Iranian Journal of Animal Biosystematics (IJAB)
Vol. 2, No. 1, 25-33, 2006
ISSN: 1735-434X

Rodents and Lagomorphs remains from late Pleistocene and early Holocene Caves and Rochshelter sites in the Zagros region, Iran

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In this research the glirs tooth remains from four caves and rockshelter sites in west and north west of Iran have been reported. Recent archaeological surveys and excavations by Center for Paleolithic Research of National Museum of Iran and two other institutions, along other remains, have yielded rich assemblages of microvertebrate remains. The cave sites are Yafteh, Gar Arjeneh and Qalaloun (Lorestan), and Kani Mikaeil (Kordestan) that have been surveyed or excavated during 2001 to 2005. Except assemblages from Yafteh and Kani Mikaeil which are excavated and collected through systematic dry sieving, two other assemblages are collected from back dirt of looters pits in those sites. The tooth remains were belong to five families including; 1) Muridae: *Meriones sp. Tatera indica, Chionomys* cf. *nivalis, Microtus socialis, Arvicola terresteris. , Ellobius* cf. *lutescens, Nesokia indica, Cricetulus migratorius, Mesocricetus auratus, Rattus rattus, Mus musculus 2)* Calomysidae: *Calomyscus bailwardi* 3) Dipodidae: *Allactaga williamsi, Jaculus* sp. 4) Ochotonidae: *Ochotona rufescens* 5) Leporidae: *Lepus* sp. This research in based on morphologic and morphometric methods using modern comparative neontological specimens of the osteological collection. Also taphonomic and paleoenviromental aspects in the Zagros are discussed.

Key words: Zagros, Five families, morphologic and morphometric methods, taphonomic, paleoenviroment

INTRODUCTION

In this study, rodent and lagomorph assemblages from four caves and rockshelters located in the Zagros Mountain were studied. Since caves and rockshelters are used as shelters by animals, including predators and scavengers, they often contain the remains of these animals and their food and hence fossil and remains evidence of past animal populations (Burke and Cinq-Mars, 1996; Heaton et al., 1996, Lauriol et al 2000). The archaeological records of pellets from birds of prey such as owls (Chaline1972, Andrews1990, Darvish, 1992, Darvish et al., 2000) are also determinant for archaeological studies. One of the other aspects of these pellets in archeological studies is that it can represent the linkage between zoology and archaeology. The results of taxonomic identification and quantification and distribution of these remains prove that the rodent remains, are useful in paleontology and archaeology, because of their abundance in fossil remains also for datating in continental remains by rodents biostratigraphy. Also, the rodent remains hold the greatest potential for archaeologists for monitoring palaeoenviroments because they are more sensitive to changes in the local environments of an archaeological site than are larger mammals (Redding, 1978). An abundant literature is now available about the ecology

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(Gårding, 2000; Lindström et al., 2001), development (Salazar-Ciudad & Jernvall, 2001) and biogeography and identification of palaeoenviroment (Demboski & Cook, 1999) of each taxon. We carried out a detailed taphonomic analysis of the rodent and logomorha remains in order to understand the taphonomic imprints in this assemblage. A taphonomic analysis permits us to discover the recorded digestion, breakage and burnt of specimens and also the age of this assemblage. Our taphonomic study by scanning microscope confirms also that the rodent remains displayed generally the fractures and corrosion marks which are the typical signs of predation (Andrews, 1990,). In addition, this research was performed on the basis of morphologic and morphometric methods and comparasion with modern osteological collections. The key of determination of rodents species are from (Corbet 1998) and Darvish (in press) which is a faunal adjusted key of corbet for Iranian plateau rodents and the classification of Rodentia and Wilson and Reeder (2005).

MATERIALS AND METHODS

Kani Mikaeil (Kordestan) (Roustaei et al. 2002), Qalaloun near Kouhdasht, Yafteh Gar and Arjeneh near Khoramabad (Lorestan) in western and northwestern Iran (Fig.1) were studied.

FIG.1.- Location map of the sites mentioned in the text

Kani Mikaeil is located about 40 km east of Saqez in Kordestan Province (Fig.2). This large cave (c. 712 m²) looking northeast, at an altitude of c. 2100m above sea level. The site was tested by H. Rezvani and a team from the Center for Paleolithic Research in 2001.Three test pits were made inside the cave, of which one contained natural sequence that yielded a rich collection of microvertabrate tentatively dating back to late Pleistocene to recent time. While in two other test pits archaeological remains dating back to Chalcolithic period (6-5th millennium B. C.) were found. (Roustaei et al 2002).

FIG.2. - General view of Kani Mikaeil Cave, Kordestan Province

Qalaloun is a small cave and a rockshelter at an altitude of 1380m above sea level that located about 15 km to southwest of Kuhdasht in Lorestan Province (Fig. 3&4). The site discovered by B. Moradi in 2004 and re-surveyed by him and a team from Center for Paleolithic Research in 2005. During these surveys a lithic assemblage with Upper Paleolithic characteristics (Aurignacian-like industry) collected at talus slope of the site and in the back dirt of some pits that have been made by looters at floor of the rochshelter. A collection of faunal remains also collected from the surface of disturbed deposits that contained large herbivores remains and a rich assemblage of microvertabrates. Although the faunal material was mixed (Late Pleistocene through Holocene and recent times) but different patination allowed us to tentatively seprate Late Pleistocene remains from later ones.

FIG.3.-Location of Qalaloun in a hilly area, southwest of Kuhdasht, inset: entrance of Qalaoun Cave, view from inside

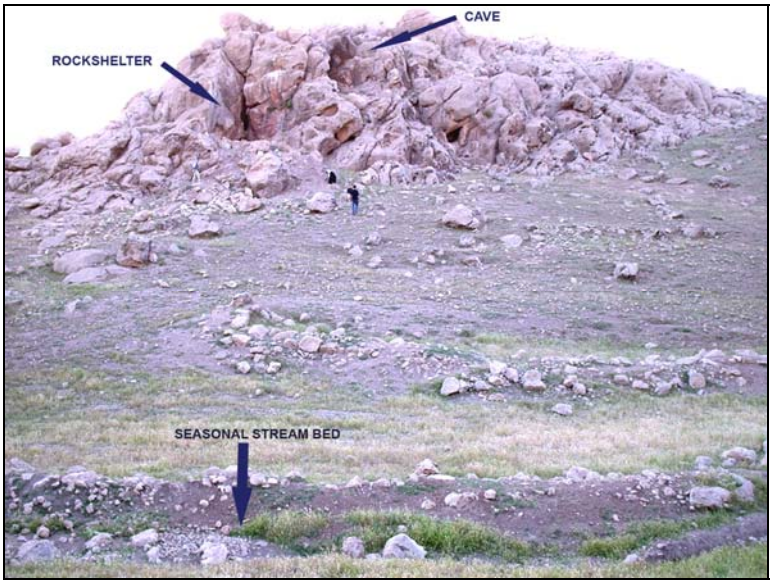

FIG.4. - Qalaloun site and its slope

Yafteh is an upper Paleolithic cave site located at an altitude of c.1280 m above sea level, about 14 km to west-northwest of Khoramabad in Lorestan Province (Fig. 5). Yafteh was discovered and later excavated by Hole and Flannery in the 1965 that yielded a large artifact collection described briefly by Hole (Hole and Flannery1967). A recent re-excavation at Yafteh cave site by a joint Iranian-Belgian team in 2005, led to the discovery of rich assemblages of lithic artifacts, faunal remains and other finds from a small 2 × 2 m test (Otte et al., 2007). Yafteh have yielded a sequence of layers rich in archaeological material typical of Upper Paleolithic period (Aurignacian-like industry) New radiometric dating reveals a date range between 35 to 24 ka for excavated deposits. Recent excavation yielded a large faunal assemblage, which in this study the rodents and lagomorph's specimens that are the most abundant part of the materials are studied. The remains are mainly belonging to the different families of rodents and a small part of specimens belongs to Lagomorphs whose taxonomic status will be discussed.

Gar Arjeneh is a rockshelter 1300 m above sea level at southern suburbs of Khoramabad (Fig.6). The site excavated by Hole and Flannery in the 1963 that yielded a long archaeological sequence from Middle Paleolithic to Upper Paleolithic (Hole and Flannery1967). During a visit to the site in 2003, F. Biglari collected a small collection of microvertabrate remains near a recent pit on the talus slope of the site. Lack of patination on the most of the specimens indicates that the collection contains a recent material, although there could be some older remains too.

A great number of remains were collected after the systematic dry sieving of the sediments from each Cave. The remains mainly belong to the different families of rodents consisting Hamsters (Hashemi et al. 2005), Jirds, Dipodidae, Wood mouse, Voles, and Pikas and a small part of specimens belong to Lagomorphs. The zooarchaeological material contained cranial and post cranial parts were sorted anatomically and then washed with HCL (5%).

The preservation conditions are unequal according to different localities. Measurements of the material were made with the aid of measuring microscope with accuracy 0.001 mm. In addition, their morphological features were investigated by stereomicroscope. All recovered fragments were measured when possible.

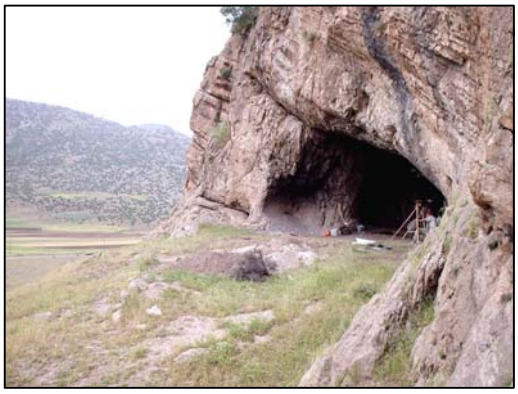

FIG.5.- Yafteh Cave, Lorestan

FIG.6. – Gar Arjeneh rockshelter, Lorestan

RESULT AND DISCUSSION

The density of the remains was different in each site. The Kani Mikaeil Cave (Kurdestan) was high while the fewer specimens were found in Gar Arjeneh rockshelter (Lorestan). This is possibly related to different sampling. The Kani Mikaeil assemblages come from excavation, while the Gar Arjeneh collection is based on a surface sample.

Factors such as physiological tolerance, food resources, competition, predation and sheltering conditions affect the local distribution of rodent species and are important for monitoring paleoenviroments (Redding, 1978). However, Miller and Getz (1972) considered predation to be the primary factor controlling the local distributions (also reported by Redding, 1978). Also noteworthy is that some of the identified species in these sites could live in different conditions; this is the case of *Tatera indica* found in Qalaloon and Yafteh. The Indian gerbil feeds on seeds, stems, rhizomes, and leaves of grasses and is restricted to those areas that support grasses for most of the year (Redding1978). Sidlovskyij (1976) stated that *Chionomys nivalis* (Snow vole) dries grass and stores it in the autumn. The *Arvicola terresteris* (water vole) is closely associated with stearams, irrigation ditches and marshy vegetation around water bodies (Lay, 1967; Harison&Bates, 1991; Qumsiyeh, 1996). *Microtus socialis* (Social voles) are inhabitants of dry steppes and semi-deserts of eastern Eurpe, western and cental Anatolia, Syria, Iraq and Iran (Krystufek&Kefeliogla, 2001). *Ellobius* cf. *lutescens* (Southern Mole-vole) Pleistocene mole vole remnants were also reported from Anatolia (Konya-Aksehir-Dursunlu; Coskun&Ulturk, 2003) populates dry grassy habitats and semi-deserts of various soil typs, including sandy ones (Gromov&Erbajeve, 1995) but avoids moving sand (Coskun2003) and it is strictly herbivorous, feeding mainly on bulbs, tubers, roots and other underground plant material. Senbort et al. (1995) consider William's jerboa to be eurytopic but avoiding marshy ground meadows with tall and dense grass and thick vegetation. The other recovered rodents in these caves are: *Nesokia indica, Rattus rattus, Mus musculus, Meriones* sp. *s*pecies belonging to Muridae families and *Cricetulus migratorius* belonging to Cricetidae family.

It should be noted that the glier remains are probably interoduced by raptors. This is confirmed by the fractures and corrosion marks on some bones, typical signs of predation (see Andrews, 1990, for discussion). This assumption was tested on some teeth and bones from different layers in Yafteh and Kani Mikaeil Caves.The SEM photo indicated that the degree of digestion in these materials is different and the frequency of digested femur and ulna from Yafteh Cave is consistently higher than dental from Kani Mikaeil assemblage (fig 7). Comparision of these remains with other studies indicate that some of these materials probably belong to *Bubo bubo*, *Tyto alba.* Obuch (1994) found *A.williamsi* among the prey of the eagle *Bubo bubo* and *Athene noctuaen* transcaucasia (Verescagin, 1959), water vole bones and *M. socialis* in the eagle owl (*Bubo bubo*). In Syria, the social vole is also hunted by *Athene noctua* and *Tyto alba* (Shehab et al, 2004). Also Obuch (1994) found snow voles in pellets of *Strix aluco* and of *Bubo bubo*, but at a low

frequency (<3% and<1%) of all small mammles, respectively). He also found mole vole in eagle owl (*Bubo bubo*) pellets.

The understanding of the late Pleistocene and early Holocene found, detailed analysis of the accumulation process of the microvertebrate remains within the archaeological sites is needed. The list of the identified specimens is reported in Table1. The speices belong to different ecological niches which can provide a picture of the past landscapes around the sites. However it is not yet very clear, especially in the case of Gar Arjeneh and Qalaloun Caves that all the remains belong to the same depositional event.

TABLE 1.- Dispersal of the studied taxa in four different sites (Caves) KM (Kani mikaeil), Q.N (Qalyllon), YH (Yafteh), A.H (Arjaneh)

Taxa / localities	KM	QN	YH	AH
Order Rodentia				
Muridae family				
Meriones sp.	+	+	+	-
Tatera indica	-	+	-	-
Nesokia indica	-	-	-	-
Rattus rattus	-	-	-	+
Mus musculus	+	-	-	-
Arvicola	+	-	+	+
Ellobius cf. lutescens	+	+	+	
Microtus sp.	+	+	+	-
Chionomys sp.	+		+	-
Cricetolus migratorius	+	+	-	-
Calomysidae family				
Calomyscus sp.	+	-	+	-
Dipodidae family	-	-	-	-
Allactaga willamsi	+	-	+	-
Jaculus sp.	-	-	-	-
Order Lagomorpha				
Ochotonidae family				
Ochotona sp.	+	-	+	-
Leporidae family				
Lepus sp.	+	-	+	-

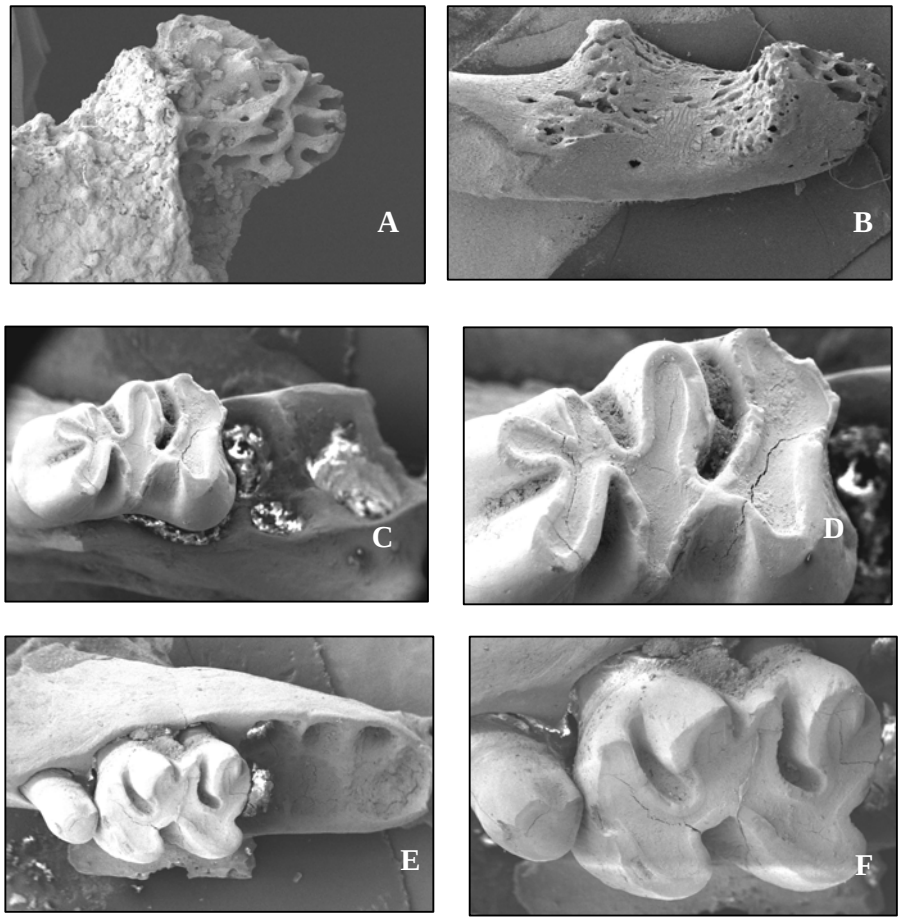

FIG.7.- SEM photo of skeletal and dental specimens A) Femur, B) Ulna from Yafteh Cave showing localized digestion, C,D) *Allactaga willamsi* molars E,F) *Allactaga willamsi* maxilla showing a few digesting.

LITERATURE CITED

ANDREWS, P.1990. Owls, Cave and fossil. University of Chicago Press, 196 pp.

CHALINE, J.1972. Les rongeurs du Pleistocene moyen et superieur de France.- Cahiers de Paleontologie du CNRS, Paris, 410pp.

CORBET, G.B. 1978. The mammals of the Palaearctic region. A taxonomic review. British Museum of Natural History London, pp.314.

COSKUN, Y., ULUTURK, S. 2003. Observation on the mole vole, Ellobius lutesense Thomas 1897, (Mammalia: Rodentia) in Turkey. Turkish Journal of Zoology, 27:81-87.

GROMOV, I.M., ERBAJEVA, M.A.1995. The Mammals of Russia and adjacent territories. Lagomorphs and Rodents.Russian Academy of Sciences, Zoological Institute, st.Petersburg. (in Russian).

COSKUN, Y .2001. On distribution, morphology and biology of the mole vole, Ellobius lutecense Thomas 1897(Mammalia: Rodentia) in eastern Turkkey. Zoology in the Middle East, 23:5-12.

DARVISH, J. GHIEASI, A. KHOSRAVI, M. 2000. Identification of rodents remaines in Robat sharaf of Sarakhs (Khorassan) by the aid of morphological and neontological study, Journal of Science, Alzahra University, Vol.12, No.1, p.31-44.

DARVISH,J. 1992. Preliminary study of the fauna of rodents in the Northern Khorassn with the aid of pellets from the prey birds, Pests and plant diseases magazine ,Vol.59, No.1,2, P.33-43.

GARDING L. 2000. A simple model for interplay of predators, rodents and foot. Journal of Theoretical Biology 206: 73–80.

HASHEMI, N. MASHKOUR, M. 2005. Palaeozoology of hamsters in Kanimikaiel cave. 13th Iranian Biology Conference and the First International Conference of Biology, Guilan University, Rasht, I.R.Iran. 23-25.

HARRISON, D.L., BATES, P.J.J. 1991.The mammals of Arabia. Harrison Zoological Museum Publ.Sevenoaks

HOLE, F., AND FLANNERY, V. 1967. The Prehistory of Southwest Iran: A Preliminary Report. Proceedings of the Prehistoric Society 33:147-206

KRYSTUFEK,B.,KEFELIOGLU,H. 2001.The social vole Microtus social in the Near East.Mammal Rev.,31:229-237.

OTTE, M., F. BIGLARI, D. FLAS, S. SHIDRANG, N. ZWYNS, M. MASHKOUR, R. NADERI, A. MOHASEB, N. HASHEMI, J. DARVISH, & V. RADU, 2007. The Aurignacian in the Zagros region:new research at Yafteh Cave, Lorestan,Iran, Antiquity, No 81, pages 82-96.

LAY, D.M. 1967. A study of the Mammals of Iran, Resulting from the Street Expedition of 1962-63. Fieliana Zoology, 54: 168-171.

LINDSTROM J, RANTA E, KKKO H, LUNDBERG P, KAITALA V. 2001. From arctic lemmings to adaptive dynamics: Charles Elton's legacy in population ecology. Biological Reviews 76: 129–158.

MARTIROSJAN, V.A.1970.The Snow vole as life form fauna I ekologija aryzuniv, 9:240-249.

OBUCH, J.1994. On The food of the eagle-Owl (Bubo bubo) and tawny owl (Strix aluco) in the eastern part of Turkey. Tichodroma Tichodroma, 7: 7-16

QUMSIYEH, M.B.1996. Mammals of the Holy Land.Texas Tech. University press, Lubbock.

REDDING, W. R. 1978. Rodents and the archaeological palaeoenvironment: Considerations, problems and future. Approaches to faunal analysis in the Middle East. R. H. Meadow and M. A. Zeder. Harvard, Peabody Museum of Archaeology and Ethnology. Peabody Museum Bulletin 2: 63-68.

ROUSTAEI ,K.; REZVANI, H. AND HEYDARI, S. 2002. Kani Mikaiil: a seasonal cave site of the Middle Neolithic period in Kurdistan, Iran. Antiquity 76: 935-6

SENBORT, G.I., SOKOLOV, V.E., GEPTNER, V.G., KOVALSKAJA, JU.M.1995. Mlekopitajuscie Rossii I sopredelnych regionov. Tuskancilkoobraznye Nauka, Moskva.

SHEHAB, A., DAOUD, A., KOCK, D., AMR, Z.2004. Small mammals recoverd from owl pellets from Syria (Mammalia: Chiroptera, Rodentia) Zoology in the Middle Eaet, 33:27-42

SALAZAR-CIUDAD, I., JERNVALL, J. 2002. A gene network model accounting for development and evolution of mammalian teeth. Proceedings of the National Academy of Sciences, USA 99: 8116–8120.

SIDLOVSKIJ ,M.V.1976. Opredelitel gryzunov zakavkazja. Akademij a nauk Gruzinkoj SSR, Tbilisi