MARSH BULLETIN 13(1) April (2018) 1–11

MARSH BULLETIN

First Registration of *Discorinopsis aguayoi* Bermúdez and *Discorinopsis vadescens* Cushman and Todd from the Iraqi coast and their environmental implication

Bushra Majeed Issa

Department of Geology, Science College, Basra University

Bushra7M.Issa@ymail.com

A B S T R A C T

Seventeen sample of sediment were collected from Iraqi coast in Khor Al-Zubair tidal flats during September 2015. Examination of these samples revealed the occurrence of three foraminiferal species, which were *Discorinopsis aguayoi*, *D. vadescens* and *D. tropica*. These foraminifera (except *D. tropica*) were recorded for the first time in the Iraq. The percentages of all these species, characteristic features of the tests and sediment texture were also recorded here.

Keywords: *Discorinopsis aguayoi*, *Discorinopsis tropica*, *Discorinopsis vadescens*, Foraminifera, Northwestern Arabian Gulf, Southern Iraq.

Introduction

Foraminifera are primarly marine and live on bottom sediments as benthic organisms; a small number of species are planktonic. They are of great importance in bulding the ooze, which cover enormous areas of the floor of many seas. Foraminiferans secrete multi-chambered tests, typically of calicium carbonate.

Foraminifera tests (represent-ing more than 30000 species) a bound in the fossil record, the oldest specimens date from the Early Cambrian, about 543 million years ago. The extensive fossilized remains of foraminifera have taken on considerable economic importance, for example, cement and black board chalk are foraminiferan-containing products in addition certain foraminiferan fossils are used as fairly reliable indicators of likely places to drill for oil (Pechenik, 2005).

The Khor Al-Zubair area is one of the main zones of tidal mud flats in the northwestern Arabian Gulf (Yacoub, 2011a). The thickness of exposed tidal

flat sediments on the banks of Khor Al-Zubair tidal channels is approximately (2 - 3) m (Yacoub, 2011b). These tidal flats are an interesting area; especially they were influenced by many factors, including those associated with erosion or sedimentation, recent tectonic activity and sea level fluctuation (Kassler, 1973, Al-Mussawy, 1993).

Numerous studies have been carried out in different parts of the world concerned with foraminfera, but such investigations are limited in Iraq. Although Safawee and Elewi (1989) studied the distr-ibution of recent foraminifera in the Khor Al-Zubair sediments. Khalaf and Elwei (1989) cited a similarity between modern Ostracoda in Khor al-Zubair and those in the Arabian Gulf, the Indian coast and the Red Sea. Issa(2006) focused on the sedimentological and paleont-ological aspects of the tidal flats recent sediments of Khor Al-Zubair and Khor Abdullah. Therefore, this study was designed to throw more light on the foraminifer's species, which were present in this area and have not yet been recorded in Iraq.

Study area

The sampling sites are located close to the dendritic tributaries of Khor Al-Zubair tidal channel inland, southern Iraq, within (30° 12' 1.44" – 30° 12' 53.28"N) and (47° 51' 4.32" – 47° 51' 56.16"E) , (Fig.1). Khor Al-Zubair represents the lowest and last section of the Old Euphrates before it changed its course in the 19th century to that of the present time (Al-Rubaiay, 1984).

Nowadays, Khor Al-Zubair is the tidal channel resembles a river with meandering course and system of tributaries having dendritic pattern. These branching tidal channels are the result of both the impact of lateral and vertical seawater erosion in unconsolidated sediments, mainly due to tidal action (Yacoub, a2011).

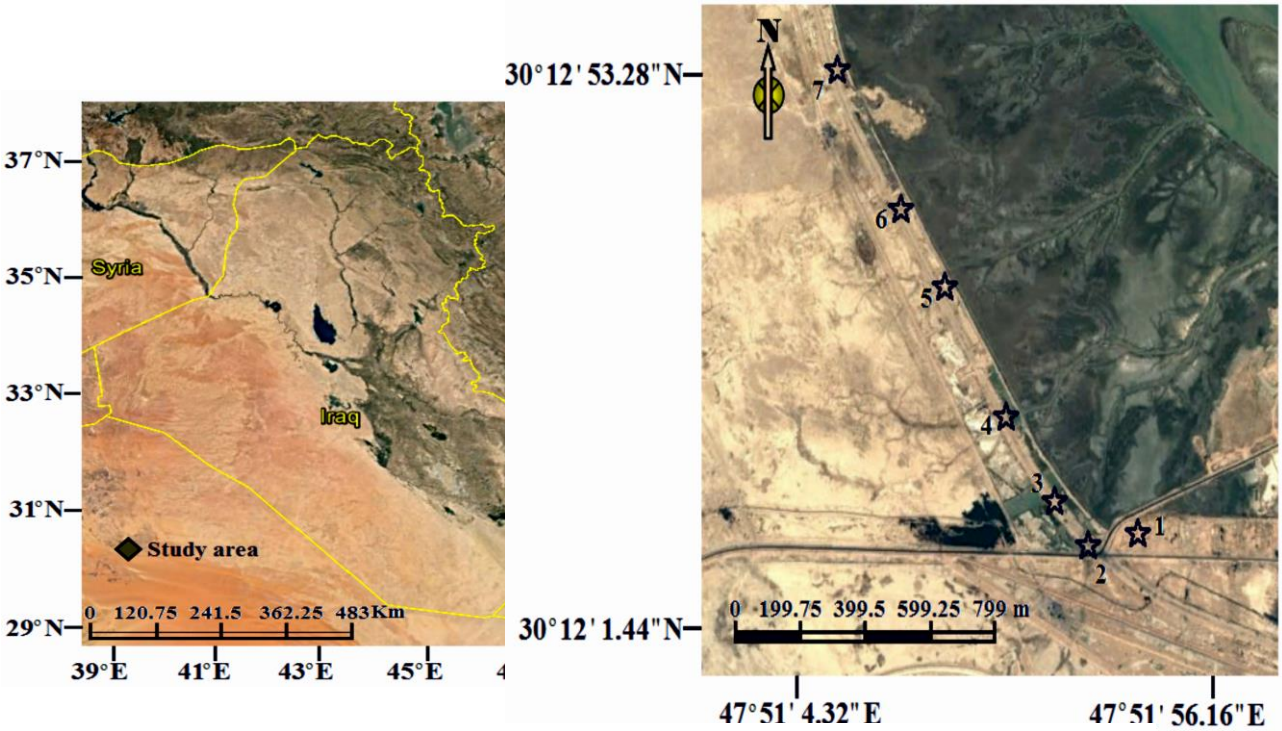

Figure 1: Location of the study area and samples sites.

Materials and Methods

In September 2015, 17 samples of sediment were collected from seven sites and at varying depths ranging from surface to 1 meter by using shovel (Fig. 1). The grain size analysis was done through wet sieving on a sieve of 230 mesh to separate the sand from silt and clay fraction which were later used in the classical pipette method of Folk (1980) . The percentage of sand, silt and clay was calculated to determine the type of sediment according to textural classification of Folk (1980). For the separation of foraminifera, 50-gram unit weight of each sediment sample was taken. All samples were washed on ASTM 230 mesh sieve to eliminate the finer particles from silt and clay. The residues left in the sieves were dried and then identified under the binocular microscope. Identification was made according to made to Loeblich and Tappan (1988) in addition to Bermúdez (1935), Cushman and Todd (1948) and Collins (1958).

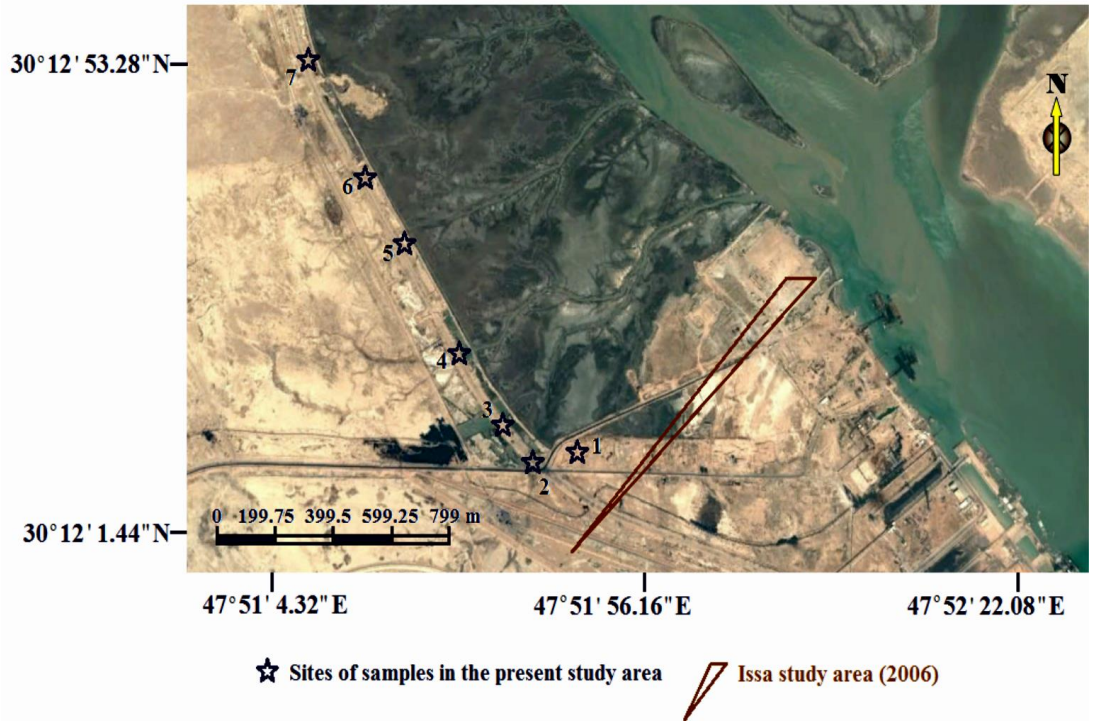

Figure 2: Location of Issa (2006) study from the present study area.

Results

Sediments type

According to the texture classification of Folk (1980), the grain size distribution shows a variable mixture of two textural types (Fig. 3); silt and mud, where mud sediment were the dominant and forms about 76% of

the total sediments samples, followed by silt which forms about 24% (Table 1).

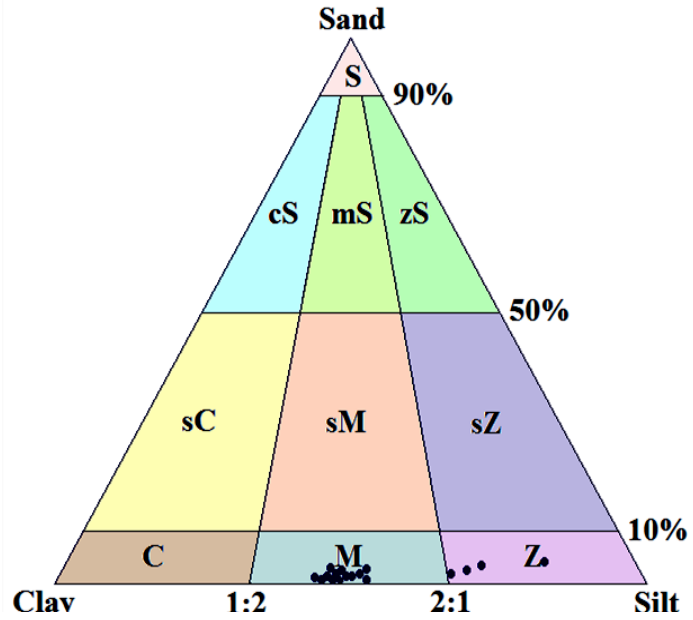

Figure 3: Ternary diagram showing sedimentary classification of the studied samples.

Table (1) Sand-silt-clay percentage in sediment samples of the study area.

Sample site	Sample depth(m)	Sand %	Silt %	Clay %	Sediment type
1	0.5	5	80	15	Silt
	0.9	4	67	29	Silt
2	0.4	4	70	26	Silt
	0.8	3	65	32	Silt
3	0.3	3	49	48	Mud
	0.6	2	51	47	Mud
	1.0	1	48	51	Mud
4	0.2	2.5	50	47.5	Mud
	0.5	0.98	53	46.02	Mud
	0.8	1	48.5	50.5	Mud
5	0.3	1.9	48.2	49.9	Mud
	0.5	0.5	48.5	51	Mud
	0.7	0.3	45	54.7	Mud
6	0.4	2.5	50.3	47.2	Mud
	0.6	1	46	53	Mud
7	0.3	1.4	47	51.6	Mud
	0.5	0.9	46.6	52.5	Mud

Foraminiferal species

Three foraminiferal species were identified in the sediment samples of Khor Al-Zubair. *Discorinopsis aguayoi* with a percentage of 60% which made it the most common species, *D. vadescens* with a percentage of 38% and *D. tropica* which form 2% of the total percentage of foraminifera species (Fig. 4). The distribution of forminifera species varies with the depths of each site in the study area (Fig. 5).

The taxonomic scheme of these foraminifera species is as follows:

Phylum: FORAMINIFERA

Class: GLOBOTHALAMEA

Subclass: TEXULARIIA

Order: TEXULARIIDA

Suborder: TEXULARIINA

Superfamily: EGGERELLIODEA

Family: VALVULMMINIDAE

Genus *Discorinopsis*

Discorinopsis aguayoi (Bermúdez, 1935)

(Figure 4,1)

Morphological description: Test trochospiral, chambers increasing slowly in height of the spire results in an auriculate test; spiral side convex, umbilical side flattened to concave with broad umbilicus; sutures strongly curved on the spiral side, nearly radial but obscured partly on the umbilical side; wall coarsely perforate.

Occurrence: This species is a typical inhabitant of mangrove swamp in Bermuda, and it occurs in Bermuda landlocked marine ponds fringed by mangroves (Javaux and David, 2003). It has apparently been characterised of nearshore and brackish environments from off Cuba and southern Brazil, the Gulf of Paria, and the coast of Texas (Todd, 1965). In Arabian Gulf, this species was found plentifully in Holocene lake sediments near Al-Mundafan in the Rub'al Khali (Gennari et. al., 2011), and rarely in saline lake at Tayma, northern Saudi Arabia, during the early to mid-Holocene (Pint et. al., 2017). This species is recording in present study for the first time in Iraq that it is found abundantly in all sites of the study area.

D. tropica (Collins, 1958)

(Figure 4, 2)

Morphological description: Test trochospiral, dorsal side rounded with all chambers discernible; coarsely perforate, sutures depressed-limbate; ventral side flat or slightly concave, all but the last two chambers veiled by irregular pustular shelly outgrowths. Periphery bluntly keeled, aperture a low slit on the ventral side of the periphery.

Occurrence: This species is distinguished in mangroves -swamp pools of Great Barrier Reef in the Northeast Australia (Collins, 1958) In Iraq, it recorded for the first time in intertidal flat of Khor Al-Zubair by Issa (2006) and she considered the species an evidence of mangrove swamp environment. With reference to the study area this species occurs as common and rare in the stations1and 2 successively.

D. vadescens (Cushman and Todd, 1948)

(Figure 4, 3)

Morphological description: Test trochoid, plano-convex, dorsal side convex, ventral side flattened, periphery subacute to slightly rounded; chambers distinct on the dorsal side, increasing rather rapidly but evenly in size as added, the last few slightly inflated on the dorsal side; sutures of the later part slightly depressed, curved; wall of the dorsal side smooth but very coarsely perforate, ventral side covered with a secondary growth of irregular shape.

Occurrence: This species is recorded from mangrove swamp, inshore mud, and brackish water of west coast of Trinidad (Cushman and Todd, 1948). In the study area, this form is a common species at all sites except the second and sixth where it founds rarely, and this species is recording in Iraq for the first time in current study.

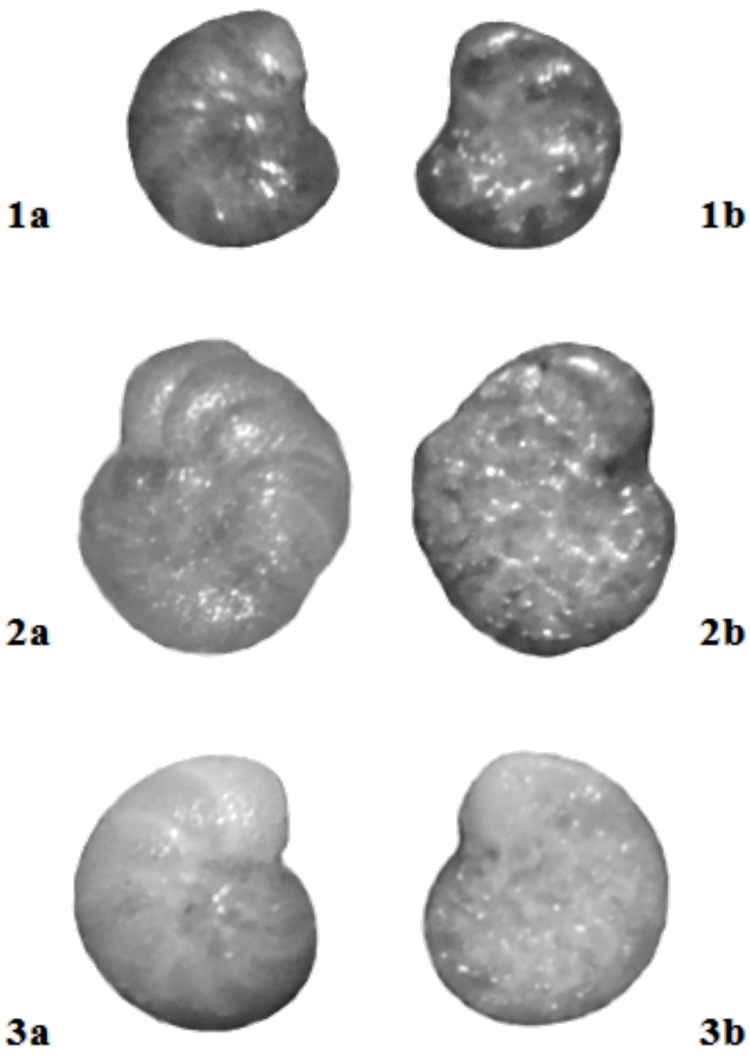

Figure 4: 1. *Discorinopsis aguayoi*, a, spiral view; b, umbilical view, site no.3, depth 1m. 2. *D. tropica*, a, spiral view; b, umbilical view, site no.1, depth 0.9m. 3. *D. vadescens*, a, spiral view; b, umbilical view, site no.3, depth 1m. Scale bar = 1mm.

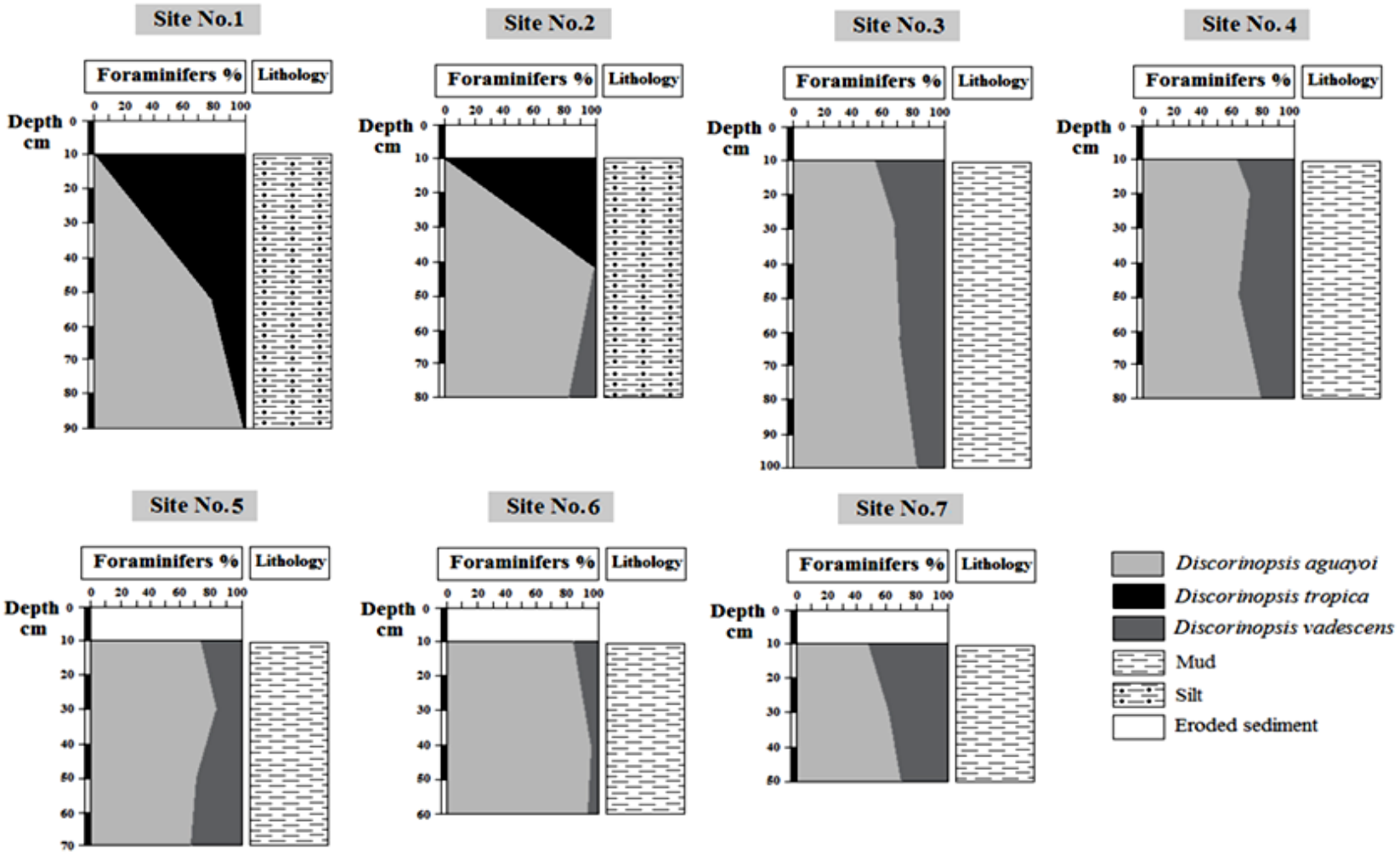

Figure 5: The percentages of foraminiferal taxa presence in present study.

The ideal environment for the presence of *Discorinopsis aguayoi*, *D. tropica* and *D. vadescens* as indicated by most of the above mentioned sour-ces is the mangrove swamp environment, which was ado-pted by Issa (2006) in deter-mining the mangrove swamp environment in the Iraqi coast within the silty sediments of intertidal flats in Khor Al-Zubair within the depth (0.3-1.1) meter where *D. tropica* (Fig.2), with the occurrence of other types of the foraminifers accompanying it which they indicated the existence of this environment. In this study (Fig. 1), it was observed that no trace on the surface area indicating a mangrove swamp environment, only the three species of foraminifera were present. It also notices no other type of fauna accompanied the three species.

None of these three species have been reported in the mangrove swamps fauna in Arabian Gulf during a geo-logical time or at present with exception of what characteristic of mangrove swamps, indicates that they may be moved to the study area from exterior the Arabian Gulf in a particular circumstance. Given the nature of the study area and the possibility of its connection to marine waters, it can be said that the most appropriate way to transfer these species are during sea level rise. In addition to the above, it is important to note that these three different species belong to one genus, noting the location of the areas in which they are famed, which indicates that these species came from outside the Arabian Gulf. Yacoub (2011b) mentions that the possibility of surface and near surface tidal flat sediments are dating back to late Holocene and continue to the recent time, and this may correspond to Aqrawi (1993) assertion that southern Iraq was affected by the fluctuation of the sea level at the end of Holocene, It therefore suggests that these three species could be transported to the study area as a result of this sea level fluctuation.

Gennari *et. al*. (2011) mentioned presence of *D. aguayoi* in paleolake sediments in the Al-Mundafan region of southern Saudi Arabia. They attributed exis-tence of the species to its transmission from the Red Sea coasts where mangrove swamps widespread there. However, other researches were not mentioned this species of foraminifera in the Red Sea. As well as the sediments in which the species exists were form during a regional pluvial period, 10.500-6000 yr BP (Gennari et. al., 2011), and the species was also found during the early to mid-Holocene period in the palae-olake deposits in Tayma of northern Saudi Arabia (Pint et. al., 2017). This shows the likelihood of the presence of this species with periods of marine water progress.

It is also possible to conclude that the non-registration of the three species of *Discorinopsis* in the Arabian Gulf region, although these species are

Conclusions

The two species of foramina-fera are *Discorinopsis aguayoi* and *D. vadescens* were recorded for the for the first time in Iraq. The presence of *D. aguayoi* and *D. vadescens* in the study area was due to their transfer to the region. This was concluded by the fact that none of them was registered in the Arabian Gulf region at present or in the past.

References

Al-Mussawy, S. N., 1993. Development of Khor Al-Zubair area through the recent geological history. Iraqi Geo-logical Journal. Vol. 26, No.3, (In Arabic),pp.: 1-17.

Al-Rubaiay, D. J.,1984. Irri-gation and drainage systems in Basrah province, Iraq. Ph.D. thesis, University of Durham, 491 page.

Aqrawi, A., 1993. Implication of sea-level fluctuations, Sed-imentation and Neotectonics for the evolution of the marshland (Ahwar) of Southern Iraq. Qu-aternary Proceedings. No.3, PP.:17-25.

Bermúdez, P. J. 1935. Foram-iniferos de la costa norte de Cuba. Memorias de la Sociedad Cubana de Historia Natural, No. 9, pp.129-224.

Collins, A. C.,1958. Forami-nifera in Great Barrier Reef Expedition1928-1929, Scienti-fic Reports, Vol.VI, No.6. British Museum Natural Histo-ry, pp.: 335-37, pl. 1-5.

Cushman, J. A. and Todd, R.,1984. Foraminifera from The Red Bluff-Yazoo section at Red Bluff, Mississippi. Contribu-tions from the Cushman Laboratory for Foraminiferal Research, Vol.24, pp.1-25.

Folk, R. L., 1980. Petrology of Sedimentary Rocks, Hemphill, Texas, 182 p.

Gennari, G., Rosenberg, T., Spezzaferri, S., Berger, J.-P., Fleitmann, D., Preusser, F., Al-Shanti, M., and Matter, A., 2011. Faunal evidence of a Holocene pluvial phase in southern Arabia with remarks on the morphological var-iability of Helenina Anderseni. Journal of Foraminiferal Res-earch, Vol. 41, No.3, pp. 248-259.

Issa, B. M., 2006. Sediment-ological and Palaeontological Study of Tidal Flats-Northwest of the Arabian Gulf. Master Thesis, University of Basrah (In Arabic),149 page.

Javaux, E. J. and David B. S., 2003. Illustration of Modern Benthic Foraminifera from Bermuda and Remarks on Distribution in Other Sub-tropical/tropical Areas. Pala-eontologia Electronica 6 (4): 29pp, 2.1MB; http://palaeo-electronica.org/paleo/2003_1/benthic/issue1_03.htm

Kassler , P., 1973 . The Stru-ctural and Geomorphic Evolution of the Persian Gulf . In: Purser, B.H.(ed.), The Persian Gulf , Springer - Verlag, New York , pp.: 11-32.

Khalaf ,S. K. and Elwei, A. H.,1989. On some recent Ostracoda from Khor AL-Zubair, Southern Iraq . Journal of Mesopotamica,Vol.4, No.1, pp.: 97-105.

Loeblich, A. R. and Tappan, H. ,1988. Foraminiferal genera and their

classification, Von Nost-rand Reinhold, New York, 970 p.
Parker, F. L., Phleger, F. B., and Pierson, J. F., 1953. Ecology of foraminifera from San Antonio Bay and environs, southwest Texas. Cushman Foundation for Foraminiferal Research Special Publication, No. 2, pp.: 1-75.
Pechenik, J. A., 2005. Biology of the invertebrates. 5thed. McGraw-Hill companies, New York.590 page.
Pint, A.; Engel, M.; Melzer, S.; Frenzel, P.; Plessen, B. and Brückner, H., 2017. How to discriminate athalassic and marginal marine microfaunas: Foraminifera and Other Fossils from An Early Holocene Continental Lake in Northern Saudi Arabia. Journal of Foraminiferal Research, Vol. 47, No. 2, pp.: 175-187.
Safawee, N. M. and Elewi, A. H.,1989. On the distribution of recent Foraminifera from north western Arabian Gulf .Journal of Mesopotamica,Vol.4, No.2, pp.: 243-279.
Todd, R.,1965. The foram-inifera of the Tropical Pacific Collections of the "Alba-tross,"1899-1900: Part 4 Rotaliform Families and Plank-tonic Families. Smithsonian Institution United States National Museum Bulletin 161. 139 p.
Yacoub, S. Y., 2011a. Geomor-phology of the Mesopotamia Plain. Iraqi Bulletin Geology Mineralogy, Special Issue, No.4, pp.: 7- 32.
Yacoub, S. Y., 2011b. Strat-igraphy of the Mesopotamia Plain. Iraqi Bulletin Geology Mineralogy, Special Issue, No.4, pp.: 47- 82.

أول تسجيل للانواع *Discorinopsis aguayoi* Bermúdez و *Discorinopsis vadescens* Cushman and Todd من الساحل العراقي والتطبيق البيئي لها

م. بشرى مجيد عيسى

قسم علم الارض كلية العلوم، جامعة البصرة

Bushra7M.Issa@ymail.com

المستخلص

أوضح فحص 17 عينه من الرواسب التي جمعت من الساحل العراقي في منطقة المد والجزر في خور الزبير في شهر أيلول 2015 عن ظهور ثلاثة انواع من المنخربات وهي *Discorinopsis aguayoi* و *D. vadescens* و *D. tropica* . يعد تسجيل هذه الانواع (عدا *D. tropica*) الاول في العراق حيث أعطيت النسبة المئوية لتواجد الانواع ووصفت أصدافها فضلا عن معرفة نسيج رواسب هذه المنطقة.

الكلمات المفتاحية: *Discorinopsis aguayoi*، *Discorinopsis tropica*، *Discorinopsis vadescens*، المنخربات، شمالي غرب الخليج العربي، جنوب العراق.