

An Updated Illustrated Checklist of Dragonflies and Damselflies of the UAE

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Introduction

Graham Giles (1998) published an illustrated checklist of UAE damselflies and dragonflies (Order Odonata) numbering 20 species, and forecast the occurrence of several more on the basis of literature reports and his own excursions in northern Oman. That checklist is updated here by the addition of six species confirmed over the intervening years, all from among those mentioned by Giles: the damselflies *Ceriagrion glabrum*,

Pseudagrion decorum and *Ischnura senegalensis*, and the dragonflies *Sympetrum fonscolombii*, *Crocothemis sanguinolenta* and *Orthetrum ransonneti*. The checklist is supplemented by brief notes about the habits and habitats of individual species in the UAE. Recent references of particular interest to field naturalists are also mentioned.



Fig 1a. *Arabineura khalidi* male. [RWR]



Fig 1b. *Arabineura khalidi* female. [RWR]



Fig 1c. Pairs of *Arabineura khalidi* ovipositing gregariously on a floating branch. [RWR]

New UAE damselflies

Ceriagrion glabrum and *Pseudagrion decorum*. Two additional species, the damselflies *C. glabrum* and *P. decorum*, were reported from the UAE soon after publication of the original checklist (Feulner 1999) and *P. decorum* was found to be breeding regularly at the Rufaysah dam in Wadi Shi, near Khor Fakkan (Feulner 2001).

Ischnura senegalensis. Local recognition of a third additional damselfly species, *I. senegalensis*, had a much less straightforward history. In March 2006, two of the authors (Reimer and Hornby) observed and photographed a damselfly present in abundance in and near reeds fringing a large pond at a golf course under construction at Al Maqam, just west of Al-Ain. On the basis of their photographs and comparison with website images, they suspected it was something other than the similar *I. evansi*, a common UAE mountain species. However, they recognised the need for caution, since *I. evansi* and *I. senegalensis* are extremely close in appearance, no website images are available for *I. evansi*, no published resources specifically discuss field distinction of these two species, and the same authors had photographed almost identical-looking damselflies from mountain front water bodies in the Mahdhah area, NE of Al Ain and Buraimi, where *I. evansi* was presumptively the species present.

Definitive taxonomic identification of most damselfly species is based upon microscopic examination, particularly of genital anatomy, and the genus *Ischnura* is a notoriously difficult one since in many species females, and sometimes males, may be heterochromic and even heteromorphic (see *Figs. 4b, c & d*); apparent hybrids have been described as well (W. Schneider, *pers. comm.*). Historically most experts have declined to attempt identification from photographs, so it appeared that definitive progress could only be made by collecting specimens for expert examination. However, as photographic technology has improved, permitting ever more detailed images, and as the number of amateur enthusiasts has grown, who wish to identify without risk of damaging or destroying, a measure of change has come to expert attitudes. K-D.B. Dijkstra and Richard Lewington have recently published a guidebook, *Field Guide to the Dragonflies of Britain and Europe* (Dijkstra & Lewington 2006), based on the premise that species distinctions, although only conclusively determined by

traditional laboratory methods, will generally correlate with macroscopic distinctions of one sort or another that can be relied on by a conscientious observer in the field.

Dijkstra and Lewington's book includes most of the Odonata species that can be found in the UAE, but does not include either *I. evansi* or *I. senegalensis* (or any of the UAE's other damselflies), whose ranges do not extend to Europe. Dijkstra was nevertheless consulted and was kind enough to comment on the images obtained by Reimer. He was of the view that the photographs from a mountain front site near Mahdhah clearly showed *I. evansi*, on the basis of short anal appendages and pterostigmae completely filled with dark colour. On the other hand, it appeared to him that the Al Maqam photographs were consistent with *I. senegalensis* by virtue of the long lower appendages and the lesser extent of black in the pterostigmae (K-D.B. Dijkstra, *pers. comm.*). Wolfgang Schneider, viewing somewhat different photos from the same sites (mountain front and Al Maqam), came to a similar conclusion, likewise on the basis of the lower anal appendages, but emphasised the exceptional difficulty of distinguishing *Ischnura* species from photographs alone, and the need for voucher specimens to be certain (W. Schneider, *pers. comm.*).

At the same time, Schneider provided the information that *I. senegalensis* has in fact been definitively recorded within the UAE in recent years. Observations were made and a single voucher specimen taken by visiting naturalists in March 2001 at Ramtha Lagoon in Sharjah (now being transformed into Al Wasit Nature Reserve). Additional observations were made at Dubai's Wimpey Pits (now Al Warsen Lakes) and a site near the northern end of the "Mahdhah 64" road in northernmost Oman (Kappes & Kappes 2001, whose photographs demonstrate the extreme heterochromicity of female specimens). Schneider himself collected a copulating male and female *I. senegalensis* in late February 2005 at a pond near Sharjah University City.

On the basis of recordings to date, it appears that *I. evansi* is the predominant *Ischnura* species at mountain sites, consistent with prior understanding, but closer investigation now seems warranted to determine (1) whether *I. senegalensis* may have been overlooked heretofore at non-montane anthropogenic sites throughout the UAE, and (2) the extent to which *I. senegalensis* may also inhabit mountain sites sympatrically with *I. evansi*.



Fig 2a. *Arabicnemis caerulea* male. [RWR]



Fig 2b. *Arabicnemis caerulea* female. [RWR]



Fig 3. *Ceriagrion glabrum* male. [RWR]



Fig 4a. *Ischnura evansi* male. [RWR]



Fig 4b. *Ischnura evansi* female with andromorph (male-form) colouration. [RWR]



Fig 4c. *Ischnura evansi* female in one of two gynomorph (female-form) colourations. [RWR]



Fig 4d. *Ischnura evansi* female in a brighter gynomorph colouration. [GRF]



Fig 4e. *Ischnura evansi* mating in wheel formation. [RWR]



Fig 5a. *Ischnura senegalensis* male. [RJH]



Fig 5b. *Ischnura senegalensis* female with gynomorph colouration. [RWR]



Fig 5c. *Ischnura senegalensis* mating in wheel formation. [RJH]



Fig 5d. A hyper-abundance of *Ischnura senegalensis* at Maqam in March 2006. [RWR]

New UAE dragonflies

Sympetrum fonscolombii. On three occasions from 2000 to 2005, always in November, one of the authors (Feulner) observed and photographed single individuals of a red male dragonfly that was clearly not one of the several red or reddish species already known to occur in the UAE. *S. fonscolombii* was suspected. Reference to Askew (2004) permitted confirmation of the *Sympetrum* genus on the basis of wing venation, but it was not until the publication of Dijkstra (2006) that comparison of photographs, including one of an unidentified female in the author's collection, also photographed in November, allowed a confident identification of *S. fonscolombii*.

Schneider concurred in the interpretation of the photographs and provided the further information that *S. fonscolombii*, too, had been recorded in recent years by visiting naturalists: ca. 10 at Wadi Bih dam in mid-March 2001 (Kappes & Kappes 2001) and a single male at Fujairah National Dairy Farm in late January 2003 (Herren 2003).

The reported *S. fonscolombii* sites are extremely diverse (see notes below) and most observations have been of single individuals, but the initial suspicion of seasonal dispersal or migration in November is not supported by the observations of the visiting naturalists.

Crocothemis sanguinolenta. The discovery and identification of *C. sanguinolenta* was an exciting but less complicated affair, since Schneider himself collected a male and female at the popular waterfall and pools in Wadi Wurayah, Fujairah, during a brief visit in late February 2005 (W. Schneider, pers. comm.). *C. sanguinolenta* resembles the common *C. erythraea*, which generally frequents still and stagnant water, but it is smaller and has a noticeably thinner abdomen, which should facilitate discrimination by amateur observers.

Orthetrum ransonneti. An enigmatic blue *Orthetrum* has been observed and photographed in mountain wadis in the UAE and northernmost Oman over a number of years and was suspected to represent an unrecognised resident species (Fig. 17a). In habits and habitat it resembles *O. chrysostigma* but the pruinescent blue male does not have the waisted abdomen of *O. chrysostigma*. At the same time it is distinctly larger and has a heavier abdomen than *O. taeniolatum*, with which it otherwise agrees in general form, eye color (upper eye brownish rather than blue-green as in *O. chrysostigma*) and wing venation (as depicted in Askew (2004) and Dijkstra & Lewington (2006)). Older females of blue *Orthetrum* spp. may sometimes achieve the pruinescence characteristic of males (see Fig. 17c), which could give the false impression of a "blue" male with a thick abdomen, but photographs confirm that the blue specimens in question are in fact males.

Christopher Drew, then with Abu Dhabi's Environmental Research and Wildlife Development Agency (now the Environment Agency – Abu Dhabi, EAD), had concluded as early as 2002 that the unknown

blue male was probably *O. ransonneti*, based on expected occurrences and the brief distinguishing information available in Askew (1988), including keys to related species (C. Drew, pers. comm.). However, available published keys did not include *O. ransonneti*, the species had not been encountered by Giles, no photographs or detailed descriptions were readily available, and at the time local amateurs were not yet in close communication with knowledgeable experts. As a result, an authoritative determination remained pending until the matter was reprised in connection with finalising the updated checklist presented here.

Inquiries were made, accompanied by photographs, to three distinguished experts acquainted with the dragonflies of Europe, the Near East and Africa, and actively engaged in regional studies. The initial responses served to emphasise that *O. ransonneti* is an uncommon species that remains poorly known and seldom collected, despite having a widespread distribution in arid regions from North Africa to Afghanistan. Only one of the experts consulted had ever seen it in the wild. In Oman, it has been collected on only a few occasions, in the mountains south and west of Muscat and also in Dhofar (Waterston & Pittaway 1991; Schneider & Dumont 1997). Thus while *O. ransonneti* was generally acknowledged as the presumptive choice (as originally reasoned by Drew), a positive identification remained elusive.

Observations and photographs by Feulner made it possible to associate the enigmatic blue male with a brownish female having a distinctive banded abdomen and thoracic markings (Fig. 17b), but even this information did not advance matters. The experts were uniform in expressing their interest in the distinctive female, but all professed to be unacquainted with any *Orthetrum* like it (W. Schneider, pers. comm.; K-D.B. Dijkstra, pers. comm., V. Kalkman, pers. comm.).

It was apparent that expert review of actual specimens would be required to resolve the mystery. A convenient opportunity presented itself almost immediately in the form of a visit to the UAE by Vincent Kalkman in February 2008, in connection with his responsibilities as chair of the Odonata Group of the IUCN. Reimer escorted Kalkman on a field trip to a mountain front site where they were successful in collecting a specimen of the putative *O. ransonneti* male. Kalkman's positive verdict came in an e-mail from Holland a few days later, and was based upon examination of the secondary genitalia plus direct comparison with specimens of *O. ransonneti* in his care at the Netherlands National Museum of Natural History (three males from Egypt and Turkey and a female from Iran, two of them dating to the 19th century). Preserved specimens of dragonflies lose most of their original colour, but Kalkman noted that the single female specimen seemed to show the same banded triangles on the abdomen as seen in photos of UAE females.

Some characteristics that may assist in field identification of *O. ransonneti* are mentioned in the notes below.

Possible additional species

Inevitably, additional species can be expected to appear from time to time in the UAE, at least temporarily. Giles (1998) has already mentioned the possibility of *Trithemis pallidinervis* (Kirby, 1889), *Tramea basilaris* (Beauvais, 1817) and *Urothemis thomasi* (Longfield 1932), which have been reported from northern Oman. A report exists of *Sympetrum meridionale* (two males) at Wimpey Pits in Dubai (Kappes & Kappes 2001) but is considered unconfirmed; if correct, it would represent a first record for Arabia (W. Schneider, *pers. comm.*).

Even apart from the possibility of new species, identification can sometimes be problematic. Females of *O. chrysostigma* seen independently by two of the authors (Feulner and Reimer) in disparate environments in the greater Al Ain/Buraimi area in late 2007 were unusually ruddy in colour (**Fig. 16c**) and could not be positively identified until they were found and photographed by Reimer in association with more typical specimens. Perhaps they were teneral, i.e. recently emerged. The same authors have also observed unusually small specimens of *Crocothemis erythraea* in the Mahdhah area of Northern Oman, which raised questions of identification (see notes below).

Checklist of UAE Odonata species

ZYGOPTERA (Damselflies)	Vernacular Name*
Family Protoneuridae	
1. <i>Arabineura khalidi</i> (Schneider, 1988)	Hajar Wadi Damselfly
Family Platycnemididae	
2. <i>Arabicnemis caerulea</i> Waterston, 1984	[Powder Blue Damselfly]
Family Coenagrionidae	
3. <i>Ceriagrion glabrum</i> (Burmeister, 1839)	[Olive-Eyes Damselfly]
4. <i>Ischnura evansi</i> Morton, 1919	Evans' Bluetail [Blue-Banded Damselfly]
5. <i>Ischnura senegalensis</i> (Rambur, 1842)	Senegal Bluetail
6. <i>Pseudagrion decorum</i> (Rambur, 1842)	Elegant Sprite
ANISOPTERA (Dragonflies)	
Family Gomphidae	
7. <i>Lindenia tetraphylla</i> (Vander Linden, 1825)	Bladetail [Arabian Lobetail]
8. <i>Paragomphus genei</i> (Sélys, 1841)	Green Hooktail
9. <i>Paragomphus sinaiticus</i> (Morton, 1929)	Sinai Hooktail
Family Aeshnidae	
10. <i>Anax imperator</i> Leach, 1815	Blue Emperor [Emperor]
11. <i>Anax parthenope</i> Sélys, 1839	Lesser Emperor
12. <i>Anax ephippiger</i> (Burmeister, 1839)	Vagrant Emperor
Family Libellulidae	
13. <i>Crocothemis erythraea</i> (Brullé, 1831)	Broad Scarlet [Carmine Darter]
14. <i>Crocothemis sanguinolenta</i> (Burmeister, 1839)	Bloody Scarlet
15. <i>Diplacodes lefebvrei</i> (Rambur, 1842)	Black Percher [Purple Darter]
16. <i>Orthetrum chrysostigma</i> (Burmeister, 1839)	Epulet Skimmer [Girdled Skimmer]
17. <i>Orthetrum ransonneti</i> (Brauer, 1865)	
18. <i>Orthetrum sabina</i> (Drury, 1773)	Slender Skimmer [Oasis Skimmer]
19. <i>Orthetrum taeniolatum</i> (Schneider, 1845)	Small Skimmer [Azure Skimmer]
20. <i>Pantala flavescens</i> (Fabricius, 1798)	Wandering Glider [Globe Skimmer]
21. <i>Selysiothemis nigra</i> (Vander Linden, 1825)	Black Pennant [Desert Darter]
22. <i>Sympetrum fonscolombii</i> (Sélys, 1840)	Red-Veined Darter
23. <i>Trithemis annulata</i> (Beauvais, 1807)	Violet Dropwing [Purple-Blushed Darter]
24. <i>Trithemis arteriosa</i> (Burmeister, 1839)	Red-veined Dropwing [Gulley Darter]
25. <i>Trithemis kirbyi</i> Sélys 1891	Orange-winged Dropwing [Orange Darter]
26. <i>Zygonyx torridus</i> (Kirby, 1889)	Ringed Cascader

[*Note: Most of the vernacular or common names listed above are taken from Dijkstra & Lewington (2006) or Walker & Pittaway (1987). Names from the latter are shown in [brackets]. For species not included in either of those references, the authors have proposed common names (shown in *italics*) based on the scientific names, except in the case of the Hajar Wadi Damselfly, *Arabineura khalidi*, a species frequently encountered by local naturalists, whose name is intended to reflect its endemic status and typical habitat. Although the use of common names may seem to make the subject initially more accessible (and they are included here for that purpose), the reader is cautioned that "common" names are not necessarily in common use, and may differ from place to place and from author to author. Moreover, they may sometimes be contradictory. For example, Walker & Pittaway call *Selysiothemis nigra* the "Desert Darter", the same name used by Dijkstra & Lewington for *Sympetrum sinaiticum*, a species not found in Arabia. In order to avoid confusion of this sort, the authors have relied on and strongly recommend the use of scientific names.]



Fig 6a. *Pseudagrion decorum* male. [GRF]



Fig 6b. *Pseudagrion decorum* pair mating in wheel formation. [GRF]



Fig 7a. Mature *Lindenia tetraphylla* male from Dhofar, Oman. [RWR]



Fig 7b. Immature *Lindenia tetraphylla* male from Kuwait, probably only a day old (V. Kalkman, pers. comm.) [Gary M. Brown]



Fig 7c. *Lindenia tetraphylla* mating pair from Dhofar, Oman. [RWR]



Fig 8a. *Paragomphus genei* male. [RWR]



Fig 8b. *Paragomphus genei* female. [RWR]



Fig 9a. *Paragomphus sinaiticus* male. [GRF]



Fig 9b. *Paragomphus sinaiticus* female. [GRF]



Fig 9c. *Paragomphus sinaiticus* exuvia, the shell left behind when the adult dragonfly emerges. [RWR]



Fig 10a. *Anax imperator* male. [RWR]



Fig 10b. A dead female *Anax imperator*. [GRF]



Fig 10c. *Anax imperator* larva. [RWR]



Fig 11. *Anax parthenope* male. [RWR]



Fig 12a. *Anax ephippiger* male. [RWR]



Fig 12b. A male *Anax ephippiger* guards a female as she lays her eggs on a reed. [RWR]



Fig 13a. *Crocothemis erythrea* male. [GRF]



Fig 13b. *Crocothemis erythrea* female. [GRF]



Fig 13c. *Crocothemis erythraea* female showing colouration resembling a male *Trithemis annulata*. It was seen mating and ovipositing. [RWR]



Fig 14. *Crocothemis sanguinolenta* male from South Africa. [John C. Abbott]



Fig 15a. *Diplacodes lefebvrei* male. [RWR]



Fig 15b. *Diplacodes lefebvrei* female. [RWR]



Fig 16a. *Orthetrum chrysostigma* male. [GRF]



Fig 16b. *Orthetrum chrysostigma* female. [GRF]

Fig 16c. Young *Orthetrum chrysostigma* female. [RWR]



Fig 17a. *Orthetrum ransonneti* male. [GRF]



Fig 17b. *Orthetrum ransonneti* female. [GRF]



Fig 17c. Mating pair of *Orthetrum ransonneti*. [GRF]





Fig 18a. *Orthetrum sabina* male (sexes alike).
[Barbara R. Reimer]



Fig 18b. An *Orthetrum sabina* consumes another dragonfly it has captured. [GRF]



Fig 19a. *Orthetrum taeniolatum* male from Greece. [Paul Cools]



Fig 19b. *Orthetrum taeniolatum* female from Greece. [Paul Cools]

Notes on habits and habitats

The notes below are intended to give an indication of the typical habitats and behaviour of the UAE's dragonfly and damselfly species, which may aid in locating and identifying them. Most Odonata, although not all, are found in close association with freshwater habitats. As a result, many species have been relatively scarce in recent years due to the prolonged drought of 1999 through 2004.

In our area, dragonfly diversity is generally greatest at sites along or just within the mountain front, including traditional plantations, which typically afford a combination of freshwater bodies (natural pools and streams as well as man-made ponds and *falaj* systems) and a diversity of microenvironments. Reliable dragonfly sites are somewhat more common in the south of the UAE's mountain areas and in the adjacent areas of northern Oman (Wilayat Mahdhah), where permanent surface water is more abundant than in the north. For the same reason, dragonflies are uncommon in the Musandam region, where surface water is normally scarce. Based on local experience, the most diverse site so far encountered is the so-called Hatta Pools (located in Wadi Qahfi in northern Oman), where 15 species were observed within a 150-200m radius in mid-April 1998, following three years of rainfall substantially above the average.

Male dragonflies are generally more colourful and distinctive than females. In addition, males of most species stake out a territory near water where they perch and/or patrol, and are therefore readily seen. Most females come to water only for food and sex, including egg laying (oviposition), but they can often be found perched among nearby vegetation (e.g. *Arabicnemia caerulea*, *Crocothemis erythraea*) or rocks (e.g. *Trithemis arteriosa*). Copulation resembles a dragonfly version of *soixante-neuf* called the "wheel" position and in most species can be maintained in flight. In damselflies copulation can be a protracted affair lasting hours. Egg-laying (oviposition) by females is accomplished by depositing eggs on the water surface (Libellulids) or in slits in submerged vegetation (damselflies and Aeshnids). In many species an ovipositing female is "guarded" by a male (her latest consort) (*Fig. 12b*) or flies in tandem with him (head to tail, male in front).

Many of the local species have adjusted their behaviour and physiology to the circumstances of the Arabian environment. For example, whereas in Europe most dragonflies are active only during the warmer part of the day, in the UAE many species rest in the shade during the heat of the day; in warmer weather they may fly even at dusk. Similarly, species which in Europe may spend as much as two years as pond-dwelling larvae develop in temporary pools in the UAE in a matter of two or three months (e.g. *Anax imperator*).

Arabineura khalidi. The most common damselfly in mountain wadis, often found over gravel wadi beds far from surface water. Does not typically seek shade or cover. Cryptic colouration blends well with wadi rocks, making it difficult to follow in flight. Often oviposits en

masse on floating and decaying vegetation (*Fig. 1c*). Endemic to wadis of the Hajar Mountains of UAE and northern Oman, but now known to be much more common and widespread than previously thought. Synonym: *Elattoneura khalidi*. [Note: The photos of *A. khalidi* and *A. caerulea* in Giles (1998) were inadvertently reversed.]

Arabicnemia caerulea. Mountain wadis, among vegetation at and near shallow pools. Powder blue male is distinctive; female duller, grayish. Also found in Yemen (Walker & Pittaway 1987; Schneider & Dumont 1997). [Note: The photos of *A. khalidi* and *A. caerulea* in Giles (1998) were inadvertently reversed.]

Ceriagrion glabrum. Rare. Single UAE site in Wadi Qawr, near abundant but temporary water and in association with dry reeds, where its striking colour may in fact be cryptic. Also found at mountain front plantations in N. Oman, likewise in association with reeds.

Ischnura evansi. Common among low or overhanging vegetation immediately adjacent to shallow pools, irrigation ditches, artificial ponds. Also at freshwater springs within Dhayah salt marsh, Ra's al-Khaimah. Female heterochrome; thorax may be vivid orange. Possible field confusion with *I. senegalensis*, especially at anthropogenic sites. Nocturnal migration has been reported in Kuwait (Waterston & Pittaway 1991) and eastern Saudi Arabia (Schneider & Dumont 1997).

Ischnura senegalensis. Hyperabundant at pond at Al Maqam Equestrian Centre & Golf Club in Al Ain, in and adjacent to reeds. Also Ramtha Lagoon (Al Wasit), Sharjah and Wimpey Pits (Al Warsen Lakes), Dubai. One natural site at pools at N. end of "Mahdhah 64" road, northernmost Oman. Possibly overlooked elsewhere due to confusion with *I. evansi*. See also discussion in main text, above.

Pseudagrion decorum. Uncommon, generally at larger pools in mountain wadis (W. Maydaq, W. Qawr dam); breeds regularly at Rufaysah dam (Wadi Shi, Khor Fakkan). Males often perch in the open on fixed or floating vegetation. Female oviposits underwater by descending a plant stem (Feulner 2001).

Lindenia tetraphylla. Rare. A migrant species. No specific UAE records or specimens are known (Schorr *et al.* 1998; Schneider *pers. comm.*), but found in neighbouring countries, e.g. Kuwait and northern Oman. Range shown in Walker & Pittaway (1987) includes UAE. N. Oman records from flowing water (Giles 1998); Dhofar records from slow-flowing large stream (Wadi Darbat); Kuwait records from coastal desert. Habitat in Europe is typically large lakes or slow-flowing rivers, with or without vegetation.

Paragomphus genei. Rare. Scattered wadi sites near vegetation, including plantations and falajes (traditional irrigation channels). Multiple sightings along *falaj* in W.

Sharm, northern Oman, in March and April 2007, including mating pairs. Apparently a migrant, not seen during drought years.

***Paragomphus sinaiticus*.** Common, perches on exposed rocks beside larger wadi pools. Returns to original perch after sorties.

***Anax imperator*.** Common. Electric blue male unmistakable. Males patrol territorially over pools or chains of pools in mountain wadis. Abdomen slightly arched in slow flight. In summer, may perch frequently, hanging in tall vegetation. Females oviposit alone and unguarded, unlike other UAE *Anax* spp.

***Anax parthenope*.** Uncommon. Rare during turn-of-century drought. Occasional at wadi pools with vegetation. Also at freshwater springs within Dhayah salt marsh, Ra's al-Khaimah.

***Anax ephippiger*.** Widespread, from sand desert (Liwa, Umm az-Zamul) to Hajar Mountains and Musandam. Swarms regularly seen in January. May be found far from water, including highest mountains. Most common dragonfly in sand deserts of Abu Dhabi. Only local *Anax* which may appear yellowish in flight. Synonym: *Hemianax ephippiger*.

***Crocothemis erythraea*.** Common at pools with fringing vegetation, including stagnant and foul water. Red males dominant over most other perching Libellulid species. Females often relatively common and conspicuous in nearby vegetation. Females on the Saiq Plateau of Oman are a darker brown than those seen in the UAE and neighbouring Oman.

[Note: In late 2007, a number of specimens were observed in the Mahdhah area of Oman that appeared to be distinctly smaller than typical *C. erythraea*. In particular, the characteristic flattened, swaybacked abdomen was shorter, so that these dragonflies were not significantly longer than the associated *Trithemis arteriosa*. They are reckoned to be *C. erythraea* (W. Schneider, *pers. comm.*; K-D.B. Dijkstra, *pers. comm.*), but the presence of such atypical individuals, especially in relatively open, atypical habitats for *C. erythraea*, is a reminder of the need for observers to be aware of the possibility that an unrecognised species could be present. In particular, in the case of *C. erythraea*, a closely-related sister species, *C. servilia* (Drury, 1773) ranges from southern Turkey eastward across Asia, and has been described as the oriental counterpart of the European and North African *C. erythraea* (Dijkstra & Lewington 2006). The two were considered synonymous by some authors, but detailed anatomical studies have supported a distinction (Askew 2004). It is not impossible that the ranges of the two species could overlap in the Hajar Mountains. Unfortunately, field discrimination alone must be considered unreliable. *C. servilia* is described as slightly smaller and sleeker than *C. erythraea*, but adults are virtually identical in most other macroscopic respects (Dijkstra & Lewington

2006).]

***Crocothemis sanguinolenta*.** Single known site at pools near permanent waterfall in Wadi Wurayah, Fujairah. See also discussion in main text, above.

***Diplacodes lefebvrei*.** Common near larger natural and man-made water bodies, e.g. Wimpey Pits (Al Warsen Lakes), Al Maqam golf course pond. Also at freshwater springs within Dhayah salt marsh, Ra's al-Khaimah. Often perches in obelisk position (i.e., with the abdomen held relatively erect). A small species that defers to others. In the UAE both the black male and pale female can be confused with *Selysiothemis nigra*. Distinguishing features of *D. lefebvrei* are: long, relatively dark-coloured pterostigma; small orange patch at base of hindwing; wing venation is distinct, with small cells; dark males have a dark face (frons); white claspers contrast with black abdomen in male.

***Orthetrum chrysostigma*.** Common in mountain wadis. Perches on rocks (and to a lesser extent vegetation) near pools. Pale blue male is readily distinguished by pinched "waist" at base of abdomen.

***Orthetrum ransonneti*.** Occasional in mountain wadis. Perches on exposed rocks near pools, frequently hanging on vertical surfaces. Seen in all seasons, including extremes of heat and cold. Sympatric with *O. chrysostigma*. Female may oviposit unescorted. Considered an arid region specialist. See also discussion in main text, above.

[Note: Although the identity of *O. ransonneti* is confirmed for the first time in this report, it is not uncommon in the UAE and N. Oman and has been observed in mountain and mountain front habitats from at least the Tayyibah area (N of Masafi) to the greater Al-Ain/Buraimi area, including Wilayat Mahdhah, Oman and rocky wadis at the base of Jebel Hafit in the UAE, in the newly developed area known as Green Mubazzarah. Globally it is an uncommon species that remains poorly known, despite having a widespread distribution in arid regions from North Africa to Afghanistan, but excluding western Arabia (Waterston & Pittaway 1989). The blue male is readily distinguishable in the field from *O. chrysostigma* by its robust and uniformly tapered abdomen; absence of amber colour at the base of the hindwings; pale blue face; upper eye brown, not green; and relatively short pterostigma. Its large size (= *O. chrysostigma*) distinguishes it from *O. taeniolatum*, with which it shares some of the foregoing characteristics. Female is distinctive: abdomen is vividly banded with dark triangles dorsally.]



Fig 20a. *Panatala flavescens* male. [Graham B. Giles]



Fig 20b. *Panatala flavescens* female. [RJH]



Fig 21a. *Selysiothemis nigra* male. [RWR]



Fig 21b. *Selysiothemis nigra* female. [RWR]



Fig 22a. *Sympetrum fonscolombii* male. [GRF]



Fig 22b. *Sympetrum fonscolombii* female. [GRF]



Fig 23a. *Trithemis annulata* male. [RWR]



Fig 23b. *Trithemis annulata* female. [GRF]



Fig 23c. A female has difficulty emerging from its exuvia. [RWR]



Fig 24a. *Trithemis arteriosa* male. [GRF]



Fig 24b. *Trithemis arteriosa* female. [RWR]



Fig 24c. *Trithemis arteriosa* female lacking the wing spots that are typical of UAE females of this species (see Fig. 24b) but uncommon in African females. [GRF]



Fig 24d. Immature male *Trithemis arteriosa*. [GRF]



Fig 24e. Immature male *Trithemis arteriosa*. [GRF]

***Orthetrum sabina*.** The most common species at stagnant and foul water, found in irrigation ditches, sumps (e.g. Ramtha lagoon [Al Wasit]) and temporary ponds on saline waste ground, but also at larger wadi pools. Perches on vegetation. Observed to prey on small butterflies and other dragonflies (*Fig. 18b*).

***Orthetrum taeniolatum*.** Rare in mountain wadis. Small, pale blue male may be sympatric with the similar *O. chrysostigma*.

[Note: The diminutive *O. taeniolatum* must be considered one of the rarest of the UAE's dragonflies. The species ranges across the Eremic Zone from North Africa through Northern India, including western Arabia (Waterston & Pittaway 1989). However, two surveys in Northern Oman in the early 1990s did not add to the single prior record from that area (Schneider & Dumont 1997). Giles (1998) recorded several UAE sightings during the "wet" years of the mid-1990s but it has not been recorded thereafter by any of the present authors. Moreover, accumulated experience permits us to question several of Giles' photographic records, which appear to be atypical individuals of other species. Ironically, Giles did not encounter *O. ransonneti*, which most closely resembles *O. taeniolatum* in various details other than size (uniformly tapered abdomen, no amber colour at the wing base, relatively short pterostigma). It may be best to regard *O. taeniolatum* as an infrequent migrant whose presence in the UAE and Oman may depend upon exceptional rainfall or other conditions.]

***Pantala flavescens*.** Widespread and locally common. Patrols with dipped abdomen, usually more than c.1.5m above ground. Seldom perches. One of the first species to appear after rainfall in an area, sometimes in swarms. Groups often patrol near trees. May be found far from water, including highest mountains. Occasional in sand desert. Occasional in mangroves, where it is the most commonly observed dragonfly. Swarms also observed at other coastal sites. Regular flight periods have been reported in Arabia in March-April and October-January (Waterston & Pittaway 1991; Schneider & Dumont 1997).

***Selysiotthemis nigra*.** Uncommon but migratory and can be locally abundant at large man-made water bodies, e.g.: Rufaysah Dam (Wadi Shi, Khor Fakkan); Al Warsen Lakes (formerly Wimpey Pits), Dubai, where males have patrolled in swarms while associated females perched on nearby waste ground; and the Al Maqam golf course pond in Al-Ain, where a swarm migrated through in May 2007. Occasional females on low shrubs on waste ground in the Dubai hinterland. Often perches in obelisk position.

[Note: In the UAE both the dark male and pale female can be confused with *Diplacodes lefebvrei*. Distinguishing features of *S. nigra* are: short, very pale pterostigma with distinct anterior and posterior margins that together resemble an "equal sign" (=); face (frons) remains pale, even in dark

gray males; wing venation is indistinct and somewhat translucent, with large cells; male claspers somewhat orange coloured; broad interior of hindwing.]

***Sympetrum fonscolombii*.** Scattered records of single individuals from diverse sites: coastal salt bushes, coastal hills, a low-lying suburban dump site, a dairy farm and a large, remote, permanent mountain pool; plus ca. 10 individuals at Wadi Bih dam. See also discussion in main text, above.

***Trithemis annulata*.** Common at larger, still or stagnant water bodies. Perches on vegetation, less commonly on rock or concrete.

***Trithemis arteriosa*.** The most common dragonfly in rocky mountain wadis. Males perch prominently on rock or vegetation near even the smallest pools, usually in obelisk position. They typically return to original perch after brief sorties. Thin abdomen of male is diagnostic (but colour is yellow in immatures). Female perches on rock or shrubs in general vicinity of pools. Distinctive orange wing spots are rarely absent in UAE and Oman females. Very tolerant of close observation. Males bold and will challenge other dragonflies despite small size.

***Trithemis kirbyi*.** Common in larger mountain wadis. Males perch low on rocks and gravel beside shallow flowing water, usually in bright sun. Females often far from water, in trees and shrubs. Large amber patches at base of both forewings and hindwings are diagnostic in male and female.

***Zygonyx torridus*.** Patrols over flowing water, often 1-2m high, seldom perches. Rare in drought years. Male blue-black, female blue-gray, both with light banding on sides of abdomen.

Dragonfly identification and recommended references

The identification and classification of dragonflies and damselflies, like most of insect taxonomy, is a matter for specialists in the first instance, and is typically based on features not readily apparent in the field (often details of the genitalia). Nevertheless, many species are in fact visually distinctive, and many others, although less distinctive, can be discriminated by conscientious and informed field observers, once expert study has established the macroscopic features that can reliably be used to distinguish them.

In the case of Odonata generally, field identification on the basis of colouration is complicated by the fact that for several days after emergence, the colouration of immature individuals may be very different from that of typical adults (see Figs. 16c, 24d, 24e, 25c), and in some species even adults may continue to darken as they mature. In addition, the same species may vary somewhat within its geographic range. Damselflies (*Zygoptera*) are generally more difficult to distinguish than dragonflies (*Anisoptera*), not only because they are smaller, but because macroscopic differences are less readily observable and individual species may be more

variable in appearance (see *Figs. 4b, c & d*).

Two printed resources have been mentioned above which should routinely be consulted in connection with the identification of problematic Odonata in the UAE. These are Askew (2004) and Dijkstra & Lewington (2006). However, neither of these pretends to be comprehensive for Arabia and both of them largely exclude the species of Asian origin that can be found there. Field observers in the UAE and Oman may therefore also wish to consult the several regional studies and other resources referenced below.

Online pictorial libraries are now available for both Europe and Asia (see references below). Arabia is unfortunately not yet well represented in online resources, with the result that (for example) at the date of this writing there are no online photographs of *I. evansi*, the most common *Ischnura* species in the UAE and Oman, as to which the authors would have benefited greatly from access to high resolution images of professionally identified specimens.

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Fig 25a. *Trithemis kirbyi* male. [RWR]



Fig 25b. *Trithemis kirbyi* female. [GRF]



Fig 25c. Immature male(?) *Trithemis kirbyi*. [GRF]



Fig 26a. *Zygonyx torridus* (sexes alike) perched in a tree.
[Graham B. Giles]



Fig 26b. *Zygonyx torridus* in flight. [RWR]

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