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New Records of Ten Species of phytoplankton from the Shatt al Arab River, South of Iraq.

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Abstract

Ten species of phytoplankton were recorded from the Shatt Al-Arab River for the first time in Iraq, and they can be added to the Iraqi algae list,during the period January to December,2020. Five Site were selected along the River (Al-Deer, Al-Ashar, Abu-Alkhaseeb, Al- Seba and Al-Fao). The results showed that five species belong to the Division Chlorophyta represented by; *Cosmariumfurcatospermum,Koliellalongiseta,Planctonemalauterborni,Pyrobotryscasinoesis, Scendesmusjavanesis,*and one species belong to the Division Cyanophyta,represented by *Planktothrixisothrix*, while theDivision Dinophytawas represented by three species;*Ceratiumfusus,Dinophysisacuminate,Peridiniumgoslaviense,* and one species of Euglenophyta, represented by*Lepocinclisfusiformis* var. *amphirhynchus*. Brief descriptions and measurements are given for each of the recorded species.

Keywords: Shatt-Al- Arab River, freshwater, phytoplankton, South Iraq

Introduction

The Phyt0plankton Community supports the natural food chains, which is essential for the survival of natural fauna, including fish populations,at the same time , phytoplankton produce nearly 70% of the world's atmospheric oxygen

(Alonso,2014).Around five decades ago, researchers began investigating the ecology and distribution of phytoplankton in the Shatt Al-Arab River and its tributaries. These researches seem to be the brainchild of Al- Kaisi (1970), Al-Saadi and Arn0lt (1973), Kell and Saad (1975), Hameed (1977), Huq *etal*.,(1978) , Al-Saadi*etal*.,(1979), Mauloo*detal*. (1981), Al-Saboonchi*etal*. (1982) and Antoine,(1983). Numerous studies have also been conductedwhich covered the phytoplankton and other forms of algae include Al-Mousawi*(*1986), Al-Handal (1989), Al- Saboonchi*etal*. (1990) and Al-Mousawi (1992).Al-Saboonchi, and Al-Manshed (2012).Therefore, this study came as an attempt to diagnose some new species that had not been previously diagnosed to support the diversity of this important waterway and a complement to previous studies.

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Study area and methods

According to subdivisions, the Shatt Al-Arab River is situated within the lower part 0f the Mesopotamian plain. (Parsons, 1957).The confluence of the Tigris and Euphrates Rivers at Al-Qurna town forms the Shatt Al-Arab River north of Basra City , and then extends south-eastward for a distance of 204 km to the Arab Gulf at latitude 57¯ 99˚ north and longitude 35¯ 48˚south (Al- Mahmood, 2012) (Figure 1).The Shatt Al-Arab River is extremely important in the region,due to the dominance of the desert climate and the scarcity of other freshwater sources, (Al- Assadi*etal*. 2015),monthly Samples of phytoplankton were taken from five locations from January to December 2020. Plankt0n net (a diameter of 40 cm and a mesh size of 20 µm) was lowered just beneath the water surface for about 15 minutes at a medium rowing speed for qualitative studies, at the low tide period of the day. The concentrated plankton samples were immediately preserved in vials with 4% Formalin.The morphology of cells were described based on light microscopy type Zeiss with camera Axio Cam lCc 3 type Zeiss.

Table (1) coordinates of sample collection sites

Site	North	South
Sit.1	N:30. ˚80 23`84	E: 47. ˚58 28`84.6
Sit.2	N: 30. ˚52 05`19	E: 47.˚84 25`82
Sit.3	N:30. ˚46 12.7	E: 48. ˚06 34`42
Sit.4	N:30. ˚33 88`09	E: 48. ˚25 90`06
Sit.5	N: 29. ˚58 40.2	E: 48 29 12.6

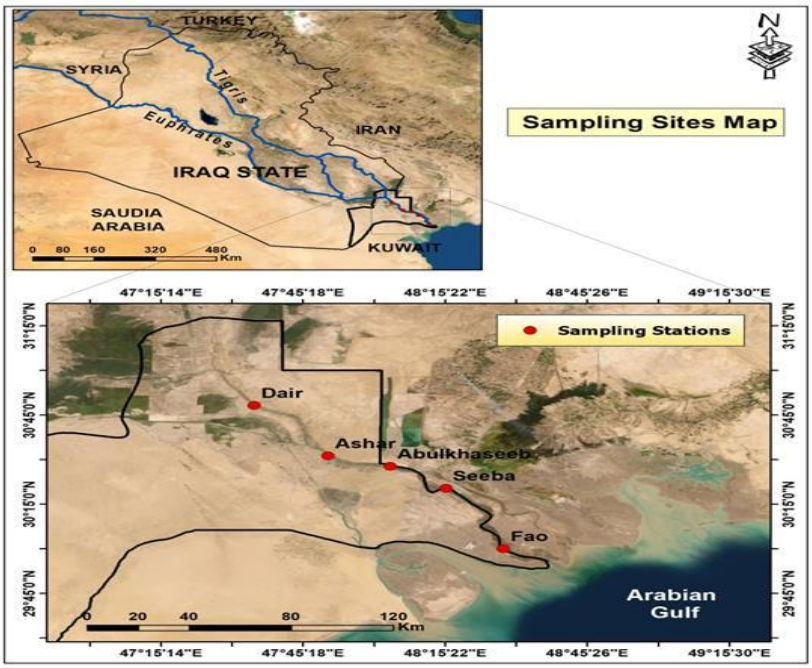

Figure: 1- A map showing sample collection regions of the Shatt Al-Arab River, South of Iraq.

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Results and Discussion

In this study 10 species of phytoplankton were identified, taxa found for the first time in the Shatt Al-Arab River Southern Iraq,they were found within the five Sites selected for the study.The Shatt Al-Arab is a unique environment of its kind in relation to the Iraqi rivers, lakes and the marine waters of the Arabian Gulf, as the waters of the Shatt al-Arab are called estuarine waters or brackish waters, as a result of the mixing of the Tigris, Euphrates and Karun waters, which are fresh water with the salty waters of the Arabian Gulf. Therefore, the flora and fauna of the Shatt Al-Arab River is distinguished by their difference, uniqueness and their distinction from the internal freshwater environment and the marine environment of the Arabian Gulf. We note from Table No. (2) that most of the species were recorded in the first, second and third sites, and during the months of January, February, March and April, this matter may relate to the suitability of the environmental conditions in these sites and the months for the growth and reproduction of algae, while their lack of suitability for their growth in the remaining months and sites (Santos et al 2011). The quantity and quality of phytoplankton also changes depending on the physical, chemical and biological features. The composition and density of the phytoplankton population gives a clear idea of the state of enrichment or trophic level prevailing in the region (Florest and Martinez,1993), the dominance of green algae (Chlorophyta) over blue-green algae (Cyanophyta) and the rest of the algae divisions is a prevalent and well-known pattern in the waters of the Shatt al-Arab due to the lack of blue-green algae species in the Tigris and Euphrates rivers. (Talling, 1980).

The table (2) shows the new phytoplankton within the study Sites

		2020											Sites
Species	Janu.	Febr.	Mar.	Apr.	May .	June.	July.	Augu.	Sept.	Octo.	Nove.	Dece.	
Cosmarium furcatospermum	+	+		+						+			Sit.1
	+		+	+			+						Sit.2
		+	+										Sit.3
													Sit.4
													Sit.5
Koliellalongiseta		+	+			+							Sit.1
	+	+	+	+									Sit.2
	+			+					+				Sit.3
													Sit.4
													Sit.5
Planctonemalaut erborni	+	+	+		+								Sit.1
	+	+	+	+							+		Sit.2
	+		+	+									Sit.3
													Sit.4
													Sit.5

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 6, 2021, Pages. 9061 - 9073
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Pyrobotrycasinoensis	+	+	+	+	+							+	Sit.1
	+	+		+									Sit.2
	+		+	+		+							Sit.3
													Sit.4
													Sit.5
Scenedesmus javanesis	+	+	+	+					+			+	Sit.1
	+	+		+			+						Sit.2
	+	+	+	+						+		+	Sit.3
													Sit.4
													Sit.5
Planktothrixisothrix	+	+			+							+	Sit.1
	+	+	+	+									Sit.2
	+		+	+				+			+		Sit.3
													Sit.4
													Sit.5
Ceratiumfusus													Sit.1
													Sit.2
													Sit.3
													Sit.4
	+										+		Sit.5
Dinophysis acuminate													Sit.1
													Sit.2
													Sit.3
									+			+	Sit.4
													Sit.5
Peridiniumgoslaviense	+	+											Sit.1
	+	+	+	+							+		Sit.2
	+	+	+	+				+					Sit.3
													Sit.4
													Sit.5
Lepocinclis fusiformis var. amphirhynchus	+	+		+					+				Sit.1
	+	+	+	+				+					Sit.2
	+	+	+									+	Sit.3
													Sit.4
													Sit.5

Ten algal species of phytoplankton were identified in Shatt Al-Arab River for the first time in the Iraqi aquatic environment represented by.

Cosmariumfurcatospermum West & West 1894

West : Pl. 7, l (1), figs.13.

Description:

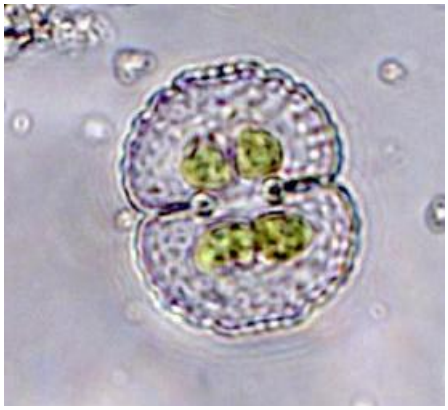
This is a freshwater species, cell body 25-30 μm long , 20-25 μm wide, central region smooth (lacks granules), single cells, the cell wall is granular and jagged , the body is divided into two equal halves, each half containing a chloroplast consisting of two lobes, basal angles rounded.

Family: Scendesmaceae

Genus: *Cosmarium*

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 6, 2021, Pages. 9061 - 9073
Received 25 April 2021; Accepted 08 May 2021.

Species: *Cosmariumfurcatospermum* West & West 1894



Cosmariumfurcatospermum

Koliellalongiseta (Vischer) Hindak (1963)

Hindak, Pl. 1:2, figs.7:1. P. 105

Description:

Filamentous algae, consisting of needle -like cell solitary, with a tapered end. Straight or slightly curved, 70-75 μm in length, and 1-2.5 μm in width. This is a freshwater species.

Family: K0liellaceae

Genus: *K0liella*

Species:Koliellalongiseta (Vischer) Hindak (1963)

Koliellalongiseta

*Planctonemalauterborni*Schmidle 1903

.Schmidle 354 pI.(18), fig. 20

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 6, 2021, Pages. 9061 - 9073
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Description:

Unbranched trichomes, filaments without gelatinous sheath, that is cylindrical cells enclosed in a fine and hyaline sheath, consisting of up to 10- 20 cell, without rhizoids, , forming short filaments, the cells within the transparent sheath are separated with each other, rounded end, chloroplast containing pyrenoide, gas vacuoles form black spots inside the cell, 50- 60 µm long, 2.5- 3.5 µm in width..

Family: O0cystaceae
Genus: Planct0nema
Species :PlanctonemalauterborniSchmidle 1903

Planctonemalauterborni

Pyrobotrycasinoensis (Playfair) P.C. Silva 1972

.Hu, H. & Wei, Y. pl.16, figs (i-iv) pp. 4

Description:

cells cup-shapedMulberry-shaped colony, colony of 8 or 16 celled, chloroplast without pyrenoid, colony length 45-58 µm, usually the colony bears flagella, vegetative cell 7-13 µm.

Family: Sp0ndylomoraceae
Genus: *Pyr0botrys*
Species: *Pyrobotryscasinoensis* (Playfair) P.C. Silva 1972

Pyrobotryscasinoensi

*Scenedesmusjavanesis*Chodat 1926,

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Received 25 April 2021; Accepted 08 May 2021.

Chdatpl. 157, figrs. 47, p. 71- 258

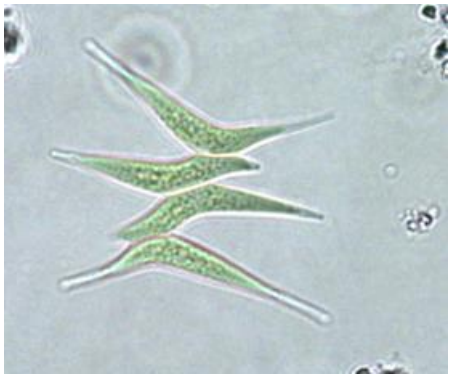
Description

Colony of 4 or 8 celled, The cells are curved and the terminal cells lunate with sharply pointed apices, the peripheral cells are more curved than the inner, the cells are covered with granules except for the extremities, one cell connects to another at a specific point, cells 40-50 µm long, wide 4.5-5.5 µm.

Family: Scenedesmaceae

Genus: *Scenedesmus*

Species: *Scenedesmusjavanesis*Chodat 1926



Scenedesmus javanesis

Planktothrixisothrix (Skuja) Komarek&Komarlova 2004

Komarek, vol.19, p.1-759

Description:

A filamentous algae, which appears in the form of single or tangeled filaments, consisting of cells approximately 3-4 µm wide, But the cell length is unclear dueto the merging of the cells with each other, the end cell of the filament is rounded. The cytoplasm appears within the filament as dense granules.

Family: Micr0coleaceae

Genus: *Plankt0thrix*

Species: *Plankt0thrixis0thrix* (Skuja) Komarek&Komarlova 2004

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 6, 2021, Pages. 9061 - 9073
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Planktothrixisothrix

Ceratiumfusus (Ehrenberg) Dujardin 1841

Nandi, 69(1/2), figs. 2, p. 41-49

Description:

The numerous chloroplasts which are yellow-brown, cell elongated, Its shape is fusiform or needle, With a slight curvature of the horn, The cell is wide at the cingulum area 23-25 μm in width, the cell is very long as it is about 280-300 μm, It has a length of a horn 52-54 μm, this is a marine species.

Family: Ceratiaceae

Genus: *Ceratium*

Species: *Ceratiumfusus* (Ehrenberg) Dujardin 1841

Ceratiumfusus

*Dinophysisacuminate*Claparede and Lachmann1859

Claparede and Lachmann pl. 20,figs.17,p. 408

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 6, 2021, Pages. 9061 - 9073
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Description:

Solitary cell, with a wide body, medium- sized cell, Its shape tends to be oval in most of its species, it is a marine plankton species,the front of the body is fitted with a canopy-like structure, some species, 30-40 μm in width and 35- 50 μm in length.

Family: Dinophysiaceae

Genus: *Dinophysis*

Species: *Dinophysisacuminate*Claparede and Lachmann 1859

Dinophysisacuminate

*Peridiniumgoslaviense*Wolszynska 1916

Wolszynska, Pl.10-14, figs. 18- 24, p. 260-285.

Description:

Solitary cells, Pear-shaped, the body is provided at the front with a disk-like structure, with a band from the middle of the body towards the inside for both sides, two small spines protrude from below the body, The cell is surrounded by a thick wall, the length of the cell is 32-34 μm, and the width is 29-31 μm.

Family: Peridiniaceae

Genus: *Peridinium*

Species: *Peridiniumgoslaviense*Wolszynsk

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 6, 2021, Pages. 9061 - 9073
Received 25 April 2021; Accepted 08 May 2021.

Peridiniumgoslaviense

Lepocinclisfusiformis var. *amphirhynchus* Nygaard 1950

Nygaard 7(1): pl. 2, figs.126, p.1- 294

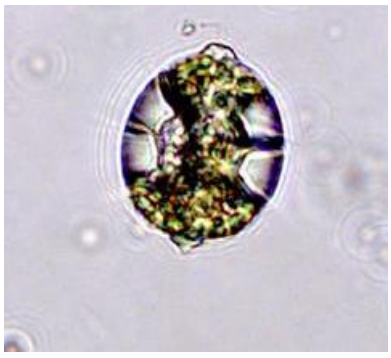
Description:

Solitary cell, 36-37 µm long, 26-28 µm width, the anterior pole is usually round, and the back pole is slightly extended,conical- shaped, cytoplasm is lobed, discoid chloroplast, with double pyrenoids in each side, oval or discoid paramylon grain, this is a freshwater species.

Family: Phacidae

Genus: *Lepocinclis*

Species: *Lepocinclisfusiformis* var. *amphirhynchus* Nygaard 1950



Lepocinclisfusiformis var. *amphirhynchus*

Conclusion

he existence of phytoplankton, whether qualitative or quantitative, reflected the status of the Shatt Al- Arab River's water quality, and whether it is appropriate for the necessary living conditions of many species of organisms, according to the findings of this study. No other

Iraqi research had found any of the new algal species discovered in this study. A total of 10 phytoplankton species were discovered. More research is needed into the ecology of Iraq's Shatt Al- Arab River in order to identify new species if they exist. The emergence of these new microalgal species in Iraqi freshwater in the Shatt Al- Arab River, for the first time, confirms the water's cleanliness, and the suitability of the environmental conditions for the reproduction and spread of phytoplankton in that region, In addition to the lack of recent taxonomic studies of the water of the Shatt Al-Arab River.

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