

**Atlas of the dragonflies
and damselflies of
West and Central Asia**

Brachytron

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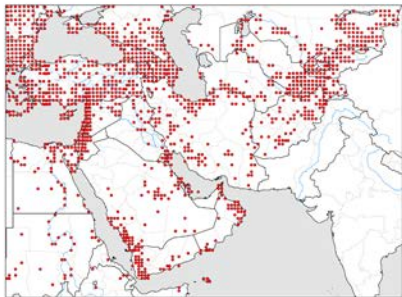


Figure 3. Distribution of records of dragonflies prior to 1990.

are available. This reflects the scarcity of water and therefore of dragonflies; however, it is likely that some widespread species with a strong dispersal ability, such as *Anax ephippiger*, *Pantala flavescens*, *Lindenia tetraphylla* and *Selysiothemis nigra*, could be found in these areas at least as migrants. The scarcity or lack of data in some regions should be taken into account when judging the distribution patterns based on the maps. However, in our opinion, the density of observations is such that the general distribution patterns shown on the maps are trustworthy. Nonetheless, major surprises could still be found everywhere in the region. Most notably, Yemen, Oman and the western part of Saudi Arabia are likely places for the discovery of Afrotropical species not yet known from the region, while Oman, southeast Iran and Afghanistan are likely places to record additional species from the Oriental region. An example of the latter is the recent finding of *Diplacodes trivialis*, which is believed to have been brought to Masirah Island (Oman) by cyclone Kyarr, which

impacted the Indian Ocean during late October 2019 (Dobson & Childs 2019). The description as "new to science" of the large and rather striking *Aeshna vercanica* as recently as 2015 shows that new species can still be discovered in the area. The extensive work done in Iran (Schneider & Ikemeyer 2019) and in the south of the Arabian Peninsula (numerous papers 1991–2019) renders the likelihood of finding new species to science more limited in these regions. The area with the greatest potential for the discovery of undescribed species is Afghanistan. Fewer than 300 records are available from this huge country, with the most recent records being from 1977. Finding species new to the region or even new to science is no longer easy, but there are many other ways to increase our knowledge of the region. A good example of this is the recent advances made in our understanding of the range and distribution of the near-endemic *Urothemis thomasi*, together with the description of its last instar larva (Chelminick et al. 2016, Lambret et al. 2017).

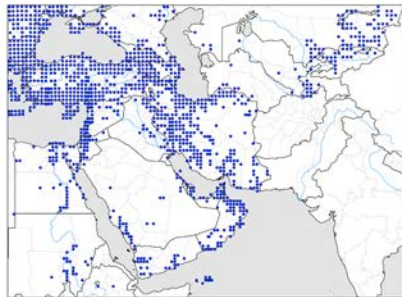


Figure 4. Distribution of records of dragonflies from 1990 onwards.

It is emphasized that the authors do not endorse any political considerations regarding country definition, nomination and delineation.

Biogeography

The region under consideration is at the crossroads of the Palearctic, Afrotropical and Oriental realms. The borders between these regions are not clear cut, as there are no hard natural barriers. In general most of the area of this atlas is considered Palearctic, with the southern Arabian coast in Yemen and Oman (Dhofar), Socotra and sometimes also a small area in the south of Iran considered to belong to the Afrotropical region. Including the Nile valley, the Afrotropical region also borders the southern part of the Levant, where several Afrotropical species occur. Part of southeast Iran and southeast Afghanistan is considered to belong to the Oriental region, although the separation from the Palearctic is far from clear here. The Dasht-e-Kavir Desert to the north and the mountains in Afghanistan are often considered

as the dividing line. At the southeastern border of Iran the Afrotropical region borders the Oriental region. This again is rather arbitrary as the border does not follow a natural barrier. As many dragonfly species are very mobile it is not surprising that several species are not restricted to one of the biogeographic realms but that species of different affinities meet in this region. In addition to species more widespread in these biogeographic realms the region also contains 25 endemic species and another 25 species being near endemic with roughly over 80% of their world range found in the region.

Phenology

The flight period of each species in the area under consideration is presented in Appendix 2. For this appendix, all records from the study area with information on the month of recording were used (approximately 37,000). The main flight period, shown in slightly darker tint, is defined as each month in which 10% or more of the observations (a species at a locality on a



Oman, Ayn Razat. Habitat of *Paragomphus sinaiticus*, *Nescothemis ferruginea*, *Zygonyx toridus* and *Tramea limbata*. Photo: Geert De Knijf



Oman, Wadi Ash Shab. Habitat of *Arabineura khalidi*, *Arabicnemis caerulea*, *Pseudagrion decorum*, *Limneta tetraphylla* and *Urothemis thomasi*. Photo: Geert De Knijf

the fauna of the Levant, Iraq and Iran. While the Peninsula is a continuous landmass, the deserts form a substantial barrier and, as a result, the southern parts are, for flying insects such as odonates, more closely connected to the Horn of Africa, across the narrow Red Sea, than with the Levant. This results in a number of species only occurring in the southern half of the Arabian Peninsula as endemics (e.g. *Arabineura khalidi*, *Arabicnemis caerulea*) or being widespread in Africa and only reaching Asia in this region. The Sarawat Mountains in western Yemen and southwest Saudi-Arabia, and the relatively wet Dhofar region in Oman are rich in afrotropical species. The island of Socotra stands apart with its unique flora and fauna; it has a dragonfly fauna with both Asian and African species, and harbours one endemic species of African descent.

Bahrain The Odonata fauna of Bahrain has received little attention from odonatologists for obvious reasons: it is small (765 km²), water is scarce, and desert covers 92% of its territory. Only six species have been recorded on the main island, records of which are included in three documents: one paper dealing with a large part of southern Arabia (Waterston & Pittaway 1991) (*Limneta tetraphylla*, *Crocothemis erythraea*), a currently deleted photo gallery on the internet (*Orthetrum sabina*) and an internet document published by Abdulqader Khamis (2010) but now deleted (*Ischnura evansi*, *L. tetraphylla*, *C. erythraea*, *C. servilla*, *Orthetrum sabina*, *Trithemis annulata*).

Kuwait Kuwait is a sandy desert with, apart from some man-made water bodies and coastal lagoons, few habitats suitable for Odonata. Just over 50 records are known totalling 13 species, mostly from museum collections or listed, sometimes without localities, in three publications (Al-Houty 1985, Waterston & Pittaway 1991, Schorr et al. 1998). It is unclear how many of the 13 recorded species do reproduce in the country. Since 1985 only one formal record has been made (*Brachythemis fuscopalliat* in 1994), so virtually nothing is known about the odonates from Kuwait over the last 35 years.

Oman Situated at the southeastern tip of the Arabian Peninsula, Oman consists largely of a sandy and rocky desert, with two wetter regions: the Hajar Mountains in the north and the Dhofar coastal area in the south. The latter is, together with Yemen, the only region in our area reached by the monsoon rains, resulting in more extensive freshwater habitats harbouring many Afrotropical species. Fewer than 10 records were published prior to 1980, and the start of our knowledge of the dragonflies of Oman basically corresponds to the publications of Waterston (1980, 1984). Since then, a steady flow of in total 27 papers has appeared, including Schneider (1988), Waterston & Pittaway (1991), Schneider & Dumont (1995, 1997), Dumont & Heidari (1998), Giles (1998), Feulner (1999), Feulner et al. (2007), Reimer (2008), Van der Weide & Kalkman (2008), Wilson (2008), Reimer et al. (2009), Frankovic (2012), Cowan & Cowan (2015, 2017, 2018), Kunz (2015), Schneider & Ikemeyer (2016a), Dobson & Childs (2019) and Boudot et al. (2020). Lambret et al. (2017) provided the most complete and recent overview of the fauna. Due to this surge in recent activity, Oman is the best documented country on the Arabian Peninsula.

Qatar Qatar constitutes a small sandy desert country of 11,586 km² with only sparse natural and man-made water bodies present. It is therefore not surprising that only 12 species have been reported, based on 48 records in three papers (Abdu & Shaumar 1985, Waterston & Pittaway 1991, Grunwell 2010).

Saudi Arabia With a surface area of 2,150,000 km², Saudi Arabia is not only the largest state of the Arabian Peninsula but also the largest state covered in this atlas. The country is dominated by the Arabian Desert, associated semi-deserts and shrublands, and includes several mountain ranges and highlands. In the southeast, the Rub' al Khali erg ('Empty Quarter') is the world's largest contiguous sand desert. Few lakes are found in the country. Among the largest of these are the Layla Lakes, which were overexploited in the late 80's and have been dry since 1995, leading to the extinction of

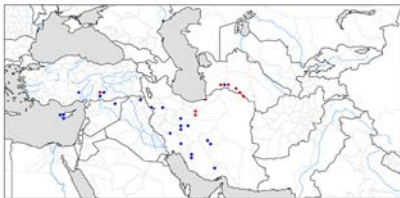
Ischnura intermedia Dumont, 1974 — Persian Bluetail

Ischnura intermedia is endemic to West Asia, occurring from western Cyprus to the Kopet Dag Mountains along the border of Iran and Turkmenistan. The species is confined to Cyprus, southern Turkey, adjacent northern Syria and Iraq (Dumont & Borisov 1995, De Knijf et al. 2016) and also Iran (Schneider & Ikemeyer 2019). In the latter country it occurs especially in the Zagros Mountains, and is often found at ancient drainage systems (Karizes or Qanats, at least 3000-5000 Years BP)



(Kiany & Sadeghi 2016, Schneider & Ikemeyer 2019). Old records of *I. forcipata* by Schmidt (1954a) from around Teheran have been found to pertain to *I. intermedia* (Dumont & Borisov 1995). *Ischnura intermedia* breeds in slow-flowing, well vegetated streams, and is often confined to small secondary channels adjacent to streams and rivulets where the current slows and water is retained. Marshy areas and short swamp vegetation typically occur locally in or near the streambed, and taller grassy margins (often reeds, up to 4 m) grow adjacent to the stream.

Populations can only become established at sites that have permanent water (De Knijf et al. 2016). The species seems to be threatened throughout its range, as many streams in the area fall dry during the summer months due to rainfall deficit and an increase in water abstraction. There have also been recent changes in water hydrology due to river damming, with the type locality in Turkey indeed now being flooded by the Atatürk Dam lake. Populations of *I. intermedia* seem to be restricted to those streams that are fed with a constant flow of water from the mountains.

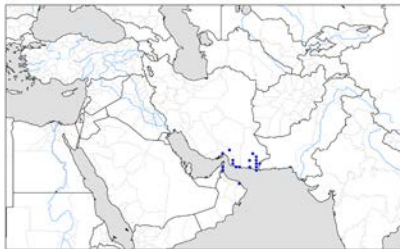


Ischnura nursei Morton, 1907 — Pixie Bluetail

Until fairly recently this species was placed in its own genus, *Rhodoschnura*, but based on molecular data Dumont et al. (2013) showed that it is part of *Ischnura*. The species is largely restricted to the Indian subcontinent and is known from Nepal, the northern two-thirds of India, Pakistan and southeast Iran. It was first found in Iran in 1995 (Dumont et al. 2011), but has since been found at 28 different localities (Dumont et al. 2011, Schneider & Dumont 2015, Schneider et al. 2015b, 2018b) and the species might be expanding its range westwards (Schneider & Ikemeyer 2019). In 2003 it was found in Oman (Kunz 2015), but has not been recorded there since. In 2013 it was discovered in the United Arab Emirates (Feulner & Judas 2013), with additional records in 2015 and 2017 bringing the total to six different Emirates localities. The lack of historical records makes the situation



difficult to judge, but recent records give the impression that the species has increased in the western part of its range over the past two decades. *Ischnura nursei* is found along banks of rivers, brooks, ditches and ponds, sometimes occurring at localities with little vegetation; it is resilient to poor water quality (Schneider & Ikemeyer 2019).



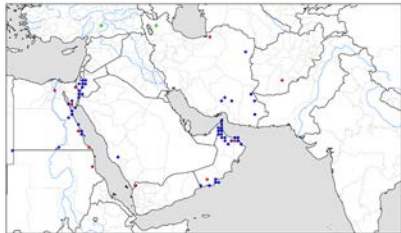
Orthetrum ransonnetii (Brauer, 1865) — Desert Skimmer

This is one of very few true desert dragonflies found in Asia and Africa (hence its English vernacular name 'Desert Skimmer'). *Orthetrum ransonnetii* ranges from Afghanistan, Iran and the Arabian Peninsula through the Central Sahara up to Morocco and even the Canary archipelago, where it has been known since 2016 and where it also breeds. (Boudot et al. 2020, Nowak & Weihs 2021). The species occurs over a vast area but is rare in most of its range. Its main strongholds in the area of this atlas are the Hajar



Mountains in northern Oman and the United Arab Emirates and in an area from the Sinai Peninsula to the south of the Dead Sea basin. In North Africa it is mostly found in the mountains of the central Sahara and the Anti-Atlas in Morocco. A record from northwestern Iran (Ghahari & Thipaksorn 2014) is considered doubtful, as well as a record from Malatia, Turkey by Selys (1887), which is possibly based on a mislabeled specimen (Boudot et al. 2020). The populations of the central parts

of the Sahara have been known since 1914 but records further west are all of much more recent dates (Jullierat & Monnerat 2009, Boudot & De Krijf 2012, Durand & Renout 2012, Mearns 2018). This might be the result of more intensive field work but is also believed to be partially due to a genuine range expansion. *Orthetrum ransonnetii* favours small flowing brooks and rivers in desert and semi-desert landscapes. It reproduces in both fresh and brackish water.



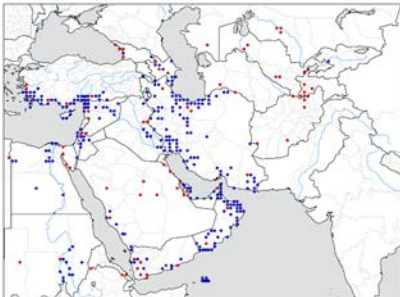
Orthetrum sabina (Drury, 1773) — Slender Skimmer

This very common Oriental species occurs from North Africa across west Asia and the Indian subcontinent to southeast Asia and Australia. In addition, *O. sabina* is widespread and abundant along a thin stretch of the Mediterranean coast in Turkey, the Levant and Iran (Schneider & Ikemeyer 2019). In Arabia, it is common in Yemen and southern Oman and well represented in northern Oman and the United Arab Emirates. In the South Caucasus countries *O. sabina* is mainly found in the coastal areas of the Black Sea and the Caspian



Sea. The majority of observations from Central

Asia including the border area of Tajikistan and Afghanistan are only historical.



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This atlas presents, for the first time, a detailed overview of the distribution of the damselflies and dragonflies (Odonata) of West and Central Asia, an area covering nearly 8 million km². The region is not only characterized by the presence of several vast arid deserts such as the Arabian desert, Syrian desert and the Karakum but also harbors extensive mountain chains rich in streams, rivers, marshes and lakes including the Caucasus, Zagros and Hindu Kush. These combination of strong geographic differences in combination with its position between the Afrotropical, Oriental and Palearctic realm result in an interesting and diverse odonate fauna.

Dragonflies and damselflies are good indicators of the quality of freshwater habitats and are colorful ambassadors for the preservation of freshwater ecosystems. In West and Central Asia the combination of climate change and an ever increasing demand for freshwater for drinking and agriculture will result in increased desertification and habitat degradation. The future of some of the species occurring in the area is therefore gloomy and some might not make it to the end of the century.

This Atlas deals with no less than 175 (sub)species, many of which are endemic to the region or occur just marginally outside the region. For each species a distribution map is presented showing its occurrence in the region and adjacent areas. Texts for each species give basic information on the distribution, habitat preferences and, in some cases, taxonomical information. Although this atlas is not an identification guide, it will definitely help to identify most of the species in the region as it contains images of nearly all species, many of which have seldom been depicted in books before. We hope that this book will help to raise local awareness about this group of freshwater species and will contribute in a better protection and management of freshwater ecosystems.