AUTOPSY OF THE GALLO-ROMAN WRECK, DURING COMPLETE DISMANTLING FOR CONSERVATION: LYON SAINT-GEORGES 4 (FRANCE)

Marc GUYON

Discovery and history

During the building of an underground car park in Lyon, on the level of a fossil bank of the river Saône, archaeological rescue operations were carried out by the French Institute of Preventive Archaeological Research (Inrap) on commission of the Ministry of Culture. Field works, directed by Grégoire Ayala (Inrap), took place from October 2002 to June 2004.

Inside a cofferdam an area of approximately 4000 m2 was investigated to a depth of 10 m according to the traditional methods of terrestrial archaeology. Within a few months, 16 wrecks were uncovered and documented under the direction of Marc Guyon (Inrap).

Only 3 of the 6 Gallo-Roman wrecks have been preserved by re-immersion. The characteristics of these wrecks highlight the existence of a regional shipbuilding design. At the moment, only wreck "***Lyon Saint-Georges 4***" is being conserved while the two others are still underwater.

The scientific objectives

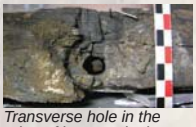
The dismantling of the boat, needed for conservation purposes, was an opportunity to enriche and extend further the observations made in 2004.

The challenge is

- to understand and identify all the stages of the processing and implementation of the raw materials use to build this flat-bottomed large capacity riverboat.
- to find out the various stages of assembly at the construction site.
- to locate its repairs and their frequency in order to assess the duration of use of the boat.

The new archaeological observations showed that this boat was already unused and altered at the time of its final burial by a flood in 210 AD. This will undoubtedly enable to establish its maintenance shedule during its period of use and to define how long it sailed for.

Transcription work on plastic film



Transverse hole in the edge of bottom plank

Hollowing in the edge of the plank carved to receive the head of a nail

Peg blocking a nail hole

The barge of Lyon Saint-Georges 4 (LSG4) Is being conserved since January 2014 and will be exhibited at of 2017 at the Gallo-Roman Museum of Lyon-Fourvière.

Please go and see the ARC-Nucléart poster on dismantling and conservation.

Archaeodendrometry studies

The work is done at two different stages: first before impregnation of PEG second after freeze-drying the wood. These studies establish an important *corpus* of about 1000 pieces of wood. All the pieces follow a multilevel analysis without taking any samples.

This results in the compilation of data on taxonomic identification, dating, technical work of wood, uses and the re-uses and forest of origin localisation.

A compilation of data to feed related research field

This project is part of an inter-institutional and multidisciplinary research programme. Among the lines already discussed, there will also be:

Textile:
No less than 25 m of linear sealing product will not be replaced when reassembling the wreck. The study of textile beads will enable exploration of the handicraft of recycle textiles. This *corpus* will be without doubt the most important known for this historical period.

Metals:
Lead strips on the front part of the boat were removed for separate conservation treatment. This temporary repair had been carried out using unrolled lead pipes. Inscriptions found on the lead pipes will enable to start a study on recycling.
Analyses within the metal allow the quantification of the main impurities. The objective will be to detect the homogeneity or heterogeneity to discriminate the different phases of construction or repair. If necessary, an isotopic analysis will be carried out.
Around 2,100 nails were removed from the wreck and will not be used for reassembly. The important presence of iron sulfide is too great a risk for the preservation of wood.
For 200 specimens, metallographic analysis will determine the exact nature of the metal. Besides, study will attempt to detect specific technical skills, phasing of construction and repairs.

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CONSERVATION OF THE GALLO-ROMAN WRECK LYON SAINT-GEORGES 4 : FOCUS ON INTERDISCIPLINARITY

Laure MEUNIER-SALINAS

Raising

Long after excavation and after a 10 years underwater storage, the wreck LSG4 was raised and transported to the conservation laboratory ARC Nucleart in Grenoble.

The operation took place by night, because the road where we sat a crane and three trucks was used by a quarry during day.

Four divers prepared the eight sections and approached them along the bank. The crane took them, following a loading plan, and put them on the bank.

There, the conservators wedged them for transport and then wrapped them in a plastic film to be conserved wet.

The elements arrived in Grenoble in the next morning and took place in a warehouse, equipped to spring fresh water on the wreck until the end of the dismantling.

Conservation for study and preservation

The dismantling of the wreck, needed for conservation purpose, was an opportunity to work tight with the archaeological team. First, we decided to coordinate our schedules to fit with the data acquisition. We also discussed the order of the operations to allow each one to do his best.

Each material has been observed inch by inch, before adapted conservation technics were applied.

At every step of the process, new things can be observed. The conservation team make it available. A really complete study of the ship can so be conducted.

Exchanging data from different fields increases each one questionning, increases data and considerably increases global knowledge.
As for example it was easier to make a sharp selection of material for analyses.
Working together and not separatly will benefit the glogal result, both on a scientific and on a museum point of view.

Removal of a timber with the crane

Insertion in the freeze-dryer of flat-bottom pieces treated with PEG

Conservators clean and return timbers for archaeological study

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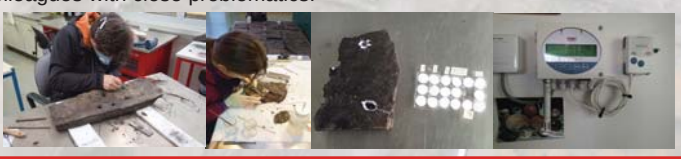
Please go and see the Inrap poster on the archaeological study.

The conservation challenge

Since the very beginning of the operation, we have to deal with a very important presence of iron and sufur compounds in the wood, coming from the nails and their degradation in anaerobic conditions. This can lead to an acidification of the wood and with time to the destruction of artefacts conserved in the normal atmosphere.

To avoid this, we have made a five points plan, taking place at every step of the conservation process :
- removal of every nail (above 2,100) and coring of the iron and sulfur compounds during the dismantling
- complementary coring after freeze-drying following a very specific condition assesment
- elaboration of an alkaline buffer paste to be put in the nails' holes to prevent acidification after complementary coring
- working group with the museum to prepare the arrival of the shipwreck, especially with an air-controlled system to stay at 50%RH
- preparation of a follow-up plan to know what to monitor after treatment, and which warning indicators can be settled, after consultation of international colleagues with close problematics.



Still underwater

There are still two roman shipwrecks in the temporary storage lake, waiting for some complete archaeological studies, a conservation plan and a museum to be settled in.

In the light of the new discoveries on LSG4, we can also expect at least the same potential for each wreck still waiting.
But they've been there for already 12 years, without real monitoring or conservation survey. They're getting deteriorated by vegetation and insects and may be destroyed before any complete archaeological study or conservation plan are set.

If there is neither museum project nor conservation plan, the sensitive option would be a temporary solution of reburial to slow down the deterioration process and give time to find money for different studies. This way have already been explored in different countries, with a survey to assess the state of the wreck.
Otherwise, as the wrecks are actively deteriorating, the only remaining option may be a raising and a complete dismantling for archaeological purposes, and then destruction, which can be less expensive but quite a bit definitive.

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