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Ostracod Species Assemblages in the Recent Sediments from Northern Basrah Governorate, Southern Iraq

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تجمعات أنواع الدرعيات في الرواسب الحديثة من شمال محافظة البصرة

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ABSTRACT

Background: The objective of the research is to determine the various ostracod species assemblages present in contemporary sediments of Northern Basrah Governorate. This investigation aims to clarify the characteristics of the sedimentary environments in those sediments, as well as uncover the events that have influenced their environmental conditions.

Materials and Methods:

A total of thirty one samples were collected from fourteen different locations and subjected to grain size analysis through wet sieving for the separation of sand from silt and clay the identification of sediment types. For the microfaunal taxa study, all samples were washed and dried thoroughly. Carapaces and valves of ostracod were then meticulously selected by hand under a binocular microscope. Photographic documented of the ostracod species to the identification of the ostracod assemblages present.

Results:

The analysis of the sediment composition reveals that 55% of the total samples fall within the silt category, while 26% as sandy silt and the remaining 19% are classified as belonging to the mud zone. The ostracod species were classified into distinct assemblages to define the environmental conditions, which are; Assemblage I, Assemblage II, and Assemblage III.

Conclusion:

There are three sedimentary textures: silt, sandy silt, and mud. Silt deposits are the most commonly found. In terms of identified ostracod species, Assemblage **I** shows characteristics typical of an estuarine environment. Assemblage **II** reflects a marsh environment. Assemblage **III** environment varied from oligohaline/lake environment at the bottom to fluvial freshwater environment at the top.

Key words: Ostracod; Recent sediments; Oxbow Lake; Late Holocene; Northern Basrah; Southern Iraq.

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INTRODUCTION

North of Basrah is characterized by floodplain and marshes that are part of the extensive Mesopotamian Marshes, an essential wetland ecosystem found in southern Iraq. The northern region of Basrah showcases depositional environments shaped by both riverine and marine influences[1]. Fluvial and marine processes in Northern Basrah Holocene depositional environments are characterized by a complex interplay influenced by relative sea-level changes and sediment supply. The fluvial processes became increasingly significant as the Holocene progressed, with sediment supply from rivers beginning to dominate over marine influences[1and 2]. While the marine processes were characterized by fluctuations in sea level, the interaction between rising sea levels and fluvial inputs led to different depositional environments that influenced sediment deposition patterns and ecological conditions[3]. Throughout the Holocene, Northern Basrah experienced significant transgressions that led to the formation of brackish tidal flats and marshlands. This transformation represents a gradual shifit from freshwater environments to saline conditions, due to the rising sea levels [1,2,4-6].

One of the tools that has contributed to revealing the diversity of environments resulting from a variety of conditions is the use of fossils, especially ostracod. Ostracod assemblages serve as valuable indicators for reconstructing past environmental conditions and events. Ostracod have helped reveal sea level fluctuations in southern Iraq during the late Holocene, as well as providing evidence of estuarine, marsh and backswamp environments in the sediments of southern Iraq[7].

THE AIM OF THE STUDY

The study aims to identify the types of ostracod assemblages found in recent sediments Northern Basrah Governorate. This will help reveal the nature of the sedimentary environments in those sediments and the events that affected their environment. This is because ostracoda useful as valuable indicators for reconstructing paleoenvironmental conditions that due to its sensitivity to environmental changes, through by analysing ostracoda assemblages found within sediment, be can obtain significant insights into past climate changes, therefore ecological shifts.

MATERIALS AND METHODS

A total of thirty-one sample were collected from fourteen sites located to from the east of Al Alwah village in the northern Al Qurnah district. The collection took place in July 2024, as illustrated in figure 1. The samples were gathered using a shovel, with depths ranging from 0.35 to 1.90 meters. All samples underwent grain size analysis which involved wet sieving through a 0.0625 mm sieve to separate sand from silt and clay. Additionally, pipette analysis was conducted for particles smaller than 0.0625 mm, following the methodology outlined by a previous study [8].

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In this study of microfaunal taxa, all samples were washed through a 0.0625 mm sieve, followed by air drying. Ostracod carapaces/valves were then hand-picked under a binocular microscope. Photographs of the ostracod were taken using a BEL microscope with a Sony Cyber-shot 1080 digital camera. The ostracod assemblages were identified abased on the works of several authors; [9-14].

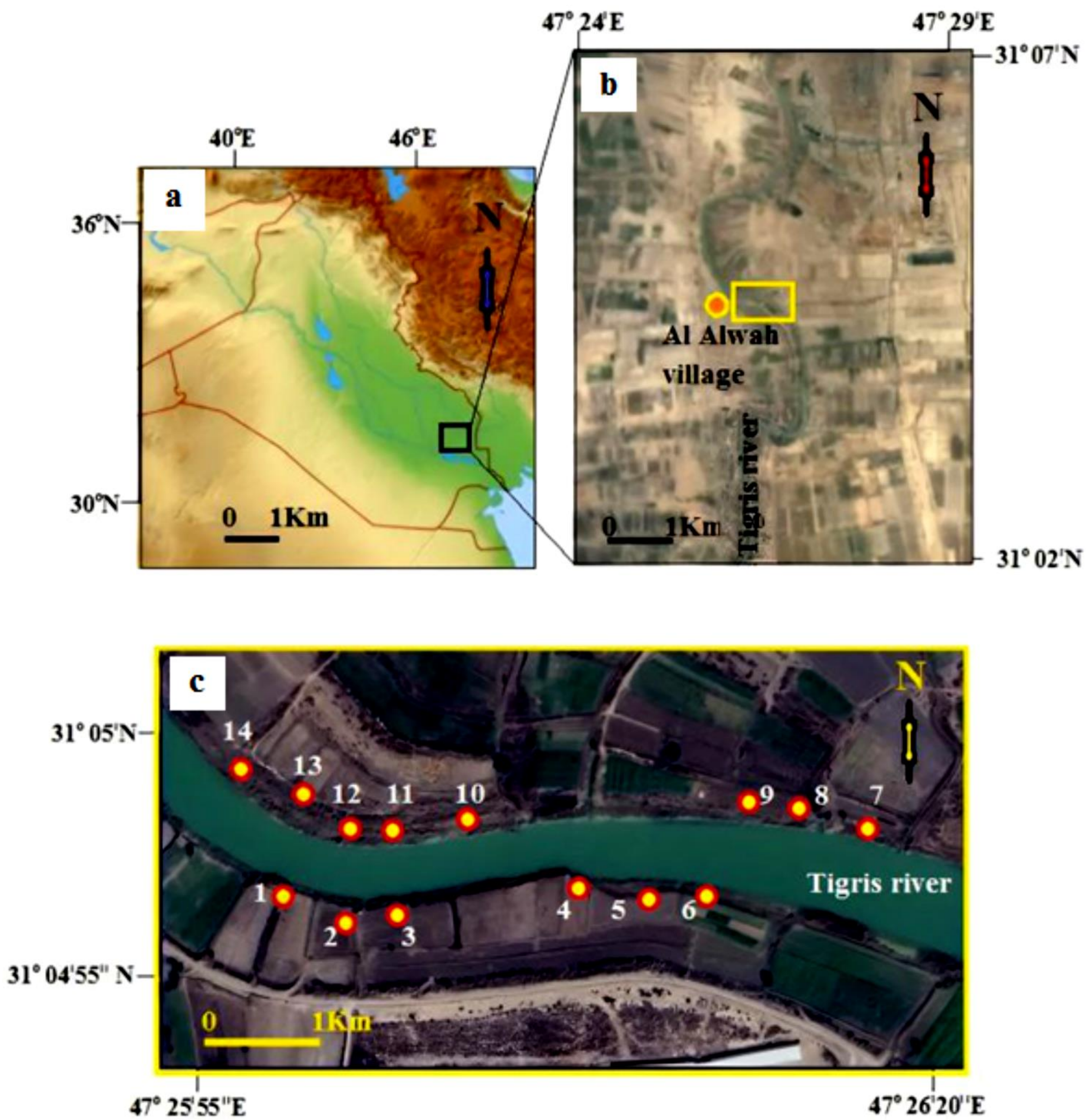

Figure 1: Google Earth image; (a) Iraq map, (b) The study area, (c) The sampling locations(modified by researcher).

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RESULTS AND DISCUSSION

Sediments Texture

Following the analysis of grain size, the classification of sediments was conducted by representing the proportions of sand, silt, and clay in a triangular diagram suggested by[8] , as demonstrated in Figure 2 and Table 1. The distribution of these components indicates that 55% of the total samples are categorized within the silt zone, 26% are classified as sandy silt, and the remaining 19% are identified in the mud zone. Consequently, it can be concluded that the sediments in the study area are predominantly silt.

This suggests that the study area has a sedimentation environment characterized by low energy levels[15], which aligns with the information provided by [16] about of the sedimentary environments in northern Basrah. Silt is considered as ideal sediment type for environments like estuaries, swamps and lakes[17], while sandy silt deposits are usually found in fluvial settings[18]. These particular environments have been observed in the northern region of Basrah[16].

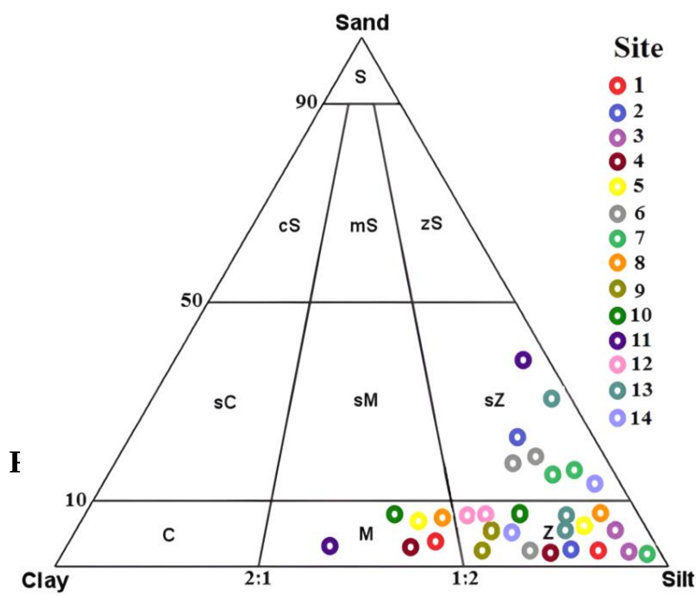

Table 1: Grain size distribution and the sediments texture of collected samples

Site Number	Depth(m)	Sand %	Silt %	Clay %	Sediment texture
1	0.75-0.95	1	90	9	Silt
	1.00-1.40	4	62	34	Mud
2	0.45-0.80	21	67	12	Sandy silt
	1.25-1.65	2	86	12	Silt
3	0.86-1.25	2	95	3	Silt
	1.30-1.65	5	90	5	Silt
4	0.75-1.45	1	82	17	Silt
	1.40-1.70	4	58	38	Mud
5	0.50-0.96	5	86	9	Silt
	1.00-1.55	9	58	33	Mud
6	0.40-1.35	19	71	10	Sandy silt
	1.40-1.55	17	69	14	Sandy silt
	1.60-1.80	19	79	2	Silt
7	0.35-1.30	16	78	6	Sandy silt
	1.40-1.55	15	76	9	Sandy silt
	1.60-1.90	2	96	2	Silt
8	0.40-0.75	8	87	5	Silt
	0.90-1.30	8	61	31	Mud
9	0.45-1.00	6	70	24	Silt
	1.10-1.40	3	71	26	Silt
10	0.65-1.20	8	74	18	Silt
	1.25-1.60	8	54	38	Mud
11	0.40-0.80	38	59	3	Sandy silt
	0.89-1.15	3	42	55	Mud
12	0.77-1.20	8	69	23	Silt
	1.30-1.70	8	65	27	Silt
13	0.35-0.90	9	81	10	Silt
	0.95-1.55	29	69	2	Sandy silt
	1.60-180	5	83	12	Silt
14	0.40-0.65	13	83	4	Sandy silt
	0.71-1.11	4	75	21	Silt

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Ostracod species

Ostracod shells are the predominant and prevalent microfaunal component found throughout the study area at various depths, as shown in Figures 3 and 4. The identified ostracod species include: *Hemicypris dentatomarginata* Baird, 1859, *Heterocypris giesbrechtii* G. W. Muller,1898, *Candona compressa* Koch, 1838, *Candona neglecta* Sars, 1887, *Pseudocandona parallela* G.W. Müller, 1900, *Candoniella albicans* Brady, 1864, *Candoniella wanlessi* Staplin, 1963, *Ilyocypris gibba* Ramdohr, 1808, *Ilyocypris bradyi* Sars, 1890, *Ilyocypris monstrifica* Norman, 1862, *Keijella karwarensis* Bhatia and Kumar, 1979, *Cyprideis torosa* Jones, 1850, *Darwinula cylindrical* Straub, 1952. The documentation of the species *Pseudocandona parallela* G.W. Müller, 1900 marks first for Iraq as a whole, and specifically for its southern region.

Ostracod assemblages

Ostracod species were categorized into specific assemblages to characterize the environmental conditions. This allowed for the determination of the sedimentary environment within the study area based on their unique species compositions at designated depths.

Upon analyzing the microfauna composition at the designated sites, as illustrated in Figures 3 and 4, it became evident that there were notable similarities in the assemblages of particular ostracod species at specified depths. Consequently, the assemblages at these sites were categorized into three distinct groups, as depicted in Figure 5, arranged from the bottom to the top;

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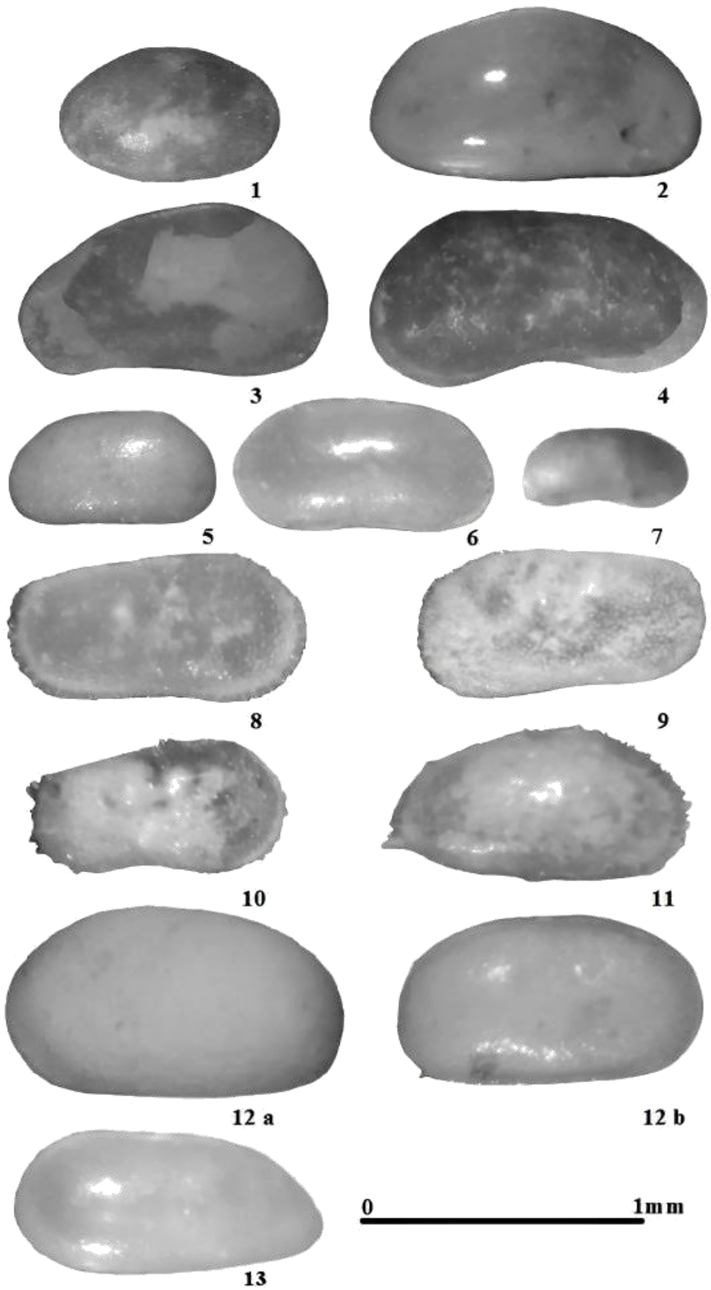

Figure 3. 1.*Hemicypris dentatomarginata* Baird,1859, External view, Right Valve. 2.*Heterocypris giesbrechtii* G.W. Muller,1898, External view, Right Valve. 3.*Candona compressa* Koch, 1838, External view, Left Valve. 4.*Candona neglecta* Sars, 1887, External view, Left Valve. 5.*Pseudocandona parallela* G.W. Müller,1900, External view, Left Valve. 6.*Candoniella albicans* Brady,1864, External view, Left Valve. 7.*Candoniella wanlessi* Staplin,1963, External view, Left Valve. 8.*Ilyocypris gibba* Ramdohr,1808, External view, Right Valve. 9.*Ilyocypris bradyi* Sars,1890, External view, Left Valve. 10.*Ilyocypris monstrifica* Norman,1862, External view, Right Valve. 11.*Keijella karwarensis* Bhatia and Kumar, 1979, External view, Right Valve. 12.*Cyprideis torosa* Jones,1850, a. External view, Left Valve, b. External view, Carapace. 13.*Darwinula cylindrical* Straub,1952, External view, Carapace.

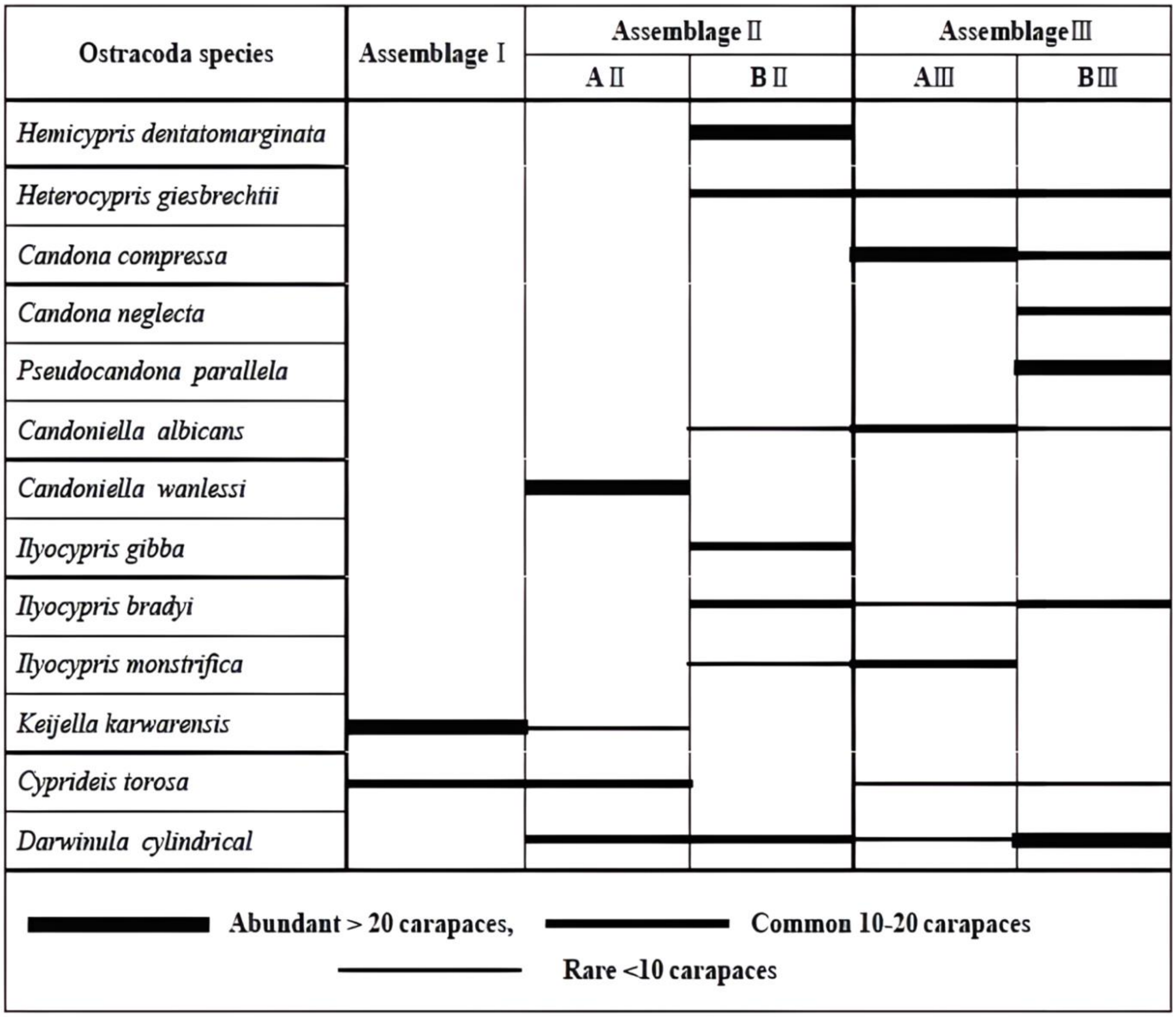

Figure 4: Relative abundance of ostracod species in assemblages Ⅰ, Ⅱ and Ⅲ within the study area

1- Assemblage Ⅰ

The sediment composition for this assemblage was determined based on silt deposits found at the sixth, seventh, and thirteenth locations. The thicknesses measured were 0.20 m, 0.30 m, and 0.20 m, respectively.

The presence of the ostracod species *Cyprideis torosa* Jones, 1850, distinguished by its non-noded shape, along with *Keijella karwarensis* Bhatia and Kumar, 1979, which is the dominant species, is a defining characteristic of this assemblage.

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The assemblage of ostracod species, along with the fluctuations in their population sizes, may provide insights into the nature of the ancient environment of the sediments in this area, which is characterized as an estuarine environment. This is evident from the presence of *Cyprideis torosa* and *Keijella karwarensis*, both of which species are commonly found in brackish and marine habitats, including shallow marine and estuaries environments [19-21]. The significant abundance of the species *Keijella karwarensis* compared to other species, serves as strong evidence that the sedimentary environment at these depths is characteristic of an estuarine setting[22-24].

2- Assemblage Ⅱ

The distinguishing feature of the Assemblage Ⅱ is the abundance of the species *Darwinula cylindrical* Straub,1952 found at all depths of the sites where this assemblage is present in the sediment.

Darwinula cylindrical Straub,1952 is typically found in freshwater environments including marshlands characterized by shallow waters and varying salinity levels. These factors can influence the distribution of ostracod species[16 and 24]. Therefore, the presence of this species is a definitive indicator that the environment of assemblage Ⅱ is a marsh.

With the variation in the appearance of the ostracod species accompanying the species *Darwinula cylindrical* Straub,1952, the assemblage can be divided into two sub-assemblages, which are:

2-1 Sub-assemblage A Ⅱ

This sub-assemblages was mainly discovered in mud deposits, as well as in silt and sandy silt deposits, at depths ranging from 0.95 to 1.70 meters across all study sites, except for sites 3, 11, and 14.

The sub-assemblages included the following ostracod species; *Candoniella wanlessi* Staplin,1963, *Cyprideis torosa* Jones,1850 (Shape without nodeds) and *Keijella karwarensis* Bhatia and Kumar,1979. The most abundant species was *Candoniella wanlessi* Staplin,1963 which contributed to confirming the marsh environment type[25]. Although the species is indicative of a freshwater environment[26], the presence of the two species *Cyprideis torosa* Jones,1850 and *Keijella karwarensis* Bhatia and Kumar,1979 suggests that the marsh environment in this part is affected by brackish water[27 and 28].

2-2 Sub-assemblage B Ⅱ

The sub-assemblage was identified in mud and silt sediments, at depths ranging from 0.90 to 1.65 meters at all study sites except for sites 6, 11, 13 and 14.

It is distinguished by the occurrence of various ostracod species including; *Candoniella albicans* Brady,1864, *Ilyocypris gibba* Ramdohr,1808, *Ilyocypris bradyi* Sars,1890, *Ilyocypris monstrifica* Norman,1862, *Hemicypris dentatomarginata* Baird,1859 and *Heterocypris giesbrechtii* G.W. Muller,1898. The majority of the ostracod species within this subassemblage indicate a freshwater environment[29-35].

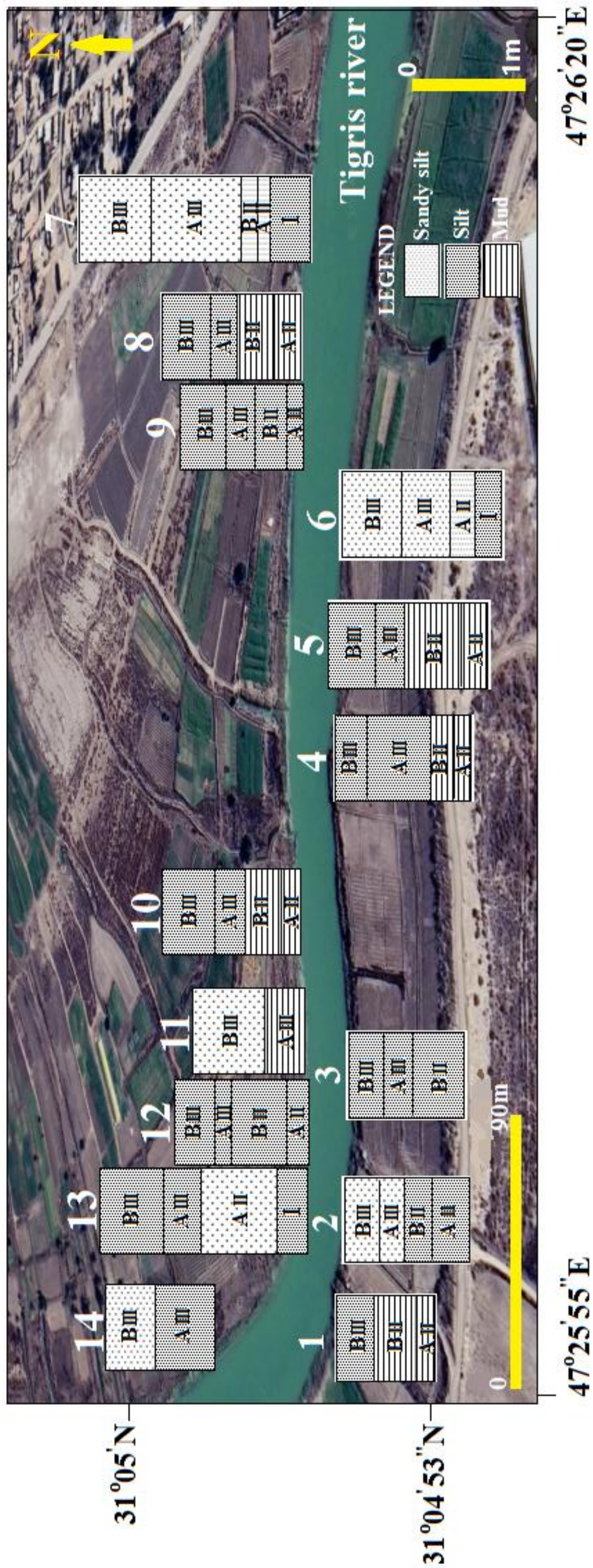

Figure 5:The distribution of ostracod assemblages in the study area, Google Earth image (modified by researcher)

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3- Assemblage III

The variety in the ostracod species, their individual numbers and, consequently, the environment they represent, has led to the assemblage being divided into two sub-assemblages;

3-1 Sub-assemblage A III

Most silt deposits as well as sandy silt deposits at depths between 0.55 and 0.45 meters from all sites except the first site in the study area were characterized by this sub-assemblage.

It contains abundant various species of ostracod, thriving in freshwater to oligohaline environments /lake such as; *Candona compressa* Koch,1838, *Candoniella albicans* Brady, 1864, *Heterocypris giesbrechtii* G.W. Muller,1898. These three species are the most abundant, accompanied by other species such as *Ilyocypris bradyi* Sars,1890, *Ilyocypris monstrifica* Norman,1862, *Cyprideis torosa* Jones,1850, and *Darwinula cylindrical* Straub,1952 [36-38]. Add these references related to the oligohaline and oligotrophic environments[5][39].

3-2 Sub-assemblage B III

This sub-assemblage has been identified in most silt deposits as well as sandy silt deposits at varying depths between 0.35 and 1.10 meters. It is characterized by the presence of ostracod species such as; *Candona compressa* Koch,1838, *Candona neglecta* Sars,1887, *Pseudocandona parallela* (G.W. Müller, 1900), *Candoniella albicans* Brady,1864, *Ilyocypris bradyi* Sars,1890, *Heterocypris giesbrechtii* G.W. Muller,1898, *Cyprideis torosa* Jones,1850 and *Darwinula cylindrical* Straub,1952. These ostracod species are indicative of a freshwater fluvial environment [40-44], particularly with the predominance of *Pseudocandona parallela* G.W. Müller,1900 [45]. This sub-assemblage marks the first recorded appearance of the species *Pseudocandona parallela* G.W. Müller,1900 in southern Iraq. It is noteworthy that this species is a freshwater ostracod [43 and 45].

Studying ostracod is crucial especially in the fields of paleontology, ecology, and environmental science. The study of ostracod is important not only for reconstructing past environments but also for understanding current ecological dynamics and the health of aquatic ecosystems. Their versatility as indicators makes them an essential focus in various scientific research areas.

Ostracod have contributed to assessing historical ocean conditions and changes. Their remains can provide insights into ancient human interactions with aquatic environments. They are also important for studying current ecological dynamics in both marine and freshwater systems[46].

Ostracod serve as excellent indicators of ecosystem health and biodiversity. Their presence and diversity can reveal significant information about past environmental conditions, such as salinity and temperature fluctuations. This makes them invaluable for reconstructing ancient ecosystems and understanding how environments have changed over time[46][47].

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As one of the most common microfossils found in sedimentary records, ostracod provide essential data for geological studies. Their fossilized remains allow us to interpret past climates and sedimentary environments over geological timescales, making them key players in understanding Earth's history[47][48].

Variations in the types and abundances of ostracod species over time can reflect shifts in water levels and salinity. Studies have documented distinct changes in ostracod faunas corresponding to historical hydrological events, such as the transition from freshwater to brackish conditions[49].

Ostracod can serve as ecological and isotopic indicators of lake water salinity, Ostracod has been able to illustrate how changes in water salinity have affected of Lake Van in Turkey over the last 150,000 years. By analyzing both the taxonomic diversity and valve morphology alongside isotopic data, researchers have successfully linked changes in ostracod assemblages to historical fluctuations in lake volume and salinity[50].

In the Baltic Sea, distinct ostracod zones have been identified that correlate with alternating fresh and brackish water conditions. This demonstrates how these organisms can be used to track significant hydrological changes throughout history[51].

In southern Iraq, the study of ostracod has provided valuable insights into the diversity of the sedimentary environment. This highlights the influence of marine waters in the northern region of Basrah Governorate, showing the presence of an estuarine environment and the environmental changes associated with fluctuations in sea level during the Late Holocene period[7].

In the current study, the assemblages of Ostracod species helped reveal the depositional environments documented by the late Holocene sediments covering the southern region of Iraq, particularly the northern part of Basrah Governorate. This was as indicated by [1], showing the variation in conditions during that time.

Where three main assemblages of ostracod species were identified in the study area; Assemblage **I**, Assemblage **II** and Assemblage **III**.

The presence of the species *Keijella karwarensis* Bhatia and Kumar,1979 the sediments indicates the presence of an estuarine environment. This species, known for its marine characteristics, along with [21], *Cyprideis torosa* Jones,1850, which is known to thrive in brackish water conditions[19], helps to define the estuarine environment of assemblage **I**.

The presence of the estuary effect in the study area suggests that it was impacted by sea level fluctuation during the Late Holocene period, leading to the presence of marine ostracod. This was supported by a study[16,52], that identified marine sediments in the northern Basrah region.

The marine influence persisted in the sediments of the region until assemblage **II**, when brackish water conditions emerged in the marsh environment sub-assemblage A **II**. This sub-assemblage signifies the diminishing marine influence and the shift in conditions as river influence started to return to the study area [16] with the presence of species *Darwinula*

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cylindrical Straub,1952. Until conditions in sub-assemblage B **II** are completely transformed into to freshwater environment through the continued presence of *Darwinula cylindrical* Straub,1952 and the thriving of the species *Hemicypris dentatomarginata* Baird,1859 which is known to thrive in freshwater environments[53].

With the stability of fresh river water, assemblage **Ⅲ** appeared. The distinctive appearance of the species *Candona compressa* Koch,1838, *Candoniella albicans* Brady,1864, and *Heterocypris giesbrechtii* G.W. Muller,1898 revealed transition from a freshwater to oligohaline environments or lakes in sub-assemblage A **Ⅲ**[5].

The ostracod species of sub-assemblage A **Ⅲ** clearly indicate the presence of river water [40 and 41]. The nature of the study area also shows the presence of the Tigris River within the study area. Thus the freshwater environment of the lake is likely to be an oxbow lake type due to its location within the river system. The seclusion of this aquatic environment frequently results in the development of unique ecological communities that are specifically adapted to thrive under their particular conditions[50]. As the river maintained its flow, freshwater fluvial deposits accumulated at the surface, sub-assemblage B**Ⅲ** emerged, characterized by the presence of *Pseudocandona parallela* G.W. Müller,1900. This species, noted for the first time in southern Iraq, reflects the freshwater river environment[55,56].

CONCLUSIONS

The study area is characterized by three distinct sedimentary textures: silt, sandy silt, and mud. Among these, silt deposits are the most prevalent, followed by sandy silt deposits, and the least mud deposits. Based on the species of ostracod present, three distinct assemblages were identified in the study area; Assemblage **I** were indicative of an estuarine environment. This assemblage illustrated that the research area experienced variations in sea level during the Late Holocene, which influenced both the sediment composition and the characteristics of the ostracod species present in the region. Assemblage **II** categorized as the marsh environment, where sub-assemblage A II impacted by seawater while sub-assemblage B **II** characterized by the return of river water influence in the study area. whilst Assemblage **Ⅲ** is categorized into sub-assemblage A **Ⅲ** which is freshwater to oligohaline/lake environments, and sub-assemblage B **Ⅲ** represented the predominance of the fluvial freshwater environment. Also, the current study represents the first documentation of the species *Pseudocandona parallela* within the southern sediments of Iraq.

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Conflict of interests

There is no conflict interest.

References

[1] B.M. Issa, "Depositional environments and biofacies of selected sediments, north Basrah", *Journal Basrah Research (Sciences)*, vol. 36, pp.1-14, 2010.

[2] V.M.A. Heyvaert and C. Baeteman, "Holocene sedimentary evolution and palaeocoastlines of the Lower Khuzestan plain (southwest Iran) ", *Marine Geology*, vol.242, no. (1-3), pp.83-108, 2007.

[3] K.C. Lima, and A. Perez Filho, "Evolução geomorfológica de planícies costeiras no holoceno", *Mercator (Fortaleza)*, vol. 19, no. 1, pp. 1-18, 2020.

[4] I.M. Ghafor, A. Javadova and R. Rashidi, "Benthic foraminifera for indication of microfossils, biostratigraphy and depositional environments of the Baba Formation(late oligcene) kirkuk oil fields, northern Iraq", *Journal of AZƏRBAYCAN GEOLOQU*, no.26, pp. 36-56, 2023.

[5] I. M. Ghafor, "Crustacean," In Crustacea, edited by G. Diarte-Plata and R. Escamilla-Montes (IntechOpen, London, 2020).

[6] I. Ghafor, A. Javadova and R. Rashidi, "Benthic Foraminifera as A Tool for Indication of Microfacies, Bio-stratigraphy, and Depositional Environment of the Baba Formation (Late Oligocene), Kirkuk Oil Field, Northeastern Iraq", *Journal of Oil and Gas Research Reviews*, , vol.3, no. 2, pp. 83-98, 2023.

[7] B.M. Issa, "Ostracoda and Charophyte as indicators of environmental variety in the marshland area of Southern Iraq", *Journal of Basrah Researches ((Sciences))*, vol.42, no.2, pp.148-159, 2016.

[8] R.L. Folk, *Petrology of Sedimentary Rocks*. Hemphill: Texas, 1980.

[9] R. C. Moore, *Treatise on invertebrate Paleontology*, *Part Q*, *Arthropoda*, (*Ostracoda*). Geological Society of America University: Kansas Press,1961

[10] P. De Deckker, "The middle Pleistocene ostracod fauna of the West Runton freshwater bed, Norfolk ", *Palaeontology*, vol. **22**, no. 2, pp. 293-316, 1979.

[11] J.A. Holmes, F.A. Street-Perrot, M.J. Allen, P.A. Fothergill, D.D. Harkness, D. Kroon, and R.A. Perrott, " Holocene Palaeolimnology of Kajemarum Oasis, Northern Nigeria: An isotopic study of ostracodes, bulk carbonate and organic carbon ", *Journal of the Geological Society London*, vol. 154, pp. 311-319 ,1997.

[12] I. Mazzini, P. Anadón, M. Barbieri, F. Castorina, L. Ferreli, E. Gliozzi, M. Mola, *and* E. Vittori, "Late Quaternary sea-level changes along the Tyrrhenian coast near Orbetello (Tuscany, central Italy): palaeoenvironmental reconstruction using ostracods*", Marine Micropaleontology, vol. 37*, pp. 289-311,1999.

[13] C. Meisch, Freshwater Ostracoda of Western and Central Europe. Spektrum Akademischer Verlag, Heidelberg: Berlin, 2000.

[14] K. Martens, and S. Savatenalinton, "A subjective checklist of the Recent, free-living, non-marine Ostracoda (Crustacea) ", *Zootaxa*, vol. 2855, pp. 1-79, 2011.

[15] T. Chitkara, O.P. Thakur, and A. Sharma, "Textural Characteristics and Depositional Environment of a Late Quaternary Alluvial Plain of Haryana", *Open Journal of Geology*, vol.12, no.11, pp. 870-882, 2022.

[16] B.M. Issa, "Ostracoda and Charophyte as indicators of environmental variety in the marshland area of Southern Iraq", *Journal of Basrah Researches* ((*Sciences*)), vol. 42, no.2, pp.148-159, 2016.

[17] K. Panchuk, *Physical Geology*. First University of Saskatchewan Edition, 2019.

[18] Britannica, The Editors of Encyclopaedia. "alluvial deposit". *Encyclopedia Britannica*, Invalid Date, 2024. https://www.britannica.com/science/alluvial-deposit. Accessed 18 October 2024.

[19] O. Külköylüoğlu, M. Yavuzatmaca, E. Akay and N. Dalkıran, "Relationships of the *Cyprideis torosa* (Ostracoda, Crustacea) with Seasonal Occurrences, Carapace Type and Physicochemical Variables in Kocaçay Delta (Türkiye)", *Journal of Limnology and Freshwater Fisheries Research*, vol. 9, no. 2, pp.76-93, 2023.

[20] V.A. Gusakov, O.N. Makhutova, M.I. Gladyshev, L.V. Golovatyuk and T.D. Zinchenko, "Ecological role of *Cyprideis torosa* and *Heterocypris salina* (Crustacea, Ostracoda) in saline rivers of the Lake Elton basin: abundance, biomass, production, fatty acids", *Zoological Studies*, vol. 60, no.53, pp. 1-16.

[21] M.B. Forel, "Recent ostracods (Crustacea) from the southwestern coast of Peninsular Thailand (Satun Province), Andaman Sea Ostracodes (Crustacea) récents de la côte sud-ouest de la péninsule de Thaïlande (Province de Satun), Mer d'Andaman", *Revue de Micropaléontologie*, vol. 72, pp.100526, 2021.

[22] S. Al-Abdul-Razzaq, W. Shublaq, Z. Al-Sheikh, and W. Kittaneh, "Ecology and distribution of ostracods in Kuwait Bay", *Journal of Micropalaeontolgy*, vol. 2, no.1, pp.39-45, 1983.

[23] S.G.D. Sridhar, K. Deepali, V.S. Prabhu, S.M. Hussain, and S. Maniyarasan, "Distribution of recent Benthic ostracoda, around Pullivasal and Poomarichan islands, off Rameswaram, Gulf of Mannar, Southeast coast of India", *Journal of the Palaeontological Society of India*, vol. 64, no.1, pp.27-38, 2019.

[24] S. Ligios, K. Minati, E. Gliozzi, and N. Krstic, "Occurrence of *Vestalenula* (Darwinuloidea, Ostracoda) in the Neogene of Italy, Crete and Serbia, with the description of three new species", *Journal of Micropalaeontology*, *28*(2), pp.99-115, 2009.

[25] C.P. Dewey, "Fossil Nonmarine Ostracoda of the United States: Developments in Palaeontology and Stratigraphy", *Palaios*, vol.15 no. 2, pp.170-171, 2000.

[26] S.S. Al-Sheikhly, W.A. Al-Jumaily, F.S. Al-Ka'abi, Z.K. Al-Shehmany and M.A. Owen, "Late Pleistocene-Holocene Paleoecology of Southern Mesopotamia, Iraq", *Iraqi Journal of Science*, vol.. 58, no. 4A, pp.1856-1873 , 2017.

[27] P.M.J .Herman, C. Heip, and G. Vranken, "The production of Cyprideis torosa Jones 1850 (Crustacea, Ostracoda) ", *Oecologia*, vol.58, pp.326-331, 1983.

[28] S.M. Hussain, S.P. Mohan, and M.P. Jonathan, "Ostracoda as an aid in identifying 2004 tsunami sediments: a report from SE coast of India", *Natural Hazards*, vol.55, pp. 513-522, 2010.

[29] M. R. Besonen, "The Middle and Late Holocene Geology and Landscape evolution of the Lower Archeron River Valleg, Epirus, Greece, " M. S. thesis, University of Minnesota, USA,1997.

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[30] C. Şekeryapan, "Paleolinological investigations Frommodern Costal Lakes on Thrace and Black Sea Coast of Turkey during the Mid-Late Holocene," PhD thesis, University of Middle East Technical, Turkey, 2011.

[31] G. Devoto, " Lacustrine Pleistocene in the lower Liri Valley ", *Geologica Romana Journal*, vol. IV, pp. 291-368,1965.

[32] P. Sylvester-Bradley and E. Kempf, " On *Ilyocypris monstrifica* (Norman) ", *Stereo-Atlas of Ostracoda Shells*, vol. 1, pp. 149-152, 1973.

[33] O. Külköylüoğlu, "On the usage of ostracods (Crustacea) as bioindicator species in different aquatic habitats in the Bolu region, Turkey ", *Journal of Ecological Indicators*, vol. 4, pp. 139-147, 2004.

[34] M. Hussein, A. Obuid-Allah, A. Mahmoud, and H. Fangary, "Ecology of eight species of freshwater ostracods (crustacea) from Qena governorate Upper Egypt", *Egyptian Journal of Aquatic Biology and Fisheries*, vol. 8, no. 4, pp.107-122, 2004.

[35] M. Mohammed, P. Frenzel, D. Keyser, F. Hussain, A. Abood, A. Sha'af, S. Alzara'e, and S. Alammari, "A humid early Holocene in Yemen interpreted from palaeoecology and taxonomy of freshwater ostracods", *Journal of Micropalaeontology*, vol. 37, no. 1, pp.167-180, 2018.

[36] R. Matzke-Karasz, and W. Witt, "Ostracods of the Paratethyan Neogene Kılıç and Yalakdere Formations near Yalova (İzmit Province, Turkey)", *Zitteliana*, pp.115-133, 2005.

[37] K. Keatings, J. Holmes, R. Flower, D. Horne, J.E. Whittaker and R.H. Abu-Zied, " Ostracods and the Holocene palaeolimnology of Lake Qarun, with special reference to past human–environment interactions in the Faiyum (Egypt). *Hydrobiologia*", vol. 654, pp.155-176, 2010.

[38] O. Özuluğ, "A preliminary study on Ostracoda (Crustacea) fauna of the Istranca streams-Turkey", *Journal of Fisheries Sciences.com*, pp. 93-98, 2011.

[39] I.M. Ghafor, and S. Najaflo, "Biostratigraphy, microfacies, paleoenvironment, and paleoecological study of the Oligocene (Late Rupelian–Early Chattian) Baba Formation, Kirkuk area, Northeastern Iraq", *Carbonates and Evaporites*, vol.*37*, no.1, pp.7. 2022.

[40] A. Wysocka, J. Sell, and T. Sywula, "Genetic variability in natural populations of eurytopic ostracod *Candona neglecta* Sars", *Zoological science*, vol.17, no.1, pp.55-59, 2000.

[41] C. Meisch, and K. Wouters, "Valve surface structure of *Candona neglecta* Sars, 1887 (Crustacea, Ostracoda)", *Studia Quaternaria*, vol.21, pp.15-18, 2004.

[42] G. Rossetti, M. Bartoli, and K. Martens, "Limnological characteristics and recent ostracods (Crustacea, Ostracoda) of freshwater wetlands in the Parco Oglio Sud (Northern Italy)", In *Annales de Limnologie-International Journal of Limnology*, vol.40, no.4, pp. 329-341, 2004.

[43] R.J. Smith, and T. Kamiya, "Four new species of the subfamily Candoninae (Crustacea, Ostracoda) from freshwater habitats in Japan", *European Journal of Taxonomy*, vol. 136, no.1-34, 2015.

[44] C. Tunoglu, B. Besbelli, and I. Ertekin, "Ostracoda (Crustacea) association and a new species (Dolerocypris anatolia nov. sp.) from the Pliocene-Pleistocene Afsin-Elbistan (Kahraman Maras) Coal Basin of Turkey", *Geologica Carpathica*, vol.63, no.2, pp.165-174, 2012.

[45] I. Karanovic, "Two interesting species of Candoninae (Crustacea, Ostracoda) from Montenegro (SE Europe)", *Bulletin de l'Institut Royal des Sciences naturelles de Belgique (Biologie)*, vol.69, pp.47-56, 1999.

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[46] I. Boomer, D.J. Horne, and I.J. Slipper, "The use of ostracods in palaeoenvironmental studies, or what can you do with an ostracod shell?", *The Paleontological Society Papers*, vol.9, pp.153-180, 2003.

[47] H. Zwair, "Perspective Chapter: Ostracoda." , 2023. In book: Formation and Evolution of Earth's Crust: M. Cengiz and S. Karabulut editors.

[48] J. Rodriguez-Lazaro, and F. Ruiz-Muñoz, "A general introduction to ostracods: morphology, distribution, fossil record and applications", In *Developments in Quaternary Sciences*, vol. 17, pp. 1-14, 2012.

[49] Y. Hong, M. Yasuhara, H. Iwatani, and B. Mamo, "Baseline for ostracod-based northwestern Pacific and Indo-Pacific shallow-marine paleoenvironmental reconstructions: ecological modeling of species distributions", *Biogeosciences*, vol.16, no.2, pp.585-604, 2019.

[50] J. McCormack, F. Viehberg, D. Akdemir, A. Immenhauser, and O. Kwiecien, "Ostracods as ecological and isotopic indicators of lake water salinity changes: the Lake Van example", *Biogeosciences*, vol.16, no.10, pp.2095-2114, 2019.

[51] F.A. Viehberg, "Quantitative paleoenvironmental studies using freshwater ostracods in northeast Germany," Ph.D. dissertation, University Greifswald, Moritz, Arndt, 2005.

[52] B.M. Isaa, "Benthic Foraminifera and *Bithynia* sp. Opercula as Indicators of Depositional Environment of Late Holocene in Eastern Hammar Marsh, Southern Iraq", *Kirkuk Journal of Science*, vol.19, no. 3, pp. 36-47, 2024.

[53] H. Rasouli, and C. Aygen, "New records and redescriptions of three *Cyprididae* ostracods (Crustacea) from Turkey", *Oceanological and Hydrobiological Studies*, vol. 46, no. 4, pp.421-438, 2017.

[54] J.A. Constantine and T. Dunne, " Meander cutoff and the controls on the production of oxbow lakes", *Geology*, vol. 36, no. 1, pp.23-26, 2008.

[55] M. Dugel, O. Kulkoyluoglu, and M. Kilic, "Species assemblages and habitat preferences of Ostracoda (Crustacea) in Lake Abant (Bolu, Turkey)", *Belgian Journal of Zoology*, vol. 138, no. 1, pp. 50-59, 2008.

[56] R. Fuhrmann, *Atlas quartärer und rezenter Ostrakoden Mitteldeutschlands* (*Atlas of Quaternary and recent ostracods of central Germany*), vol. 15. *Altenburger naturwissenschaftliche Forschungen*, 2012.

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الخلاصة

المقدمة:

يهدف البحث إلى تحديد تجمعات أنواع الدرعيات المختلفة الموجودة في الرواسب الحديثة لشمال محافظة البصرة، ويسعى هذا البحث إلى توضيح خصائص البيئات الرسوبية في تلك الرواسب، فضلاً عن الكشف عن الأحداث التي أثرت على ظروفها البيئية.

طرق العمل:

تم إخضاع ما مجموعه واحد وثلاثين عينة تم جمعها من أربعة عشر موقعًا مختلفًا لتحليل حجم الحبيبات من خلال الغربلة الرطبة، مما سمح بفصل الرمل عن الغرين والطين. سهلت هذه العملية تحديد نوع الرواسب. لدراسة تصنيفات الحيوانات الدقيقة(الدرعيات)، تم غسل جميع العينات وتجفيفها جيدًا، ثم تم اختيار دروع ومصاريع الدروع بعناية يدويًا تحت المجهر الثنائي، مع توثيق فوتوغرافي لأنواع الدرعيات، مما أدى إلى تحديد مجموعات الدرعيات الموجودة.

النتائج:

كشف تحليل مكونات الرواسب أن 55% من إجمالي العينات تندرج ضمن فئة العرين، في حين تم تصنيف 26% منها على أنها غرين رملي. أما النسبة المتبقية البالغة 19% من العينات فقد تم تصنيفها على أنها تنتمي إلى نوع الطين. في حين تم تصنيف أنواع الدرعيات إلى تجمعات مميزة لتحديد الظروف البيئية، وهي؛ التجمع I، والتجمع II، والتجمع III.

الاستنتاجات:

توجد ثلاثة أنواع من الرواسب: الغرين والغرين الرملي والطين. ومن بين هذه الأنواع، تعد رواسب الغرين الأكثر شيوعًا. أما بالنسبة لأنواع الدرعيات التي تم تحديدها، فقد أشار التجمع I إلى خصائص نموذجية لبيئة مصبات الأنهار. وعلى النقيض من ذلك، عكس التجمع II بيئة المستنقع (الهور). بينما تباينت بيئة التجمع III من بيئة المياه العذبة إلى بيئة قليلة الملوحة/البحيرة في اسفل التجمع الى بيئة المياه العذبة النهرية في اعلاها.

الكلمات المفتاحية: الدرعيات، الرواسب الحديثة، العصر الهولوسيني المتأخر، شمال محافظة البصرة، جنوب العراق.