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Gastropod consumption during the Late Pleistocene and Early Holocene in the Haua Fteah, Libya

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Highlights

The Haua Fteah has a record covering the last ~150,000 years

Pierced land snails occur throughout the sequence

Shell piercing probably aided consumption of molluscs

Atypical microliths may have been used for piercing

Abstract

Land snail shell is a frequent constituent of archaeological sites, but it is rarely clear whether it represents food refuse, the remains of scavengers, or evidence for natural processes. Piercing of land snail shells enables the animal to be extracted from the shell and thus provides direct evidence for human consumption. We report pierced land snails from the Haua Fteah, Libya. The earliest pierced land snail shell in the Haua Fteah pre-dates the Last Interglacial, while the most recent is Late-Classical in age, but the largest quantities are in layers of Late-Glacial and earliest Holocene age, where they are associated with atypical microliths.

Introduction

Marine gastropods are major components of shell middens worldwide and are usually regarded as evidence for human consumption of the animals, except in the cases of shell middens produced during the processing of Muricids for dye production (e.g. Reese 2000, 2010) and the use of gastropods for bait (Oliver 2015). The issue of consumption of land gastropods is, however, more complex. Land snails are reported on many prehistoric sites, especially in caves. In some cases the quantities are so great that excavators report a shell midden and it is very clear that the molluscs were consumed (e.g. Rabett et al. 2011), but with the exception of the great open-air escargotières in the Maghreb (Lubell et al. 1976), land snail middens are globally a relatively rare component of the total archaeology of a region. There are many cases, however, where land snail shell is present in archaeological cave sites, but not in huge quantities and not forming obvious midden deposits. This is not surprising because some molluscs use caves to hibernate, lay eggs or to forage, or because natural processes can bring land snail shell into caves, or that some taxa will enter caves to scavenge on food refuse left by humans or animals (e.g. Hunt 1993; Girod 2011; Weigand 2014). Signs of burning or calcining might reflect human consumption of the snails, but it is possible that shells which had entered the site by natural means might come into contact with fire by chance. Removal of the tips of apices has also been linked with consumption of snails (Borzatti von Löwenstern 1964). Recently, Hutterer et al. (2011) reported characteristic patterns of piercing damage from late prehistoric levels in Moroccan caves. Piercing of the shell enables the animal within to be removed easily. It appears to be an unequivocal signal for the consumption of land snails.

This paper describes pierced land snails from the deposits of the Haua Fteah in Northeast Libya. We have noted piercing of shells extensively throughout the complete Haua sequence, but the nature of the piercing changes with time. We suggest, following the argument of Hutterer et al. (2011), that the piercing of the shells was anthropogenic and was done to aid consumption of the snails. We then describe lithic artefacts likely to have been used in the consumption of the snails during later prehistory. The lithic artefacts described here show characteristics consistent with their use to pierce and consume the molluscs.

The Haua Fteah

The Haua Fteah is a huge cave of probable phreatic origin, lying approximately 1 km south of the Mediterranean coast in Northeast Libya, some 7.5 km East of Susah at E22º 03’06” N32º 54’ 01”. It was first excavated by Charles McBurney in the 1950s (McBurney 1967) and is the subject of ongoing research by the TRANSNAP Project, led by Graeme Barker (Barker et al. 2007, 2008, 2009, 2010, 2012; Hunt et al. 2010, 2011, 2015; Rabett et al. 2013; Douka et al. 2014; Farr et al. 2014).

McBurney excavated a 13 m deep trench at the Haua Fteah. The trench had two steps, subdividing it into three broad levels: an Upper Trench, which is excavated in deposits of broadly Holocene age, a Middle Trench, which cuts through deposits which range in age from MIS 4 to the Late Glacial, and the Deep Sounding, which sampled deposits from late MIS 6 and MIS 5. The TRANSNAP project has cleared the McBurney trench and excavated new trenches on the side of the original excavation (Fig. 1). In the Upper Trench, the TRANSNAP team cut several small sample columns through the whole depth of the trench, together with the small Trench U, which sampled Neolithic and post-Neolithic deposits. In the side of the Middle Trench, the TRANSNAP team cut Trench M. Two trenches were cut in the Deep Sounding. Trench D started at the base of the Middle Trench and runs down the side of the Deep Sounding, while Trench S was cut in the base of the Deep Sounding and continues down into previously-unknown stratigraphy.

Throughout its deep stratigraphy, the Haua Fteah contains very abundant material – bones, plant macrofossils, shell – resulting from the processing and consumption of animals and plants for food and other purposes (McBurney 1967; Klein and Scott 1995; Barker et al. 2008, 2009, 2010, 2012; Hunt et al. 2011; Rabett et al. 2013). The cave fill appears to have started to accumulate during MIS6, perhaps around 150,000 years ago, and to have accumulated relatively continuously until the present day, preserving an enormously important archaeological record. Stone artefact technology (McBurney 1967) divides this record into a series of industries (Table 1). Mollusc shell, both marine and non-marine, is extremely common in some parts of the cave fill, particularly in those layers attributed by McBurney (1967) to the Oranian to Neolithic. Much of this is most probably food refuse, although shell tools and beads are also present.

The taphonomy of mollusc consumption in the Haua Fteah

Initial investigations of the mollusc shell showed that much was heavily fragmented as the result of taphonomic processes (Barker et al. 2010, 71-72; Hunt et al. 2011). Further study of the shell has suggested that several characteristic types of damage pattern may be linked with the taking and consumption of the molluscs for food. In *Patella* spp. (limpet), the most common breakage is to the margin of the shell, characteristic of their removal from the rocks using a point of some sort to pry under the edge of the shell, breaking the suction of the foot on the substrate. With the top-shell *Phorcus (Osilinus) turbinatus* (Born), in many cases the very tip of the apex of the shell was removed in antiquity, most probably to facilitate the sucking of the animal from the shell. In the Late Glacial and Holocene parts of the sequence, many specimens attributed to these taxa are slightly to very charred, suggesting perhaps that they were roasted beside fires or in hot ashes (Hunt et al. 2011). In Trench D in the lower part of the sequence in the Haua Fteah, burnt *Phorcus* and *Patella* occur in contexts 695, 696, 698, 699 and 706, pointing to human consumption of these marine gastropods. In the same trench, burnt *Trochoidea cretica* occurs in context 1005 and burnt *Sphincterochila* sp. in context 1011, but this cannot be regarded as definite proof of consumption.

In general, with shells of land molluscs, the proportion of charred material is relatively low (Fig. 2), but much material is incomplete, probably because the land snail shells are less durable than the marine taxa. Where complete specimens are present, the most common damage patterns are small piercings, usually close to the apex of the shell (Fig. 3). The specimens that demonstrate these patterns are almost exclusively *Trochoidea cretica* (Férrusac), but it is also seen occasionally in *Helix melanostoma* (Draparnaud) and *Sphincterochila* sp.

Several patterns of piercing are seen. Throughout the sequence some apertures are approximately circular and 1-1.5 mm in diameter. It is hypothesised that such apertures (e.g. Fig 3.6) were made using something like an *Acacia* thorn. Palynology suggests that *Acacia* was present through much of the Haua sequence (D. Simpson, pers. comm. 2014).

Most piercings in the lower part of the sequence are, however, lenticular to elongate-elliptic in shape and typically 0.8-1.2 x 1.8-3.0 mm (e.g. in contexts 908 and 912 in Trench S (Figs. 3.1, 3.2), and contexts 1001, 1002, 1004-1006 and 1011 in Trench D (Fig. 3.3). In the Oranian-Neolithic layers, apertures are typically lenticular to elongate-elliptic in shape and typically 0.8-1.5 x 2.0-5.0 mm. Typical damage patterns of the latter type are shown in Figs. 3.4-3.8. This pattern is particularly prevalent in Trench M contexts 10008 and 10007, which contain artefacts attributable typologically to McBurney's (1967) Oranian. Following Hutterer et al. (2011), we hypothesise that these lenticular to elongate-elliptic apertures are the result of the systematic use of lithic artefacts.

In Classical and late Classical layers, ovoidal and subcircular perforations become prevalent (Fig. 3.9-3.12). It is likely that the perforators were either metal points, perhaps knife tips, or again *Acacia* or similar thorns.

Artefacts potentially used to pierce molluscs: Late Glacial

In Trench M, the Late Glacial lithic complex characterised by McBurney (1967) as Oranian in Trench M is characterized, from the lowest to the highest levels of the stratigraphical sequence, by a gradual microlithization of the artefacts, with a trend toward the production of more geometric shapes (Barker et al. 2012).

This trend is clearly visible in the production of retouched tools, especially scalene bladelets, and rectilinear backed bladelets (Fig. 4.1). The presence of drills, borers and *lamelles aigue* (Tixier 1963, 96-98), among the retouched artefacts, in association with a considerable amount of terrestrial shell, may suggest they were used for piercing land snails. It is important to stress that, according to preliminary functional studies, microliths could have been used in many different ways, in order to address a range of specialized tasks. It is likely that this multi-functionality is one of the primary explanations for the significant explosion of the microlithic technology after the Last Glacial Maximum as a successful innovation.

In percentage terms, the presence of tools potentially exploitable to pierce snails relative to the total number of retouched tools for each level goes from a maximum of 3.36% in context 10008, almost at the base of the Oranian sequence, to a minimum of 0.71% in the highest Oranian context (10006). This parallels the occurrence of *Trochoidea cretica* in these levels, since it peaks in contexts 10008 and 10007 (Fig. 2). There does not seem to be any clear pattern in terms of quantity of any particular type of tool through layers attributed to the Oranian, but it is noteworthy that from a techno-typological point of view the artefacts from the lowest levels are mostly represented by borers made on flakes. In the middle of the Oranian the most representative 'piercing' tools are drills made on blades and/or bladelets (Fig. 4.2). At the top of the sequence the *aguillon droit* (Tixier 1963, 102-103) first appears. The highly specialized morphology of this artefact could represent a further adaption to the task.

Artefacts potentially used to pierce molluscs: early to mid Holocene

The highest part of the lithic sequence in Trench M corresponds to the early Capsian of McBurney (1967). The later Capsian is present in the lower part of the Upper Trench and is overlain by industries attributed by McBurney to the Neolithic. These levels have yielded a number of pointed retouched microlithic tools that could be used for piercing shells. Among these, pointed backed blades and bladelets, and different types of drills and perforators are present. Moreover, a possible use of pointed unretouched debitage elements cannot be ruled out.

It is usually assumed that most backed blades/bladelets were used mainly as elements of hunting tools, but considering the massive presence of marine and land shells in the levels containing Capsian artefacts it is highly probable that the use of some of them could be connected with mollusc consumption. There is an almost complete absence of these tools in the lowest context with Capsian lithics (10005) - only one *perçoir sur lamelle a bord abbattu* (Tixier 1963, 64). In higher levels there is a clear increase. The pointed backed bladelet ratio to retouched tools increases from 3.92% in context 10004 and 6.38% in context 10003, to 24.32% in context 10001. This accompanies very considerable numbers of both land and marine gastropods in these levels and a distinct peak in pierced *Trochoidea cretica* in 10001 (Fig. 2). Some of the pointed backed bladelets found in the upper Capsian contexts show unusual microlithic dimensions (Fig. 4.3). The perforating tip of both the pointed backed elements and the drills often show a scalene section which could match with the lenticular or elongate-elliptic shape of the pierced apertures in the shells. Considering this and their unsuitability for possible hafting, it is probable that some of these tools were not elements of hunting weapons, but could have been used as small perforators for molluscs.

Lithics of Neolithic type come from Trench U, a small excavation dug in the wall of McBurney's Upper Trench (Fig. 1). This yielded a great number of marine shells, in particular *Phorcus turbinatus*, associated with a few lithic artefacts. Among the six retouched tools brought to light, the presence of a particular type of drill, defined as *mèche de foret* (Tixier 1963, 66), is worth noting (Figs. 5, 6). This is manufactured on a bladelet and measures 30x4x4 mm. It shows a bilateral continuous, abrupt retouch all over the edges. Considering the massive presence of marine shell in the context 747, it is likely that this tool could be used as a drill for perforating the shell or as a pick for removing the mollusc from it. Use wear analysis on this tool shows the presence of a wide initiating scalar scar on the right side of the distal end, in dorsal view, consistent with a torsion motion (Fig. 5). The right side on the proximal end (Fig. 6) instead shows a series of scalar step-terminating scars, most probably from contact with hard material (hafting?). These elements seem to reinforce the hypothesis of the use of this tool to extract the animals from the shells, or at least to perforate them.

Conclusion

Hutterer et al. (2014) illustrates pierced shells from Neolithic contexts in Morocco and suggest that these result from piercing of the shell for consumption of the animals. Since it is sometimes difficult to identify patterns of human consumption of land snails, piercing of shells offers an important taphonomic signal for the mollusc analyst. Similar piercing has now also been recorded at the Haua Fteah, in Northeast Libya, suggesting that this practice may have been extremely widespread although hitherto unreported across North Africa. At the Haua Fteah, we can demonstrate that pierced land mollusc shell goes to the base of the sequence, estimated to be before the last interglacial. The huge chronological depth of the fill of the Haua Fteah suggests that piercing of land molluscs to facilitate consumption is an extremely ancient behaviour. Other mollusc collections from sites in the region should be reassessed to substantiate this suggestion.

It appears that a specific lithic technology was developed to facilitate the piercing and consumption of the molluscs. This technology seems to have become visible in the Haua Fteah early during the Late Glacial, contemporary with the beginning of McBurney's Oranian. An integrated usewear and microresidue analysis, which is currently ongoing, will provide more specific information about the exact function of these microlithic artefacts. Continuing analysis of lower levels in the Haua Fteah may in due course show whether similar lithic technology was present in contexts with pierced molluscs in the Deep Sounding.

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References

Barker, G., Antoniadou, A., Barton, H., Brooks, I., Candy, I., Drake, N., Farr, L., Hunt, C., Abdulhamid Ibrahim, A., Inglis, R., Jones, S., Morales, J., Morley, I., Mutri, J., Rabett, R., Reynolds, T., Simpson, D., Twati, M. and White, K. 2009 The Cyrenaican Prehistory Project 2009: the third season of investigations of the Haua Fteah cave and its landscape, and further results from the 2007-2008 fieldwork. Libyan Studies 40, 55-94.

Barker, G., Basell, L., Brooks, I., Burn, L., Cartwright, C., Cole, F., Davison, J., Farr, L., Grün, R., Hamilton, R., Hunt, C., Inglis, R., Jacobs, Z., Leitch, V., Morales, J., Morley, I., Morley, M., Pawley, S., Pryor, A. Reynolds, T., el-Rishi, H., Roberts, R., Simpson, D., Stimpson, C., Touati, M. and van der Veen, M. 2008 The Cyrenaican Prehistory Project 2008: the second season of investigations of the Haua Fteah cave and its landscape, and further results from the initial (2007) fieldwork. Libyan Studies 39, 175-221.

Barker, G., Antoniadou, A., Armitage, S., Brooks, I., Candy, I., Connell, K., Douka, K., Drake, N., Farr, L., Hill, E., Hunt, C., Inglis, R., Jones, S., Lane, C., Lucarini, G., Meneely, J., Morales, J., Mutri, G., Prendergast, A., Rabett, R., Reade, H., Reynolds, T., Russell, N., Simpson, D., Smith, B., Stimpson, C., Twati, M., & White, K. 2010. The Cyrenaican Prehistory Project 2010: the fourth season of investigations of the Haua Fteah cave and it's landscape, and further results from the 2007-2009 fieldwork. Libyan Studies 41, 63-88.

Barker G., Bennett P., Farr L., Hill E., Hunt C., Lucarini G., Morales J., Mutri G., Prendergast A., Pryor A., Rabett R., Reynolds T., Spry-Marques P., Twati M. 2012. The Cyrenaican Prehistory Project 2012: the fifth season of investigations of the Haua Fteah cave. Libyan Studies 43, 115-136.

Barker, G., Hunt, C. and Reynolds, T. 2007 The Haua Fteah, Cyrenaica (Northeast Libya): renewed investigations of the cave and it's landscape. Libyan Studies 38, 2-22.

Borzatti von Löwenstern, E. 1964. La Grotta di Uluzzo C (Campagna di scavi 1964). Rivista di Scienze Preistoriche 19, 41-52.

Douka, K., Jacobs, Z., Lane, C., Grün, R., Farr, L., Hunt, C., Inglis, R.H., Reynolds, T., Albert, P., Aubert, M., Cullen, V., Hill, E., Kinsley, L., Roberts, R.G., Tomlinson, E.L., Wulf, S., Barker, G. 2014. The chronostratigraphy of the Haua Fteah cave (Cyrenaica, northeast Libya). Journal of Human Evolution 66, 39-63.

Farr, L., Lane, R., Abdulazeez, F., Bennett, P. Holman, J. Marasi, A., Prendergast, A. Al-Zweyi, M., and Barker, G., 2014. The Cyrenaican Prehistory project 2013: the seventh season of excavations in the Haua Fteah. Libyan Studies 45, 163-173.

Girod, A.2011. Land snails from Late Glacial and Early Holocene Italian sites. Quaternary International 244, 105-116.

Hill, E. 2015. The Radiocarbon Dating of Terrestrial Molluscs in Northeast Libya. Unpublished PhD Thesis, Queen's University Belfast.

Hunt, C.O. 1993. Mollusc taphonomy in caves: a conceptual model. Cave Science 20, 45-49.

Hunt, C., Davison, J., Inglis, R., Farr, L., Barker, G., Reynolds, T., Simpson, D. and el-Rishi, H. 2010 Site formation processes in caves: the Holocene sediments of the Haua Fteah, Cyrenaica, Libya. Journal of Archaeological Science 37, 1600–1611.

Hunt, C.O., Gilbertson, D.D., Hill, E.A. and Simpson, D. 2015. Sedimentation, re-sedimentation and chronologies in archaeologically important caves: problems and prospects Journal of Archaeological Science 56, 109-116.

Hunt, C.O., Reynolds, T. G., el-Rishi, H. A., Buzian, A., Hill, E. and Barker, G.W. 2011. Resource pressure and environmental change on the North African littoral: Epipalaeolithic to Roman gastropods from Cyrenaica, Libya. Quaternary International 244, 15-26.

Hutterer, R., Mikdad, A. and Ripken, T.E.J. 2011. Species composition and human exploitation of terrestrial gastropods from Taghit Haddouch, an Early Holocene archaeological site in NE Morocco. Archiv für Molluskenkunde 140, 57-75.

Hutterer, R., Linstädter, J., Eiwanger, J. and Mikdad, A. 2014. Human manipulation of terrestrial gastropods in Neolithic culture groups of NE Morocco. Quaternary International 320, 83-91.

Klein, R.G. and Scott, K. 1986. Re-analysis of faunal assemblages from the Haua Fteah and other Late Quaternary archaeological sites in Cyrenaican Libya. Journal of Archaeological Science 13, 515–42.

Lubell, D., Hassan, F.A. and Ballais, J.-L. 1976. The Capsian Escargotieres. Science ns 191, 4230, 910-920.

McBurney, C.B.M. 1967. The Haua Fteah in Cyrenaica and the Stone Age of the South-East Mediterranean. Cambridge: Cambridge University Press.

Oliver, A.V. 2015. An ancient fishery of Banded dye-murex (*Hexaplex trunculus*): zooarchaeological evidence from the Roman city of Pollentia (Mallorca, Western Mediterranean). Journal of Archaeological Science 54, 1-7.

Rabett, R., Appleby, J., Blyth, A., Farr, L., Gallou, A., Griffiths, T., Hawkes, J., Marcus, D., Marlow, L., Morley, M., Tâń, Nguyêń Cao, Son, Nguyêń Van, Penkman, K., Reynolds, T., Stimpson, C. and Szabó, K. 2011. Inland shell midden site-formation: Investigation into a late Pleistocene to early Holocene midden from Tràng An, Northern Vietnam. Quaternary International 239, 153–169.

Rabett, R., Farr, L., Hill, E., Hunt, C., Lane, R., Moseley, H., Stimpson, C. and Barker, G.2013 The Cyrenaican Prehistory Project 2012: the sixth season of excavations in the Haua Fteah cave. Libyan Studies 44, 113-125.

Reese, D.S. 1980. Industrial exploitation of Murex shells: purple-dye and lime production at Sidi Krhrebish, Benghazi (Bernice). Libyan Studies 11, 79–93.

Reese, D.S. 2010. Shells from Sarepta (Lebanon) and East Mediterranean purple-dye production. Mediterranean Archaeology & Archaeometry 10, 1, 113-141.

Taylor, V., Barton, R.N.E., Bell, M., Bouzzougar, A., Colcutt, S., Black, S. and Houge, J.T. 2012. The Epipalaeolithic (iberomaurusian) at Grotte desa Pigeons (Taforalt), Morocco. A preliminary study of the land mollusca. Quaternary International 244, 5-14.

Tixier J. 1963. *Typologie de l'Épipaléolithique du Maghreb*. Paris: Mémoires du Centre de Recherches Anthropologiques, Préhistoriques et Ethnographiques, Alger II.

Weigand, A.M. 2014. Next stop Underground. Variable degrees and variety of reasons for cave penetration by terrestrial gastropods. Acta Carsalogica 43, 1, 175-183.

Tables

Table 1. Stone tool industries in the Haua Fteah, following McBurney (1967) with dating from Hunt et al. (2010), Douka et al. (2014) and Hill (2014).

Approximate dates (ka) before present	Industry	Affinities
>65	Pre-Aurignacian	MSA
65-46	Mousterian	MSA
46-17	Dabban	LSA/Early Upper Palaeolithic
14-12	Oranian	LSA/Epipalaeolithic
11-9	Capsian	LSA/Epipalaeolithic
8.4-6	Neolithic	Neolithic
~4	'Pre-Classical'	Unknown
<2.7	Classical	Greco-Roman

Table 2. Examples of Piercing dimensions in land molluscs from the Haua Fteah

Trench	**Context**	**Species**	**Piercing width**	**Piercing length**	**Location of hole**	**Shell diameter**
U	746	*T. cretica*	1.5	3.0	mid whorl	20
U	747	*T. cretica*	3.1	3.2	upper whorl	18
U	742	*T. cretica*	2.0	2.3	upper whorl	19
Upper	132	*T. cretica*	2.5	3.8	lower body	23
Upper	133	*T. cretica*	1.6	1.2	mid body	14
Upper	133	*T. cretica*	1.0	2.1	mid body	14
Upper	133	*T. cretica*	1.1	3.4	upper body	23
Upper	133	*T. cretica*	1.8	3.2	mid body	20
Upper	133	*T. cretica*	1.6	2.8	mid body	21
Upper	134	*T. cretica*	1.9	2.8	upper body	13
Upper	134	*Sphincterochila* sp.	1.7	3.9	mid body	15
Upper	422	*T. cretica*	1.1	1.4	mid body	16
Upper	440	*T. serrulata*	1.5	2.0	mid body	10
M	11002	*T. pyramidata*	1.46	2.5	upper whorl	18
M	11005	*T. cretica*	2.4	4.0	upper whorl	17
M	11005	*T. cretica*	1.4	3.0	mid whorl	16
M	11005	*T. cretica*	1.7	2.4	upper whorl	17
M	11006	*T. cretica*	1.5	1.6	mid whorl	15
M	11006	*Sphincterochila* sp.	2.3	3.3	mid whorl	18
M	11006	*Sphincterochila* sp.	1.4	2.7	mid whorl	17
M	11007	*Sphincterochila* sp.	1.0	2.4	upper whorl	19
M	11007	*T. cretica*	1.2	2.0	mid whorl	15
M	11046	*T. cretica*	1.7	2.9	mid whorl	17
D	695	*T. serrulata*	1.4	2.0	upper body	11
D	1000	*T. serrulata*	1.0	2.0	near aperture	9
D	1000	*T. serrulata*	2.1	2.3	mid body	11
D	1000	*T. serrulata*	2.2	3.0	near aperture	7
D	1002	*T. serrulata*	1.6	1.7	upper body	9
D	1002	*T. serrulata*	1.1	1.5	mid body	12
D	1002	*T. serrulata*	1.3	2.9	mid body	8

D	1004	*T. serrulata*	1.5	2.1	mid body	11
D	1005	*T. serrulata*	2.5	3.0	mid body	10
D	1005	*T. serrulata*	1.0	0.9	mid body	8
D	1005	*T. serrulata*	1.1	1.3	mid body	8
D	1005	*T. serrulata*	1.0	1.2	mid body	7
S	908	*Trochoidea* sp.	1.5	3.0	mid body	16
S	912	*Trochoidea* sp.	1.5	2.0	upper body	15

Captions to figures

Fig. 1. The Haua Fteah. (A) Location of the Haua Fteah in North Libya: (B) Location of the excavation in the Haua Fteah, indicated by grey shades; (C) Sketch of the McBurney and TRANSNAP excavations (after a drawing by Dr Sacha Jones).

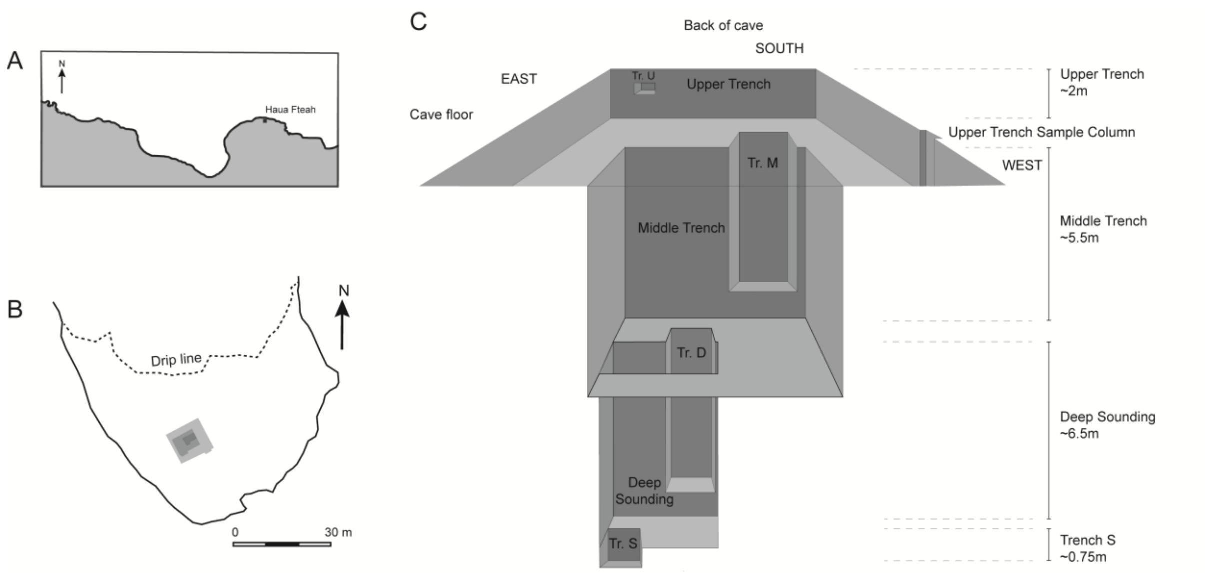

Fig. 2. The occurrence of land molluscs in the Oranian and earlier Capsian contexts from the upper part of Trench M in the Haua Fteah.

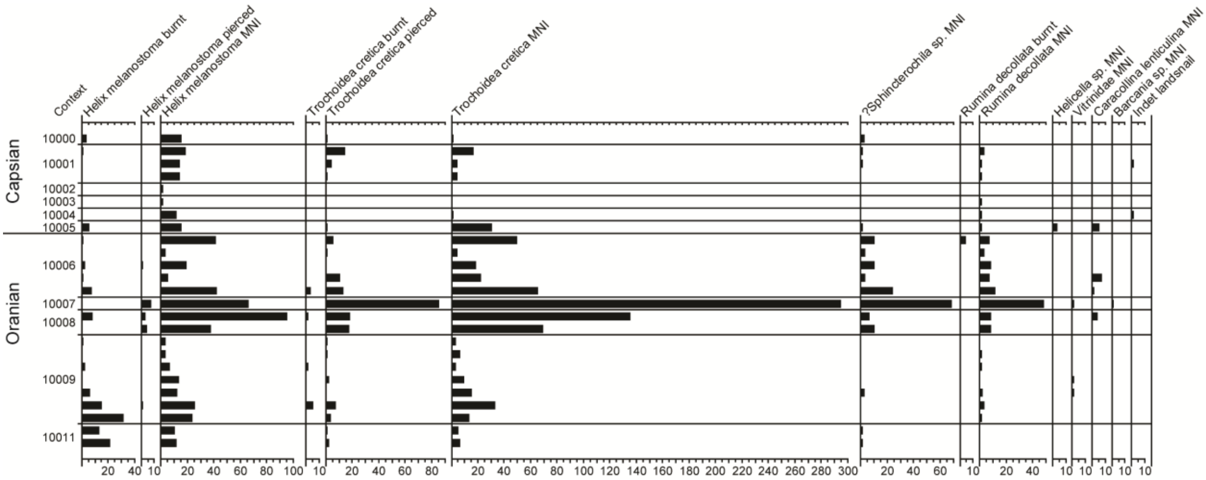

Fig. 3. Pierced mollusc shell from the Haua Fteah. (1) *Trochoidea cretica* with oblong aperture (arrowed) and apex removed in antiquity, Trench S, Context 912 (pre-Aurignacian); (2) *T. cretica* with oval aperture, Trench S, Context 908 (pre-Aurignacian); (3) *T. serrata* with two lenticular apertures, Trench D, Context 1009 (pre-Aurignacian); (4) *Sphincterochila* sp. with circular aperture, Upper Trench Context 132 (Neolithic); (5) *T. cretica* with lenticular aperture, Upper Trench, Context 130 (Neolithic); (6) *T. cretica* with circular aperture, Upper Trench, Context 132 (Neolithic); (7,8) *T. cretica* with lenticular apertures, Upper Trench, Upper Trench, Context 130 (Neolithic); (9, 10) *T. cretica* with ovoidal apertures, Upper Trench, Context 139 (Classical); (11, 12) *T. cretica* with ovoidal apertures, Upper Trench, Context 143 (Late Classical)

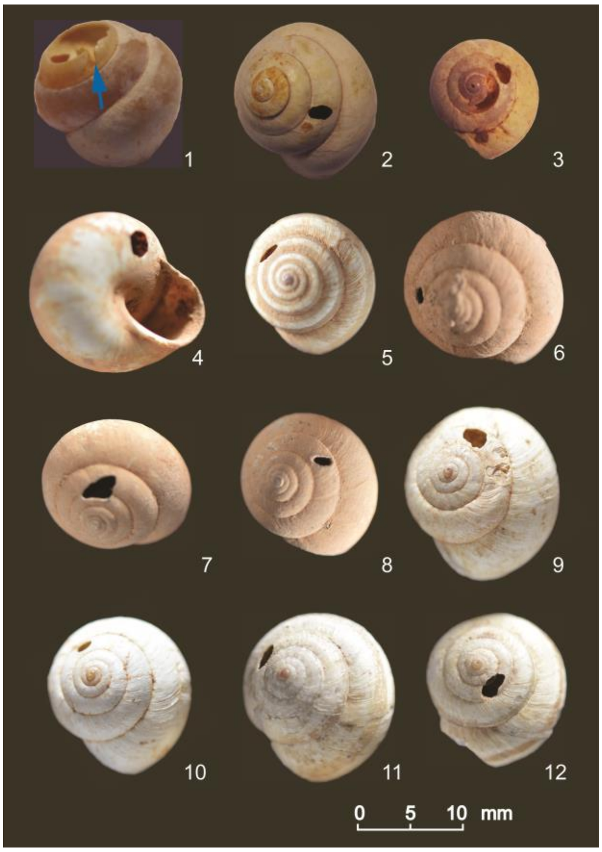

Fig. 4. Pointed backed bladelets from contexts attributed to (1, 2) Oranian; (3) Capsian.

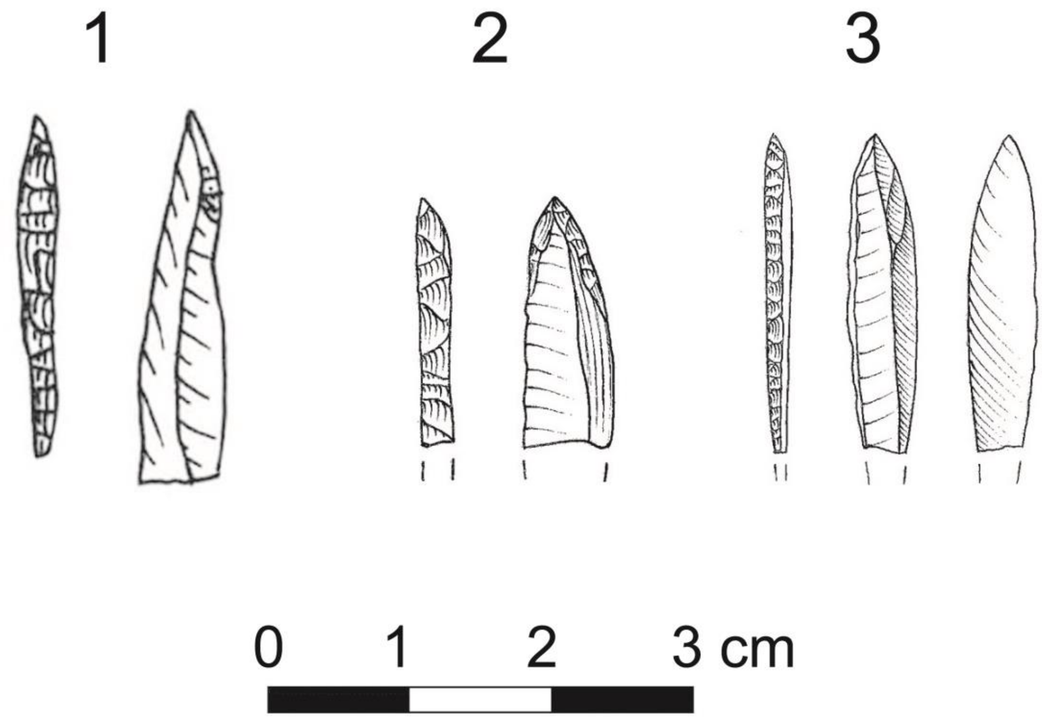

Fig. 5. Mèche de foret, distal end, wide initiating scalar scar –Trench U, Neolithic.

Fig.6. Mèche de foret, proximal end, step-terminating fractures- Trench U, Neolithic.