The Odonata of the Tassili-n-Ajjer, Algeria

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Inleiding

It has been pointed out to me that, in the framework of my Sahara work, I have dealt with the Odonata of the Air (Dumont 1978a), the Hoggar mountains (Dumont 1978b), and later with the Mouydir plateau (Dumont 2007) and the Tibesti and Ounianga (Dumont 2014), but I have never published on the Central Saharan plateau of Tassili-n-Ajjer. Yet, I visited this area of deeply dissected sandstone on six occasions between 1978 and 1991, and made observations on the local dragonfly fauna. Here, I present the delayed results of this work. Voucher specimens were collected, in addition to field notes on observations made in situ, when no specimens were extirpated from nature. Some locations were only visited once, others four or five times (see below).

The study area: Tassili-n-Ajjer

The Tassili-n-Ajjer ('plateau of the rivers') is a 75,000 km2 sandstone plateau in the centre of the Sahara desert, mainly on east Algerian territory, but extending in the south-east as the Tadrart Acacus into western Libya. The area has become world famous as an archaeological site, where thousands of rock paintings of Neolithic age were found (Lhote 1958). It is well isolated from the Hoggar that extends to the south-west, and more or less contiguous with the Mouydir and Tefedest plateaus in the west. The plateau is deeply dissected by the canyons of a number of oueds (or wadis). Most of these run north, although some shorter ones drain towards the south. Many of these canyons are so deep that permanent water can locally be found on their floors. These water bodies are known by the

Figure 1. A fragment of the canyon of the Oued Imirhou near Iherir. The green patches on the floor are vegetation fringes surrounding the gueltas.

Deel van de canyon van de Oued Imirhou nabij Iherir. De groene vlekken komen overeen met vegetatie die de gueltas begrenzen (Image ©2017 CNES/Airbus, ©2016 Google Earth).

Figure 2. Gueltas of El Bahtou in the Oued Djerat.
Guelta van El Bahtou in de Oued Djerat (Image ©2017 Digital globe, ©2016 Google Earth).

name of guelta or aguelmam and are foci of relict aquatic biota, including cichlid, cyprinid and silurid fish. Research on the area only started in the period 1949-1952, when a group of French biologists explored the southern part of the plateau. They estimated the number of lakelets, most of which permanent, at ca 300 (Bernard 1953). There are two main human settlements, the city of Illizi in the north, and the oasis of Djanet in the south. On Libyan territory, somewhat east of Djanet, the small town of Ghat is located. The best-known canyon of the Tassili is that of the Oued Imirhou, flowing north. It contains at least a trickle of running water over a length of almost 50 km, and has the reputation of being the only (semi-) permanent river of the Sahara (figure 1). Also famous is the Oued Djerat, which opens to the sand desert a few kilometres north-east of Illizi (figures 2-3). The canyon of the Oued Djerat became known to the world for its rock engravings and frescoes, which were studied by Lhote (1958) even before he made his famous inventory of the rock art of Tamrit (loc. 11) and Sefar, on the high plateau to the north-east of Djanet.

List of locations studied

Loc. 1. Amguid. Tuareg village, bounded to the north-east by a canyon in which the guelta(s) Tin Esselmakene (26° 24' N, 05° 20' E) and the spring of Ain Kerma (26° 18' N, 05° 22' E) are located. Visited in May 1978 and June 1984. Fish (*Barbus* sp.) present.

Loc. 2. Oued Djerat, south-east of Illizi, a stretch of about 20 km explored from 31 May 1978 to 2 June 1978. Large permanent gueltas Balouahi (26° 20' N, 08° 29' E) and El Bahtou (26° 20' N, 08° 31' E) (Figs 2-3). Fish (*Barbus* sp.) present.

Loc. 3. Guelta Efenni, permanent guelta at the foot of the Fadnoun plateau (25° 31' N, 07° 59' E), situated in the Oued Aharhar, a side canyon of the major Oued

Figure 3. Guelta El Bahtou seen from the floor of the canyon.
Guelta van El Bahtou bekeken van de bodem van de canyon (Photo: Henri Dumont, 1977).

Figure 4. Guelta Azar (or Assa) at Dider. The arrow points at the basal-most guelta. A second guelta situated a bit higher is hidden by mountains and is not visible. The bed of the Oued higher up is filled with small temporary gueltas after each rain event.
Guelta Azar (of Assa) bij Dider. De pijl wijst de meest laaggelegen guelta aan. Een tweede guelta ligt hoger en is niet zichtbaar door de rand van de canyon. De bedding van de oued hoger op bestaat uit kleine tijdelijke gueltas die gevormd worden na elke regenbui (Image ©2017 Digital globe, ©2016 Google Earth).

Tadjeradjeri that runs west and parallel to the Oued Imirhou (see Bernard 1953). Fish (*Clarias* sp., *Barbus* sp., *Tilapia* sp.) present. Visited June 1978, April 1979, July 1984 and April 1985.

Loc. 4. Guelta Adess(e)i (25° 20' N, 08° 01' E), deep yet temporary guelta at foot of waterfall, close to main road Illizi-Djanet. Visited June 1978, May 1979 and November 1991.

Loc. 5. Oued Imirhou at Iherir village (25° 23' N, 08° 25' E) and area upstream of village 5-7 June 1978; as well, northern end of gorge in May 1979. Permanent lakes with fish, and running water between the main gueltas (figure 1).

Loc. 6. Ain Tihoubar ti-n-Afella, hot spring, of which the outflow forms a permanent guelta in the bed of its Oued, 25° 56' N, 08° 44' E. May 1979.

Loc. 7. Aguelmam Azar (also known as Assa), at site of Dider (a huge desert plain surrounded by mountains) (25 10' N, 08° 28' E). A big temporary guelta at foot of waterfall (figure 4), and a series of temporary pools in the bed of the temporary oued that drains the plateau. June 1978 and May 1979.

Loc. 8. Large but temporary guelta near Bordj el Haouas (Fort Gardel) (24° 52' N, 08° 25' E). May 1987.

Loc. 9. Large oasis of Djanet, with palm groves and irrigation network (24° 31' N, 09° 27' E), situated in bed of Oued Idjeriou. June 1978, April 1979, June 1984, May 1987 and November 1991.

Loc. 10. Large but temporary guelta Bei-Bei near Djanet (24° 38' N, 09° 26' E). 9 June 1978.

Loc. 11. Guelta Tamrit (24° 38'N, 9° 40' E), permanent guelta on top of the plateau of Tamrit, close to the site of the tassili cypresses and the rock frescoes (April 1979). Several temporary gueltas are also found nearby, after rains.

Loc. 12. Guelta near village of Tam(a)djert (24° 38' N, 09° 40' E). May 1979.

Loc. 13. Libya: El Barkat and Ghat (24° 55' N, 10° 12' E), June 1978, irrigation ditches and pools in palm gardens.

List of species encountered with their locations

1	*Ischnura saharensis* (Aguesse): locs. 1, 2, 3, 5, 6, 8, 9, 11, 12, 13
2	*Agriocnemis sania* Nielsen: loc. 13 and Ghat (Libya), just across the border (type locality, type population believed extinct)
3	*Pseudagrion hamoni* Fraser: locs. 1, 2, 3, 5, 6, 12 (common)
4	*Anax imperator* Leach: locs. 1, 2, 3, 5, 6, 7, 9, 11, 12
5	*Anax parthenope* Selys: locs. 2, 5, 12
6	*Hemianax ephippiger* (Burmeister): loc. 9 (rare)
7	*Paragomphus genei* (Selys): loc. 3 (1 male, 1978)
8	*Crocothemis erythraea* (Brulle): locs. 1, 2, 3, 5, 7, 8, 9, 11, 12, 13
9	*Orthetrum chrysostigma* (Burmeister): locs. 2, 4, 7, 9, 11, 13
10	*Orthetrum ransonnetii* (Brauer): locs. 1 (May 1978), 8
11	*Trithemis annulata* (P de Beauvois): locs. 1, 2, 3, 5, 9, 13
12	*Trithemis arteriosa* (Burmeister): locs. 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13
13	*Trithemis kirbyi* (Selys): locs. 2, 3, 5, 7, 8, 9, 12
14	*Sympetrum sinaiticum* (Dumont): locs. 1, 5
15	*Sympetrum fonscolombii* (Selys): locs. 3, 5

Discussion

The fauna of the Tassili is impoverished when compared to tropical Africa and the Maghreb. As well, most species are of Afrotropical extraction, with many more surviving in the Maghreb countries than in the central Sahara. Much extinction must therefore have happened after the Holocene moist periods. One strange case, however, is that of *Pseudagrion hamoni*. This tropical species has no relict populations in the Maghreb, while the related *P. sublacteum* survives in Morocco and the Levant. It is remarkably common and widespread in the Tassili, where it is the co-dominant zygopteran together with *Ischnura saharensis* (figure 5). In the zone north of Illizi, mainly saline surface water is found, and possibly this obstructs the occurrence of *P. hamoni* further north. However, it remains

unclear why no relicts occur in those pockets in Morocco, Algeria or Tunisia where a series of African species and genera thrive (Samraoui & Menai 1999, Jacquemin & Boudot 1999, Jödicke et al. 2000, El Haissoufi et al 2015).

Many palaearctic and African families are completely absent from the central Sahara, including all Lestidae, Calopterygidae, Platycnemididae, Corduliidae, Macromiidae, and Cordulegastridae. The Gomphidae are reduced to two species of *Paragomphus*. *Paragomphus genei*, currently known from a single male from Guelta Efenni, may in fact be more common, and should certainly be expected in the Oued Imirhou. *Paragomphus sinaiticus* has not been found in the Tassili yet, but is known from Mare de Zouarké in the Tibesti Mountains and from Guelta Timia in the Air. Rather abundant populations are known much further to the north-east, in the Sinai desert and south Arabia. It is a rather robust species that is found as well in fishless waters as in gueltas with fish. It is conceivable that it has been overlooked in the Tassili so far. I consider it as a probable future addition, just like *Selysiothemis nigra*, which is known from the canyon of Arak.

The process of extinction that takes place as desertification proceeds does not seem to happen in a random way: relatively more zygopterans disappear than anisopterans. One way to visualize this is by computing a zygopteran: anisopteran ratio. For Morocco (Jacquemin & Boudot 1999; with later additions – see El Haissoufi et al. 2015) the ratio is 24:38 or 1:1.6. For the Netherlands (Geijskes & Van Tol 1983) it is 25:44 = 1:1.8. For Europe (Askew, 1988) we find a value of 39:79 = 1:2. Desert environments score very differently. The Tassili value is 3:12 = 1:4 and the Hoggar 2:13 = 1:6.5. This interesting phenomenon merits further study. It could as well be due to a more rapid extinction rate of zygopterans as to a slower colonization rate.

As to the geographic origin of the Tassili dragonflies, most species are African and occupy wide ranges, both in Africa and sometimes in Europe and western Asia. *Ischnura saharensis*, almost an endemic of the Sahara, is of Palaearctic origin, however. *Sympetrum sinaiticum* and *Orthetrum ransonnetii* are both palaearctic as well, but restricted to arid areas in the so-called Irano-Turanian zone of western Asia. *Agriocnemis sania* probably has a range similar to the previous species but was only found once in the Tassili, at Ghat oasis in Libya, which is its type locality (Nielsen 1959). The species went extinct at that location. Gambusia fish, for combatting mosquitoes, were introduced to the oasis around the time of the only observation.

Hemianax ephippiger, the well-known migrant that migrates from Sahelian Africa to Europe almost yearly, along the coasts of the Atlantic and the Persian Gulf, is notoriously rare in the mountainous areas of the Central Sahara. Only stray specimens have been seen in both the Tassili as the Hoggar. The reasons for that are currently unclear. Possibly, the migratory streams originating in the Sahel are deflected to the west and the east.

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Figure 5. Immature male Ischnura saharensis*, Oued Ziz, Morocco, 3 April 2017.*
Onvolwassen mannetje *Ischnura saharenis,* Oued Ziz, Marokko, 3 april 2017 (Photo: Geert De Knijf).

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Summary

Fifteen dragonfly species are reported from the Tassili-n-Ajjer plateau. *Paragomphus genei* is a first record for the Sahara. *Pseudagrion hamoni* is remarkably widespread and common in the Tassili, but is not known from the Mediterranean coastal zone. In general, zygopterans are underrepresented while *Hemianax ephippiger,* the yearly migrant along the Atlantic coast, is rare.

Samenvatting

Dumont H. J. 2017. De libellen (Odonata) van de Tassili-n-Ajjer, Algerije. Brachytron 19(1): 44-49.

Vijftien soorten libellen werden waargenomen op het Tassili-n-Ajjer plateau in Algerije. Groene haaklibel (*Paragomphus genei*) betreft een eerste waarneming voor de Sahara. *Pseudagrion hamoni* is opmerkelijk wijd verspreid en algemeen in de Tassili, maar is niet bekend van het Middellandse Zeegebied. Algemeen genomen zijn de juffers (Zygoptera) ondervertegenwoordigd en is de Zadellibel (*Hemianax ephippiger*), die jaarlijks trekt langsheen de Atlantische kust, opvallend zeldzaam.

Keywords: Odonata, Dragonflies, Tassili-n-Ajjer, Algeria, biogeography, relict faunas, zygopteran-anisopteran ratio, *Hemianax ephippiger*