

The Odonata of Lebanon

(Insecta: Odonata)

Aref Dia, Henri J Dumont

Abstract. In a year-long survey of the Odonata of Lebanon, 29 species of the approximately 49 known or expected to live in the country were recorded. Some endangered species should be considered for urgent protection. Others are doing well. A brief biogeographic analysis of the fauna is given. The almost complete absence of species typical of semi-arid to arid environments is to be noted.

Key words. Lebanon, Odonata, biogeography, river ecology.

Introduction

With a surface area of approximately 10,400 km², Lebanon is a small country but offers a variety of relief and local climate. Most of the country is hilly or mountainous, with the exception of a narrow coastal plain and the Beka'a valley, contained between the Lebanon and Anti-Lebanon ranges, and close to the northern end of the Great African Rift. The climate is Mediterranean, with a yearly average temperature of ca 20°C, but locally strongly modified by altitude. Summers tend to be hot and dry, winters wet and cool. Snowfall and below-zero temperatures are common in the mountains, which locally reach over 3,000 m a.s.l. Precipitation is relatively high (average ca 600 mm per annum), except locally in the north-east, but on the whole, the country is well watered and well endowed with rivers. The principal rivers are the Litani, which springs on the eastern side of the Beka'a valley, and the Orontes (Asi), which springs close to it, as well as a number of shorter, coastal rivers, about 18 in all (DIA 1998). In contrast to its neighbouring countries Syria and Iraq, no water is received from outside countries, while the Orontes (Asi River) evacuates water to Syria and Turkey. Nevertheless, competition for water is on the increase, and surface water quantity is decreasing, while its quality is degrading (BOU-ZEID & EL FADEL 2002), as has happened in the Jordan valley (SCHNEIDER 1981a). Aquatic life, plant and animal alike, are suffering from this, and dragonflies, the "guardians of the watershed" (CLAUSNITZER & JODICKE 2004), are prominent among the early victims of water quality degradation.

Therefore, we here update the current knowledge on Lebanese Odonata, especially since there has been no contemporary review of the fauna so far. The oldest significant paper, SELYS (1887), identifies Beirut as the type locality of a few species/subspecies. Later contributions that at least partially deal with Lebanon include BOLIVAR (1893), MARTIN (1909), GADEAU DE KERVILLE (1926), MORTON (1924), SCHMIDT (1938, 1954), ST QUENTIN (1965), SCHNEIDER (1986), SCHNEIDER & MOUBAYED (1987), and DUMONT (1977, 1991). Here, we present the result of thirty years of observations (1979 to the present) on the aquatic environments of Lebanon (DIA 1998), with special emphasis on the Odonata. Imagines were collected using entomological hand nets. In all, 77 stations were surveyed, scattered all

across the country and covering all of its 18 river systems. Springs, brooks and rivers dominate; ponds and lakes are much less well represented (locs 74-77). Localities are arranged and numbered per river basin (S= station), their altitude is given, and the year(s) of study are added. All localities can be found on Fig. 1. Collections were made and are conserved by Aref DIA.

Collection localities (Fig. 1)

I. River El Kebir: 2008, 2009 (surface 1000 km², length 60 km): S 1 Chadra brooklet (373 m). - S 2 Es Safa spring (380 m). - S 3 Below Es Safa spring (370 m). - S 4 El Kebir at Aarida (254 m). - S 5 El Kebir at Hoker Ed Dâhri 110 m). S 6 El Kebir à El Aarida (5 m). - **II. River (Nahr) Oustouane** 1998, 1999 (basin surface 160 km², length 22 km): S 7 El Banat spring (950 m). S 8 Oustouan at bridge El Mazraat (near El Mazraat Baldé) (240 m). - S 10 Oustouan at bridge near El Koucha (88 m). S 11 Oustouan at El Massaoudiye (below Massaoudiye) (22 m). - **III. River (Nahr) Aarqa** 2000 (surface 153 km², length 20 km): S 12 Above bridge near El Houaïch (480 m). - S 13 Above bridge El Aiyouâna (Nahr Châne) (300 m). - S 14 Aarqa above Bqerzla waterfall (130 m). - S 15 Aarqa at bridge on road Tripoli-Halba (75 m). - **IV. River (Nahr) El Bared** 1997, 1998 (surface 277 km², length 24 km): S 16 Abou Moussa above dam (near Barêd power plant) (240 m). - S 17 El Barêd at mouth of river. - **V. River Abou Aali**, 1997 (surface 484 km², length 42 km): S 18 Ain Misiera (1400 m). - S 19 Abou Aali à Mazraat en Nahr (563 m). - S 20 El Kadi (El Mqaddem) spring 130 m). - **VI. River (Nahr) El Jaouz** 1999 (surface 198 km², length 38 km): S 21 Tannôurine brook (Ouâdi Tannôurine) (1000 m). - S 22 Brook of Ain Er Râha (near Tannôurine Et Tahta) (900 m). - S 23 El Jaouz below confluence of Ain Er Râha and Tannôurine (610 m). - S 24 El Jaouz after receiving Ed Dalli spring (605 m). - **VII. River Ibrahim** 1994, 2002 (surface 330 km², length 30 km): S 25 Below Afqa spring (1020 m). - S 26 Ibrahim at Janné village (730 m). - S 27 Ibrahim above Chouâne power plant (300 m). - **VIII. Brook Ghazir**, S 28 Brook Ghazir 1997 (383 m). - **IX. River Beirut** 2003, 2007, 2008, 2009 (surface 231 km², length 29 km): S 29 Beirut at bridge Ras El Metn (450 m). - S 30 Beirut city (10- 20 m). - **X. El Ghadir Brook**, S 31 El Ghadir Brook 1980 (10 m). - **XI. River Damour**, 1980, 1981 (surface 288 km², length 33 km): S 32 Nabaa es Safa and Dara = Nahr es Safa (1000 m). - S 33 below Nahr es Safa (950 m). - S 34 Jisr el Quâdi (260 m). - S 35 Jisr ed Damour (40 m). - S 36 Ouâdi el Ghâboun (temporary river) (200 m). - S 37 Nahr el Hammam (45 m). - **XII. River Aouali** 1979, 1980, 1981 (surface 302 km², length 48 km): a. Main valley: S 38 Jisr Batloûn - el Kharrara (980 m). - S 39 Jdaïdet ech Choûf (710 m). - S 40 Jisr Bisri (80 m). - S 41 above Aouali power plant (230 m). - S 42 above Joun power plant (50 m). - b. Affluents: springs and brooks: S 43 Ras el Ain (850 m). - S 44 Nabaa Salman brook (800 m). - S 45 Nabaa Bâter ech Choûf spring (820 m). - S 46 Nabaa Aazibi spring (990 m). - S 47 Nabaa Jezzine spring (950 m). - S 48 Below Jezzine (Oûadi Jezzine) (690 m). - S 49 Nabaa Joun spring (Fouar es Saraaouniye) (36 m). - **XIII. River Sainiq** 2008 (surface 108 km², length 20 km): S 50 Ouadi el- Leimoun (200 m). - **XIV. River El Zahrani** 2004, 2008 (surface 109 km², length 25 km): S 51 El - Tassé spring (700 m). - S 52 At Ouadi el- Akhader (445 m). - S 53 At Deir ez -Zahrani village (300 m). - S 54 At Kaferoua village, near a spring (200 m). - **XV. River Litani** 1980, 1987, 1988, 1993, 1995, 1996, 2000, 2004, 2005 (surface 2170 km², length 170 km): S 55 Sifri spring (1000 m). - S 56 Yahfoufa brook (1000 m). - S 57 Ammiq spring (850 m). - S 58 Maidani spring (420 m). - S 59 Hjaïr spring (230 m). - S 60 Bridge O. Ghandouriyé (125 m). - S 61 Litani at Khardalé bridge (240 m). - S 62 Litani above Zrairiyyé (50 m). - S 63 Litani above Kasmiyyé (5 m). - S 64 Yelouch spring (200 m). **XVI. Ras el-Ain**, S 65 Ras Al-Ain, Tyr, 1996, Brooklet formed by a spring (10 m). - **XVII- River Hasbani** 2003, 2004 (surface 526 Km², length 21 km): S 66 Source Hasbani (545 m). - S 67 Hasbani at Fardis bridge (495 m). - S 68 Hasbani below Source Wazzani / Ouazzani (270 m). - **XVIII. River Orontes** 1985, 1986, 1996, 2000. 2001, 2002, 2004 (surface 1870 km², length 46 km): a-Main valley, S 69 El Laboué spring and village (900 m). - S 70 Jabboulé village (840 m). - S 71 Ain El Zarka spring (650 m). - S 72 Orontes above Hermel village (610 m). - S 73 Orontes below Chwaghîr village (570 m). - b- Marjhine: S 74 El Haour, springs and pond (1730 m). - S 75 El Jammâssia, springs and pond (1720 m). - S 76 El Jamiaa, springs and pond (1720 m). - c- Aayoun Orghouche: S 77 Aayoun Orghouche, springs and pond (2100-2150 m).

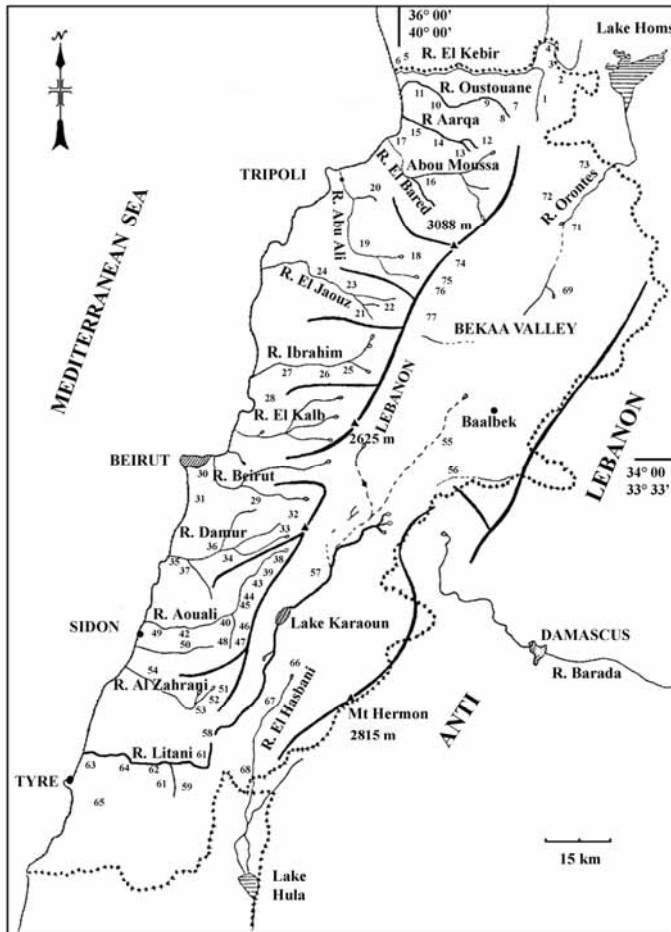


Fig 1. Map of Lebanon showing the hydrographic network. All collecting locations are indicated by numbers.

Results and discussion

List of dragonfly species recorded from Lebanon. Species in **bold**: 29 species found during this study and stations where they were found. * = in need of confirmation (see discussion).

Euphaeidae

01. *Epallage fatime* (Charpentier): 27, 52, 53, 58, 71-73.

Calopterygidae

02. *Calopteryx splendens hyalina* Martin: 9, 10, 11.

- 03. *C. splendens syriaca*** Rambur: 1-3, 9, 12-14, 16, 19, 21-24, 26, 28, 33-35, 40, 49, 52-54, 59, 60, 62, 64, 66, 69, 70-73.

Lestidae

- 04. *Sympecma fusca*** (Vander Linden)
05. *Lestes virens* (Charpentier)*
06. *Lestes barbarus* (Fabricius)
07. *Chalcolestes parvidens* (Artobolewski): 32, 37, 43, 57.

Platycnemididae

- 08. *Platycnemis dealbata*** Sélys: 4, 15, 33, 34, 40, 49, 50, 57, 61-63, 65, 66.
09. *P. kervillei* (Martin): 12.
10. *P. pennipes* (Pallas)

Coenagrionidae

- 11. *Coenagrion vanbrinkae*** Lohmann (= *ornatum* (Sélys): 76.
12. *C. scitulum* Rambur: 16, 19.
13. *C. syriacum* (Morton): 55, 57, 62, 71-73.
14. *Ischnura elegans ebneri* Schmidt: 4, 29, 35, 38, 40, 57, 62, 74, 75, 77.
15. *Pseudagrion syriacum* Sélys: 10, 15, 17, 49, 60.
16. *Erythromma viridulum orientale* Schmidt*
17. *Erythromma lindenii zernyi* Schmidt*
18. *Ceriagrion georgifreyi* Schmidt

Aeshnidae

- 19. *Aeshna mixta*** (Latreille): 8.
20. *Anax immaculifrons* (Rambur): 40, 49.
21. *A. imperator* (Leach): 16, 18, 20.
22. *A. parthenope* (Sélys): 30.
23. *Hemianax ephippiger* (Burmeister): 30.
24. *Caliaeschna microstigma* (Schneider): 7, 25, 39, 45, 46-48, 51, 56, 72.

Gomphidae

- 25. *Gomphus davidi*** Sélys
26. *G. ubadschii* Schmidt
27. *Lindenia tetraphylla* (Vander Linden)*
28. *Onychogomphus lefebvrui* (Rambur): 29, 34, 59, 61, 67.
29. *O. macrodon* Sélys
30. *Paragomphus genei* (Sélys)

Cordulegasteridae

- 31. *Cordulegaster i. insignis*** Schneider: 32, 39, 45, 47.

Libellulidae

- 32. *Brachythemis fuscopalliat***a (Sélys)*
33. *B. impartita* (Karsch): 5, 6.
34. *Crocothemis e. erythraea* (Brullé): 38, 49, 62.
35. *C. servilia* (Drury)
36. *Libellula depressa* Linnaeus: 18, 77.
37. *Orthetrum coerulescens anceps* (Schneider)
38. *O. b. brunneum* (Fonscolombe): 32, 46.

39. ***O. c. chrysostigma*** (Burmeister): 33, 36, 38, 40–42, 49, 68.
 40. *O. taeniolatum* (Schneider)
 41. *Diplacodes lefebvreii* (Rambur)
 42. *Pantala flavescens* (Fabricius)
 43. ***Sympetrum fonscolombii*** (Sélys): 75, 76.
 44. ***S. meridionale*** (Sélys): 74.
 45. ***S. striolatum*** (Charpentier): 9, 75.
 46. *S. sanguineum*
 47. ***Tritthemis annulata*** (Beauvais): 59.
 48. ***T. arteriosa*** (Burmeister): 20, 30, 31, 36, 37, 40, 42, 44, 46, 47, 49, 51.

Macrodiplactidae

49. *Selysiothemis nigra* (Vander Linden)*

In all, 29 species were collected. They are given in bold in the list below, which is a compilation of the ca 49 species now recorded or expected from Lebanon (BOUDOT et al., 2009, with additions). Those species that have not yet been found but may eventually be found in the country have been included in the list (marked with *). No species new for Lebanon were noted in our survey, except that we confirm that it is not *Coenagrion ornatum* but the related *C. vanbrinkae* that lives in the Orontes valley. The population(s) in Lebanon constitute the southernmost limit of geographic range of this species (SCHNEIDER 1986). This is also the case for the Lebanese populations of *Platycnemis kervillei* and *Cordulegaster insignis*. Of *Calopteryx splendens hyalina*, a single population used to occur on Lake Hula in the Upper Jordan valley, but this became extinct, presumably through the drainage of much of the lake in the mid-20th century (SCHNEIDER 1986). The species is now also extinct in much of Syria, except for some short coastal rivers (MOUSATAT et al. 2010), so that the population in the extreme northern Lebanese River Oustouane is one of the very few that have survived to date. The taxon, a true Levantine endemic, is really on the brink of global extinction now. By contrast, its congener, *C. s. syriaca*, is doing well. It occurs in almost all rivers in Lebanon (see list). In Syria, however, it is not doing so well (MOUSATAT et al. 2010) so that globally it has correctly been listed as endangered (SCHNEIDER 2004). Another regional endemic, *Brachythemis fuscopalliata*, is quite common in southern Syria, and should be expected with a high probability to live in Lebanon. It easily settles along irrigation ditches and canals, and seems to be expanding its range as this sort of environment becomes more common in a man-mediated landscape. Globally, species restricted to or with a clear preference for running waters (*Epallage*, *Calopteryx*, *Platycnemis dealbata*, *Pseudagrion syriacum*, *Caliaeschna*) are not doing badly in Lebanon, but the gomphids are a strange exception. Of 6 species that occur or are expected to occur, only one (*Onychogomphus lefebvreii*) was recovered. The reasons for this are obscure.

Among species to be expected, two (*Lindenia*, *Selysiothemis*) are migrants that have been observed in large swarms in Jordan (SCHNEIDER 1981b, see also SCHORR et al. 1998). It is therefore almost certain that they will eventually also be found in Lebanon. These species are part of the so-called Irano-Turanian fauna, typical of the arid landscapes that extend from central Asia to the Sahara desert. This fauna, quite abundant and widespread in Eastern Syria and Jordan, is almost totally absent from the well-watered Lebanon.

Other expected species (*Ceriagrion*, *Erythromma viridulum* and *E. lindeni*) are typical of marshy environments, and these have typically remained understudied in Lebanon. The northern Beka'a valley seems to be a promising site to explore for them.

Table 1. Number of dragonfly species recorded per river system in Lebanon.

	El Kebir	Oustouane	Aarqa	El Bared	Abou Aali	El Jaouz	Ibrahim	Ghasir	Beyrouth	El-Ghadir	Damour	Aouali	Sainiq	Zahrani	Litani	Ras El-Ain	Hasbani	Orontes
<i>Epallage fatime</i>							+							+	+			+
<i>Calopteryx s. hyalina</i>		+																
<i>C. s. syriaca</i>	+	+	+	+	+	+	+	+			+	+		+	+		+	+
<i>Chalcolestes parvidens</i>											+	+			+			
<i>Platynemis dealbata</i>	+		+								+	+	+		+	+	+	
<i>P. kervillei</i>			+															
<i>Coenagrion scitulum</i>				+	+													
<i>C. syriacum</i>									x						+			+
<i>C. vanbrinkae</i>																		+
<i>Ischnura elegans ebneri</i>	+								+		+	+			+			+
<i>Pseudagrion syriacum</i>		+	+	+								+			+			
<i>Aeshna mixta</i>		+																
<i>Anax immaculifrons</i>												+						
<i>A. imperator</i>				+	+													
<i>A. parthenope</i>									+									
<i>Caliaeschna microstigma</i>		+					+					+		+	+			+
<i>Hemianax ephippiger</i>									+									
<i>Onychogomphus lefebvrei</i>									+		+				+		+	
<i>Cordulegaster i. insignis</i>											+	+						
<i>Brachythemis impartita</i>	+																	
<i>Crocothemis erythraea</i>												+			+			
<i>Libellula depressa</i>					+													+
<i>Orthetrum brunneum</i>											+	+						
<i>O. chrysostigma</i>											+	+					+	
<i>Sympetrum fonscolombii</i>																		+
<i>S. meridionale</i>															+			+
<i>S. striolatum</i>		+																+
<i>Trithemis annulata</i>															+			
<i>T. arteriosa</i>					+				+	+	+	+		+				

By and large, the Lebanese fauna is predominantly Palaearctic in composition, with a strong eastern Mediterranean flavour added to it. Species of African extraction or origin are limited to the two *Trithemis* species, *Orthetrum chrysostigma*, *Brachythemis impartita*, *Diplacodes lefebvrei*, and *Pseudagrion syriacum*. *Brachythemis impartita* (formerly known in the Eastern Mediterranean as *B. leucosticta*) was found only in the north of the country, but POR et al. (1986) also found it in the Hasbani catchment in the south. It is also on record from the adjacent Jordan valley (DUMONT 1991). Oriental elements are surprisingly few, and

in fact limited to *Anax immaculifrons*, *Orthetrum taeniolatum* and, at the family level, *Epallage fatime*.

Looking at the number of species recorded per river basin (Table 1), the longest two (Orontes and Litani) stand out by having the largest number of species, but the River Aouali forms a strange exception, having the largest number of species (12) on record of all. However, these figures should not be given too great a significance, as the research effort on the different river systems has been quite uneven.

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Authors' addresses: Prof. Dr Aref Dia, Université Libanaise et Conseil National de la Recherche Scientifique (C.N.R.S.) Libanais, P.P. 8182-11, Riad El Solh, 11072260, Beirut, Lebanon. – Prof. Dr Henri J. Dumont, Ghent University, Department of Biology, Ledeganckstraat 35, 9000 Ghent, Belgium. – Email contact: Henri.Dumont@UGent.Be