Article

Muricidae breakage-patterns at the Roman high imperial period purple dye workshop from isla de Lobos (Fuerteventura, islas canarias), a characterisation proposal

Types de cassure des Muricidae d’un atelier de teinte pourpre du Haut-Empire de l’île de Lobos, une proposition de catégorisation

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Abstract

The discovery of a Roman workshop of a purple workshop dating from the High Imperial Roman period in Isla de Lobos (Fuerteventura) has allowed us to initiate research into the purple extraction processes.

Written sources from ancient times pointed out that the modus operandi is different due to the size of the taxa to be processed. Historiography often reflects the reference to the observation of patterns of breakage in the remains of archaeological sites, although neither typification nor quantification is carried out.

We approach a methodological proposal for the systematic analysis of these failure patterns, taking into account their morphological variety and the size of the specimens and that could evaluate operating models associated with specific actions by taxon or individualized work systems of the Lobos factory and confront it with other workshops to propose hypotheses about the globality of gestures in the purple-dye production system or its specificity by cultural periods-traditions, chronological stages or regional areas.

Keywords: breakage-patterns, islote de Lobos, muricidae, Mvrilegyli, purple-dye, roman-workshop, Shell-middens.

Résumé

La localisation d’un atelier de pourpre datant de l’époque du Haut empire romain dans l’îsla de Lobos (Fuerteventura), nous a permis d’initier une étude sur les processus d’extraction de la pourpre.

Les nouvelles littéraires sur l’Antiquité ont favorisé l’idée selon laquelle le modus ope-

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randi des *mvrilegvli* est différent en raison de circonstances liées à la taille des taxons à traiter. L’historiographie spécialisée dans la valorisation de ces sites archéologiques requière constamment la référence à l’observation des types de cassures, bien que sa qualification et sa quantification ne soient pas effectuées.

Nous présentons ici le terme une proposition méthodologique d’analyse de ces types de cassure, en tenant compte de leur variété morphologique et de la taille des spécimens. La définition de ces types pourrait être un moyen de nous amener à évaluer des modèles techniques associés à des actions spécifiques ou à des systèmes de travail individualisés du site de Lobos et les comparer avec d’autres ateliers analogues.

**Mots clefs** : types de cassures, islote de Lobos, muricidae, Mvrilegvli, teinture pourpre, atelier romain, dépôt coquillier.

**Introduction**

In 2012, an archaeological site was located in La Playa de la Calera, in the South-Southwest of the Isla de Lobos (Fuerteventura), located in the Northeast of the Canary Islands (Figs. 1-2) characterised by the for the presence on the surface of wheels pottery around the second ascription to the Baetic province of Roman high empire, and abundant shells of *Stramonite haemastoma*, a Muricidae mollusk characteristic of the Atlantic coasts of north Africa. From then on, six campaigns in the form of systematic archaeological work have revealed a site catalogued as a purple workshop with high imperial chronological ascription that would cover a period between the first century BC.- I AD3.

![Google Earth map of Canary Islands and location of Lobos 1 site.](image)

**Fig. 1:** canary islands and location of Lobos 1 site.

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3 Del-Arco Aguilar Mª-C. *et al.* 2016.
For this categorisation, the Lobos deposit shows a diverse and profuse archaeological record with all the elements that researchers such as consider basic for the consideration of an archaeological site as a purple dye extraction workshop⁴:
- Majority composition of shellfish by Muricidae molluscs.
- Observation of a fracture pattern in dye specimens.
- Existence of combustion structures associated with the shell-midden.

To these traits we should add the presence of some kind of tools used in the technological process. Lobos includes, in addition to the first three defining traits, the following elements:
- Six rectangular trend enclosures whose structure is made of rubble work, with elements of basalt, sandstone, and mortar with a sandy matrix, as well as remnants of tegulae in their vicinity and scattered throughout the site.
- A wide sample of wheels pottery of transport, cooking pots, lamps, and fine wares
- Other faunistic taxa (ovine or caprine, suidae, ichthyofauna and marine malacofauna) related to nutritional processes.
- Lithic and metallic tools related to the purpurigenic extraction process, with fishing and subsistence activities: anvils, hammers, chisels, knives, mortars, cauldrons, hooks, net weights, and nails.

It should be noted that Lobos 1 is located on the shore of a cove (Figs. 2-3), something quite common in the Mediterranean purple deposits and in the proximity of salt ponds, with

an historical chronology, but that could have a continuity from the phase indicated for the archaeological record. In our opinion, the cove, closed by a barrier nature, should function as a *vivarium* and it facilitated the work of *mvrileguli*.

![Fig. 3: playa de La Calera, Lobos 1 (© C. Del-Arco).](image)

We know, through the archaeological record, that they introduced salted fish, wine, oil, as well as live cattle. The proximity of the islands of Lanzarote and Fuerteventura, the first inhabited at that time for sure⁵, would make it possible to overcome any need for food or water.

Perhaps we could think that Lobos must appertain to the model designed by Alfaro & Tébar (2004) of ephemeral or occasional workshops with the function of collecting raw material destined to the dyeing process and where a part of it would be carried out with movable or non-lasting elements.

Lobos shows the peculiarity of housing architectural constructions covering functional or habitat activities but that may suggest a use beyond the Muricidae fishing season. Maybe these features were necessarily related to the fact of corresponding to a distant settlement to the points of habitual residence of the workers who work in the factory.

Returning to the composition of the faunal elements in the record at Lobos 1, this site is presented as a workshop stage. The archaeological works has allowed the identification of

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six shell-middens, all with lenticular shape, as piles of soft profiles and formed mainly by *Stramonita haemastoma* (Figs. 4-5). These shell-middens are shown as true industrial stages, in a primary situation and associated with some of the essential tools. Still in the process of studying some of them, the figures corresponding to the first two campaigns in 2012 show that the main taxon is the already mentioned *Stramonita haemastoma*, with an MNI of 68211 specimens (98.49% of all malacological taxa)\(^6\). Other representative taxa for appearing in other similar shells middens as *Patella*, *Osilinus* or *Cerithium* and they none reach 1%. The other purpurigen taxon that appears is *Hexaplex duplex*, it does not reach the mentioned figure either. Generally, the specimens of MURICIDAE appear fractured except for small exceptions that appear intact.

As well as the Muricidae with a breakage-pattern, the shell-midden are associated with elements that could be considered part of the extraction instruments, due to their morphological characteristics and also the presence of traces of use or signs of impact and remnants of reddish spots of dibromoindigo. These are lithic like hammerstones and anvils that appear prominently in the Lobos site and the metal tools, which were described to the extractive process, and they are punches or chisels (copper-based) and the fragments of lead pots.

![Fig. 4: Shell-midden, combustion structures and basalt tools](https://example.com/fig4.png)\(^6\) Del-Arco Aguilar Mª-C. *et al.* 2016.

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\(^6\) Del-Arco Aguilar Mª-C. *et al.* 2016.
Regarding mvrileguli’s working methodology, specifically the use of tools, the textual sources do not provide precise descriptions of the tools used except for the nature of some of them (lead cauldrons, metal, or stone hammers ...). This forced, on the one hand, that many of them could go unnoticed in the set of archaeological records and, on the other, that one had to elucubrate about what and how these tools would be.

When describing the classical sources, the procedure with actions such as “crush” “open” or “separate” it was evident the fracturing of the Muricidae, so it should be thought tools to help perform these actions and facilitate accurate and rapid technical gestures that processed the large number of specimens needed for basic productivity. Hammerstones and anvils were simple elements to acquire in the coastal locations. This ease of purchase, they could be discarded once the productive cycle was completed or, simply, they were amortized. Quite the opposite would happen with the tools of metallic nature, much more difficult to acquire and, therefore, to discard.

About all that instrumental, if we take a look in the archaeological literature we can see lithic anvils or “billots” of Delos⁷, usually cited; lithic pieces such as anvils in Pou des Lleó and Metrouna⁸; hammerstones and anvils in Essaouria and Meninx⁹; others hammerstones

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⁷ Bruneau Ph. 1969.
⁸ Alfaro Giner C. and Tébar Mejías E 2004 and Bernal et al. 2011a, 2014b respectively.
in *Carteia*¹⁰. Within the metallic instruments, a lead cauldron has been found in Águilas¹¹; various metal tools in Sa Caleta¹²; of various kinds as lithic and useful metal percutors pieces in Luis Milena¹³. In Lobos ¹⁴, the nature of its taphonomic development that has allowed to preserve the record practically in its entirety useful and have been found: metallic (Fe and Cu base and lead cauldrons) and stone hammers and anvils. The presence for at least a century in the factory could also explain the presence of material of various kinds in the field.

Regarding the record of Muricidae that make up the manufacturing nature shell-midden, we explained that one of the basic characteristics is the presence of a generalized breakage-pattern in the archaeological record caused by a deliberate anthropic action for the extraction of the secretion of the hypobranchial gland. Nor in this the classical textual sources are sufficiently explicit. Aristoteles speaks of “crushed” (*HA* V. 547a, 20-30); Vitruvius of “opening the outline with iron instruments” (*Arch.* VII.13); Plinius also to “crush” (*NH* IX, 126) following the trail of Aristoteles; Aelianus speaks of “crushing with blows of stone ...” (*HNA*, XVI, 1).

Apart from the usual cryptic tone of the classical texts, this lack of definition could be due to that the information was biased and coming from indirect sources. Then, it caused that the archaeologists to work in part “blindly”, without noticing to a large extent the components of the record that could belong to the process extractive, especially those of a lithic nature that, being abundant in the usual coastal environments of the purple workshops, went unnoticed by research.

The truth is we have not an objective criterion to define this breakage-pattern, almost becoming a semantic problem. The different teams of archaeologists who work the records and infer from the analysis of these they speak (like the classic texts) of “crushing” or “fragmenting”. We even talk about similarities of certain records, that is, always from the remains coming from these but the method of analysis, counting and characterisation did to establish these fracture patterns, is not explicit.

In the Pitiusas area, Spain¹⁵ in the Pou des Lleó site Alfaro and Tébar (2004) check up to three types of breakage-patterns (transversal fracture, longitudinal blow, and other longitudinal openings) and suggest the possibility of the existence of different methods of fracturing by regional zones. Cala Olivera¹⁶ would have in its registry a different breakage-pattern to Pou des Lleó, more similar to Chania record, in the distant Crete. Sa Caleta¹⁷, they appear “fractured”, as well as in Foum Assaka (Morocco)¹⁸. Águilas, Murcia¹⁹ the term “crushed” is used

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¹³ Bernal Casasola D. *et al.* 2011b.
¹⁴ Del-Arco Aguilar Mª-C. *et al.* 2016.
¹⁵ Costa Ribas B. 2011.
as in the Cádiz archaeological records at Luis Milena, Sagasta, or Villa Victoria\(^{20}\) and the Moroccans’ sites of Metrouna and Septem\(^{21}\). Talking about the Isla de Lobos, we’re still reluctant to use such conclusive terms without a strong scientific basis. In this sense and from the need to generate a common method of observation for purpurigenic records, we would propose a quantitative use of the malacological record of the deposits making an integral or partial count. This would allow calculations of the Index Fragmentation (that we call NR, literally number of rest) and from there propose categories, in relation to the number of remains.

The opportunity to reflect on the technological process of purple in Isla de Lobos, has meant that we face as a line of research the specific study of that and particularly the analysis of breakage-pattern, because, to a great extent, we’re still reticent to use such conclusive terms without an empirical base that contemplates from the observation of the malacological records and its systematic study, its characterization and, later, the realization of experimental archaeology procedures.

**Experimental details**

![Figs 6: Big and Medium apices of *Stramonita haemastoma* with breakage-pattern (© Del-Arco).](image)

Starting from the accumulated knowledge and the indicated observations to the technological processes related to the extraction of the purple, we have faced the study of the malacological remains from the shell-middens using of different methodological actions:


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![Image](image.png)

Figs 7: Big and Medium apices of Stramonita haemastoma with breakage-pattern (© Del-Arco).

Archaeological works: we proceeded to an extensive excavation of the shell-middens, with the in-situ observation of the distribution of its components (malacological matrix, artefacts, and combustion structures); the entire deposit was sifted with sieves of different sizes (5, 2.5 and 1 mm) collecting all the detritus that is transferred to the laboratory.

Laboratory works: we’ve processed the entire malacological remains, always considering their taxonomic attribution, separating the complete and fragmented specimens of the different anatomical parts (apex, columella, and shell). We proceeded to the complete count of the apexes, in order to know the MNI, according to its size (Big, Medium, and Small) (Figs. 6-7), first in a subjective manner and, subsequently, starting up a procedure of comparison using biometry of current specimens, its application to a sample of the archaeological record and statistical analysis\textsuperscript{22}.

As a starting point we consider that we can divide the remains of Stramonita haemastoma in relation to its size into three groups. In our record there aren’t specimens above 6 cm. measured from the siphonal notch to the apex. By means of calculations we’ve determined that the sizes that can be extrapolated from the remains of the apex are: Small (apex less than <10 mm.) Medium (greater than >10 and less than <15 mm.) and Big (greater than >15 mm.) measured on the diagonal from the last nodule from the spiral to the vertex of the apex.

On the aforementioned sample, we also counted the NR, in order to progress in the study of the degree of fragmentation. We carry out the complete weighing of the different anatomical parts.

\textsuperscript{22}Martín-González E. \textit{et al.} 2016.
During the processing of all the material we began to observe the presence of repeated forms of fragmentation, which we’ve been calling “breakage-pattern” and that mostly affect the anatomical parts corresponding to apex-sectors of columnella and shell, but also some repeated forms of fracture that maintain high portions of the columnella-shell with loss of the apex.

In relation to the Minimum Number of Individuals (MNI), we observe that this has been done in all cases from the counting of the apices of the mollusks, the only element that appears invariably intact, unlike the columnella and the shell that appear fractured in the vast majority of cases. In the separation of these elements and the count of the apices as well as in the analysis and study of the publications on other similar records, we observe that the apices seem to present a series of determined forms in which they included, to a lesser and greater extent, the continuity of the columnella and the shell. This could be due to different fracturing methods, the use of certain tools, the nature of the different malacological taxa, their own characteristics (size, hardness...), the operator’s particularities (right-handed, sex, strength...), without ruling out taphonomic processes. In short, it could serve to lay the groundwork for an Experimental Archaeology procedure and the comparison of results.

Results and discussion

As results of our analysis, we propose the need to develop a common method of study of the archaeological shell-middens, in such a way that it allows us to compare the results a posteriori beyond subjective observations.

In this way, a quantitative use of the malacological records of the deposits will be necessary, with an integral or partial count that allows calculations of the Number of Remains of the shell-midden (NR), of the Index Fragmentation of each specimen (IF) and from there propose a categorization in relation to the number of remains of the shell-middens.
From our analysis and observations that we’ve made on the apices we propose eight types of breakage-pattern forms as Morphological Categories (CM) of the apices. This identification was based on the morphology of the apices in relation to the continuity or not of the columella and the shell as a result of the fragmentation of the mollusk for the extraction of the hypobranchial secretion. (Fig. 9):

- **Lobos-I (L-I).** - Longitudinal fracture parallel to the columella that remains integrated. Keep half of the shell and spire. It's, by global percentage, the third most abundant, both for big and medium sizes. It's the most abundant type in the small size.
- **Lobos-II (L-II).** - Transverse fracture. It conserves, in part, the columella and the shell, where the external labro sits. It's intact. It's the most abundant, being this way for big and medium sizes, while in the small ones it represents the third place of its percentage.
- **Lobos-III (L-III).** - Transverse fracture. It keeps part of the columella. General loss of the shell. Keep the spire. It's the fourth most abundant. That same position in the percentage is maintained for big and medium sizes, while its presence between the small size falls to the sixth place.
- **Lobos-IV (L-IV).** - Transverse fracture. Loss of the columella and the shell. Spire practically integral. It's the sixth place, occupying this position for the big size, same percentage as Lobos-VIII for the Medium and in the small sizes go up to a fifth place.
- **Lobos-V (L-V).** - Transverse fracture. It keeps the columella or part of it sometimes sectioned in bevel. It retains part of the shell in the form of a tongue. Spire fractured. The second most abundant for the three sizes.
- **Lobos-VI (L-VI).** - Transversal fracture with total loss of the columella, keeping a part of the shell in the form of a tongue. Spire fractured. Fifth most abundant, as well as for big and medium size. In the Small ones it rises to the fourth place.
- **Lobos-VII (L-VII).** - Longitudinal fracture parallel to the columella practically integrates up to the siphonal canal, like half of the shell that remains open. This longitudinal fracture divides the spiral in half, showing us the entire interior of the specimen, appreciating its cavities. It’s the least usual as in the small size. However, for Big and Medium appears in the seventh place.
- **Lobos-VIII (L-VIII).** - Longitudinal fracture parallel to the columella, keeping much of it but never reaches the siphonal canal. It shows part of the structure of the shell and the fractured spiral and the cavities of the mollusk. The least abundant among the big size, while for Medium and Small it appears in a seventh place.
- We also recorded minimum “exceptions” that can't be incorporated into any of the previous CM, especially the specimens that have preserved all the columella along with the apex without the remains of the shell.
Our intention after presenting this categorisation, as we’ve already mentioned, is to carry out an experimental archaeology procedure that helps us to clarify whether the forms are directly related to the breakage-pattern, either as a residual product of the blow or an action to tear off the apex of the rest after fracturing or if they are random, postdepositional forms. In the case that we observe in this experimental exercise that these forms, generated, could be used as a tracking method to compare records and understand if these forms are characteristics resulted of common work of regional or influence areas, which together with other elements of the registry, like the pottery or the recovered tools, would allow us to understand the dynamics of the historical processes in each workshop.

For this reason, it’s our pretension that the experimental action includes not only the work on *Stramonita haemastoma*, the “hyper-represented” taxa in the workshop of Lobos but on other taxa identified at the Cádiz area (*Hexaplex trunculus* and *Bolinus brandaris*), in such a way that it’s possible to falsify the hypothesis of regional technological modes vs. individual *modus operandi* or adaptive working method by the nature of the specimens.

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Bibliography


Atoche-Peña P. 2009, Estratigrafías, cronologías absolutas y periodización cultural de la Protopregunta de Lanzarote, Zephyrus 63, p. 105-134.


Bernal D., Sáez A. M., Bustamante M., Cantillo J. J., C-Soriguer M., Zabala C. y Hernando J. A. 2014, Un taller tardorromano de producción de púrpura getúlica en Septem, Actes de la III Reunión Científica de Arqueomalacología de la Península Ibérica (Cadiz, 3-4 décembre 2012), Cadiz, p. 329-344.

Bernal-Casasola, D. et. al. 2014b, De la producción de púrpura getulica. Arqueomalacología en la cetaria altoinperial de Metrouna, Actes du IV Symposium Internacional sobre Textiles y Tintes del Mediterráneo en el mundo antiguo (Valence, 5-6 novembre 2010), Valence, p. 175-188.


Del Carmen Del Arco Aguilar Mª, Mercedes del Arco Aguilar Mª, Benito Mateo C. y Candelaria Rosario Adrián Mª 2016, Un taller romano de púrpura en los límites de la Ecúmene, Lobos 1 (Fuerteventura, Islas Canarias). Primeros resultados, Canarias Arqueológica Monografías 6, OAMC. Cabildo de Tenerife, Santa Cruz de Tenerife.


Drine A. 2007. La pourpre de Meninx, África 21, p. 79-93.


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ملخص
نظراً لأهمية الموقع الجغرافي لورشة عمل خاصة بصباغة الأرجوان، يعود تاريخها للعصر الإمبراطوري الروماني في جزيرة لوبوس (فويرتيفنتورا)، تم بدء سلسلة من الأبحاث حول دراسة عمليات استخراج مادة الصباغة الأرجوانية.

عززت الروايات الأدبية القديمة فكرة أن طريقة العمل على»المُرِّيق/ mvrilegvli (صدف يستخرج منه الأرجوان) تختلف حسب الظروف المتعلقة بحجم الوحدات المراد معالجتها. الهيستوغرافيا المتخصصة في تقييم هذه المواقع الأثرية تعمل باستمرار على مراقبة أطاق الكسور، على الرغم من أن تحديدها الكيفي والكمي لم ينجز بعد.

نقدم في هذا العمل اقتراحًا عملياً للتحليل المنهجي لهذه الأنواع من أطاق الكسر، مع الأخذ بعين الاعتبار تنوع مورفولوجي وحجم العينات. قد يكون تحديد هذه الأنواع وسيلة تقوينا إلى تقييم النماذج التقنية المرتبطة بالإجراءات الخاصة بالأصناف أو أنظمة العمل الفردية المتواجدة بموقع لوبوس ومقارنتها بمواقع أخرى.

الكلمات المفتاحية: أطاق الكسر، جزيرة لوبوس، الموريسيديات،»المُرِّيق«، الصباغ الأرجواني، ورشة Románica، رواسب من الصدف.