REVISION OF ALGAL FLORA (DIATOMS) CHECKLIST IN TIGRIS RIVER WITHIN BAGHDAD CITY -IRAQ

J. S. Al Hassany[1] F. M. Hassan[1] B. K. Maulood[2] R. N. Al-Saedy[3]
Assist. Prof . Prof. Prof. Lecturer.
[1]Department of Biology, College of Science for Women, University of Baghdad, Iraq
[2]Scientific consultant in presidency of Kurdistan region, Iraq
[3] Ministry of Education, Director of Rusafa, Baghdad, Iraq
[1]Corresponding author: jinnansz_bio@ csw.uobaghdad.edu.iq

ABSTRACT

The present study was confined to a taxonomical and systematical revision of all so far, recorded diatoms from study was Tigris River within Baghdad district. There is a lot of confusion in the naming and nomenclature of this and other groups of algae in Iraq and even in the whole middle east. Since various systematic categories have been used and applied for the identification of diatoms and another algal taxon. More than half of all so far, known diatoms (a total of 345 taxa) have been renamed by the most recent internationally accepted system of classification. In the current study, Bacillariophyta in Tigris involves 27 species of Coscinodiscophyceae, 48 species of Fragilariophyceae whereas, all other 267 species were found within Bacillariophyceae within the Baghdad district. All these taxa have been rearranged, revised, and renamed accordingly, to avoid any confusion or mistakes in naming diatoms in the future, however undoubtedly this will enhance a wider revision to include all other known algal taxon in Iraq and even the whole Middle east.

Keywords: Bacillariophyta, Iraq , Lotic water, .Systematical revision,

مجلة العلوم الزراعية العراقية -2021 :52 (4):836-858 الحسني وآخرون

مراجعة قائمة الطحالب (الدايتومات) في نهر دجلة داخل مدينة بغداد – العراق

جنان شاوي زامل الحسني [1] فكرت مجيد حسن[1] بهرام خضر مولود [2] رواء نادر كيطان [3]
استاذ مساعد استاذ استاذ مدرس مساعد
قسم علوم الحياة، كلية علوم البنات، جامعة بغداد، بغداد، العراق1
مستشار علمي في رئاسة إقليم كردستان، العراق2
وزارة التربية مدير الرصافة، بغداد، العراق3

المستخلص

شهدت الدراسة الحالية على مراجعة تصنيفية ومنهجية لجميع االدايتومات المسجلة في نهر دجلة ضمن مدينة بغداد حتى الآن،. هناك الكثير من الالتباس في تسمية هذه المجموعة والمجاميع الاخرى من الطحالب في العراق وحتى في الشرق الاوسط كله. وبسبب المنهجية المختلفة المستخدمة والمطبقة في تشخيص الدايتومات والانواع المختلفة من الطحالب، فقد تم اعادة تسمية اكثر من نصف انواع الدايتومات المعروفة حتى الان (ما مجموعه 345 مرتبة تصنيفية) بأحدث نظام للتصنيف والمقبول عالميا. في الدراسة الحالية، شعبة الدايتومات العصوية Bacillariophyta في دجلة تضمنت 27نوعًا من من صف Coscinodiscophyceae و48 نوعًا الدايتومات و التي تعود الى صف Fragilariophyceae في حين سجل (267) نوعا من الدايتومات التي تعود الى صف Bascillariophyceae ضمن مدينة بغداد. ولتجنب أي التباس او اخطاء في تسمية الدايتومات Diatoms في المستقبل فقد تم اعادة ترتيب، وتنقيح، وإعادة تسمية انواع مختلفة من انواع الدايتومات وفقا لذلك، ولكن مما لاشك فيه ان هذا سيعزز مراجعة اوسع لتشمل جميع انواع الطحالب المعروفة في العراق و الشرق الاوسط كله.

الكلمات المفتاحية: الطحالب العصوية، العراق، مياه جارية، مراجعة منهجية.

Received:29/7/2020, Accepted:19/10/2020

INTRODUCTION

The effect of climate and non-climatic parameters on water system had become evident to be the most important factor on the algal biomass, types, and its distribution within any aquatic ecosystem (1, 2), Both twin rivers in Iraq (Tigris and Euphrates) have been and still are under the influence of such factors both rivers, quality-wise, have shown a clean degradation from freshwater to oligohaline (0.5 ppt to 0.5-5 ppt). Chemical composition, physical properties, and even biological components have been changed and altered, all these variations have been already referred to by many authors (3.4 and5) Diatoms are an important dominant group of algae that had been used as one of the main parameters of indices to water quality in Iraq (6, 7 , 8 and 9). They constitute more than 90% of algal biomass in Iraqi inland water systems (10, 11 and 12) However diatoms have a worldwide application as bio-monitors and bioindicator for water quality of different water system (1). Identification and listing of the algal taxon, particularly diatoms in Iraq may go back to the late eighteenth century when Kolb and Krieger had surveyed the water system and algae of Mesopotamia and Kurdistan then after the results were published in 1942 throughout. However, papers on algae were found to be scarce in general, up to the establishment of Basra and Sulaymaniyah University (13). Then after quite a lot of paper and these have been performed from both universities to cover most aquatic ecosystems within three territories (14). Later on, projects and investigations on algae expanded to cover the middle part of Iraq also. Investigations had covered springs, streams, and another inland water system of Kurdistan of Iraq in the north down to impoundment and water channels in middle up to Shatt Al Arab and Arabian gulfs in the south including the marshes (13,15 ,16,17 and 18). A few comprehensive checklists of algal flora have been published each decade successively in Iraq since 1980 by several researchers (3, 13,19,20,21 and22). These checklists are listed 1296,1328,1900,2312 and 2647 algal taxa respectively whereas the total recorded number of diatoms had raised to (1150 species) in 2013 in hole Iraq in contrast to 1983 when their number did not exceed (593 species). Recently , a checklist of the taxa of diatoms was completed in the Shatt Al-Arab in the Basra province ,southern Iraq , which recorded the total number(410 species) of identified taxa(22) .The present study is devoted to listing all diatoms recorded in the previous study on the Tigris River within the Baghdad district. Names of genus's and species have been revised and rechecked according to the new classification and molecular studied. Almost all available papers and this related to algal naming and its identification in Iraq have been revised in respect to these taxonomical status in the current investigation, then after, all taxon have been renamed and rearranged in accordance to the most recent system of diatom taxonomy, however, the main thirty two references used were as follows:

1- Saadalla (11)
2- Maulood *et al*. (10)
3- Ismail &Saadalla (23)
4- Al-Lami *et al* (24)
5- Al-Saadi *et al* (12)
6- Farka (25)
7- Al-Janabi (26)
8- Hassan *et al* (27)
9- Al-Husseini *et al* (28)
10- Al-Dulaimi (29)
11- Al-Bdulameer (30)
12- Al-Rawi (31)
13- Al-Qaisi *et al* (32)
14- Al-Saedy (33)
15- Abed *et al*. (34)
16- Al-Hassany & Al-Bayaty (35)
17- Al-Hassany & Hindi (36)
18- Al-Hassieny *et al*. (37)
19- Jabbar& Al-Hassany (38)
20- Al-Fraidawi (39)
21- Al-Hassany & Kattian (40)
22- Al-Meshhdany (6)
23- Al-Magdamy & Al-Salman (41)

All algal taxa in each group that have been recorded so far in the Tigris River within Baghdad city are arranged in the following sequence phylum Bacillirophyta 345species which include three classes: Coscinodiscophyceae, Fragilariophyceae, and Bacillariophyceae

This newly arranged list is quite necessary and will be used as a baseline system for any

future review on algal distribution and name in the area. The diatoms classification which was suggested by Round *et al*. (2), had distinguished three classes: the Fragilariophyceae, Bacillariophyceae, and Coscinodiscophyceae. Whereas through the last 10 years, recent studies of molecular genetics have shown that this classification does not exactly reflect phylogeny. For example, the central diatoms, which were all identified to. the Coscinodiscophyceae. have shown to be 'paraphyletic' with the pennales so they have been rearranged in two classes, Bacillariophyceae (raphid pennate diatoms) and the Fragilariophyceae (araphid pennate diatoms) , in other words, the ancestor of the centric diatoms was not the same as the two pennate diatom groups; in another word origin of a centric diatom are different. However, despite many comprehensive investigations by diatomists have yet not settled on a satisfactory replacement for the two point of view and it is a systematic revision on diatoms.

Study area description

The Tigris River is one of the most important water sources in Iraq, Tigris river enters Baghdad tourist Island (5 km from the city center). As appoint of exit far (3.0 km) south of the Diyala river. The river course is passing the Baghdad city with (58.5 km) length (Fig.1). Tigris river is characterized by its meandering course in Baghdad city. The first of this meander, Al-, Al-Kadhimiya site, then Al-Etaifiyya who are considered relatively small twists, then Al- Jadiriyah twisting which is the largest and most complex twisting on the river within the Baghdad city (42) .

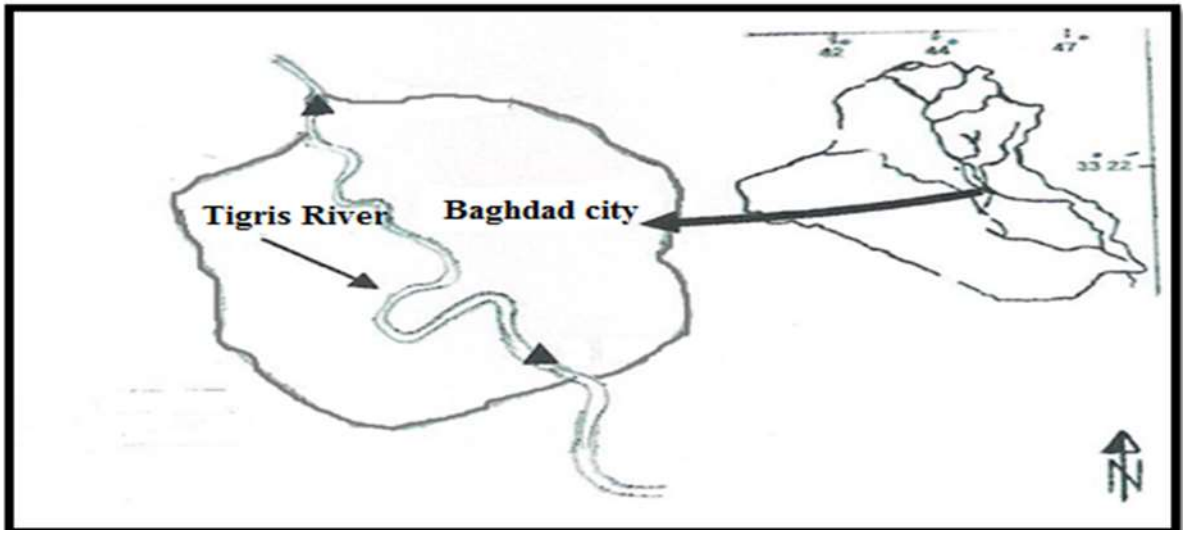

Fig. 1. Map of Iraq showing the Tigris river in Baghdad city (42).

RESULTS AND DISCUSSION

The taxonomic review was performed for all diatoms species that were identified in the Tigris River within the city of Baghdad was carried out by many researchers (Based on Round et al. (2) classification) as shown in Tables (1) and (2)

Classes of Bacillariophyta
Kingdom: Plantae
Subkingdom: Chromista
Division: Bacillariophyta
Class1: Coscinodiscophyceae Round & Crawford (Centric Diatom)
Subclass1: Thalassiosirophycidae Round & Crawford
Order: Thalassiosirales Glezer & Makarova 1986
Family: Stephanodiscaceae Glezer & Makarova 1986
Genus: *Cyclotella*, *Stephanodiscus*
Subclass 2: Coscinodiscophycidae Round & Crawford
Order 1: Aulacoseirales Crawford
Family: Aulacoseiraceae Crawford
Genus: *Aulacoseria*,
Order 2: Melosirales Crawford
Family: Melosiraceae Kutzing 1844
Genus: *Melosira*
Subclass 3: Rhizosoleniophycidae Round & Crawford
Order 1: Rhizosoleniales Silva 1962
Family 1: Rhizosoleniaceae De Toni 1890
Genus 1: *Rhizosolenia*
Subclass 4: Chaetocerotophycidae Round & Crawford

Order 1: Chaetocerotales Round & Crawford
Family 1: Chaetocerataceae Ralfs in Pritchard 1861
Genus 1: *Chaetoceros,*
Family 2: Attheyaceae Round & Crawford
Genus: *Attheya*

Class2: Fragikariophyceae Round (Araphid , Pennate, Diatom)
Subclass 1: Fragilariophycidae Round
Order1: Tabellariales Round
Family 1:Tabellariaceae Kutzing 1844
Genus: *Tabellaria*

Order 2: Fragilariales Silva 1962 sensu emend
Family 1: Fragilariaceae Greville 1833
Genera : *Diatoma, Ceratoneis, Centronella, Asterionella, Meridion,, Fragilaria, Synedra, , Opephora*

Class 3: Bacillariophyceae Haeckel 1878 (Raphid ,Pennate Diatom)
Subclass 1: Eunotiaphycidae D. G Mann
Order 1: Eunotiales Silva 1962
Family 1: Eunotiaceae Kutzing 1844
Genus: *Eunotia,*
Family 2: Peroniaceae (Karsten) Topachevs'kyj & Oksiyuk 1960
Genus: *Peronia*

Subclass2: Bacillariophycidae D. G. Mann
Order 1: Mastogloiales D. G. Mann
Family 1: Mastogloiaceae Mereschkowsky 1903
Genus: *Mastogloia*

Order 2: Cymbellales D. G. Mann
Family 1: Anomoeoneidaceae D. G. Mann
Genus: *Anomoeoneis*
Family 2: Rhoicospheniaceae Chen & Zhu 1983
Genus: *Rhoicosphenia*
Family 3: Cymbellaceae Greville 1833
Genus: *Cymbella*
Family 4: Gomphonemataceae Kutzing 1844
Genera: Gomphonema, Didymosphenia, Gomphoneis

Order 3: Achnanthales Silva 1962
Family 1: Achnanthaceae Kutzing 1844
Genus: *Achnanthes*
Family 2: Cocconeidaceae Kutzing 1844
Genus: *Cocconeis*

Order 4: Naviculales Bessey 1907 sensu emend.
Family1: Amphipleuraceae Grunow 1862
Genera : *Amphiprora ,Frustulia*
Family2: Pleurosigmataceae
Genera: *Pleurosigma , Gyrosigma*
Family 3: Neidiaceae Mereschkowsky 1903
Genus: *Neidium*
Family 4: Stauroneidaceae D.G.Mann.fam.nov
Genus: *Stauroneis*
Family 4: Pinnulariaceae D. G. Mann
Genus: *Pinnularia*

Suborder 1 : Naviculineae Hendey 1937
Family 1: Naviculaceae Kutzing 1844
Genus1: *Navicula*

Suborder2: Diploneidineae D. G. Mann
Family1: Diploneidaceae D. G. Mann
Genus: *Diploneis*

Order5: Thalassiophysales D. G. Mann
Family1: Catenulaceae Mereschkowsky 1902
Genera: *Amphora , Caloneis*

Order6: Bacillariales Hendey 1937
Family1: Bacillariceae Ehrenberg 1831
Genera: *Hantzschia, Bacillaria, Nitzschia, Cylindrotheca Denticula*

Order7: Rhopalodiales D. G. Mann
Family 1: Rhopalodiaceae (Karsten) Topachevs'kyj & Oksiyuk 1960
Genera: *Epithemia, Rhopalodia*

Order8: Surirellales D. G. Mann
Family1: Surirellaceae Kutzing 1844
Genera: *Surirella, Campylodiscus, Cymatopleura*

Table 1. Total numbers of diatoms species according to systematic positions

Classes	Sub -class	Ord.	Sub-ord	F.	G.	Sp.
Coscinodiscophyceae	Thalassiosirophycidae	1	-	1	2	14
	Coscinodiscophycidae	2	-	2	2	10
	Rhizosoleniophycidae					
	Chaetocertophycidae	1	-	1	1	1
		1	-	2	2	2
Fragilariophyceae	Fragilariophycida	2	-	2	9	48
Bacillariophycea	Eunotiophycidae	1	-	2	2	3
	Bacillariophycidae	8	2	17	30	267
Total		16	2	27	49	345

Ord. = Order , F. = Family . G. = Genera , Sp. = Species

Table 2. list of the taxonomic review for all diatoms species that were identified in the Tigris River within the city of Baghdad

Taxa of algae species	References	General Habitat	Status of name
Sub-class2: Coscinodiscophycidae			
Order:1 Aulacoseirales Crawford , *ord. nov*			
Family1 : Aulacoseiraceae			
Genus1: *Aulacoseira* Thwaites , 1848			
A.distans (Ehrenberg) Simonsen 1979	**26**	Freshwater	Accepted
A.granulata (Ehrenberg) Simonsen **1979**	**6,12,24,25,26,29,32,38,39,40**	Freshwater	Accepted
A.herzogii (Lemmermann) Simonsen 1979	**31**	Freshwater	Accepted
A. islandica (Otto Müller) Simonsen**1979**	**26**	Freshwater	Accepted
A. italica (Ehrenberg) Simonsen **1979**	**6,29,31,38,39,40**	Freshwater	Accepted
Order2: Melosirales Crawford , *ord. nov*			
Family1: Melosiraceae Kützing 1844,*sensu emend*			
Genus*: Melosira* C.Agardh,1824			
M. granulata (Ehrenberg) Ralfs1861	**10, 11,23,34, 35,36**	Freshwater	***Aulacoseira granulata***(Ehrenberg) Simonsen 1979
M. granulata var. *angustissima* O. Müller1899	**36**	Freshwater	***Aulacoseira granulata*** var. ***angustissima***(Otto Müller)Simonsen1979
M.italica (Ehrenberg) Kützing 1844	**6,11,35,36**	Freshwater	***Aulacoseira italica*** (Ehrenberg) Simonsen1979
M.roeseana Rabenhorst1853	**35**	Freshwater	***Orthoseira roeseana*** (Rabenhorst) Pfitzer 1871
M.varians Agardh **1827**	**6,10,35,36,40**	Freshwater	Accepted
Order:1 Rhizosoleniales Silva 1962			
Family1: Rhizosoleniaceae De Toni 1890			
Genus1: *Rhizosolenia* Brightwell, 1858			
Rhizosolenia sp.	**12**		
Sub-class4: Chaetocertophycidae			
Order:1 Chaetocertales Round & Crawford , *ord. nov*			
Family1: Chaetocertaceae Ralfs in Pritchard 1861			
Genus1: ***Chaetoceros*** Ehrenberg **1844**			
Chaetoceros sp.	**12,32**		
Family2: Attheyaceae Round & Crawford , ord. nov			
Genus1: Attheya T.West,**1860**			
A. zachariasii Brun 1894	**23,26**	Marine	***Acanthoceras zachariasii*** **(**Brun)Simonsen 1979

Taxa of algae species	References	General Habitat	Status of name
Class2: Fragilariophyceae			
Sub-class 1: Fragilariophycidae			
Order1: Tabellariales Round ord.nov.			
Family: Tabellariaceae Kützing 1844			
Genus : *Tabellaria* Ehernberg ex Kützing , 1844			

Tabellaria fenestrata (Lyngbya) Kützing	**37**	Freshwater	***Diatoma fenestrata*** Lyngbya
	Order2: Fragilariales Silva 1962 *sensu emend*		
	Family1:Fragilariaceae Grevile		
	Genus 1*: Diatoma* Bory,1824		
D. anceps (Ehrenberg) Kirchnerr **1878**	**35**	Freshwater	***Odontidium anceps*** (Ehrenberg) Ralfs 2017
D. elongata (Lyngbya)C. Agardh **1824**	**6,12,24,25,29,31,37,38**	Freshwater	Accepted
D. elongata var. *minor* Grunow **1878**	**33**	Marine	Accepted
D.hyemalis (Roth) Heiberg **1863**	**25,37**	Freshwater	***Odontidium hyemalis*** (Roth) Kützing
D. tenuis C.Agardh **1812**	**6,33**	Freshwater	Accepted
D. vulgaris Bory **1824**	**6,12,25,26,29,30,31,32,33,34,35, 37,39, 40**	Freshwater	Accepted
D. vulgaris var. *brevis* Grunow **1862**	**25,26,29,35**	Freshwater	Accepted
D. vulgaris var. *linearis* Grunow **1881**	**26,29**	Freshwater	Accepted
D. vulgaris var. *ovalis* (Fricke) Hustedt **1930**	**25,26,29,36**	Freshwater	***Diatoma moniliformis*** sub sp. Ovalis (F.FRICKE)Lange – Bertalot ,Rumrich &G.Hofmann
D. vulgaris var.*producta* Grunow **1862**	**35,36**	Freshwater	Accepted
	Genus2:*Centronella* Max Voigt ,1901		
C. reicheltii Voigt **1901**	**35**	Freshwater	Accepted
	Genus3: *Ceratoneis* Ehernberg ,1839		
C. arcus (Ehrenberg) Kützing **1844**	**25**	Freshwater	***Hannaeaarcus arcus*** (Ehrenberg)R.M.Patrick, Hustedt,1930
Genus4: *Asterionella* Hassal,**1859**			

Taxa of algae species	References	General Habitat	Status of name
A. formosa Hassall 1850	26,31,32	Freshwater	Accepted
	Genus5:*Meridion C.Agardh,* 1824		
Meridion sp.	**11,26**		
	Genus6: *Fragilaria* Lyngbye,**1819**		
F. acus (Kützing) Lange-Bertalot 2000	**6,25,32,36**	Freshwater	***Ulnaria acus*** (Kützing)Aboal & Ector 2003
F. bicapitata A. Mayer **1917**	**26,29,39**	Freshwater	***Fragilariforma construens*** (Ehrenberg) D.M.Williams &Round
F. brevistriata Grunow **1885**	**26,29,32,33,36,40**	Freshwater	***Pseudostaurosira brevistriata*** (Grunow) D.M.Williams &Round ; Lange-Bertalot&Cantonati 2017
F. brevistriata var. *inflata*(Pantocsek) M.B.Edlund **1994**	**26**	Freshwater	Accepted

F.capucina Desmaziéres **1830**	**6,36,37**	Marine \Freshwater	Accepted
F. construens Ehrenberg (Grunow **)1862**	**25,29,33,35,37,39**	Marine /Freshwater	***Staurosira construens*** Ehrenberg; Lange-Bertalot&Cantonati 2017
F. crotonensis Kitton **1869**	**25,29,31,38**	Marine /Freshwater	Accepted
F. intermedia (Grunow) Grunow **1881**	**6,29,30,33,36,37,40**	Freshwater	***Fragilaria capucina*** var. ***vaucheriae*** (Kützing)Lange-Bertalot&Cantonati 2017
F. mesolepta Rabenhorst **1861**	**26**	Freshwater	Accepted
F. pinnata Ehrenberg **1843**	**30,32,33,36,39**	Marine /Freshwater	***Staurosirella pinnata*** (Ehrenberg)D.M. Williams &Round (1988.1987)
F. pinnata var.*lancettula* (Schumann)Hustedt **1913**	**26,39**	Freshwater	***Punctastriata lancettula*** (Schumann)P.BHamilton &Siver 2008
F.pulchella (Ralfs ex Kützing) Lange-Bertalot **1980**	**32**	Marine\ Freshwater	***Ctenophora pulchella*** (Ralfs ex Kützing)D.M.Williams&Round 1986
F.ulna (Nitzsch) Lange – Bertalot **1980**	**12,32**	Freshwater	***Ulnaria ulna***(Nitzsch)Compére 2001
.F. virescens Ralfs **1843**	**28,29,32,37**	Freshwater	***Fragilariforma virescens***(Ralfs) D.M.Williams &Round 1986
Taxa of algae species	**References**	General Habitat	***Status of name***
F.vaucheriae (Kützing) J.B. Peterson1938	**25,32,36,37**	Freshwater	***Accepted***
Genus7: *Synedra* Ehrenberg ,1830			
Syndra actinastroides Lemmermann 1900	**26**	Marine	***Nitzschia holsatica*** Hustedt
S. acus var. *radians* (Kützing) Hustedt 1930	**29**	Marine \Freshwater	***Fragilaria radians*** (Kützing) D.M.Williams &Round 1986
S. affinis Kützing 1844	**29**	Freshwater	***Tabularia affinis*** (C.Agardh) Snoeijs 1992
S.affinis var. *faciculata* (Lyngbye)Grunow 1885	**41**	Marine	Accepted
S.amphicephala Kützing 1844	**36**	Marine	***Fragilaria amphicephala*** (Kützing) Hofmann &Lange – Bertalot 2013
S. cyclopum Brutschy 1922	**41**	Marine	Accepted
S. delicatissima W. Smith 1853	**26**	Marine	***Ulnaria delicatissima*** (W. Smith) Aboal&P.C.Sliva 2004
Synedra incisa C.S.Boyer 1920	**41**	Freshwater	***Fragilaria incisa*** **(C.S.Boyer)** Lange – Bertalot 1980
S.parasitica (W.Smith)Hustedt 1930	**36**	Marine / Freshwater	***Pseudostaurosira parasitica*** (W.Smith)E.Morales 2003
S.pulchella (Ralfs ex Kützing) Kützing1844	**6,29,30,33,39 ,40**	Marine / Freshwater	***Ctenophora pulchella*** (Ralfs ex Kützing) D.M.Williams&Round 1986
S.radians Kützing 1844	**31**	Marine	***Fragilaria radians*** (Kützing)D.M.Williams&

			Round 1986
S.rumpens Kützing 1844	**6,37**	Freshwater	***Fragilaria rumpens*** Kützing G.W.F.Carlson , Hofmann &Lange – Bertalot 2013
S.tabulata var.*fasciculata* (C. Agardh) Grunow ex Hustedt 1932	**36**	Marine	***Tabularia fasciculata*** (C. Agardh) D.M.William&Round 1986
S .ulna(Nitzsch) Ehrenberg 1832	**6,10,11,23,24,26,29,30,33,34,35, 36,37,38,39,40**	Marine	***Ulnaria ulna***(Nitzsch) Compere 2001
S.ulna var. *contracta* Ǿstrup 1901	**33**	Marine	***Ulnaria contracta*** (Ǿstrup) E.A.Moralrs&M.L.Vis 2007
S.ulna var. *oxyrhynchus* (Kützing) ǾMeara 1875	**26,29,33,36,40**	Freshwater	***Ulnaria oxyrhynchus*** (Kützing) Aboal&Ector 2003
Taxa of algae species	**References**	General Habitat	***Status of name***
S. vaucheriae (Kützing(Kützing 1844	**28,40**	Freshwater	***Fragilaria. vaucheriae (Kützing(J.Petersen , Hofmann &Lange – Bertalot 2013***
Genus 8 :*Opephora* P.Petit,1889			
Opephora sp.	**41**		
Class3: Bacilariophyceae			
Sub-class 1: Eunotiophycidae			
Order1: Eunotiales Silva 1962			
Family1: Eunotiaceae Kützing 1844			
Genus1: *Eunotia* Ehrenberg ,1837			
E. formica Ehrenberg **1843**	**32**	Freshwater	Accepted
E.pectinalis (Kützing) Rabenhorst **1864**	**6,36,37**	Freshwater	Accepted
Family2:Peroniaceae (Karsten)Topachevesky)&Oksiyuk			
Genus 1:*Peronia* Brébisson&Arnott ex Kitton ,1869			
Peronia fibula (Brebisson& Kützing) R.Ross **1956**	**6,35,36,37**	Freshwater	Accepted
Sub-class 2:Bacilariophycidae			
Order1: Mastogloiales D.G.Mann.ord .nov.			
Family1: Mastogloiaceae Mereschkowsk 1903			
Genus1: *Mastogloia* Thawites ex W.Smith ,1856			
Mastogloia braunii Grunow **1863**	**26,33**	Brackish	Accepted
M. elliptica (C.Agardh) Cleve 1**893**	**28,30,37,39**	Marine /Frshwater	Accepted
M. elliptica var. *danseyi* (Thwaites) Cleve**1895**	**33**	Marine /Frshwater	***Mastogloia danseyi*** (Thwaites) Thwaites. Ex W.Smith
M.smithii Thwaites. Ex W.Smith **1856**	**6,29,30,32,33,37,39**	Marine /Frshwater	Accepted
M. smithii var. *amphicephala* Grunow **1880**	**28,29,33,35,36,40**	Freshwater	***Mastogloia albertii*** (A.Pavlov,E.Jovanovska, C.E.Wetzel, L.Ector&Z.Levkov 2016

M. smithii var. *lacutris Grunow 1878*	**31,33**	Freshwater	***Mastogloia lacutris*** (Grunow) Grunow , Van Heurck 1880
Order2:Cymbellales D.G.Mann.ord.nov			

Table 2. Continuum

Taxa of algae species	References	General Habitat	Status of name
Family1:Anomoeoneidaceae D.G.Mann.*fam.nov*			
Genus1:*Anomoeoneis* Pfitzer,1871			
A. exilis (Kützing**)** Cleve **1895**	**12,23,24,25,26,29,30,33,39,40**	Freshwater	***Navicula exilis*** (Kützing**)**
A.vitrea (Grunow) R.Ross **1966**	**37,41**	Freshwater	***Brachysira vitrea*** (Grunow) R.Ross , Hartley 1986
Family2:Rhoicospheniaceae Chen &Zhu 1983			
Genus1:*Rhoicosphenia* Grunow,1860			
R. curvata (Kützing**)** Grunow 1**860**	**11,12,24,25,26,28,29,30,32,33,35,36,37,38,40**	Marine/ Freshwater	***Rhoicosphenia abbreviate*** (C.Agardh) Krammer &Lange-Bertalot1986
R.marina (Kützing)M.Schmidt **1899**	**26,32**	Marine	Accepted
Family3:Cymbellaceae Greville			
Genus1: *Cymbella* C.Agardh, **1830**			
Cymbella affinis Kützing **1844**	**6,12,26,29,30,31,33,34,35,36,37,39,40**	Freshwater	Accepted
C. affinis var.*excisa* (Kützing) Grunow 1**882**	**32**	Freshwater	***Cymbella excisa*** Kützing Krammer (2002)
C.angustata (W.Smith) Cleve **1894**	**25**	Freshwater	***Cymbopleura angustata*** (W.Smith) Krammer *2003*
C.aspera (Ehrenberg) Cleve **1894**	**6,12,26,28,29,30,33,37,38,39,40**	Freshwater	Accepted
C. cistula (Ehrenberg) O.Kirchner **1878**	**6,12,25,26,28,29,30,31,32,33,35,36,37,39,40**	Freshwater	Accepted
C.cymbiformis C.Agardh 1**930**	**29,33,35,36,40**	Freshwater	Accepted
C. delicatula Kützing 1**849**	**33,37**	Freshwater	***Delicatophycus delicatulus*** (Kützing) M.J.Wynne 2019
C.differta (A.Cleve) Krieger **1943**	**25**	Freshwater	***Cymbopleura lange-bertalot*** Krammer 2003

Table 2. Continuum

Taxa of algae species	References	General Habitat	Status of name
C.gracilis (Ehrenberg) Kützing **1844**	**35**	Marine / Freshwater	Accepted
C. helvetica Kützing **1844**	**6,35,40**	Freshwater	Accepted
C. laevis Nägeli **1863**	**26**	Freshwater	Accepted
C.lanceolata (C.Agardh) C.Agardh **1830**	**6,35,37**	Freshwater	Accepted
C.lanceolata var. *inflata* Pantocsek **1901**	**36**	Freshwater	Accepted
C.leptoceros (Ehrenberg) Kützing	**36,37,38,39**	Freshwater	***Cymbella neoleptoceros*** Krammer ,Bak&Szulc 2012
C. microcephala Grunow **1885**	**25,32,33,37,39**	Freshwater	***Encyonopsis. microcephala*** (Grunow)Krammer 1997
C.obtusa W. Gregory**1856**	**31,36**	Freshwater	Accepted
C.obtusiuscula Kützing **1844**	**6,26,35,39**	Freshwater	Accepted
C.parva (W.Smith) Kitchner **1878**	**32,35,37**	Freshwater	Accepted
C.perpusilla Cleve-Euler **1895**	**37,39**	Freshwater	***Encyonema perpusillum***(Cleve-Euler)D.G.Mann
C. prostrata (Berkeley) Cleve**1894**	**24,25,26,29,31,35 ,39,40**	Freshwater	***Encyonema leibleinii*** (C.Agardh)W.J.Silva,R.Jahn,T.ALudwig&M.Menezes,Silva *et.al*.2015
C.pusilla Grunow1**875**	**25,31**	Freshwater	***Navicymbula pusilla*** (Grunow) Krammer 2003

Table 2. Continuum

Taxa of algae species	References	General Habitat	Status of name
C.sinuata W.Gregory 1856	**25,36**	Freshwater	***Reimeria sinuata*** (W.Gregory) Kociolek & Stoermer
C. tumida (Brébisson)Van. Heurck **1880**	**25,29,32,35,36,37,40**	Freshwater	Accepted
C.tumidula Grunow **1875**	**6,35**	Freshwater	Accepted
C. turgida (Ehernberg) Hassal **1845**	**12,26,29,32,33,35,39,40**	Freshwater	***Epithemia turgida*** (Ehrenberg) Kützing
C. turgidula Grunow **1875**	**29,31,40**	Freshwater	Accepted
C. ventricosa (C.Agardh) C.Agardh **1830**	**6,12,25,26,28,29,31,32,33,35,36,37,40`**	Freshwater	***Encyonema ventricosum*** (C.Agardh) Grunow
Family4:Gomphonemataceae Kützing,1844.			
Genus1: *Gomphonema* Ehrenberg ,1832.			

G.acumintum Ehrenberg **1832**	**6,12,27,29.30.33,40**	Freshwater	Accepted
G.acumintum var.*turris* (Ehrenberg)Wolle 1**890**	**32,33**	Freshwater	***Gomphonema turris*** Ehrenberg, Levkov&Reichardt 2016
G.angustatum (Kützing**)**Rabenhorst **1864**	**6,25,35.37**	Freshwater	Accepted
G. angustatum var. *productum* Grunow1**880**	**29,30,35,40**	Freshwater	***Gomphonema productum*** (Grunow) Lange-Bertalot 1993&E. Reichardt
G.augur Ehrenberg **1841**	**29,30,33,49**	Freshwater	Accepted
G.constrictum Ehrenberg **1844**	**6,23,29,30,35,37,40**	Freshwater	Accepted
G.constrictum var.*capitatum* (Ehrenberg) Grunow **1880**	**29,32,33,35,40**	Freshwater	Accepted
G.fanensis Maillard **1964**	**29,37,40**	Freshwater	Accepted
G.gracile Ehrenberg **1838**	**6,25,26,29,30,31,32,33,36,40**	Freshwater	Accepted
G.intricatum Kützing **1844**	**6,29,37,40**	Freshwater	Accepted
G. intricatum var. *lunatum* H.Germain **1981**	**29,40**	Freshwater	***G.angustatum*** var. ***lunatum***(H.Germain) Aboal 2003
G. intricatum var.*pumila* A.Cleve **1932**	**26,29,36,40**	No habitat entry yet been made for this entity	***G. pumilum*** (Grunow) E. Reichardt &Lange-Bertalot

Table 2. Continuum

Taxa of algae species	References	General Habitat	Status of name
G.lanceolatum C.Agardh 1831	**6,26,30,32,33,36,39,40**	No habitat entry yet been made for this entity	***Brébissonia lanceolata*** (C.Agardh)R.K.Mahoney &Reimer
G. lanceolatum f. *torris (*Huestedt) Huestedt **1937**	**6,29,40**	Freshwater	
G.montanum (J.Schumann)Grunow **1878**	**29**	Freshwater	Accepted
G.olivaceum (Hornemann) Ehrenberg **1838**	**6,28,29,30,33,35,36,38,39,40**	Freshwater	***Gomphonella olivacea*** (Hornemann) Rabenhorst 1853
G. olivaceum var. *minutissimum* Huestedt **1930**	**36,37**	Freshwater	Accepted
G.parvulum (Kützing) Kützing **1849**	**6,26.29,30,32,33,35,38,39,40**	Freshwater	Accepted
G.sphaerophorum Ehrenberg **1845**	**26,29,30,33,36,40**	Freshwater	Accepted
G. subtile Ehrenberg **1843**	**26**	Freshwater	Accepted
G. tenellum Kützing 1**844**	**26**	Freshwater	Accepted
G.tergestinum (Grunow**)**Fricke1**902**	**37,39**	Freshwater	Accepted
G.ventricosum W.Gregory **1856**	**12,35,36**	Freshwater	Accepted
Genus2: Didymosphenia Mart.Schmidt,1849			
D. geminata (Lyngbye) Mart.Schmidt **1899**	**26**	Freshwater	Accepted

Genus3:*Gomphoneis* Clev,1894			
G. olivaceum (Hustedt) Aysel **2005**	**28,29,30,33,35,36,38,39,40**	Freshwater	***Gomphonema olivaceum*** var.***minutissimum*** Hustedt
Order3:Achnanthales Silva 1962			
Family1: Achnanthaceae , Kützing 1844 sensu emend			
Genus1: *Achnanthes* Bory,1822			
Achnanthes affinis Grunow **1880**	**30,32,35,36,40**	Freshwater	***Achnanthidium affine*** (Grunow) Czarnecki
A.biasolettiana Grunow **1880**	**25,32,36,37**	Freshwater	***Achnanthidium pyrenaicum (***Hustedt) H.Kobayasi, Hofmm & Lange- Bertalot 2013
A. brevipes H.Perogalo& Perogalo **1897**	**6, 36**	Freshwater	Accepted
A.brevipes var. i*ntermedia* (Kützing) Cleve **1895**	**26,39,40**	Brackish	Accepted

Table 2. Continuum

Taxa of algae species	References	General Habitat	Status of name
A.conspicua Ant. Mayer **1919**	**25**	Freshwater	***Platessa conspicua*** (Ant. Mayer) Lange- Bertalot, Hofmm & Lange-Bertalot 2013
A.delicatula(Kützing) Grunow **1880**	**6,33**	Freshwater	***Planothidium delicatulum***(Kützing) Round&Bukhtiyarova
A.exigua Grunow **1880**	**5,26,29,36,37**	Freshwater	***Lemnicola exigua*** (Grunow) Kulikovskiy,Witkowski&Plinski2011
A. flexella(Kützing) Brun1**880**	**33**	Freshwater	***Eucocconeis flexella*** (Kützing) Meister, Krammer& Lange- Bertalot 2004
A.gibberula Grunow**1880**	**33**	Freshwater	Accepted
A. hungarica (Grunow) Grunow**1880**	**6,26,29,30,32,33,36,37,40**	Freshwater	***Lemnicola hungarica*** (Grunow)Round &Basson 1997
A.inflata (Kützing) Grunow **1886**	**31**	Freshwater	Accepted
A. lanceolata (Brébission ex Kützing) Grunow **1880**	**25,26,29,30,31,33,36,39**	Freshwater	***planothidium lanceolatum***(Brébission ex Kützing), Lange- Bertalot 1999
A .linearis (W. Smith) Grunow 1880	**26,29,40**	Freshwater	***Achnanthidium lineare*** W. Smith
A. microcephala (Kützing) Grunow **1880**	**30,33,35,37,40**	Marine/ Freshwater	***Achnanthidium minutisimum***(Kützing) Czarnecki
A. minutissima Kützing **1883**	**6,12.24,25,30,32,33,35,36,37,39,40**	Terrestrial / Freshwater	***Achnanthidium minutisimum***(Kützing) Czarnecki , Czarnecki 1994
A. minutissima var.*genuina* A.Cleve **1953**	**29,32**	Freshwater	***Achnanthidium minutisimum***(Kützing) Czarnecki
A.ploenensis Hustedt **1930**	**29,37,40**	Freshwater	***Karayeria ploenensis*** (Hustedt) Bukhtiyarova , Bukhtiyarova 1999

A. saxonica Krasske ex Hustedt **1933**	**28**	Freshwater	***Platessa saxonica*** (Krasske ex Hustedt).Wetzel,Lange-Bertalot &Ector, Wetzel,*et al*., 2017
Family2: Cocconeidaceae Kützing 1844			
Genus1: *Cocconeis* Ehrenberg ,1836			
C. pediculus Ehrenberg**1838**	**6,25,26,29,30,31,32,33,34,35,36,37,38,39**	Freshwater	Accepted
C. placentula Ehrenberg **1883**	**6,25,26,29,30,32,33,34,35,36,37,38,39,40**	Freshwater	Accepted

Table 2. Continuum

Taxa of algae species	References	General Habitat	Status of name
C. placentula var. *euglypta* (Ehrenberg) Grunow 1884	**6,25,26,29,30,31,32,33,35,36,38,39,40**	Freshwater	Accepted
C. placentula var. *lineata* (Ehrenberg) Van Heurch 1885	**26,28,29,30,33,35,36**	Freshwater	***Cocconeis lineata*** Ehrenberg , Kulikovskiy *et al*., 2016
C.rugosa Sovereign 1960	**31**	Freshwater	Accepted
Order4:Naviculales Bessy 1907sensu emend			
Family1:Amphipleuraceae Grunow 1862			
Genus 1:*Amphiprora* Ehrenberg ,1843			
A.alata (Ehrenberg) Kützing 1844	**12,29,37**	Brackish	***Entomoneis* alata** (Ehrenberg) Ehrenberg , Aboal ,*et al*., 2003
A. paludosa W.Smith 1853	**35**	Marine/ Freshwater	***Entomoneis paludosa*** (W.Smith)Reimer , Patrick & Reimer 1975
Genus 2: Frustulia Rabenhorst,1853.			
F. vulgaris (Thwaites) De Toni **1891**	**6,29**	Freshwater \ Terrestrial	Accepted
Family2: Pleurosigmataceae Mereschkowsky 1903			
Genus1:*Pleurosigma* W.Smith, 1852			
P. delicatulum W.Smith **1852**	**29,35,36**	Marine	Accepted
Genus 2:*Gyrosigma* Hassall,1845			
G.acuminatum (Kützing) Rabenhorst 1**853**	**6,26,29,35,37,39,40**	Freshwater/	Accepted
G.attenuatun(Kützing) Rabenhorst **1853**	**6,26,28,37,40**	Freshwater	Accepted
G.kuetzingii(Grunow) Cleve **1894**	**29,40**	Freshwater	Accepted
G.peisone (Grunow) Huestedt **1930**	**6,29**	Brackish	Accepted
G.scalproides (Rabenhorst) Cleve **1894**	**30**	Freshwater	Accepted
G.spencerii (Baily ex Quckett)J.W.Griffith&Henfrey**1856**	**12,29,33,35,40**	Freshwater	***Gyrosigma acuminatum***
G.strigilis (W.Smith) J.W.Griffith&Henfrey **1856**	**31**	Brackish	Accepted

G.tenuirostrum(Grunow) Cleve **1952**	**11,29,33**	No habitat entry yet been made for this entity	No Synonyms

Table 2. Continuum

Taxa of algae species	References	General Habitat	Status of name
Family3: Neidiaceae Mereschkowsky 1903			
Genus1: *Neidium* Pfitzer ,1871			
Neidium sp.			
Neidium affine (Ehrenberg) Pfitzsr 1871	**37**	Freshwater	Accepted
N.hercynicum A.Mayer 1917	**37**	Freshwater	Accepted
Family4: Stauroneidaceae D.G.Mann.*fam.nov*.			
Genus1: *Stauroneis* Ehrenberg, 1843			
S. phoenicenteron (Nitzsch) Ehrenberg 1843	**28**	Freshwater	Accepted
S. pseudosubobtusoides H.Germain 1981	**28**	Freshwater	Accepted
Family 5: Naviculaceae Kützing 1844			
Genus 1*: Navicula* Bory, 1822			
N.angelica Ralfs 1861	**6,30,35,37**	No habitat entry has yet been made for this entity	Accepted
N.angusta Grunow1860	**31**	Freshwater/ Terrestrial	Accepted
N. atomus (Kützing) Grunow 1860	**26,29,30,36,38**	Freshwater/ Terrestrial	***Mayamaea atomus*** (Kützing) Lange-Bertalot, Lange-Bertalot 1997
N.bacillum Ehrenberg 1839	**36,37**	Freshwater	***Sellaphora bacillum*** (Ehrenberg)D.G.Mann , Reichardt 2018
N.bicephala Hustedt 1952	**26,29**	Freshwater	Accepted
N.capitata Ehrenberg1838	**36**	Freshwater	***Hippodonta capitata*** (Ehrenberg) Lange-Bertalot *et al*.,1996
N. capitatoradiata H.Germain ex Gasse 1986	**26**	Brackish	Accepted
N.cincta (Ehrenberg) Ralfs	**6,29,30,32,33,35,36,37,40**	Marine \Freshwater	Accepted
N.cincta var.*heufleri* (Grunow (Grunow 1880	**35**	Brackish	***Navicula*** *heufleri* Grunow ,Etti&Gartner 1995
N.confervacea (Kützing) Grunow1880	**31**	Brackish	***Diadesmis confervacea*** Kützing,Eberle 2008
N. cryptocephala Kützing	**6,12,24,29,30,31,32,33,35,36,38,40**	Marine \Freshwater	
N. cryptocephala var. *Exillis Grunow*	**30,35,37**	**Brackish**	**Navicula exillis Kützing**

Table 2. Continuum

Taxa of algae species	References	General Habitat	Status of name
N. cryptocephala var. *intermedia* Grunow	**26,29,32,36,38,41**	Marine / Freshwater	***Navicula capitatoradiata*** H.Germain
N. cryptocephala var. *veneta* (Kützing) Rabenhorst **1864**	**6,29,30,32,35,36**	Brackish	***Navicula*** *veneta* Kützing
N.crucicula (W.Smith) Donkin**1871**	**30**	Marine / Freshwater	***Prestauroneis crucicula*** (W.Smith)Genkal&Yarushina 2017
N.cuspidata (Kützing) Kützing 1**844**	**6,26,29,33**	Freshwater	***Craticula cuspidata*** (Kutzing) D.G.Mann, Round *et a*l., 1990
N.cymbula Donkin**1869**	**6,37**	Freshwater	Accepted
N.exigua(W. Gregory) Grunow**1880**	**6,36**	Freshwater	***Placoneis exigua***(W. Gregory)Mereschkovsky
N.exilissima Grunow	**35**	No habitat entry has yet been made for this entity	No distributions recorded
N.falaisensis Grunow**1880**	**35**	Freshwater	***Encyonopsis falaisensis*** (Grunow) Krammer
N.fragilarioides Krasske**1929**	**37**	Freshwater	*Diadesmis laevissima* (Cleve) D.G.Mann
N.fusca (W. Gregory) Ralfs **1861**	**12**	Marine	***Diploneis fusca*** (W. Gregory) Cleve,Witkowski et al.,2000
N.gastrum (Ehreberg) Kützing**1844**	**35**	Freshwater	***Placoneis gastrum***(Ehreberg)Mereschkowsky , 1903
N.gracilis Ehrenberg **1832**	**26,29,30,32,33**	Freshwater	***Navicula tripunctata*** (O.F.Müller) Bory, Lange-Bertalot 2001
N.graciloides A.Mayer 1**919**	**37**	Marine	***Navicula cari*** Ehrenberg , Ettl&Gartner 1995
N. gregaria Donkin **1861**	**6,26,35,36**	Ubiquitous	Accepted
N.grimmei Krasske**1930**	**32,35**	Freshwater	***Dorofeykea grimmei*** (Krasske)Kulikovskiy&Kociolek , 2018-2019
N.gottlandica Grunow1**880**	**35**	Freshwater	Accepted
N. halophila (Grunow) Cleve 1894	**24 ,29,35,37,40,41**	Marine/ Freshwater	***Craticula halophila*** (Grunow) D.G.Mann , Round *et al* ., 1990
N.hungarica Grunow 1**860**	**36**	Freshwater	***Hippodonta hungarica*** (Grunow)Lange-Bertalot,Metzeltin&Witkowski,1996
N. inflata Donkin **1870**	**29,30,33,35,40**	Freshwater	***Navicula mournei*** R.M.Patrick ,1959
N.lanceolata Ehernberg **1838**	**6,35,38**	Freshwater,	Accepted
N.menisculus Schumann **1867**	**35**	Marine /Freshwater	Accepted
N.microcephala Grunow **1868**	**35**	Freshwater	***Brachysira microcephala*** (Grunow) Compére,1986
N. minima Grunow**1880**	**26**	Freshwater	Accepted

Table 2. Continuum

Taxa of algae species	References	General Habitat	Status of name
N. mutica Kützing *1844*	**29,30,32,33,36**	Brackish	***Luticola mutica*** (Kützing) D.G.Mann Round *et al.*,1990
N. mutica var. *binodis* Huestedt	**26**	Freshwater	***Luticola binodis*** (Hustedt) M.B.Edlund
N. mutica var. *nivalis* (Ehrenberg) Hustedt 1911	**26**	Freshwater	***Luticola nivalis*** D.G.Mann (Ehrenberg) , Round *et al*.,1990
N. notha J.H.Wallace 1960	**35**	Freshwater	Accepted

N.oblonga (Kützing) Kützing 1844	**6,35,38**	Freshwater	Accepted
N. parva (Ehrenberg) Ralfs 1891	**29,32,33,36,40**	Freshwater	***Pinnularia parva*** G.Gregory
N.peregrina (Ehrenberg) Kützing 1844	**31**	Brackish	Accepted
N.phyllepta Kützing 1844	**29,36**	Marine \Freshwater	Accepted
N.pseudolanceolata Large-Bertalot	**6,37**	Freshwater	Accepted
.*N.pseudotuscula* Hustedt 1943	**33,36**	Freshwater	***Aneumastus stroesei*** (Østup)D.G.Mann11 , Large- Bertalot 2001
N. pupula var. *rostrata*	**29**	Freshwater	***Sellaphora rostrata*** (Hustedt)J.R.Johanson
N. pupula var.*capitata* Hustedt 49	**36**	Freshwater	***Sellaphora parapupula***
N.pygmaea Kützing 1849	**6,36**	Freshwater	***Fallacia pygmaea*** (Kützing) Stickle&D.G.Mann, 1990
N. radiosa Kützing 1844	**6,24,26,29,30,32,35,36,37,38**	Freshwater/ Terrestrial	Accepted
N. radiosa var. *tenella* (Brébisson ex Kützing) Van Heurck 1885	**29,30,35,36,40**	Freshwater	***Navicula tenella*** Brébisson ex Kützing
N. rhyncocephala Kützing 1844	**6,29,30,32,33,35,36,40**	Marine/Freshwater	Accepted
N.salinarum Grunow	**35,36**	Brackish	Accepted
N.saxophila W. Bock ex Hustedt 1966	**30**	Freshwater	***Luticola saxophila*** (W. Bock ex Hustedt)D.G.Mann , Round *et al*.,1990
N.schroeteri F. Meister 1932	**6,30,32,33,35,37**	Brackish	Accepted
N.spicula (Hickie) Cleve 1894	**29,40**	Marine/Freshwater	***Haslea spicula*** (Hickie)Buktiyarova 1995
N. tripunctata (O.F.Müller) Bory 1822	**6,26**	Freshwater	Accepted
N.trivialis Lange –Bertalot 1980	**6,28,30,33**	Freshwater	Accepted
N.tumida Brébisson ex Kützing 1849	**12**	Marine	***Metascolioneis tumida*** (Brébisson ex Kützing) Blanco&Wetzel 2016

Table 2. Continuum

Taxa of algae species	References	General Habitat	Status of name
N.tuscula Ehrenberg 1840	**36,37**	Freshwater	***Aneumastus tusculus*** (Ehrenberg) D.G.Mann&A.J, Stickle,in Aboal *et al*.,2003
N.viridula var. *rostellata* (Kützing) Cleve 1895	**6,33,35,40**	Freshwater	Navicula *rostellata* Kützing,Hofmann *et.al*.2013
N.vitrea (Cleve) Cleve **1894**	**28**	Marine	***Haslea vitrea*** Cleve, Simonsen , 1974
Family6: Diploneidaceae D.G.Mann *fam.nov.*			
Genus1: *Diploneis* Ehrenberg ex Cleve, 1894			
D. elliptica (Kützing) Cleve **1894**	**29,33,35**	Marine/ Freshwater	Accepted
D. ovalis (Hilse) Cleve 1**891**	**6,25,26,29,30,33,35,36,37**	Freshwater	Accepted
D. puella (Schumann) Cleve **1894**	**26,35**	Freshwater	Accepted

Family 7: Pinnulariaceae D.G.Mann *fam.nov.*			
Genus1: *Pinnularia* Ehrenberg ,1843			
P.acuminata W.Smith 1853	**37**	Freshwater	Accepted
P.biceps W.Gregory 1**856**	**5,36**	Freshwater	Accepted
P. borealis Ehrenberg **1843**	**6,28,30,37**	Freshwater/ Terrestrial	Accepted
P.globiceps Gregory 1**856**	**30,36**	Freshwater/ Marine	Accepted
P.gracillima W. Gregory **1856**	**37**	Freshwater	Accepted
P.leptosoma (Grunow) Cleve **1895**	**6,35,36**	Freshwater	***Caloneis leptosoma*** (Grunow) Krammer
P.lundii Hustedt	**25,29**	Ubiquitous	Accepted
P.mesogongyla Ehrenberg **1843**	**31**	Freshwater	Accepted
P. tabellaria Ehrenberg **1843**	**28**	Freshwater	Accepted
P.viridis (Nitzsch)Ehrenberg **1843**	**35**	Freshwater	Accepted
Order5:Thalassiophysales D.G.Mann.ord.nov.			
Family1:- Catenulaceae Mereschkowsky 1903			
Genus 1:Amphora Ehrenberg Kützing 1844			
A. coffeiformis (C. Agardh) Kützing	**6, 24,25**	Freshwater	***Halamphora coffeiformis*** (C. Agardh) Mereschkowsky , Mereschkowsky 1903

Table 2. Continuum

Taxa of algae species	References	General Habitat	Status of name
A. commutata Grunow **1880**	**35,36**	Brackish	Accepted
.*A.normanii* Rabenhorst **1864**	**33,35,37**	Freshwater	***Halamphora normanii***(Rabenhorst) Levkov, Levkov 2009
A. ovalis(Kützing(Kützing **1844**	**6,25,26,28,29,30,31,33,40**	Marine/Freshwater	Accepted
A. ovalis var. *libyca* (Ehrenberg) Cleve **1895**	**32**	Marine	***Amphora libyca*** Ehrenberg
A.pediculus Kützing Grunow **1875**	**6,29,37**	Freshwater	Accepted
A. perpusilla Grunow **1884**	**26**	Freshwater	***Halamphora perpusilla*** (Grunow)Q.-M.You&Kociolek, You ,*et al.*, 2015
A. proteus W.Gregery	**26**	Marine	Accepted
A.venata Kützing 1844	**25,29,32,36,37,40**	Freshwater - Brackish	***Halamphora venata*** (Kützing (Levkov , Levkov 2009
Genus2: *Caloneis* Cleve,1894			
C. bacillum (Grunow) Cleve 1**894**	**6,25,29,30,32**	Ubiquitous	Accepted

C. permagna (Bailey) Cleve **1894**	**11,24,29,39**	Brackish	Accepted
C.placentula Ehrenberg	**36**	No habitat entry has yet been made for this entity	No synonyms are currently
C.venticosa F.Meister **1912**	**10,30**	Freshwater	Accepted
Order6: Bacillariales Hendey 1937 *sensu emend* , **Family1: Bacillariaceae Ehrenberg 1831** **Genus1:** *Hantzschia* Grunow **1877**			
H. amphioxys (Ehrenberg) Grunow	**6,24,29,30,35**	Freshwater/ Terrestrial	Accepted
Genus2: *Bacillaria* J.F.Gmelin,**1791**			
B.paxillifera (O.F.Müller) T.Marsson **1901**	**10,11,12,25,26,29,30,31,32,33,35,36,39 ,41**	Brackish	Accepted
Genus3: *Nitzschia* Hassall, **1845**			
N. acicularis(Kützing) W.Smith **1853**	**11,12,24, 26,30,36,37,38,39**	Freshwater/ Marine	Accepted
N.acuta Hantzsch **1930**	**35**	Marine / Freshwater	Accepted

Table 2. Continuum

Taxa of algae species	References	General Habitat	Status of name
N. amphibia Grunow **1862**	**6,24,27,29,30,31,33,36,38,39,40**	Freshwater	Accepted
N.angustata (W.Smith) Grunow**1880**	**6,40**	Freshwater	***Tryblionella angustata*** W.Smith
268.N. apiculata (W.Gregory) Grunow **1878**	**6,26,25,29,30,31,32,33,35,36,40**	Marine	***Tryblionella apiculata*** W.Gregory
N.closterium (Ehrenberg)W.Smith **1853**	**35,37**	Marine	***Cylindrotheca closterium*** (Ehrenberg) Reimann&J.C.Lewin 1964
N. commutata Grunow **1880**	**6,25**	Marine / Freshwater	Accepted
N. dissipata (Kützing) Rabenhors**1860**	**6,26,29,30,32,33,35,36,37,38,39,40**	Freshwater	Accepted
N. dubia W.Smith**1853**	**6,28**	Marine / Freshwater	Accepted
N.fasciculata (Grunow) Grunow**1881**	**6,24,25,26,29,36,40**	Brackish	Accepted
N. filiformis (W. Smith)Van Heurck1**896**	**6,26,29, 32,33,35,36,39,40**	Brackish	Accepted
N. fonticola (Grunow) Grunow**1881**	**6,29,36,39**	Freshwater	Accepted
N. frustulum (Kützing) Grunow**1880**	**6,25,26,29,30,32,33,35,36,39,40**	Marine / Freshwater	Accepted
N. frustulum var. *perpusilla* (Rabenhorst)Van Heurck**1885**	**41**	Freshwater	Accepted
N. fruticosa Hustedt **1957**	**28,30,37**	Freshwater	Accepted
N. gandersheimiensis Krasske**1927**	**26**	Freshwater	***Nitzschia tubicola*** Grunow,Witkowski *et al*.,2000
N. gotlandica A. Cleve **1952**	**26**	Marine	Accepted

N. gracilis Hantzsch**1860**	**24,29,31,32,35,36,37,39,40**	Freshwater	Accepted
N.granulata Grunow**1880**	**24,33,39**	Freshwater	***Tryblionella granulata*** (Grunow)D.G.Mann in Round *et al*.,1990
N. hantzschiana Rabenhorst **1880**	**28**	Freshwater	Accepted
N. holsatica Hustedt **1924**	**26,29**	Freshwater	Accepted
N. hungarica Grunow**1862**	**25,26,29,31,32,35,34,40**	Marine	***Tryblionella hungarica*** (Grunow) Frenguelli1942
N. inconspicua Grunow**1862**	**41**	Freshwater	Accepted
N. intermedia Hantzsch**1880**	**6,28,29,37,40**	Freshwater	Accepted
N.kützingiana Hilse**1861**	**29,33,40**	Marine	Accepted

Table 2. Continuum

Taxa of algae species	References	General Habitat	Status of name
N.linearis W.smith**1853**	**6,28,29,37**	Marine/ Freshwater	Accepted
.*N. microcephala* Grunow**1880**	**6,25,29,32,33,36,37,39,40**	Freshwater	Accepted
.*N. minutula* Grunow**1881**	**6,37**	Freshwater	Accepted
N. obtusa W. Smith**1853**	**6,25,26,28,29,32,35,36,38,40**	Marine	Accepted
N. palea (Kützing) W. Smith**1856**	**12,6,23,25,26,29,31,32,33,34,36,37,38,39**	Freshwater	Accepted
N. paleacea Grunow **1881**	**26,35,37,39**	Freshwater	Accepted
N.parvula W.Smith**1853**	**36**	Brackish	Accepted
N. punctata (W. Smith) Grunow **1880**	**12,29,33**	Freshwarter /Marine	***Tryblionella punctata*** W. Smith
N. pusilla Grunow**1862**	**6,37**	Freshwater	Accepted
N.recta Hantzsch ex Rabenhorst**1862**	**6,29,33,35,36**	Freshwarter /Marine	Accepted
N.romana Grunow**1881**	**22,26,33,37**	Freshwarter	***Nitzschia fonticola*** Grunow(Grunow) , Krammer &Lange-Bertalot 1988
N.rostellata Hustedt**1956**	**37**	Freshwater	Accepted
N. scalaris (Ehrenberg)W. Smith**1853**	**29,31,33**	Freshwater	***Tryblionella scalaris*** (Ehrenberg) Siver & Hamilton 2005
N. sigma (Kutzing) W. Smith**1853**	**6,25,26,28,29,32,33,35,36,37,39**	Brackish	Accepted
N. sigma var. *rigidula*(H.Peragallo&M.Peragallo) Grunow**1881**	**33,39**	Freshwater	Accepted
N. sigmoidea (Nitzsch) W.Smith**1853**	**6,25,26,28,29,30,33,35,36,37, 38,39**	Freshwater	Accepted
N.spectabilis W.Smith**1853**	**35**	Freshwater	No synonyms are currently included in AlgaeBase
N.stagnorum Rabenhorst**1860**	**25,26,39**	Freshwater	***Nitzschia umbonata*** (Ehrenberg) Lange-Bertalot 1988
N.sublinearis Hustedt**1930**	**25,26,28,29,32,33,35,36**	Freshwater	Accepted
N.subtubicola H.Germain**1981**	**37**	Freshwater	***Nitzschia sociabilis*** Hustedt
N.supralitorea Lange-Bertalot**1979**	**6,37**	Freshwater	Accepted
N.thermalis (Ehrenberg) Auerswald1**861**	**36**	Freshwater	Accepted

Table 2. Continuum

Taxa of algae species	References	General Habitat	Status of name
N. tryblionella Hantzsch**1860**	**25,29,33,36**	Ubiqutous	***Tryblionella hantzschiana*** Grunow,Kusber *et al*., 2017
N. tryblionella var.*debilis* (Arnott&OMeara)Hustedt**1913**	**36**	Freshwater	***Tryblionella debilis*** Arnott&OMeara
N. tryblionella var. *victoriae* (Grunow) Grunow**1879**	**30**	Freshwater	***Tryblionella victoriae*** Grunow
N.umbonata(Ehrenberg) Lange-Bertalot**1978**	**6,37**	Marine / Freshwater	Accepted
N.vermicularis (Kützing) Hantzsch**1860**	**6,24,35,37,38,39**	Marine / Freshwater	Accepted
N.vitrea G. Norman**1861**	**36**	Marine /Freshwater	Accepted
Genus4:Cylindrotheca Rabenhorst 1859			
Cylindrotheca sp.	**36**		
Genus5:*Denticula* Kützing,1844			
D.elegans Kützing**1844**	**25,26,37**	Freshwater	Accepted
D.rainierensis Sovereign **1963**	**26,30**	Freshwater	Accepted
D.tenuis Kützing **1844**	**30**	Freshwater	Accepted
D. thermalis Kützing**1844**	**41**	Freshwater	Accepted
Order7: Rhopalodiales D.G.Mann.*ord.nov* ,			
Family1: Rhopalodiaceae(Karsten) Topachevsky&Oksiyuk			
Genus1:*Epithemia* Kützing,1844			
E. sorex **1844**	**6,30,33**	Freshwater	Accepted
E. turgida var. *granulata* (Ehrenberg)Brun **1880**	**28**	Freshwater	Accepted
E. zebrs (Ehrenberg) Kützing **1844**	**25,29,30,333,37,40**	Freshwater	***Epithemia* adnata** (Kützing) Ehrenberg , Hofmann , *et al* 2013
E. zebrs var.*procellus*(Kützing) Grunow **1862**	**33**	Freshwater	***Epithemia procellus*** Vishnyakov , *et al* 2014
Genus2: *Rhopalodia* O. Müller ,1895			
R. gibba (Ehrenberg) O. Müller **1895**	**6,29,30,32,33,37**	Freshwater	***Epithemia gibba*** (Ehrenberg) Kützing , Cocquyt &Jahn 2018

Table 2. Continuum

Taxa of algae species	References	General Habitat	Status of name
Order8: Surirellales D.G.Mann.*ord.nov* , Family: Surirellaceae Kützing 1844			
Genus1:*Campylodiscus* Ehrenberg ex Kützing,1844			
C. clypeus (Ehrenberg) Ehrenberg **ex** Kützing,**1844**	**11,25,26,30**	Freshwater \ Marine	Accepted
Genus2: *Cymatopleura* W.Smith,1851.			
C. elliptica (Brébisson) W.Smith **1851**	**12,29,37,39**	Freshwater	Accepted
C.sola (Brébisson) W.Smith1**851**	**12,26,29,30,30 ,37,39,40,41**	Freshwater	***Surirella librile*** (Ehrenberg) Ehrenberg 1845 , Jahn&Cocquyt 2017

Genus3: *Surirella* Turpin, **1828**			
S. angusta Kützing**1844**	**6,30,31,33**	Freshwater	Accepted
S. biseriata Hustedt **1914**	**25**	Freshwater	Accepted
S. capronii Brébisson&Kitton **1869**	**25,23,36,39**	Freshwater	***Iconella capronii*** (Brébisson&Kitton) Ruck&Nakov , 2016
S.linearis W.Smith **1853**	**35**	Freshwater	***Iconella linearis*** (W.Smith) Ruck&Nakov, 2016
S.linearis var. *constricta* Grunow **1862**	**35**	Freshwater	***Surirella grunowii*** Kulikovskiy,Lange-Bertalot&Wilkovski , 2006
S. ovalis Brébisson**1838**	**6,25,26,29,30,31,33,35,36,39,40**	Freshwater	Accepted
S.ovata Kützing **1844**	**26,29,30,31,32,33,36,38,39,40**	Freshwater \ Marine	***Surirella minuta*** Brébisson& Kützing , Day *et al*.,1995
S.ovata var. *pinnata* (W.Smith) J.J.Brun **1880**	**35**	Freshwater	***Surirella minuta*** Brébisson& Kützing , Aboal *et al*.,2003
S.robusta Ehrenberg **1841**	**6,25,33,37,38**	Freshwater	Accepted
S. striatula Turpin **1828**	**26**	Marine	Accepted

CONCLUSION

The study conclude that its necessary to revised all identified algae in Iraq, and needs to revised their names and rearranged the groups, , to avoid any confusion or mistakes in naming diatoms in the future, and encourage the researchers to use molecular approach to classify the diatoms in Iraqi aquatic systems. However undoubtedly this will enhance a wider revision to include all other known algal taxon in Iraq and even the whole Middle East.

REFERENCES

1. Wetzel R.G. 2001. Limnology, lake, and River Ecology. 3rd. ed. Academic Press, pp: 1006

2. Round FE. , R.M. Crawford and D.G.Mann .1990. The Diatoms Biology and Morphology of the Genera. Cambridge University Press, Cambridge, pp:747.

3. Maulood B K , F. M .Hassan, A. A. Al-Lami , J. J. Toma and A .M. Ismail. 2013. Checklist of Algal Flora in Iraq. Ministry of Environment, Iraq, pp:3-93

4. Albueajee, A.I., F.M. Hassan, and A.A.Z. Douabul, 2020. Phytoplankton Species Composition and Biodiversity Indices in Auda Marsh-Southern Iraq. The Iraqi Journal of Agricultural Science, 51, pp ; 217-228

5. Ali, S.F., F.M. Hassan and R.A. Abdul-Jabar, , 2019. Ecological Study of Epiphytic Diatoms on Two Submerged Aquatic Macrophytes in Tigris River, Iraq. The Iraqi Journal of Agricultural Science, 50(3), pp.1109-1119

6. Al-Meshhdany,WY.2020 Environmental Indices., and eDNA to Assess The Water quality of Tigris River Within Baghdad- Iraq, M.Sc. Thesis, Univ. of Baghdad / College Science of Women, pp:136

7. Abu-Hadal L. S. and J .S .Al-Hassany .2020. Using Diatom Indices to Evaluate Water quality In Abu-Zirig Marsh Thi-Qar Province /south of Iraq Baghdad Science Journal P-ISSN: 2078-8665 2020, 17(2 Special Issue).NICST :pp599-603

8. Al- Naqeeb N A, J S Al Hassany and F . K. Mashi .2020. Assessment of The Water Quality of Um El-Naaj Marshes by Diatoms, Eco. Env. & Cons. 26 (1)pp : 405-410

9. Abbas A.A.A, and F.M. Hassan. 2018. Water Quality Assessment of Euphrates River in Qadisiyah Province (Diwaniyah River), Iraq. Iraqi Journal of Agricultural Science 49(2)pp: 152-162

10. Maulood B. K., M .N. Al-Azzawi.and H. A. A .Saadalla. 1994 . An ecological Study on The Tigris River Pre and After Crossing Baghdad. J. coll. Educ. for Women. Univ.Baghdad. 5 (1).pp:43-50

11. Saadalla H A A. 1988 . An ecological Study on The Effect of Saklawia Irrigation Drainage on Tigris River in Baghdad. M.Sc.

Thesis, Univ. of Baghdad / College Education

12. Al-Saadi H. A., H A.A .,Saadalla and A. M. Ismail .2003. .Phytoplankton Population Dynamics in Tigris river Pre and After passing Baghdad City, Iraq. Journal Al-Qadisiya. 8(1).pp:241-254.

13. Hinton G.C.F and B.K. Maulood .1983.Checklist of The Algae from the Inland Water of Iraq. J.Univ.Kuwait (Sci.,) 10:191-256

14. Maulood B.K. 1991 . Contribution to The Algal Flora of Some Springs and Streams in The Derbendikhan area, Iraqi ,J.Sci. . 33(2)

15. Maulood BK and Hinton GCF .1978. Observations on The Algal Flora of the Sulaimaniya Area :Green and Blue-green Algae .Zanco (Sci. J.Univ. Sulaimaniya ,Iraq) , Series A, 4 pp:55-75

16. Maulood B.K. and Hinton G.C.F. 1979 Tychoplanktonic Diatoms from a Stenothermal Spring in Iraqi Kurdistan .Br. Phyc. J., 14 pp:175-183

17. Maulood, B.F., G.C.F.Hinton, H.S. Khamees,, F.A.K. Salah, A.A. Shaban and S. M. H. Al- Shahwani,. 1979. An ecological Survey of Some Aquatic Ecosystems in Southern Iraq. Tropical Ecology , 20(1) pp:27-40

18. Maulood B.K. G.C.F. Hinton, B.A. Whitton and H.A. Al-Saadi. .1981.On The Algal Ecology of The Lowland Iraq Marshes, Hydrobiol. 80 pp: 269-276

19. Islam A K M and H.A.Hameed. 1985. Checklist of The Algae With A note on Limnological and Oceanographic Studies in Iraq (1947-1982) Asiatic Society of Baghdad pp:63

20. Maulood B K, R .M .A.Hadi , H A A Saadalla , T. I. Kassim and A .A .Al-Lami . 1993. Checklist of Algae in Iraq. Marina Mesopotamia Suppl. (1)pp:1-128.

21. Maulood B. K and J. J. Toma . 2004. Checklist of Algae in Iraq. Scientific Journal of Babylon Univ., 9(3),pp:1-62

22. Al-Saedy R, M. Al-Shaheen and A.Y.Al-Handal . 2020 Checklist of Diatoms in Shatt Al-Arab River, Basrah Province, Southern Iraq, Biol.Appl.Environ.Res. 4 (2)pp: 237-284

23. Ismail . A. M. and H. A. A. Saadalla. 1997. A Quantitative Comparison Study on Algae Between Two Aquatic Ecosystems Within Baghdad –Iraq. J. coll. Educ. for Women. Univ.Baghdad. (8)1.pp:83-90

24. Al-Lami A A , T.I. Kassim and S. K. Salman. 2000. Phytoplankton of Tigris River, Iraq. J. Colt. Educ. for Women, Univ. Baghdad, Iraq 3 pp: 56-61

25. Farka T.K.J. 2009. Study Spread Phytoplankton and Fungi in Running Water Within Baghdad City and On Effect Environmental Factors. Ph. D. ,Dissertation College of Science, Univ. Mustensyria, pp:149.

26. Al-Janabi Z Z.F.(2011). Application Water Quality Indices for Tigris River Within Baghdad city –Iraq. M.Sc. thesis, Univ. of Baghdad/College Science of women pp:160

27. Hassan, F.M., J..J. Toma, A.M. Ismail, J.S. Al-Hassany, R.A.M. Hadi,., and , B.K. Maulood.2012. A contribution to Algae Flora in the Baghdad Area, Iraq. Journal of Advanced Laboratory Research in Biology 3 (2) pp:90-98

28. Al-Husseini A A , R. F. Kamal and A..Fiek . 2013 . Diagnose Some Type of Epiphytic Algae on Surfaces Submerged in The Aquatic Environment of The Tigris. Journal of Mustansiriya Science. 24(3)pp:28-15

29. Al-Dulaimi, W. A. A. 2013. An Ecological Study of Epiphytic Algae on Aquatic Macrophytes in Tigris River within Baghdad city/ Iraq. M.Sc. Thesis, Univ. Diyala/ College of Edu. for Pure Sciences. pp: 175

30. Al-Bdulameer S H. 2013 . An Ecological Study of Epiplic Algae in Tigris River within Baghdad city/ Iraq. M.Sc. Thesis, Univ. of Baghdad / College Science of Women .pp:150

31. Al-Rawi A A. 2013 . Phytoplankton compositions Alaaras tourist Island lake –Iraq Journal Baghdad of science. 10 (1):P 13-21

32. Al-Qaisi W G , Salman S K and Abdul Wahid A. 2013 . Identification and Diversity Study of Phytoplanktons in Some Artificial Lakes in Al-Jadria, Baghdad, Iraq.Journal of Babylon University, Pure and Applied. 8 (21).pp:2723-2734

33. Al-Saedy R .N. K. 2014 . An Ecological Study of Epiphytic Algae on Aquatic Macrophytes in Tigris River within Baghdad City/ Iraq. M.Sc. Thesis, University of Baghdad / College Science of Women, pp:165

34. Abed I J, A. A. Al-Hussieny , R .F. Kamel and A. L. Jawad .2014 . Environmental and Identification Study of Algae Present in Three Drinking Water Plants Located on The Tigris River in Baghdad. International Journal of Advanced Research. 2 (3) pp : 895-900

35. Al-Hassany J.S. and H .E .Al-Bayaty . 2016 . Qualitative Study of Epiphytic Algae on Aquatic Plant *Phragmites australis* in Tigris River on Al-Jadria Site, Baghdad, Iraq. Baghdad Journal Science 1(15).pp:1-15

36. Al-Hassany J S and M. T. Hindi .2016 . A study of Epiphytic and Epipelic Algae at Al-Dora Site in The Tigris River in Baghdad Province-Iraq. Baghdad Journal Science 15(11):1-11

37. Al-Hassieny A A , S. F. Hussain, R. F. Kamel and S.N. Mohsin . 2016 . Algae Species of The Tigris River in Baghdad City-Iraq. International Journal of Innovation and Applied Studies, 1(3).pp:531-546

38. Jabbar, S. H. and J. S. Al-Hassany . 2018 . Use of Indices of Algae and Water Quality to The Assessment of The Tigris river in Al-Gheraiat area in Baghdad city, Iraq Baghdad Journal Science. Mesopo. Environ. 4(3) pp: 25 – 41

39. Al-Fraidawi, S. H. J. 2018 . Phytoplankton as Bioindicator to Assessment the Environmental status of A section of The Tigris River Within Baghdad City –Iraq, M.Sc. Thesis, University of Baghdad / College Science of Women pp:128.

40. Al-Hassany J. S and R. N. Kattian. 2018 .Qualitative and Quantitative Study of Epiphytic Algae on *Hydrilla verticillata* at Al-Dora Site in Tigris River Wthin Baghdad City,Iraq,4(4) pp:1-15

41. Al- Magdamy B A and I. M .A. Al-Salman . 2018..A qualitative Study of Epiphytic Diatoms from *Phragmites australis* in A section of the Tigris River north of Baghdad, Proceedings of the 1st and 3rd International Scientific Conference of The Faculty of Science, Univ. Tikrit,17-18 Desmp..2018.: pp29-38

42. Al-Qayim , B. A 1994. Emergence of River islands in Baghdad city Journal of The Iraqi Geological,Society pp: 65