The Kyrenia Ship Conservation Project

Kyrenia Ship Collection:

Conservation Progress Report

March 2017

Photographs courtesy of Veronica Ford and Cassy Cutulle, 2017

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General Introduction

Throughout March, a multitude of activities—both preventive and remedial—were undertaken by conservators Cassy and Veronica. Logging of relative humidity and temperature took place as usual within the Conservation Laboratory to obtain an idea of the ongoing seasonal fluctuations occurring within the storage spaces. Additionally, recorded relative humidity and temperature data for the Kyrenia Ship Storeroom, Ship Gallery and Shipwreck Museum Gallery were uploaded from the Tiny Tag monitors to provide in-depth information on the environmental fluctuations occurring throughout the Castle. Both within the Kyrenia Ship Storeroom and the Conservation Laboratory the sticky blunder pest traps were examined and the information recorded so as to update our integrated pest management logs. Furthermore, re-housing of the lead rigging rings and some miscellaneous strakes from the Hull was started. Supplies have been continuously sourced throughout these activities.

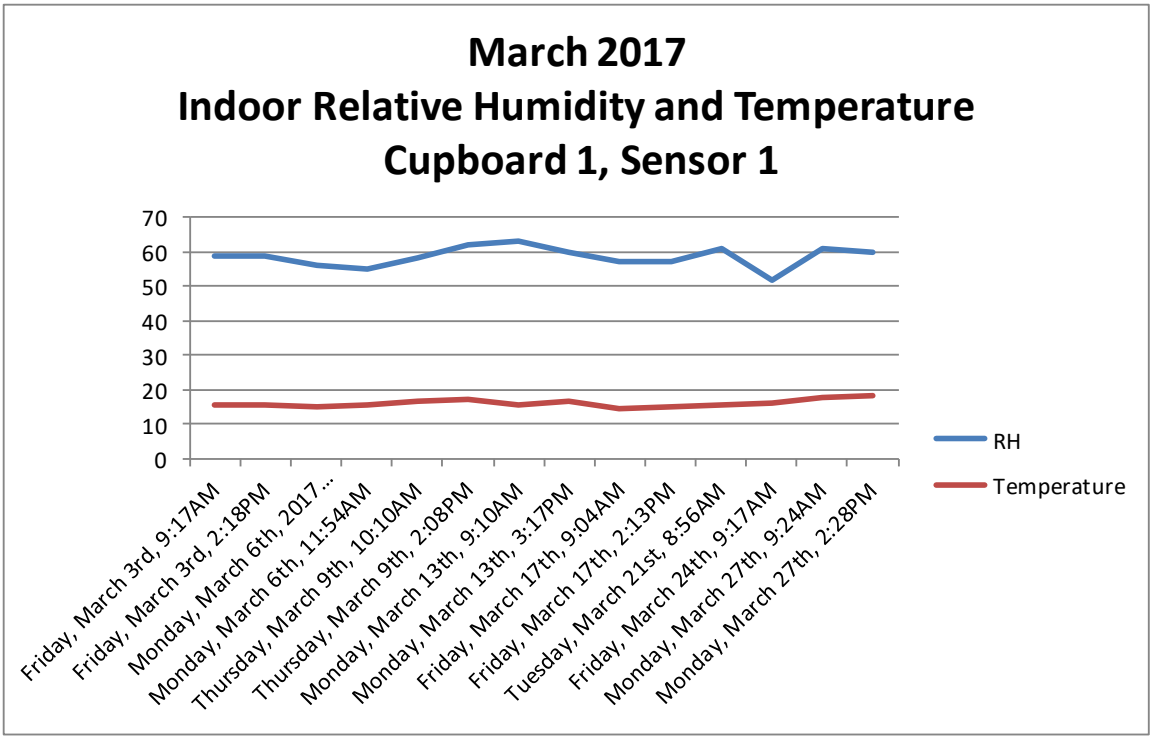
Remedial work has focused on the treatment of the metal objects at the Conservation Laboratory in Nicosia. Work is also still continuing on the restoration of ceramics P15 and P21. The aim is to finish up these treatments and commence the packaging of the completed objects in the Laboratory for transport back to Kyrenia Castle in early April.

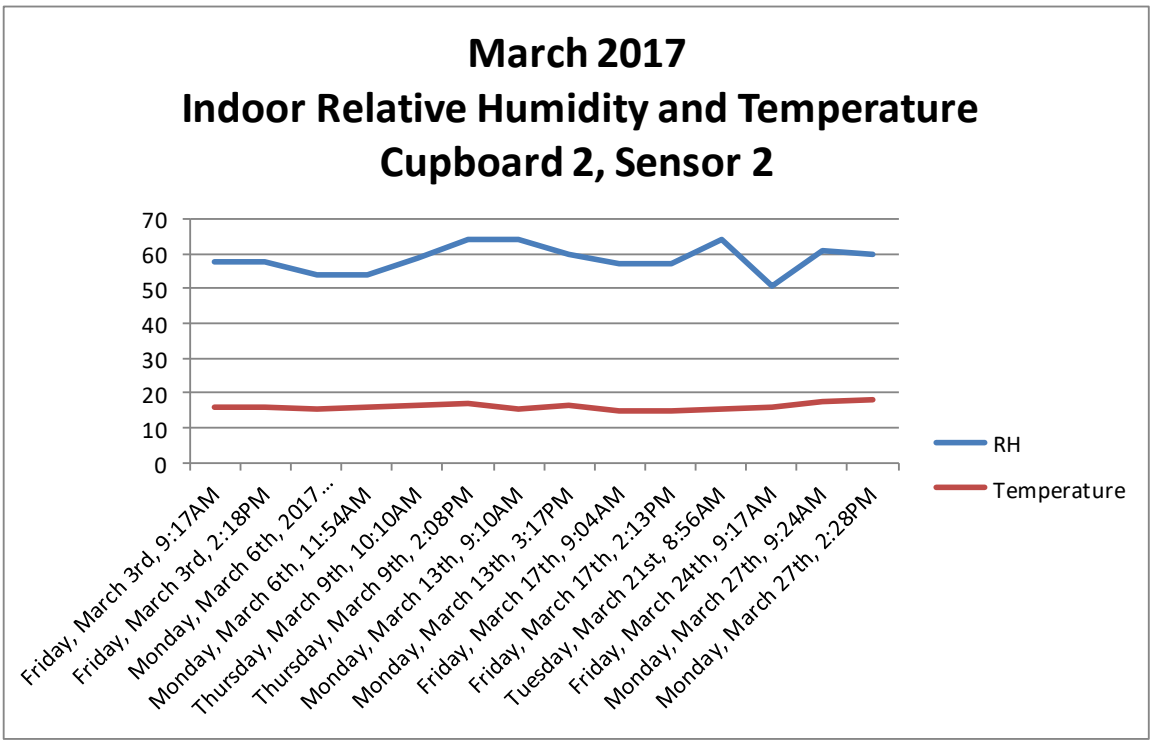
Figs. 1-2: Photographs of conservators Cassy Cutulle and Veronica Ford uploading data from the Tiny Tag environmental monitoring devices. Information on relative humidity and temperature that was collected every seven minutes from December 12th, 2016 to March 1st, 2017 was uploaded from the devices onto the Project computer (Photographs courtesy of Veronica Ford and Cassy Cutulle, 2017).

March 2017: Conservation Tasks in Progress

Preventive Conservation Tasks

In March, relative humidity and temperature data from the Conservation Laboratory in Nicosia continued to be collected and assessed by the conservators. Data was obtained from two object storage cupboards situated within the Conservation Laboratory, while external conditions were recorded from "Weather.com". The same recording schedule was utilized as previously: logging of relative humidity and temperature took place four times a week—two recordings on Monday and Friday mornings and afternoons at approximately 9:00am and 2:00pm. On several days, data was not collected due to lack of internet access or work obligations at Kyrenia Castle.


March 2017
Indoor Relative Humidity and Temperature
Cupboard 1, Sensor 1
70
60
50
40
30
20
10
0
Friday, March 3rd, 9:17AM
Friday, March 3rd, 2:18PM
Monday, March 6th, 2017 ...
Monday, March 6th, 11:54AM
Thursday, March 9th, 10:10AM
Thursday, March 9th, 2:08PM
Monday, March 13th, 9:10AM
Monday, March 13th, 3:17PM
Friday, March 17th, 9:04AM
Friday, March 17th, 2:13PM
Tuesday, March 21st, 8:56AM
Friday, March 24th, 9:17AM
Monday, March 27th, 9:24AM
Monday, March 27th, 2:28PM
RH
Temperature


March 2017
Indoor Relative Humidity and Temperature
Cupboard 2, Sensor 2
70
60
50
40
30
20
10
0
Friday, March 3rd, 9:17AM
Friday, March 3rd, 2:18PM
Monday, March 6th, 2017 ...
Monday, March 6th, 11:54AM
Thursday, March 9th, 10:10AM
Thursday, March 9th, 2:08PM
Monday, March 13th, 9:10AM
Monday, March 13th, 3:17PM
Friday, March 17th, 9:04AM
Friday, March 17th, 2:13PM
Tuesday, March 21st, 8:56AM
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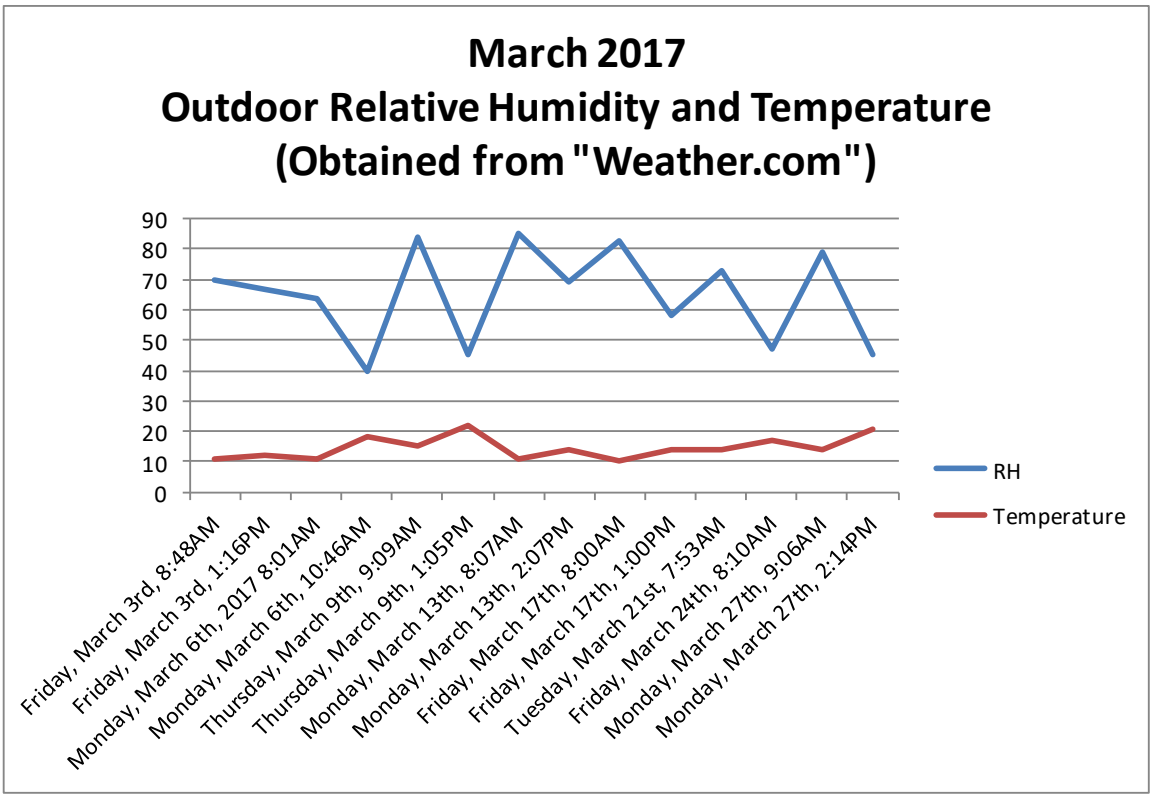
RH
Temperature



Figs. 3-5: Line graphs displaying the relative humidity and temperature within the two object cupboards housed in the Conservation Laboratory in Nicosia and the overall humidity and temperature outdoors (Graphs courtesy of Cassy Cutulle, 2017).

The line graphs above display the relative humidity and temperature variations throughout the month of March both within the two object cupboards in the Laboratory and also outdoors. For both cupboards, the fluctuations illustrate a change in seasons seen in the steady temperature rise throughout the month as spring begins. The higher relative humidity in both cupboards can be also attributed to the start of spring in Cyprus, coinciding with increased rain. The outdoor graph shows much more fluctuation in overall humidity, with some variation in temperature.

For the most part, both graphs demonstrate stable variations within the range of 50-65% relative humidity and 14-19 C, with only one sharp increase and decrease towards the end of the month. The higher average relative humidity is concerning for the metallic objects, however, their packaging in additional archival boxes with acid-free tissue paper and silica gel does greatly help to combat this. Overall, these graphs demonstrate that the metal cupboards are important in buffering out the external variations. This information is particularly pertinent for our impending re-housing work at Kyrenia Castle, where the conservators will be storing the treated metal and ceramic objects in the same type of metal cupboards.

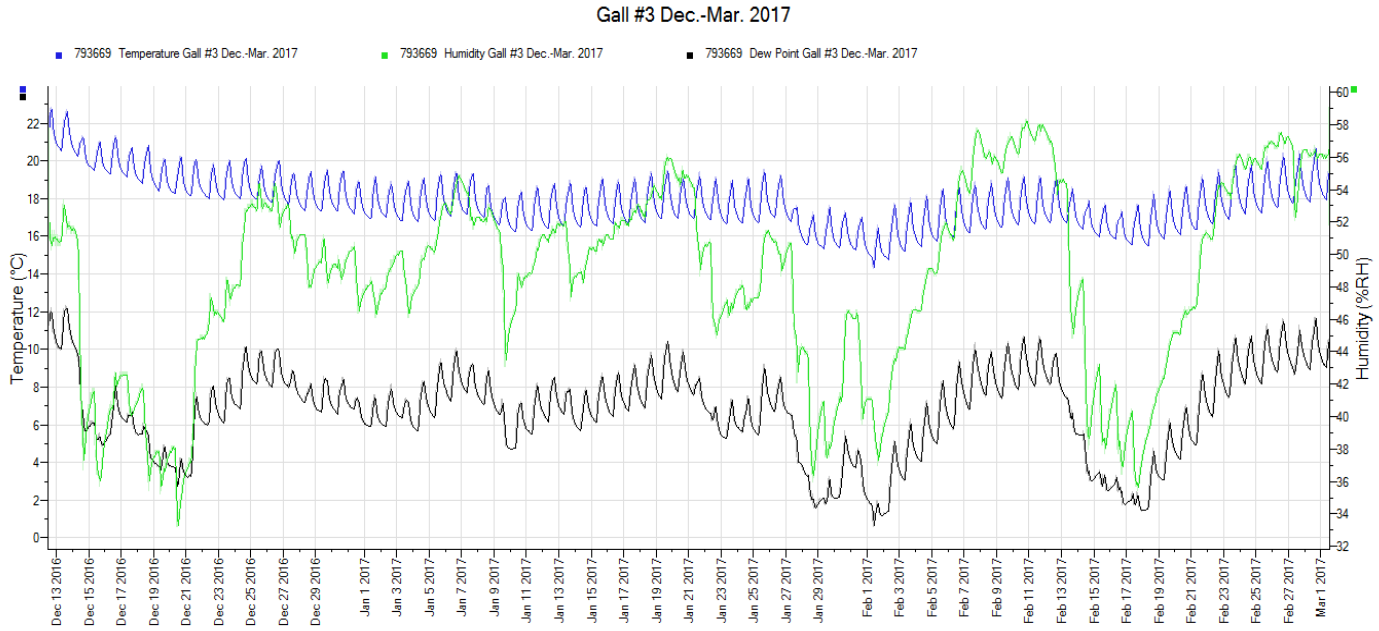
On March 1st, the conservators extracted the environmental data recorded by the Tiny Tag monitoring devices, which recorded temperature and relative humidity readings every 7 minutes for three

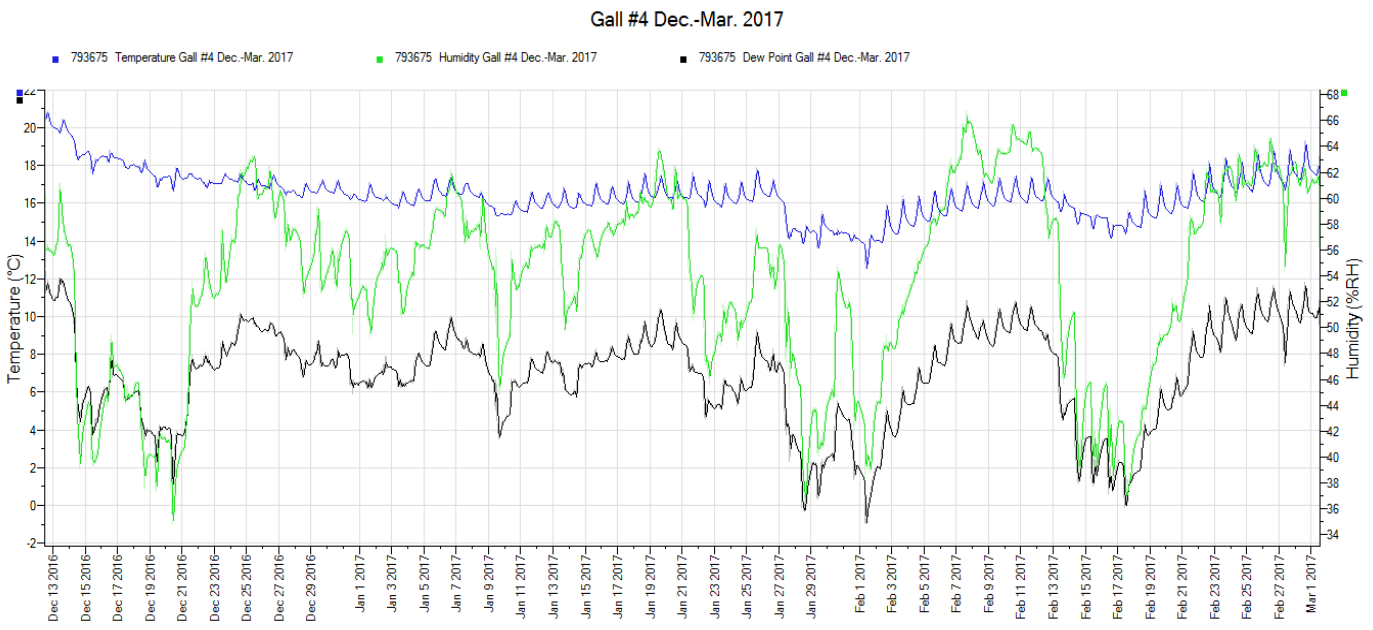
months from December to March. Two monitors were already in place in the Ship Gallery and with the addition of four more Tiny Tag monitors—2 in the Shipwreck Museum Gallery and two in the Kyrenia Ship Storeroom—more detailed information was acquired about the environmental fluctuations occurring throughout the seasonal shifts.

Fig. 6-7: Line graphs displaying the temperature (blue lines), relative humidity (green lines), and dew point (black lines) in the Ship Gallery at seven minute intervals over the period from December 12th, 2016 to March 1st, 2017.

In the Ship Gallery, two Tiny Tag monitoring devices recorded relative humidity and temperature every 7 minutes on either side of the Hull. The line graphs above show the data recorded over the period from December 12th, 2016 to March 1st, 2017. Both monitors show very similar line graph data. A steady increase in temperature from December to March can be seen, in accordance with the warmer season approaching. The temperature does remain relatively stable in this space with a range of 15-21 C over the past 3 months. There are some spikes and decreases in temperature, however, these are mostly gradual and uniform fluctuations which are not typically concerning and indicate a regular, daily shift.

The relative humidity range of 42-70% over the past 3 months is more concerning. Although it is understandable to have various increases and decreases in relative humidity as the seasons change, the nature of the fluctuations are not ideal. As seen in the green line, the spikes and decreases occur over shorter periods of time and are not gradual or regular, like the temperature data. Ideally, relative humidity fluctuations should occur within the range of 50% +/- 5% and at most 10%. These types of fluctuations in relative humidity can negatively affect the wood of the Hull as the wood swells and contracts with the increase and decrease of humidity in the air. These fluctuations can therefore increase degradation, especially over a long period of time.

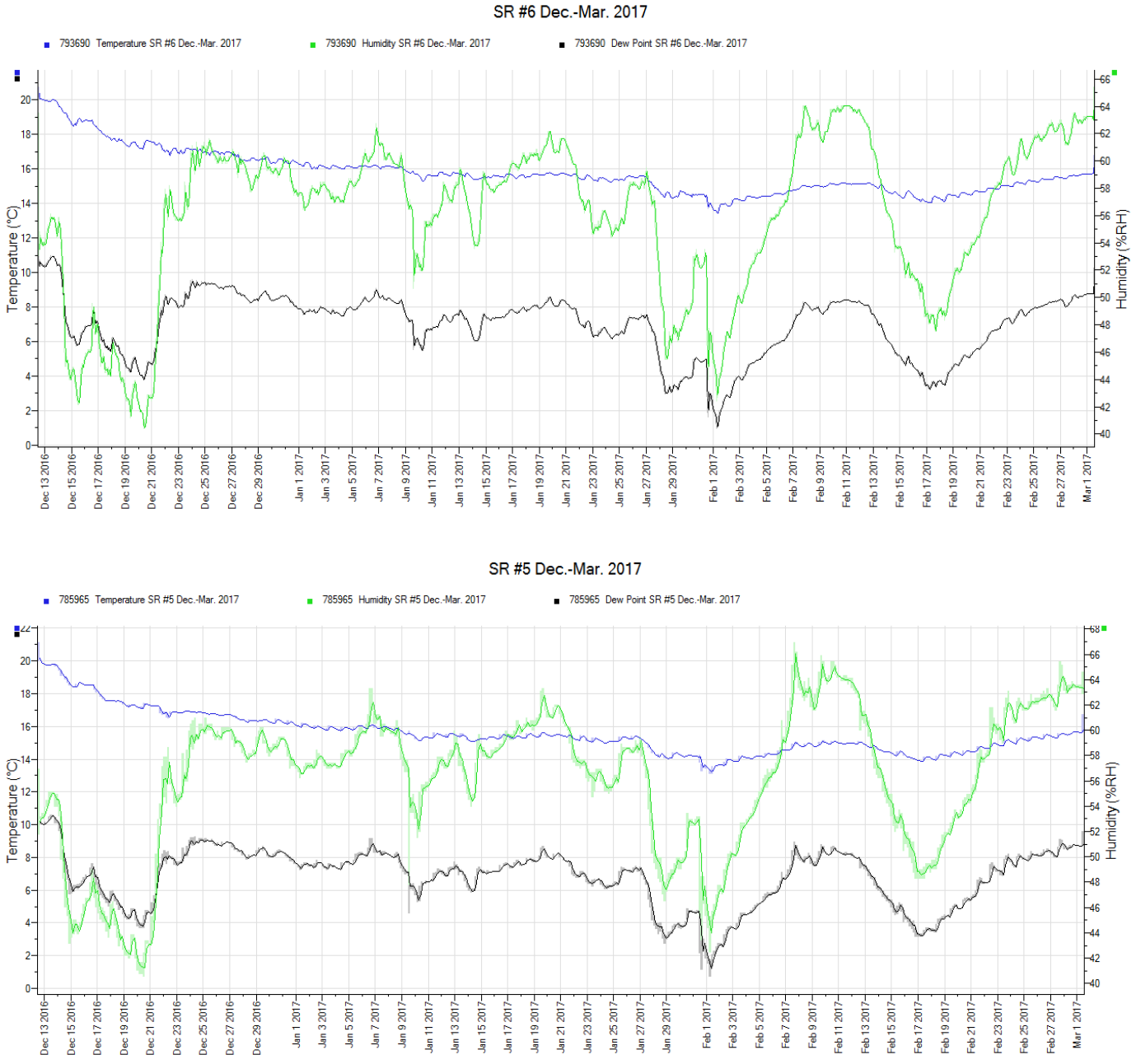




Figs. 8-9: Line graphs displaying the temperature (blue lines), relative humidity (green lines), and dew point (black lines) in the Shipwreck Museum Gallery at seven minute intervals over the period from December 12th, 2016 to March 1st, 2017.

Two more Tiny Tag environmental data loggers—termed "Gallery 3" and "Gallery 4"—were placed in two different display cases in the Shipwreck Museum Gallery. Gallery 4 was placed in display case #1 with the lead curse tablet while Gallery 3 was placed in display case #10 which encases lead rigging rings, a copper alloy hook and other metal objects. The two graphs show similarity in the temperature and relative humidity data with some slight differences. First, the line-graph data for temperature in both cases show regular, daily temperature shifts that are in accordance with the lighting in the cases. The blue lines appear to take on a uniform zig-zag pattern that is in correspondence with the lights being turned on and off each day, which affects the temperature inside the case. Between both monitors, the range for temperature over the monitoring period is 13-25 C, however, this is understandable given the seasonal shifts. Additionally, the fluctuations are uniform and regular, with no sharp spikes or decreases over short periods of time.

The relative humidity is again concerning here. The range for the percent relative humidity over the period from December to March was 33-67% between both monitors. Again, although it is understandable to see shifts in the humidity over time as the seasons change, more stability is needed to prevent the time of stark fluctuations seen in the data obtained from within the display cases. Over short periods of time, the relative humidity spikes and drops, which is potentially damaging to the objects housed within the cases. Especially with metal objects, it is important to keep the relative humidity stabilized at approximately 50% +/- 5% since the higher water content within the case can encourage corrosion of the objects.

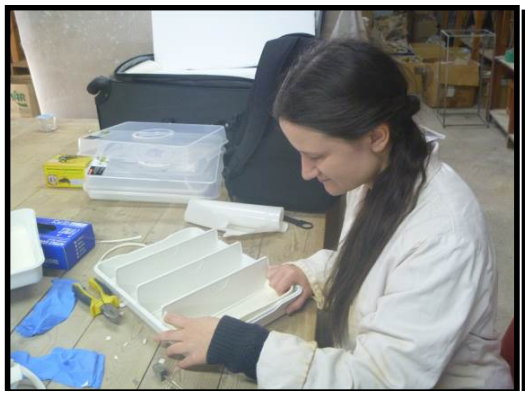


Figs. 10-11: Line graphs displaying the temperature (blue lines), relative humidity (green lines), and dew point (black lines) in the Kyrenia Ship Storeroom at seven minute intervals over the period from December 12th, 2016 to March 1st, 2017.

Lastly, two Tiny Tag monitors were placed within the Kyrenia Ship Storeroom—one within a metal cupboard and one on a shelf next to amphoras. The data for both are very similar, with stable temperature fluctuations, with no sharp increases or decreases over short periods of time. The data for relative humidity shows some stability with some fluctuations occurring gradually over longer periods of time. Still, the presence of fast shifts in relative humidity over 24 hours is concerning and indicates that more stabilization is needed within the Storeroom. This is especially important for the metallic objects stored there.

Additionally throughout March, the conservators acquired supplies to begin the re-housing and storage of the wooden Hull pieces and lead objects stored within the Kyrenia Ship Storeroom. Over the past several months, the conservators researched and obtained materials like acid-free tissue paper, Plastazote® and Volara® archival foams and archival-grade plastic boxes. The dimensions and specifications of the boxes were particularly important as the conservators needed boxes that would be efficient at buffering out external variations in relative humidity and temperature, are archival-quality for long-term preservation and would also fit the dimensions of the objects and could be reasonably stored. As a result, several types of archival boxes were purchased: 50 "Sistema" (name and material) polypropylene boxes with clip-closure for the lead sheathing and 40 polypropylene 40L plastic boxes and lids for the storage of the wooden members of the Hull that are currently stored within the Kyrenia Ship Storeroom. An additional 6 polypropylene boxes were purchased for the storage of the lead rigging rings, which were particularly useful because they contain partitions which allowed the conservators to separate the rings by their allocated condition categories. Most of the boxes are currently stored in the Kyrenia Ship Storeroom, with the exception of the 50 "Sistema" boxes, which are due to be delivered in May.

Fig. 12: Photograph of the 40L polypropylene boxes which were purchased to re-house the wooden members of the Hull stored in the Kyrenia Ship Storeroom.



Figs. 13-14: Photographs of the conservators lining archival plastic storage boxes with Volara® self-adhesive foam (left) and placing the lead rigging rings into the newly purchased boxes (Photographs courtesy of Cassy Cutulle and Veronica Ford, 2017).

After acquiring the boxes, the conservators set out to start the re-housing of the objects in the Storeroom. First, Veronica and Cassy re-housed the lead rigging rings in the newly purchased boxes. To do this, the thin self-adhesive Volara foam was cut to the dimensions of the box and placed on the interior base and side walls to provide cushioning for the rings. 4 boxes were re-housed corresponding to the 4 wooden trays of rigging rings stored in the Storeroom. In each tray, 3 partitions were put in place which allowed the conservators to separate the rings by their condition categories as assessed originally by Pembe Ozen in 2011. After a shipment of supplies arrives in April, the rings will be placed in new sample bags and Jiffy® foam will be placed between the rings to prevent abrasion as a result of contact between them.

Figs. 15-16: Photograph of the lead rigging rings after re-housing in the new archival plastic box (left) and conservator Veronica Ford placing the box into a metal cupboard in the Kyrenia Ship Storeroom (right). Enviornmental monitoring is ongoing in this metal cupboard (Photographs courtesy of Cassy Cutulle, 2017).

In addition, two trays of wooden members belonging to the Hull were re-housed in the archival boxes. Re-housing of this wood started with the trays labeled “MISC STRAKES” as the remaining trays will be packed alongside Team Supervisors Helena Swiny and Robin Piercy in April to ensure proper association of the pieces. Thus far, each tray has been spilt in half and packed into a 40L box. First, the box was lined with acid-free tissue paper and then the front first half of the tray was placed into the left side of the box, while the second half was placed into the right side of the box. Acid-free tissue paper padding was placed on top of the wood pieces and the box appropriately labeled. Clips were placed onto the lid to provide a more air-tight storage. This work is particularly important because, as the wood has been stored in on the trays in which the wood was originally treated with polyethylene glycol (PEG) in the early 1970s, the trays were also impregnated with the PEG, which has since started to age. This re-housing project will allow the conservators to dispose of these old trays and ensure that the wood will be placed in packaging that will encourage long-term preservation.

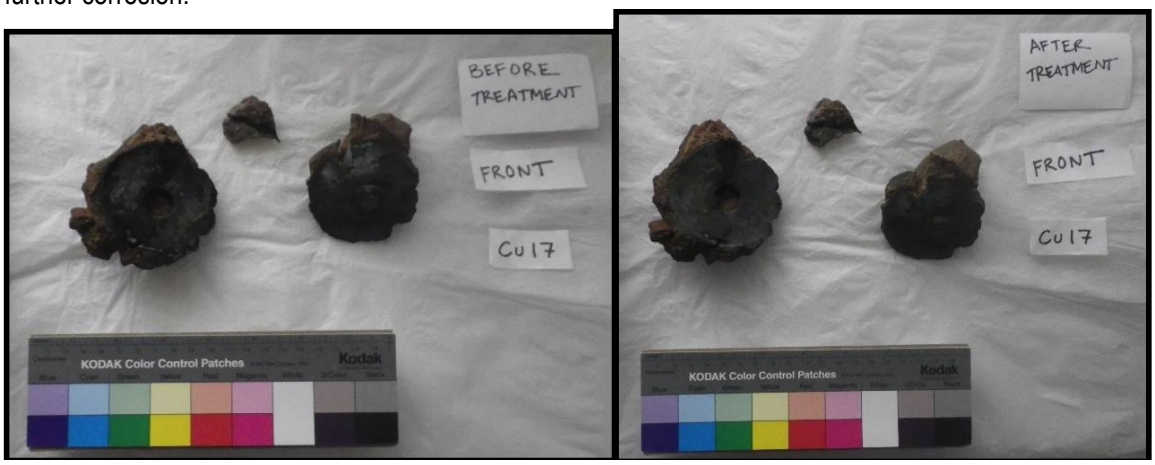

Figs. 17-18: Photographs of Veronica Ford packing the "MISC STRAKE II" wooden members into an archival box (left) and the process of packing for the wood (right) (Photographs courtesy of Cassy Cutulle, 2017).

Fig. 19: Photograph of the tray of wood after re-housing in the archival plastic box with acid-free tissue paper padding (Photograph courtesy of Cassy Cutulle, 2017).

Remedial Conservation Tasks

Over the course of March, focus of remedial conservation work has been on the physical and chemical stabilization treatment of the final few metals in the Conservation Laboratory in Nicosia. As treatment involves the use of chemicals and solvents, it was considered a priority to complete this treatment prior to the return of the objects to Kyrenia Castle in April and May.

As the conservators had successfully treated the copper tacks and copper nails in February, during the course of March they moved on to treat some of the more fragile and complex metal objects. These included Cu17, a bronze lid, Cu19 bronze duck's head ladle and Cu18, a copper alloy possible knife sheath. It was decided that these metals would not be treated with Benzotriazole (BTA). This was due to three main factors: the potential research value of the items; the fact that corrosion appears to be currently inactive; and, in the cases of Cu17 and Cu19, the recognition that the large accretions attached to the objects would not stand up well to a wet immersion treatment. All three objects were, however, carefully cleaned under magnification using ethanol applied on cotton swabs and stiff bristle brushes to remove dirt and previous coatings, before coating with a 1.75% w/v Paraloid B48N in 1:1 acetone: ethanol. This coating will provide an additional protective barrier against the external environment, reducing the likelihood of further corrosion.



Figs. 20-21: Photographs of Cu17 before treatment (left) and after treatment (right). As is evident a considerable layer of engrained dust was removed from the metal's surface (Photographs courtesy of Veronica Ford 2017).

At this point the treatment of Cu17 was completed, but both Cu18 and Cu19 were considerably physically unstable and required additional supports to the fragile remaining metal. In the case of Cu18 (the possible knife sheaf), part of the upper metal band to which the handle is attached was coming away from the rest of the object. Meanwhile Cu19 (the duck's head ladle) required extra support to the metal of the bowl, which had large areas of loss due to previous corrosion resulting in the thinning and pitting of the metal. In both cases, it was decided that the best treatment was to use small pieces of tinted Japanese tissue to support the existing metal. Prior to the start of treatment, experimentation was carried out to select the correct tissue and application of color. Three tissues were tested with – Gampi Silk Tissue, Japanese Mitsumata Tissue and Japanese Gampi Smooth Paper. The Japanese Mitsumata Tissue was selected as it had the best properties: it took the color from the watercolor paints well, was easy to rip, and was of the correct thickness (thin enough to be inconspicuous, but thick enough to provide adequate support). Several methods of applying the watercolors were tested, including mixing the correct color before applying, as well as applying each color in separate layers after allowing each layer to dry. In both cases, once dry, considerable lightening of the color was observed and numerous layers of color had to be applied to avoid

this. A mixture of green, brown, black and red was used to create a color that would blend in with, though remain distinct from the copper alloys. Once the Japanese tissue was tinted, it was impregnated with 2 coats of 1.75% w/v Paraloid B48N in 1:1 acetone: ethanol. After drying the strips were then placed on the objects and adhered in place using a little acetone and ethanol to reactivate the adhesive.

Figs. 22-24: Photographs of tests done on the Japanese tissue paper used to physically stabilize the metals (upper left); one of the supports in place on Cu18 (upper right) - the red box highlights the location of the tinted Japanese tissue paper; and conservator Cassy Cutulle applying Japanese tissue paper to the bowl of Cu19, the duck's head ladle (bottom) (Photographs courtesy of Veronica Ford, 2017)

In addition to the treatment of the metal objects this month, the conservators have continued to work on the restoration of P15 and P21, as and when there was available time. The large tinted fill for P21 has begun to be sanded into shape by Veronica, and Cassy has continued to work on the fills for P15,

which are required to support some of the rim fragments of the objects. Once metal treatments and their rehousing is complete, additional time will be available for the conservators to work on these objects.

April 2017: Projected Work Plan

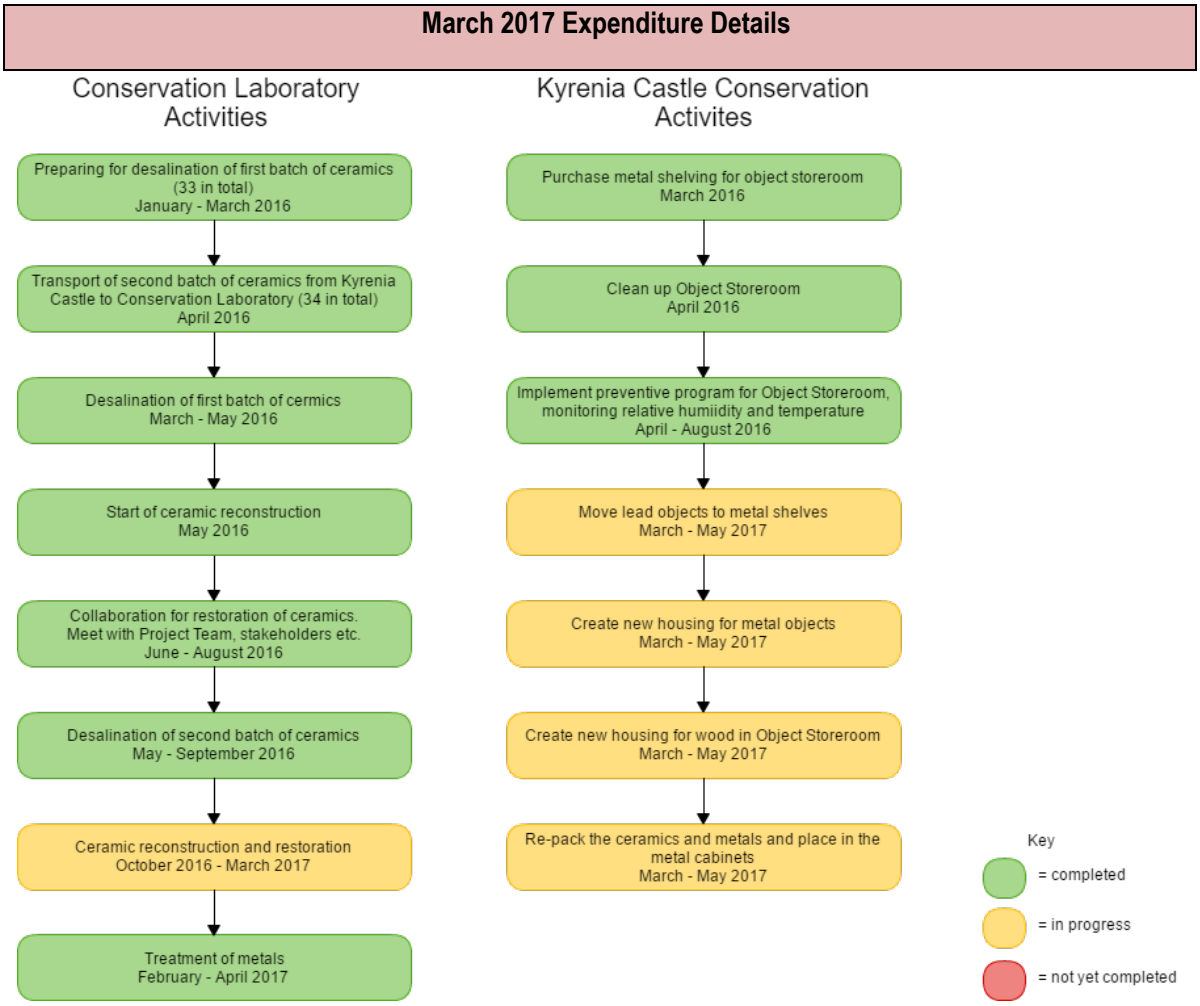


Fig.25: Flow chart displaying the activities to be undertaken by the conservators for this Project and the progress made thus far (Flow chart courtesy of Veronica Ford, 2017).