MetalPAT

The MetalPAT project involves a wide range of professionals spread over the Interreg France-Switzerland region. The exchange of knowledge and experience is essential to the success of the project. It is this objective that has guided the setting up of this newsletter which will accompany you throughout the project.

The project partners

A confined but active first quarter...

Following the project kick-off meeting on 6 February 2020, we very quickly started our first actions. The current health crisis has obviously impacted the project because no face-to-face meetings could be set up. However, the work is progressing, as shown by the actions developed in the following pages.

- **COLLABORATION BETWEEN METALPAT'S PARTNERS**

Querying the MiCorr database, via its search tools, raises an important question. Is it suitable for all the communities concerned? In fact, no, so our initial work is aimed at improving the multidisciplinary nature of the tool.

Discussion between Christian Degrigny (HE-Arc CR), Claude-Alain Künzi (MHL) and Aude Spicher (SERAC) at Musée Historique Lausanne, © N. Gutknecht

It is fundamental to better take into account the needs of end-users - in particular those responsible for the collections - in the future MiCorr⁺ application. Following preliminary discussions with certain managers, it appeared that the question of the nature of the metal being examined was a recurrent request. Therefore, we will add a new search tool to the MiCorr application "by general description" which will enable us to deduce, from macroscopic observation of the metal, proposals as to the family to which it belongs.

The questioning will be done via a decision tree and by elimination/acceptance of suggested characteristics. Christian Degrigny (CDE) and Naïma Gutknecht (NGU) of the Haute Ecole Arc Conservation-restoration (HE-Arc CR) have worked on a first draft

that Cédric Gaspoz (CGA) and Bernard Letourmy (BLE) of the Haute Ecole de Gestion Arc (HEG Arc) will translate into visual mode on the application by the end of July 2020.

The "stratigraphic representation" tool, although innovative and promising, raises many questions. Often, the feedback we get from it is the difficulty to appreciate this or that characteristic mentioned in a field to be filled in, or even the impossibility to fill in certain fields. Knowing that the querying of the MiCorr database via this tool is based on the quality and quantity of the fields filled in, we decided to review it entirely. We agreed between the project partners to subdivide it into two tools based on the material observation mode. Conservators examine the object under study at different scales: from macroscopic to microscopic. They assess the corrosion structures observed as a whole. In order to learn more, they create observation windows studied under binoculars enabling them to understand the complexity of the stratigraphy in place via scalpel soundings. During this work, for each stratum (Metal, Corroded metal, Corrosion Product, etc.), they have access to a set of visual and tactile characteristics, without taking material samples. Conservation scientists, archaeometallurgists and corrosion scientists with access to techniques for studying the physico-chemistry of materials, work rather on sections of samples taken and polished. While the section studied normally reflects corrosion structures observed on the surface of the objects, certain (tactile) characteristics revealed by binocular observation are not accessible, while others appear more clearly, such as the mineralogical nature of the phases of each stratum.

CDE and NGU of the HE-Arc CR are responsible for selecting from the characteristics and sub-characteristics of the current stratigraphic representation tool, those that can be informed by binocular observation, while Philippe Dillmann (PDI) and Marion Berranger (MBE) of the laboratoire Métallurgies et Cultures (LMC-IRAMAT UMR5060-CNRS) of the Technological University of Belfort- Montbéliard (UTBM) and Delphine Neff (DNE) of the Laboratoire Archéomatériaux et Prévision de l'Alttération (LAPA) of the Commissariat à l'Energie Atomique et aux Energies Alternatives (CEA) are in charge of selecting the characteristics and sub-characteristics that can be obtained from cross-section observation. The MiCorr application currently allows to switch from binocular observation to cross-sectional observation by progressively enriching the stratigraphy with new data acquired during the in-depth study of materials. We wish to preserve this possibility in the future MiCorr+ application but for this the user will have to change the observation mode, which will give him/her access to new fields to fill in.

CGA and BLE of the HEG Arc having validated the approach, the partner teams are working on specifying the relevant characteristics and sub-characteristics for the two observation modes selected (until the beginning of June 2020). CGA and BLE will then have to visually translate the new tools developed into MiCorr+ (end of July 2020).

The approach will be refined throughout the MetalPAT project, bridges will be created between the two observation modes, and the key characteristics/sub-characteristics used by the material stratigraphic comparison function of the MiCorr database will be determined. In the end, the entire contents of the database will have to be reviewed to adapt to this new approach.

This content will also be enriched with new contributions from end-users and project partners. In-depth work will thus be carried out by a post-doc researcher at UTBM's LMC-IRAMAT and CEA's LAPA in the autumn of 2020 on issues raised by the end-users. Recruitment is in progress.

- **COLLABORATION WITH END-USERS – COLLECTIONS MANAGERS**

Once implemented, the new search tool "by general description" will be tested with collection managers. For this purpose, we are gathering a repository of representative metal objects that will be used to validate the approach and even optimise it if necessary. On this occasion, it is also planned to present the artefact file of the objects in the MiCorr database. This includes a section describing the main characteristics of the objects studied which, a priori, could be filled in by those responsible for collections, thereby strengthening the collaboration with the conservators involved in the diagnosis of the objects concerned. Face-to-face meetings have been planned to discuss and exchange on these different points. They are the subject of a request for financial support from the *Communauté du Savoir* (www.communautedusavoir.org/). Our request is currently being evaluated (response expected at the beginning of June 2020). These meetings would be held between the end of June and the end of November 2020..

- **COLLABORATION WITH END-USERS – CONSERVATORS**

We would like to involve our colleagues – conservators - as soon as possible in the development of the stratigraphic representation of the corrosion structures studied in binocular observation mode. CDE and NGU are currently working on an Excel table gathering all the data collected (characteristics and sub-characteristics according to the strata of the corrosion structures). Some colleagues will be asked to give their opinion on the relevance or not of keeping this or that data and on the need to add others. As soon as the visual interface is accessible, we will share it with these same colleagues in order, again, to test and improve it. Depending on the evolution of the health crisis, meetings must be set up by videoconference or face-to-face to discuss and exchange on this point but also on the issues of corrosion of heritage metals that they wish to raise. As these issues may be of interest to several end-users, synergies will be established between them.

In addition, CDE and NGU are working on an accompanying document to provide a better understanding of the approach to describing the forms of corrosion on the surface of heritage metals and its various stages. This guidebook/manual should make it easier for both parties to adopt the method developed by Régis Bertholon in the context of his thesis (https://tel.archives-ouvertes.fr/tel-00331190/document).

Students of the HE-Arc CR are made aware of the MiCorr application during their training course. Some of them contribute by creating artefact sheets corresponding to forms of corrosion not yet represented in MiCorr: this is the case of Emeline Perret-Gentil who recently became interested in a bracelet from the archaeological site of Ban Chiang, located in the south-east of Thailand, belonging to the Museum of Cultures in Basel. Similarly, Elodie Granget will contribute to MiCorr as part of her

master's project on aluminium alloys from cooling systems at the Mulhouse National Automobile Museum.

Internships in institutions are another possibility to involve our students in the MetalPAT project. Thus Julie Asmstutz, 2nd year student, will work with Martine Rochat on different iron and copper-based pieces from the collections of Section d'Archéologie et Paléontologie du Jura (SAP).

- **AN EVER-INCREASING NUMBER OF END-USERS**

If the architectural firm Delaloye has declared its withdrawal before the launch date of the project, other end-users have joined it in recent weeks as "external collaborators", namely :
- **For Switzerland**: the Musée Régional du Val de Travers and the Musée Rural Jurassien des Genevez, represented by Marie Bourgnon, conservator.
- **For France**: the Centre de Conservation et d'Etudes René Rémond des Musées de Lons le Saulnier represented by Mrs Sylvie Jurietti in charge of the archaeological collections; the Pontarlier Museum represented by its director Mrs Lauraine Mansuy. The French Jura is now involved in the project. In addition, the Musée National de l'Automobile de Mulhouse (MNAM) wished to be associated with our work. The MNAM, located in the Haut-Rhin department, which is not in the Interreg France-Switzerland region, is an important end-user because of its interest in the forms of corrosion developing on modern metals, including aluminium.

- **COMMUNICATIONS**

An article presenting our approach was submitted to the journal Conservation 360° for its 2nd issue on the issue of "Diagnosis": "Exploitation and dissemination of MiCorr as a diagnostic support tool for heritage metals". It is currently being evaluated. An abstract has also been submitted and accepted for the DigiArch2020 conference which was to be held on 18-19 June 2020 in Zürich but has been postponed to 24-25 March 2021. The paper ("Open access and participatory digital tools as a support for the analysis and diagnosis of heritage metals: possibilities and limits") is due by the beginning of July 2020.