A REVIEW OF THE DRAGONFLY FAUNA OF TURKEY AND ADJACENT MEDITERRANEAN ISLANDS (INSECTA ODONATA)*

by Henri J. DUMONT**

Introduction

In the course of three journeys by the author to Turkey (May 1972, July-August 1973 and August, 1975) 62 species and subspecies of dragonflies, including one new to science (DUMONT, 1974) were collected. Later, a number of unstudied collections of dragonflies from Turkey were obtained from various persons and institutes. As a result, the species list increased to about 80 % of the estimated fauna of the country. This was thought to be an adequate basis for a review of the Odonata of Turkey and neighbouring islands.

Literature survey

The history of odonatological research in Turkey begins with a journey through West Anatolia by the dipterologist LOEW, who collected some dragonflies that were studied by SCHNEIDER (1845), discussed in the *Revue des Odonates d'Europe* (SÉLYS & HAGEN, 1850) and partly revised by HAGEN (1863) who had obtained further material collected by KINDERMAN. Of some importance, though frequently overlooked, is a paper by KOLENATI (1846), giving data on the extreme NE Provinces of Anatolia. Minor and vague references (« *Asia Minor, Asie Mineure* », etc.) are found in SÉLYS (1854, 1863, 1869, 1872), SÉLYS & HAGEN (1854, 1858), BRAUER (1868, 1876). Some species found near

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Istanbul are summed up by SPAGNOLINI (1877), but the first epoch-making paper is the « *Odonates de l'Asie Mineure* » by SÉLYS (1887), which has the character of a review, although many new species are described. The data-set kept increasing through notes by BOLIVAR (1893), MCLACHLAN (1899) and KEMPNY (1908). During the first decades of our century, the Russian worker BARTENEF thoroughly investigated the Caucasus mountains and Transcaucasia. His results were condensed and completed in an account of the dragonflies of the Soviet Armenian Republic (AKRAMOWSKI, 1948), with some later additions (AKRAMOWSKI, 1964). The fauna of the adjacent Soviet republics of Daghestan and Georgia were treated by ARTOBOLEVSKI (1929) and SHENGELIA (1964, 1975), respectively.

Due to the labile political situation at the end of the nineteenth century and the first decades of our century, problems arise when one tries to find out exactly what is meant by various authors by such regions as « Asia Minor », « Klein-Asien », « Syria », « Armenia », etc.

Boundary changes and changes in the names of major and minor localities occurred, and it is often difficult, sometimes impossible, to place all records exactly. During a temporary border change in the North-East, a number of North-Eastern provinces of Anatolia were placed under Russian administration. Data for the dragonflies of this area are given by BARTENEF (1909, 1912). The Fauna of Cyprus is first discussed by MARTIN (1894), and the same author has also worked on Syria (MARTIN, 1909, 1926) and on Iran (MARTIN, 1912). A series of papers on Turkish dragonflies was published by MORTON (1914, 1915a, 1915b, 1922) and another series on the fauna's of Iraq and Iran (MORTON, 1919, 1920 a, 1920 b, 1921). As a result of these, a review appeared a few years later (MORTON, 1924). Dragonfly collections made by H. GADEAU DE KERVLLE (1926, 1939) and B. VON BODEMEYER (1926, 1927, 1930) in Turkey and adjacent countries were studied by MARTIN (1909, 1926), NAVAS (1932) and RIS (1930). A note by LONGFIELD (1932) and a review of the dragonflies of « Syria and Palästina » (SCHMIDT, 1938) conclude the period prior to world-war II. References to Turkey in the monographs by MARTIN (1909) and RIS (1909-1916) should also be mentioned. The post-war period begins with E. SCHMIDT

(1953, 1594). The second paper is a pleasant narrative of the author's efforts to find back Schneider's vague type localities. E. SCHMIDT was also the first to make all his collections himself, but unfortunately, a complete systematic record has never been published. He was accompanied by C. BUCHHOLTZ, who produced an ethological study on the local Calopterygids (BUCHHOLTZ, 1955). The most recent additions are ST-QUENTIN (1964 a, 1964 b, c, 1968) and DUMONT (1972, 1974), and a recent review by ST-QUENTIN (1965). The latter is incomplete in places, while on the other hand, it includes species that do not occur in Turkey. It is therefore in need of revision. Useful data on Central Iraq are given by SAGE (1960, a, b), and on Northern Iraq by ASAHINA (1973, 1974). The fauna of the mediterranean islands is discussed by MARTIN (1894), BENTIVOGLIO (1929), DE JOANNIS (1916) and WERNER (1938). A review was prepared by COWLEY (1940, 1944). Recent information on Cyprus was provided by VALLE (1952) and KIAUTA (1963) and on Rhodos by ST-QUENTIN (1964 c).

Locality records

1. *The Odonata collected by the Ghent University expedition*

This collection amounts to several thousands of specimens.

Collections were made, during spring 1972, by H.J. DUMONT and J. VERMEIR, and during 1973 by G. DAEMS, W. DECRAEMER, H.J. DUMONT, D. MAERTENS, I. MIRON and A. & T. VAN DER HEIDEN. The material, following study, was deposited with the following institutions and persons : The Zoological Institute, University of Gent (Belgium), Natuurmuseum M. Thierry (Gent, Belgium), Institut des Sciences naturelles de Belgique (IRSN), British Musuem (Natural History), Faculty of Sciences, Istanbul University, Faculty of Sciences, Ankara University, H. J. DUMONT (private collection), D. MAERTENS (private collection).

List of Localities

1 : Uskudar, hillside, 14.V.1972
2 : Gebze, canal along main road, richly grown with macrophytes, 14. V.1972.
3 : Sile, rivulet. 15.VII.1973 (leg. I. MIRON)
4 : Eskiçehir, brook, 16.VII.1973 (leg. I. MIRON)
5 : Sakarya River, 16.VII.1973 (leg. I. MIRON)

6 : Samos Island, rivulet, 28.V.1972
7 : Kusadaçi, swamps near coastline, 27.V.1972
8 : Efes, rivulet, 27.V.1972
9 : Menederes River, 10 km W. of Saraköy (Denizli), 17.VII.1973
10 : Pammukale, sources at Hierapolis, 26.V.1972
11 : Açi Göl, swamp near dry lake bed, 17.VII.1973
12 : Burdur Lake, SW-angle, 20.VII.1973
13 : Rivulet, 5 km S. of Burdur City, 18.VII.1973
14 : Swampy meadow, 5 km N. of Buçak, 19.VII.1973
15 : Irrigation canal, partly grown with Phragmites, at Aglasun, 22.VII. 1973
16 : Mountain rivulet near Isparta, 22.VII.1973
17 : Rivulet and source, ca. 15 km W. of Egridir City, 22.VII.1973
18 : Egridir Lake S. bank, 25.VII.1973
19 : East bank of Lake Egridir and adjacent irrigation canal, 23.VII.1973
20 : Barla, W. bank of Lake Egridir 25.VII.1973 (leg. R. JOCQUE and D. MAERTENS)
21 : Mountain rivulet at Yalvaç, 23.VII.1973
22 : Mountain rivulet, ca. 10 km N. of Orkenez, along main road to Akçehir, 24.VII.1973
23 : East bank of Lake Akçehir, 24.VII.1973 (also a record from « Akçehir », 16.VII.1963, H. SCHUMANN)
24 : East bank of Lake Beyçehir, at inlet of small, near-standing river, 25.VII.1973
25 : Swampy brook, 5 km from Beyçehir City, 27.VII.1973 (leg. R. JOCQUE & D. MAERTENS)
26 : Small River, South of Lake Beyçehir, 26.VII.1973.
27 : Complex of rivulets, swamps and ponds at SW-corner of Lake Beyçehir, 26.VII.1973
28 : Swampy bay at West bank of Lake Beyçehir, 26.VII.1973
29 : Irrigation canal, 5 km N. of Bozova (Antalya Prov.), 19.VII.1973
30 : Pinar Baschi (source-fed swampy area), 30 km W. of Antalya, at foot of Cubuk Bogazi, 25.V.1972.
31 : Rivulet at Gölova (Antalya Prov.), 21.VII.1973.
32 : Fishtail source (Balikbardag) and pond, ca. 20 km S. of Elmali, 22. VII.1973
33 : Mountain rivulet at Japrateli, ca. 20 km S. of Elmali, 22.VII.1973
34 : Ditches along main road east of Konya, 26.VII.1973
35 : Krater « Açi » Göl, small volcanic hypersaline lake, east of Karapinar, 27.VII.1973
36 : Kargi çay, rivulet halfway between Alanya and Manavgat, 24.V.1972 and 5.VIII.1973
37 : Alanya :
a. Dimçay (small river), 24.V.1972 and 5.VIII.1973
b. small swamp and source at site of BP-mocamp, 24.V.1972
38 : Sedre çay at Demirtas, 23.V.1972 and 5.VIII.1973
39 : Rivulets at Gazipaça, 23.V.1972 and 4.VIII.1973
40 : Babadil çay, 65 km W. of Silifke, 23.V.1972 and 5.VIII.1973
41 : Sarikavak, 30.VII.1973 (leg. D. MAERTENS)
42 : Kirobaçi. small pond, 21.V.1972
43 : Ditch on main coastal road, 15 km W. of Tarsus, 18.V.1972
44 : Tarsus River, at entrance in Tarsus City, 28.VII.1973
45 : Tarsus River, 35 km N. of Tarsus, 28.VII.1973

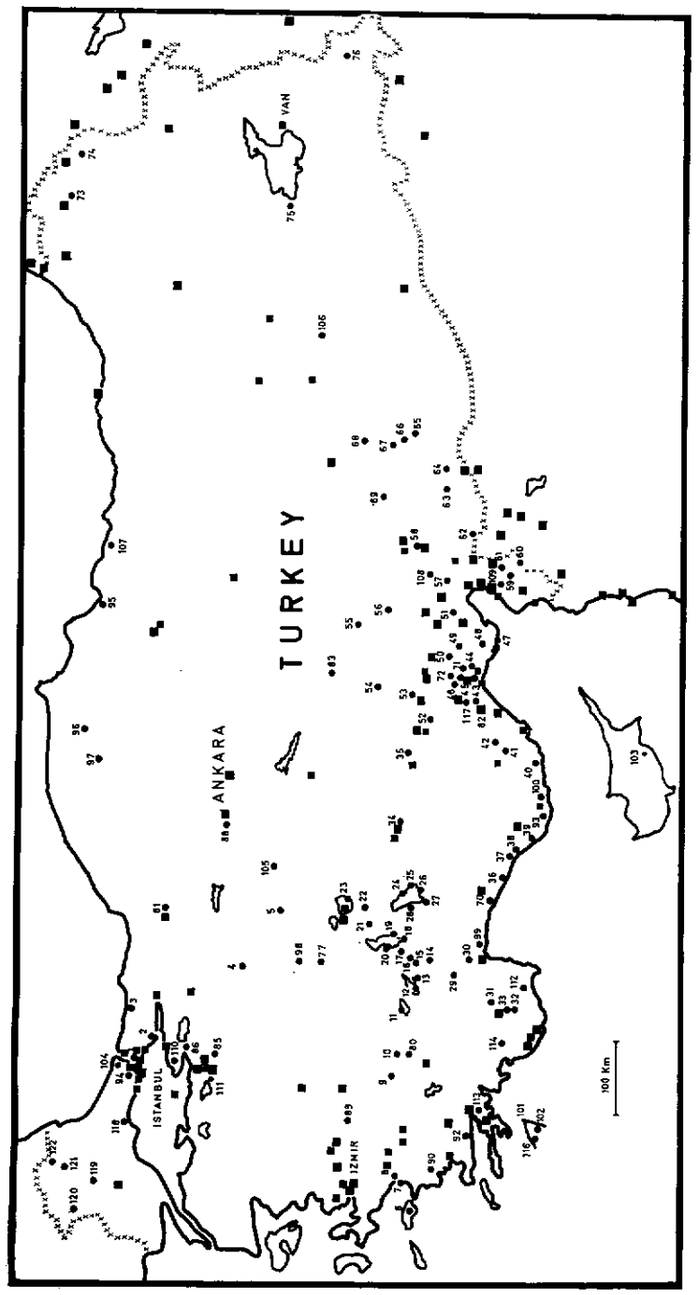
46 : Kadinçik Göl, man-made lake and mountain river near Çamliyayla, 29.VII.1973
47 : Karatas (Adana), canal, 17.V.1972
48 : Irrigation canal on road Adana-Karatas, ca. 20 km from the latter, 17.V.1972
49 : Seyhan Baraji, South part, 30.VII.1973
50 : Seyhan Baraji, swamps at NW-corner of the lake, 30.VII.1973
51 : Ceyhan River, at crossing with road Adana-Gaziantep, 18.V.1972 and 31.VII.1973
52 : Halkapinar (Zanapa river), 31.VII.1973 (leg. R. JOCQUE & D. MAERTENS)
53 : Volcanic hill, flanking dry river bed, 50 km S. of Nigde, 3.VIII.1973 (leg. A. VAN DER HEIDEN, F. DECRAEMER & L. CLINKENBORGS)
54 : Nigde, 16.V.1972, swamp
55 : Bakirdagi, on road towards Develi, 3.VIII.1973 (leg. A. VAN DER HEIDEN, F. DECRAEMER & L. CLINKENBORGS)
56 : Small man-made lake near Feke, 2.VIII.1973 (leg. A. VAN DER HEIDEN, F. DECRAEMER & L. CLINKENBORGS)
57 : Partly dry river bed near Osmaniye, 4.VIII.1973
58 : Richly grown tributary of the river Aksu, on road Turkoglu-Maras, at about 15 km from the latter, 18.V.1972 and 3.VIII.1973
59 : Drainage and irrigation canals in the bed of the former Amik Gölu, 31.VII.1973
60 : Rivulet ca. 5 km S. of Reyhanli, 31.VII.1973
61 : Irrigation canal and swamps near Kirikhan, 31.VII.1973
62 : Rivulet, 10 km W. of Kilis, 1.VIII.1973
63 : Rivulet, 15 km W. of Nizip, 1. VIII.1973
64 : Firat Nehri (River Euphrat) at Birecik, 1.VIII.1973
65 : Rivulet at Bozova (Urfa Prov.), 2.VIII.1973
66 : Firat Nehri (River Euphrat) at Samsat, 2.VIII.1973
67 : Halber çay, small tributary of the Euphrat, ca. 30 km S. of Adiyaman, 2.VIII.1973
68 : Small rivulet (alt. ca. 2000 m) on Nemrut mountain, 3.VIII.1973
69 : Swamps at Gölbasi, 3.VIII.1973
70 : Manavgat River, 5.VIII.1973
71 : Hilly tract between Tarsus and Pozanti, at ca. 25 km from Tarsus, 31.VII.1973
72 : Cilician gates, at ca. 30 km from Pozanti, 31.VII.1973

2. *Collection* Dr. A. KOÇAK, *Zoological Department, Ankara University, Turkey*

73 : Camliçatak (Kars), alt. 2000 m, 21.VII.1973
74 : Arpaçay (Kars), alt. 1600 m, 21.VIII.1973
75 : Bitlis (Tatvan), alt. 1700 m, 27.VII.1973
76 : Yüksekova (Hakkari), alt. 1800 m, 29.VII.1973

3. *Collection Museo Civico di Storia Naturale, Milano* (*leg.* PERISSINOTO, *communicated by* Mr. I. BUCCIARELLI)

77 : Afyon, 2.VII.1965 (and Akviran, near Afyon, same date)
78 : Gülluk, Bodrum, 7.VII.1965
79 : Kemalpassa, Izmir, 12.VII.1965



Map 1. — Compilation of locality records for dragonflies in Turkey.
Numbered circles : original data discussed in this paper ;
squares : various historical records.

4. *Collection Faculté des Sciences Agronomiques, Gembloux, Belgium* (*leg.* M. Leclerq)

80 : Denizli, alt. 415 m, 16.VII.1967
81 : Bolu, Abant, alt. 1512 m, 26.VII.1966
82 : Erdemli (Mersin), 10.VII.1966
83 : Ürgüp, 16.VIII.1967
84 : Selimpassa (Istanbul), 4.VII.1966
85 : Bursa, 11.VIII.1971
86 : Gemlik (Bursa), 28.VII.1967
87 : Balikesir, between Bandirma and Erdek, 25.VII.1967
88 : Ankara, 12.VII.1967
Also records from loc. 10, 15.VII.1967 ; loc. 23, 18.VII.1966 ; loc. 37, 20.VII.1966.

5. *Zoologische Sammlung des Bayerischen Staates, München, G.F.R.* (*communicated and identified by the late* Mr. A. Bilek)

a) Mainland Records :
89 : Boz Dagi (Salihli), 18-25.V.1965 (leg. W. Gatz)
90 : Bafa Gölü (Herakleia), 22.VIII.1969 (leg. M. Kaniss)
91 : Izmir, 18.IV.1965 (leg. W. Gatz)
92 : Üren, 28.VIII.1969 (leg. M. Kaniss)
93 : Anamur, 3.V.1965 (leg. W. Gatz)
94 : Kilyos (Istanbul), 2.IX.1964 (leg. W. Gatz)
95 : Samsun, 11.X.1964 (leg. H. Kumerloeve)
96 : Tasköprü, 27.V.1969 (leg. W. Gross)
97 : Kastamonu, 24.V.1969 (leg. W. Gross)
98 : Madensuyu, 13.VI.1965 (leg. W. Gross)
99 : Antalya, 15-28.VIII.1964 (leg. W. Gatz)
100 : Anamur, 3.V.1965 (leg. W. Gatz)

b) Islands records
101 : Rhodos, Rodini, 20.V.1958 (leg. R. Bender)
102 : Rhodos, Petaludes, VI.1965 (leg. R. Bender)
103 : Cyprus, Larnaka, 15.VII.1965 (no collector stated)
Also records from loc. 3, 9.VIII.1965 (leg. W. Gatz), loc. 37, 16.VI. 1956 (leg. H. Kumerloeve) and 20.VIII.1964 (leg. W. Gatz), loc. 69, 15.VI.1969 (leg. W. Gross) and loc. 77, 25.V.1964 (leg. H. Kumerloeve)

6. *Collection Museum Koenig, Bonn, G.F.R.*

104 : Belgrad Ormani, 19 km N. Istanbul, 26.VI.1959 (leg. W.J.M. Vader)
105 : Sakarya River, 95 km SW of Ankara, 11.VI.1959 (leg. W.J.M. Vader)
106 : Dicle (700 m), 17 km NW. of Dyarbakir, 27.V.1959 (leg. W.J.M. Vader)
107 : Curiköyü, 7 km W. of Unye (Ordu Prov.), 11.VI.1959 (leg. W.J.M. Vader)
108 : Haruniye, 19.VI.1953 (leg. H. Kumerloeve)
109 : Iskenderun, 17.VII.1953 (leg. C. Buchholtz)
110 : Gemlik, 25 km N. Bursa, 21.VI.1959 (leg. W.J.M. Vader)
111 : Bursa, 4.VIII.1953 (leg. C. Buchholtz)

Also records from loc. 4, VIII.1960 ; loc. 7, 9.VIII.1967 (leg. ROESLER) loc. 49, 18.V.1959 (leg. W.J.M. VADER) ; loc. 69, 14.V.1953 ; loc. 99, 19.IV.1959 (leg. W.J.M. VADER)

7. *Collection* Dr. A. HEYMER, Brunoy, France

a) Mainland records from SW Turkey :
112 : 10 km N. Finike, 15.VI.1973
113 : 20 km N. Marmaris, 23.VII.1973
114 : Ortaca, W. of Fetiye, 18.VI.1973
115 : Manisa, 30.VII.1973

b) Island records :
116 : Rhodos, Epta pigai and Kalithies, 3.VII-9.VII.1973

8. *Individual records*

117 : Icel, Gözne 4.IV.1960 (leg. K.M. GUICHARD) communicated by Dr. M.A. LIEFTINCK (Rhenen, The Netherlands)
23 bis : Aksehir, 16.VII.1963. Coll. Ir. H. SCHUMANN (Hannover, G.F.R.). This locality presumably refers to streamlets in the mountains around Aksehir lake.

Also a small collection of dragonflies from Cyprus (Stenous, July 1947) collected by Prof. Dr. J. WAHRMAN (Jerusalem) could be examined.

9. *Additional records during 1975* (Thracia)

118 : Brook 10 km W. of Silivri, 8.VIII.1975
119 : Small river near Babaeski, 8.VIII.1975
120 : Edirne, ditch, 7.VIII.1975
121 : Kirklareli (10 km E. of City) : river in woodlands, 17.VIII.1975.
122 : Dereköy : hilly woodland with several small, swift brooklets, 17. VIII.1975.

Historical locality records

Wherever possible, old locality data were brought in accordance with modern spelling (see text). In a few cases only, this proved impossible.

Calopterygidae

1. *Calopteryx splendens mingrelica* SÉLYS, 1869

Calopteryx splendens race *mingrelica* SÉLYS, 1869
Calopteryx mingrelica : BARTENEF, 1912
Calopteryx Ludoviciana LEACH : SCHNEIDER, 1845, nec *Calopteryx splendens* HARRIS.
Calopteryx splendens race *meridionale* (*Agrion xanthostoma* CHARP.) : SPAGNOLINI, 1877, nec *Calopteryx xanthostoma* (CHARPENTIER).
Calopteryx splendens race typique (septentrionale) : SÉLYS, 1887, nec *Calopteryx splendens* (HARRIS).

Calopteryx splendens race *xanthostoma* : MARTIN, 1894, MCLACHLAN, 1899, nec *Calopteryx xanthostoma* (CHARPENTIER).
Calopteryx amasina BARTENEF, 1911.
Calopteryx splendens cartvelica BARTENEF, 1930.
Calopteryx (sic) *splendens* HARRIS form *amasina* BARTENEF : LONGFIELD, 1932.
Agrion splendens cartvelicum (BART.) : AKRAMOWSKI. 1948.
Calopteryx splendens : KEMPNY, 1908, VALLE, 1952, nec. *Calopteryx splendens* (HARR.).
Calopteryx splendens amasina (BART.) : SCHMIDT, 1954, BUCCHOLTZ, 1955.
Calopteryx splendens cartvelica (BART.) : SCHMIDT, 1954, BUCCHOLTZ, 1955.
Calopteryx syriaca mingrelica, apud ST-QUENTIN, 1965.
Calopteryx splendens : MARTIN, 1915, NAVAS, 1932, nec. *Calopteryx splendens* (HARRIS).
Calopteryx splendens ssp. : KIAUTA, 1963.

Material : ca. 500 specimens in both sexes. Loc. 2, 5, 8, 9, 13, 17, 19, 21, 24, 26, 36-40, 43, 51, 60, 62, 65, 80, 85, 92, 112-115 121. In addition a short series of ♂♂ and ♀♀, Stenous, Cyprus, leg J. WAHRMAN.

First recorded from Gelemish by SCHNEIDER (1845) and Istanbul (SPAGNOLINI, 1877). Reported by SÉLYS (1887) from Malatia and Manisa and, under various names and combinations by MACLACHLAN (1899) : Marmaris ; KEMPNY (1908) : Balikli near Istanbul, Gökçekisik and Eskisehir ; MORTON (1915 a) : Göksu near Istanbul, Asiatic side ; LONGFIELD (1932) : Menderes River at Ortakche and Demirchi (S. of Simav) ; NAVAS (1932) : Izmir ; SCHMIDT (1954 a) : Pozanti, Gelemish ; BUCHHOLTZ (1955) : Bursa, Izmir, Gelemish and Antakya ; ST-QUENTIN (1964 c) : Rhodos ; MARTIN (1894), VALLE (1952) and KIAUTA (1963 : Cyprus.

A distribution may in BARTENEF (1930) allots central Anatolia to *C. splendens amasina,* while *C. s. mingrelica* is restricted to the Western Caucasus (« Mingrelia »), and *C. s. cartvelica* to the central Caucasus. In the Eastern Caucasus only *C. s. intermedia* is said to occur, although ARTOBOLEVSKI (1929) had indicated *C. s. amazina* (sic) from several localities in Daghestan. BARTENEF's map is incorrect in other respects as well. *Calopteryx syriaca* (RAMBUR, 1842) is shown as extending North-East up to Malatia, while in fact it does not range further north than the bay of Iskenderun (see further). Further, the mediterranean coast, the islands and West Armenia are a vacuum. BARTENEF's distributional ideas were supported by a very limited material only and, except

for one excursion to the area of Kars, this author had no field experience of Anatolian populations.

I must finally attract attention to the occurrence of *C. s. mingrelica* in Thracia, i.e. on the European continent, another fact not anticipated in BARTENEF's map.

Status : The types of *Calopteryx splendens* race *mingrelica* SÉLYS, 1869 in the Sélys collection in Brussels are two males, collected by T. DEYROLLE in « Mingrelia » (precise locality not stated). They were briefly described in SÉLYS (1869) and SÉLYS (1873). They were said to differ only slightly from *C. xanthostoma* (CHARP.), in having the wing spot commencing slightly distal to the nodus. It is explicitely added that in one specimen the wing apex is narrowly hyaline. The latter specimen, now before me, has the wing spot in the fore-wing beginning two cells posteriad to the nodus, and four cells in the hind-wing (not 8-12 cells, as stated in SÉLYS, 1873). It is an immature specimen with partly shrinked abdomen and a chocolate-brown wing-spot that has a diffuse hyaline border at the apex of the fore-wings only.

This specimen differs greatly from BARTENEF's (1912) conception (and photograph) of the wings in the male. Here, the wing spot begins about 15 cells distal to the nodus, i.e. at about 1/3 of the distance between the nodus and the apex which is completely dark coloured. The Sélysian type, as far as the male fore-wing is concerned, agrees in fact better with BARTENEF's figure of *C. amasina* male (type ?), showing a narrow hyaline border along the apex and a wing spot beginning just distal to the nodus. *C. splendens cartvelica* BARTENEF, 1930, combines characters of *mingrelica* and *amasina* : a fully coloured wing apex and a spot beginning at, just basad, or just posteriad to the nodus. In the later literature, the use of the name *amasina* has prevailed, until SCHMIDT (1954 a) and BUCHHOLTZ (1955) applied *cartvelica* to some populations living along the mediterranean coast of Turkey and in Cyprus (i.e. far outside the central Caucasus), but the name *mingrelica* was not used at all. Recently, and propably on authority of BARTENEF's (1912) figure, ST-QUENTIN (1965) moved mingrelica into the *C. syriaca*-complex.

All this confusion is due to the typological approach of earlier authors, neglecting individual variability, while, in fact, what is most striking when one travels through Anatolia, is the tremendous variability between populations of different localities.

One should discriminate between within-population variability and between-population variability. Inside individual populations, variability is reduced and bears on the basal extent of the male wing spot relative to the nodus, ranging between 5 cells basad and 15 cells apicad to the nodus. The apical extent of the wing spot is stable inside populations only, and specimens have either a hyaline apical fringe or no fringe at all, but both types are not normally mixed. In general, populations on the Anatolian plateau (around the great lakes) tend to have a wider hyaline fringe than those of the coastal plain, which have either a narrow fringe or none at all. Another variable feature is the percentage of homochrome females in populations, ranging from over 50 % to virtually none. One can therefore conclude that in view of the very limited migratory activities of Calopterygids and the topographic isolation of the different streamlets that descend the Taurus mountains on either side (towards the sea or the Anatolian plateau), all populations are, to a considerable degree, isolated from all neighbouring ones and tend to produce individual characteristics. I find it impossible to distinguish more than one taxon in all populations that have the wing spot in the male beginning not more than, say, five cells basad to the nodus or distal to it, and this should be called *Calopteryx splendens mingrelica* SÉLYS. In Anatolia, I have not seen it in co-habitation with *C. s. intermedia*, although they share the same area in the Taurus mountains and East of these. Where *C. s. mingrelica* co-occurs with *C. syriaca* RAMBUR, the latter takes a peculiar morphological aspect (see further). As explained in DUMONT, 1972, *C. s. mingrelica* has nothing to do with *C. xanthostoma* (CHARP.), in which the ventrum of the male terminalia is white (not yellow as stated in the paper cited) with extensive black markings, while in *mingrelica* and *intermedia* (also in *syriaca* and, according to a pers. comm. by AKRAMOWSKI, even in *erevanense*), it is bright ochraceous, with a longitudinal black stripe over the middle of the eigth sternite. In all oriental calopterygids, the wing spot is visible in newly hatched imagoes, while in *xanthostoma* it develops gradually in the first week following emergence.

2. *Calopteryx splendens intermedia* SÉLYS, 1887

Calopteryx splendens race *intermedia* SÉLYS, 1887.
Calopteryx intermedia intermedia BARTENEF, 1912.

Calopteryx xanthostoma intermedia SÉLYS, 1882 (sic) : ST-QUENTIN, 1965, nec. *C. xanthostoma* (CHARP.).
Calopteryx splendens intermedia : SCHMIDT, 1954, BUCHHOLTZ, 1955.

Material : about 100 specimens in both sexes, loc. 30, 45, 46, 55, 58, 109.

The type, a male from « Akbès, Syria » (= Ekbaz, Hatay, Turkey) has been photographed by SCHMIDT (1961). I have re-examined it and found my Anatolian material to be in good agreement with it. Among two topotypical males examined by ST-QUENTIN (1965), one is said to be typical, the second one being near *cartvelica* BARTENEF. ST-QUENTIN jumps to the conclusion that *cartvelica* is synonymous with *intermedia,* and reduces the latter to a subspecies of *xanthostoma.* As stated earlier, I consider both *cartvelica* and *amasina* as synonyms of *mingrelica.*

The status of *intermedia* has puzzled me considerably. However, it seems that there is no conclusive evidence for considering it as anything more than a subspecies.

BARTENEF's treatment, in wich *intermedia* is treated as a full species, split up into three geographical races, is at present untenable. If one examines BARTENEF's (1930) distribution map, *mingrelica* (in the sense of this paper) and *intermedia* show a partly complementary dispersal, with overlaps in the Caucasus range, part of Armenia and Kurdistan and an *intermedia* « tongue » extends from the bay of Iskenderun westward over the Taurus mountains as far as the province of Antalya and southward into Syria. I am familiar with the situation in the Taurus mountains only, where I never found both taxa actually co-occurring. On the river Tarsus (loc. 45), at the foot of Bolkar Daglari, a series of over 50 males was examined. The wing spot varied between extending from 20 to 5 cells basad to the nodus, invariably reaching the wing apex. « Minimum » specimens, if taken individually, could possibly be confused with extreme (« maximum ») examples of *mingrelica.* In the same population, about 50 % of homochrome females were found, with a brown wing spot that varied as in the male. Heterochrome females could not be distinguished from heterochrome females of *mingrelica.* At loc. 30, a population of *intermedia* was found, inhabiting standing water. In this population, the wing spot originates about 15 cells basad to the nodus, but the apex shows a narrow hyaline

fringe, a character as yet unreported in this form. All females seen here were heterochromes. It seems that a different habitat selection in areas where its range overlaps with that of *mingrelica* serves as a mechanism for obviating competition.

Further records from Turkey : SCHMIDT, 1954 a ; Hupnik Çay at Hassa (near the type locality) and Lamas, 66 km SW of Mersin, Tarsus ; BUCHHOLTZ, 1955 : W. and E. of Antalya, NE of Silifke, near Adana and near Iskenderun.

3. *Calopteryx syriaca* RAMBUR, 1842 (syn. *C. splendens pseudosyriaca* BUCHHOLTZ, 1955)

Material : 2 males, loc. 60. Recorded from the same area by SCHMIDT (1954 a) and by BUCHHOLTZ (1955), sub *C. splendens pseudosyriaca.* According to both authors, this form extends southward into Northern Syria (Dschishr ech Schugr). BUCHHOLZ (1955) considers it as identical with *C. cartvelica* (*mingrelica* in the sense of this paper) as males of both perform precopulatory behaviour in front of females of both. However, it is not clear whether BUCHHOLTZ had identified the females correctly (how ?) and further, it is not stated whether actual copulation took place. In my view, « *pseudosyriaca* » is specifically distinct from *mingrelica* and pertains to *C. syriaca* RAMBUR. The area along the East coast of the mediterranean sea, roughly between the bay of Iskenderun and the Dead Sea, is characterized by a dragonfly fauna of great complexity, in which so-called mediterranean elements are mixed with Ethiopian, Oriental and endemic species. These endemics occupy very restricted areas, and this applies not only to the Calopterygids, but also to some Gomphids (see further), a number of *Pseudagrion* species and even some Libellulids. *Calopteryx syriaca* is restricted to the drainage area of three major river systems : the Jordan, the Litani and the Orontes (or Asi) (plus a few unimportant short rivers draining directly into the mediterranean).

On the Asi and Litani, in addition, *C. hyalina* MARTIN, occurs with uncoloured wings in both sexes. Its true relation to *C. syriaca* is uncertain. It might be a good species or no more than an extreme condition of *syriaca.* It certainly co-occurs with *syriaca* all over its range. At one time, I received a mixed lot of Calopterygids from Al-Hosh, a small village at about 20 km

West of Homs (leg. N. DAAS, 31.VII.1971) in which both were represented and, as usual, it was impossible to tell the females apart.

Somewhat further north, in the area between Antakya and Dschishr ech Schugr, three to four forms of *Calopteryx* may co-occur, among which « *pseudosyriaca* » but not typical *syriaca,* and further *hyalina, mingrelica* and, according to BUCHHOLTZ, also *intermedia.*

In such a complex biocenosis, females of *syriaca* might confuse *syriaca* males with *mingrelica* males.

There thus could exist a selective advantage for *syriaca* males with extremely reduced wing spots, taking the aspect of « *pseudosyriaca* ». As stated earlier, *hyalina* may be the extreme condition of this process, but then it is not clear why *hyalina* should continue to co-exist with typical *syriaca* in the Lebanon (Litani basin), and, if it were just an ecoform of *syriaca,* why it does not still occur in the Jordan valley, where *syriaca* is the only Calopteryx present. It is well established that the mountain barreer between the Jordan and Litani valleys, running across the Rift, is not much more than 30,000 years old. That would, then, also be the maximum « age » of *hyalina.* Strikingly, other endemics (DUMONT, 1975 a) occur just south of the barreer, on a lake (Lake Hula) that was formed as a consequence of the volcanic events that closed the Jordan valley, so that this area might be a place where one can see evolution at work.

4. *Calopteryx taurica tschaldyrica* (BARTENEF, *1909*)

First described from Cildir Göl and surroundings (Kars Province, Eastern Armenia). Later reported from the Soviet Armenian Republic (Erevan, Leninakan, etc.) and found in abundance along the Black-Sea coast near Batum (BARTENEF, 1930).

C. splendens erevanense AKRAMOWSKI, 1948 probably also pertains to the *taurica*-complex, that seems to extend along (or across ?) the Caucasus to the Crimea (loc. typ. of *Calopteryx splendens* race *taurica* SÉLYS). More study is needed to elucidate the status of these forms.

5. *Calopteryx virgo festiva* (BRULLÉ, *1832*)

Material : long series from loc. 6, 7, 15, 17, 110, 112, 113, 122.

Previously recorded by MAC LACHLAN (1899) from Marmaris and by KEMPNY (1908) : « Taurus », Baliki (Istanbul) and « Adampol ».

The latter locality I have been unable to place (perhaps not in Turkey ?). Further records for the area of Istanbul are : Beikos woods, Kartal (Asiatic side of Bosporus) and Belgrade forest (European side) : MORTON, 1915, 1922.

Not recorded from Armenia by AKRAMOWSKI (1948).

HAGEN (1863) considers *Agrion Colchicum* EICHWALD, 1830 as a synonym to this species, that should thus exist in the West Caucasus (Mingrelia). It is another form that stands half-way between subspecific and specific status. The ultimate abdominal sternites are bright red in living males, almost as in *C. haemorrhoidalis,* and in Anatolian populations, virtually all females are homochromous. *C. virgo festiva* is locally abundant and is found on small, swift-running brooks and canals. It was not seen on larger rivers and not in the company of other Calopterygids.

Euphaeidae

6. *Epallage fatime* CHARPENTIER,*1840*

Material : numerous specimens, loc. 6, 38, 61, 70, 89, 99, 101, 104, 109, 113, 116.

Extralimital material : several hundreds of specimens from different localities in the Jordan valley, Israel, June 1972.

A widespread, variable species that has been reported by MAC LACHLAN (1899) : Marmaris ; VALLE (1952) : several localities in Cyprus ; SCHMIDT (1954 a) : Hassa (Hupnik Çay); Dörtyal ; Lamas ; Çamliayla (Namrun) ; Mezitli Çay. The type locality (SELYS, 1854) should be in « Turquie d'Europe ». It has been split into four subspecies, based on the relative extension of the apical brown wing-spot. Variability within populations with regard to this character is enormous and, in a large sample from almost any population, one may find specimens without any indication of a spot and, at the other extreme, wings spots extending several cells basad to the pterostigma. The subspecies,

under the conditions in which they were defined, are therefore all invalid.

Lestidae

7. *Sympecma fusca* (VANDER LINDEN, *1820*)

Material : ♂♂, ♀♀, Loc. 13, 20, 52, 55, 71, 108.

Widely distributed throughout Anatolia. Recorded by SCHNEIDER (1845) : Bursa, not Kellemisch as stated in SELYS (1887) ; Naxos (BUCHHOLTZ, 1954) ; Amasia (SELYS, 1887) ; Istanbul (SPAGNOLINI, 1877) ; Ankara (GADEAU DE KERVILLE, 1939 ; NAVAS, 1932) ; Pozanti (SCHMIDT, 1954 a) ; Cyprus (VALLE, 1952 ; KIAUTA, 1963) and Rhodos (BENTIVOGLIO, 1929).

8. *Sympecma annulata annulata* (SÉLYS, *1887*)

This is the correct name for the animal mostly referred to as *S. paedisca* BRAUER, 1880. The latter is a homonym of *Agrion paedisca* EVERSMANN 1836 (a *Lestes,* probably *L. sponsa*), und therefore, as correctly explained by AKRAMOWSKI (1948), unvalid. The first junior synonym is not *S. braueri* JACOBSON and BIANCHI 1905, but *S .annulata* (SÉLYS, 1887), as explained by MAY (1928). The type localities for the latter are Malatia and Antakya, both in Anatolia, and local populations should therefore be named *S. annulata annulata* (SÉLYS, 1887), and not *S. a. braueri* (JACOBSON & BIANCHI, 1905). The latter name applies to European populations but not to Armenian ones (AKRAMOWSKI, 1848), which almost certainly belong to the nominal subspecies, just as Iraqi specimens (MORTON, 1919). Since the Selysian types, no new topotypical material has become available.

9. *Lestes viridis parvidens* ARTOBOLEVSKI, *1929*

Material : ♂♂, ♀♀, Loc. 37, 39, 89, 90, 95.

Previous records : SCHNEIDER (1845) : Xanthus (lower Koca Çay valley), Istanbul ; SÉLYS (1887) : idem ; HAGEN (1863) : « Klein-Asien » ; KEMPNY (1908) : Kagishani ; MORTON (1922) : Bursa, Kestel near Bursa and Göksu river near Istanbul, Asiatic side ; BENTIVOGLIO (1929) : Rhodos ; VALLE (1952) and KIAUTA (1963) : Cyprus.

10. *Lestes barbarus* (FABRICIUS, *1798*)

Material : ♂♂, ♀♀, Loc. 44, 46, 77, 89.

Previous records : SCHNEIDER (1845) : Marmaris, Gelemish ; HAGEN (1863) : « Klein-Asien » ; SPAGNOLINI (1877) : Istanbul ; SÉLYS (1887) : « Alpes Pontiques » ; KEMPNY (1908) : Eskisehir, Uludag, Izmir ; MORTON (1922) : lake at Büyükçekmece ; BENTIVOGLIO (1929) : Cos ; NAVAS (1932) : Izmir ; LONGFIELD (1932) : Bornova (Izmir) ; LONGFIELD (1932) : Bornova (Izmir), Habibler (city of Aydin), Tire (Aydin), Turgutlu (Manisa) ; BUCHHOLZ (1954) : Delos ; VALLE (1952) and KIAUTA (1963) : Cyprus.

11. *Lestes virens virens* (CHARPENTIER, *1825*)

Material : ♂, ♀, Loc. 81.

Previous records : SCHNEIDER (1845) : Gelemish ; HAGEN (1863) : « Klein-Asien » ; SÉLYS (1887) : Erzerum ; KEMPNY (1908) : Bursa ; MORTON (1922) : Yalova ; NAVAS (1932) : Ankara.

12. *Lestes macrostigma* (EVERSMANN, *1836*)

Material : long series, Loc. 7, 47, 103. Swarming at loc. 47.

A species occurring in local colonies, frequently common where it lives. The larva seems to favour brackish waters.

Previous records : HAGEN (1863) : Cyprus ; SÉLYS (1887) : Cyprus, Tinos ; MARTIN (1894) : Cyprus ; STROBL (1906) : Tinos ; KEMPNY (1908) : Izmir, very (!) common ; BUCHHOLZ (1954) : Delos ; KIAUTA (1963) : Zasaki, Cyprus.

AKRAMOWSKI (1964) records the species from Kafan district, in the East of SSR. Armenia.

13. *Lestes sponsa* (HANSEMANN, *1823*)

Material : ♂♂, ♀♀, Loc. 73, 74.

Previous records : SÉLYS (1887) : Pontic Alps at Tartum.

ST-QUENTIN's (1965) remark concerning this and the next species, « occurs only in the northern part of the area », is incorrect.

14. *Lestes dryas,* KIRBY, *1890*

Material : ♂♂, ♀♀, Loc. 74, 77.

Previous records : SÉLYS (1887) : « Anatolie » and Pontic alps at Erzerum ; KEMPNY (1908) :Uludag (1800 m), Izmir, common ; MORTON (1915) : Istanbul area, Belgrade forest and Mavri, asiatic side of Bosforus.

This species is apparently widely distributed, although locally common only.

Platycnemididae

15. *Platycnemis pennipes pennipes* (PALLAS, *1771*)

Material : long series at Loc. 2-8, 15, 19-21, 24-28, 34, 36-40, 70, 77, 89, 98, 104, 105, 107, 118-121.

Previous records : SCHNEIDER (1845) : Marmaris ; HAGEN (1863) : « Klein-Asien » ; SPAGNOLINI (1877) : Istanbul ; SÉLYS (1887) : Amasia and « Mingrelie » ; MACLACHLAN (1899) : Marmaris ; KEMPNY (1908) : Kâgithane (Istanbul), Gökçekisik (Eskisehir), Izmir ; MORTON (1915, 1922) : surroundings of Istanbul (Erenköy, Göksu River, sweet waters of Europe) ; NAVAS (1932) : Izmir ; LONGFIELD (1932) : Menemen (Izmir prov.), Ortacke, E. of Aydin ; BENTIVOGLIO (1929) : Rhodos ; DE JOANNIS (1916) : Lesbos ; WERNER (1938) : Andros, Lemnos, Tinos ; BUCHHOLZ (1954) : Naxos ; BARTENEF (1929) : Kobulety near Batum, near the Turkish border ; SCHMIDT (1950) : Alhak Dere W. of Kerasada ; Anaare ; SCHMIDT (1954 a) : Eregli, Manavgat, Nilufer Çay near Bursa, Antalya and up to 3 km. East of Alanya. ST-QUENTIN (1964 a) : Egridir, Mut ; ST-QUENTIN (1964 c) : Rhodos. In the SSR. Armenia, *P. pennipes* co-occurs with *P. dealbata* (SÉLYS) (AKRAMOWSKI, 1948, 1964), while in Daghestan (ARTOBOLEVSKI, 1929) and along the Caspian coast, only *P. dealbata* seems te exist.

The detailed distribution of both species in Asia Minor is interesting.

Along the mediterranean coast, there exists a narrow zone where both species actually share the same biotopes. SCHMIDT (1954) defines the limit of eastern extent of *pennipes* near Alanya. I found the species some 200 km more to the East, on Babadil Çay, where it was mixed with *P. dealbata.* How this zone runs

through the Anatolian mainland is unkown. It is probably directed North East, but may be complicated by the complex relief of East Anatolia and its continental climate.

Some authors (LONGFIELD, NAVAS) report *P. dealbata* from West-Anatolia. These records are probably incorrect, as young stages of adult pennipes may easily be mistaken for *dealbata.* On the other hand, ST-QUENTIN's (1965) remark that *P. pennipes* occurs only in the Northern part of Asia Minor is definitely incorrect.

16. *Platycnemis kervillei* (MARTIN, *1909*)

Psilocnemis kervillei MARTIN, 1909.
Copera kervillei : MORTON, 1924.
Platycnemis pennipes kervillei : SCHMIDT, 1950.
Platycnemis kervillei : SCHMIDT, 1954 a.

Material : series from Loc. 58, 106, 110, 117.

Previous records : Types from Lac de Homs, Northern Syria (MARTIN, 1909), where they were collected by H. Gadeau de Kerville (GADEAU DE KERVILLE, 1926) during mid-May. MORTON (1924) redescribed the species on a male collected at Eregli, Anatolia.

More specimens were collected by SCHMIDT (1954 a) : Aksu river (10 km S. Maras), Uçurke Su, Guvenç (25-30 km NE of Adana), Mezitli Çay, 19 km W. Mersin, Köle Musali, Mersin ; also found in Syria (5 stations, not explicited) and in The Lebanon at Kherbet Kanafer near Bekaa, and more North, on the road Beirut-Damascus (at the intersection with the Litani). ST-QUENTIN (1964 a) figures a male from Kayabasi near Islahiye (Eastern slopes of Amanus mountains), 13.IV.1962. The species was recently reported from Northern Iraq, very near the Turkish border (Amadiya, Singa valley, 3.VII.1970 and Korikavana, 11. V.1970) (ASAHINA, 1973).

Little is known about *P. kervillei,* although it now appears to have a wider range than used to be thought. It seems to replace *P. pennipes* in the western range of *P. dealbata* (except Loc. 110, which is the most western station known), and, safe for one record in July by ASAHINA, it is a distinct spring species. In Loc. 58, which I visited twice, I found it plentiful in May 1972. Beside

fully adult specimens, many tenerals were seen, and only *C. splendens intermedia* and *I. elegans ebneri* were in evidence on the same spot. In early August 1973, the same place was crowded with *P. dealbata,* but no *P. kervillei* were seen. Although the flight period of both is likely to overlap, a segregation in time appears evident. Teneral *P. kervillei* have a pure white abdomen, with two small black spots at the base of each segment. In some, the spots on S7-S9 seemed to develop into longitudinal lines, but already began to be covered by a blue pruinosity, and the latter development on the thorax and abdomen seems to proceed much faster than that of the longitudinal stripes, so that adults are completely dark-blue, strongly reminescent of *Pseudagrion syriacum* (SÉLYS) from The Lebanon and Israel. This peculiar habitus, the unflattented legs in both sexes, the early flight period, largely outside the range of *P. pennipes* to which it is, structurally (genitalia, appendices) almost identical, are proof of its full specificity. It is probably what remains of a pleistocene species that used to extend over the whole mediterranean basin, and was split into two centres of occurrence, one in the western mediterranean, where *P. subdilatata* now lives, and one in the eastern mediterranean. *P. pennipes,* a « glacial » newcomer, seems to extend eastward nowadays at the expense of *P. kervillei.*

17. *Platycnemis dealbata* (SÉLYS, *1863*)

Material : several hundreds of specimens, Loc. 40, 43-49, 51, 58, 60-65, 67, 69, 106, 108.

Previous records : SÉLYS (1887) : Iskenderun, Beirut, « Kaketia » ; SCHMIDT (1954 a) : South Anatolia, W. limit of distribution at Lamas, 66 km SW of Mersin ; ASAHINA (1973) : Singa valley, Amadiya, N. Iraq. Also in SSR Armenia (AKRAMOWSKI, 1948). The records by NAVAS (1932) and LONGFIELD (1932) from Izmir Province are probably immature specimens of *P. pennipes.*

This well-defined species is among the dominant zygopterans of South-East and South Anatolia. It becomes even more abundant in Syria, The Lebanon and Israel. It is the only Platycnemis species known from Iran (SCHMIDT, 1954 b), and it still occurs in Afghanistan (SCHMIDT, 1961), reaching Kashmir and NW. India. Its nearest relative, *P. latipes* (RAMB.) from France and Spain is probably related to it in the same way as are related *P. kervillei* and *P. subdilatata.*

Coenagrionidae

18. *Ischnura elegans ebneri* SCHMIDT, *1938.*

Material : abundant, Loc. 2, 6-9, 11, 13, 15, 17-21, 23-28 30, 32, 34-40, 43-46, 51, 52, 54, 58-63, 65, 69-71, 82, 118-121.

Very common and widespread, occurring on most types of waters. Recorded by almost all authors that have studied Turkish dragonflies mostly sub *I. elegans* VANDER LINDEN, and it is difficult to know whether their material pertained to this or the next subspecies. *I. elegans ebneri* was described by SCHIMDT (1938) in a key, without indication of a type. The Terra Typica is the Jordan valley and the area of distribution was originally indicated as « Creta, Cyprus, Palestine and Syria ». Later found in Iran (SCHMIDT, 1954 b) and commented upon in detail by SCHMIDT (1967), where it is referred to under the somewhat enigmatic name of « forma atavistica ». SCHMIDT apparently means that *ebneri is* a primitive form from which most of the circum-mediterranean *Ischnura* may be deduced. There is evidently some truth in this, since in the West mediterranean we find forms with crossed appendages in the male as well (*genei, saharensis*), which might be remnants of a pleistocene complex, and forms with uncrossed appendages in central and western Europe, which might be of late pleistocene origin (see further).

Previous records : MARTIN (1894) and VALLE (1952) : Cyprus ; BUCHHOLZ (1954) : Naxos, Delos, Paros, Mykonos ; WERNER (1938) : Naxos ; SCHMIDT (1954 a, 1967) : Antakya area (Orontes river, Ain Camus, 10 km S. of Antakya) ; Iskenderun area (Hupnikçay, 40 km NE of Iskenderun, Kirikhan, Sariseki) ; 10 m S of Maras ; Eloglu ; Seyhan near Misis ; Guvenç, Tarsus, Mezitli çay, 19 km SW of Marsin, Tarsus Cay ; Pozanti ; Hanan, S. of Kozan, 108 km N. of Adana ; Alaipinar, near Pekmezli 16 km S-SE of Kozan (NE of Adana) ; Saline stream at Karatas (Adana) ; Eregli (Konya) ; Bektitk, 1005 m, 10 km NW of Eregli ; Pinar Baschi 30 km N. of Antalya ; Karpuz çay 80 km E. of Antalya ; Duden çay and Arap suyu at Antalya ; Sedre çay at Seki, 18 km from NW of Gazipasa ;Avian Gölü, 16 km S. of Elmali ; Kücük Su, Asiatic side of Bosforus ; Gediz, 3 km N. Manisa ; Nilufer Çay, 13 km NW of Bursa ; çine Çay, S. of Aydin ; Yatagan, S. of Aydin ; Akçapinar, 32 km N-NE of

Marmaris ; also Cyprus, records from Limassol, Zazaki and Moni River and from Lardos, Rhodos.

19. *Ischnura elegans pontica* SCHMIDT, *1938*

Very briefly described in 1938 ; types indicated in the 1967 revision (SCHMIDT, 1967).

Distribution given as : from Neusiedler Lake (Austria), through Hungary and the Northern Balkans to the Caspian coast of Iran and to Afghanistan. The following Turkish localities are given (SCHMIDT, 1967) : Mandra (Thracia) and Belgrade Forest (Istanbul). If, indeed, *pontica* is a valid taxon, it should extend along the Black sea cost of Turkey to the Transcaucasian provinces of the USSR.

20. *Ischnura pumilio* (CHARPENTIER, *1825*)

Material : series from Loc. 4, 20, 29, 42, 52, 64, 67, 96, 120.

Previous records : SCHNEIDER (1945) : Istanbul, Izmir, Island of Cos ; SPAGNOLINI (1877) : Istanbul ; SÉLYS (1887) : Kaketia, Bursa, Malatia ; KEMPNY (1908) : Istanbul, Kagithane (Istanbul area), Eskichehir (« var. *rubra* ») ; MORTON (1914) : Van ; LONGFIELD (1932) : between Tire and Efes, Turgutlu (Manisa), between Demirchi and Simav, Kula, 35 km NE of Alachehir, E. of Ankara, on river Kizikirmak ; MARTIN (1894) : Cyprus ; BOLIVAR (1893) : « Syria » ; AKRAMOWSKI (1948) : SSR Armenia.

Also known from Iran (SCHMIDT, 1954 b) and Afghanistan (SCHMIDT, 1954 b) and Afghanistan (SCHMIDT, 1961).

21. *Ischnura intermedia* (DUMONT, *1974*)

Material : 3 ♂♂, 1 ♀, Loc. 68 (Loc. typ.).

Obviously a remmant of an old fauna, of more oriental facies, that existed in the area and probably in the whole mediterranean basin at the beginning of the Pleistocene. The species is more closely related to *I. forcipata* MORTON, 1907 than to *I. pumilio* (CHARP. 1825).

22. *Ischnura fountainei* (MORTON, *1905*)

Ranging from East North Africa, through Lower Egypt and Sinai to Iraq. It has not strictly been reported from Turkish

territory, but is occurrence in Azerbajdzan, on the Kura river and as far west as Mingecaur (AKRAMOWSKI, 1964) and near the Turkish border of Korikavana, N. Iraq (ASAHINA, 1973) make it almost certain that it lives in East Anatolia. VALLE's (1952) record from Cyprus is considered doubtful (KIAUTA, 1963).

23. *Ischnura senegalensis* (RAMBUR, *1842*)

In the area under study, this species has about the same distribution as the preceding. It is common in Iraq and in the Kura valley it was found at Geoktapa near Kirovabad. It is therefore to be expected in East Anatolia.

24. *Enallagma c. cyathigerum* (CHARPENTIER, *1840*)

Material : long series, Loc. 4, 12, 13, 20, 35, 73-75, 81.

Previous records : SÉLYS (1887) : Pontic Alps ; MORTON (1905) : Van ; ST-QUENTIN (1964 a) : Aksehir and Burdur Göl (under the name *E. c. rotundatum* BART., 1929), Abant Lake. The local populations vary greatly in the development of the black humeral stripes. Specimens from brackish Burdur lake agree with typical European material, while those from the Eastern Provinces have reduced and, at times, even interrupted humeral markings. I failed to find structural differences between these populations and also with Western European material. ST-QUENTIN's opinion that *E. c .rotundatum* occurs on lake Burdur has been examined on very long series and cannot be confirmed. *E. c. rotundatum* BART., 1929 from the Caucasus has been very inadequately described and poorly figured, and is, therefore, a doubtful taxon. The decolorate forms from Eastern Anatolia are quite reminescent of *E. deserti* (SÉLYS, 1871), but the true identity of the latter is to be finally clarified as well.

25. *Cercion l. lindeni* (SÉLYS, *1840*)

Material : series from Loc. 18-20, 23-28, 47, 71, 120, 121.

Previous records : HAGEN (1863) : « Klein-Asien » ; MORTON (1922) : Büyükçekmece ; LONGFIELD (1932) : Kula, 35 km NE of Alachehir. Also known from SSR Armenia (AKRAMOWSKI, 1948).

Specimens from Turkey do not differ from European and North African examples. In the Lebanon, Syria, Jordan and Israel occurs

Cercion lindeni zernyi SCHMIDT, 1938, a form with greatly reduced abdominal markings.

26. *Coenagrion syriacum* (MORTON,*1924*)

Coenagrion puella syriaca MORTON, 1924.
Agrion ponticum BARTENEF, 1929.
Agrion pulchellum : SÉLYS, 1876, 1887 (Mingrélie).
Agrion syriacum : SCHMIDT, 1954 a, SCHMIDT, 1960.

Material : 3 ♂♂, Loc. 2 ; 8 ♂♂, 2 ♀♀, Loc. 30.

Previous records : all under *C. puella,* are : MORTON (1914) : Van ; KEMPNY (1908) : Uludag, 1600 m ; MORTON (1915 b) : Istanbul, Asiatic side and European side. ST-QUENTIN (1965) assumes that both *C. puella* and *C. syriacum* occur in Anatolia, but this is quite improbable. If *C. puella* occurs on Turkish territory, it should be looked for in Thracia. In Bulgaria, between Plovdiv and the Turkish Border, I found typical *C. puella.*

Status : it is difficult to place this taxon objectively. My decision to follow SCHMIDT (1954) in considering it a full species is based upon the existence of small but consistent structural differences with *puella* in both sexes. A comparison was made of Turkish material with topotypical *syriacum* from Lake Hula, Israel, and with typical *puella* from the area of Plovdiv (Bulgaria), Baile Herculanie, Roumania and Belgium. Turkish examples agree structurally with those from Lake Hula, and differ from *puella* from Europe, which are structurally homogeneous. Males in *C. syriacum* have the terminal hook of the app. sup. much longer than in *puella,* extending for about half their length over the tips of the app. inf. The long, ventrally projecting basal hook on the app. sup. is longer in *syriaca* than in *puella.* In the females, the hind border of the pronotum is more distinctly trilobate in *syriacum* than in *puella.* The latter character was well described by BARTENEF (1929) on specimens from Transcaucasia. SÉLYS' specimens from « Mingrelie » (SÉLYS, 1887) were re-examined by SCHMIDT and again by me, and are typically *syriacum* also. There is a weak tendency towards melanism is *C. syriacum,* which was stressed by ST-QUENTIN (1965). The latter author exagerates in giving too much weight to the dark marking on the dorsum on the second abdominal segment, which should be U-shaped in *puella,* and stalked in *syriacum* and *C. puella kocheri*

(SCHMIDT, 1960) from Morocco. It is true that the black U-marking is usually more developed in *syriacum,* but it is by no means always stalked, and similar specimens may occur in typical *puella* as well.

27. *Coenagrion scitulum* (RAMBUR, *1842*)

Material : series from Loc. 32, 71.

Previous records : MORTON (1922) : surroundings of Istanbul (Göksu, Kartal, Belgrade forest) ; ST-QUENTIN (1964 a) : Egridir.

A widespread circum-mediterranean species.

28. *Coenagrion ornatum* (SÉLYS, *1850*)

Material : series from Loc. 54, 77.

Previous records : SÉLYS (1887) : Malatia ; MORTON (1914) : Van (long series, with very noteworthy variability of black markings on first abdominal segments in males); SCHMIDT (1954a) : Van (Coll. LACROIX), Pozanti, Ulukischla.

29. *Coenagrion vernale* (HAGEN, *1839*)

Material : 1 ♀, Loc. 73.

Previous records : a pair from Van (MORTON, 1914). Also found in the SSR Armenia (AKRAMOWSKI, 1948).

30. *Coenagrion hastulatum* (CHARPENTIER, *1825*)

A female from Gelemish was identified under this name by SCHNEIDER (1845). No further records known.

31. *Coenagrion pulchellum* (VANDER LINDEN, *1825*)

Recorded from Gelemish by SCHNEIDER (1845). Not found back since. According to SCHMIDT (1960), a specimen from the original SCHNEIDER collection still exists in HAGEN's collection in Harvard, and is said to be *pulchellum,* not *syriacum.* The occurrence of *pulchellum* in Anatolia is not improbable, and especially in Thracia, the species should occur. It is locally common in Greece (BUCHHOLZ, 1954 : Argos plain, Peloponesos).

32. *Erythromma viridulum orientale* SCHMIDT, *1960*

Material : series, Loc. 23, 27, 30.

Previous records : SCHNEIDER (1845) : Gelemisch ; SPAGNOLINI (1877) : (?) Istanbul ; SÉLYS (1887) : Tartum ; WERNER (1938) : Mykonos. Aslo in Iran (SCHMIDT, 1954 b) and extending South to the Jordan valley (DUMONT, unpublished).

33. *Pyrrhosoma nymphula* (SULZER, *1776*)

An old record by SÉLYS (1887) from Iskenderun and MORTON (1922) from Kartal, Istanbul. Whether local populations pertain to typical *nymphula* or to *P. n. elisabethae* (SCHMIDT, 1948) is unknown.

34. *Ceriagrion tenellum georgfreyi* (SCHMIDT, *1953*)

Material : ♂♂, ♀, Loc. 30.

Previous records : SÉLYS (1887) : Iskenderun ; SCHMIDT (1953, 1954 a) : Sariseki, 10 km N. Iskenderun (Loc. typ.), Arab Su (Antalya), Nahr Sene (Northern Syria). The subspecies extends up to the Jordan valley (MORTON, 1924).

Gomphidae

35. *Gomphus schneideri* (SÉLYS, *1850*)

Gomphus forcipatus, nec. *Onychogomphus forcipatus* (L) : SCHNEIDER, 1945.
Gomphus Schneiderii DE SÉLYS : SÉLYS & HAGEN, 1850.
Gomphus scheiderii, race de *Gomphus vulgatissimus* : SÉLYS, 1857, 1887.
Gomphus simillimus, nec. *G. simillimus* SÉLYS : KEMPNY (1908) (Adampol).
Gomphus schneiderii : MORTON, 1915.
Gomphus schneideri : SCHMIDT, 1954 a.
Gomphus vulgatissimus schneideri : ST-QUENTIN, 1964 b.
Gomphus schneideri : ST-QUENTIN, 1968.

Material : ♂♂, ♀♀, Loc. 51, 89, 91, 97.

Previous records : SÉLYS (1850) first described this species, based on Schneider's material. HAGEN (1863) had already seen additional material from Trabzon and the Caucasus.

SÉLYS (1887) sums up the following localities : Gelemish, Amasia, Malatia, Mingrelia and South Russia (the last locality on authority of EVERSMANN). The slenderness and expanded yellow markings of this species lead some authors to mistake it for *G. simillimus* SÉLYS (KEMPNY, 1908), or, at least, to consider it as more nearly related to *G. simillinus* than to *G. vulgatissimus* (MORTON, 1915), a point of view that is not without a fundament of truth (see further). SCHMIDT (1954 a) took the species at Hassa, Sariseki, Dörtyol, Maras, Pozanti, Eregli and Konya.

ST-QUENTIN (1968) again raises the possibility of a racial connection between *G. schneideri* and the west mediterranean *G. simillimus.*

36. *Gomphus davidi* (SÉLYS, *1887*)

Material : 2 ♂♂, 2 ♀♀, Loc. 51.

Previous record : SÉLYS (1887) : Iskenderun (Loc. typ.), Beirut, Damascus; SCHMIDT (1954 a) : Aksu (Maras), Kirikhan and Mezitli çay near Tarsus ; ST-QUENTIN (1965) : Izmir (BRAUER's record). Also known from Iraq (ST-QUENTIN, 1964 c) and widespread in the Jordan valley (MORTON, 1924 ; SCHMIDT, 1938).

A large and handsome spring species, endemic of the Near East. Structurally, it stands well apart from *G. schneideri* with which it co-occurs in the northern part of its range.

37. *Gomphus flavipes lineatus* (BARTENEF, *1929*)

Gomphus flavipes var. *lineatus* BARTENEF, 1929.
Gomphus ubadschii SCHMIDT, 1953.
Stylurus lineatus SCHMIDT, 1961.
Stylurus ubadschii ASAHINA, 1973.

Material : ♂, ♀, Loc. 9, ♂♂, ♀♀, Loc. 51, ♀, Loc. 64.

Previous records : BOLIVAR (1893) : « Syria » (sub *G. flavipes*) ; BARTENEF (1929) : Poti, West flanks of Caucasus (sub *G. flavipes* var. *lineatus*) ; SCHMIDT (1953) : Daphne valley south of Antakya, Maras, Aksu near Maras, Misis on Seyhan river (type Loc.). In SCHMIDT (1954 a) Nilufer çay near Bursa is added. The identity of *G. ubadschii* and *G. flavipes lineatus* is established by SCHMIDT (1961). ASAHINA (1973) presents records from N. Iraq. WERNER's (1938) record of *G. flavipes* from the island of Lemnos also pertains to this species.

G. f. lineatus, contrary to the preceding species, has a remarkably long flight period and in Loc. 51 which was visited in May and again end of July, specimens were found on both occasions.

In Loc. 64, freshly emerged specimens were seen as late as early August.

38. *Onychogomphus f. forcipatus* (LINNAEUS, *1758*)

Material : 1 ♂, Loc. 81.

Previous record : none with certainty. Perhaps SÉLYS' (1887) record from Trabzon and the Caucasus refers to the nominal subspecies, but AKRAMOWSKI (1948) records only ssp. *unguiculatus* from Armenia. The specimen before me agrees with typical specimens from central Europe and from the Dalmatian Alps in Yugoslavia. It seems to extend, at higher altitudes, into Anatolia, and it should be further searched for along the pontic coast, where the climate would seem to suit it well.

39. *Onychogomphus forcipatus albotibialis* (SCHMIDT, *1954* a)

Material : series, Loc. 18-21, 27, 52.

Previous records : SCHMIDT (1954 a) : Ulukischla and Pozanti.

This form, characterized by its yellow tibiae, is probably a paler condition of the preceding, localized on the Western and Central Anatolian plateau. Although it was seen on running waters, it is frequently found on lakes, and it was abundant along the shores of lakes Egridir and Beysehir.

40. *Onychogomphus forcipatus unguiculatus* (VANDER LINDEN, *1820*)

(**syn. nov.** *Onychogomphus forcipatus cypricus* SCHMIDT, 1954 a)

Material : specimens from Loc. 36-39, 45, 70, 79, 121 and a short series in both sexes from Stenous, Cyprus, Leg. J. WAHRMAN.

I felt tempted to preserve ssp. *cypricus* SCHMIDT, and apply it to populations fringing the mediterranean coast of Anatolia and adjacent islands. The following objections, however, exist : 1. Schmidt's description is so rudimentary that *cypricus* is almost a nomen nudum. 2. the so-called « structural differences » with *forcipatus* typ. were not explicited and, upon examination of a long series of animals in both sexes, have proved not to exist. Males from Cyprus and the opposite Turkish coast are extremely

pale, with a characteristic reduction of the black markings on S_7-S_{10} and on S_3 where two isolated, apical black spots are formed. More western examples (Izmir area and Thracia) are darker, without fragmentation of the black markings on S_3, and the change from one to another is continuous and rapid. I am presently unable te separate this heterogeneous series in two groups.

Previous records : MAC LACHLAN (1899) : Marmaris ; VALLE (1952) : Cyprus (correctly referred to as *O. f. unguiculatus*) ; SCHMIDT (1954 a) : 25 km W. of Alanya (type of *O. f. cypricus* ?); KLAUTA (1963) : Cyprus, sub *O. f. cypricus*.

41. *Onychogomphus lefebvrei* (RAMBUR, *1840*)

Material : series from Loc. 51, 60, 62, 67.

Previous records : SÉLYS (1887) : Antakya, Beirut ; SCHMIDT (1954 a) : Maras, Dörtyol, Guvenç, Tarsus, Köle Musali (8 km W. Tarsus), Mezitli çay (Mersin) ; ST-QUENTIN (1965) : « Anatolia » ; ASAHINA (1974) : Adana ; also Dohok, N. Iraq.

The synonymy is given in full by ASAHINA (1974), who correctly considers this animal a good species rather than a subspecies of *O. forcipatus*.

42. *Onychogomphus assimilis* (SCHNEIDER, *1845*)

Material : 1 ♂, 1 ♀ observed at Loc. 46.

Material examined : SCHNEIDER's type and a pair from Pozanti, ex. coll. SCHMIDT (fide S. ASAHINA).

Previous records : SCHNEIDER (1845) : Gelemish, male (holotype). Found back on the southern slopes of the Caucasus and described sub *Onychogomphus fulvipennis* (BARTENEF, 1912). SCHMIDT (1954 a) records the species from Pozanti, Mezitli çay, Silifke, Manavgat. Further records are by ST-QUENTIN (1964 a) : Silifke, and ST-QUENTIN (1964 b) : Tunceli. AKRAMOWSKI (1948) gives a considerable number of locality records from SSR Armenia, some of which are situated very near the Turkish border. The range is obviously continuous through Anatolia, but seems not to extend outside Asia Minor. Very little is known about its ethology, and although I briefly observed two specimens at Loc. 46, I am unable to add anything substantial. The specimens seen were shy and disappeared in the trees upon my attempt to approach them.

43. *Onychogomphus macrodon* (SÉLYS, *1887*)

SÉLYS' (1887) type series came from Antakya and Beirut. I could not find a single male in the Sélys collection in Brussels and two females, labeled « type », proved to be females of *O. lefebvrei*. More Turkish material was collected by SCHMIDT (1954 a) : Dadat, Aksu (Maras), Misis (Seyhan river) and « Orontes river ».

Numerous specimens were also captured in Northern Syria. The species reaches the Northern Jordan valley (DUMONT, unpublished data).

44. *Onychogomphus flexuosus* (SCHNEIDER, *1845*)

Material : ♂, Loc. 9, series, Loc. 10, 46, 51.

Previous records : SCHNEIDER (1845) : Gelemish (Loc. typ.) ; SÉLYS (1887) : Amasia, Malatia, Kirovabad ; MORTON (1924) : Amasia, series ; SCHMIDT (1954 a) : Misis (Seyhan), Garablus and Deer Ezzor at the Euphrates. Also known from Iran (RIS, 1930), Iraq (MORTON, 1921), SSR Armenia (AKRAMOWSKI, 1948), Northern Israel (DUMONT, unpublished).

45. *Paragomphus genei* (SÉLYS, *1841*)

Recorded from Beirut and « Syria » by SÉLYS (1887), from « Syria » by BOLIVAR (1893) and from Israel (MORTON, 1924 ; SCHMIDT, 1938). Found only once in Turkey : Antakya, on the river Orontes (SCHMIDT, 1954 a).

46. *Paragomphus lineatus* (SÉLYS, *1850*)

Material : 5 ♂♂, 4 ♀♀, Loc. 68.

First record for Turkey. The species, a typical oriental form, was known from Iran (SCHMIDT, 1954 b). The specimens before me are sand-coloured, almost absolutely devoid of black markings, very reminescent of *Anormogomphus kiritchenkoi*.

47. *Ophiogomphus serpentinus* (CHARPENTIER, *1825*)

Cited from Malatia by SÉLYS (1887). This record is in need of reconfirmation.

48. *Anormogomphus kiritchenkoi* (BARTENEF, *1913*)

Not yet recorded from Turkey. SAGE (1960 a, b) found it abundantly in the area of Khanaquin, East-Central Iraq and the species might well occur locally on the Tigris, the Euphrates or some of their tributaries on Turkish territory, in the poorly explored Eastern provinces of Anatolia.

49. *Lindenia tetraphylla* (VANDER LINDEN, *1825*)

Not yet definitely recorded in Turkey, although it certainly lives here. This species is abundant in certain parts of Greece, Yugoslavia, Iraq, Israel, and it also lives in the Caucasus and along the Caspian coast. It is therefore surprising that no Turkish records have become available yet.

Cordulegasteridae

50. *Cordulegaster pictus* (SÉLYS, *1854*)

Cordulegaster charpentieri auct., nec. *Cordulegaster charpentieri* (KOLENATI, 1846).

Material : 2 ♂♂, Loc. 122.

I show elsewhere (DUMONT, 1976) that *Aeschna charpentieri* KOLENATI 1846, is a synonym of *Cordulegaster insignis* SCHNEIDER, 1845. Under the name *C. pictus* should be brought together, all specimens pertaining to the *C. boltoni*-complex that have been reported from the Balkans and Asia Minor, including Transcaucasian Republics of the USSR, and named *C. annulatus* (HAGEN, 1863), *Cordulegaster pictus* (SÉLYS, 1873, 1887) of *Cordulegaster charpentieri* (SÉLYS, 1887, MORTON, 1915, FRASER, 1929, ST-QUENTIN, 1957). As is well known, SÉLYS has repeatedly changed his opinion on this animal ; the most homogeneous diagnosis, with indication of a type series, was given in 1873 (Holotype : female of unknown origin, at one time supposed to have come from India ; paratypes : four males from the surroundings of Kirovabad, Azerbajdzan SSR). Under no condition can the name *pictus* be associated with *C. bidentatus* SÉLYS.

Previous records : HAGEN (1863) : Bursa, Trabzon ; SÉLYS (1873) : near Kirovabad ; SÉLYS (1887) : near Lagodechi, Cau-

casus ; MORTON (1915) : Belgrade forest near Istanbul ; MORTON (1915 b) : Lagodechi ; FRASER (1929) : Bursa (+ all previously reported localities) ; BARTENEF (1930) : series from Lagodechi.

All records available suggest a species which extends from the southern slopes of the Caucasus (though apparently not occurring south of the Kura valley), along the Pontic coast of Turkey, reaching Istanbul and extending through the Dalmatian Alps (SÉLYS, 1873, 1887) as far as Austria (ST-QUENTIN, 1959).

51. *Cordulegaster bidentatus* ssp.

A pair from Bursa, now in the Vienna Museum, were described by SÉLYS (1873) as *C. bidentatus anatolicus,* although SÉLYS later (1887) says : « je n'ai pas étudié ces derniers exemplaires ». This couple was also part of the « *charpentieri* » puzzle (see MORTON, 1915 b, FRASER, 1929).

Recently, WATERSTON (1976) re-confirmed its pertainance to *C. pictus*. This contrasts with ST-QUENTIN's (1965) statement that the Bursa pair is « eine form von *bidentatus* mit augedehnterer Gelbfärbung ». Still, I preserve the possibility of the presence of an undescribed form of *C. bidentatus* in Asia Minor. I have seen very « yellow » forms from Greece and AKRAMOWSKI and SHENGELIA (1967) may well be correct in including Western Anatolia in the area of distribution of *C. bidentatus*. A male of *C. bidentatus* reported by KEMPNY (1908) from « Adampol » is of little help, since this locality could not be placed in modern Turkey by the experts and teaching staff of the University of Ankara.

52. *Cordulegaster insignis insignis* (SCHNEIDER, *1845*)

Cordulegaster insignis amasinus MORTON, 1915 b.

Material : ♂, loc. 112 ; ♂, loc. 23 bis.

Previous records : SCHNEIDER (1845) : Gelemish (type) ; HAGEN (1863) : « Syria » ; SÉLYS (1887) : Amasia, Malatia ; MORTON (1915 b) : Taurus mountains, Amasia ; FRASER (1929) : Amasia ; SCHMIDT (1954 a) : Gelemish, Ulukischla. Also records from The Lebanon (Hammana, Bekaa, Baalbek) and from Greece (STEIN, 1863 ; BUCHHOLZ, 1954), the latter including the island of Naxos. The ssp. *amasinus* should be eliminated since it occupies the same area as the nominal subspecies and differs from it in some insignificant, variable colour details only.

53. *Cordulegaster insignis charpentieri* (KOLENATI, *1846*)

Aeschna charpentieri KOLENATI, 1846.
Cordulegaster insignis lagodechicus BARTENEF, 1930.
Cordulegaster insignis : KEMPNY, 1905 ; BESHOVSKI, 1964.
Cordulegaster insignis montandoni ST-QUENTIN, 1971.

The arguments for this combination are explained in DUMONT, 1976. The distribution of this subspecies is between the Caucasus and the Black Sea coasts of Bulgaria and Roumania, and is supposed to fringe the Pontic coast of Turkey.

54. *Cordulegaster insignis nobilis* (MORTON, *1915* a)

This is an eastern vicariant of the nominal subspecies, extending well into western Iran. The loc. typ. is lake Van area. FRASER's (1929) animals from Mardin an around Mosul also belong here, and ST-QUENTIN's (1964 c) record of a female from Helgurd, Iraq was tentatively placed here by ASAHINA (1973), who had a good series from Sarsang, Dohok and Amadiya, Singa valley, all N. Iraq near the Turkish border. The ssp. is also widely distributed in SSR Armenia (AKRAMOWSKI, 1948). Transcaucasian stations are summarized by AKRAMOWSKI and SHENGELIA, 1967.

Aeschnidae

55. *Caliaeschna microstigma* (SCHNEIDER, *1845*)

Material : a series in both sexes, loc. 6, 13, 32, 46, 122.

Previous records : SCHNEIDER (1845) : Gelemish (loc. typ.) ; HAGEN (1863) : Peloponesos ; SÉLYS (1887) : Amasia, Corfu, Greece, Mingrelia, Persia, Lebanon ; MORTON (1915 a) : Belgrade Forest, Beikos, woods, Istanbul ; SCHMIDT (1954 a) : Daphne Çay at Antakya, Çamliyayla, Ulukischla, Eregli ; VALLE (1952) and KIAUTA (1963) : Cyprus ; ASAHINA (1973) : Sarsang, Dohok, N. Iraq.

56. *Brachytron pratense* (MÜLLER, *1764*).

Previous records : SÉLYS (1887) : Asie Mineure, Mingrélie ; MORTON (1915 a) : ♂, 2 ♀♀, Büyüçekmece (Istanbul area) ; DE JOANNIS (1916) : Lesbos, Cape Malea Loutra. ST-QUENTIN (1965)

knew only SÉLYS' record and doubts the occurrence of this species in Anatolia.

57. *Aeshna mixta* (LATREILLE, *1805*)

Material : ♂, ♀, Loc. 52.

Previous records : HAGEN (1863) : Transcaucasia ; SÉLYS (1887) : Amasia, Akbes (= Ekbaz), Iskenderun, Kaketia, Persia ; SPAGNOLINI (1877) : Istanbul ; MORTON (1922) : Pera, Büyükçekmece ; AKRAMOWSKI (1948) : SSR Armenia.

58. *Aeshna affinis* (VANDER LINDEN, *1820*)

Material : ♂♂, ♀, Loc. 30.

Previous records : LONGFIELD (1932) : Turgutlu (Manisa) ; ST-QUENTIN (1964 b) : Konya ; KIAUTA (1963) : Cyprus. Also known from SSR Armenia (AKRAMOWSKI, 1948), Iran (refs in SCHMIDT, 1945 b) and Israel (DUMONT, unpublished).

59. *Aeshna cyanea* (MÜLLER, *1764*)

Not yet found in Turkey, but definitely occurring in East Anatolia and the Pontic area. Recorded by SÉLYS (1887) from Kaketia and by BARTENEF (1912) from Batum and Kobulety near Batum. Recently found in SSR Armenia (AKRAMOWSKI, 1964).

60. *Aeshna juncea* (LINNAEUS, *1758*)

Recorded by SÉLYS (1887) from Erzerum and by KOLENATI (1846), sub *A. picta* var. *caucasica* from Balik Göl (« Ballochghöl ») in Eastern Anatolia (Agri Prov.).

61. *Aeshna serrata* (HAGEN, *1856*)

Previous records : MORTON (1914) : Van ; AKRAMOWSKI (1964) : Lake Gelli, Amasiiski district, SSR Armenia.

62. *Anaciaeschna isoceles antehumeralis* (SCHMIDT, *1954*)

Material : ♂, ♀, Loc. 30.

Previous records : HAGEN (1863) : Caucasus ; SÉLYS (1887) : Iskenderun, Caucasus, Mingrelia; BUCHHOLZ (1954) : Delos ; ST-QUENTIN (1964 a) : Aksehir ; AKRAMOWSKI (1948) : SSR Armenia. According to SCHMIDT (1954 b), specimens from Iran north of the Elburz belong under the nominal subspecies.

63. *Anax imperator* (LEACH,*1815*)

Material : Loc. 6, 12, 29, 33, 37, 90.

Previous records : HAGEN (1863) : « Syria » ; SPAGNOLINI (1877) : Istanbul ; BUCHHOLZ (1954) : Naxos, Delos ; ST-QUENTIN (1964 a) : Aksehir.

64. *Anax parthenope* (SÉLYS, *1839*)

Material : Loc. 19, 23-27, 38, 39.

Previous records : SPAGNOLINI (1877) : Istanbul ; SÉLYS (1887) : Lenkoran, Caucasus ; MORTON (1915 a) : Belgrade forest, Istanbul ; BUCHHOLZ (1955) : Cevlik (Hatay), ex. coll. SCHMIDT ; VALLE (1952) and KIAUTA (1963) : Cyprus.

65. *Anax immaculifrons* (RAMBUR, *1842*)

Material : ♂, Loc. 37, ♂, Loc. 66.

Not previously reported from Turkey and an interesting addition to the fauna of this country, since the presence of this oriental species so far to the west was not anticipated. It can no longer be considered impossible that it may one day be found on the European continent. The first record from the Near East was by MARTIN (1909, 1926) : Beit-Méri near Beirut. MORTON (1924) obtained another specimen from Beirut and I have seen specimens from Israel as well (DUMONT, unpublished).

66. *Hemianax ephippiger* (BURMEISTER, *1839*)

Previous records : HAGEN (1863) : Beirut ; SÉLYS (1887) : Amasia ; AKRAMOWSKI (1948) : Mount Ararat area ; KIAUTA (1963) : Cyprus. An ethiopian migrant, that may enter far into Europe.

Corduliidae

67. *Somatochlora metallica meridionalis* (NIELSEN, *1935*)

ST-QUENTIN (1965) states that this species was indicated from Asia Minor by CONCI and NIELSEN (1956) only. He overlooked

two precise citations : KEMPNY (1908) : Adampol (although the coordinates of the latter locality are doubtful) and MORTON (1915 a ; 1922) : Belgrade forest, « common in the woods ».

68. *Somatochlora flavomaculata* (VANDER LINDEN, *1825*)

Not recorded by ST-QUENTIN (1965), although cited by MORTON (1922) from Istanbul area : Kadikoy (Asiatic side) and Prince's islands, « pine woods, common ».

Libellulidae

69. *Libellula quadrimaculata* (LINNAEUS, *1758*)

Another species unrecorded by ST-QUENTIN (1965), although cited by SÉLYS (1887) from Erzerum, and more in general, from Transcaucasia. It is also indicated by AKRAMOWSKI (1948) from SSR Armenia, but, historically, the first record is by KOLENATI (1846) : Balik Göl, Agri Province.

70. *Libellula depressa* (LINNAEUS, *1758*)

Material : ♂, Loc. 1, ♂, ♀, Loc. 42, ♀, Loc. 52.

Previous records : HAGEN (1863) : « Syria » ; SÉLYS (1887) : Ekbaz, Erzerum, Amasia, Pontic alps, Mingrelia ; KEMPNY (1908) : Kagithane (Istanbul) ; MORTON (1914) : Van ; MORTON (1915 a) : Istanbul area : Göksu, Sweet waters of Asia ; DE JOANNIS (1916) : Lesbos ; WERNER (1938) : Kythera ; SCHMIDT (1954 a) : Pozanti ; ST-QUENTIN (1968) : Hazar Göl.

A widespread species, in Europe mostly occurring during spring, in Anatolia and Armenia (AKRAMOWSKI, 1948) till August.

71. *Libellula pontica* (SÉLYS, *1887*)

The question whether in geographic Turkey both *L. fulva* and *L. pontica* occur remains open.

Previous records are : SCHNEIDER (1845) : Gelemish (this record is considered to be *fulva*, not *pontica* by SCHMIDT, 1954 a) ; SÉLYS (1887) : Antakya, Malatia, Hula lake (N. Israel). SÉLYS claims that typical *L. fulva* occurs in Mingrelia (Grusinia).

SCHMIDT (1954 a) : Sariseki, Maras, Hassa, Eregli ; RIS (1909) : Eregli, Malatia.

Material from Thracia is highly desirable.

72. *Orthetrum ramburi* (SÉLYS, *1848*)

Material : a rich collection in both sexes, Loc. 6-10, 30, 37-39, 43, 44, 48, 51, 60, 62, 65, 69, 78, 82, 121.

Previous records : HAGEN (1863) : « Syria » ; SÉLYS (1887) : Tartum (sub *O. caerulescens*), Iskenderun, Ekbaz, Malatia (sub *O. gracilis*), Mingrelia, Armenia, Kaketia, Imeretia, Beirut ; SPAGNOLINI (1877) : Istanbul ; Asiatic side of Bosforus at Alem Dag (sub *O. coerulescens*) ; MORTON (1922) : Belgrade forest (sub *O. anceps*) ; BENTIVOGLIO, 1929 : Rhodos (sub *O. coerulescens*) ; MAC LACHLAN (1899) : Marmaris ; BARTENEF (1919) : Batum (sub *O. anceps*) ; RIS (1909) : Tinos ; AKRAMOWSKI (1948) : SSR Armenia (sub *O. anceps*) ; SCHMIDT (1954 a) : Pozanti ; ST-QUENTIN (1964 c) : Helgurd, Iraq (sub *O. coerulescens*) ; MORTON (1924) : Israel and Jordan (sub *O. anceps*) ; SCHMIDT (1938) : Lebanon (*O. anceps*) ; SCHMIDT (1954 b) : Iran (*O. anceps*).

A widespread, circum-mediterranean insect, ranging eastwards till India, that has given raise to much nomenclatorial confusion. It is still often referred to under the name *O. anceps :* SCHEIDER's type of *Libellula anceps* was, as HAGEN (1863) states it, a specimen on *O. b. brunneum* and the *anceps*-problem is really due to SÉLYS's (1887) effort to preserve SCHNEIDER's name next to his own *ramburi* (in the same paper, SÉLYS describes *O. gracilis*, which, according to the description is another synonym of *ramburi*). BARTENEF (1930) has increased the confusion by figuring a penis, attributed to *anceps,* which is completely atypical for the Genus ORTHETRUM and cannot even be placed with certainty. ST-QUENTIN, 1964 c and LIEFTINCK, 1966 have clearly shown that the name *anceps* is not available for Eastern mediterranean members of the *O. coerulescens*-complex, and LIEFTINCK (1966) has correctly proposed the name *ramburi* as a substitute (in reality, Western mediterranean *ramburi* and Eastern mediterranean *ramburi* are one and the same species). Therefore, I am not prepared to follow ST-QUENTIN, who considers Eastern mediterranean populations as *O. coerulescens*. The distribution of *ramburi*

is continuous from South Spain, throughout Northern Africa and Egypt to the Near East and up to India on one hand, and from the coastal area of Yugoslavia to Anatolia on the other hand. In continental Yugoslavia, ADAMOVIC (1967) has found intermediates between *ramburi* and *coerulescens,* and similar populations may one day turn up from Central Spain and Portugal as well, but this is by no way exceptional in the interpenetration zone between closely related species. The European *O. coerulescens* (FABR.) is probably nothing else but a geologically recent sister-taxon to the widespread *O. ramburi,* of probable post-pleistocene age. As to possible speculations on the taxonomic value of the colour of the membranula, which is pure white in Western mediterranean specimens (especially those from Sardinia, Loc. typ.), brown-grey in Near-Eastern animals, I might add that in my Turkish material all sorts of intermediate tinges were met and that SCHMIDT (1961) has met a similar mixture of tinges in his Afghan material. The few specimens from India that I have seen had a white membranula. I cannot see, at the present time, any value of this character alone in reproductive isolation, and therefore, it should no be used in itself for justifying a subspecies, although it is an indication of spatial heterogeneity.

73. *Orthetrum b. brunneum* (FONSCOLOMBE, *1837*)

Libellula anceps SCHNEIDER, 1845.

Material : by far the commonest *Orthetrum* found in Turkey. Long series were collected, Loc. 2, 6-12, 14-34, 37-45, 47-52, 57-65, 67-72, 83, 92, 99, 108, 116.

Previous records : SCHNEIDER (1845) : Marmaris (Loc. typ. *O. anceps*) ; HAGEN (1863) : Beirut, Caucasus ; SPAGNOLINI (1877) : Istanbul ; SÉLYS (1887) : Erzerum, Tartum, Amasia, Malatia, Beirut, « Palestine » ; KEMPNY (1908) : Kaghitane (Istanbul), Izmir, Eskicehir ; MORTON (1914) : Van ; DE JOANNIS (1916) : Lesbos ; BENTIVOGLIO (1929) : Astropalia, Tilos ; NAVAS (1932) : Izmir ; BARTENEF (1912) : Ardanutch near Artvin, Batum ; WERNER (1938) : Kythera, Lemnos, Lesbos, Milos, Nikaria, Seriphos ; SCHMIDT (1954 a) : Pozanti, Köle Musali (Tarsus) ; ST-QUENTIN (1964 a) : Anamur ; VALLE (1952) and KIAUTA (1963) : Cyprus.

74. *Orthetrum cancellatum* (LINNAEUS, *1758*)

Material : ♂♂, ♀♀, Loc. 12, 13, 18.

Previous records : SPAGNOLINI (1877) : Istanbul ; SÉLYS (1887) : Erzerum, Tartum, Toilisi (Caucasus) ; KEMPNY (1908) : Kagithane (Istanbul) ; MORTON (1915 a) : Asiatic side of Bosforus, Istanbul ; MORTON (1922) : Büyüçekmece, Yalova (Istanbul area) ; ST-QUENTIN (1964 a) : Burdur Göl ; AKRAMOWSKI (1964) : Lake Parz-Litch, SSR Armenia.

This species seems to adapt well to a development in saline waters. Exuviae were found « en masse » along the shores of lake Burdur (Cl^-, ca 4 g/l). Morphologically, adults taken here did not differ in any respect from others taken at a freshwater brook some 5 km away from the lake.

75. *Orthetrum albistylum* (SÉLYS, *1848*)

Material : ♂♂, ♀♀, Loc. 20, 25, 27, 28.

The regional occurrence of this species in doubted by ST-QUENTIN (1965), who overloked records by SPAGNOLINI (1877) from Istanbul, by BARTENEF (1912) from Batum and several stations in SSR Armenia by AKRAMOWSKI (1948). The species is also found in Greece (BUCHHOLZ, 1954).

76. *Orthetrum trinacria* (SÉLYS, *1841*)

Material : one male, labeled « Klein-Asien », leg. KUMERLOEVE, probably from Amik Göl area (Antakya prov.).

A second regional record is by BENTIVOGLIO (1929) : Rhodos.

The paucity of information regarding this species in Anatolia is surprising. It is extremely common in the Jordan Valley, where it was first reported by SCHMIDT (1938).

77. *Orthetrum taeniolatum* (SCHNEIDER, *1845*)

Material : ♂♂, ♀♀, Loc. 38-40, 43, 44, 46, 49, 50, 60, 63, 65, 67, 89, 92, 93.

Previous records : SCHNEIDER (1845) : Rhodos (Loc. typ.) ; HAGEN (1863) : Beirut Syria, Cyprus ; BRAUER (1868) : Rhodos ; SÉLYS (1887) : same records as Hagen ; BENTIVOGLIO (1929) : Rhodos ; LONGFIELD (1932) : Burnova near Izmir ; SCHMIDT

(1954 a) : Manavgat, Antalya (Kargi çay) Pinar Baschi (30 km N Antalya), Köle Musali (Tarsus), Maras ; KIAUTA (1963) : Cyprus.

This species has its centre of distribution in the Oriental region, but is still very common in the Eastern Mediterranean area.

78. *Orthetrum sabina* (DRURY, *1773*)

Material : ♂♂, ♀♀, Loc. 7, 37, 38, 40, 43-45, 49-51, 61, 91, 92, 99.

Previous records : SCHNEIDER (1845) : Gelemish (Loc. typ. of *L. ampullacea*) ; SÉLYS (1887) : Iskenderun, Cyprus, Syria ; BOLIVAR (1893) : « Syria » ; SCHMIDT (1954 a) : Ova Gölü (Kalkan), Eleoglu (Maras), Misis (Seyhan river), Tarsus, Antalya (Arab su) ; ST-QUENTIN (1964 a) : Anamur (sub. *O. sabina ampullacea*) ; KIAUTA (1963) : Cyprus.

I cannot confirm ST-QUENTIN's arguments for preserving SCHNEIDER's name as a subspeices. In the long series before me, there is much variability in the characters used to separate typical *sabina* from ssp. *ampullacea.* These differences seem to be due, before all, to age, there being a tendency towards melanism in older specimens. BARTENEF's (1929) « var » nigrescens from the Caucasus, likewise, is no more than a melanistic condition without taxonomic implications.

As the foregoing, this is an oriental species which is still very common in the Near East. MORTON (1924) found it in the Jordan Valley and it is, indeed, abundant throughout Israel (DUMONT, unpublished data), including the Negev and Sinai deserts. It is equally abundant in Egypt (ANDRES, 1928).

79. *Orthetrum c. chrysostigma* (BURMEISTER, *1839*)

Material : ♂♂, ♀♀, Loc. 37, 38, 92.

Previous record : SÉLYS (1887) : Antakya, Beirut, Sinai desert ; ST-QUENTIN (1964 a) : Anamur.

This is the first of a group of Ethiopian species, which are still common in the Jordan valley (MORTON, 1924, SCHMIDT, 1938), and occupy a coastal fringe in Anatolia.

80. *Crocothemis erythraea* (BULLÉ, *1832*)

Material : One of the commonest dragonflies of Turkey, found

in great abundance, Loc. 2, 6-9, 13, 15, 18-21, 23-30, 33-40, 43-45, 47-53, 55, 57-60, 62, 63, 65, 67, 69-72, 92, 108, 121.

Previous records : SCHNEIDER (1845) : Gelemish, Marmaris ; HAGEN (1863) : Cyprus, Beirut ; STEIN (1863) : Naxos ; SPAGNOLINI (1877) : Istanbul ; SÉLYS (1887) : Beirut, Iskenderun, Rhodos, Kaketia, Marmaris, Malatia ; MORTON (1915 a) : both sides of Bosforus ; BENTIVOGLIO (1929) : Rhodos, Astropalia ; WERNER (1938) : Delos ; SCHMIDT (1954 a) : Gelemish ; VALLE (1952) and KIAUTA (1963) : Cyprus.

The use of the name *erythraea* is a matter of convenience, since no structural differences exist with *C. servilia* (DRURY) which has priority. In view of the enormous range of the *servilia-erythraea* complex, and the current feeling that East Asiatic populations form an entity, it is customary to apply the name *erythraea* to mediterranean populations, and *servilia* to East Asiatic populations. It is, however, clear, that this argument is rather weak in terms of present-day taxonomy and that, if no new evidence for a specific distinction between both groups can be found, the name *erythraea* will ultimately have to be reduced to a synonym.

81. *Sympetrum fonscolombei* (SÉLYS, *1840*)

Material : ♂♂, ♀♀, Loc. 9, 11, 12, 15, 19-21, 23, 24, 37-41, 44, 46, 49-51, 53, 56, 60-67, 69-72, 121.

Previous records : SCHNEIDER (1845) : Gelemish, Patara (Koca çay) ; HAGEN (1863) : Cyprus, Beirut, « Klein-Asien » ; SPAGNOLINI (1877) : Istanbul ; SÉLYS (1887) : Iskenderun, Beirut, Kaketia, Armenia ; KEMPNY (1908) : no precise locality ; MORTON (1922) : Büyükçekmece ; NAVAS (1932) : Izmir ; ST-QUENTIN (1964 a, b) : Silifke, Anamur, Tarsus ; MARTIN (1894), VALLE (1952), KIAUTA (1963) : Cyprus ; BUCHHOLZ (1954) : Delos.

A circum-mediterranean species, very common in Turkey, as in all adjacent countries.

82. *Sympetrum meridionale* (SÉLYS, *1841*)

Material : ♂♂, ♀♀, Loc. 9, 13, 53, 85-88, 90, 94, 99, 108, 121.

Previous records : SPAGNOLINI (1877) : Istanbul ; SÉLYS (1887) : Antakya, Amasia, Malatia, Beirut ; KEMPNY (1908) : Istanbul, Antigoni ; MARTIN (1894), VALLE (1952) : Cyprus ;

MORTON (1915 a) : Istanbul area ; NAVAS (1932) : Izmir ; WERNER (1938) : Psara ; ST-QUENTIN (1968) : Tarsus, Iskenderun, Karapinar, Amik Göl. Another mediterranean species of wide distribution in Anatolia and Armenia (AKRAMOWSKI, 1948).

83. *Sympetrum danae* (SULZER, *1776*)

Not yet found in Turkey, but recorded from Bakuriani and Stepanavan (SSR Armenia) and Tbilisi (SSR Georgia) (AKRAMOWSKI, 1948). The species should occur at least in the eastern provinces of Kars and Artvin.

84. *Sympetrum s. sanguineum* (MÜLLER,*1764*)

Material : ♂♂, ♀♀, Loc. 24-28, 69, 89, 91, 120.

Previous records : SCHNEIDER (1845) : Istanbul ; SÉLYS (1887) : Erzerum, Tartum, Kaketia ; KEMPNY (1908) : Kagithane (Istanbul), Oxia (?) ; BENTIVOGLIO (1929) : Cos, Astropalia ; LONGFIELD (1932) : Turgutlu (Manisa) ; SCHMIDT (1954 a) : Gelemish ; ST-QUENTIN (1964 b) : Tarsus-Mersin, Abant Göl.

Common in West and Central Anatolia. At higher altitudes in the Taurus, East Anatolian and Armenian mountains replaced by the next subspecies.

85. *Sympetrum sanguineum armeniacum* (SÉLYS, *1884*)

Material : ♂, Loc. 52, 3 ♀♀, Loc. 76.

First record for Turkey of a subspecies, described by SÉLYS on specimens from Tartum.

In the original description, it was chiefly characterized by the presence of yellow stripes on all tibiae. BARTENEF (1919) adds that the central part of the labium is yellowish in *armeniacum,* black in *sanguineum* and that, unlike in ssp. *sanguineum,* the tip of the app. inf., seen laterally, exceeds the level of the inferior corner in the app. sup. The wing bases are said to present very little amber colour, although the main veins are mostly light-coloured. AKRAMOWSKI (1948) comments that the best distinctive character is the yellow colour of the middle lobe of the labium, which sometimes has a central black stripe, that the yellow stripe on the legs is variable, that females are usually yellower than males, and, correcting BARTENEF, that there is always some amber

at the base of the wings while many females have faint amber markings around the pterostigma. I found the latter set of characters well exemplified in the material mentioned above, with in addition a faint amber patch under the pterostigma in the males from Loc. 76.

AKRAMOWSKI states that *S. s. sanguineum* is common in Armenia up to an altitude of 1200 m, while *S. s. armeniacum* frequents higher altitudes and up to 1900 m. Our specimens were captured at 1500 and 1800 m, respectively, and it therefore appears that *S. s .armeniacum* is a monticolous subspecies, extending much further west than hitherto believed.

86. *Sympetrum depressiusculum* (SÉLYS, *1841*)

Material : 1 ♂, Loc. 52.

First record for Turkey, but known from Kafan, in the extreme East of SSR Armenia (AKRAMOWSKI, 1948). Remarkably, this species was found at the same high altitude as the preceding.

87. *Sympetrum pedemontanum* (ALLIONI, *1766*)

Recorded by SÉLYS (1887) from Izmir, Malatia, Kaketia, Armenia and by AKRAMOWSKI (1948) from several places in SSR Armenia.

88. *Sympetrum flaveolum austrinum* AKRAMOWSKI, *1948*

Material : 1 ♂, Loc. 22 (bare mountains area on a windy day).

Previous records : SÉLYS (1887) : common in the pontic alps at Erzerum and Tartum ; BARTENEF (1912) : vicinity of Artvin ; MORTON (1914) : Van « the yellow basal markings of the wings seem to be more restricted than usual ».

AKRAMOWSKI (1948) collects Armenian population under the ssp. *austrinum,* chiefly characterized by the reduced basal amber on the wings. Since this character is nicely exemplified on our specimen (and vide MORTON, supra), it appears that Anatolian specimens are best included into this as well. A record from Cos by BENTIVOGLIO (1929) might refer to the nominal subspecies.

89. *Sympetrum s. striolatum* (CHARPENTIER, *1840*)

Material : ♂, ♀, Loc. 121.

Previous records : SCHNEIDER (1845) : Phinicia (?) ; HAGEN (1863) : Cyprus, Klein-Asien ; SPAGNOLINI (1877) : Istanbul ; SÉLYS (1887) : Antakya, Tartum, Cyprus, Kaketia ; KEMPNY (1908) : Kagithane, Adampol, Oxia (Klein-Asien) ; MORTON (1914) : Van ; BENTIVOGLIO (1929) : Rhodos, Cos ; NAVAS (1932) : Izmir ; SCHMIDT (1954 a) : Antakya ; ST-QUENTIN (1964 a, b) : Silifke, Anamur, Siel, Iskenderun ; BUCHHOLZ (1954) : Paors, Delos ; MARTIN (1894), VALLE (1952), KIAUTA (1963 : Cyprus.

90. *Sympetrum vulgatum flavum* (BARTENEF, *1915*)

Material : ♂♂, ♀♀, Loc. 26, 27, 53, 55, 56, 69.

It is impossible to know which previous records refer to this subspecies, since SÉLYS had included it into his *S. decoloratum*. KEMPNY's (1908) record of *Diplax vulgatum* is of little use, since it was recorded from Adampol. This subspecies, which appears to be very common in Armenia (AKRAMOWSKI, 1948) is so different in habitus from *S. v. vulgatum* that one, when seeing it on the wing, could hardly believe it is conspecific with it. Yet, structurally, it is identical to typical *vulgatum* in the structure of the hamuli, the caudal appendages, and in the valvulae.

This is, therefore, another case which is difficult to evaluate by current taxonomical standards, being situated somewhere between a subspecies and a good species, as is the case with so many dragonfly species in Turkey.

91. *Sympetrum d. decoloratum* (SÉLYS, *1884*)

SÉLYS' (1887) records (Tartum, Amasia, Malatia, Antakya) are certainly in part *S. vulgatum flavum* (RIS, 1911 is inclined to consider all specimens as *vulgatum*).

A correct record is given by MORTON (1914) : Lake Van. Recently, the species was found on the Iraqi border (Singa Valley, Amadiya) (ASAHINA, 1973).

Specimens from the Sinai mountains, Tunisia and extending as far as the Hoggar mountains in Algeria form a distinct subspecies (DUMONT, 1977).

92. *Brachythemis leucosticta* (BURMEISTER, *1839*)

The only Turkish record is by SCHMIDT (1954) : Tarsus. This Ethiopian species becomes exceedingly common more to the south and is one of the dominant species of the Jordan valley and the Nile Delta.

93. *Brachythemis fuscopalliata* (SÉLYS, *1887*)

Material : ♂, Loc. 48, ♂, ♀, Loc. 49, ♂, Loc. 69, ♂, Loc. 108.

I discussed (DUMONT, 1972) the distribution of this interesting species, which was at one time believed to be restricted to the coasts of the Persian gulf in Iraq. I have to correct one of the viewpoints expressed earlier : whereas in Lake Hula area the species is probably extinct, it is still thriving on the Adana peninsula, where it is, in fact, widely distributed. I found it quite commonly along the shores of Ceyhan lake, where numerous males and females where perching on (more frequently inside) bushes along the shores. It is a fierce insect, exceedingly shy and difficult to catch.

94. *Diplacodes lefebvrei* (RAMBUR, *1842*)

Material : ♂, Loc. 37, ♀, Loc. 69.

Previous records : SCHNEIDER (1845) : Gelemish ; BENTIVOGLIO (1929) : Rhodos ; SCHMIDT (1954 a) : Ova Gölü, Sariseki ; ST-QUENTIN (1964 a) : Samandag.

95. *Trithemis festiva* (RAMBUR, *1842*)

Nomen nudum : *Trithemis festiva rhodia* NIELSEN (ST-QUENTIN, 1964 c, Rhodos).

Material : ♂♂, ♀♀, Loc. 37, 38, 46, 49, 116 ; in addition, two couples from Cyprus (leg J. WAHRMAN).

Previous records : SCHMIDT (1954 a) : Kargi çay (108 km O. Antalya), Alanya ; MACLACHLAN (1899) : Marmaris ; MARTIN (1894), VALLE (1952), KIAUTA (1963 : Cyprus.

I have compared my material (including specimens from Rhodos) with examples from India and Nepal in my collection, and found no ground to separate them from the Oriental form.

96. *Trithemis annulata* (P. DE BEAUVAIS, *1805*)

Material : ♂♂, ♀♀, Loc. 37-40, 44, 49-51, 59-63, 65, 67, 70, 90, 92.

Previous records : HAGEN (1863) : Cyprus, Beirut, Syria ; BRAUER (1876) : Izmir ; SÉLYS (1887) : same records as HAGEN ; BOLIVAR (1893) : Syria ; BENTIVOGLIO (1929) : Rhodos ; MARTIN (1894), VALLE (1952), KIAUTA (1963) : Cyprus. An Ethiopian species that advances far North (Sicilia, Sardinia, etc.) and is extremely common in the Jordan valley and the Nile Delta (MORTON, 1924 ; ANDRES, 1928).

97. *Trithemis arteriosa* (BURMEISTER, *1839*)

Not yet found within the limits of Turkey, but reported from Beirut and Syria (SÉLYS, 1887). Its occurrence in Hatay is not improbable (see the next species).

98. *Pantala flavescens* (FABRICIUS, *1798*)

Material : ♂♂, ♀♀, Loc. 55, 56, 59, 61.

First record for continental Turkey. This circumtropical migrant was reported from Beirut by SÉLYS (1887) and from Cyprus (KIAUTA, 1963). Its occurrence so much further West is interesting, since there is no barreer that might prevent the species from reaching the European continent and it is almost certain that it may at times occur in Greece. This is also proof that some species known from the Jordan valley might well advance further N-W than we suspect now. Recently, a female of *P. flavescens* was found in Lenkoran, Azerbajdzan (AKRAMOWSKI, 1964).

99. *Leucorrhinia pectoralis* (CHARPENTIER, *1825*)

Found by RIS (1919) : Aksehir and again by SCHMIDT (1954 a). Recorded from Egridir by ST-QUENTIN (1964 a). Apparently restricted to the great West-Anatolian freshwater lakes, although also known from Bakurnani and Stepanavan in Armenia (AKRAMOWSKI, 1948).

100. *Selysiothemis nigra* (VANDER LINDEN, *1825*)

Material : ♂♂, ♀♀, Loc. 35, 55, 58, 65, 69, 108. Locally common.

One previous record known to me : SCHMIDT (1938) : Iskenderun.

Possible further additions and suggestions for future research.

The total number of species now known from Turkey is rather impressive. It is explained by the strategic position of Turkey at the intersection of the Palaearctic, Oriental and Ethiopian realms. Further, there is a wide variety of landscapes and climates and finally, large parts of the country were only little affected by the cold Pleistocene climates and could thus play the role of glacial refuges. Despite this richness, it is reasonably certain that further additions are to be expected. Some might be real surprises, since relicts and endemics of very local nature may occur in isolated pockets, especially in the accidented areas of Eastern Anatolia. In the history of odonatological research in Turkey, one is struck by the paucity of data on South and North-Eastern Anatolia, the Pontic Alps, and, surprisingly, most of Thracia (Turkey-in-Europe) as well. Along the Syrian border, I should expect *Pseudagrion syriacum* (SÉLYS) to turn up, while in the same area *Agriocnemis sania* NIELSEN might occur. Few new Libellulids are to be expected here, at the exception of *Zygonyx torrida* (KIRBY). In the list of species, I have not included *Orthetrum ransonetti* BRAUER, although this species was reported from Eastern Anatolia. Its occurrence in Kurdistan is not improbable, but confirmation of this record would be most welcome. In North-East Anatolia, with its continental climate and high average elevation, more continental and boreal forms of *Leucorrhinia* and *Somatochlora* may live, so that un ultimate sum of between 105 and 110 species appears as a reasonable total.

Sommaire

Au cours de trois voyages en Turquie, environ 70 espèces et sous-espèces d'Odonates furent récoltées, dont plusieurs nouvelles pour le pays et une nouvelle pour la science. Une revue de la faune globale de la Turquie, basée sur mes propres observations, des collections existantes et les données de la littérature conduit à un total de 100 espèces. Ce nombre doit être considéré comme approchant de très près la totalité de la faune.

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