Mesopot. J. Mar. Sci., 2016, 31(1): 1 - 14

New record of Chromistan parasites of copepods and rotifers in Iraqi marine and brackish waters

T.A. Khalaf[1*], A.H.H. Awad[2] and M.S.S. Morad[2]
[1] *Marine Science Centre,* [2] *College of Education, University of Basrah, Basrah - Iraq*
**e-mail: drtalibabbas@hotmail.com*

(Received: 28 Jan. 2015 - Accepted: 1 March 2016)

Abstract - The present study was focused on the infections of some zooplankton groups (copepoda and rotifer) with ecto and endo parasites in Iraqi marine and estuarine brackish water during the period from January to the end of October 2010 by seasonally intervals. Samples were collected from 5 selected stations represent Iraqi marine and brackish waters. Many parasites were recorded on copepods and other zooplankton in the study area, these are: *Ellobiopsis chattoni*, *Ellobiopsis* sp., *Thalassomyces* sp., *Blastodinium* sp., *Zoothamnium* sp., Dinoflagellate and peritrich ciliates. These parasites were recorded for the first time in Iraqi marine and brackish waters except for *Ellobiopsis chattoni,* and the genus *Thalassomyces* sp. which were recorded in Kuwaiti waters before. The percentage and the intensity of infections were studied; the highest percentage of infections copepods was 35.7% in winter at station 4, while the lowest was 0.73% at stations 2 during autumn. The highest percentage of infections in rotifers was 9.49% at station 1 during autumn, while the lowest percentage was 0.15 % at station 3 during winter. The highest mean intensity of the copepods was 12.03 at station 1 during summer, while the lowest value was 1.05 in the same station during autumn. The highest mean intensity of the copepods and rotifers was 6.3 at station 2 during summer, while the lowest was 0.8 in the same station during autumn. Scanning Electron Microscope (SEM) was used in this study for identification of some ecto parasites of copepods.

Keywords: New record, parasites, copepods, rotifers, marine water and brackish waters.

Introduction

The existence of parasites is well documented in marine zooplankton, while the knowledge on the effect of parasites on zooplankton populations are limited (Ho and Perkins, 1985).

A considerable amount of researches has been devoted to the taxonomy of parasites of marine zooplankton (Chatton, 1920; Sewell, 1951; Theodorides, 1989). But the prevalence of parasites, their ecological relevance and their influence on energy transfer in pelagic ecosystems remain poorly resolved (Skovgaard, 2005; Skovgaard and Saiz, 2006). The most frequent parasites in marine zooplankton appear to be protists, and most of these are hosted by copepods (Chatton, 1920); however, appendicularians, chaetognaths, radiolarians are also parasitized (Theodorides, 1989).

The parasitic dinoflagellate of marine crustacean inhabits the eggs, stomach, soft tissues and hemisinuses of their hosts (Jeffery, 1994). The effect of parasitism on the individual zooplankton host varies with parasite species. Some species, such as ellobiopsids, induce sterility in the infected females (Wickstead, 1963, Albaina and Irigoien, 2006).

The same applies to the dinoflagellate genus *Blastodinium* (Chatton, 1920; Sewell, 1951; Skovgaard, 2005). *Syndinium* spp. Comprises an example of lethal parasites that literally devour their host (Chatton, 1920).

A number of dinoflagellates are parasites of marine zooplankton organisms (Chatton, 1920) and at times, these parasites may contribute significantly to the mortality of copepod populations (Ianora, *et al*., 1990; Kimmerer and McKinnon, 1990).

The parasite *Ellobiopsis chattoni* was recorded for the first time in the Arabian Gulf, dimensions of the mature parasite are about 70oμm in length by 35oμm in breadth (Al-Yamani and Fahmi, 1995; Al-Yamani *et al*., 2011). Three other ellobiopsid species are belonging to the genus *Ellobiopsis*, are known to infect marine copepods (Boschma, 1959), upon which they are found attached to antennae, on or near the feeding appendages (Skovgaard, 2004). The parasites absorb nutrition from the hosts deteriorating their health and eventually lead to their mortality (Santhakumari and Saraswathy, 1979).

Parasites may play an important role in controlling seasonal abundance cycles in coastal copepod populations. At the individual level, parasites can arrest development, induce intersexuality, cause sterility and even death in the host (Chatton, 1920).

Different studies were carried out recently in the fields of taxonomy and ecology of protozoan parasites worldwide (Bhandare and Ingole, 2008; Visse, 2007; Manca *et al*., 2004; Moon *et al*., 2008; Ohtsuka *et al*., 2004; Willey, *et al*., 1990, Wing, 1975; Walkusz and Rolbiecki, 2007). The aim of this study is identify the chromistan parasites which infect copepods, rotifers and other zooplankton in Iraqi marine and brackish water Southern Iraq.

Materials and Methods

Zooplankton samples were collected seasonally from surface water at different five stations in Iraqi waters during the period from January 2010 to the end of October 2010, (station 1, 30°25'18.39"N - 47°46'10.15"E), (station 2, 30°23'39.44"N - 47°46'59.57"E), (station 3, 30°11'22.50"N - 47°53'15.05"E), (station 4, 29°56'44.70"N - 48°33'54.82"E) and (station 5, 29°47'14.03"N - 48°43'49.23"E) (Fig. 1), during daytime with respect to tide. Samples were collected using a 120 μm mesh-sized zooplankton net of mouth aperture 40 cm in diameter with a digital flow-meter (model 438 110) Hydro bios Ltd., the net was horizontally towed. Samples were transferred to plastic container, immediately fixed with 4-6% formaldehyde solution.

Two subsamples were taken from diluted sample in each station. The counting was carried out based on Wickstead (1965), by using a Bogorov counting tray. Host specimens were examined under dissecting and compound microscope and photographed by a digital camera (1x us 8015).

All the specimens were analyzed and identified to the possible taxa (zooplankton and parasites). The identification of the ecto and endo parasites were carried out according to the following references: Sewell (1951); Fahmi and Hussain (2003); Manca *et al*. (2004); Ohtsuka *et al*. (2004); Skovgaard (2005); Skovgaard and Saiz (2006); Walkusz and Rolbiecki (2007). Some of the infected copepods were sent to Prof. Dr. Dag Olav Hessen of the biological department, faculty of mathematics and natural sciences of Oslo University, for scanning electron microscope (SEM) inspection.

Some photographs of infected copepods were sent to Prof. Dr. Alf Skovgaard, department of veterinary pathobiology, faculty of life sciences, University of Copenhagen, Denmark, for confirmation of the identification of some ecto and endo parasites. Three infected groups were been identified as copepods (which identified to species level), rotifers and other zooplankton.

The percentages of infection for individuals of the zooplankton were calculated according to (Margolis *et al.*, 1982)

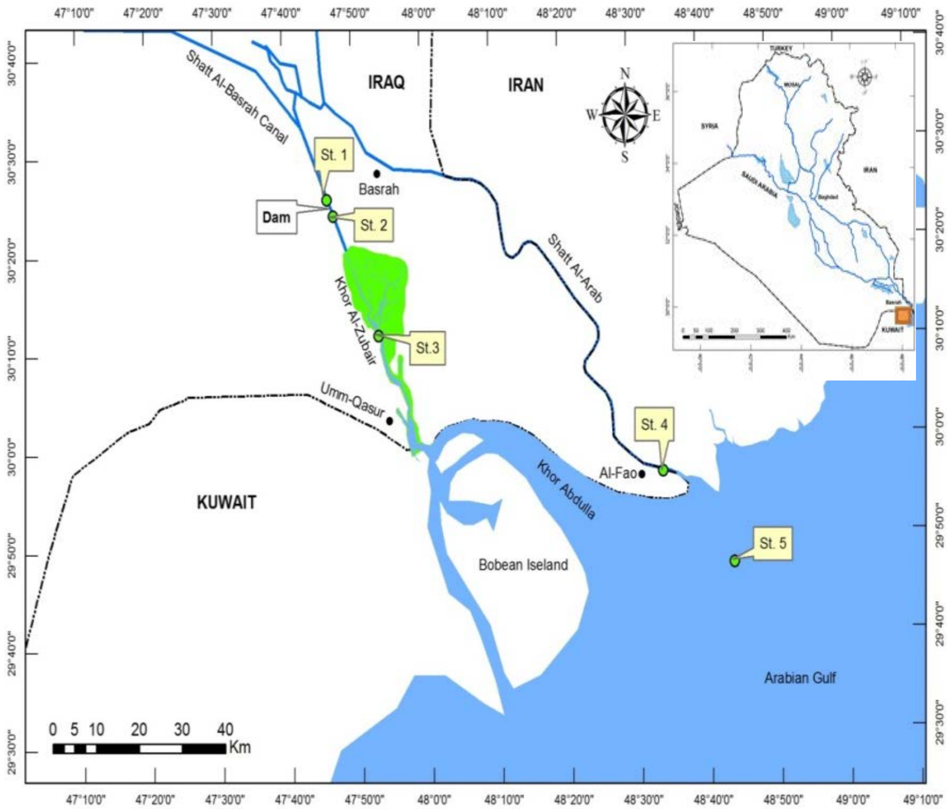

Figure 1. A map showing the studying area.

Results

Classification

Domain Eukaryota Whittaker and Margulis, 1978
Kingdom Chromalveolata Adl *et al*., 2005
Superphylum Alveolata Cavalier-Smith, 1991
Phylum Dinozoa T. Cavalier-Smith, 2004
Infraphylum Protalveolata Cavalier-Smith, 1991
Class Ellobiopsea Loeblich, 1970
Order Ellobiopsida Coutiere, 1911
Family Ellobiopsidae Coutiere, 1911
Genus *Ellobiopsis* Caullery, 1910

Ellobiopsis chattoni Caullery, 1910
Thalassomyces niezabitowski, 1913
Class Dinophyceae
Order Blastodiniales
Family Blastodinidae
Genus *Blastodinium* Chatton, 1906
Phylum Ciliophora Doflein, 1901
Subphylum Intramacronucleata Lynn, 1996
Class Oligohymenophorea de Puytorac *et al.*, 1974
Subclass Peritrichia Stein, 1859
Order Sessilida Kahl, 1933
Family Zoothamniidae Sommer, 1951
Genus *Zoothamnium* Bory de St. *et al.*, Vincent, 1826

Taxa of parasites infected zooplankton:

Many taxa of parasites on zooplankton were recorded for the first time in the study area (Figs. 2-19) as follows:

***Ellobiopsis chattoni* (Caullery 1910)**

This parasite infected *Ectinosoma* (*Halectinosoma*) sp. (Fig. 2).

***Ellobiopsis* sp.**

Acartia (Odonatacartia) pacifica (male and female) were infected with *Ellobiopsis* sp. (Figs. 3 and 4).

***Thalassomyces* sp.**

Thalassomyces sp. was found on calanoid`s copepodite stages, *Acartia (Odonatacartia) pacifica* and naupliar stage of copepod (Figs. 5, 6 and 7).

***Blastodinium* sp.**

This parasite was found in *Labidocera minuta* (female) and *Acartia (Odonatacartia) pacifica* (female) (Figs. 8 and 9).

***Zoothamnium* sp.**

Zoothamnium sp. parasitized on *Pseudodiptomus ardjuna* (female) (Fig. 10) and *Acartia (Odonatacartia) pacifica* (male) (Figs. 12, 13 and 14).

Peritrich ciliates

The peritrich ciliates parasitized *Ectinosoma* (*Halectinosoma*) sp., *Bestiolina Arabica* (male), *Acrocalanus gibber* (male), *Oithona attenuata* (female) and *Microsetella* sp. (Figs. 11, 15, 16, 17 and 18).

Dinoflagellates

The dinoflagellates were diagnosed in *Brachionus rotundiformis* and other Rotifers species (Fig. 19).

The parasites *Ellobiopsis chattoni*, *Ellobiopsis* sp., *Thalassomyces* sp., *Blastodinium* sp. and *Zoothaminium* sp. as well as unidentified dinoflagilletes and peritrich ciliates were recorded on the collected zooplankton during the study period.

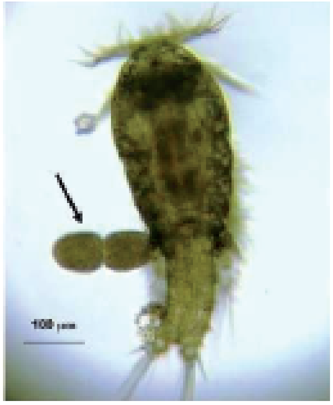

Figure 2. *Ectinosoma* (*Halectinosoma*) sp. infected with *Ellobiopsis chattoni* (→).

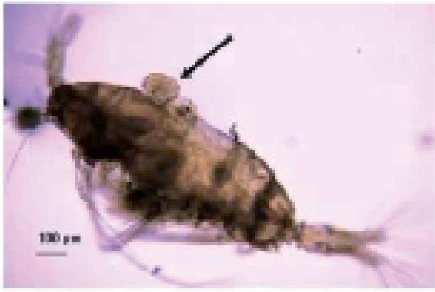

Figure 3. *Acartia (Odonatacartia) pacifica* (male) infected with *Ellobiopsis* sp. (→).

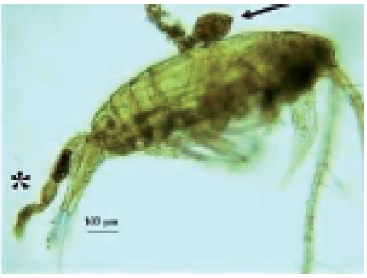

Figure 4. *Acartia (Odonatacartia) pacifica* female) infected with *Ellobiopsis*) sp. (→) an unknown ecto parasite (*)

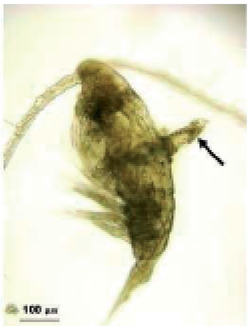

Figure 5. Copepodite stage(Calanoida) infected with *Thalassomyces* sp .(→)

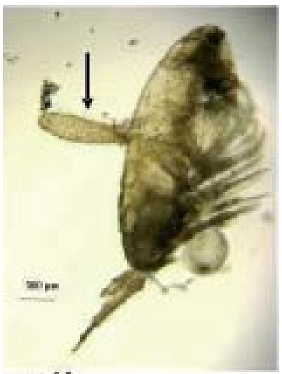

Figure 6. *Acartia (Odonatacartia) pacifica* (Female) infected with *Thalassomyces* sp. (→)

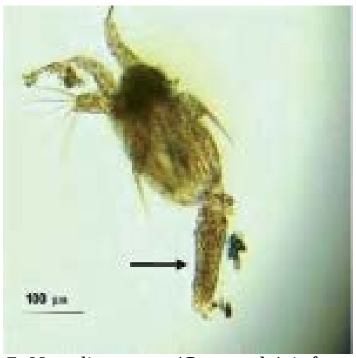

Figure 7. Naupliar stage (Copepoda) infected with *Thalassomyces* sp. (→).

Figure 8. *Labidocera minuta* (female) infected with *Blastodinium* sp. (→)

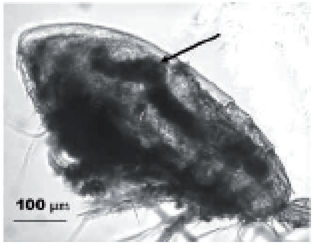

Figure 9. *Acartia (Odonatacartia) pacifica* (female) infected with *Blastodinium* sp. (→)

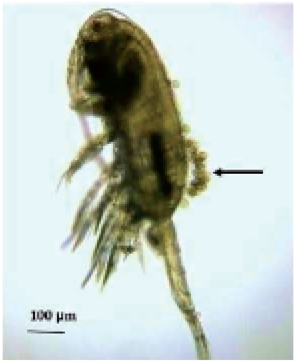

Figure 10. *Pseudodiaptomus ardjuna* (female) infected with *Zoothamnium* sp. (→).

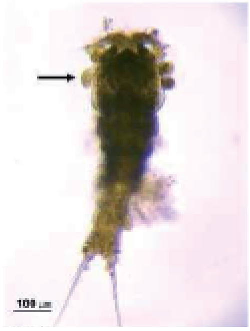

Figure 11. *Ectinosoma* (*Halectinosoma*) sp. infected with ecto-parasite peritrich ciliates (→) .

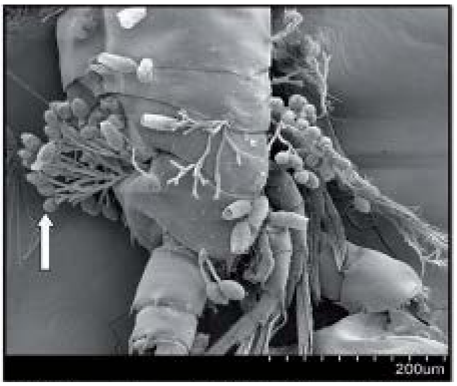

Figure 12. Photomicrograph (SEM) of *Acartia (Odonatacartia)* pacifica (male) infected with *Zoothamnium* sp.(→) .

Figure 13. Photomicrograph (SEM) of *A. (O.) npacifica* (male) infected with *Zoothamnium* sp.(→) .

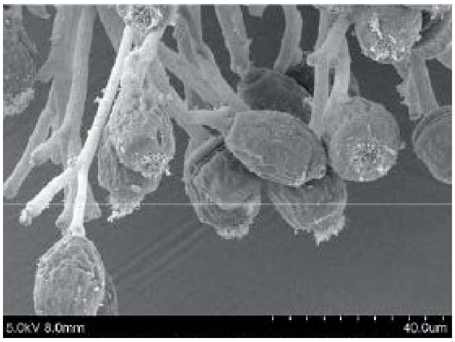

Figure 14. Photomicrograph (SEM) of *Zoothamnium* sp. (enlarged from Figure 18).

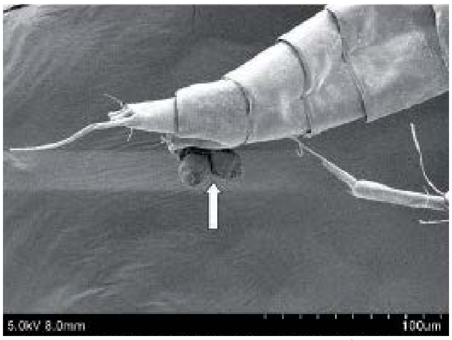

Figure 15. Photomicrograph (SEM) of *Bestiolina Arabica* (male) infected with peritrich ciliates (→).

Figure 16. *Acrocalanus gibber* (male) infected with peritrich ciliates (→) .

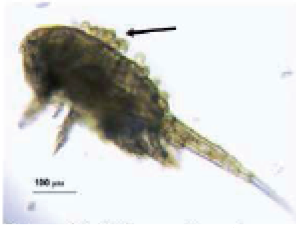

Figure 17. *Oithona attenuata* (female) infected with peritrich ciliates (→) .

Figure 18. *Microsetella* sp. infected with peritrich ciliates (→) .

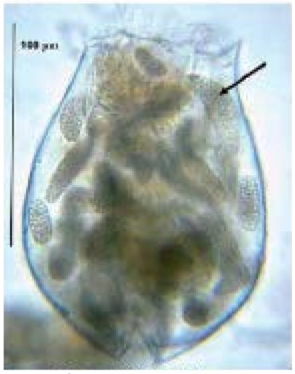

Figure 19. Rotifera (*Brachionus rotundiformis*) infected with endo parasite (→) Dinoflagellates

The percentage of infected zooplankton at five stations:

The variations of percentage and intensity of the infected zooplankton were studied at all stations (Figs. 20, 21, 22, 23 and 24).

At station (1), the highest percentage of the infected zooplankton was 66.6% recorded in *Parvocalanus crassirostris* during winter, while the lowest value was 0.34 % recorded in copepod nauplii during autumn.

The highest percentage of infection in station (2) was 77.27 % recorded in *Acartia (Acartiella) faoensis* during winter, while the lowest was 0.21% in copepod nauplii during summer. The highest percentage of infection at station (3) was 50% recorded in *Oithona attenuate* and *Pesudodiaptomus ardjuna*during spring and summer respectively, while the lowest value was 0.41% recorded in rotifers during winter. At station (4) the highest percentage was 50% recorded in *Euterpina acutifrons* during winter, while the lowest value was (0.6%) recorded in *Oithona attenuata* during spring. The highest percentage at station (5) was 50% recorded in *Acartia (Odonatacartia) pacifica* during summer, while the lowest value was (0.58%) recorded in *Coryceaus (Dithrichocoryceaus) lubbocki*during autumn.

Total percentage of infections in copepods and rotifers:

The highest percentage of infection in all Copepods (35.7%) was counted in winter at station (4), while the lowest was (0.73%) at stations (2) during autumn (Fig. 20). The highest percentage of infection in rotifers was (9.49%) at station (1) during autumn, while the lowest was (0.15 %) at station (3) during winter (Fig. 21).

Total percentage of infections in all zooplankton:

The highest percentage of infection in all zooplankton was (31.9%) at station (4) during winter, while the lowest was (0.89%) at station (2) during autumn (Fig. 22).

Total intensity of infections in copepods and all zooplankton:

The highest total intensity of the infected copepods was (12.03) recorded at station (1) during summer, while the lowest was 1.05 in the same station during autumn (Fig. 23). The highest value of intensity of infected all zooplankton was (6.3) at station (2) during summer, while the lowest was 0.8 was during autumn at station (2) (Fig. 24).

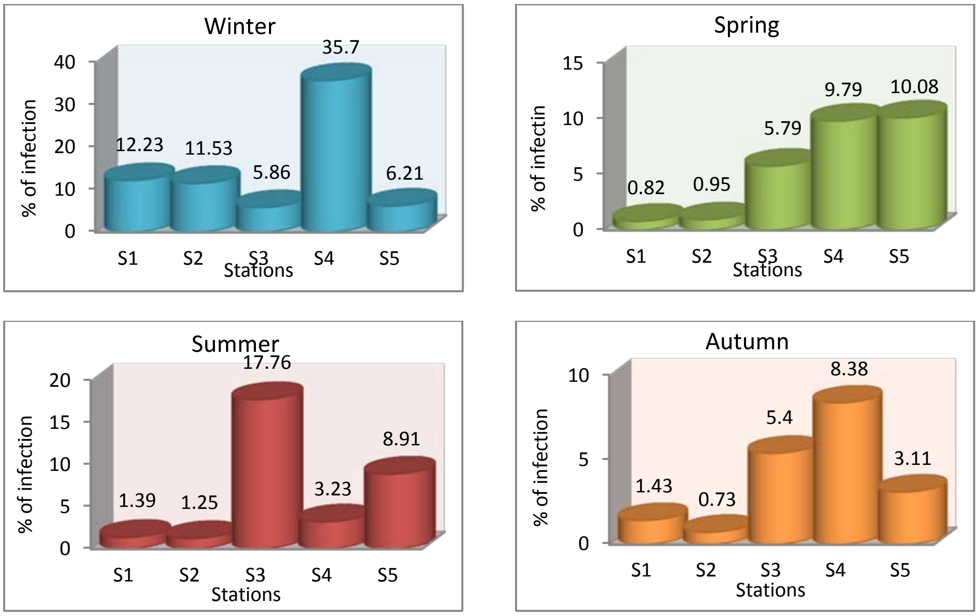

Figure 20. The total percentage of infected copepods at five stations during 2010.

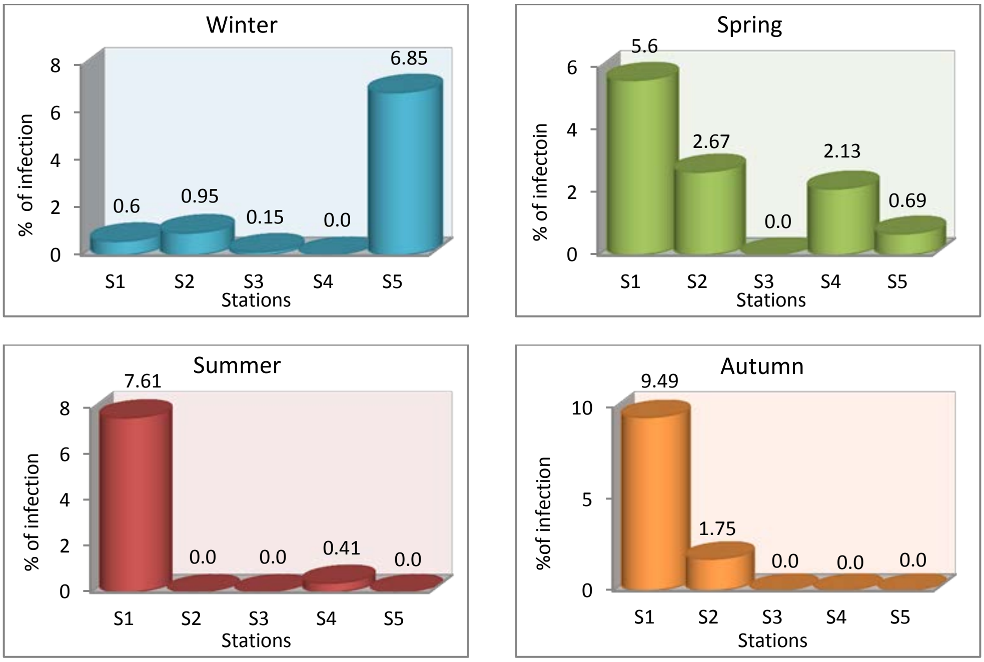

Figure 21. The percentage of infected Rotifers at five stations during 2010.

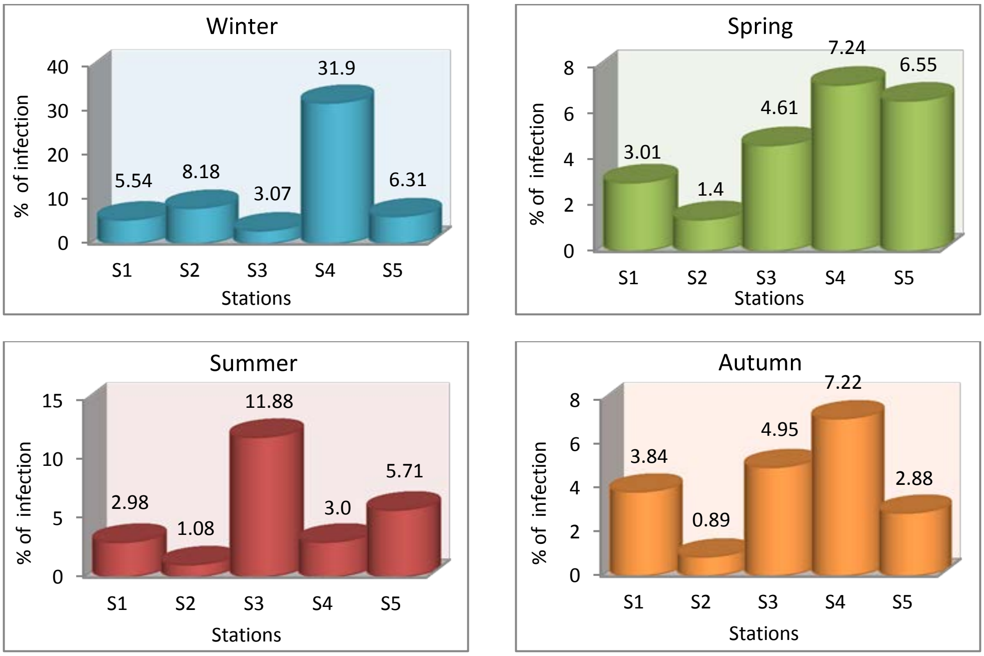

Figure 22. The total percentage of infected zooplankton at five stations during 2010.

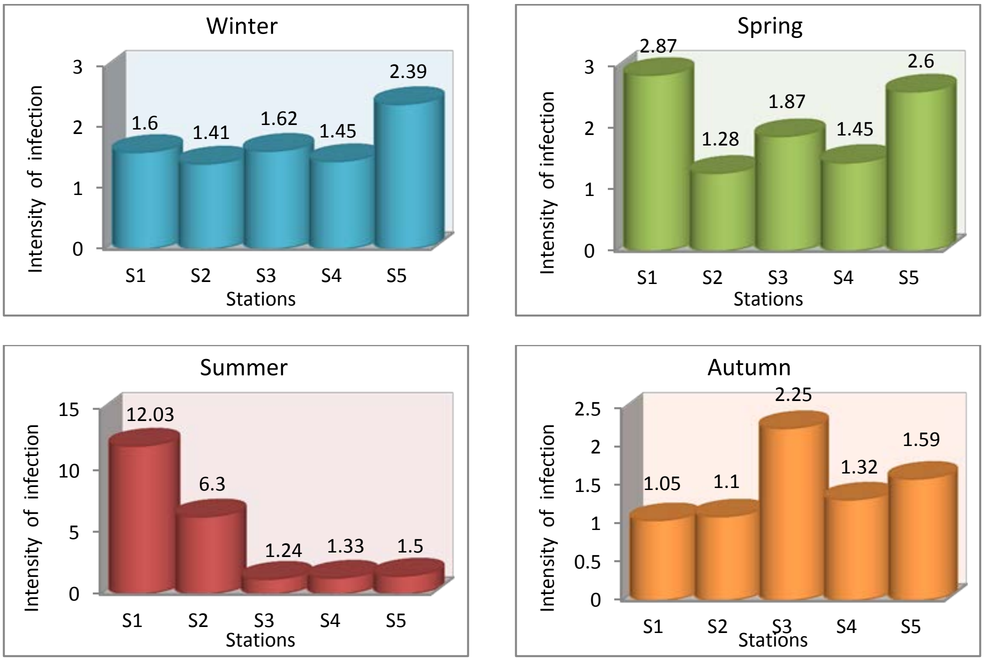

Figure 23. The total intensity of the infection copepods at five stations during 2010.

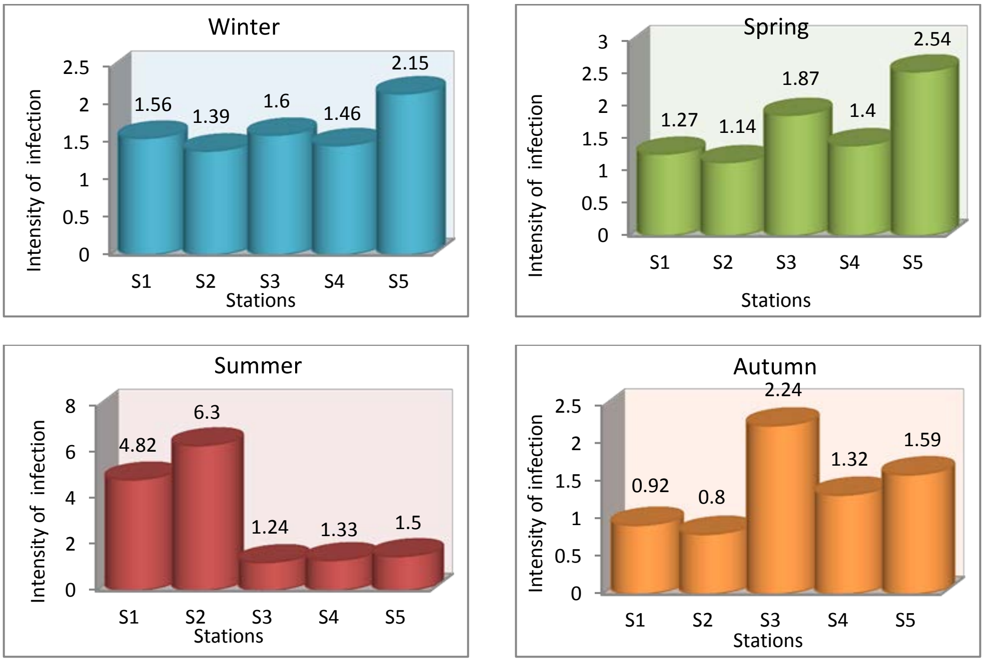

Figure 24. The total intensity of the infection in zooplankton at five stations during 2010.

Discussion

The present study showed that the highest percentage of infection in *Acartia (Acartiella) faoensis*, *Bestiolina arabica*, *Acartia (Odontacartia) pacifica*and *Acrocalanus gibber*at station (2) was during winter, where more of these parasites prefer the cold water (Sewell, 1951). The highest value of percentage of infection in most stations had been found in winter and, the highest intensity of infection of all zooplankton with ecto and endo-parasites was recorded at station (2) during summer. The unhealthy individuals and those of overwintering generations are more susceptible to parasitism (Zhong, 1989).

The organic pollution in Shatt Al-Basrah canal, which is caused by discharge of Hamdan sewage treatment may, reduces the resistance of the zooplankton against parasites (Al-Imarah *et al.*, 2010, 2003).

The fertilizer factory and petrochemicals company throw their discharges in Shatt Al-Basrah canal the Cl, SO_4, PO_4, NO_3, Oil, TDS and TSS, added to Shatt Al Basrah canal, most of them came from the discharge of fertilizer and petrochemicals factories (Hassan *et al.*, 2011).

The toxic chemicals and excessive metal concentration weakened the exoskeleton of the copepods making them more susceptible to the attachment by the ecto parasites such as *Ellobiopsis* sp. (Bhandare and Ingole, 2008). Fahmi and Hussain (2003) referred to the infected copepods by parasites in Kuwaiti waters may be partly due to the impact of six to eight million barrels of oil spilled into the Arabian Gulf during the Gulf war in 1991 threatening the marine life of the entire Gulf.

In the Arabian Gulf, some of the parasitized copepods were slightly deformed in shape, and smaller than their non-parasitized counterparts, possibly because the parasites draw heavily on the metabolic resources of their hosts (Al-Yamani and Fahmi, 1995).

Most of the parasites of zooplanktonic hosts are from protista and its assemblages (Theodorides, 1989). Several dinoflagellates are extracellular parasites, while others are intracellular. Their effects on hosts vary from almost harmless to fatal (Skovgaard and Saiz, 2006).

The studying area suffered strong dramatic changes in salinity values in recent period. Salinity may play a distinct role in the epizootiology of the disease in estuarine hosts (Jefferey, 1994).

Aquatic food web is always subjected to different kinds of threats to its well-being and it is difficult to say what the next threat could be, parasitism in copepods is said to be a global phenomenon that has a common cause, but the factors responsible for the susceptibility of the copepods to such parasitic attacks may be site specific and the frequency as well as type of infection could vary from area to area (Bhandare and Ingole, 2008).

Acknowledgements

We would like to express our gratitude to Prof. Dr. Dag Olav Hessen of the Biology Dep., Faculty of Mathematics and Natural Sciences, Oslo University, Norway for his help and for assistance with the digital photographs using scanning electron microscope. Many thanks to Prof. Dr. Alf Skovgaard, of the University of Copenhagen, Faculty of Life Sciences, Denmark for his assistant in classification of the parasitic infections. Deep gratitude goes to Eva Kristin Skogstad, of the general manager of Natre Gjøvik AS., Norway for her help.

References

Albaina, A. and Irigoien, X. 2006. Fecundity limitation of *Calanus helgolandicus*, By the parasite *Ellobiopsis* sp. J. Plankton Res., 28(4): 413-418.

Al-Imarah, F.J.M., Abdul Hussain, A.S. and Al-Mayahy, Q.M.A.S. 2010. Toxic environmental parameters in water samples from some aquatic wetlands, Southern Iraq. Basrah J. Sci., 28(2): 253-261.

Al-Imarah, F.J.M., Irabii, D.S. and Mahmood, A.A. 2003. Levels of mercury in the Environmental media of Southern part of Iraq. Jordan J. Applied Sci., 5(1): 85-97.

Al-Yamani, F.Y. and Fahmi, A.M. 1995. New copepod host records for ellobiopsid parasites from the Northwestern Arabian Gulf. Arab Gulf J. Sci. Res., 13: 571-581.

Al-Yamani, F.Y., Skryabin, V., Gubanova, A., Khvorov, S. and Prusova, I. 2011. Marine zooplankton, practical guide for the Northwestern Arabian Gulf. Kuwait Inst. for Sci. Res., V. 2, 198pp.

Bhandare, C. and Ingole, B.S. 2008. First evidence of tumor-like anomaly infestation in copepods from the Central Indian Ridge. Indian J. Mar. Sci., 37(3): 227-232.

Boschma, H. 1959. Ellobiopsidae from tropical West Africa. Atlantide. Rep.: Scientific results of the Danish expedition to the coasts of tropical West Africa 1945-1946, 5: 145-175.

Chatton, E. 1920. Les Peridiniens parasites. Morphologie, reproduction, ethologie. Arch. Zool. Exp. Gen., 59: 1-475.

Fahmi, A.M. and Hussain, M. 2003. Two groups of parasites on the body of Copepods. J. Arid. Environ., 54(1): 149-153.

Hassan, W.F., Hassan, I.F. and Jasim, A.H. 2011. The Effect of industrial effluents polluting water near their discharging in Basrah Governorate / Iraq. J. Basrah Res., 37(1): 21-32 (In Arabic).

Ho, J. and Perkins, P.S. 1985. Symbionts of marine copepod: An overview. Bull. Mar. Sci., 37(2): 586-589.

Ianora, A., Scotto di Carlo, B., Mazzocchi, M.G. and Mascellaro, P. 1990. Histomorphological changes in the reproductive condition of parasitized Marine Planktonic copepods. J. Plankton. Res., 12: 249-258.

Jeffery, D. S. 1994. The parasitic dinoflagellate of Marine crustaceans Annual Rev. Fish Dis., 4: 241-271.

Kimmerer, W.J. and McKinnon, A.D. 1990. High mortality in a copepod Population caused by a parasitic dinoflagellate. Mar. Biol., 107: 449-452.

Manca, M., Carnovale, A. and Alemani, P. 2004. Exotopic protrusions and ellobiopsid Infection in zooplanktonic copepods of large, deep subalpine lake, Lago Maggiore, In Northern Italy. J. Plankton Res., 26(11): 1257-1263.

Margolis, L., Esch, G.W., Holmes, J.C., Kuris, A.M. and Shad, G.A. 1982. The use of Ecological terms in parasitology (Report of an *ad-hoc* committee of the American Society of Parasitologists). J. Parasitol., 68(1): 131-133.

Moon, S.Y., Ohtsuka, S.; Ueda, H. and Soh, H.Y. 2008. *Acartia (Odontacartia) ohtsukai* Ueda and Bucklin, 2006 (Copepoda, Calanoida, Acartiidae): First Record of its Occurrence in Korean Waters and Habitat Segregation from its Sibling Species *A. pacifica* Steuer, 1915. Zootaxa, 1841: 61-64.

Ohtsuka, S., Hora, M., Suzaki, T., Arikawa, M., Omura, G. and Yamada, K. 2004. Morphology and host - specificity of the apostome ciliate *Vampyrophrya* *pelagic* infecting pelagic copepods in the Seto Inland Sea, Japan. Mar. Ecol. Prog. Ser., 282: 129-142.

Santhakumari, V. and Saraswathy, M. 1979. On the Ellobiopsidae, parasitic Protozoa from zooplankton. Mahasagar-Bulletin of National Institute of Oceanography, 12(2): 83-92

Sewell, R.B.S. 1951. The epibionts and parasites of the planktonic copepoda of the Arabian Sea. The John Murray Expedition, 1933-34, Scientific Reports, 9(4): 256-394.

Skovgaard, A. 2004. Tumour-like anomalies on copepods may by wounds from Parasites. J. plankton Res., 26(9): 1129-11131.

Skovgaard, A. 2005. Infection with the dinoflagellate parasite *Blastodinium* spp. in two Mediterranean copepods. Aquat. Microb. Biol., 38: 93-101.

Skovgaard, A. and Saiz, E. 2006. Seasonal Occurrence and role of protistan parasite in coastal marine zooplankton. Mar. Ecol. Prog. Ser., 327: 37-49.

Theodorides, J. 1989. Parasitology of marine zooplankton. Adv. Mar. Biol., 25: 117-177.

Visse, M. 2007. Detrimental effect of peritrich ciliates (*Epistylis* sp.) as epibionts on the survival of the copepod *Acartia bifilosa*, Proc. Estonian Acad. Sci. Biol. Ecol., 56(3): 173-178.

Walkusz, W. and Rolbiecki, L. 2007. Epibionts (*paracineta*) and parasites (*Ellobiopsis*) on copepods from Spitsbergen (Kongsfjorden area). Oceanologia, 49(3): 369-380.

Wickstead, J.H. 1963. A new record of *Ellobiopsis chattoni* (Flagellate Incertae sedis) and its incidence in a population of *Undinula vulgaris* var. major (Crustacea, Copepod). Parasitology, 53: 293-296.

Wickstead, J.H. 1965. An introduction to the study of tropical plankton Hutchinson and Co. LTD., London, 160pp.

Wing, B.L. 1975. New records of Ellobiopsidae (Protista (Incertae sedis)) from the North Pacific with a description of *Thalassomyces albatrossi* new species, a parasite of the mysid Stilomysis major. Fish. Bull., 73(1): 169-185.

Willey, R.L., Cantrell, P.A. and Threlkeld, S.T. 1990. Epibiotic euglenoid flagellates increase the susceptibility of some zooplankton to fish predation. Limo. Oceanogr., 35: 952-959.

Zhong, Z. 1989. Marine Planktology. China Ocean Press, Beijng and Springer-Verlag, Berlin, 454pp.

تسجيل جديد لبعض الطفيليات من مجذافية الأقدام والدولابيات في المياه المالحة والمويلحة العراقية

طالب عباس خلف[1] ، عبد الحسين حبش عواد[2]، محمد شاكر مراد[2]

[1] مركز علوم البحار، [2] كلية التربية، جامعة البصرة، البصرة، العراق

المستخلص – ركزت الدراسة الحالية على إصابة بعض مجاميع الهائمات الحيوانية (مجذافية الأقدام والدولابيات) بالطفيليات الخارجية والداخلية في المياه المالحة والمويلحة العراقية خلال المدة من شهر كانون الثاني ولنهاية شهر تشرين أول 2010. جمعت العينات من خمسة مناطق مختارة تمثل المياه

المالحة والمويلحة العراقية. سجلت في هذه الدراسة أنواع عدة من الطفيليات. فقد عزلت من مجذافية الأقدام وبقية الهائمات الحيوانية وشملت (*Ellobiopsis chattoni*, *Ellobiopsis* sp., *Thalassomyces* sp., *Blastodinium* sp. and *Zoothamnium* sp.) فضلاً عن بعض السوطيات والهدبيات. سجلت هذه الطفيليات لأول مرة في المياه المالحة والمويلحة العراقية عدا طفيلي (*Ellobiopsis chattoni* و جنس *Thalassomyces*) فقد سجلا من قبل في المياه الكويتية. درست النسبة المئوية للأصابة وشدة الأصابة للأفراد المفحوصة بالطفيليات المختلفة، فقد بلغت أعلى نسبة مئوية للإصابة في مجذافية الأقدام 35.7 % عند المحطة (4) خلال فصل الشتاء في حين سجلت أدنى نسبة مئوية لها 0.73 % عند المحطة (2) خلال فصل الخريف. أما في الدولابيات فقد سجلت أعلى نسبة مئوية للإصابة 9.42 % عند المحطة (1) خلال فصل الخريف وأدناها 0.15 % عند المحطة (3) خلال فصل الشتاء. بلغت أعلى شدة للإصابة في مجذافية الأقدام 12.03 عند المحطة (1) خلال فصل الصيف وأدناها 1.05 عند المحطة نفسها خلال فصل الخريف. كانت قد سجلت أعلى شدة إصابة 6.3 لمجذافية الأقدام والدولابيات معاً عند لمحطة (2) خلال فصل الصيف وأدناها 0.8 عند المحطة نفسها خلال فصل الخريف. إستعمل المجهر الألكتروني الكاسح في هذه الدراسة للتعرف على بعض الطفيليات الخارجية لمجذافية الأقدام.