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First Record of Fresh Water Gastropods and Sedimentary Facies of Nezam-Abad area, South-East Bam, Iran

M. Dastanpour,* M.R. Vaziri, H. Ameri, and A.R. Jafari Sadr

Department of Geology, Faculty of Sciences, Shahid Bahonar University, Kerman, Islamic Republic of Iran

Abstract

Sediments of the Nezam-Abad area, south-east of Bam have been studied for the first time. Sedimentary facies are composed of thin-bedded clay, silt and fine grained sand interbedded with thin laminated limestone. Chemical analysis of X-Ray florescent indicates that more than 50% of sediments consist of silisium and aluminum oxide that can be used for reconstruction of environment. Ninety eight gastropod specimens were collected and two genera and one species of *Discus* sp., *Goniobasis* sp. and *Hydrobia neglecta* were introduced for the first time. Occurrence of lithofacies together with gastropod faunas and also absence of evaporate indicate a fresh water lake environment during Pleistocene to Recent time.

Keywords: Stratigraphy; Gastropods; Lake; Pleistocene-Recent; Nezam-Abad Bam

Introduction

During the geological research for clay exploration, the sediments at Nezam-Abad area were studied in detail. The study area located at 14Km south-east of Bam, south-east central Iran. Coordinate cited at 28°-56′-45.8″ N and 58°-31′-54″ E (Fig. 1) The elevation of area is 836 m above the sea level. Morphology of the area is almost flat covering an area of 24 Km^2. Based on the geological map of StÖcklin [13], Nezam-Abad area is located near the south-west border of the Grate Lut depression [10,11]. Aghanabati [1] showed that the Bam fault is located west of the area. A study of none marine Iranian molluscan [14] indicated several new species. The aim of this research is to study Quaternary sediments and their faunas which allowed discovering a fresh water lake deposits and gastropods.

Geological Setting

The Bam regional feature formed by the Late Alpine Orogeny of Pasadenian [1,2,13] during the Quaternary time. This is the first study of the Recent sediments and their faunas of this region. Geological map of the Nezam-Abad area (Fig. 2) constructed from the satellite image and field work, covering an area of about 24 Km^2. Three sections of cutting exposures were studied for about 8 m below the surface (Fig. 2).

The beds are horizontal with no deformation. The sediments consist of clay, silt and fine grained sand, interbedded with thin laminated limestone (Fig. 3).

Chemical analysis of X-Ray florescent (Table 1) indicates high amount of silisium and aluminum oxide with low rate of evaporate content that depend upon the parent rocks and favorable climate for the fresh water deposition at Nezam-Abad area.

* *E-mail: dastanpour@mail.uk.ac.ir*

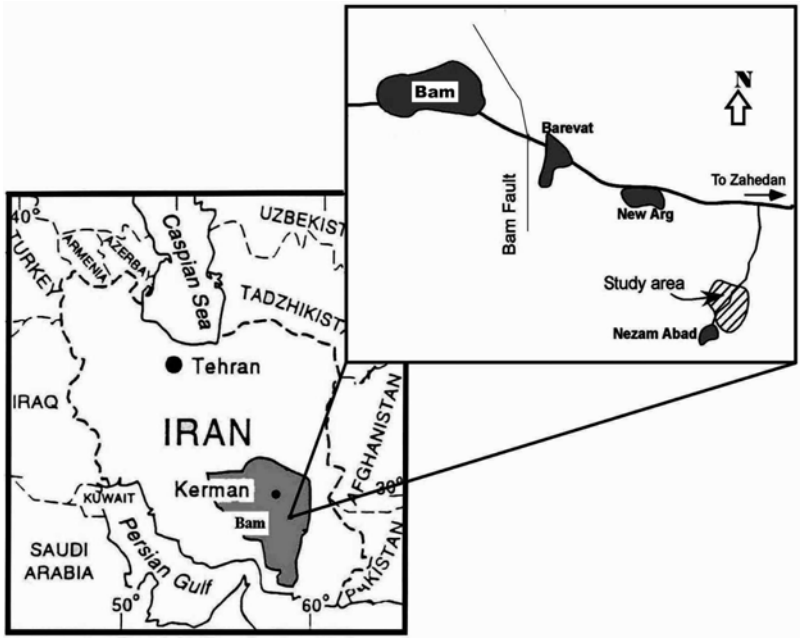

Figure 1. Location of study area (Nazem-Abad).

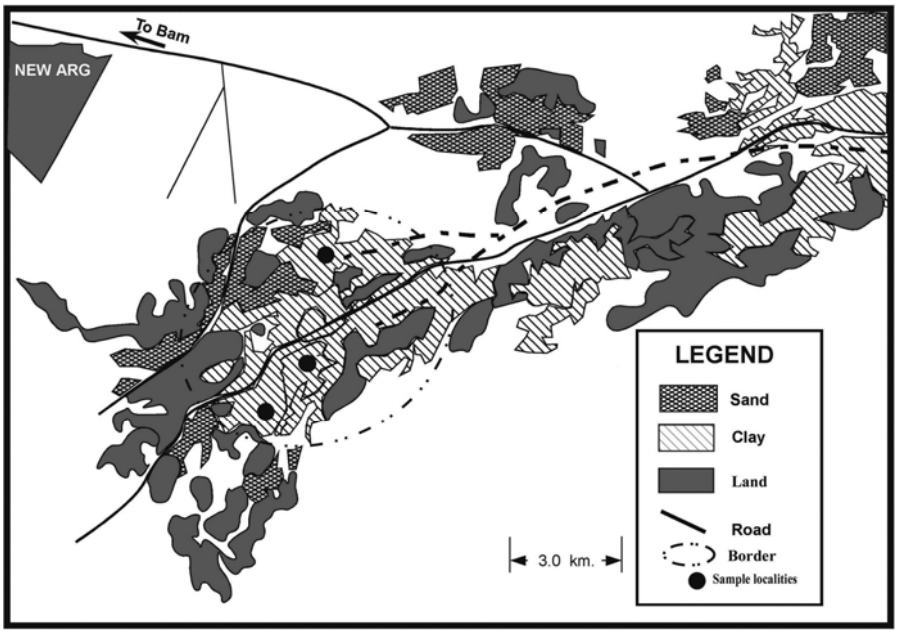

Figure 2. Generalized geological map of Nazem-Abad area (from satellite photo).

The faunas consist of fresh water and terrestrial gastropods. They were preserved within three fine grained sand beds at 0.75 m, 2 m and 3.20 m below the surface (Fig. 3).The gastropod shells are mostly intact with good preservation, suggesting that they were preserved close to their living environment. Lithofacies and chemical composition together with gastropod faunas and absence of gypsum and salt indicate a fresh water lake depositional environment [5]. Both sedimentary facies and faunas of Nezam-Abad area are comparable with the recent fresh water lake environment in western Massachusetts [3,4,9].

Table 1. Chemical analysis of samples from Nezam-Abad area

Sample	SiO2 %	Al2O3 %	Fe2O3 %	CaO %	Na2O %	Mg2O %	K2O %	Ti2O %	MnO %	P2O5 %
B10-2	48.35	10.29	5.63	14.99	1.09	3.13	1.73	0.574	0.150	0.103
B11-2	58.59	9.64	4.62	10.63	2.01	2.30	2.17	0.503	0.096	0.104
B12-2	48.58	10.26	5.59	14.42	2.00	3.39	1.78	0.582	0.123	0.108
B19-11	57.65	10.02	5.22	11.33	1.47	2.35	2.16	0.541	0.106	0.116
B19-22	49.63	12.47	7.27	11.31	1.27	3.21	2.04	0.691	0.146	0.112
B19-33	53.17	10.23	5.75	13.92	1.43	2.14	1.82	0.592	0.183	0.093
B7-2	52.45	10.75	5.19	10.36	2.06	3.69	2.39	0.552	0.117	0.105
B8-2	53.28	9.83	4.79	11.08	2.27	4.12	2.25	0.513	0.109	0.124
B9-2	54.93	8.97	4.75	11.92	2.43	3.50	2.20	0.513	0.107	0.147

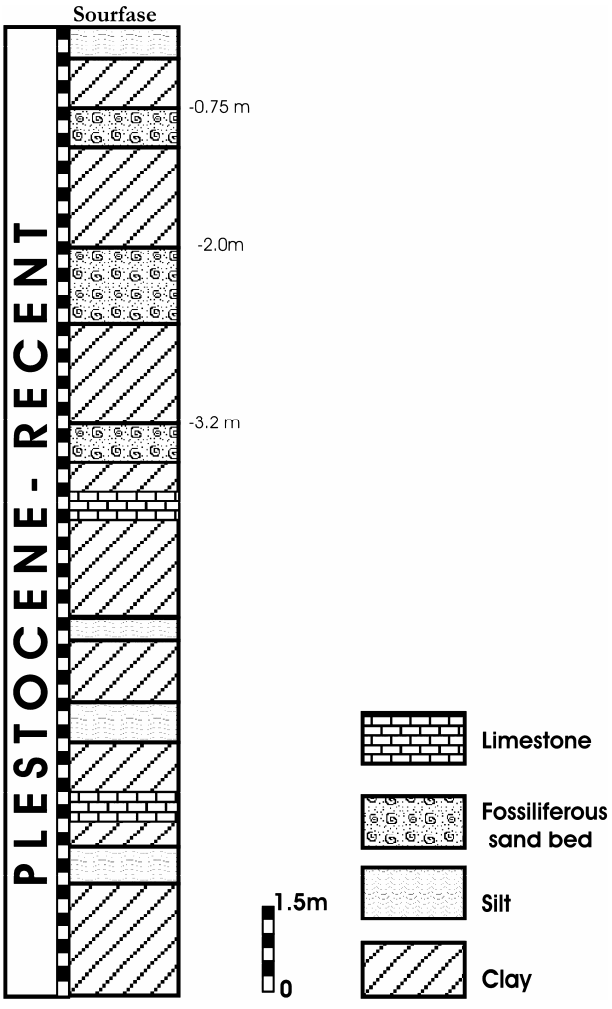

Figure 3. Stratigraphical column of the Nazem-Abad section.

Palaeontology

Members of the classes of gastropoda and bivalvia are commonly studied as biological indicators of past environments [12]. 98 gastropod specimens were collected from the fine grained sand beds at 0.75 m, 2 m and 3.20 m blow the surface. The shells are almost complete with good preservation. Three genera of different orders are present; all indicating a fresh water lake environment [15]. All specimen are deposited in the collection of the Geology Department, University of Shahid Bahonar, Kerman.

Class GASTROPODA Cuvier 1797
Order BASOMATOPHORA Keferstean 1864
Family HYDROBIIDAE Stimpson 1965
Genus *Hydrobia* Stimpson 1965
Hydrobia neglecta. Plate 1: Figures 1-4

Description: Shell small to minute for the genus, elongate, high spiral and subcylindrical in shape, with collabral riblet surface and 7-8 low convexity whorls. Apex is sharp with an angle between 18 to 26 degree. Operculum horny and spiral; aperture is subcircular with the diameter of about 3.2 mm (Fig. 4 and Table 2).

Apertural margin uninterrupted and not thick.

Relationship of length to maximum thickness is shown in Table 2 and Figure 4; it indicates a possibility that all samples belong to a single species. In addition, in some specimens, numerous fine ribs intending throughout the shell surface.

Materials: 35 samples were collected from 2 fine sand beds at 0.75 m and 2 m below the surface, mostly in good condition.

Occurrence: *Hyrobia neglecta* has been reported from fresh water and terrestrial of Pleistocene to Recent sediments in USA, England and Asia [6,8].This species also was found in recent fresh water near Caspian Sea and east Iran [14].

Order MESOGASTROPODA Kinght 1814
Family LOXONEMATIDAE Koken 1889
Genus *Goniobasis* Moor 1952
Goniobasis sp. Plate 1: Figures 5-8

Description: Shell symmetrical, small to medium in size and porelaneous. Elongate and slightly high spiral with about 6-7 whorls. The shell is spirally costate certhid, and the aperture is rounded to subrounded and holostomatous. Upper margin of aperture slightly extended and inhalant siphon is present. Just below the suture there are about 14 weakly axial ribs per whorls. Angel of apex (shoulder) is about 23 degree.

Relationship of length to maximum thickness is shown in Table 3 and Figure 5; it indicates that all samples belong to one genus (Fig. 5 and Table 3).

Material: 55 samples were collected from 0.75 m and 2 m and 3.2 m below the surface, mostly in good preservation with a few broken apertures.

Occurrence: The genus *Goniobasis* is an index fauna of fresh water and terrestrial gastropods of Pleistocene-Recent from USA, UK and Asia [6,7].

Table 2. Measurement of length and maximum thickness of *Hydrobia neglecta* sp.

No.	Length (mm)	Maximum thickness (mm)	Aperture diameter
1	18.6	6	3.1
2	18.2	5.9	3
3	18.1	6	2.8
4	18.4	6	2.5
5	18.5	6.1	2.1
6	18.4	6.2	2.6
7	18.6	6.2	2.3
8	19.1	6.3	2.8
9	19.4	6.3	3
10	19	6.4	2.1

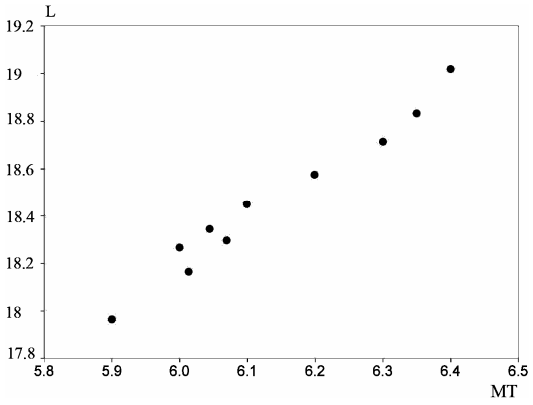

Figure 4. Relationship of length (L) to maximum thickness (MT) of *Hydrobia neglecta*.

Order PLEUROCOELA Thiele 1925
Family PELAGIELLIDAE Knight 1956
Genus *Discus* Faver 1963
Discus sp. Plate 1: Figures 9-11

Description: Small size with thin sells, discoidal umbilicate in outline and aperture wider than thickness. The shell comprising 3 whorls and sharply rounded periphery; aperture round with thin wall, shell rapidly expanding whorls, smooth surface growth lines fine and numerous.

Material: 8 samples were collected from the fine sand bed level 3.2 m below the surface of Nezam-Abad field, mostly in good condition.

Occurrence: *Discus* has been reported from fresh water and terrestrial sediments of Cretaceous-Recent in USA, UK and Asia [5,7].

Table 3. Measurement of length and maximum thickness of *Goniobasis* sp.

No.	Length (mm)	Maximum thickness (mm)	Aperture diameter
1	21.5	6.1	3.9
2	21.1	5.9	4
3	21	6	3.9
4	21.3	6	3
5	21.4	6.1	3.4
6	21.3	6.2	3.3
7	21.5	6.2	3.1
8	22	6.3	3.5
9	22.3	6.4	3.8
10	21.9	6.4	3.1

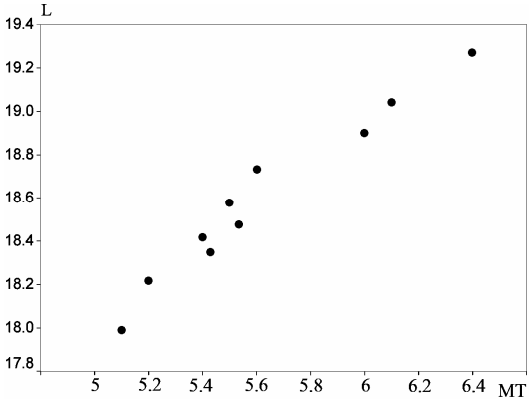

Figure 5. Relationship of length (L) to maximum thickness (MT) of *Goniobasis*.

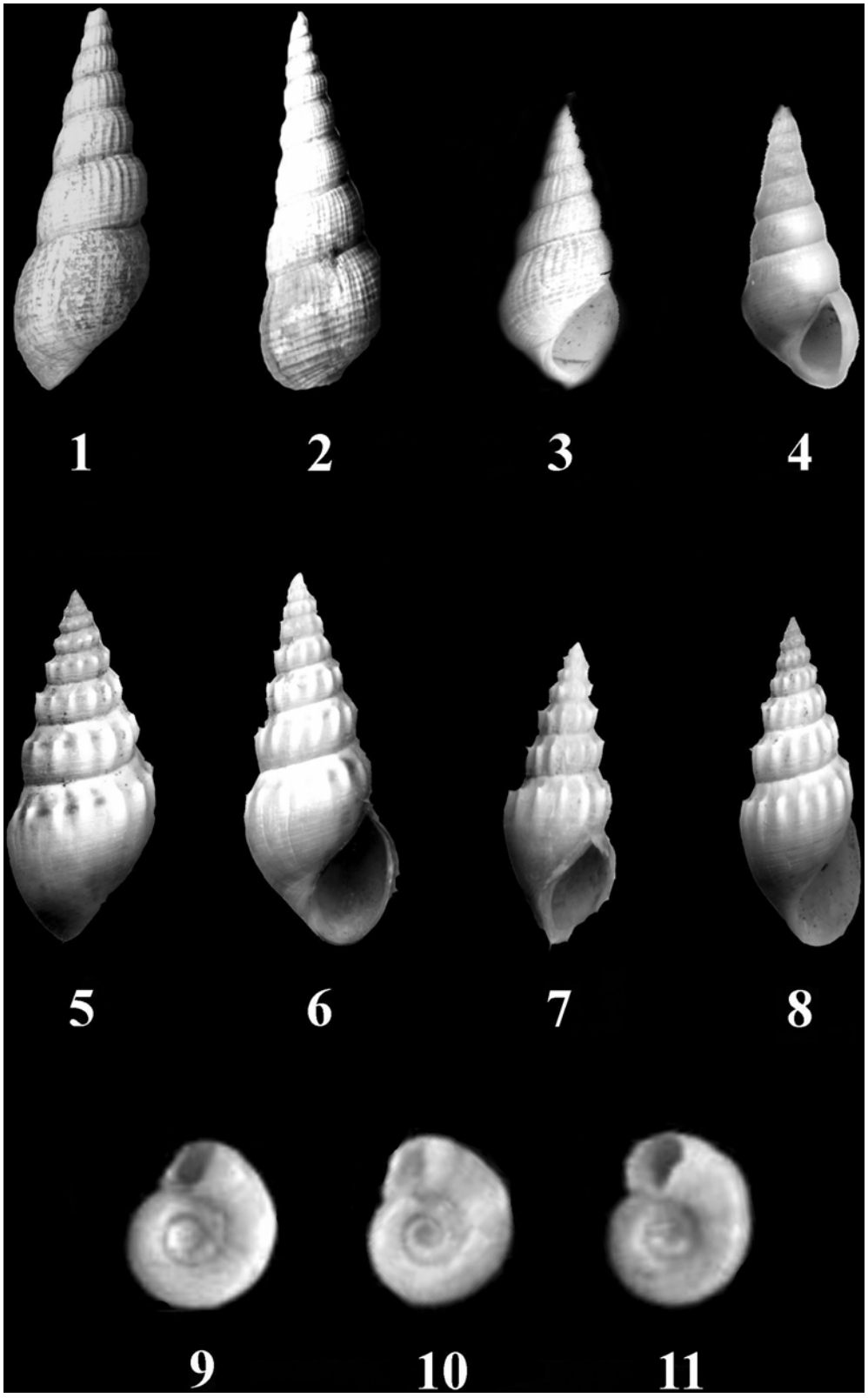

Plate 1. Figures 1-4: *Hydrobia neglecta*, all ×2.5; Figures 5-8: *Goniobasis* sp., all ×2; Figures 9-11: *Discus* sp., all ×4.

Conclusion

Lithofacies and Palaeontological investigation provided the following data for interpretation:

1- Morphology of the Nezam-Abad area is almost flat covering an area of about 24 Km^2.

2- Thin bedded clay, silt and fine grained sand interbedded with thin laminated limestone deposited next to Nezam- Abad village.

3- Two genera and one species of gastropoda (*Discus* sp., *Goniobasis* sp. and *Hydrobia neglecta*) indicate Pleistocene-Recent age for the environment [7,14].

4- Lithofacies and gastropod faunas together with absence of evaporate suggest a fresh water lake depositional environment during Pleistocene-Recent time in the vicinity of Nezam-Abad village [3].

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References

1. Aghanabati A. Geological map of Bam, Scale 1:100000 with general description. *Geol. Survey Iran Sheat*, **79**: 48 (1993).
2. Berberian M. and King G.C.P. Towards a palaeogeography and tectonic evolution of Iran. *Can. Jour. Earth Sci.*, **18**: 210-265 (1981).
3. Blatt H., Middleton G., and Murry R. *Origin of Sedimentary Rocks*. Second edition, Printice-Hall, Inc., pp. 782 (1999).
4. Kehoe, Sarah W. High resolution climate Proxies for a Late Pleistocene-Holocene lake kampoosa Boq, western Massachusotts. *The Geological Society of America*, **75**: 76 (2003).
5. Lowe J.J. and Walker M.J.C. *Reconstructing Quaternary Environments*. Longman, London, pp. 389 (1984).
6. Moore R.C. *Treatis on Invertebrate Palaeontology Part I Mollusca*. Geol. Soc. Am. Inc. and University of Kansas Press, pp. 1351 (1982).
7. Moore R.C., Lalicker C.G., and Fischer A.G. *Invertebrate Fossils*. McGraw-Hill Book Company, Inc., pp. 766 (1952).
8. Mayr M. *Collins Photo Guide Fossils*. Harter Collins Publishers, pp. 256 (1985).
9. Reineck H.E. and Singh I.B. *Depositional Sedimentary Environments*. Second edition, Springer-Verlag, New York, pp. 551 (1980).
10. Romanko E. Geology of the Anarak area (central Iran). *Geol. Sur. Iran*, Report TE/No. 19 (1984a).
11. Romanko E. Geology of the Khur area (Central Iran). *Geol. Sur. Iran*, Report TE/No. 20 (1984b).
12. Snowball I. Records of Holocene environmental change in tow annually laminated (varved) Lake Sediment sequences in northern Sweden. *Geol. Soc. Am.*, **170**: 2-27 (2003).
13. Stuocklin J., Eftekhar-nezhd J. and Hushmand-Zadeh A. Central Lut Reconnaissance East Iran. *Geol. Sur. Iran*, Report No. 22 (1972).
14. Tajallipour M. Iranian Mollusca of terrestrial and river. Cultural Study and Research Institute, pp. 167 (1361).
15. Wagner B., Melles M., and Hahne J. Lake sediments as archives of Holocene climatic variations in east Greenland. *Journal of Conference, Geol. Soc. Am.*, **4**(1): 1-2 (2003).