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RESEARCH ARTICLE

FIRST RECORD OF SOME AQUATIC FAUNA COLLECTED FROM QATARI INLAND WATERS WITH REFERENCE TO ARABIAN PENINSULA

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ABSTRACT

One of the man-made wetlands and natural inland waters in Qatar were investigated for the aquatic fauna from September 2010 up to June 2013 during random intervals. The investigations have revealed 24 species of macroinvertebrates: one Rotifer, 3 gastropods, one Notostracan, 2 Ostracods, 2 Copepods, one Cladoceran, one Odonatan, 2 Hemipterans, 5 Coleopterans and 6 Dipterans. Except Gastropods, Ostracods, Copepods and the Odonatan, all the remaining taxa are recorded for the first time in Qatar. Surprisingly, these man-made wetlands have created a favorable habitat for enriched numbers of aquatic organisms in such arid desert.

INTRODUCTION

The inland water fauna of Qatar seems to have a rich diversity in spite of the natural water resources are very scarce. Qatar like the other countries of Arabian Peninsula are geographically located in the worlds' most arid region, the north desert belt, and regarding to freshwater availability, it is one of the poorest regions (Amer *et al.*, 2006). The inland water of Qatar is mainly represented by scattered landfill areas which are formed – seasonally – after rainfall which is usually scanty. There is no permanent surface water in Qatar (Batanouny, 1981), however, some man-made wetlands have been established recently. These wetlands are receiving good quality treated wastewater from the main treatment plants. It is characterized by high organic matter that representing a good habitat for different species of freshwater organisms (Abulfatih *et al.*, 2002). There have been a few publications about the inland fauna of Qatar. The literatures revealed one study in which one of the most important wetland has been investigated ecologically and many meio-faunal species have been recorded (Alhag *et al.*, 2002).

Al-Khayat (2010) has recorded 5 terrestrial snails, some of them are likely been introduced as invasive species. Recently, ten species of mosquito larvae have been reported from the inland water of the north-eastern district (Kardousha, 2015). Regarding the inland water fauna, many studies have been encountered from Arabian Peninsula. In Oman, the macro-invertebrates of Inland water have received intensive studies (Victor and Al-Mahrouqi, 1996; Schneider and Dumont, 1997 and Burt, 2003). In Saudi Arabia, several studies have been accomplished to investigate the diverse communities of fresh water macro-invertebrate and zooplankton (Obuid-Allah, 2000; Abd El-Wakeil and Al-Thomali, 2013; Montaser *et al.*, 2014 and Al-Oufi and Obuid-Allah, 2014). In Yemen, inland water fauna has received a good attention (Boormanand van Harten, 2002; Merabdullayev *et al.*, 2002). The current study is the first survey of some important aquatic fauna - especially aquatic insects - which are considered as promised and effective agents in biological control of mosquito larvae which has been practiced in some adjacent countries (Alahmed *et al.*, 2009).

MATERIALS AND METHODS

Study area

Samples were collected from Abu-Nakhla wetland which is the oldest and biggest wetland in Qatar that located by nearly 12

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Km southwestern of Doha city. It is receiving the excess of treated wastewater effluent that is discharged from the main treatment stations of Doha city. Sampling also were carried out from different natural temporally wetlands which scattered among Al-Khor district at the northeastern part (Fig 1).

Sampling methods

This study is a descriptive one that was performed through random sampling during field trips of mosquito larvae collection which has been extended from September 2010 up to June 2013. Collection and preservation of specimens was done at the study sites while methods of identification were achieved in the laboratory. The collection equipment was composed of D-frame net collector and plastic jars. Samples were preserved in plastic collection jars, brought to the laboratory of the department of biological and environmental Science of Qatar University, sorted, and preserved in 80% ethanol. The date and location of sampling were reported. The samples were studied using stereo-types microscope and Identification was completed using the available keys and publications to reach at least the generic level (Heinertz, 1979; Waterson 1980; Linnavouri and Alamy, 1982; Cranston and Judd, 1989; Krupp *et al.*, 1990; Delmori, 1991; Williamson, 1991; Segars and Dumont, 1993; Schneider and Krupp, 1993; and Al-Ahmadi and Salem, 1999).

RESULTS AND DISCUSSION

A total of 24 species were found in all sampling wetlands. Among these, Diptera are dominating group of 6 species, Coleoptera comprise of 5 species, Gastropods of 3 species, Hemiptera of 2species, Ostracods of 2species, Copepods of 2species while Odonata, Cladocera, Notostraca and Rotifera are least diverse groups of only one species each (Table 1).

Diptera

The Diptera are the most dominating group in all investigated wetlands that shown clearly in Table (1).The non-biting midge's larvae of *Chironomus sp* are dominating in Abu-Nakhla and AL-Khor wetlands (Fig 2). The mosquito larvae of *Aedes caspius*, *Culex pusillus* and *C. pipiens* complex are distributed in all wetlands also (Figs. 3, 4 and 5). The pupae of brine flies *Brachydeutera sp* and lake shore flies *Ephydra sp* are also dominated (Figs 6 and 7). The dominance of the 3 collected species of mosquito larvae concur with the findings of the two previous studies that was carried out by Mikhail *et. al.*, (2009) and Kardousha (2015). *Chironomus* larvae, as well as, *Brachydeutera* and *Ephydra* pupae are recorded for the first time in Qatar. However, it was received an intensive study in Arabian Peninsula (Cranston and Judd, 1989; Boorman and Harten, 2002).

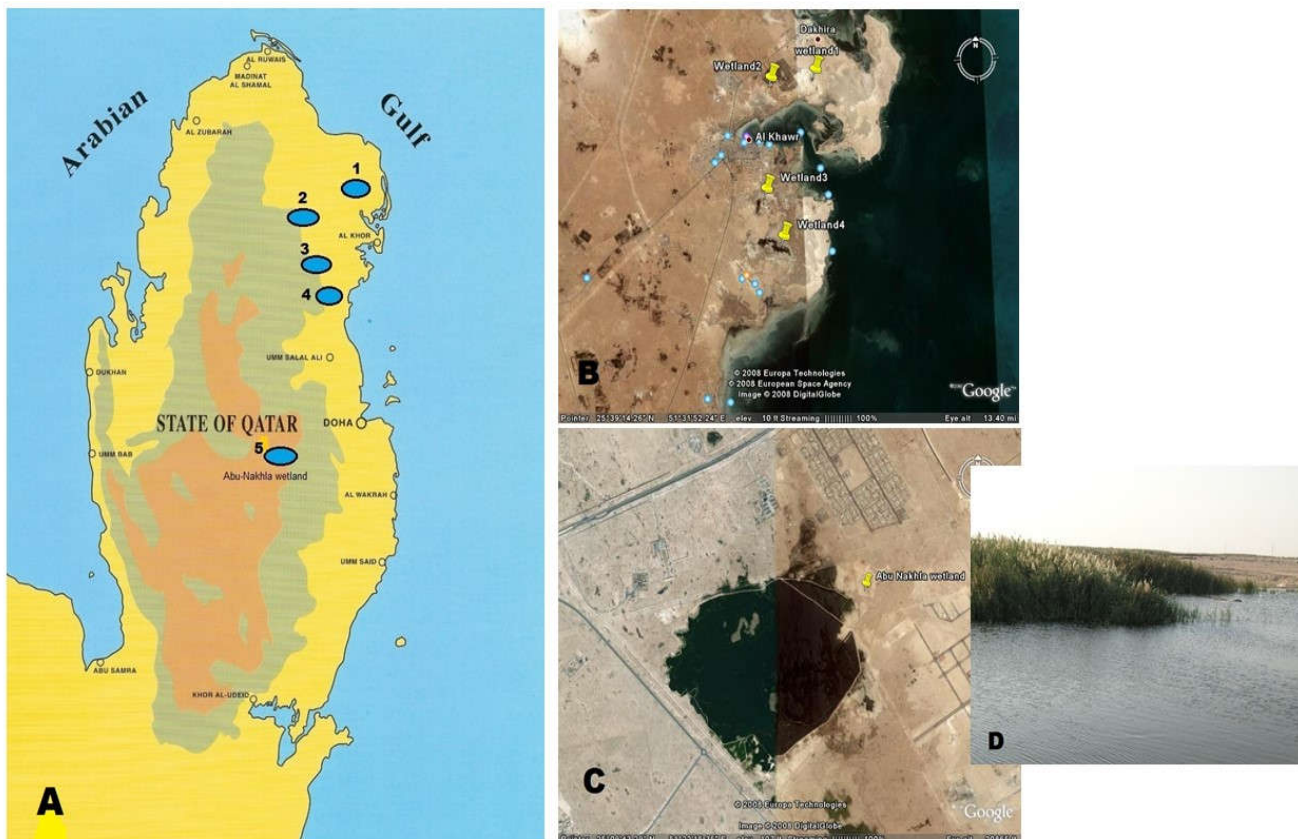
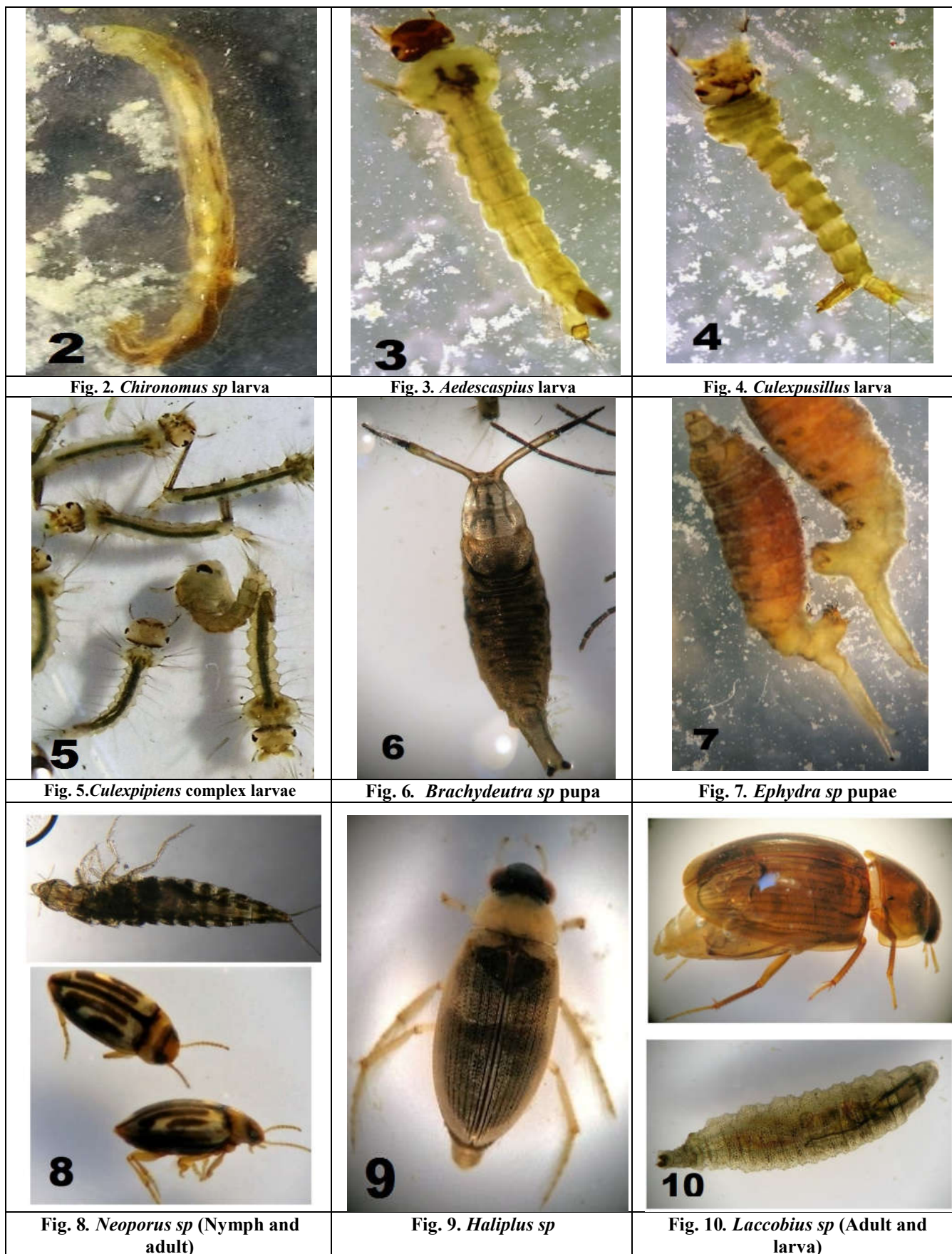











Figure 1. (A) a map of Qatar showing the location of the five study wetlands; the first 4 are located in Al-Khor district, northeastern side and (5) is Abu-Nakhla, a man-made wetland which located southwestern of Doha city. (B) Google map of the 4 Wetlands in AlKhor district. (C) Google map of Abu-Nakhla wetland. (D) a landscape photograph for Abu-Nakhla, the man-made wetland



 <p>11</p>	 <p>12</p>	 <p>13</p>
<p>Fig. 11. <i>Hydrophilus</i> sp</p>	<p>Fig. 12. <i>Stenopelmus</i> sp</p>	<p>Fig. 13. The backswimmer <i>Anisops</i> sp</p>
 <p>14</p>	 <p>15</p>	 <p>16</p>
<p>Fig. 14. The boatman <i>Sigara striata</i> (Nymph and adult)</p>	<p>Fig. 15. Anisopteran dragon fly larva</p>	<p>Fig. 16. The tadpole shrimp <i>Triops longicaudatus</i> (dorsal view)</p>
 <p>17</p>	 <p>18</p>	 <p>19</p>
<p>Fig. 17. The tadpole shrimp <i>Triops longicaudatus</i> (ventral view)</p>	<p>Fig. 18. Ostracods from Abu-Nakhla wetland</p>	<p>Fig. 19. Ostracods from Al-Khor wetlands</p>

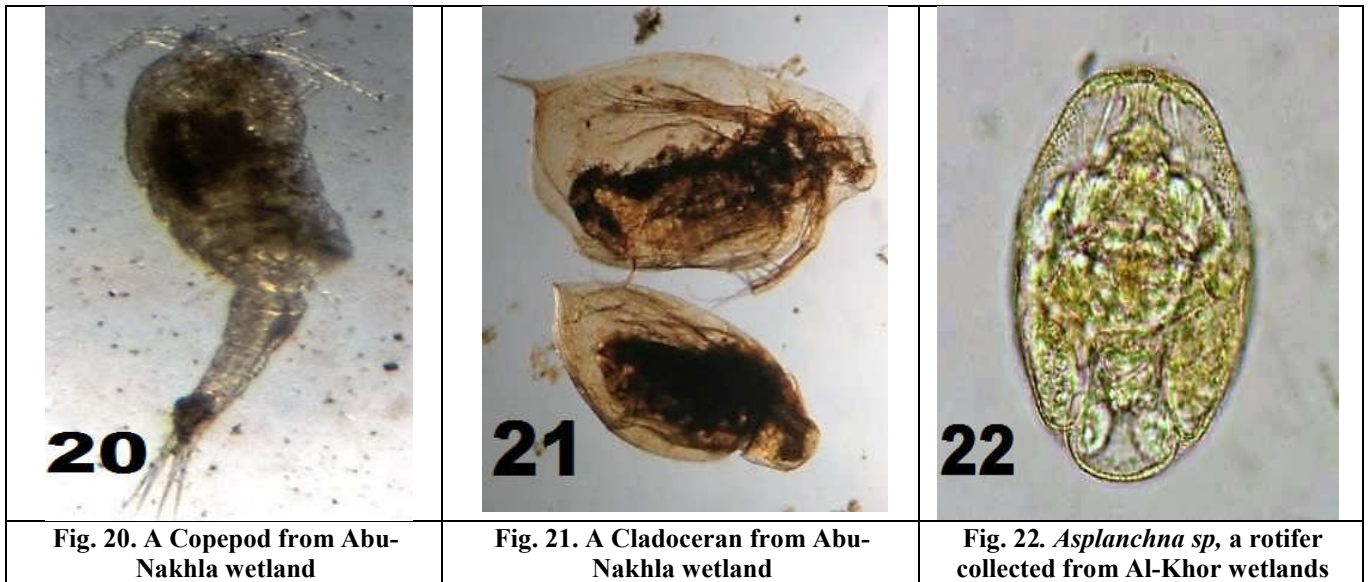


Fig. 20. A Copepod from Abu-Nakhla wetland

Fig. 21. A Cladoceran from Abu-Nakhla wetland

Fig. 22. *Asplanchna sp.*, a rotifer collected from Al-Khor wetlands

Table 1. Annotated list of recorded Taxa from different wetlands in Qatar; Abu-Nakhla, the man-made wetlands and Al-Khor natural temporally wetlands. Abundance categories represent the mean number which collected at each habitat, present with few numbers <10 (+), common with >10 to 30 (++) , abundant >30 (+++). Larval stages (L) and adults (A)

Taxa species	Abu-Nakhla wetland	Al-Khor wetlands
ROTIFERA		
Asplanchnidae		
<i>Asplanchna sp*</i>	-	++
GASTROPODA		
Subulinidae		
<i>Zooticusinsularis</i>	+	+
Hygromiidae		
<i>Monachaobstructa</i>	+	-
Polygyridae		
<i>Polygyracereolus</i>	+	-
NOTOSTRACA		
Triopsidae		
<i>Triops longicaudatus (A)*</i>	-	++
OSTRACODA		
Ostracod (Abu-Nakhlatype)	+++	-
Ostracod (Al-Khortype)		++
COPEPODA		
Copepodid (Abu-Nakhla type)	++	-
Copepodid (Al-Khor type)	-	++
CLADOCERA		
Cladoceran sp	++	-
ODONATA		
Anisopteran (L)*	++	++
HEMIPTERA		
Notonectidae		
<i>Anisops sp (A)*</i>	+	+++
Corixidae		
<i>Sigara striata (A, L) *</i>	++	+++
COLEOPTERA		
Dystiscidae		
<i>Neoporus sp (A, L) *</i>	-	++
Haliplidae		
<i>Halipus sp (A) *</i>	-	++
Hydrophilidae		
<i>Laccobius sp (A, L) *</i>	-	++
<i>Hydrophilus sp (L)*</i>	+	+
Curculionidae		
<i>Stenopelmus sp (A)*</i>	+	++
DIPTERA		
Chironomidae		
<i>Chironomus sp (L)*</i>	+++	+++
Culicidae		
<i>Aedes caspius (L)</i>	++	++
<i>Culex pipiens complex (L)</i>	+++	+++
<i>Culex pusillus (L)</i>	+++	+++
Ephydriidae		
Brachydeutera Pupa (L)*	+++	+++
<i>Ephydra pupa (L)*</i>	+++	+++

(*) New records of Qatari inland water fauna

Coleoptera

The coleopterans are represented by 5 species of aquatic insects, four of them were collected as adult stages. The encountered species were: *Neoporussp* (Fig 8), *Haliphus sp* (Fig 9), *Laccobius sp* (Fig 10), *Hydrophilussp* (Fig 11) and *Stenopelmus sp* (Fig 12). The specimens need more investigation to reach the species level. The first three types have been found only in Al-Khor area (Table 1). Although, aquatic coleopterans have been thoroughly investigated in different localities of Arabian Peninsula (Heinertz, 1979; Olmi, 1980; Gentili, 1989 and Hebauer, 1997), there is no records have been found among the available entomo-fauna of Qatar (Abdu, 1985).

Hemiptera

The most prominent aquatic hemipteran which have been encountered by high numbers are the backswimmer *Anisops sp* (Fig 13) and boatman *Sigarastrriata* (Fig 14). Both species were found dominated all sampling areas (Table 1). *Sigarastrriata* has been recorded previously as *Sigara sp* during an entomological survey (Abdu, 1985), while *Anisops sp.* is reported for the first time among Qatari insects. There is a strong evidence to use *Sigaraspecis* as larvicide agent against mosquito larvae. Alahmed *et al.*, (2009) have investigated the predatory Efficacy of *Sigarahoggarica* against mosquito larvae of *Culexquinquefasciatus* and found that the predatory activity was very high against early stages of mosquito larvae. From this point of view, it is urgently recommended to investigate the potentially of this species to be used as an important factor in integrated mosquito control programs in Qatar.

Odonata

It is represented in this study by one Anisopteran larval type (Fig 15) which has been found in both types of study area. Odonate larvae are likely to be expected common in all wetland habitat and need regular sampling. Odonata was investigated intensively in different localities in the Arabian Peninsula (Waterson, 1984; Schneider and Krupp, 1993 and Schneider and Dumont, 1997).

Crustacea

The study revealed 6 types of Crustaceans which comprise one Notostraca can; *Triopslongicaudatus* (Fig 16 and 17), two types of Ostracods; Abu-Nakhlatype (Fig 18) and Al-Khor type (Fig 19), one type of Copepods: Abu-Nakhlatype (Fig 20) and one type of Cladoceran (Fig 21). Ostracods, Copepods and Cladoceran are needed more investigation for precise identification, however, some related species have been previously report in Qatar (Al Hag, 2002). The tadpole shrimp *Triopslongicaudatus* is recorded for the first time in Qatar while it was intensively described from the northwestern side of the Peninsula (Aloufi and Obuid-Allah, 2014).

Rotifera

One rotifer species which related to the genus *Asplanchna* has been collected from Al-Khor wetlands (Fig 22). Literatures revealed one rotifer species has been recorded from Abu-Nakhlatype wetland (Alhag *et al.*, 2002), in spite of numerous

species were recorded from the peninsula (Segars, and Dumont, 1993).

Gastropoda

Three fresh water snails are reported during this study, *Zooticusinsularis*, *Monachaabstracta* and *Polygyracereolus* which are shown in Table (1). The species *Polygyracereolus* is thought to be an invasive species which recently introduced to the Peninsula (Al-Khayat, 2010).

Conclusion

The present study concludes that the inland water of Qatar which are mainly represented by made-made wetlands and natural temporary wetlands are enriched with freshwater fauna that need more intensive studies. In addition, efforts should be given to study the predatory activity of the aquatic insects to be used, efficiently, as mosquito control agents in future programs of mosquito control.

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