The dragonflies (Insecta: Odonata) of Jordan

A. Katbeh-Bader, Z. Amr,
M. Abu Baker & A. Mahasneh

Abstract: A total of 46 species of Odonata have been reported from Jordan based on recent collections and previous records. The Zygoptera comprises 15 species while the Anisoptera includes 31 species. Notes on the ecology are given for some species. Threats affecting the dragonfly are discussed with reference to *Calopteryx syriaca* Rambur 1842.

Key words: Dragonflies, Odonata, Jordan.

Introduction

The Odonata of Jordan received attention during the late seventies and early eighties by Dumont (1973, 1975) As a part of his doctoral dissertation, Dr. Wolfgang Schneider studied the dragonfly fauna of Jordan along with the odonata of the Levant (Schneider 1981a, b, 1982a, b, 1985, 1986; Schneider & Katbeh Bader 1997). Ever since, few studies were undertaken to explore this insect group. With the encouragement of Dr. W. Schneider, the authors studied the dragonflies of Azraq oasis (Amr et al. 1997) and examined the Odonata collection at the possession of the Insect Museum at the Jordan University, Amman and the Jordan University of Science & Technology, Irbid (Katbeh-Bader et al. 2002).

The present study reports on the records of the dragonfly fauna of Jordan and their past and current distribution.

Systematic Account

Suborder Zygoptera

Species of this suborder are elongate, thin with transversely elongate heads. The thorax is shaped to allows the wings to be held along the back of the abdomen. The forewing is as broad as the hindwing at the base. Nymphs have three caudal appendages which function as gills (Howell et al 1998).

Family Calopterygidae

Calopteryx syriaca Rambur 1842 (Fig. 1, 2)

Remarks: This species is restricted to clear running water. It seems that the Nahlah population is still viable through the past 20 years. As the collection dates indicate, adults are common from April to October. Collected from Jsr Damyah (Morton 1924), the Dead Sea area, Wadi Zarqa (cited in Schneider 1986) and from Nahlah (Katbeh-Bader et al. 2002). We observed other populations along the Yarmouk River and in springs in Ajlun area. This species is very sensitive to pollution and manipulation of water course for irrigation schemes (Dumont 1991).

Construction of dams along springs and rivers in the Jordan Valley affected and reduced the population of this elegant species. *Calopteryx syriaca* is listed under appendix II in CITES.

Family Euphaeidae

Epallage fatime (Charpentier 1840)

Remarks: Previously recorded from Ghawr as Safi, Az Zarqa'a River, Wadi Al Fari'ah, Jisr Damya, Wadi Fasa'il, Wadi Al-Karak, Wadi Musa and several localities along the Jordan and Yarmouk Rivers (Dumont 1991; Schneider 1986), and inhabit running water bodies in the Jordan Valley

Denisia 14, zugleich Kataloge der OÖ. Landesmuseen Neue Serie 2 (2004), 309–317

Fig. 1: *Calopteryx syriaca* RAMBUR 1842 (♂)

Fig. 2: *Calopteryx syriaca* RAMBUR 1842 (♀)

(KATBEH-BADER et al. 2002). This is the only representative of Euphaeidae in Jordan. It was found to co-exists with *Calopteryx syriaca* at Nahlah, and its populations are facing the same threat.

Family Lestidae

Chalcolestes parvidens (ARTOBOLEVSKI 1929)

Remarks: This is the only member of the family Lestidae in Jordan. DUMONT (1991) considered the populations of this damselfly in the Levant as *Lestes viridis parvidens*, however, COBOLLI et al. (1994) gave it a specific status. Localities from Jordan include Mafraq, and Ghor as Safi (KATBEH-BADER et al. 2002).

Family Platycnemididae

Platycnemis dealbata SELYS & HAGEN 1850

Remarks: A rather common species in Jordan. It was observed and collected from various springs, rivers and pools from all over the country (KATBEH-BADER et al. 2002). This species appeared at irregular intervals. At Azraq pools, it was collected at the beginning of the March and later in May. The thorax of adult males in June was light orange while young males showed a dull white color. It prefers low vegetation close to the soil as perching sites (AMR et al. 1997). Because of its week flying ability it avoids other damselflies perching at higher vegetation.

Family Coenagrionidae

Agriocnemis sania NIELSEN 1959

Remarks: Recorded from Jisr Banat Ya'cub on the Jordan River (DUMONT 1991). No recent record of this species is available, and its populations may have become very small or extinct due to the introduction of fish farms along the Jordan Valley. DUMONT (1991) stated that *A. sania* disappeared from its type locality (Osias of Ghat, Libya) due to the introduction of *Gambusia*.

Coenagrion lindenii zernyi (SCHMIDT 1938)

Remarks: SCHNEIDER (1986) examined specimens collected by WHITEHORN from Jisr Banat Ya'cub on the Jordan River. The specimens are deposited at BMNH (Natural History Museum London). This species is considered as an endemic to the Jordan Valley (DUMONT 1991).

Coenagrion scitulum (RAMBUR 1842)

Remarks: This species was collected from two localities only: one in the northern heights from Princess Haya Farm near Al Fuhays, the other from southwest Jordan in Ail (SCHNEIDER 1986).

Erythromma viridulum orientale Schmidt 1960

Remarks: Schneider (1986) examined specimens from Jisr Banat Ya'cub collected by Whitehorn. It appears that it was not collected after this date. Further research is needed to clarify the status of this subspecies.

Ischnura elegans ebneri Schmidt 1938

Remarks: A very common damselfly occurring in Jordan, especially in the eastern wadis of the Jordan River. It was seen in high numbers on jute plant fields near the Jordan River. The elegant damselfly is another species that co-exist with *Ischnura evansi* and *Platycnemis dealbata*. In Azraq oasis, it was associated with vegetation comprised mainly of *Juncus* sp. and *Typha* sp. (Amr et al. 1997).

Ischnura evansi Morton 1919 (Fig. 3)

Remarks: This species is common in the wadis east of the Dead Sea, Yarmouk River and Azraq and usually associated with *I. elegans ebneri* (Schneider 1986; Katbeh-Bader et al. 2002). It is usually common in shaded area with shallow pools resting on aquatic vegetation. It was observed on several occasions in tandem during the summer months. The Blue-banded *Ischnura* migrates in large numbers during the night (Waterston & Pittaway 1989).

Ischnura fountainei (Morton 1905)

Remarks: Reported from Al Azraq and Yarmouk River (Dumont 1991), Dayr Alla, Ain Al Hadithah (South end of the Dead Sea), Wadi Al Hasa and Ain Fashkha (Schneider 1986; Katbeh-Bader et al. 2002). Intermediate forms between *I. e. ebneri* and *I. fountainei* were found in populations examined from Nahr Al-Khabour drainage, suggesting natural hybrids between the two species (Schneider & Krupp 1996).

Ischnura pumilio (Charpentier 1825)

Remarks: Very few specimens were collected from Jordan. Reported from Amman (Morton 1924) and from Ail (Schneider 1986). This species is widely distributed in Turkey, with a wide range of distribution extending from North Africa to Europe to west and central Asia (Demont 1991).

Fig. 3: *Ischnura evansi* Morton 1919

Ischnura senegalensis (Rambur 1842)

Remarks: Collected from Wadi Al-Hidan (Schneider 1986).

Pseudagrion sublacteum mortoni (Ris & Schmidt 1936)

Remarks: Schneider (1986) and Katbeh-Bader et al. (2002) listed several localities along the Jordan Valley and tributary wadis of the Jordan River. It was seen in jute plant fields near the Jordan River and near irrigation canal in north Adasiyah. It appears to be more common than *P. syriacum* and has greater ability to adapt to the different ecological conditions (Schneider 1982b).

Pseudagrion syriacum (Selys 1887)

Remarks: Reported from the Jordan Valley and from scattered springs in the upper lands (Schneider 1986; Katbeh-Bader et al. 2002). Schneider (1995) recorded it from Turkey and mapped its distribution in the Levant. In contrast to *P. sublacteum*, it prefers slow flowing waters with shady vegetation (Schneider 1982b).

Suborder Anisoptera

Anisopterans are large and robust with large eyes that may meet at the top of the head. The forewing is less broad at the base than the hindwing. The nymphal stages of Anisoptera are distinguished by their more robust form and by the lack of caudal gills

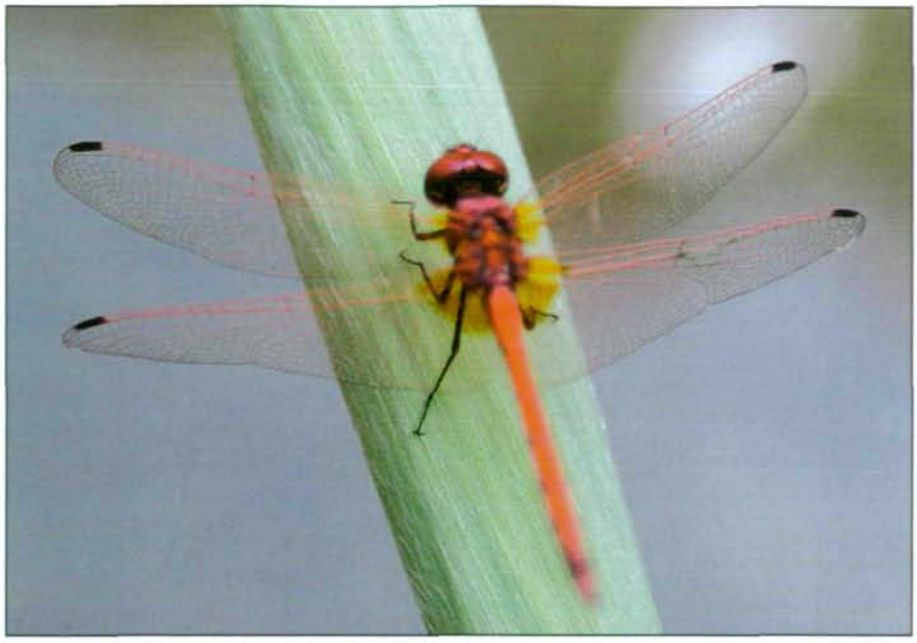

Fig. 4: *Crocothemis erythraea* (Brullé 1832)

on the abdomen. Adults at rest hold their wings outstretched as opposed to along the back as in Zygoptera (Howell et al 1998).

Family Gomphidae

Gomphus davidi Selys 1887

Remarks: A rare running water species. Previously recorded from Az Zarqa'a River (Schneider 1986) and the Jordan Valley (Katbeh-Bader et al. 2002). The larva of this species was described and figured by Schneider (1983). The distribution and status of this species in Jordan needs further work. It is expected that its populations in Jordan are declining due to destruction of its habitats.

Lindenia tetraphylla (Vander Linden 1825)

Remarks: Schneider (1981a) reported a migratory movement of great numbers in south Jordan. He observed this species in large numbers near Al-Hassa pools along with *Selysiothemis nigra* migrating southwards. This species prefers deep open water bodies (lakes, pools etc.).

Onychogomphus flexuosus (Schneider 1845)

Remarks: Wadi Al Mujib is considered the south ward extent in its range of distribution (Dumont 1991).

Onychogomphus macrodon (Selys 1887)

Remarks: A single specimen was collected Dayr Alla, the Jordan Valley in 1975 (Katbeh-Bader et al. 2002). Schneider (1987b) reported on the distribution of this dragonfly, described the unknown female and redescribed the male.

Paragomphus genei (Selys 1841)

Remarks: Previously collected from Jordan Valley, eastern and southern sides of Dead Sea, Az Zarqa'a River (Katbeh-Bader et al. 2002). Few individuals were recently seen at Ibn Ath Thikr springs south of the Dead Sea. Schneider (1987a) redescribed and figured the holotype female which was thought to be lost and gave a short account of the complex synonymy of this species.

Family Aeshnidae

Anax parthenope (Selys 1839)

Remarks: Previously recorded from Al Azraq, Wadi Shu'ayb and southwestern Jordan (Amr et al. 1997; Schneider 1986). This species was collected near polluted, sewage treatment pools in Al Khirbah as Samrah near the city of Az Zarqa'a (Katbeh-Bader et al. 2002).

Caliaeschna microstigma (Schneider 1845)

Remarks: Dumont (1991) mentioned that this is a running water species that occurs in the upper reaches of the Jordan River and its tributaries in Palestine, between May and October. However no localities from Jordan were given and further collecting is needed to determine its distribution.

Hemianax ephippiger (Burmeister 1839)

Remarks: This is a notorious migrant that is often found in large swarms in absolute desert country (Dumont 1991). Previously recorded from Yarmouk River (Schneider 1986). Collected from several localities along the mountains and the Jordan Valley (Katbeh-Bader et al. 2002).

Family Libellulidae

Brachythemis leucosticta (Burmeister 1839)

Remarks: One of the most common dragonflies of the Jordan Valley. Previously recorded from Al Azraq, and Zarqa'a River (Amr et al. 1997; Schneider 1986). Large numbers were seen near the Jordan River resting on the ground in the shade of trees. One dragonfly was collected near the Jordan River with an asilid fly on its back probably trying to pray upon it. This species prefers open water such as large pools, wide irrigation canals (Waterston & Pittaway 1989).

Crocothemis erythraea (Brullé 1832) (Fig. 4)

Remarks: A very common species in Jordan Valley, eastern wadis of the Dead Sea, Wadi Arabah and Al Azraq (Katbeh-Bader et al. 2002). This species prefers open sparsely vegetated irrigation canals and pools in wadis (Waterston & Pittaway 1989).

Crocothemis sanguinolenta arabica Schneider 1982

Remarks: This subspecies was described from specimens collected near the Dead Sea, Wadi Musa and Ain al Hadithah. It is regarded as a relict of Pleistocene immigration of African elements into the Levant (Schneider 1982a).

Crocothemis servilia (Drury 1770)

Remarks: Dumont (1991) mentioned that the only record from the Levant was given by Schneider (1985) which was one male collected from Al Azraq. This is a very common species found in Jordan Valley, Al Azraq and the upper lands (Katbeh-Bader et al. 2002).

Diplacodes lefebvre (Rambur 1842)

Remarks: Schneider (1982b) collected it from Wadi Al Kufrayn. No further records are available and further collecting is needed to determine its status in Jordan.

Libellula pontica (Selys 1887)

Remarks: This dragonfly was recorded from Jisr Banat Ya'cub on the Jordan River. Further collecting is needed to determine its distribution in Jordan.

Libellula depressa Linnaeus 1758

Remarks: Schneider (1986) reported this dragonfly from upper Jordan Valley.

Orthetrum abbotti Calvert 1892

Remarks: This is a rare species. A single male was found in Wadi Al Mujib (Dumont 1977). Probably Wadi Al Mujib is the northern border of the distribution range of the species.

Orthetrum anceps (Schneider 1845)

Remarks: Even though this species is very common in the Levant, only few specimens were collected. It was collected from Al Azraq oasis and Jarash (Schneider 1986; Katbeh-Bader et al. 2002).

Orthetrum brunneum brunneum (B. de Fonscolombe 1837)

Remarks: Previously recorded from Al Azraq, Jordan Valley and Al Mujib (Schneider 1986; Katbeh-Bader et al. 2002).

Orthetrum chrysostigma (Burmeister 1839)

Remarks: This is a very common species all over Jordan (Katbeh-Bader et al. 2002). The ability of the larvae to adapt to arid conditions and aestivate in damp soils enabled this dragonfly to become widely distributed in Jordan and other arid areas (Dumont 1991). Two males were seen fighting for their territory above an irrigation canal in Adasiyah, one of them was forced to land, at this moment a lizard appeared from the nearby vegetation and captured the dragonfly.

Orthetrum ransonneti (Brauer 1865)

Remarks: A species typical of arid and hyperarid areas (Dumont 1991). Schneider (1986) recorded it from south Jordan east of Aqaba.

Orthetrum sabina (Drury 1770)

Remarks: Previously recorded from south of Dead Sea, Az Zarqa'a River and Al Azraq and other localities in the Jordan Valley (Amr et al. 1997; Schneider 1986; Katbeh-Bader et al. 2002).

Fig. 5: *Selysiothemis nigra* (VANDER LINDEN 1825)

Orthetrum taeniolatum (SCHNEIDER 1845)

Remarks: Less common than O. *chrysostigma*. Previously recorded from Az Zarqa'a, two localities east of the Jordan River and Irbid (AMR et al. 1997; SCHNEIDER 1986; KATBEH-BADER et al. 2002).

Orthetrum trinacria (SELYS 1841)

Remarks: This is a rare species. Only two previous records; from Al Azraq (SCHNEIDER 1986) and Dayr Alla (KATBEH-BADER et al. 2002).

Selysiothemis nigra (VANDER LINDEN 1825) (Fig. 5)

Remarks: Common in Wadi Shu'ayb, Wadi al Hasa, eastern side of Dead Sea and Aqaba (SCHNEIDER 1986). This is a strong migrant species; brackish pools surrounded by *Tamarix* are the preferred hiding places (WATERSTON & PITTAWAY 1989). It was found near al-Hasa along with *Lindenia tetraphylla* SCHNEIDER (1981a).

Fig. 6: Yarmouk River: The Jordan-Yarmouk basin harbors several endemic dragonfly species to the Jordan Valley such as P. syriacum and the endangered *Calopteryx syriaca* RAMBUR.

Sympetrum decoloratum sinaiticum DUMONT 1977

Remarks: This dragonfly was recorded from the southern tip of the Dead Sea and from Wadi Arabah (SCHNEIDER 1986).

Sympetrum fonscolombei (SELYS 1837)

Remarks: Tenerals are usually yellowish-brown, while adults may attain a light or bright red color. Older females usually become grayish-blue. The taxonomic status of this heterochromic species is still under revision. Recorded previously from Al Azraq, Az Zarqa'a River, Wadi Shu'ayb and Wadi Al Kufrayn (SCHNEIDER 1986; AMR et al. 1997; KATBEH-BADER et al. 2002).

Sympetrum meridionale (SELYS 1841)

Remarks: This dragonfly is not found in true desert country (DUMONT 1991). It was recorded by SCHNEIDER (1982b) from Wadi Al Kufrayn.

Sympetrum striolatum striolatum (CHARPENTIER 1840)

Remarks: Collected previously from Az Zarqa'a River (SCHNEIDER 1986).

Trithemis annulata (PALISOT DE BEAUVOIS 1805)

Remarks: Common in the Jordan Valley and Al Azraq (KATBEH-BADER et al. 2002). This species inhabit shady areas and was found along with O. *chysostigma*, O. *sabina* and C. *erythraea*. A very characteristic perching position is exhibited by this species, adults perch with the abdomen held vertically.

Trithemis arteriosa (BURMEISTER 1839)

Remarks: One of the most common dragonflies in Jordan. Known to occur all over Jordan from the north to the south near Aqaba. Very successful in colonizing small irrigation pools scattered in many small farms in the upper lands and semi-desert areas (KATBEH-BADER et al. 2002). Males

Fig. 7: Burqu pool: This pool is located in the middle of the eastern desert and is frequented by migrant dragonfly species.

and females inhabit separate habitats, males hunt in rocky wadis with pools, whereas females take refuge in small tributaries (WATERSTON & PITTAWAY 1989).

Zygonyx torridus torridus (KIRBY 1889)

Remarks: A stream dweller that favors rapid and water falls (DUMONT 1991). Some individuals were seen near Yarmouk River in 1996 (KATBEH-BADER et al. 2002).

Freshwater Habitats in Jordan

The freshwater habitats in Jordan are limited and diverse. There are four main rivers (The Jordan, Yarmouk, Az-Zarqa and Mujib). All these rivers finally discharge their water to the Dead Sea, forming a network of connections between the different waterbodies (Fig. 6–9). The majority of the springs are located in the Jordan Valley, where groundwater emerges from the porous calcareous bedrock as seeps or springs. These sources are subject to local ground water alterations over time and may become depleted. Permenant streams are developed when the wadis have eroded down to the level of underground water deposits or where underground water aquifers emerges to provide steady flow (MALLETT & AMR 1990). Few natural ponds are scattered near by the Jordan and Yarmouk rivers. In the eastern desert, swamps and ponds are formed during winter and may retain the water all year round such as Burqu' pond in the heart of the eastern desert. Such habitats provide a shelter for migrating species (i.e. *L. tetraphylla*). Additionally, open water reservoirs constructed in farms may provide breeding sites for some selected species of dragonflies. This was observed in newly established farms in Wadi Rum area, whereas *I. evansi* and *O. chrysostigma* found to occur in the middle of the desert.

Fig. 8: Birkit Al Arayis: This small pond is located close to the Yarmouk River. It is a perfect habitat for several ishnurids. Turtles were found to feed on larval stages of dragonflies.

Fig. 9: Mujib River: This fast running river hosts several species of dragonflies especially gomphids.

Discussion

Despite the arid nature of Jordan, the Odonata of Jordan is represented in 46 species and subspecies. The Zygoptera comprise 15 species while the Anisoptera comprise 31 species. This is far less than species known to occur in more humid regions with plentiful natural water bodies such as Turkey, where 96 species are known (KALKMAN et al 2003). However, diversity of the dragonfly fauna of Jordan is similar to that of the Arabian Peninsula despite its vast area with 56 reported species (SCHNEIDER & KRUPP 1993).

Several species of the dragonflies of Jordan disappeared with in the past fifty years (*Coenagrion lindenii zernyi*, *Agriocnemis sania* and *Calopteryx syriaca*). Indeed, SCHNEIDER (1982b) pointed out earlier on such changes and their impact on the dragonfly fauna of Jordan. For example, *E. fatime* was common allover the Jordan Valley and currently is very scarce. Similarly, *C. syriaca* populations are diminishing in previously known breeding sites. This species is very sensitive to pollution and could be eradicated easily from its natural habitats. SCHNEIDER (1982b) pointed out that the survival of the endemic species, *P. syriacum*, is endangered due to the overwhelming changes in freshwater ecosystems in the Jordan Valley.

The Jordan Valley is rich in its natural water resources. The Jordan and Yarmouk Rivers extend along most of the Jordan Valley reaching southward to the Dead Sea. Other rivers (Mujib and Az Zarqa rivers) extend from the east to the west draining into the Jordan River or the Dead Sea. Other many springs that originate from the mountains also discharge into the Jordan Valley drainage basin. Most of the man-made modifications of these water bodies occur in the Jordan Valley. Dams construction, irrigation canals, intensive agriculture and land modification are being conducted at an alarming rate. Certainly this will impact the surviving dragonfly populations. Establishment of a nature reserve in the Jordan River Basin may conserve such populations.

Further studies on the ecology, biology and conservation of the Odonata of Jordan should be encouraged.

Zusammenfassung

Die Libellen (Insecta: Odonata) Jordaniens. Basierend auf aktuellen Aufsammlungen und früheren Nachweisen umfasst die Libellenfaua (Odonata) Jordaniens 46 Arten. Von den Zygoptera sind 15 Arten, von den Anisoptera 31 Arten bekannt. Für einige Spezies werden Bemerkungen zur Ökologie angeführt und die Gefährdung der Libellen wird mit Bezug auf *Calopteryx syriaca* RAMBUR 1842 diskutiert.

References

AMR Z., AL-MELHIM W., KATBEH-BADER A. & W. SCHNEIDER (1997): On the common arthropods of Al Azraq. — Entomologist Gazette **48**: 55-66.

COBOLLI M., UTZERI C., DE MATHAEIS E. & L. DELL'ANNA (1994): Note preliminari sullo status tassonomico e la corologia italiana di *Chalcolestes parvidens* (st. nov.) (Odonata: Lestidae). — Atti 17th Congr. naz. ital. Ent., Udine, pp. 77-82.

DUMONT H. (1973): The genus *Pseudagrion* SELYS in Israel and Egypt, with a key to the regional species (Insecta: Odonata). — Israel Journal of Zoology **22**: 169-195.

DUMONT H. (1975): *Endemic dragonflies of the Pleistocene age of the Hula Lake area (northern Israel), with notes of the Calopterygidae of the River Jordan (Israel, Jordan) and Litani (The Lebanon) and description of Urothemis edwardsi hulae* subpec. nov. (Libellulidae). — Odonatologica **4** (1): 11-19.

DUMONT H. (1977): *Orthetrum abbotti* CALVERT, 1892, a new Ethiopian representative in the Palaearctic fauna (Anisoptera: Libellulidae). — Odonatologica **6** (3): 199-203.

DUMONT H. (1991): Odonata of the Levant. — Fauna Palaestina **5**: 1-297.

HOWELL V., DOYEN J.T. & A.H. PURCELL (1998): Introduction to Insect Biology and Diversity. 2nd Edition. — Oxford University Press. New York, NY.

KALKMAN V.J., WASSCHER M. & G.J. VAN PELT (2003): An annotated checklist of the Odonata of Turkey. — Odonatologica **32**: 215-236.

KATBEH-BADER A., AMR Z. & W. SCHNEIDER (2002): Odonata of Jordan. — Fragmenta Entomologica **34**: 147-170.

MALLET J. & Z. AMR (1990): Ecology of freshwater snails in Jordan. — Walkerana **11**: 80-93.

MORTON K.J. (1924): The Dragonflies of Palestine, based primarily on collections made by Dr. B. A. Buxton, with notes on the species of adjacent areas. — Trans. R. ent. Lond. **1924**: 25-44.

SCHNEIDER W. & A. KATBEH-BADER (1997): Ein atypisches Weibchen von *Pseudagrion syriacum* SÉLYS 1887 aus Jordanien (Odonata: Zygopte-

ra: Coenagrionidae). — Entomologische Zeitschrift **107** (9): 391-394.

SCHNEIDER W. & F. KRUPP (1996): A possible natural hybrid between *Ischnura elegans ebneri* SCHMIDT, 1939 and *Ischnura fountainei* MORTON, 1905 (Odonata: Coenagrionidae). — Zoology in the Middle East **12**: 75-81.

SCHNEIDER W. & F. KRUPP (1993): Dragonfly records from Saudi Arabia, with an annotated checklist of the species from the Arabian Peninsula (Insecta: Odonata). — Fauna of Saudi Arabia **13**: 63-78.

SCHNEIDER W. (1981a): Eine Massenwanderung von *Selysiothemis nigra* (VANDER LINDEN, 1825) (Odonata: Macrodiplactidae) und *Lindenia tetraphylla* (VANDER LINDEN, 1825) (Odonata: Gomphidae) in Südjordanien. — Entomologische Zeitschrift **91**: 97-102.

SCHNEIDER W. (1981b): On a dragonfly collection from Syria. — Odonatologica **10**: 131-145.

SCHNEIDER W. (1982): *Crocothemis sanguinolenta arabica* n.subsp. (Odonata: Anisoptera: Libellulidae), ein afrikanisches Relikt in der südlichen Levante. — Entomologische Zeitschrift **92** (3): 25-31.

SCHNEIDER W. (1982b): Man-induced changes in the dragonfly fauna of the Jordan Valley. — Adv. Odonatol. **1**: 243-249.

SCHNEIDER W. (1983): The larva of *Gomphus davidi* SELYS, 1887. — Hydrobiologia **98**: 244-248.

SCHNEIDER W. (1985): Die Gattung *Crocothemis* BRAUER 1868 im Nahen Osten (Insecta: Odonata: Libellulidae). — Senckenberg. biol. **66** (1/3): 79-88.

SCHNEIDER W. (1986): Systematik und Zoogeographie der Odonata der Levante unter besonderer Berücksichtigung der Zygoptera. — Thesis 3 vol, University of Mainz.

SCHNEIDER W. (1987a): Der Holotypus von *Paragomphus genei* (SELYS) 1841) (Odonata: Anisoptera: Gomphidae). — Entomologische Zeitschrift **97** (10): 129-144.

SCHNEIDER W. (1987b): The distribution of *Onychogomphus macrodon* SELYS, 1887, with description of the hitherto unknown female, and redescription of the male (Odonata: Gomphidae). — Opuscula Zoologia Fluminensia **13**: 1-12.

SCHNEIDER W. (1995): Die Verbreitung von *Pseudagrion syriacum* SELYS 1887 und Erstnachweis der Art für die Türkei (Odonata: Zygoptera: Coenagrionidae). — Entomologische Zeitschrift **105**: 161-180.

WATERSTON A.R. & A.R. PITTWAY (1989): The odonata or dragonflies of Oman and neighboring territories. — The Journal of Oman Studies **10**: 131-168.

Addresses of authors:

AHMAD KATBEH-BADER
Ahmad MAHASNEH
Department of Horticulture
and Plant Protection
Faculty of Agriculture
University of Jordan
Amman/Jordan

Zuhair S. AMR
Mohammad ABU BAKER
Department of Biology
Jordan University of Science
& Technology
P.O. Box 3030
Irbid/Jordan
E-Mail: amrz@just.edu.jo