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Investigation of Odonata Diversity in different localities in Sudan

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Abstract

The Odonata and their habitats are a part of the world's natural heritage and this insect order encompasses, worldwide. This study aimed to survey the Odonata species in different sites in Sudan to update data of Odonata in Sudan. A total of 184 individuals were observed from April 2012 to December 2013 and nineteen species of adult dragonflies and damselflies were collected and classified from 6 localities: Kassala, New Halfa, Dinder National Park, El Sabaloka Game Reserve, El Musawwarat and Om Dawwanban. Family Libellulidae showed highest diversity among the other families followed by family Congrinidae. Furthermore *Brachythemis leucosticte*, *Pantala flavescens* and *Trithemis annulata* from family *Libellulidae* present in all study area. With regards *Tramea limbata* was a new country record from Om Dawwanban area.

Key words: Odonata, Dragonflies, Damselflies, Sudan, Libellulidae, Om Dawwanban.

1. Introduction:

Sudan, with its vast territory, diverse climate and ecosystems, and different wetlands; is amongst the richest countries in insect diversity, wetlands like fresh water lakes, streams, (khores) in the areas of mountains and valleys in the rainy season and artificial pools considered are important for Odonata diversity and abundance, also the river Nile and branches provide good habitats for Odonata. Published studies of Odonata in the Sudan are very rare and in fact there are only two old papers by Ris (1912, 1924). on the Nile valley Odonata, and by Happold (1966) on Jebel Marra area and two recent contributions by El Rayah (1975) and El Rayah and Abu shama (1977, 1978). These primarily deal with the ecology of some species that occur near Khartoum. Dumont (1973, 1988); Dumont and Martens (1984) carried out a study on dragon flies species from the Red sea hills, the main Nile and Saharan part. In this study we aimed to

2. Material and Methods

2.1 Study area:

This study was carried out in April 2012 to December2013.

Fig 1: location of study areas

2.2 Kassala

Located in the east of Sudan (15º 40' N, 36º 41'E), different sites were visited in Kassala encluding: New Halfa and Eltaka Mountains lakes. Odonatas were observed around three lakes in front of Eltaka Mountains. There are Mesquite trees and grass near the lakes, dragonflies and damselflies were seen around the lakes. Also dry skin was observed on trees branches which were close to the water.

New Halfa is an agricultural land that contains running water canal used to supply the minor canals inside farms (abo sabaeen and abo aeshreen), the edge of the canal is bordered by grass and bushes.

2.3 Dinder National Park (DNP):

Dinder National Park is located in the south east of Sudan in three states: Sennar, Gadarif and Blue Nile state. DNP is extended into the Ethiopian borders. The water sources in DNP are represented by Dinder and El Rahad rivers, Khores like Glago Khore, Elaetanat and Kenana Khore. And wetlands are represented by a system known as Mayaa's. Mayaa's are low lands collecting amounts of water until the summer season.

2.4 Om Dawwanban:

Om Dawwanban, is a village north of Khartoum on the eastern bank of the Nile. There are artificial pools to collect rain water. Most odonata were seen flying above the water and rest on trees branches at the evening.

2.5 El Musawwarat

El Musawwarat is located in Nile River state (16º 22' N, 33º 22' E), about 170 Km from Khartoum. It is a semi desert area, there are

artificial pools protected from animals and human, also there are different species of plants such as *Acacia nilotica, Acacia ehrenbergiana, Maerua crassifolia and Leptadenia pyrotechnica.*

2.6 El Sabaloka Game Reserve (SGR)

Is located in Nile River state. There are *Acacia nilotica* on the edge of the Nile which is characterized by rocky substrate in this area.

3. Collection and preservation

Adult dragonflies and damselflies were collected using butterfly nets, samples were preserved dry in envelopes.

4. Identification

Samples were checked under dissecting microscope and identified according to Dragonflies and Damselflies of South Africa guide (Samways, 2008). Samples were then documented by photography using a 14 megapixel Sony Camera and a 16 megapixel Nikon.

5. Results:

Four families and nineteen species of adult dragonflies and damselflies were collected (Table 1).

Different Families:

1. **Lestidae:** *Lestes pallidus*, this species have a pale color, noted rest on dry tall grass. Only collected from ElMusawwarat which it driest habitat in all the study areas, and Om Dawwnban it was found until winter season.

2. **Coenagrionidae:**
   - *Ceriagrion glabrum*, was seen near the water resting on the grass and trees, adult were observed on November in El Sabaloka Game Reserve.
   - *Pseudagrion torrium:* was rare only one sample were found in each of Om Dawwanban, New Halfa and El Musawwarat, it was obtained on May in New Halfa until October in El Musawwarat.
   - *Pseudagrion hamoni:* was recorded in New Halfa as very common. It was observed flying along the irrigation canal and mating pairs were observed resting on the green grass in April.
   - *Pseudagrion niloticum:* was common in El Salaloka only. A copulating pair was observed flying near the water in November.
   - *Agriocnemis sp.:* one sample was recorded in Om Dawwnban. It was defficult to catch. A male specimen was obtained in Aguset for identification purposes.
   - *Ischnura senegalensis:* was abundant in all study areas except El Musawwarat and Om Dawwanban which are the driest habitats under study. A copulating pair was observed flying around aquatic plants during May in DNP in Ras Aamer Mayaa.

3. **Ashnidae:**
   - *Anax ephippger:* was rarely observed. Only two specimens were collected from El Musawwarat at night when they were attracted to the light.
   - *Anax imerator:* also rare, they were observed in Kassla and New Halfa and were difficult to catch.

Table (1) Dragonflies and damselflies collected during the course of this study

Species	**Families**	**Kassla**	**New Halfa**	**DNP**	**Om Dawwanbam**	**El Musawwarat**	**SGR**	**Total**
Lestes pallidus	Lestidae	-	-	-	+	+	-	3
Ischnura senegalensis	Coenagrionidae	+	+	+	-	-	+	28
Agriocnemis sp	Coenagrionidae	-	-	-	+	-	-	1
Ceriagrion glabrum	Coenagrionidae	+	+	-	-	-	+	6
Pseudagrion torrium	Coenagrionidae	-	+	-	+	+	-	5
Pseudagrion hamoni	Coenagrionidae	-	+	-	-	-	-	6
Pseudagrion niloticum	Coenagrionidae	-	-	-	-	-	+	6
Anax ephippger	Ashnidae	-	-	-	-	+	-	2
Anax imerator	Ashnidae	+	+	-	-	-	-	2
Crocothemis erythraea	Libellulidae	+	+	-	-	-	+	10
Diplacodes lefebvrii	Libellulidae	-	-	+	+	+	-	2
Orthetrum Sabina	Libellulidae	+	+	-	+	-	-	10
Orthetrum trinacria	Libellulidae	+	+	-	-	-	-	2
Brachythemis impartita	Libellulidae	-	+	-	-	-	-	3
Brachythemis leucosticte	Libellulidae	+	+	+	+	+	+	30
Pantala flavescens	Libellulidae	+	+	+	+	+	+	54
Trithemis annulata	Libellulidae	+	+	+	+	+	+	12
Tramea limbata	Libellulidae	+	_	_	_	_	_	1
Tramea basilaris	Libellulidae	_	_	_	+	_	_	1
Total								**184**

4. **Libellulidae**:

- *Crocothemis erythraea:* very common in New Halfa and Kassala, they were observed flying along the minor irrigation canal (Abo aeshreen), and also around the fishes farms.
- *Diplacodes lefebvrii:* rare, observed in DNP in March, April and May and in El Musawwarat in October. Happold (1968) mentioned that it was rare in Sunut forest and recorded in Khartoum between August and October and it is the same species found in Jabel Marra in the western Sudan according to (Happold, 1965).
- *Orthetrum Sabina:* was observed in New Halfa in April flying singly along the irrigation canal and it has a long flying season in Om Dawwanban starting from July to November.
- *Orthetrum trinacriawas:* rare only observed in Kassala in October, flying near the water and rest on tree branches on the edge, also observed in New Halfa in April.
- *Brachythemis impartita:* abundant was observed in April in New Halfa flying around the canals and on flat mud also
- *B. leucosticte:* abundant was observed in all the study areas from April until November.
- *Pantala flavescens:* was abundant. Observed in New Halfa in April; it appeared in Om Dawwnban in July flying in groups in large numbers and it was observed feeding in small flying insects at the evening and it observed in Kassala in October.
- *Trithemis annulata:* was generally common and found in all the study areas. Males were observed resting on twigs on trees.

Identification and description of *Tramea basilaris* (Fig 2):

Face: brown. Labrum dark brown. Anteclypeus, postclypeus and fronts lower margin and sides light brown peak.**Eyes:** above deep reddish brown, below light grey to dark grey mottles.

Synthorax: above light orange brown, sides dark brownish grey with dark brown areas.

Wings: pointed. Hindwing with an irregular dark red patch, almost broken center. Forewings all clear.

Pterostigmas: yellowish to reddish, brown, forewing 2.5 mm long, hindwings 2 mm long.

Abdomen: Segment 1 dark brown, S2-10 light red. S8 above with triangular, black patch, S9-10 all black above, S8, 9and 10 wit fine cream hind margins. Superior appendages very long, dark brown, lighter at base.

Female: similar to male in body colour grayish brown instead of reddish. Wing patches similar but brown rather than dark red.

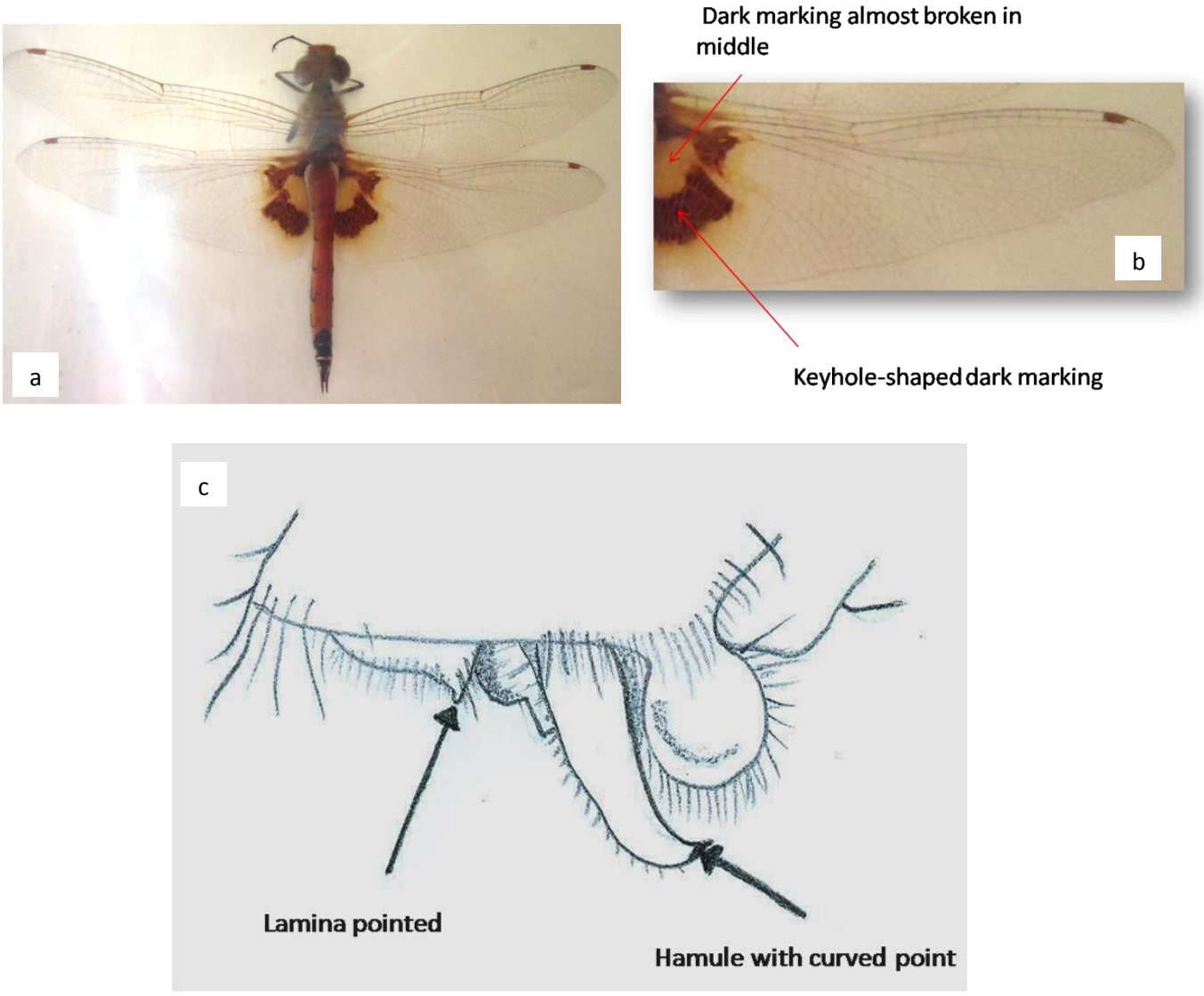

Fig 2: a) *Tramea basilaris*; b) Right forewing of *Tramea basilaris; c)* Secondary genitalia, in side view

Discussion

Adult dragonflies were fling at Khartoum during the rainy season (July -September), and after the rains (October -November) until the start of the winter season (Happold 1965).

No adult were seen in April in Khartoum, But in New Halfa different species were observed flying around artificial canal in April and May, some species it difficult to see like *Anax imerator* only two individuals were seen**.** *Pantala flavescens* showed highest number compared to other species (Table 2&Fig1) it was flying in groups, in Khartoum they were observed flying around small water canals which were used to pass the rainy water to the Nile.

New Halfa showed the highest diversity among the damselflies and dragonflies species (Table 1) also they observed flying for long period after the rainy the rainy season and that is may be because the irrigation canal around the farms contain water in all seasons not like kassla the artificial lake in front of Taka mountains dry up in the summer season, also the small lakes in Dinder national park dry up in the summer season.

After October the number of adult dragonflies and damselflies declines but a few *lestes pallidus*, *Orthetrum Sabina* and *Trithemis annulata* were seen flying in Om Dawwanban area in November and have disappeared after beginning of cool weather.

Some spices like *Pseudagrion hamoni* not obsarved in Khartoum during the study period but according to the literature review it was recorded in Blue Nile in Khartoum by Dumont and Martens (1984).

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