

Zoogeography of Recent Ostracoda From North West Arabian Gulf

Saleh K. Khalaf Ibrahim Y. Al-Shareefi
*Department of Geology- College of Science
Mosul University*

(Received November 11,2000 ; Accepted April 23,2001)

ABSTRACT

The Ostracoda from 89 samples of recent sediments from fourteen traverses along Khor Al-Zubair channel, southern Iraq have been studied.

Forty-two species of marine and non-marine Ostracodes belonging to twenty-eight genera have been recorded, including twenty species recorded for the first time in Iraq.

The distribution of each species is discussed from palaeogeographical point of view in relation to the adjacent and related regions. The affinities indicate distinctive migratory routes; the first from Indian Ocean to the Red Sea and the second route from Indian Ocean to the Arabian Gulf and Southern Iraq, therefore the origin of most of the species in the studied area is indo-Pacific bioprovince.

الجغرافية الإحيائية لأوستراكودا العصر الحديث من شمال غرب الخليج العربي

الملخص

يتضمن البحث دراسة متحجرات الاوستراكودا في تسعة وثمانين نموذجاً من الترسبات الحديثة لمقاطع طولية على قناة خور الزبير جنوب العراق. تم تشخيص اثنان وأربعين نوعاً من الاوستراكودا تعود إلى ثمانية أجناس منها عشرون نوعاً يسجل لأول مرة في العراق. مناقشة الانتشار الجغرافي لهذه الأنواع وعلاقتها بالمناطق المجاورة حيث أظهرت العلاقة الإحيائية وجود مسار لهجرة هذه الأنواع من المحيط الهندي باتجاه البحر الأحمر وكذلك من المحيط الهندي وصولاً إلى منطقة الخليج العربي مما يشير إلى أن أصل هذه الأنواع يعود إلى منطقة المحيط الهندي الإحيائية.

INTRODUCTION

The Ostracoda fauna recorded in the present work are obtained from Khor Al-Zubair channel, southern Iraq, NW of the Arabian Gulf. This channel is bounded by latitudes between 30 & 30 20' North and longitude 47 50' & 48 East.

Khor Al-Zubair is part of the Arabian Gulf geosyncline as defined by (Morris, 1978) which is bounded by the Arabian shield and the Dead Sea fault on the west, the southeastern over thrust and the belt of Turkey on the north, the Zagros thrust and the

Oman line on the east and the hills of Saudi Arabia to the south. The position of the studied area relative to the remainder regions is shown in Figure (1).

Khor Al-Zaubair channel is connected to the Arabian Gulf at its northwest part with constricted mouth situated southwest of Basrah city (Fig. 1), with 40 km length and 1-1.5 km width which are mostly floored with fine sediments including muddy to marly sand and silt.

The composition of residue of these sediments consists of different macrofossils shell remains specially mollusca and microfossils (Ostracoda and Foraminifera).

Previous Work

Information on the recent Ostracoda from South Iraq is very limited. (Macfadyen & Vata, 1978), (Khalaf & Elewi, 1989) reported eighteen species from south Iraq. (Al-Jumaily, 1994) has investigated Quaternary Ostracoda from Mesopotamia region. Towards the Arabian Gulf and Indian Ocean regions, relevant work has been carried out. (Al-Abdul Razzaq et al. 1982 & 1983a/b) reported recent Ostracoda from Sulaibikhat Bay and Kuwait Bay. (Bate, 1971 & 1981) studied recent Ostracoda from Abu -Dhabi lagoon. (Paik, 1977) studied recent Ostracoda from the Arabian Gulf and Gulf of Oman. (Jain, 1978 & 1981) has investigated recent Ostracoda along the Arabian Sea from Mandvi beach, West coast of India.

METHODS

Sampling

The present study is based on 89 samples collected from 14 traverses which were dredged and obtained from Khor Al-Zubair channel South Iraq, NW of Arabian Gulf (Fig. 1) using a Van veen grab sampler to obtain the upper half inch of the sediments from the channel.

Technical Methods

Each of the 89 samples were derived from 75 gm dry weight sediments material rinsed through a screen of (20, 40, 60, 80 & 120) mesh. The classification of the species level demanded that all Ostracoda are picked out from the residue down to the fragments determinable at least to the generic level.

Zoogeography

The recent Ostracoda fauna of S. Iraq are poorly known in spite of the fact that this region is important as zoogeographical subtraction-transition area between indo-pacific and the Mediterranean provinces. Thus, the described species in the present study are compared with other areas on the basis of geographical and stratigraphical distribution depending on the previous studies.

For convenience, the distribution of described species in the present study and other regions are given below:

1. *Cytherella maculosa*

Present Study : Khor Al-Zubair (TD, T1, T2, T4, T5, T6, T7 & T9).

Other Regions:

Recent : Gulf of Aden.

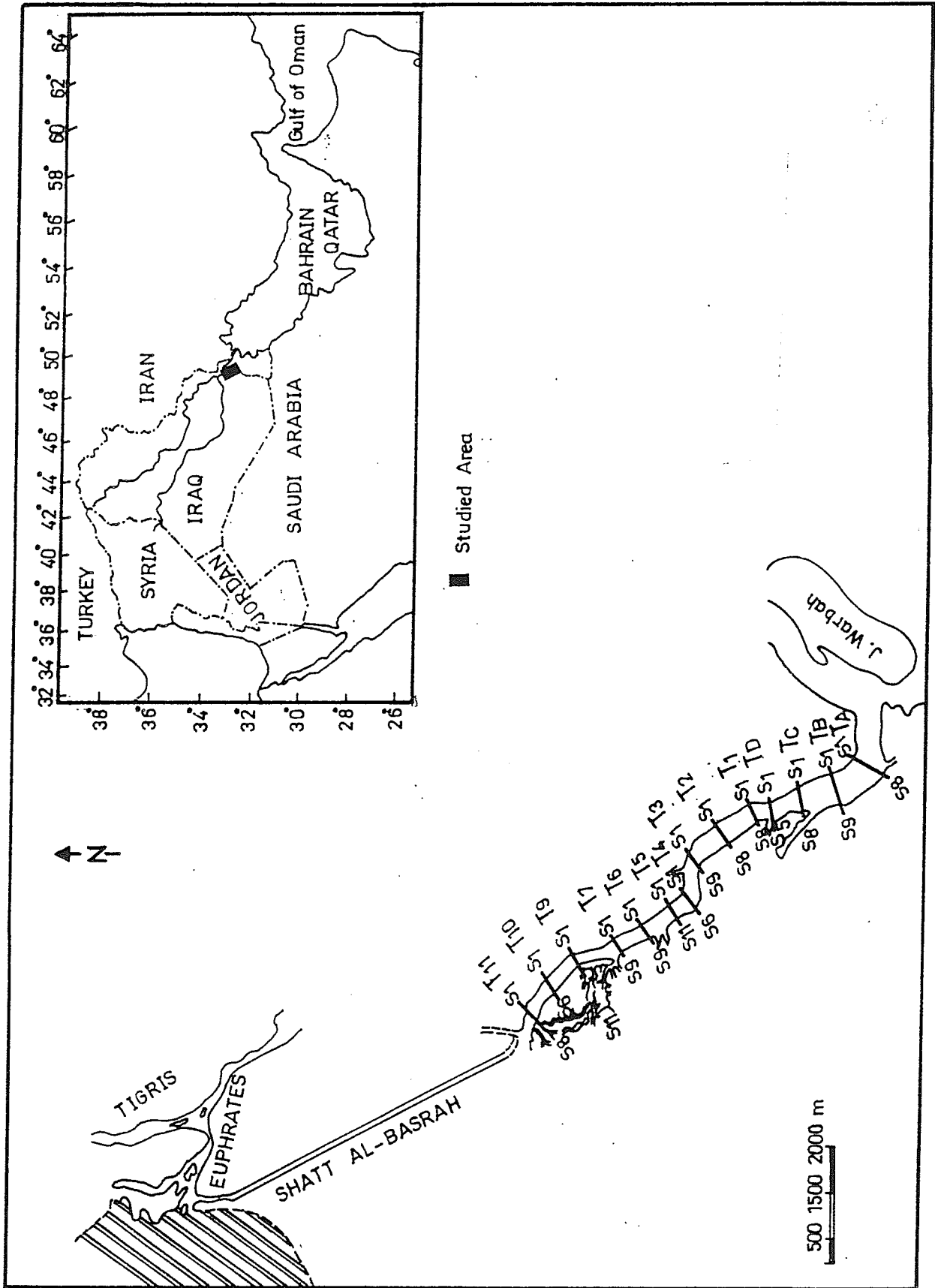


Fig.1 : Locatin map

2. *Tanella gracillis*

Present Study: Khor Al-Zubair (TB, TC, TD, T1 & T11).

Other Regions:

Recent : Kuwait , Gulf of Oman , Red Sea, Gulf of Aqaba, Gulf of Suez , Arabian Gulf , Gulf of Aden, Bay of Bengal , India , Gulf of Mexico , Gulf of Manaar , China , Australia, Hainan , West Africa , Brazil , Florida, Indonesia and Malay peninsula.

Quaternary: Iraq.

3. *Limmocythere inopennata*

Present Study : Khor Al-Zubair (T2, T3, T4, T5, T6, T7, T9 & T11).

Other Regions:

Recent : Iran, England, Canada, France , Germany.

Quaternary : Iraq, England.

Holocene : Hungary; Austria , Netherlands, France, Canada.

Pleistocene : Hungary.

Lower Pleistocene : United States, Germany.

Pliocene : Mediterranean region.

4. *Leguminocythere papuensis*

Present Study : Khor Al-Zubair (TB, TC, T1, T2 & T5).

Other Regions:

Recent : Kuwait, Arabian Gulf, Gulf of Oman, India, Malayan region.

Quaternary: Iraq.

Pliocene : Malayan region.

5. *Leguminocythere sp.*

Present Study : Khor Al-Zubair (TC, TD, T3 & T4).

Other Regions:

Recent : India.

6. *Cyprideis torosa*

Present Study : Khor Al-Zubair (TB, TC, T6, T9, T10 & T11).

Other Regions:

Recent : Iran, Palestine, Egypt, Tunisia, Algeria, Kazakhstan, Russia, Senegal, Cyprus, Germany, Netherlands, France, Spain, England, Canada.

Quaternary : Iraq, Turkey, Pakistan, China, Tunisia, Italy.

Holocene: Turkey, Kenya and Tanzania, Germany, Spain, United States.

7. *Haplocytheridea Keyseri*

Present Study : Khor Al-Zubair (TC, T7 & T9).

Other Regions:

Recent : Iraq, India.

Quaternary : Iraq.

Cenozoic : China.

8. *Hemicytheridea reticulata*

Present Study : Khor Al-Zubair (TD, T1, T7 & T9).

Other Regions:

Recent : Malayan region.

Quaternary: Iraq, China.

9. *Hemicytheridea paiki*

Present Study : Khor Al-Zubair (TC, TD, T1, T9 & T10).

Other Regions:

Recent : Kuwait.

Quaternary: Malayan region.

E. Pliocene: Malayan region.

10. *Cushmanidea guhai*

Present Study : Khor Al-Zubair (TB, TC, T2, T9 & T10).

Other Regions:

Recent : Iraq , Kuwait , Oman, India.

Quaternary: Iraq.

11. *Krithe kroemmelbeini*

Present Study : Khor Al-Zubair (TB, TC, TD, T1, T5 & T6).

Other Regions:

Recent : India.

12. *Hemikrithe peterseni*

Present Study : Khor Al-Zubair (TB, TC, T6, T10 & T11).

Other Regions:

Recent : Kuwait, India, Oman, Malayan region.

Quaternary: Iraq.

13. *Loxoconcha indica*

Present Study : Khor Al-Zubair (TB, TC, TD, T1, T10 & T11).

Other Regions:

Recent : Abu Dhabi lagoon and Arabian Gulf, Kuwait, India.

14. *Loxoconcha rhomboidea*

Present Study : Khor Al-Zubair (T1, T2, T3, T4, T5, T6, T7 & T9).

Other Regions:

Recent : Northern Aegean sea, England and NW Europe, Romania.

15. *Loxoconcha gruendeli*

Present Study : Khor Al-Zubair (TD, T1, T5 & T6).

Other Regions:

Recent : India

16. *Loxoconcha mandiviensis*

Present Study : Khor Al-Zubair (TC, TD, T7 & T9).

Other Regions:

Recent : India.

17. *Neomonoceratina delicata*

Present Study : Khor Al-Zubair (TC, TD, T1, T2, T5, T9 & T10).

Other Regions:

Recent : Iraq, Kuwait, India.

M. Pleistocene : Japan.

18. *Neomonoceratina iniqua*

Present Study : Khor Al-Zubair (T1, T2, T3 & T5).

Other Regions:

Recent : Arabian Gulf and Gulf of Oman.

Quaternary: Iraq.

M. Miocene : Iraq.

19. *Neomonoceratina microreticulata*

Present Study : Khor Al-Zubair (TB, TD, T1, T2, T5, T10 & T11).

Other Regions:

Recent : India, Netherlands.

Pliocene-Pleistocene : Malayan region.

20. *Carinocythereis batei*

Present Study : Khor Al-Zubair (TB, TC, T9 & T10).

Other Regions:

Recent : India.

21. *Carinocythereis indica*

Present Study : Khor Al-Zubair (TB, TC, T1, T2, T3, T4, T5, T6 & T9).

Other Regions:

Recent : Arabian Gulf and Gulf of Oman, Kuwait, India, Malayan region.

Quaternary: Iraq.

22. *Crysocythere keiji*

Present Study : Khor Al-Zubair (TB, TD, T1, T2, T4 & T5).

Other Regions:

Recent : Arabian Gulf and Gulf of Oman, Kuwait, India.

Quaternary : Iraq.

23. *Keijila karwarensis*

Present Study : Khor Al-Zubair (TB, TC, T2, T3 & T5).

Other Regions:

Recent : Arabian Gulf, Kuwait, India, Malayan region.

Quaternary : Iraq.

24. *Keijila neali*

Present Study : Khor Al-Zubair (TB, T1, T2, T4 & T5).

Other Regions:

Recent : Arabian Gulf and Gulf of Oman, Arabian Sea, Mediterranean sea, Kuwait.

25. *Ruggieria (R.) darwini*

Present Study : Khor Al-Zubair (TB, T1, T4, T5 & T6).

Other Regions:

Recent : Iraq, Gulf of Oman.

26. *Ruggieria (R.) sp.B*

Present Study : Khor Al-Zubair (TB, TD, T1, T7 & T9).

Other Regions:

Recent : Arabian Gulf and Gulf of Oman.

27. *Alocopocythere reticulata*

Present Study : Khor Al-Zubair (TB, TC, TD, T2, T3, T10 & T11).

Other Regions:

Recent : Iraq, Gulf of Oman, Kuwait, Red sea, India, Australia, Burma.

Quaternary : Iraq, Burma.

28. *Xestoleberis rotunda*

Present Study : Khor Al-Zubair (TB, TC, TD, T7, & T9).

Other Regions:

Recent : Kuwait, Southern part of Arabian Gulf.

29. *Xestoleberis* cf. *communis*

Present Study : Khor Al-Zubair (TB, TC, T2 & T4).

Other Regions:

Recent : Gulf of Neapal, Cyprus , Gulf of Argos, Greece.

Quaternary : Gulf of Argos, Greece, Adreatic sea.

L. Miocene : Tunisia.

30. *Aglaiella sanctamaria*

Present Study : Khor Al-Zubair (TB, T1, T2, T6 & T7).

Other Regions:

Recent : Senegal and Gambia.

31. *Paradoxostoma* sp

Present Study : Khor Al-Zubair (TB, TC, TD, T10 & T11).

Other Regions:

Recent : India.

32. *Darwinula cylendrica*

Present Study : Khor Al-Zubair (T9, T10 & T11).

Other Regions:

Quaternary : Iraq.

Miocene-Pliocene : Turkey.

M-L. Miocene : Greece

Neogene : Southern Europe.

33. *Darwinula stevensoni*

Present Study : Khor Al-Zubair (TB, TC, TD, T1, T10 & T11).

Other Regions:

Recent : Iran, India, Canada, Germany, Ethiopia, United States , Yemen, Malayan region, Finland.

34. *Ilyocypris gibba*

Present Study : Khor Al-Zubair (T3, T4, T5, T6, T7, T9, T10 & T11).

Other Regions:

Recent : Iran, Turkey, Palestine, Algeria, Spain , England, Canada, United States , Ethiopia, Kenya, Uganda, Tunisia, Mozambique.

Quaternary: Jordan, Argentina.

Holocene : Netherlands, Canada.

Pleistocene : Hungary, United States.

L. Pleistocene: Germany, England.

Pliocene-Pleistocene: India, China.

L.Miocene – E. Pliocene : Greece.

Miocene : Spain..

35. *Ilyocypris Bradyi*

Present Study : Khor Al-Zubair (T3, T4, T5, T6, T7, T9, T10 & T11).

Other Regions:

Recent : Turkey, Palestine, India, Hungary, France, Spain, England, Canada.

Quaternary: Iraq, India, Germany, England.

Holocene : United States.

Pleistocene : India.

E. Pleistocene: Czechoslovakia.

L. Pleistocene : China, Germany, Italy.

Pliocene-Pleistocene : India, China, Canada.

36. *Propontocypris* sp. C

Present Study : Khor Al-Zubair (TB, TC, TD, T6 & T7).

Other Regions:

Recent : Arabian Gulf and Gulf of Oman.

37. *Candona candida*

Present Study : Khor Al-Zubair (T3, T4, T5, T6, T7, T9, T10 & T11).

Other Regions:

Pleistocene : Germany; England.

38. *Candona semicognita*

Present Study : Khor Al-Zubair (T2, T3, T4, T5, T6, T7, T9, T10 & T11).

Other Regions:

L. Pleistocene : Germany.

39. *Cyprinotus salinus*

Present Study : Khor Al-Zubair (T2, T3, T4, T5, T6, T7, T9, T10 & T11).

Other Regions:

Recent : Palestine, India, Norway, Netherlands, Spain, Mongolia, Bulgaria, United States, Macaronesia.

Quaternary: Iraq, Argentina, Germany.

Holocene : France.

Pleistocene : India, England.

40. *Candoniella albicans*

Present Study : Khor Al-Zubair (T2, T4, T5, T6, T7, T9, T10 & T11).

Other Regions:

Recent : Macedonia, France, Spain, Canada.

Quaternary: Iraq, Jordan, China, Germany.

Holocene : Germany.

Pleistocene : United States, India.

M. Pleistocene: England.

L. Pleistocene : China, Germany.

Pliocene-Pleistocene : China.

L. Miocene : China.

41. *Aglaiocypris gambiensis*

Present Study : Khor Al-Zubair (TD, T1, T2, T3, T4, T5, T6 & T7).

Other Regions:

Recent : Senegal and Gambia.

Neogene: Senegal and Gambia.

42. *Phlyctenophora* aff. *Zealandica*

Present Study : Khor Al-Zubair (TB, TC, TD, T1, T2, T3, T4 & T5).

Other Regions:

Recent : India, Philippines.

Quaternary: Malayan region.

From the above information, the Iraqi Ostracode fauna show a strong link with Arabian Gulf region (twenty species) which are duplicated between them (mostly from Kuwait coasts) such as *Tanella gracilis*, *Leguminocythereis popuensis*, *Hemicytheridea paiki*, *Cushmanidea guhai*, *Hemikrithe petersoni*, *Loxoconcha indica*, *Neomonoceratina delicata*, *Carinocythereis cf. Indica*, *Chrysocythere keiji*, *Keijella karwarensis*, *Keijella neali*. This relationship indicates that S. Iraq and Kuwait were one piece and part of Mesopotamian plain specially before Würm glaciation period. A fault accompanied with a tectonic subsidence has constructed Khor Al-Zubair and another fault isolated Warba island from the opposite Iraqi coast (Al-Mosawi, 1993), indicated by the strong variation in the ornamentation such weak developed phenotypic nodes *Cyprides torosa* and *Ilyocypris gibba*.

Regionally, there are twenty-six species duplicated with West Asia in particular west coast of India and on the basis of this relationship, one can conclude that the migration route of Ostracoda was from the Indian ocean towards the Red Sea, and to the Arabian Gulf and S. Iraq.

CONCLUSIONS

1. The shallow marine Ostracoda recorded in the present work shows strong link of affinities with those recorded from Arabian Gulf, Red Sea and Indian Ocean region indicated migratory routes through Arabian Sea towards Red Sea and towards Arabian Gulf to Southern Iraq, so the studied area is classified as intermediate zone between Indo-Pacific and Mediterranean bioprovinces. Also, some of the recorded species are from Indo-Pacific such as *Tanella gracilis*, *Alocopocythere reticulata* and *Neomonoceratina delicata*.
2. The Ostracode assemblages distribution along Khor-Al-Zubair channel were strongly related to the geological evolution of the area, indicating erosion and deposition processes, neotectonism as well as sea level fluctuation.
3. The strong affinities between the recorded Ostracoda species in the present study and those from Kuwait coast confirm that the area was part of the Mesopotamian plain in particular before Würm glaciation period (70-17) thousand years as suggested by (Al-Mosawy, 1993), where a fault accompanied with tectonic subsidence has isolated Warba island from the opposite Iraqi coast indicated by the strong variation in the ornamentation such weakly developed phenotypic nodes of *Cyprideis torosa* and *Ilyocypris gibba*.

ACKNOWLEDGEMENT

The authors would like to acknowledge the financial support from Mosul University. Also, we thank Mr. A.H. Elewi for his great help in providing samples from Khor Al-Zubair channel.

REFERENCES

- Al-Abdul-Rzzaq, S.K., Shublaq, W. and Al-Sheikh, Z. 1982 : Ostracode distribution and ecology of Sulaibikhat Bay, Kuwait. *Marl. Geol.*, 47: 57-75.
- Al-Abdul-Rzzaq, S.K., Shublaq, W. and Al-Sheikh, Z. 1983a : The marine bethic micro fauna of the tidal flats of Kuwait. *J. Univ. Sci.*, 10: 101-110.
- Al-Abdul-Rzzaq, S.K., Shublaq, W., Al-Sheikh, Z. 1983b and Kittaneh, W. : Ecology and distribution of Ostracoda in Kuwait Bay. *J. Macropaleontol.*, 2: 39-45.
- Al-Jumaily, W.A. 1994: Quaternary Ostracodes in southern Iraq. Ph.D. Thesis, Baghdad University, Iraq. P. 117.8Pls.
- Al-Mosawy, S.N. 1993: The evolution of Khor Al-Zubair area and its border lands during the Holocene. *Iraqi Geol. J.*, 26(3): 1-17.
- Bate, R.H. 1971: The distribution of recent Ostracoda in the Abu-Dhabi lagoon, Arabian Gulf. In: Oertli, H.J. (ed) *Paleoecologies of Ostracodes*. Bull. Centre Rech.Pau.SNPA, S, Suppl., 239-256.
- Bate, R.H. and Gurney, A. 1981: The ostracod genus *Loxoconcha* sars from Abdu-Dhabi lagoon and the neighbouring near shore shelf, Arabian Gulf. *Bull. Br. Mus. Nat. Hist.*, 44: 235-251.
- Jain, S.P. 1978: Recent ostracoda from Mandvi Beach, west coast of India. *Bull. Ind. Geol.Assoc.*, 11: 89-139.
- Jain, S.P. 1981: Checklist of Ostracoda from Indian-1-Cenozoic Ostracoda (marine). *J. Paleont. Soc. India.*, 25: 85-105.
- Khalaf, S.K. and Elewi, A.H. 1989: On some recent Ostracoda from Khor Al-Zubair, Southern Iraq. *Marina Mesopotamica.*, 4: 97-105.
- Macfadyen, W.A and Vita, F.C. 1978: Mesopotamia: the Tigris Euphrates delta and its Holocene Hammar faun. *Geol. Mag.* 115:287-300.
- Morris, M. 1978: Arabian Gulf, AAPG, special issue.
- Paik, K.H. 1977: Regionale Untersuchungen Zur verteilung der Ostracodaen in Arabian Golf und im Golf von Oman. *Meteor Forsch Ergebnisse, Reihe, C*: 37-76.