

# The archaeology of taste: Gargilius Martialis's Garum

**In this article, after a brief description of garum and its history, a preliminary experiment based on Martialis' recipe provides a taste of past.**

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*De gustibus non disputandum*

Cicero

## Introduction

When Rome came into contact with the Greek world, a great amount of information, culture, technology and grandeur entered the then rural Roman way of living. It is in fact from the second half of the III century BC that Greek influence in many aspects of life was acknowledged by the ancient authors. Among these, we find influences on cuisine and cooking. *Garum*, as it was known among the Greeks, was a culinary preparation made mainly of fish, salt and herbs and was in use in Greek cuisine from at least the 5th century BC (Pliny, *NH XXXI*, 93). The production and trading of *garum* lasted for at least one millennium: its taste could be called a golden thread of the Ancient World.

But what was it like? And, more importantly, what was it that made it taste like itself? It is to answer these questions that this project came to life. In this article we will illustrate the first steps taken for searching the answers. The analysis needs to be carried on deeper and wider, many written sources have to be read (and found!), many archaeological finds are there to be researched: we are perfectly aware of the fact that this is just a beginner's log.

A brief history of *garum* production, fortune and trade will be given in the first part. In the second part methodology and specific information from written sources will be discussed and in the third the

preliminary experiment will be illustrated. In the conclusions problems, variables and further experiments will be analysed.

## 1. Garum in the Roman world: archaeology of production

In his *Liber de Agricultura* Cato (between the 3rd and 2nd century BC) refers to *allec*, which seemed to have been a paste obtained by the working of fish, herbs and salt. The etymology of such a term appears to find its roots in the word *putrescence* (Dosi, Schnell 1984: 181). Interestingly, he refers to it when describing food needed by the family who run a rural farm once the olives run out (Cato, *LVI-II*). Because of the amount of nutritive substances (such as amino acids, nitrogen, and many different trace elements), *garum* and *allec* were quite important in the mainly vegetarian diet of ancient Rome (Hubert 2001).

*Garum* was a liquid or semi liquid sauce obtained by the decomposition of fish and herbs in salt. According to Pliny, it was at first obtained from one selected kind of fish which might be compared to anchovies. Common *garum*, on the contrary, was created by the decomposition of fish entrails in salt. Its exotic taste entered firmly into the Roman world in the time of Apicius and was considered a fundamental ingredient to many recipes. The liquid *garum* (another term used to indicate it is *liquamen*) was so popular that it was also added to fruit jams (Dosi, Schnell 1984: 210).

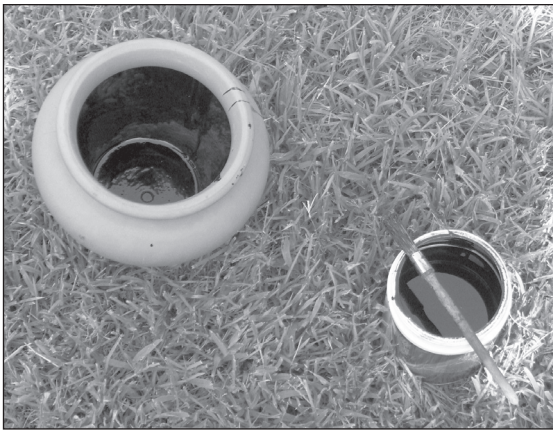
Many archaeological remains witness the importance of the product. The Atlantic coast of Spain and Morocco, as well as the Mediterranean coasts and the Black Sea were sites of production of *garum*. The centres of industry in the transformation of fish, in which tuna and other fish was cleaned and salted, were also the sites in which salt was extract-



■ **Fig. 15** The final result of the experiment: a granular, olive green in colour compound with a strong fragrance of spices and fish. The amount of extracted liquid was minimal.

ed (see Purpura 1982). These industries consisted of a series of *cocciopesto* (lime mortar with crushed pottery) covered vats (called *cetaria*) in which the fish was worked and, probably, entrails, salt and herbs were left in the sun for transformation into *garum*. Usually, amphorae sherds found nearby the vats help to give an idea of the duration of the production. The most famous *garum* was made only with mackerel and was produced in Spain (Pliny *NH XXXI*, 94) and sold all over the empire in Dressel 7-9 amphorae (Purpura 1982). The north African coast was rich in this sort of industry which produced a typical amphora to contain the sauce. The African amphorae sherds for *garum* trade can be found across the empire from Severian times and a sign of change in the market trends of that time (Purpura 1982).

This mode of production is not so common on the Tyrrhenian coast of Italy. Scholars believe the reason for this can be found in the *garum officina* (garum's factory) found in Pompeii. Even though Pliny acknowledges Pompeii as a famous site for the production of *garum* (*NH XXXI*, 95), the witnessed procedure differs slightly from the



■ Fig. 1 Brushing the vase with pine tar



■ Fig. 2 Hardening the tar with a gas flame



■ Fig. 3 A subtle olive oil layer to ensure impermeability



■ Fig. 4 Closing the vase

others. Here the mixed ingredients were left to ferment in *dolia*, not in vats, but were sold in amphorae as the other *garum* (*Salza Prina Ricotti* 1999).

An interesting note of the *edictum de pretiis* by Diocletian (301 AD) states two different prices for the first *liquamen* and the second *liquamen* (III, 7), probably reflecting a difference in quality.

The production of *garum* was carried on until the 5th century AD in Morocco, and the consuming of *garum* is witnessed into the early medieval times and later (8th century AD, *Salza Prina Ricotti* 1999, *Purpura* 1982 footnote 10; *Encyclopaedia Romana* under “Garum” states that there is trace of production of *garum* as late as 1345 AD).

It seems therefore that production of *garum* was strictly linked with the industry of fish transformation: it actually used the same facilities. But this is not the only production witnessed as another method used *dolia* to obtain the same product.

## 2. Exploring *garum*'s taste: methodological approach, written sources, ethnography

The curiosity about the taste of such a famous and renown ingredient lead us to approach *garum* from the experimental perspective. The first aim of our experiment was to be able to evaluate variables which may affect *garum*'s taste. To attempt a reconstruction of a “taste” might be considered as rather an impossible mission. Experimental archaeology has already demonstrated in the past decades how an “accurate” reconstruction is not only impossible to obtain, but also does not necessarily improve our knowledge of the past. We can imagine, therefore, how subtle the results could be when the object of the experiment is not an object but a taste, which certainly lacks both materiality and assessment measurements which can aid the evaluation. This theme has entered many times into the discussion of those who participated in the experiment, and lead sometimes to a great discour-

agement for the task. Even so, after having eviscerated the problem in many ways, we decided that experimental methodology could be a great help in such an attempt. The preliminary experiment on *garum* production was therefore planned to assess the variables and their consequent relationship. An organoleptic evaluation of the final product was programmed to have a standardised description of the taste, useful to provide a comparison for further experiments.

As the starting point should be the archaeological record but we did not find any convincing sources and studies made on the subject. In popular books the stereotypes of *garum* being a putrescent and morbid thing were not sustained by experiment on actually making or tasting it according to the ancient procedure (*Dosi, Schnell* 1984: 28, 246). On the contrary, in the same source, the experimental approach in the creation of *garum* was gladly encouraged, as the importance of that ingredient was evident both by written and material sources (*ibidem*: 254). The information about taste was limited to a link to *nuoc-mâm*, an oriental preparation still in use. The origin of it were referred to as an error made in the conservation of fish, ending in some sort of not-too-bad waste (*ibidem*: 210).

Even the ancient world seems to be split into those who liked *garum* and those who did not. Martial refers to *garum* made only with the blood of freshly killed mackerel as a sumptuous gift (*Xen. XIII, 102*), but points out also that common *garum* had a terrible smell. Apicius, on the other hand, gives a recipe to change the smell of *garum* with the aid of herbs and honey (*Apicius De Re Coquinaria*, I, 6). The first liquid was called *gari flos* (flower of *garum*). The most appreciated was called *garum nigrum* and was sold in small jars. The banqueters could use it as they pleased directly on the table (*Dosi, Schnell* 1984: 212). As we said, *allec* was the remaining paste after all the liquid has been extracted, but some scholars say that originally *allec* was *garum* at the midfermentation point. In recipes *allec* was used as an appetiser. At some point, it seems to become

an independent preparation, as we can also read about *allec* made only with one type of fish or molluscs.

Let us move to consider present-day information about fish sauces of that kind. As we said, *nuoc-mâm* from Vietnam and *naam-pla* from Thailand are the closest existing sauces to ancient *garum*. To make it, fish and salt layers are alternatively put into an earthenware big jar with a percentage of 20% salt on the total. The jars are then closed with a mat and left to ferment from one to three months. The first extracted sauce is the best quality. Then subsequently adding brine and filtering produce second and third quality choice sauce. The obtained liquid is put into glass bottles and exposed to sunlight to acquire a clear caramel colour. As it is today, different hues were associated with different qualities of sauce (see above, *garum nigrum*).

The process of transformation from solid to liquid, is not, as it was thought commonly, decomposition or fermentation. If the percentage of salt is kept 20% or higher, the process of fermenting stops at a certain point and gives way to what is known as autolysis, an actual maturation of the compound (Hubert 2001, Purpura 1982, footnote 7). The presence of viscera probably aids the process because of the presence of active enzymes (Rovere et al. 2008, “*garum*”). The knowledge of this biochemical

process lead modern *garum*-makers to obtain good results with a yogurt-maker in which heat can be kept controlled (*Wunderlich's webpage*).

An Italian product, called “*Colatura di Alici*”, is quite similar to the ancient *garum*. Made with anchovies collected in spring and summer, it is created by the fish being put under pressure with salt. The raw fish is cleaned of entrails and put in salt for at least 24 hours. It is then transferred to wooden barrels between layers of salt. The closing cap is then charged with extra weight and the resulting liquid collected in glass bottles and left for four or more months exposed to sunshine to gain concentration. After this, the liquid is then put again in wooden barrels with anchovies and then collected from a little opening. It is then ready in December. Its use is traditional for Christmas' eve on non-salted pasta (*Colatura di Alici webpage*).

### 3. *Garum's taste: preliminary experiment*

Written sources that illustrate the “recipe” for making *garum* are very few and very late. No one states the quantities, and the most accurate are those of the Geoponica collection, dating to medieval times (Curtis R. I. 1991: 194). We decided therefore to start from a late source that seemed to be sufficiently clear to elaborate a pro-

Volumes	
Container capacity	2,7 lt.
Volume filled	2,4 lt
Volume loss after first week	0,2 lt
Volume loss after liquid drainage	0,2 lt
Ingredients weights	
Salt	1575 g
Herbs	86 g
Celery	150 g
Fish	624 g
<b>Salt/fish ratio</b> (volume)	1/1 (nearly)
Herbs ratio	
Saffron	1/100
Celery	4/1
Other herbs	1/1
Layers' thickness	
Herbs	2/3 cm
Fish	3/4 cm
Salt	3/4 cm
Average temperature	
	> 30 °C
Time	
Total duration	28 days
First phase without stirring	7 days
Second phase, daily stirring	7 days
Last phase 2-3 stirring/week	14 days

■ **Tab. 1** Experimental data summary

portion of the ingredients. This source comes from a collection of works made in medieval times and its supposed author is Gargilius Martialis as quoted from *Dosi Schnell 1982* and *Gozzini Giacosa 1992*. Gargilius Martialis, a writer from the third century AD, in “*De medicina et de virtute herbarum*” writes: “Use fatty fish, for example sardines, and a well-sealed (pitched) container with a 26-35 quart/litre capacity. Add dried aromatic herbs possessing a strong flavour, such as dill, coriander, fennel, celery, mint, oregano, and others making a layer on the bottom of the container; then put down a layer of fish (if small leave them whole, if large use pieces); and over this add a layer of salt two fingers high. Repeat these three layers until the container is filled. Let it rest for seven days in the sun. Then mix the sauce daily for twenty days. After that time it becomes a liquid (*garum*)” (*Gozzini Giacosa 1992: 27*).



■ **Fig. 5** Mixed dried herbs



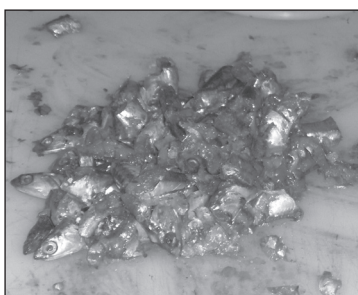
■ Fig. 6 Minced celery



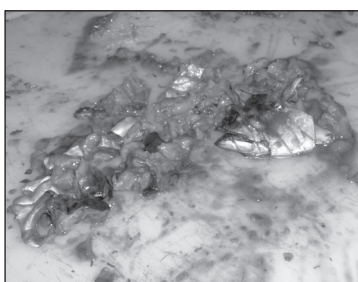
■ Fig. 7 Blue fish cleaning



■ Fig. 8 Mackerels cleaning



■ Fig. 9 Minced blue fish



■ Fig. 10 Minced mackerels

Since our aim was to assess the variables included in the process, we decided to scale down the quantities and to adapt them from an industrial standard to a more family-like method of making *garum*. The container used was an earthenware vase of 2,7 lt. capacity at the brim. The vase was tarred to prevent leaking (this method had been used since Cato's times). Tar was considered an important part of the experiment, not only because of the impermeability needed for the procedure of fermentation, but also because it was thought that the resulting taste could be affected by the use of vegetable tar. The chosen one was natural pine tree tar, spread onto the inner surface of the vase with a brush (Fig. 1). To harden the tar, a common flame device was used (Fig. 2). Subsequently, for ultra-safety of impermeability, it was isolated with a veil of olive oil (Fig. 3). During the experiment, it was clear that a softer way of hardening the tar, possibly with embers, would have produced a more reliable result and avoided damage to the vase. To prevent insect contamination, a wooden cap wrapped with a cotton cloth was prepared to be put on the brim of the vase (Fig. 4). Beeswax was considered to be the best material to be used to seal the cap. This system was very useful as it permitted an easy re-opening each time mixing was needed.

After preparing the vase, a selection of herbs as described by Martialis was prepared.

We used: dill (*Anethum graveolens* L., dried seeds), coriander (*Coriandrum sativum*, dried seeds), fennel (*Foeniculum vulgare*, dried seeds), celery (*Apium graveolens*, leaf and stem), mint (*Mentha Longifolia*, dried leaves), pepper (*Piper Nigrum*, grains and dried leaves), saffron (*Crocus sativus*, dried stigma) and oregano (*Origanum vulgare*, dried leaves). We also used saffron as we found it quoted into an Italian translation of the recipe that also quoted this spice (Wikipedia). Since the proportion of the herbs were not described, we decided to use a mixture of the essences in equal parts, except for saffron, added as 1/100 against the other herbs. As saffron has always been an extremely expensive spice since ancient times, as the process of collect-

ing it has actually remained the same over the millennia. Other spices may as well have been imported, but the collecting methods were surely different and affected the final presence in the recipe differently. Since celery was added fresh, the quantity was increased to 4/1 against other herbs, considering the amount of water in fresh vegetables. All the dried herbs were carefully mixed in a soup dish to obtain an even compound (Fig. 5). Celery was added later with the other ingredients (Fig. 6).

Bluefish and mackerels were partially cleaned (Fig. 7-8) – intestines were only taken from the bluefish, whereas fishbone, intestines and gills were taken away from mackerels – and cut into small pieces (Fig. 9-10). It was felt that, considering the small dimension of the vase, cutting the fish would aid the process.

Salt was carefully chosen to prevent contamination from industrial chemical substances. We used whole organic marine salt naturally gathered from Trapani (Sicily).

See tables for details in quantities of ingredients used.

The actual procedure of preparing *garum*, started with a bottom layer of herbs (Fig. 11) of 2/3 cm height being put in the vase complete with celery (Fig. 12). Fish was then laid in a layer 3/4 cm high (Fig. 13). The next layer was salt, “two fingers in height” as Martialis says (3/4 cm). The vase contained 9 layers in total and then was closed with the above described cap. The preparation ended at midday on the 15th August 2008. For the whole duration of the experiment (until 13th September) the vase was left in the sun from just after dawn to a little before sunset. The temperature reached above 30 °C. For only two days bad weather prevented the vase to be exposed. After 7 days excluding the first, the vase was opened to begin stirring (Fig. 14) On this occasion an intense perfume of fish and Mediterranean spices was released from the compound. The volume seemed to be diminished by 0,2 l and a liquid part was noted among the cloggy compound. For seven days the *garum* was stirred daily, whereas for the remaining two weeks it was stirred only 3 to 2 times per week.

On the third day of stirring, a yellowish liquid begun to leak from a fissure in the vase. This yellowish liquid had a very acrid smell and become crispy on drying. The fissure in the vase, probably caused by the hardening of the tar within using the flame, was sealed with natural beeswax. The liquid started then to turn into a more greenish colour, probably because of the herbs.

After 28 days, the compound was taken out of the vase and put into a fine linen cloth with medium large texture and compressed to extract the liquid. This method proved to be a failure as the amount liquid was very small and too dense to drip from the cloth. This made us think that a slow dripping method might be more effective as described in the *Geoponica*. The mixture was then suspended in a natural fibres basket from which to extract the *liquamen*. A small amount of *garum* was indeed collected and tasted. The taste resembled that of anchovy paste with a strong accent on raw fish and a background of spices which made it quite pleasant. At the organoleptic examination the product obtained with the experiment turned out to have the following characteristics:

**Consistency:** granular with fragments of spices and salt to which the fish are amalgamated.

**Colour:** olive green.

**Smell:** the blue fish one is predominant, rounded off by spices. Smells are well amalgamated.

**Taste:** very intense salt and fatty fish, the initial impact vanishes fairly rapidly with the dissolution of salt, leaving a clean aftertaste.

(Examined by Cristiana Minelli, laboratory technician for food industry)

#### 4. Conclusions

There are few conclusions that we can point to at this stage of research. The preliminary experiment, in fact, lead us to evaluate many other possibilities in experimenting with *garum* making. The procedure we used was not successful as very little liquid sauce was obtained. Among the many explanations, lack of ex-

tra viscera (besides the utilized fish ones), an over abundance of salt and doubt on the scaled proportion used are to be explored deeper. As said above, viscera from the fish could aid the autolysis process. Salt could also be kept at a lower percentage of the total (being almost- at volume 1:1 in our procedure) or, more likely, added in form of brine as happens in Oriental fish sauces and as probably happened in the fish-salting industries in ancient times. Another point seems to be the overall quantity of ingredients, probably standardised at the times of the description for the success of the procedure.

This experiment lead us to distinguish the different variables present in the process, some of which came to light by accident during the experiment itself. For example, we felt that the failure of the process of extracting the liquid was due to the need for a different technique: probably the original recipe for the *colatura di alici*, using weight put on top of the anchovies, could have helped. Temperature was not a problem as the experiment had been planned for a season in which weather was hot and sunny. Probably air has to be considered carefully in the next experiments in relation to the autolysis.

There is another question regarding the relation between *allec* and *garum*, and *garum* to *liquamen*. Sources of the time seem to distinguish between different consistencies. The archaeological record could be analysed to assess whether there exists a distinction in the container morphology which could be linked to ceramic morphology, content and production procedure.

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 Gozzini Giacosa I. 1992: *A taste of ancient Rome*. Chicago, 1992



■ Fig. 11 The first layer of dried herbs



■ Fig. 12 The first layer of celery



■ Fig. 13 The first layer of fish (one of three)



■ Fig. 14 Stirring with a wooden spoon

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## Appendix

*Geoponica* is a medieval manual which may derive from a 6th Century Latin text.

Quoted by *Curtis, R. I. 1991*, 12-13:

"1. The so-called *liquamen* is made in this manner: the intestines of fish are thrown into a vessel and salted. Small fish, either the best smelt, or small mullets, or sprats, or wolfish, or whatever is deemed to be small, are all salted together and, shaken frequently, are fermented in the sun.

2. After it has been reduced in the heat, *garum* is obtained from it in this way: a large, strong basket is placed into the vessel of the aforementioned fish, and the *garum* streams into the basket. In this way, the so-called *liquamen* is strained through the basket when it is taken up. The remaining refuse is *alex* (*allec*).

3. The Bythinians prepare it in this manner: it is best if you take small or large sprats, but if not, wolfish, or horse-mackerel, or mackerel, or even alica, and a mixture of all, and throw these into a baker's kneading trough, in which they are accustomed to knead meal. Tossing into the *modius* of fish two Italian *sextarii* of salt, mix up thoroughly in order to strengthen it with salt.

After leaving it alone for one night throw it into a vessel and place it without a lid in the sun for two or three months, agitating it with a shaft at intervals. Next take it, cover it, and store it away.

4. Some add to one *sextarius* of fish, two *sextarii* of old wine.

5. Next, if you wish to use the *garum* immediately, that is to say not ferment it in the sun, but to boil it, you do it this way. When the brine has been tested, so that an egg having been thrown in floats (if it sinks, it is not sufficiently salty), and throwing the fish into the brine in a newly-made earthenware pot and adding in some oregano, you place it on a fire until it is boiled, that is until it begins to reduce a little. Some throw in boiled down must. Next, throwing the cooled liquid into a filter you toss it a second and third time through the filter until it turns out clear. After having covered it, store it away.

6. The best *garum*, the so-called *himation*, is made in this way: the intestines of tunny along with the gills, juice and blood are taken and sufficient salt is sprinkled on. After having left it alone in the vessel for two month at most, pierce the vessel and the *garum*, called *himation*, is withdrawn."

## Summary

### L'archéologie du goût.

#### Le garum de Gargilius Martialis

Reconstituer de façon expérimentale des goûts est une chose très difficile, voir impossible. Bien que le *garum* ait été consommé en grandes quantités par les romains, il n'existe aucune recette décrivant précisément les ingrédients et leurs proportions. Les chercheurs ont donc eu recours à des observations ethnologiques et à des sources médiévales, ainsi qu'à une source antique, le «*De Medicina et de virtute harbarum*» de Gargialus Martialis (III<sup>e</sup> siècle).

Une sélection d'herbes aromatiques (en proportions égales – sauf pour le safran) a été ajoutée à un mélange de maquereaux, de morues et de sel naturel, le tout dans un vase de terre cuite dont l'intérieur avait été préalablement enduit de résine de pin. Clos par un bouchon de bois, le vase a été laissé 7 jours à macérer au soleil avant d'être ouvert pour remuer le mélange. L'expérience a duré presque un mois au total, pour obtenir un liquide épais avec des morceaux d'épices, de sel et de poisson amalgamés, d'une couleur

vert olive, à l'odeur forte et au goût intense de sel et de poisson gras, laissant un arrière-goût très net. Il est toutefois impossible de dire si le *garum* romain ressemblait à cela, d'autant plus qu'il semble avoir existé plusieurs gammes et plusieurs qualités de produit.

### Die Archäologie des Geschmacks – Das Garum von Gargilius Martialis

Der Versuch einen „vergangenen Geschmack“ zu rekonstruieren, mag unmöglich erscheinen. Das Würzmittel *Garum* wurde von den Römern in großen Mengen konsumiert, ein genaues Rezept mit Mengenangaben der Zutaten ist jedoch bisher nicht bekannt. Untersuchungen dazu haben deshalb ethnologische und jüngere Schriftquellen zu Rate gezogen. Die dabei hauptsächlich genutzte Quelle ist die Beschreibung in „*De medicina et de virtute herbarum*“ („Vom medizinischen und praktischen Nutzen der Kräuter“) von Gargilius Martialis aus dem 3. Jh. n. Chr. Eine Auswahl von aromatischen Kräutern, Fisch und natürlichem Salz wurden schichtweise in einem Tontopf gefüllt, dessen Gefäßwandung vorher mit einem pflanzlichen Pech versiegelt wurde. Der Topf wurde danach mit einem hölzernen Deckel verschlossen. Das Gemisch wurde anschließend zur Fermentation in der Sonne aufgestellt, in der ersten Woche ungestört und danach regelmäßig umgerührt. Das Ergebnis war eine feinkörnige Flüssigkeit mit einer olivgrünen Farbe und einem intensiven Geruch nach Fisch und Gewürzen. Die Sauce besaß einen salzigen, fetten Geschmack nach Fisch, der jedoch schnell verschwand und einen angenehmen Nachgeschmack hinterließ. Dieses Experiment ermöglichte eine Analyse der verschiedenen Variablen innerhalb des Prozesses und führte zur Formulierung von neuen Fragestellungen für zukünftige Experimente.

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