



PALEO

Revue d'archéologie préhistorique

Hors-série | Décembre 2022

Sociétés humaines et environnements dans la zone circumméditerranéenne du Pléistocène au début de l'Holocène

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Electronic version

URL: <https://journals.openedition.org/paleo/8704>

DOI: 10.4000/paleo.8704

ISSN: 2101-0420

Publisher

Musée national de Préhistoire

Printed version

Date of publication: November 15, 2023

Number of pages: 306-314

ISBN: 978-2-911233-24-1

ISSN: 1145-3370

Electronic reference

Ismail Saafi, Nabiha Aouadi, Souhila Merzoug and Lotfi Belhouchet, "The status of minority species and young individuals of the terrestrial malacofauna in Capsian and Neolithic populations in eastern Maghreb", *PALEO* [Online], Hors-série | Décembre 2022, Online since 15 November 2023, connection on 02 December 2023. URL: <http://journals.openedition.org/paleo/8704> ; DOI: <https://doi.org/10.4000/paleo.8704>



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THE STATUS OF MINORITY SPECIES AND YOUNG INDIVIDUALS OF THE TERRESTRIAL MALACOFAUNA IN CAPSIAN AND NEOLITHIC POPULATIONS IN EASTERN MAGHREB

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HORS-SÉRIE

Colloque hommage à Émilie Campmas (1983-2019)

Sociétés humaines et environnements

dans la zone circumméditerranéenne du Pléistocène
au début de l'Holocène

DÉCEMBRE 2022

THÈME 2 | Données récentes sur la Préhistoire d'Afrique
du Nord – Occupations humaines, paléoenvironnements
et relations avec le reste du continent

PAGES 306 À 314

KEY-WORDS Land snails, minority species, young individuals, Capsian, Neolithic, Eastern Maghreb.

The *rammadiyet* (or “escargotières”) in the Eastern Maghreb are enormous shell-midden complexes made by people during the Capsian Epipalaeolithic and the Neolithic. Mollusc assemblages in all *rammadiyet* are dominated by between one to four land snail species. Other, rarer – minority - species, and young land snails are present in all these sites.

Of these minority and young molluscs, only large species, such as *Cornu aspersum*, could have contributed to human diets, but their numbers are so low that this contribution was minimal. The presence of these minority species and young specimens might be explained in four ways: collection errors (unintentional collection or by necessity), archaeological (minor presence in the excavated area of the site), ethnographic factors (medicinal or ritual uses) and ecological reasons (rarity during the season of gathering of land snails, or the collection area being unsuitable habitat for these species).

Le statut des espèces minoritaires et des jeunes individus de la malacofaune terrestre chez les populations capsiennes et néolithiques au Maghreb oriental

Les *rammadiyet* (ou « escargotières ») du Maghreb oriental sont d'énormes complexes de coquillages accumulés par les populations au cours du Capsien et du Néolithique. Les assemblages de mollusques

dans tous les *rammadiyet* sont dominés par une à quatre espèces d'escargots terrestres. D'autres espèces plus rares - minoritaires - et de jeunes escargots terrestres sont présents dans tous ces sites. Parmi ces mollusques minoritaires et jeunes, seules les grandes espèces, comme *Cornu aspersum*, auraient pu contribuer à l'alimentation humaine, mais leur nombre est si faible que cette contribution était minime. La présence de ces espèces minoritaires et de ces jeunes spécimens pourrait s'expliquer par quatre hypothèses : des erreurs de collecte (collecte non souhaitée ou par nécessité), des facteurs archéologiques (présence mineure dans la zone fouillée du site), ethnographiques (usages médicaux ou rituels) et écologiques (rareté pendant la saison de ramassage des escargots terrestres, ou la zone de collecte étant un habitat inadapté pour ces espèces).

INTRODUCTION

The terrestrial malacofauna from Capsian and Neolithic sites in the eastern Maghreb shows the dominance of a few species, which are present in great numbers. The occupants of these sites mainly targeted adult individuals, since this maximized the mollusc flesh gathered. In addition to the common species, other, rarer taxa are found. These are here termed minority species and they are defined as comprising <5 % of the molluscs in an assemblage. Young molluscs were also identified at all sites (Saafi 2019; Saafi *et al.* 2013, 2021a).

Studies of the terrestrial malacofauna of prehistoric sites in this region, are rare and few are new. Most focus on reconstructing climatic data (Roubet 1979; Lubell *et al.* 1982-83). In some, researchers have tried to determine the place of land snails in the diet of human groups (Morel 1953, 1974; Lubell 2004a and b) but these accounts are not very detailed, especially concerning the distribution of gastropod age classes (adults or young), or the presence of minority taxa. Further, it is unclear whether minority or young taxa really contributed to the diet of the occupants of these sites, and if they were eaten, the magnitude of their contribution. For example, without an age distribution for a species the accurate estimate of the mass of meat consumed on a site cannot be computed. If consumption was not the main objective of their collection, however, different probable hypotheses to explain this phenomenon must be established.

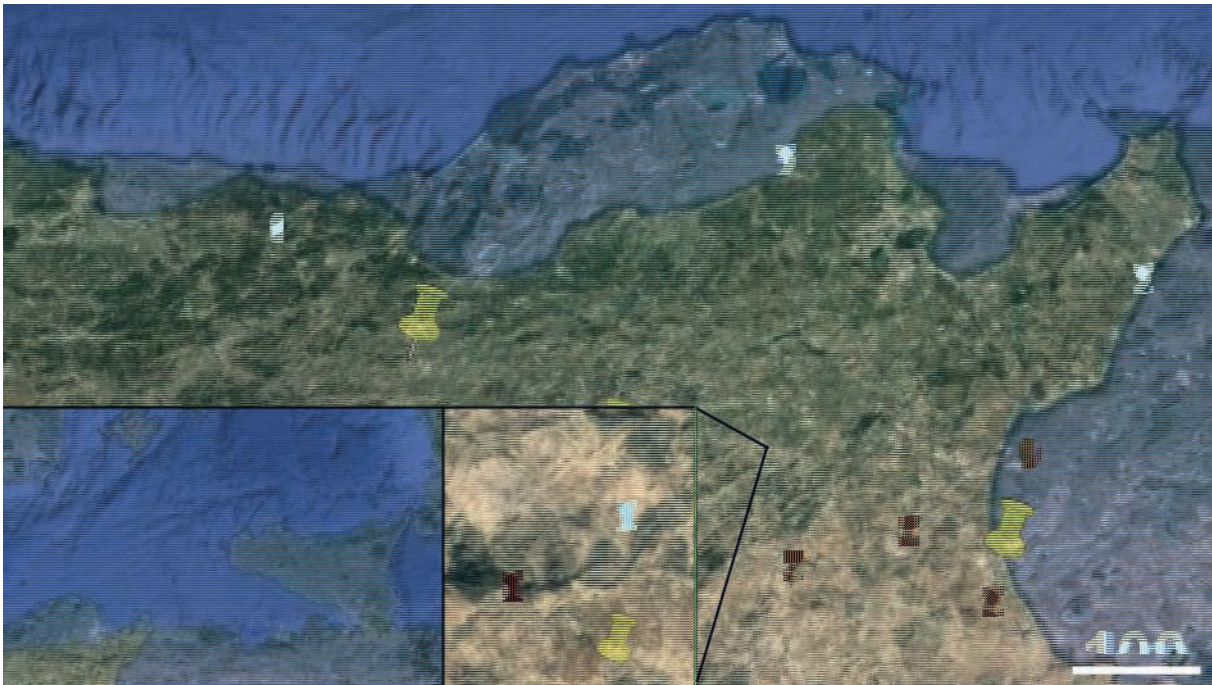
In our work, we study the presence of minority species and young land snails from several Capsian and Neolithic *escargotièr*e sites in Tunisia and Algeria. The results of this study will allow us to attempt to discuss the contribution of this part of the fauna to the diet of the occupants of the sites. They will also help to answer the questions mentioned above.

1 | THE RAMMADIYET SITES

Our study area is part of the Eastern Maghreb, comprising Tunisia and Eastern Algeria. Eight sites are located in Central and Northern Tunisia and there is one site near El Eulma in Algeria (**fig. 1**). The *rammadiya* at Aïn Metherchem (Tunisia) belongs to the Typical Capsian (~ 8200 - 6200 cal. BC). At El Mekta (Tunisia), two successive occupation phases were discovered: Typical Capsian and Upper Capsian (~ 6800 and 6200-5500 cal. BC). Six other sites belong to the Upper Capsian. These are Sabkhet Halk el Menjil (SHM-1), Kef Ezzahi, El Oghrab, Aïn Oum Henda 1, Aïn Charchara (in Tunisia) and Medjez I (in Algeria). The Neolithic, dated to the first half of the 6th millennium, is represented by a single site: Kef el Agab (Northwestern Tunisia). This type of site is known as *rammadiya* (plural: *rammadiyet*: ash) or *escargotièr*es. Large quantities of ash and terrestrial shells are the two main components of this type of site. In addition, we find faunal remains, fragments of ostrich eggs, flint, charcoal and stones, sometimes burned...

MOTS-CLÉS

Escargots terrestres, espèces minoritaires, individus jeunes, Capsien, Néolithique, Maghreb oriental.



— FIGURE 1 —

Location of the studied sites: 1. Medjez I (Algeria); 2. Kef el Agab; 3. Sabkhet Halk el Menjil (SHM-1); 4. Kef Ezzahi; 5. Aïn Oum Henda 1; 6. El Oghrab; 7. El Mekta; 8. Aïn Charchara; 9. Aïn Metherchem (Tunisia).

Localisation des sites étudiés : 1. Medjez I (Algérie) ; 2. Kef el Agab ; 3. Sabkhet Halk el Menjil (SHM-1) ; 4. Kef Ezzahi ; 5. Aïn Oum Henda 1 ; 6. El Oghrab ; 7. El Mekta ; 8. Aïn Charchara ; 9. Aïn Metherchem (Tunisie).

2 | METHODS

The study material comes from excavations of prehistoric sites carried out recently within the framework of cooperative projects between different Maghrebian and international research institutes: National Heritage Institute, Tunisia; National Center for Prehistoric, Anthropological and Historical Research, Algeria; University of Bologna, National Research Institute, Italy. Some of the archaeological data used in this paper are briefly presented in previous studies. This concerns the sites of Kef Ezzahi, Aïn Oum Henda 1 and El Oghrab in Tunisia and Medjez I in Algeria (Saafi *et al.* 2021a and b, 2023).

The identification of terrestrial shell species found in prehistoric sites is based on bibliographic references (Ktari, Rezig 1976; Abbes *et al.* 2009, 2011; Bouaziz-Yahyatene *et al.* 2017; Ezzine *et al.* 2017). Taxon naming updates are based on WoRMS (World Register of Marine Species; website: [www.https://www.marinespecies.org](https://www.marinespecies.org)). The determination of MNI is quantified essentially on the presence of the apex and/or the peristome of the shell. If both of these parts are present in an assemblage, the one with the higher number will be the MNI. In the absence of these two elements (the apex and peristome), the choice was made to count the samples whose size exceeds $\frac{1}{4}$ of the shell volume. Following the results obtained for each site, we can classify the identified species into two categories: majority taxa and minority taxa. By definition, minority species have a very low presence in an archaeological site. In most cases, their proportion does not exceed 5 % of the total terrestrial shells of each malacological taxon in each site. According to the ethnographic study, the size of the shell of mollusc is one

of the criteria of selection of the preferred species among Tunisian consumers. We distinguish between two types. Mollusks with large shells (e.g. *Helix melanostoma* or *Cornu aspersum*) are preferred by some people (to have more meat). Medium-sized snails such as *Eobania vermiculata* are preferred by other consumers. These have a more delicious taste than the first type of mollusks. We can add a third type, that of small mollusks, such as *Sphincterochila candidissima* and *Theba pisana*. Tunisian consumers do not collect them because of their small flesh mass (Saafi 2019).

For young molluscs, the distinction from adult gastropods is based mainly on shell size (measurement: length and height), and the development of the peristome which is not well formed in a young specimen (thin and fragile). Thanks to the count, we can determine the rate of young molluscs in each site, which helps us to explain their role for the occupants of the prehistoric sites studied.

3 | RESULTS

3.1 | Minority species

The number of minority species is limited to two taxa in the sites belonging to the Typical Capsian: Aïn Metherchem and El Mekta (T. C.: Typical Capsian). This number increases during the Upper Capsian and Neolithic (between 4 and 7 species in each site) (fig. 2). While minority species represent only half or less of the number of taxa identified in Typical Capsian sites, they predominate in number during the two most recent periods. For example, they represent six species in the Kef Ezzahi site (total species

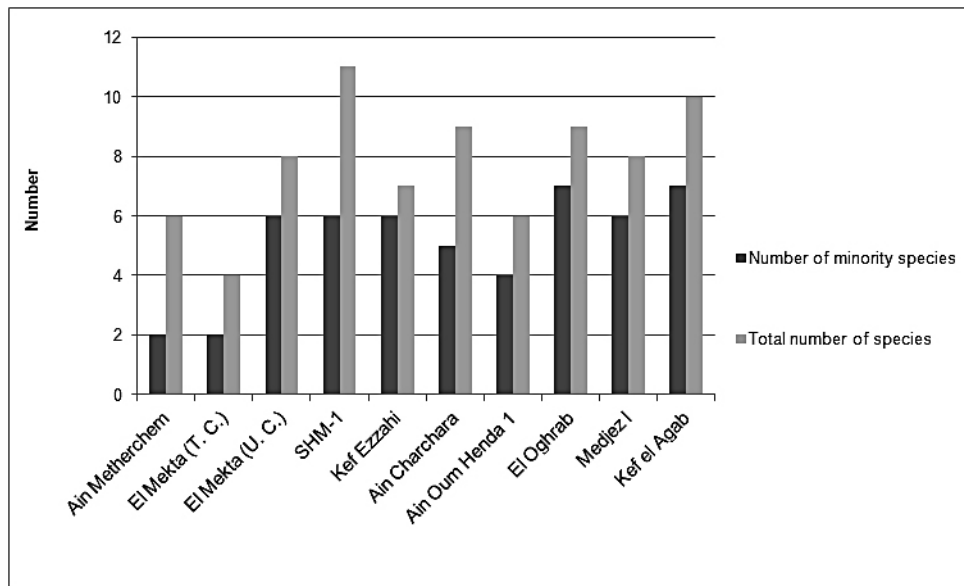


FIGURE 2

Number of minority species in relation to the total number of taxa identified in each study site (Saafi 2019; Saafi *et al.* 2023); T. C.: Typical Capsian; U. C.: Upper Capsian.

Nombre d'espèces minoritaires par rapport au nombre total de taxons identifiés dans chaque site étudié (Saafi 2019; Saafi *et al.* 2023); C. t.: Capsien typique; C. s.: Capsien supérieur.

= 7) (fig. 2). In other *rammadiyet* of Eastern Algeria, there are three minority taxa in the Medjez II site (Camps-Fabrer, 1975) and 15 taxa in the Dra-Mta-el-Ma-el-Abiod site, near Tebessa (Morel 1974). In the Capeletti cave of Khanguet Sidi Mohamed Tahar, a Neolithic site of Capsian tradition, no minority species were reported (Roubet 1979).

The presence of shells of minority species relative to majority taxa in a Capsian or Neolithic site is always low. With a low number (the case of Ain Metherchem (fig. 3.1) or high (the cases of Kef Ezzahi (fig. 3.2) and Kef el Agab (fig. 3.3), their MNI rate does not exceed 10 % except in the *rammadiya* of SHM-1 (11.6 %) (fig. 4).

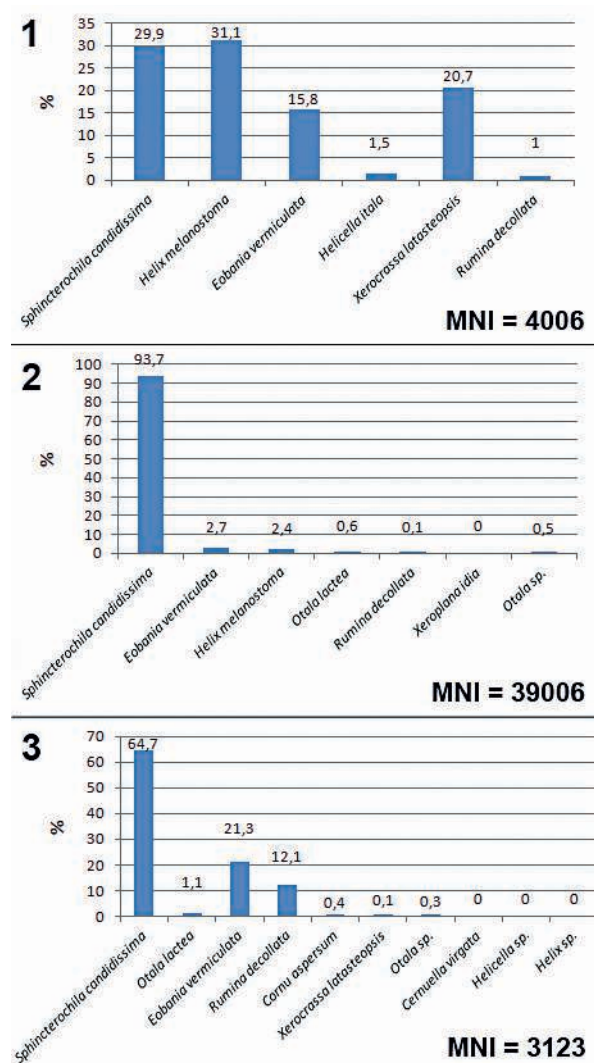


FIGURE 3

Examples of minority species (< 5%) from some Capsian (Typical and Upper) and Neolithic sites in Tunisia: 1- Ain Metherchem; 2- Kef Ezzahi (MNI of *Xeroplana idia* = 7); 3- Kef el Agab (MNI of *Cernuella virgata* = 1, *Helicella* sp. = 1 and *Helix* sp. = 1).

Exemples d'espèces minoritaires (< 5%) de quelques sites capsien (typique et supérieur) et néolithiques en Tunisie : 1- Ain Metherchem ; 2- Kef Ezzahi (NMI de *Xeroplana idia* = 7); 3- Kef el Agab (NMI de *Cernuella virgata* = 1, *Helicella* sp. = 1 et *Helix* sp. = 1).

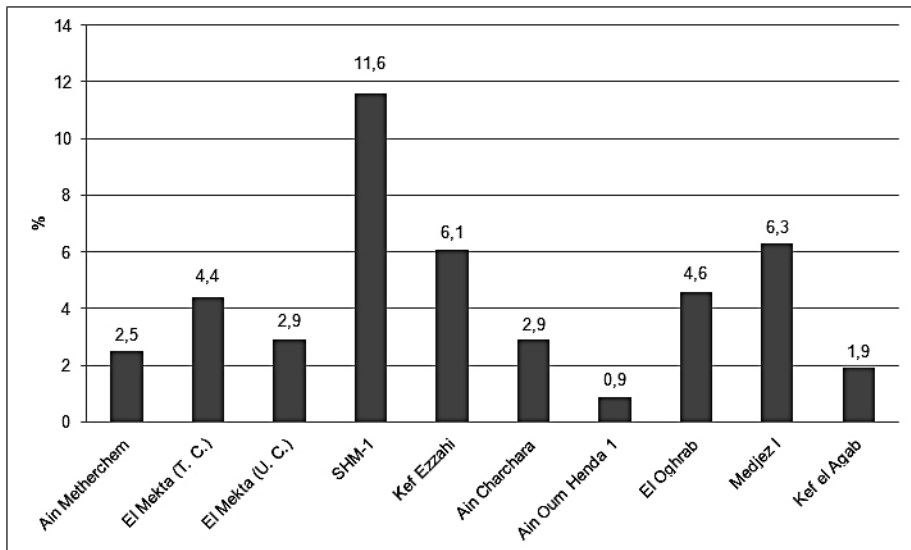


FIGURE 4

Percentages NMI of minority species in comparison to majority taxa in Capsian and Neolithic sites.

Pourcentages de NMI des espèces minoritaires par rapport aux taxons majoritaires dans les sites capsien et néolithiques.

3.2 | Young molluscs

The age distribution of molluscs suggests regional characteristics. In the Tunisian sites, the percentage of young snails is low. Except in the SHM-1 (13.4%) and El Oghrab (11.2%) *escargotières*, it does not exceed 10 % of the total terrestrial malacofauna in the other sites (fig. 5).

The importance of young molluscs is remarkable in the only Algerian site studied, Medjez I, where their rate is equal to 31.7 %. This high rate is due to the importance of youngs in *Xerosecta* sp., one of the two majority taxa (with *Helix melanostoma*) in this site, with youngs specimens accounting for 78.6% of the NMI of this taxons (fig. 5) (Saafi et al. 2023).

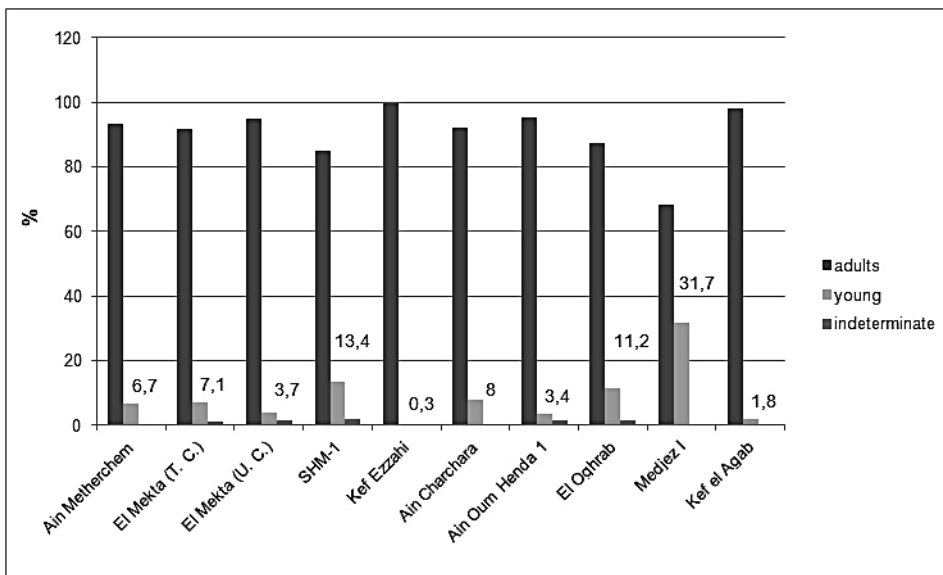


FIGURE 5

Age distribution of land snails from Capsian and Neolithic sites in the eastern Maghreb.

Répartition par âge des escargots terrestres provenant de sites capsien et néolithiques du Maghreb oriental.

4 | DISCUSSION

4.1 | Mollusc nutrient contribution to the diet of Capsian and Neolithic populations

The contribution to the diet of human groups provides a distinction among minority taxa. We can distinguish between two groups: edible species and non-edible ones. The first group consists of mainly large shells such as *Helix melanostoma* and *Cornu aspersum* (fig. 6). This type of

molluscs will provide consumers with more flesh, but nutrient intake will be very low from the taxa in this first group due to their limited MNI at each site.

The second group concerns small-shelled molluscs. *Xeroplana idia* (Issel 1885) is one such. It is identified in the site of Kef Ezzahi (fig. 3.2; fig. 6). The height of this species (between the umbilicus and the apex) is about 6 mm (Manganelli et al. 1997). The small size of the shells of these molluscs as well as their very low MNI make it difficult for them to have contributed appreciably to the diet of human groups in the region.

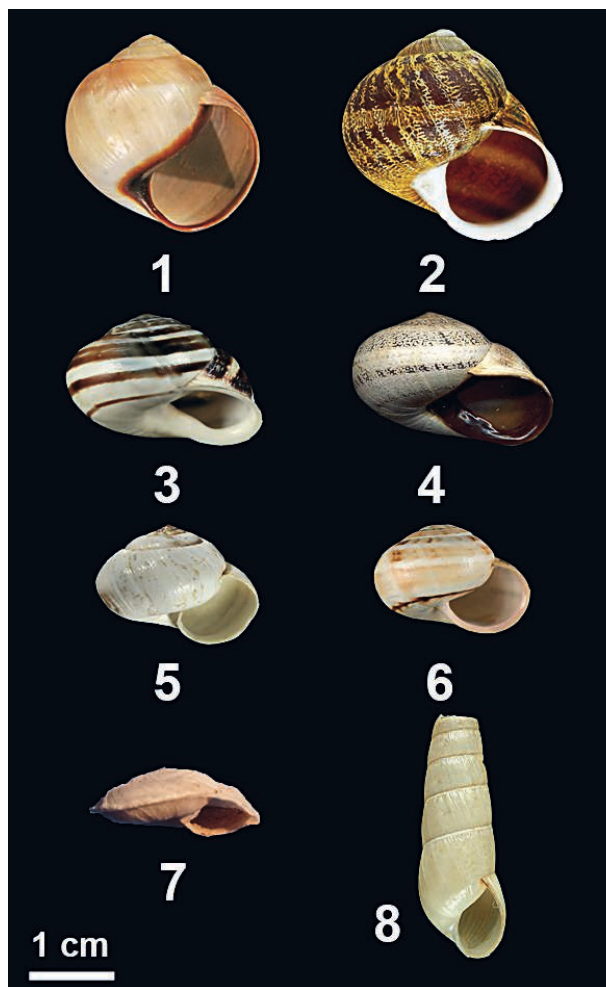


FIGURE 6

Examples of minor species present in the sites of Ain Metherchem, Kef Ezzahi and Kef el Agab: 1- *Helix melanostoma*; 2- *Cornu aspersum*; 3- *Eobania vermiculata*; 4- *Otala lactea*; 5- *Xerocrassa latasteopsis*; 6- *Cernuella virgata*; 7- *Xeroplana idia*; 8- *Rumina decollata*.

Exemples d'espèces minoritaires présentes dans les sites d'Ain Metherchem, Kef Ezzahi et Kef el Agab : 1- *Helix melanostoma* ; 2- *Cornu aspersum* ; 3- *Eobania vermiculata* ; 4- *Otala lactea* ; 5- *Xerocrassa latasteopsis* ; 6- *Cernuella virgata* ; 7- *Xeroplana idia* ; 8- *Rumina decollata*.

The contribution to the diet of human groups by young molluscs is possible only at Medjez I. We count 1329 young individuals of *Xerosecta* sp. (Total MNI = 1689 shells). Significantly, the taphonomic study shows the presence of traces of burning and anthropogenic perforations on some of these youngs (Saafi *et al.* 2023). This confirms their contribution to the nutrition of the occupants of Medjez I, albeit minor (MNI of all identified species = 4812 shells).

4.2 | Hypotheses on the presence of minority species and young individuals in the study sites

The presence of a very low quantity of terrestrial shells of minority species or young individuals could be linked to certain hypotheses which will be developed below. We can classify them into four types.

4.2.1 | Methodological (collection method)

Ethnographically, the collection of land snails is often subject to precise criteria, especially concerning the choice of the species and the age of the mollusc (young or adult). Currently, in Tunisia, each human group or family has a single preferred taxon, for example, *Helix melanostoma*. The expectation is that only adult land snails will be collected (Saafi 2019, 2022). Based on the ethnographic study, an inexperienced collector may, however, collect unwanted species or young molluscs. It is possible that

the presence of minority taxa or young gastropods in a Capsian or Neolithic site followed collection by an inexperienced collector. The plants harvested by the occupants of a site could be contained some mollusks that take refuge there.

A collection by necessity could also be a reason for the presence of minority or young specimens. The lack of food resources seasonally, or during extended famines, can force people to extend and diversify their normal diets, i.e. look for abnormal food resources. In this case, the collection of any other possible nutritional resource becomes an obligation. Terrestrial malacofauna are known to have been used as famine foods. Thus, the contribution of molluscs to human diets became more important in some regions of Tunisia during the crises of the 1940s (Saafi 2019; A. Brahmi, *pers. comm.*). In this context, the high rate of young individuals of *Xerosecta* sp. at Medjez I might be related to the temporary absence of other food resources (Saafi *et al.* 2023). Similar arguments have been advanced for the collection of very small coastal molluscs during the Epipalaeolithic and Little Ice Age in Northeast Libya (Hunt *et al.* 2011).

4.2.2 | Archaeological factors

The dimensions of some *rammadiyet* are large, such as at El Oghrab (50×30 m) or at Ain Oum Henda 1 (45×30 m) (Saafi *et al.* 2013). In some sites, just a test-pit (1×1 m) were

carried out. The limited area excavated would naturally limit the samples obtained and thus might contribute to the relatively low MNI of some species, where distributions of taxa in the deposit are uneven. At other sites where the excavated area is larger, effects of spatial patterning on the relative proportions of taxa would be nullified. At Medjez I (area excavated: 9 m²), in stratigraphic subunit II209, there are 28 *Helix melanostoma* shells in square N43, whereas there is a higher in MNI in square N45, with 1293 individuals of the same taxon (fig. 7; Saafi *et al.* 2023). Even though this is a majority species, there may be very low MNI in some areas of the site. The limit of the excavated area may sometimes result in very low numbers of one or more taxa, but proof of this is difficult to demonstrate without wider excavation.

The topography of the site directs the disposition of the refuse at a given location and thus concentration or dispersion. The removal of empty shells after consumption to a more or less flat area gives a concentration of waste on a rather limited surface. In some sites, the dump is located in a slope as is the case in El Mekta or Kef el Agab. The slope is about 45° in the *rammadiya* of El Mekta. This element leads to the dispersion of empty shells over a large area of the site. In some areas of the deposit, the number of shells of a given species could be restricted.

Mollusc shells are relatively mobile but fragile sedimentary particles. After consumption, the shell becomes lighter. It could be transported by rain or strong wind from one area of the site to another. Shells may also be kicked from routeways across the midden by passers-by, or may be crushed underfoot. And thin mollusc shells may be calcined and disintegrate at relatively low temperatures by burning, for instance in the substrate of camp-fires.

4.2.3 | Ethnographic factors

Some taxa could be used in the preparation of certain remedies for specific diseases. This has been documented ethnographically in Vietnam (Rabett *et al.* 2011). Others may have been used as ochre containers (*Rumina decollata* at Medjez II; Camps-Fabrer 1975). There is a long history of the use of molluscs as personal adornment (for instance Vanhaeren *et al.* 2006). Molluscs have also been documented as accompanying the deceased (e.g. Kurzawska 2010).

4.2.4 | Ecological and natural factors

Some molluscs lived in the vicinity of the site. They were adapted to the climate and environment of the excavated area. For example, during the excavation of the site of Kef Ezzahi in December 2014, live shells of *Xeroplana idia* were found around the *rammadiya* (Saafi 2019). The presence of sometimes juvenile individuals of *Rumina decollata* in some sites (Oued el Akarit, south Tunisia; Iberomaursian site) confirms the hypothesis of a natural presence since ethnographic data suggests that this species is rarely eaten (only during periods of crisis (famines)). It could be reduced to colonization by local populations of land snails (mating place) (Lubell 2004b). Some scavenger's species (*Natalina cafra* for example) come to consume organic matter from prehistoric dumps or abandoned shells of their conspecifics for calcium (Appleton and Heeg 1999; Cadee 1999; Law and Thew 2015).

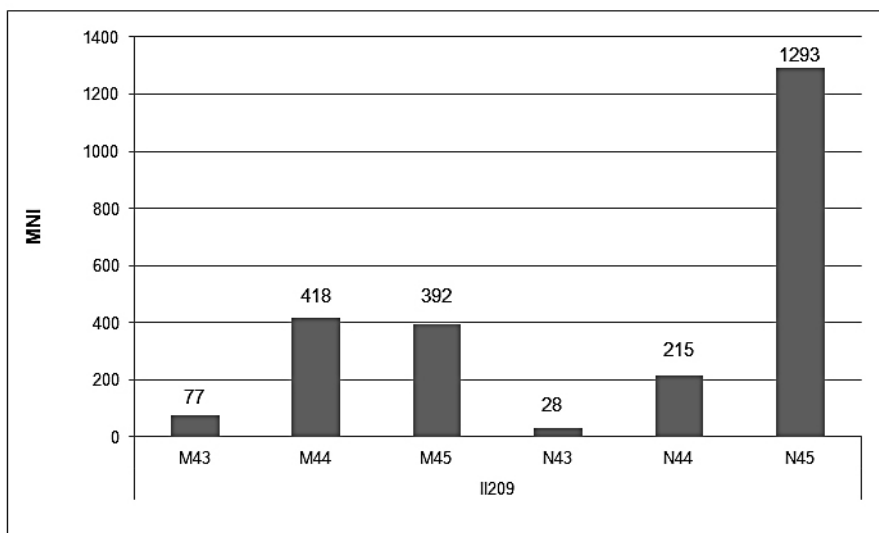


FIGURE 7

Spatial distribution of *Helix melanostoma* shells from stratigraphic subunit II209 at Medjez I.

Distribution spatiale des coquilles d'*Helix melanostoma* de la sous-unité stratigraphique II209 à Medjez I.

CONCLUSION

Minority species and young molluscs are present at all sites surveyed. The number and list of taxa involved varies from one *escargotièrre* to another. The MNI rate of all minority taxa is low compared to the majority species. Only the larger molluscs may have contributed to the nutrition of the site occupants. As for young individuals, the NMI of *Xerosecta* sp. shells as well as the presence of anthropic traces (systematic burning and perforations) at Medjez I could be explained by a collection by necessity in order to remedy the temporary absence of certain foods. Other hypotheses could lead to the presence of these two types of molluscs in the sites concerned.

In our future research, we plan to extend our study area to include the rest of North Africa while studying older collections. This would allow us to better interpret the archaeological data concerning this issue.

ACKNOWLEDGEMENTS

We are grateful to Chris Hunt and Jörg Linstädter for their useful comments, and for their English revision of this text.

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