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Study of Cod reserves from the La Hougue Battle Shipwrecks (1692) through ichthyofauna remains: Supply and food aboard.

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Abstract

In 1692, in the context of the Nine Years War (1689-1697), Admiral Tourville's French fleet faced the Anglo-Dutch alliance along the Norman coast. Five large French men-of-war were reduced to ashes close to Tatihou island in St-Vaast-La Hougue bay (Manche county, France). Discovered in 1985, these shipwrecks have been excavated from 1990 to 1995 by Michel L'Hour and Élisabeth Veyrat, from the Département des Recherches Archéologiques Subaquatiques et Sous-Marines (DRASSM, Ministry of Culture). Among the numerous remains, fish bones were found in large quantities on one of the wrecks. Preliminary studies conducted between 1990 and 1992 by Myriam Sternberg determined that the fish remains were cod (*Gadus morhua* L.) which were reserved for food aboard. The data recovery during the year 2020-2021 allowed the acquisition of new knowledge on the supplying and the process carried out on this fish.

Keywords

La Hougue Battle; Ichthyofauna remains ; Cod ; Supply ; Food aboard.

Introduction

In 1985, a Norman diver discovered close to the Tatihou island in the Manche county (**Figure 1**), a group of five wrecks, corresponding to the remains of five ships of the line of King Louis XIV (**Figure 2**). In 1990, a diagnostic-survey was initiated under DRASSM's direction on the wrecks at La Hougue. Having concluded the archaeological interest of the site, the diagnosis led to the establishment of a multi-year research program directed by Michel L'Hour and Elisabeth Veyrat, from 1991 to 1995. The Conseil Général of La Manche contributed to the financing of the excavation as part of the valorisation project of the Tatihou island.

The excavation campaigns uncovered a great quantity of archaeological remains, and ichthyofauna remains were discovered at the rear of the wreck E, identified as the royal vessel “*le Foudroyant*” or “*le Merveilleux*”. These remains were the subjects of a preliminary study conducted by Myriam Sternberg between 1990-1992. This study determined that the fish remains were cod (*Gadus morhua* L.) intended for consumption aboard.

In 2020-2021, as part of a first-year master’s degree, the study focused on acquiring new knowledge about the supply and type of treatment carried out on the fish. Sediment samples collected during the excavations were studied during the year. In addition to the archaeological material, various written sources were consulted such as treaties or royal ordinances to deepen the knowledge on the organisation of supply and consumption onboard.

In this article, it is necessary to contextualise the ichthyofaunal remains through the events of the Battle of la Hougue. In addition, the contribution of the royal orders will provide more information on the management and supply of food onboard ships. Thanks to written sources, we will be able to understand in detail the different treatments of cod and its trade. Then, we will present the material from wreck E and the methodology applied to the ichthyofaunal remains. Finally, the main results of the osteological analyses and the data from the historical sources will be discussed.

Context

La Hougue Battle

In May 1692, the King of France Louis XIV and his cousin Jacques II, stripped of his throne of Great Britain, intended to invade England. To that end, the two men sent forty-two ships of the line under the command of Admiral Tourville to confront the hundred-strong Anglo-Dutch fleet north of Cotentin. Nevertheless, it was at Saint Vaast-La Hougue, between Tatihou island and the bay of Cul de Loup, that after a fierce engagement with the coalition, twelve French ships were forced to retreat, while some thirty ships were able to return to the ports of Brittany and Le Havre, and three ships were set on fire off Cherbourg. But, a few days later, the English fleet launched fire ships to attack the French ships taking refuge at La Hougue and eleven of them disappeared in flames. For twenty years, systematic campaigns to recover the wrecks were organised by the royal administration and thus the archives and local memory kept the recollection of these wrecks alive (L’Hour and Veyrat, 1998).

Royal orders, an organisational indicator

During the analysis of the Battle of La Hougue’s archives transmitted by Elisabeth Veyrat, the mentions “*morue*” and “*molue*” were sought. Royal ordinances, letters, and treaties have allowed us to deepen our knowledge on the organisation of supplies from warships, but also to extract new information on cod.

Each meal was distributed according to the rules of the church, meals with meat corresponded to “*meat day*” and fish meals were given on “*abstinence day*”. These historical sources provide information on the rations allocated to each man and the type and treatment of the fish:

[...] Il sera donné par semaine quatre repas de viande, trois de poisson, & sept de légumes. [...] Les dimanches, mardis, & jeudis, de 28. onces de lard cuit (856 g, soit 122 g par homme) pour le disner de sept hommes. Les lundis de trois livres & demie de bœuf, sans pieds ny testes (1713 g, soit 244 g par homme). Les mercredis vendredis & samedi, de vingt-huit onces de mouluë

cruë (856 g, soit 122 g par homme). Chaque jour à souper, de vingt-huit onces de pois, greau, fèves, fayols ou autres legumes cruës (856 g, soit 122 g par homme), ou quatorze onces de ris aussi cru (428 g, soit 61 g par homme) ; le tout assaisonné, sçavoir la viande, d'une pinte de bouillon (0,9313 l) dans lequel elle aura cuit, pour en faire du potage, la moluë d'un demy quart de pinte d'huile d'olive (0,116 l) & d'un quart de pinte de vinaigre (0,233 l), pour sept hommes ; [...]

(Ordonnance de Louis XIV pour les armées navales et arcenaux de marine, 1689)

The cod trade in modern times

The great cod fishery began in the 15th century with the discovery of fish-bearing shoals on the Newfoundland Island by Basque fishermen. Later, the Portuguese, the Bretons, the Normands, the Dutch and the English armed themselves to go to these shoals. The great French fishery began and has continued to this day, despite all kinds of conflicts.

During the 17th and 18th centuries, the French cod fishery flourished. The most important harbours were Le Havre, Saint-Malo, Saint-Brieuc, Nantes, Les Sables d'Olonne and, Saint-Jean-De-Luz. The French flotilla numbered 400 units and employed between 10 000 and 12 000 crewmen. However, other countries such as Great Britain, which fished in these waters, were in constant conflict with France. In 1713, the Treaty of Utrecht assigned Newfoundland and Acadia to Great Britain, but the French retained the right to fish in Newfoundland waters and to establish their own facilities on the island's shores each summer to prepare "*salted cod*". In addition, France had the sovereignty of Cape Breton Island recognized, now called île Royale, which proved to be an excellent base for cod fishing. However, the Franco-English wars of the 18th century broke the quasi-monopoly that the French held on the production and trade of cod. Nevertheless, the great French fishery remained active until the revolution of 1789 (Fournet, 1978).

The cod process.

Cod fishing in the 17th and 18th centuries took place mainly in the waters of northern America. Depending on the climatic conditions, Newfoundlanders had to adapt their fishing organisations in order to avoid a reduction in cod harvest. The cod fishery took place during the summer's months.

During the months of June and July, the Newfoundlanders fished on the Grand Banks. Fish were scarce in August. Cod fishing resumed in September and October when conditions were optimal (Duhamel Du Monceau and La Marre, 1769: 48).

Cod treatment existed in many forms and denominations. The most common treatments were "*green salted cod*", "*salted cod*" and "*stockfish*". Fishermen claimed that Newfoundland cod was the most delicate because of the ambient temperature or the good food that the cod found there (Duhamel Du Monceau and La Marre, 1769: 40).

For the so-called "*green salted*" cod fishery, the fishermen settled in open sea on the shoals. All operations were carried out aboard the ship, and each crewman had a specific role. When the cod arrived on deck, they were unhooked from the nets and sent to the header, who cut off the head and gutted the fish. Then the dresser split the fish along its entire length and removed the backbone. Certain parts of the body were recovered and treated by the sailor, such as the tongue, the stomach or the

bladder for consumption or to make fishing bait. The last step was salting. The fishermen salted each fish individually and stacked them in the holds on the return journey (**Figure 3**) (Duhamel Du Monceau and La Marre, 1769: 65-79).

The second preparation, called “*salted cod*” was organised differently. It was hierarchised around several posts managed by a large crew gathering between 30 and 200 men. It was divided into two main steps: the first concerned the fishing onboard the fishing boat and the second the shore service.

When the fishery was successful, the fishing boats would moor to the scaffold. The men on shingle entered the boats and picked up the cod to deposit them on the wharf. The cod were sent to the cutter, who opened the throat and stomach of the fish to recover the tongue. Then the fish were sent to the dresser. There were two ways to dress cod. In the first, the dresser split the cod from the head to the anus to remove the backbone, reserving only a small piece of the tail. And the second was not removing the entire backbone to support the cod. The fish was then retrieved by the gutter, who had to detach the head and gut the fish. A final cut was made by the slicer. The codfish were collated by the salter, who placed a layer of salt on the floor of the scaffold and formed a bed of cod by placing the skin at the bottom and the flesh at the top. When the cod had given up their water and blood and the salt was incorporated, they were sent to the washing place. The washhouses were cages placed on the shore so that the seawater could come in during washing. When white flesh was obtained, they were removed from the water and taken to dry on the shore. They were spread next to each other without touching (**Figure 5**). Then followed a long period of drying for several days until the moment of boarding (Duhamel Du Monceau and La Marre, 1769: 82-107).

The “*salted cod*” had the advantage of longer preservation than “*green salted cod*”. It did not lose its quality when it was stored, and it tolerated the heat much better when it was exported.

The last treatment for cod is “*stockfish*”. This treatment was produced mainly in the northern countries by Norwegian or Baltic Sea fishermen. The fish was simply beheaded, emptied, and then hung by the tail with a rope and dried by the wind (Allemandou, 2018). When the fish was well prepared and served in shops, it could be kept for several years without deteriorating. Thanks to the cold dry northern wind, fermentation was delayed, unlike the humid heat of the European climate which accelerated this process (Duhamel Du Monceau and La Marre, 1769: 110-114). Despite the marketing around the producing regions, there is evidence of export of this product for consumption by the population, armies in the field and sailors (Allemandou, 2018: 155).

Materials and methodological approach

The materials presented in this study come from samples taken during the 1991 campaign on wreck E at the Hougue wreck site. The materials studied include the bones from area XIV (“*STVH 91-E-XIV.6*”) and, more specifically, from “*sampling 4*” (**Figure 4**) corresponding to sediments filled with cod bones taken in bulk from 3 m x 3 m square XIV.6 (“*STVH 91-E-XIV.6, sampling 4*”). In addition, three one-millimeter mesh sieve bags were taken from batch “*STVH 91-E-XIV.6, sampling 4*”. Both batches contain 1826 cod bones (**Figure 9**). The selection of these batches is based on the testimony that they were the storage holds for the crew’s food. These batches yielded a multitude of head bones and vertebrae (Sternberg, 1991). As part of the first-year master, we were only able to study the head bones and carry out preliminary work on the vertebrae.

The methodology of the osteological study is divided into seven steps. The first two steps are to determine anatomically and taxonomically the bones. Then, the lateralisation of the bones makes it possible to obtain an MNI (minimum number of individuals) which gives an approximate value of the

fish stock. Afterward, the bones are measured according to the standards defined by different authors. For *Gadus morhua*, the measurements have been defined in the publication of Morales and Rosenlund for several bones. However, these publications do not allow the calculation of the size and mass of the fish. Here, the article entitled “*Live length and weight of cod (Gadus Morhua) estimated from various elements*” by Alfonso Rojo was used, as it is the only extensive osteometry work on *Gadus morhua*. The next step is to observe and replace the vertebrae in the axial skeleton of the cod. Then the taphonomic and traceological observations allow the examination of the cutting traces and the preservation of the bones. Finally, the aim of the sieving was to check that no small individuals were excluded, that no small species were missed and to check the anatomical representation of the species.

Presentation and discussion of preliminary results

First of all, taxonomic identification was not necessary because the only species present in the corpus is *Gadus morhua* L. (**Figure 7**) which had already been identified in the preliminary work of Myriam Sternberg (Sternberg, 1991). With the recovery data during the year 2020-2021, we were able to inventory the bones present in the “*STVH 91-E-XIV.6*” and “*STVH 91-E-XIV.6 sampling 4*” batches. These batches delivered *cleithra*, basiptyrgiums, coracoids, *post-cleithra*, post-temporal, scapula and *supracleithra* (**Figure 6**). These bones belong to the pectoral girdle (**Figure 8**). The bones of the head, anterior to the pectoral girdle and the neurocranium are non-existent in this corpus, which makes it possible to hypothesise that the cods were beheaded.

In this corpus, 796 bones could be lateralised. Lateralisation of the *cleithrum* made it possible to estimate an MNI of 227 individuals. Being the most represented bone, it was chosen as a reference bone for the rest of the study.

In this study, measurements and calculations of size and mass were made on the right *cleithra*. We obtained a size scale between 60 cm and 67 cm. The total weight with the viscera varies between 2.05 kg and 3.05 kg and the empty weight evolves between 1.611 kg and 2.411 kg.

The treatment of the vertebrae was not completed during the study. The inventory made it possible to count 1010 vertebrae for batch XIV.6. The precaudal vertebrae (close to the head) are not many. The vertebrae in the middle of the spine are more represented, as are the last vertebrae. The presence of the last vertebrae indicates that some cod had their tails.

The indication of preparation, and therefore conservation of the fish, can be seen in the distribution of the skeleton present or absent in the corpus. The chosen preparation would be salted cod or “*stockfish*”.

During the study, we noticed that the state of conservation of the bones was very heterogeneous. We found that many of the bones, including *cleithra*, had very crumbling surfaces and that others had been broken in various areas. In addition, colour variations from white to brown were observed, as well as dark brown and dark green pigmentation (**Figure 10**). The colour changes of their surfaces are explained by the position of the bones in the wreck and the surrounding elements. Bones with a darker ochre surface were immersed in a dense, muddy, anaerobic sediment, while those with a very pale, almost white tint were generally found outside the sediment. The colour would be an indicator of the surrounding sediment, in the same way as the presence of metal nearby (especially ferrous), would be the cause of the blackish pigmentations on the bones. As for the crumbling on the bones, it would be due to the salinity of the marine environment. This phenomenon is recurrent on many underwater archaeological remains, but it could be slowed down because the bones were all desalinated and stored

in water to remove as much salt as possible, before being dried during excavation. The fractures on the *cleithra* could be explained by two phenomena. The first one, and most consistent, is that during the treatment of the cod, when the cod is beheaded, it is possible that the fishermen broke some ends of the bone. The second possibility is alteration by taphonomic phenomena, which could have facilitated the fragmentation of certain bones during collection.

The sieving made it possible to extract a quantity of remains: seeds, glass, metal, textiles, fragments of fauna, ceramics and flint (**Figure 11**). Each of these remains is a testimony, either of life aboard, or of the consumption of food or of war. Bone remains of cod were also found, their observation allowed the identification of small vertebrae. These small vertebrae could be an indicator of small fish supply.

In addition, several fishing hooks were discovered by archaeologists during the excavation, the hypothesis of itinerant fishing is likely. However, archaeologists are not certain that these materials are contemporary to the life of the ship. They could indeed belong to later fisheries carried out in the area of the wrecks, which became an excellent fishing ground for local fishermen after the sinking.

Conclusion

Analyses of the ichthyofauna remains and the contribution of written sources make it possible to formulate the following hypotheses: the cod remains found in wreck E, identified as the remains of the vessel “*le Foudroyant*” or “*le Merveilleux*”, could correspond to salted cod or “*stockfish*” type preparation. The preserved bones, such as the pectoral girdle, the vertebrae, including that of the tail, and the absence of the front part of the head evoke these types of treatment.

The next study, on the bone remains, and in particular on the vertebrae, will allow to better specify the type of preparation used. To understand the supply and consumption of fish resources in the vessels, it is necessary to undertake in-depth work on the various written and archaeological sources of the 17th - 18th centuries. Ethnoarchaeology and experimental archaeology can also be used to advance our interpretation on fish cutting and preservation processes.

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Bibliography

- Allemandou, G., 2018, Le stockfish et la morue mis en recette, *Techniques et culture*, 69, 153-167.
DOI :
10.4000/tc.8817
- Belanger, J., 2009, Histoire de la Gaspésie, *Institut québécois de recherche sur la culture*, 1-4.
- Briere, J-F., 1982, L'état et le commerce de la morue de Terre-Neuve en France au XVIIIe siècle, *Institut d'histoire de l'Amérique française*, 323-338.
DOI :
10.7202/304066ar
- Brumont, F., 2018, Les normands à Terre-Neuve au XVIe siècle, *Association Les Annales de Normandie*, 35-60.
DOI :
10.3917/annor.682.0035
- Cosepac., 2003, Evaluation et rapport de situation du COSEPAC sur la morue franche au Canada, *Comité sur la situation des espèces en péril au Canada*, iii-121. Ottawa.
- Cote-Behert, A., 2009, La situation des stocks de morues franches (*Gadus Morhua*) de Terre-Neuve-et-Labrador – Les causes de son faible recrutement, *Centre universitaire de formation en environnement, Faculté des sciences*, i-75.
- Couperie, P., 1963, Régimes alimentaire dans la France du XVIIe siècle, *Annales*, 1133-1141.
- Delumeau, J., 1959, Le commerce malouin à la fin du XVIIe siècle, *Annales de Bretagne et des pays de l'Ouest*, 263-286.
DOI :
10.3406/abpo.1959.2081
- Duhamel du Monceau, H-L., 1769-1782, *Traité général des pesches et histoire des poissons qu'elles fournissent tant pour la subsistance des hommes, que pour plusieurs usages qui ont rapport aux arts et au commerce, Paris, Saillant et Nyon*, 3 volumes.
- Fournet, P., 1978, La grande pêche morutière française, *Travaux de l'institut de Géographie de Reims*, 37-58.
DOI :
10.3406/tigr.1978.1051
- Gury, J., 2001, La philosophie et la morue. Histoire philosophique et politique de la pêche et du commerce de la morue de la Terre-Neuve, *Dix-Huitième Siècle*, 81-100.
DOI :
10.3406/dhs.2001.2400
- Guyotjeannin, O., Briere, J-F., 1990, La pêche française en Amérique du Nord au XVIIIe siècle, *Revue française d'histoire d'outre-mer*, 229-230.
- Hesart de la Villemarque, J., 1995, La pêche morutière de 1500 à 1950 : statistique, climat et société, *Edition IFREMER*, 134.
- Huet, M., 1987, Ostéologie crânienne de dix gadidés du littoral breton, étude descriptive et comparative appliquée à la diagnose des espèces, *Ecole national vétérinaire de Toulouse*. Toulouse.
- L'Hour, M., Richez, F., Veyrat, E., 1990, les épaves de la Bataille de la Hougue (1692), *Sondage – Diagnostique 1990, DRASSM*, 2 volumes, 51 and 74.

L'Hour, M., Veyrat, E., 1991, les épaves de la Bataille de la Hougue (1692), sauvetage programmé 1991, *DRASSM*, 2 volumes, 40 and 59.

L'Hour M. Veyrat E., 1992, les épaves de la Bataille de la Hougue (1692), sauvetage programmé 1992, *DRASSM*, 2 volumes, 45 and 28.

L'Hour, M. Veyrat E., 1998, Les épaves de la bataille de la Hougue (Manche). L'art de bâtir les vaisseaux sous Louis XIV, *Archaeonautica n°14*, 243-251. DOI :
10.3406/nauti.1998.1211

L'Hour, M. Veyrat E., 2005, La mer pour mémoire. Archéologie sous-marine des épaves atlantique, éd. *Somogy et association Buhez*, 367.

Rojo, A., 1987, Live length and Weight of Cod (*Gadus Morhua*) estimated from various skeletal elements, *North American Archaeologist*, 329-351. DOI:
10.2190/AMXN-UJ9H-Q924-PL3U

Scott, J-S., 1977, Back-calculated fish lengths and Hg and Zn level from recent and 100 year old cleithrum bones from Atlantic Cod (*Gadus Morhua*), *Journal of Fisheries Board of Canada*, 147-150. DOI: 10.1139/f77-020

Sternberg, M., 1990, « Les ossements », in L'Hour, M., Veyrat, E. Les épaves de la bataille de la Hougue (1692), Sondage archéologique 1990, *DRASSM*, 36-37.

Sternberg, M., 1991, « Les restes ichtyofauniques », in L'Hour, M., Veyrat, E. Les épaves de la bataille de la Hougue (1692), Sauvetage programmé 1991, *DRASSM*, 31-32.

Toujas, R., 1954, I. Le poisson séché, monnaie réelle à Montauban, au XVIIe siècle, *Annale du Midi : revue archéologique, historique et philologique de la France méridionale*, 171-173. DOI :
10.3406/anami.1954.5991

Watt, J. Pierce, G-J. Boyle, P-R., 1997, Guide to the identification of North Sea fish using premaxillae and vertebrae, *International Council for the Exploration of the sea*, 48-49. DOI:
10.17895/ices.pub.4627

Internet website

ADRAMAR. Atlas Ponant. <https://www.atlasponant.fr/>

COUTUREAU M. CLAVEL B (2004). ArcheoZoo.
https://www.archeozoo.org/archeozootheque/picture/gadus_morhua/tags/299-gadidae

FFESSM. (2021), Données d'Observation pour la Reconnaissance et l'Identification de la faune et de la flore Subaquatique. <https://doris.ffessm.fr/>

TERCERIE S. BEAREZ P. PRUVOST P. BAILLY N. VIGNES-LEBBE R. (2021), Osteobase. World Wide Web electronic publication. <http://osteobase.mnhn.fr/index.php?lang=fr>

THE UNIVERSITY OF NOTTINGHAM. (2021), Archaeological fish resource.
<http://fishbone.nottingham.ac.uk/>

VETOFISH. (2002-2021), VetoFish. <https://www.vetofish.com/definitions>

Figures

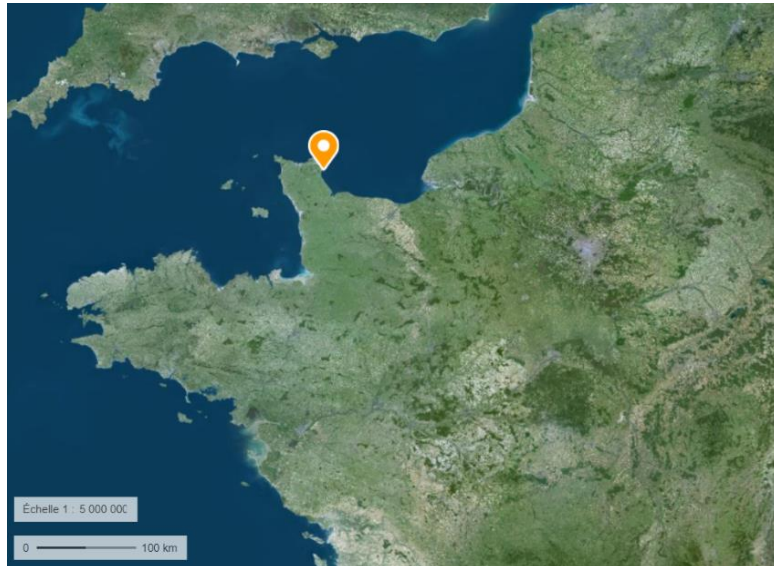


Figure 1 : IGN map location of the St-Vaast-la-Hougue (France). 2022.



Figure 2 : IGN photo of the localisation of the five shipwrecks at the south of Tatihou island (labelled A/B, C, D, E, F). 2022.



Figure 3 : Illustration of the treatment of the green cod. F1: general view of the preparation of the green cod; F2: Pollarding and dressing of cod; F3: Stacking and salting of cod, 18th century. *Traité général des pesches*. Duhamel du Monceau. 1772.

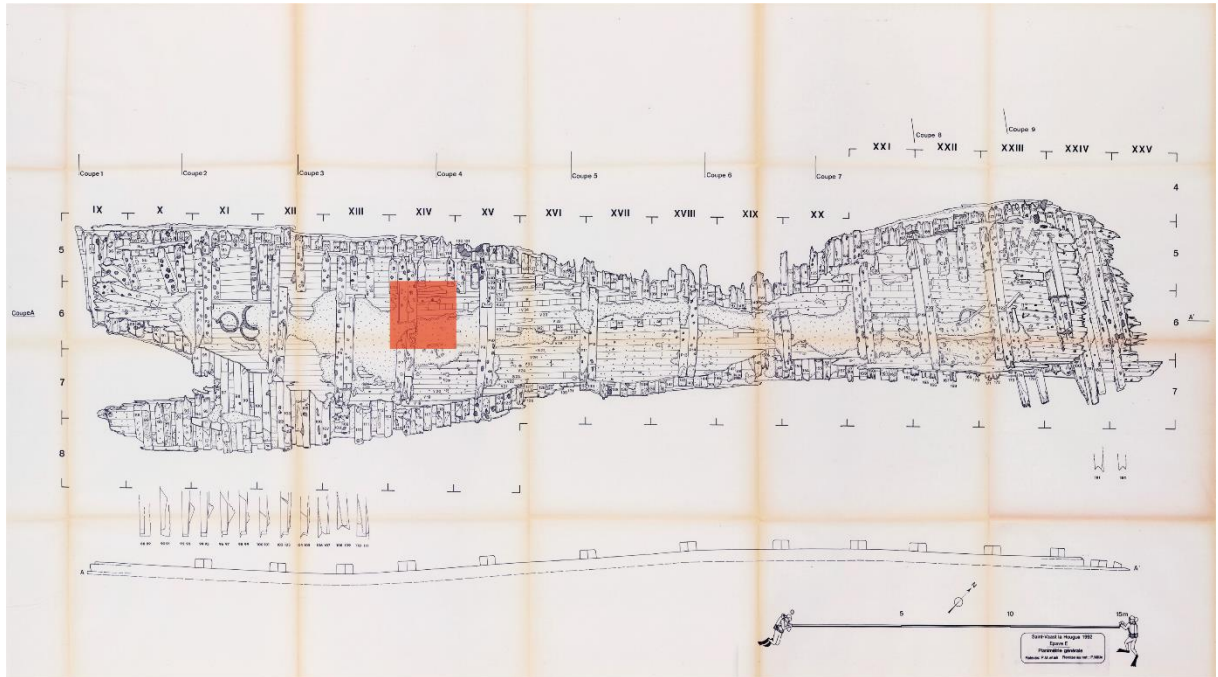


Figure 4 : General map of la Hougue, Wreck E (1692). Port side of the wreck. Front side: right ; back side: left. Drawing P.Mille (DRASSM).



Figure 5 : Overview of salted cod on land, 18th century. *Traité général des pesches*. Duhamel du Monceau. 1772.

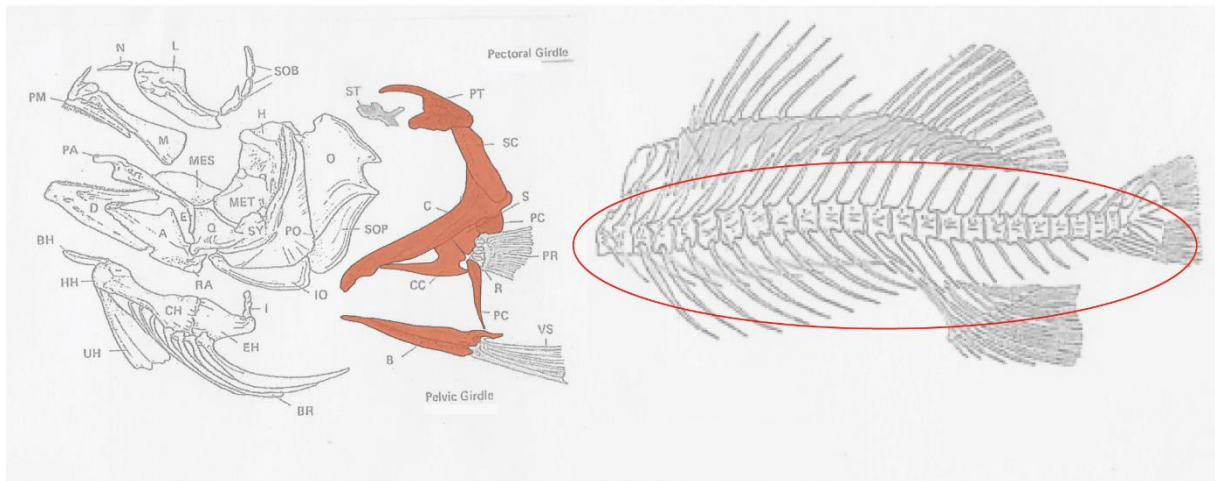


Figure 6 : Representation of a cod skeleton (2022). Drawing: D. Cannon; modification: L. Bonjour.



Figure 7 : Representation of a cod (*Gadus morhua* L.) (2022).



Figure 8 : Photography of the pectoral girdle of *Gadus morhua* (2021). L. Bonjour.

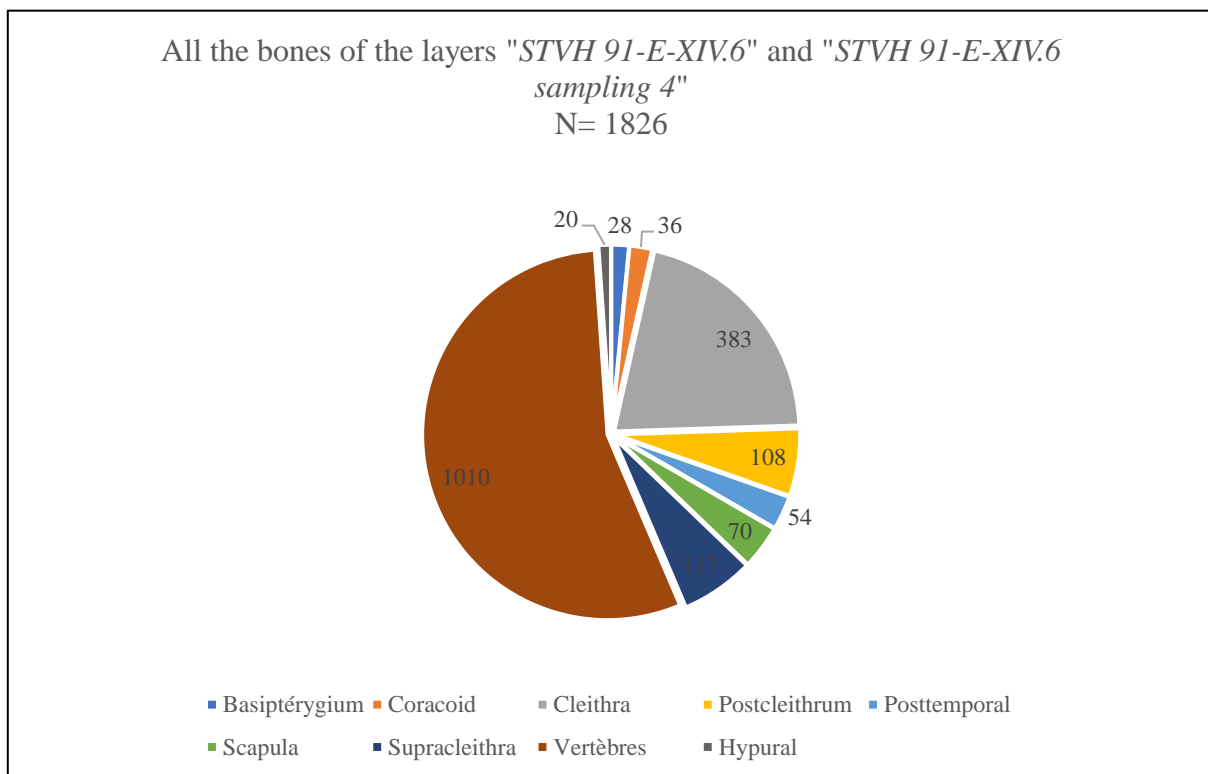


Figure 9 : All the bones of the layers "*STVH 91-E-XIV.6*" and "*STVH 91 E-XIV.6 sampling 4*" (2021). L. Bonjour.



Figure 10 : Photography of damaged *cleithra* (2022). L. Bonjour.



Figure 11 : Photography of the remains of flint, glass, seeds and fabric from sieving (2021). L. Bonjour.