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RECORDING OF NEW ALGAL SPECIES WITHIN THE EUPHRATES RIVER ENVIRONMENT IN IRAQ

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ABSTRACT
Eleven species were recorded for the first time in the Iraqi aquatic environment of algae within the environment of the Euphrates river in Iraq , four sites represented (the reservoir of Haditha, the bottom reservoir of Haditha, the field of Al-Haqlaniya and the village of Aloos).The results showed the emergence of two species belong to the division of green algae, which were represented *Kentrosphaera gloeophila* , *Nephrocytum Agardhianum* in the bottom of the reservoir and the field of Al-Haqlaniya, respectively. While, there are two species belonging to the division of Bacillariophyta (Diatomatae) the order of Pennales, which were represented *Planktoniella planda* and *Melosira circulare* in the position of Aloos village and Haditha reservoir, respectively. There are two species belong to the division of blue-green algae *Rhabdoderma hamiformi* , *Komvophoron schmidlei* in the village of Aloos and Al-Haqlaniya , respectively. Also, a species appeared belong to the Euglenozoa division in the village of Aloos represented by *Trachelomonas armata*. One species appeared, which is belonged to the division of Dinophyta in the Haditha reservoir represented by Ceratium sp in Al- Haqlaniya appeared three species, which are belonged to the division of Chrysophyacea represented by *Arachnochloris minor* and *Ophiocytium paraulum*. in the reservoir. While, One species appeared, which is belonged to the division of Xanthophyta in Al- Haqlaniya represented by *Harpochytrion hyalothecae*.

KEYWORDS: Recorded of new species, algae, Euphrates River, environment, blue and diatomaceous.

INTRODUCTION

The River Euphrates (length 2940 km) is one of the forty longest rivers of the world (Vander, 1975). In the last decade details have been published on its limnological features (AL-Nimma, 1982; Hassan, 1997) and on the phytoplankton composition (Maulood *et al*., 1981). The seasonal variations of phytoplankton composition have been published for the lower region of the river by (AL-Saadi, 1995). The present work deals for the first time with the quantitative and qualitative seasonal variation of phytoplankton species of the upper region of the Euphrates River. The limnological characters of the same area were described by (Al-Lami *et al*., 1998). Phytoplankton are tiny (single - celled) algae, plant-like organisms that use sunlight as an energy source to produce their own food in a process called photosynthesis while The definition of phytoplankton adopted for sunlight as an energy source to make their own food in a process called photosynthesis while The definition of phytoplankton is the collective of photosynthetic microorganisms, adapted to live partly or continuously in open water ,where remain near the surface because the surface waters of the open sea and large lakes are regularly mixed each day by the wind (Hamner) (Reynold, 2006). Hydrological factors are most significant for determining the growth of phytoplankton in rivers than in lakes, biomass of phytoplankton in lakes related with the abundance of nutrients whilst in the rivers they are associated factors hydro biological (Thurman, 2007). Phytoplanktons are photosynthesis microscopic organisms that inhabit the upper sunlit layer of almost all oceans and bodies of fresh water on Earth. They are agents for "primary production," the creation of organic compounds from carbon dioxide dissolved in the water, a process that sustains the aquatic food web (Thurman, 2007). Phytoplankton obtain energy through the process of photosynthesis and must therefore live in the well-lit surface layer (termed the euphotic zone) of an ocean, sea, lake, or other body of water. Phytoplankton account for half of all photosynthetic activity on Earth (Ghosal, 2011; NASA, 2009). Additionally, changes in the mortality of phytoplankton due to rates of zooplankton grazing may be significant. On the other hand, one of the more remarkable food chains in the ocean – remarkable because of the small number of links – is that of phytoplankton- feeding krill (a crustacean similar to a tiny shrimp) feeding baleen whales (NASA, 2005; Calbet, 2008). Present work aimed to study the systematic account for algae and to add new records species of algae for the first time in the environment of the Euphrates River of Iraq.

MATERIALS & METHODS

Non-diatomic algae were identified by preparing slides and examined less than 400X by using compound microscope in depending on the following references which used for identification of non-diatomic algae (Desikachary, 1959; Prescott, 1964). While diatoms were identified after dissolving the organic matter by using nitric acid and examined under 1000X in depending on (Hustedt, 1930; Hustedt, 1959). One liter of each sample was placed in one liter Duran cylinder and mixed with Lugol's solution and left to settle for 10 days and then concentrated to 100 ml by a siphon.

The same steps were repeated on 100 ml of the concentrated sample; it was placed in 100 ml cylinder and

left for one week in the laboratory for reduction to 10 ml. A clean slide was left on a hot plate at 75-80 °C and a 0.05 ml drop of the preserved concentrated sample was put in the middle of the slide and dried, then a drop of concentrated Nitric acid was put on the dried drop and after evaporation of the acid drop, Canada Balsam was placed on a cover slip and put on the dried sample and pressed to remove any air bubbles (Furet and Benson, 1982).

Description of the Study Area

Location 1:

The first site is located south of the Haditha Reservoir in Al-Khasafa area. It is 2 km away from the Haditha Dam Body, at coordinates 34° 14'17.93 "north and 42° 21'57.83" east. The depth of the water in this site is about 24 m, and the banks are characterized by a vegetative cover is not thick (Figure 1).

Location 2:

The second site is located in the Euphrates River in the city of Haditha at coordinates 34 ° 11'28.89 "north and 42 ° 22'56.51" east, the water depth reaches to 8 meters and the site is characterized by the abundance of agricultural fields on both sides of the river (Figure 1).

Location 3:

The third site is located Al- Haqlaniya near the water and is located about 8 km from the dam at coordinates 34 ° 5'40.51 "north and 42 ° 22'11.96" east, the depth of water is between 1 - 5m. This area is characterized by the presence of agricultural fields with the intensity of reed plant on the side (Figure 1).

Location 4:

The fourth location at the village of Aloose at coordinates 34 ° 0'52.12 "north and 42 ° 25'5.71" east of the site is characterized by low density of population and the existence of few agricultural fields (Figure 1).

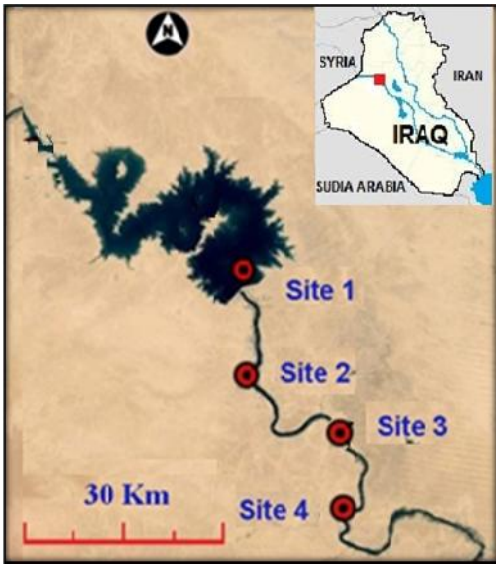


FIGURE 1: shows the map of the locations study

Temperature

Water temperature was measured immediately in the field by placing a precise clean mercury thermometer (range 10 to 60 Cº) graduated up to 0.1 Cº.

Electrical Conductivity and pH

The electrical conductivity, and pH were measured by using pH-EC-Sal- meter (HANNA Instruments).The expression of results were µS/cm for conductivity . Physiochemical factors such as NO_3 and PO_4 were measured according to standard method of analysis (APHA. 1989; 1999).

RESULTS & DISCUSSION

Eleven species of algae were identified in Haditha city within the Euphrates River for the first time in the Iraqi aquatic environment. They were found within the four sites selected for the study. The table (1) shows the new algal species within the study sites.

TABLE 1: The new record algal within the study sites

List of algal taxa	Study Stations			
	South of Haditha Reservoir	Euphrates River in Haditha city	Al-Haqlaniya	Aloose village
Chlorophyceae				
Kentrosphaera gloeophila				*
Nephrocytum Agardhianum		*	*	
Bacillariophyceae				
PENNALES				
Planktoniella planda	*			
Melosira circulare.	*			
Cyanophyceae				
Rhabdoderma hamiformis.				*
Komvophoron schmidlei.			*	
Euglenophyta				

Trachelomonas armata.			*
Pyrrhophyta			
Ceratium sp.	*		
Chrysophyacea			
Arachnochloris minor.		*	
Ophiocytium paraulum.		*	
Xanthophyta			
Harpochytrion hyalothecae		*	

*= existing

Kentrosphaera gloeophila

Characters of the genus : cells broadly ovate, or ovoid or elliptic, with Knob- like thickenings of the lamellate wall, 18 - 20µ in diameter, 25 - 30 µ long.

Division:-Chlorophyta
Class: - Chlorophyceae
Order: - Oodogoniales
Family:-Endosphaeraceae
Genus: - *Kentrosphaera*
Species: - *gloeophila*

Kentrosphaera gloeophila

Nephrocytium agardhianum

Colony ovate composed of 2-8 cylindeical or reniform cells, twisting so as to give a spiral arrangement within the old mother cell wall; cells 2 – 7 µ in diameter, 8 -18µ long.

Division: - Chlorophyta
Class: - Chlorophyceae
Order: - Chlorococcale
Family: - Oocystaceae
Genus: Nephrocytium

Nephrocytium agardhianum.

Planktoniella planda

Solitary cells, discoid, entire wing-like ribbed expansion of organic material extending from valve mantle. Central part characterised by convex to flat valves with polygonal areolation arranged as tangentially curved striate. Chromatophores dispersed within the valve face. Valve diameter of the central valve 70–95 µm, including the extended wings 130–175 µm, centric diatoms with discoid cells. Areolae seen in radial or tangential rows. Organic extensions of the girdle are characteristic of this genus. Presence of a central strutted process (fultoportula) and one or two labiate processes (rimoportula) and a ring of marginal processes reported but not clearly visible under light microscope. The identification of the genera poses problem since the organic extensions usually disappear after frustule cleaning treatment that diatoms are subjected to for microscopic observation. The species being sensitive to temperature fluctuations, especially rise in temperature can be a favored model organism in studying rising temperature effects.

Division: Bacillariophyta
Sub Division: Bacillariophytina
Class: Mediophyceae
Subclass: Thalassiosirophycidae
Order: Thalassiosirales
Family: Thalassiosiraceae
Genus: *Planktoniella* Schütt.

Planktoniella planda

Melosira circulare

Cells clearly heteropolar both in view valvaire and in connection view, larger 4 to 8 µm in vulvar view, 6 to 15 µm in connective view. Length 12 to 80µm, 3 to 5 in 10µm, the intermediate streaks are a little more visible than in the diatoms.

Division:-Bacillariophyta
Class Bacillariophyceae
Subclass Fragilariophycidae
Order Fragilariales
Family Fragilariaceae
Genus *Melosira*

Melosira circulare

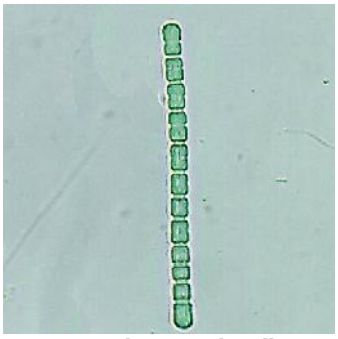
Rhabdoderma hamiformis
A fusiform colony with uneven margins; cells cylindrical, 7- 10 times their diameter in length, arcuate or somewhat sigmoid, the poles broadly rounded, loosely scattered with their longitudinal axes approximately parallel with that of the colony, in closed in a wide, hyaline, mucilaginous envelope; cell contents bright blue-green , homogeneous; cells 1.5 – 2µ in diameter, 10-14µ long.

Division: - Cyanophyta.
Class:- Myxophyceae.
Order: - Chroococcales.
Family: - Chroococcaceae.

Rhabdoderma hamiformis

Komvophoron schmidlei
Filamentous, filaments (trichomes) solitary or agglomerated in clusters or in fine, mucilaginous colonies (mats), straight or slightly waved or arcuated, moniliform, simple, short or (rarely) long (up to 650 µm), without firm sheaths, someties with very fine, diffuent, colourless, narrow mucilaginous envelope (staining); trichomes deeply and widely motility (trembling), cells more or less spherical or barrel shaped, up to 10 µm wide, without gas vesicles, sometimes with irregularly dispersed prominent granules end cells rounded.

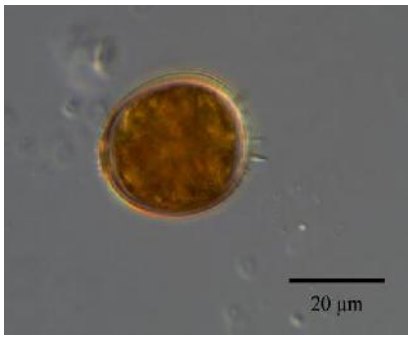
Division:- Cyanophyta.
Class:-. Cyanophyceae
Order: - Oscillatoriales.
Family: - Gomontiellaceae.



Komvophoron schmidlei

Trachelomonas armata
Test broadly ovate, flagellum aperature in a collar, surrounded by a circle of erect spines in some varieties; wall spiny in the anterior region with sparsely scattered spines over the midregion, test 22µ in diameter, 38-40µ long, including spines.

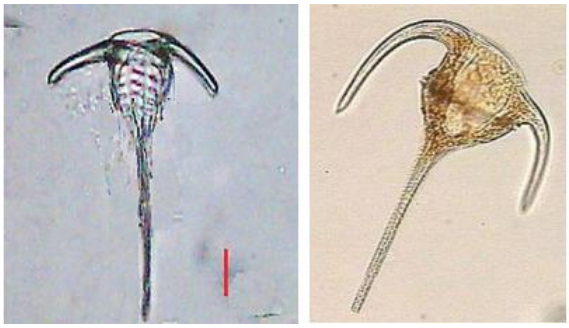
Division: Euglenozoa
Class: Euglenophyceae
Order: Euglenales
Family: Euglenaceae
Genus:*Trachelomonas* Ehrenberg, 1835.



Trachelomonas armata

***Ceratium* sp.**
Cell solitary, Cell body width 66 µm, leagth 197µm with markedly convex posterior margin, antapical horns are short. In this genus there are broadly fusiform cells which have 3 or 4 horns , one anterior and 2 or 3 posterior. The univalve of the theca soon narrows abruptly to form the apical horn, which is composed of 4 plastes. The hypotheca has 5 post singular and 2 antapical plates, the latter forming the longest posterior horn. In forms which have 3 posterior horns, one is very short.

Division: Dinophyta
Class: Dinophyceae
Order: Gonyaulacales
Family: Ceratiaceae
Genus: *Ceratium*



Ceratium sp.

Arachnochloris minor

Cells spherical, the wall firm, finely Sculptured (sometimes in distinctly) with Closely arranged series of depressions; basal body of chromatophore spongy, with an indistinct pyrenoid; chromatophore forming 2 parirtal lobes; red oil drops sometimes present; cells 7-9 µ in diameter.

Division: Ochrophyta
Class: Xanthophyceae
Order: Mischococcales
Family: Pleurochloridaceae

Arachnochloris minor

Ophiocytium paraulum

Cells free-floating, eylindrical, long and strongly S-curved or spiral, truncate at ends, 3-10µ in diameter, common in the tychoplankton of many lakes.

Division: Ochrophyta
Class: Xanthophyceae
Order: Mischococcales
Family: Ophiocytiaceae

Ophiocytium paraulum

Harpochytrion hyalothecae

Also this genus should be compared with *Harpochytrion hyalothecae* , certain species of which greatly resemble Characiopsis .Especially when examining preserved algae this comparison should be made.

Harpochytrion hyalothecae

While, the physical and chemical parameters were altered which include: pH, electrical, conductivity, salinity, NO_3 and PO_4, those are given in (Table 2).

TABLE 2: shows Physical and chemical factors of the study sites.

Stations / Parameters	Study Stations			
	South of Haditha Reservoir	EuphratesRiver in Haditha city	Haqlaniya	Aloose village
Temperature (C°)	14	11	13	12
pH	7.40	7.49	7.35	7.6
Electrical Conductivity µS/cm	718	758	576	652
Sal.‰	0.41	0.45	0.28	0.43
NO_3 Mg/l	192	220	132	251
PO_4 Mg/l	27	20.5	6.22	15

It is worth mentioning, that the Iraqi aquatic environment is characterized by a wide variety of phytoplankton (algae), especially after the process of revitalizing the marshes and water bodies. The biological diversity is not

limited to the Tigris and Euphrates, as well as, in many of the southern marshes in Iraq and specifically in the study (Al-Hussieny, 2016), which added 38 new species of algae to the Iraqi marshes.

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