village Ain Quaniye = st8	840		2–3	8.3–15.5
Sta14 Ras el Ain, spring-brook near village Aammatour = st9	850		1–2	14.5–16.0
Sta15 Nabaa Salman, spring-brook near village Haret Jandal = st10	800		3–4	11.5–18.0
Sta16 Nabaa Abou Kharma, spring-brook near village Bâter = st11	850		3–4	8–15
Sta17 Nabaa Bâter ech Choûf, spring-brook near village Niha = st12	820		2–3	13.0–14.5
Nahr Aaray / Jezzîne Waterfall				
Sta18 Nabaa Aazibi, spring-brook near village Jezzîne = st13	990		3–4	5.0–15.5
Sta19 Nabaa Jezzîne, spring-brook near village Jezzîne = st14	950		3–4	12.5–14.0
Sta 20 Nahr Aaray, stream near village Jezzîne = st15	900	0.95	2–5	10–19
Sta 21 Nahr Aaray (Ouâdi Jezzîne) = st16	690	2.25	2–5	10.0–21.5
Sta 22 Ouâdi Azour (temporary) = st23	380		3–4	10.5–23.0
Basin of Lower Litani				
at bridge Jisr [bridge] el Khardala	240	120	10–15	16–22
at bridge Jisr [bridge] Zrairiye near village Sir el Gharbiye	50	150	10–12	16–26

Tab. 1: Elevation range, distance from source, stream width and water temperature of the stations in the river sytems of El Kebir, Oustouene, Aarqa, El Bared, Abou Ali, El Jaouz, Ibrahim, Damour, Awali, and Lower Litani.

		Basin of Damour							
		main river				**tributaries**			
Stations		**D1**	**D2**	**D3**	**D4**	**D5**	**D6**	**Total**	**%**
H. berytus	ind./m²	3	90	4	0	0	0		
	F.G.	17	15	11	0	3	0		
	T	20	205	15	0	3	0	143	40.6
H. damascena	ind./m²	1	1	0	0	0	0		
	F.G.	0	0	0	0	0	0		
	T	1	1	0	0	0	0	2	0.56
H. furthi	ind./m²	1	4	61	34	3	10		
	F.G.	0	0	72	11	9	2		
	T	1	4	133	45	12	12	207	58.8
Total number		**22**	**110**	**148**	**45**	**15**	**12**	**352**	
Richness		**3**	**3**	**2**	**1**	**2**	**1**		

Tab. 2: Average numbers (ind./m²) of *Hydraena* adults collected from the Damour river basin, F.G. = benthos fauna, non quantitative sample, T = total number.

		Basin of Awali																			
		main river							tributaries												
Stations		**A1**	**A2**	**A4**	**A5**	**A6**	**A7**	**A8**	**A11**	**A12**	**A13**	**A14**	**A15**	**A16a**	**A16b**	**A17**	**A18**	**A21**	**A22**	**Total**	**%**
H. berytus	ind./m²	6	1	0	1	0	0	0	0	0	0	10	0	15	7	0	9	12	0		
	F.G.	0	2	4	2	1	0	1	0	7	1	4	6	23	10	4	3	21	0		
	T	6	3	4	3	1	0	1	0	7	1	14	6	38	17	4	12	33	0	150	32.7
H. damascena	ind./m²	2	0	0	2	1	0	0	1	2	0	2	0	34	26	0	8	2	0		
	F.G.	0	2	3	10	1	0	0	0	12	0	6	12	11	12	1	3	1	0		
	T	2	2	3	12	2	0	0	1	14	0	8	12	45	38	1	11	3	0	154	33.5
H. furthi	ind./m²	0	0	0	5	1	1	0	0	2	0	0	0	0	34	0	0	14	0		
	F.G.	0	0	0	21	10	1	7	0	5	0	0	2	0	6	5	0	2	1		
	T	0	0	0	26	11	2	7	0	7	0	0	2	0	40	5	0	16	1	117	25.4
H. modili	ind./m²	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	F.G.	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	T	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
H. paganettii	ind./m²	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	F.G.	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0		
	T	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	
H. sidon	ind./m²	0	0	0	0	0	0	0	0	0	7	11	0	0	0	0	0	0	0		
	F.G.	0	0	0	0	0	0	0	0	3	2	10	0	0	0	3	0	0	0		
	T	0	0	0	0	0	0	0	0	3	9	21	0	0	0	3	0	0	0	36	7.8
Total number		**8**	**5**	**7**	**42**	**14**	**2**	**8**	**1**	**31**	**10**	**44**	**20**	**83**	**95**	**13**	**23**	**52**	**1**	**459**	
Richness		**2**	**2**	**2**	**4**	**3**	**1**	**2**	**1**	**4**	**2**	**4**	**3**	**2**	**3**	**4**	**2**	**3**	**1**		

Tab. 3: Average numbers (ind./m²) of *Hydraena* adults collected from the Awali river basin, F.G. = benthos fauna, non quantitative sample, T = total number.

Acknowledgements

We are obliged to A. van Nieuwenhuizen (Groningen) and R. Ortal (Jerusalem) for providing additional specimens. The habitus photographs were made by Harald Schillhammer (NMW). A visit of J.A. Díaz to the Naturhistorisches Museum Wien was supported by Synthesys (Application AT-TAF-1613). The second author received financial support from the Lebanese National Council for scientific Research.

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