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Ecological notes on running water *Ochthebius* from southern Lebanon, with description of a new species (Insecta: Coleoptera, Hydraenidae)

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A b s t r a c t. The ecology of 5 running water species of the genus *Ochthebius* (Hydraenidae) from southern Lebanon is briefly discussed. *Ochthebius libanus* JÄCH & DIA sp.n. is described.

K e y w o r d s: Coleoptera, Hydraenidae, *Ochthebius*, running water, ecology, Lebanon, new species.

Hydrobiological studies carried out by the senior author in southern Lebanon in 1979/80 revealed - among many Coleoptera and other Insects - 5 species of the Hydraenid genus *Ochthebius*. A brief description of the study area, ecological notes on the *Ochthebius* species and the description of a new species (*Ochthebius libanus* JÄCH & DIA sp.n.) are given in the present paper.

Study area, physiographical and physico-chemical characteristics

The water-courses studied belong to the hydrographic basins of the Aouali and the Damour river systems on the western slope of Mount Lebanon, between Beirut and Saida (Fig. 1). They include most of the permanent running waters of southern Lebanon, from trickles to rather large rivers. Most of these streams are fed by aquifers in limestone massifs, thus this karstic area is rich in large springs.

The Damour and Aouali are the main drainage systems of southern Lebanon. They originate in the Jabal Barouk and Jabal Niha mountains and both flow in a southwestern direction. The Damour river is 33 km long; at its mouth it

drains 288 km². The head spring is a rheocrene karst spring at 1100 m above sea level. The average gradient of the main channel is 33 m/km. The drainage network shows a dendritic pattern. The river receives two third-order tributaries.

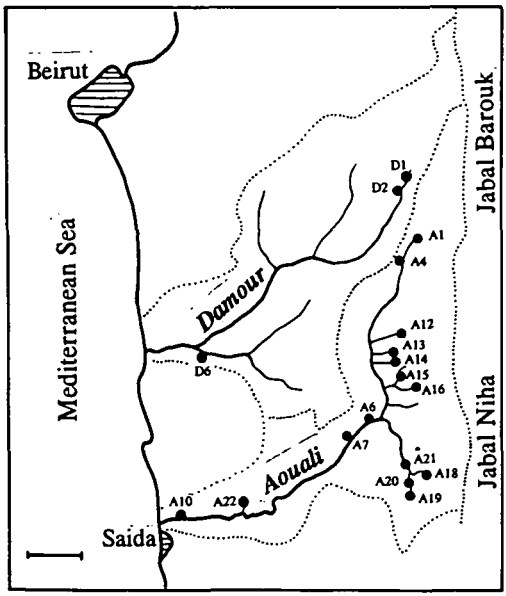

Fig. 1: Map of the Aouali and Damour river systems, showing 18 sampling stations (..... limits of the hydrographic basins). Scale: 4 km.

The Aouali river is 48 km long; its drainage area is 302 km². Its head source is at 1080 m above sea level. The upper reaches of the bassin are fed by important spring systems whose emissaries run through small valleys (1 - 3 km long) perpendicular to the main valley. The average channel gradient is 22 m/km. The drainage network is rather palmate at the upper end of the bassin. The headwaters are fast flowing and the channel gradients are steep (40-70 m/km). In its lower reaches, the Aouali flows 18 km through lowland alluvial deposits (channel gradient 5 - 15 m/km), whereas the Damour flows 9 km through the flood plain (channel gradient 10 m/km).

All the water-courses of southern Lebanon belong to the same climatic region. The climate is mediterranean with a hot dry summer and a cool wet winter. The mean annual rainfall ranges from 680 mm at the lower elevations to 1350 mm on the summits. Rainfall occurs from November to March over a 60-80 days period.

The highest flows are registered from February to April, low waters being registered from June to October. In the lower reaches of the Aouali (near Saida) the average water-discharge is about 16 m³/sec, with a maximum discharge of about 27 m³/sec in April and a minimum of about 8 m³/sec. In

the lower reaches of the Damour the annual mean discharge is about 4 m^3/sec, the maximum begin 11 m^3/sec and the minimum 0,15 m^3/sec.
The main springs are fed by an aquifer situated in limestones of jurassic age. The outflow of the main source of the Aouali varies from 600 liter/sec (November) to 1700 liter/sec (March), that of the main source of Damour from 300 liter/sec (November) to 2000 liter/sec (April).
The maximum annual water temperature fluctuations did not exceed 12°C in the upper reaches of the investigated streams, but attained 20°C in the lower reaches. Lowest temperatures (8°-14°C) were recorded in winter, highest temperatures (26°C in Damour, 29°C in Aouali) in July. The annual maximum during three years ranged from 13° to 24°C in upland streams and from 23° to 29°C at the lowland stations. Water temperature was rather constant in the springs, the annual water temperature fluctuations being reduced: 10°-13°C in the head spring of the Damour, 9.5°-11°C in that of the Aouali.
The streams of southern Lebanon, fed by limestone aquifers, have hard waters rich in dissolved matter (conductivity: 200 - 500 µS; pH: 7.3 - 8.3; $CaCO_3$: 60 - 100 mg/l; alcalinity: 115 - 250 mg/l). The pH, water hardness and conductivity increase downstream. Dissolved O_2 levels were at or near saturation at all stations, with values ranging from 80 % to 105 %.
Rivers and main tributaries receive a considerable impact from many villages as sewage input. Accordingly increasing nitrate, nitrite and phosphate concentrations have been recorded downstream these villages.

Sampling Stations

Specimens of the genus *Ochthebius* were collected at 18 stations. The following information is given for each station: E: elevation, D: distance from the source, W: stream width, t: annual water temperature range.
Signification of some arabic words: nahr = permanent stream, ras = head spring; nabaa = spring, ain = small spring, jisr = bridge.

A. Basin of Damour.

a) Main river

stn. 24 = D1: Nahr es Safa, a spring-brook near village Aïn Zhalta, E: 1000 m; W: 4 m; t: 10°-13°C.

stn. 25 = D2: Damour; E: 950 m; D: 2 km; W: 3 - 4 m, t: 9°-17°C.

b) Tributaries

stn. 28 = D6: Nahr el Hammam; E: 45 m; D: 15 km; W: 4 - 6 m, t: 13,5°-22°C.

B. Basin of Aouali

a) Main stream

stn. 1 = A1: Nabaa El Barouk, a spring-brook near the village El Barouk; E: 1080 m; W: 3 - 4 m; t: 9,5°-11,5°C.

stn. 4 = A4: Aouali at Jisr Bâtloun el Kharara; E: 980 m, D: 4 km; W: 6 - 8 m; t: 9°-18°C.

stn. 17 = A6: Aouali at Jisr Bisri; E: 380 m; D: 28 km; W: 6 - 8 m; t: 9°-29°C.

stn. 18 = A7: Aouali; E: 230 m; D: 30 km; W: 6 - 10 m; t: 9,5°-26°C.

stn. 21 + stn. 22 = A10: Aouali near Saïda; E: 5 m; D: 48 km; W; 8 - 12 m; t: 11,5°-23°C.

b) Tributaries

stn. 7 = A12: Nabaa Mourched, a spring-brook near village El Moukhtâra; E: 800 m, t: 13,5°-15°C.

stn. 8 = A13: Aïn Chelouf, a spring-brook near village Aïn Quaniye; E: 840 m; W: 2 - 3 m; t: 8,5°-15,5°C.

stn. 9 = A14: Ras el Aïn, a little spring-brook near village Aammatour; E: 850 m; W: 1 m; t: 14,5°-16°C.

stn. 10 = A15: Nabaa Salman, a spring-brook near village Harêt Jandal; E: 800 m; W: 3 - 4 m; t: 11,5°-18°C.

stn. 11 = A16: Nabaa Abou Kharma, a spring-brook near village Bater ech Choûf; E: 850 m; W: 3 - 4 m; t: 8°-15°C.

stn. 13 = A18: Nabaa Aazibi, a spring-brook near village Jezzine; E: 990 m; W: 3 - 4 m; t: 8°-18,5°C.

stn. 14 = A19: Nabaa Jezzine, a spring-brook near village Jezzine; E: 950 m; W: 3 - 4 m, t: 12,5°-14°C.

stn. 15 = A20: Nahr Aaray, a stream near village Jezzine; E: 900 m; W: 2 - 5 m; t: 9.5°-18,5°C.

stn. 16 = A21: Nahr Aaray; E: 690 m; W: 2 - 5 m; t: 10°-21,5°C.

stn. 23 = A22: Nabaa Joun; E: 36 m; W: 1 - 4 m; t: 16°-26°C.

Sampling methods

At each station, sampling was conducted monthly from May 1979 to April 1980, twelve Surber Samples (each of 250 cm^2) being taken from fast flowing reaches at each site. About 263 imagines of *Ochthebius* were collected. A list of the material with numbers of imagines ($\overline{X}/m^2$) found at the stations is given (Table 1).

Ecological comments on the species of the genus *Ochthebius*

Imagines of *Ochthebius* were confined to the benthos (medium rubble, small boulders, water moss, filaments of green algae encrusting the substrate).

Ochthebius (*Asiobates*) *striatus* CASTELNAU was the dominant species (219 imagines). It occured from 36 to 1000 m and accounted for 83% of the total number of *Ochthebius* imagines collected. *Ochthebius striatus* is eurytope (main river, tributaries) and eurythermous (8°-29°C).

Ochthebius (s.str.) *difficilis* MULSANT is a cool-adapted species restricted to the head waters (water temperature 5°-19°C).

Ochthebius (s.str.) *elisae* SAHLBERG appears to be a lowland species, it was found at one isolated station of the Damour (elevation 45 m, water temperature 13,5°-22°C).

Ochthebius (s.str.) *libanus* JÄCH & DIA sp.n. (water temperature 8°-21,5°C) was found to live consociate with *Ochthebius striatus* in three stations and with *Ochthebius metallescens levantinus* JÄCH in one station.

Ochthebius (s.str.) *metallescens levantinus* JÄCH (water temperature 11,5°-22°C) was found consociate with *Ochthebius striatus* in one station.

Ochthebius libanus JÄCH & DIA sp.n.

Type Locality: Nabaa Abou Kharma, a spring-brook near Bater ech Choûf (= stn. 11, see above), Aouali river system, southern Lebanon.

Type Material: Holotype ♂: "S-LIBANON 1979 Aouali-River-Basin 25.7. (St. 11a). Paratypes: 3 exs.: labelled as the holotype; 3 exs.: "S-LIBANON 1979 Damour-River (St. 24)"; 1 ex.: "S-LIBANON 1979 Aouali-River-Basin (St. 16)". All specimens are deposited in the Naturhistorisches Museum Wien, Austria.

Diagnosis: 2.0 - 2.25 mm long. Black, head and pronotum usually with a very faint greenish or coppery metallic tinge, legs and palpi reddish-brown to dark brown. Head usually distinctly shagreened, only ocelli smooth; labrum distinctly and deeply emarginate. Pronotum distinctly shagreened, intervals between foveae on disc occasionally less strongly shagreened or almost glabrous and with small and distinct punctures; median sulcus and admedian foveae present and moderately deeply impressed, anterior foveae

small and round, posterior foveae large, oval and slightly oblique; postocular tooth present; postocular emargination distinct, thus pronotal front angles acute; sides of lateral depression straight and slightly convergent to anterior margin. Elytra with 5 regular rows of punctures between suture and shoulders; punctures large and deeply impressed, intervals glabrous and slightly convex; explanate elytral margin of male only moderately wide, usually slightly wider in female. Middle of metasternum glabrous. Last abdominal tergite of female with strong setae.

Aedeagus (lateral aspect): Main piece stout, moderately strongly curved; distal lobe flat, wide, moderately long and strongly recurved, its apex truncate; parameres not reaching the apex of the main piece, inserted at the basal one third. The aedeagus of *Ochthebius libanus* sp.n. was illustrated by JÄCH (1989: 385: Fig. 13). It differs significantly from *O. huberti* JÄCH in the truncate apex of the distal lobe, from *O. scitulus* FERRO in the considerably longer distal lobe and from *O. ciliciae* JÄCH in the narrower and longer distal lobe.

Externally *Ochthebius libanus* sp.n. is not significantly differerent from *O. huberti*, *O. scitulus* and *O. ciliciae*, which occur in southern Turkey. Pronotum usually (not always) slightly shorter than in these species.

D i s t r i b u t i o n: So far known only from the southern Lebanon.

E t y m o l o g y: Named in reference to the geographical distribution.

Zusammenfassung

Ökologische Bemerkungen zu *Ochthebius* Arten aus Fließgewässern aus dem südlichen Libanon. Fünf Arten wurden bei hydrologischen Untersuchungen in den Jahren 1979/80 festgestellt. *Ochthebius striatus* ist die häufigste Art im Untersuchungsgebiet. *Ochthebius libanus* JÄCH & DIA sp.n. wird beschrieben.

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Table 1: Average numbers ($\bar{x}/m^2$) of *Ochthebius* (imagines) collected from the stations of Aouali and Damour basins (May 1979 to April 1980).

	Basin of Damour			Basin of Aouali															
	Main River		Tributary	Main River					Tributaries										
	D1	**D2**	**D6**	**A1**	**A4**	**A6**	**A7**	**A10**	**A12**	**A13**	**A14**	**A15**	**A16**	**A18**	**A19**	**A20**	**A21**	**A22**	**Total**
O. elisae			1																1
O. difficilis														5					5
O. striatus	2	4		20	24	10	3	18	39	25	12	10	16	16	16	2	1	1	219
O. libanus	3												4				1		8
O. m.levantinus	3											18	8						30