

# Contribution to the recent history of archaeology by using some digital humanities methods and techniques applied to field recording documents of an archaeological site excavated in 1970s

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## Abstract

This article presents the results of an archaeological archive research. Field recording documents from the Rivaux site in France, which was excavated from the 1970s to the 1990s, were exploited. After digitising a set of field notebook pages, the author developed an application, called *Archeotext*, which allows transcribing and georeferencing these documents. Some of the results obtained show new ways of exploiting this type of archive by using certain methods and techniques of the digital humanities <sup>1</sup>.

## keywords

archaeology, archives, field notebooks, recording methods, digital humanities

## INTRODUCTION

Many archaeologists have already written about the recent history of archaeology [Giligny, 2011, Djindjian, 2016a and 2016b, Plutniak, 2017a and 2017b, Favory and al. 2018, Giligny and Desachy, 2019, Tufféry and Augry, 2021]. The use of archaeological archives has already been the subject of several research projects, notably on an international scale such as the European project Archives of European Archaeology (Schnapp and al., 2007). These works, which are stimulating contributions to the history of archaeological science, provide a useful overview of the methods used in the past and the results already obtained, particularly when ancient excavations were resumed [Duclert, 2002, Soulet, 2012]. Some of these projects rely on artificial intelligence and on an approach inspired by the principles of participatory science [Girard and al., 2019]. Rarer are the projects in which researchers mobilise their own memory and their own archives several decades away from the periods in which they themselves took part in excavations. It as if this kind of work of history could only be done after the disappearance of the people concerned and by people who were not involved either in the place, or in the excavations, or in the period on which these works of recent history of the archaeological discipline focus.

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<sup>1</sup> This research was carried out in the context of my thesis by the project at CY Cergy Paris Université, in the Humanities, Creation and Heritage department (*Humanités, Création, Patrimoine*), in partnership with the French national heritage institute (*Institut National du Patrimoine*); thesis jointly supervised by Julien Longhi, Director of the Institute of Digital Humanities (*Institut des Humanités Numériques*) and Boris Valentin (Université de Paris 1 Panthéon-Sorbonne). The thesis was presented on 12 of December 2022. The thesis is available online : <https://www.theses.fr/2022CYUN1129>

Since it covers a period and facts in which I was personally involved, the narrative proposed here inevitably lacks objectivity. Our memories may introduce biases and an *a posteriori* interpretation that ‘rewrites’ history. This is what constitutes the “biographical illusion” [Bourdieu, 2004]). As [Gautier and Zancarini-Fournel, 2022] state, “describing what is real supposes adopting a point of view from which to see the thing that is to be described (...) Adopting a particular point of view means admitting that other, differing, points of view may be possible. Thus it means positively accepting engaging in a confrontation of points of view in order to reach a more finely graduated description of something we claim to know, emerging from the plurality of these perspectives”. Thus the description and analysis presented here constitute just one of a number of possible points of view.

Although memory inevitably has some limitations, and indeed carries some risk of falsification, it also has a number of advantages, such as the possibility of compensating at least in part for the weaknesses of certain archives. Taking stock of one’s own history by looking back at one’s trajectory and experience should therefore not be totally discounted from the outset. The exercise of reflexivity, self-analysis and ego-history have been theorised by a number of historians (Maurice Agulhon, Pierre Chaunu, Georges Duby, Raoul Girardet, Jacques le Goff, Michelle Perrot, René Rémond), and this has already been applied to archaeology [Demoule and Jacob, 2012], [Guilaine, 2019] and [Clottes, 2015]; my contribution to the genre is much more modest, and makes no claim to be as important as the contributions of these authors.

Because of my own career and my participation in the history referred to here, the results of the following research are imbued with a subjectivity and a situated point of view; I fully recognise that this is so.

## **I DATA SOURCES USED**

As archaeologist, my experience in this field began in 1980, working for the first time as volunteers on digs in France, one on a preventive dig in the centre of Clermont-Ferrand, the other on the scheduled dig at *Les Rivaux* in the Haute-Loire *département* [Daugas and Raynal, 1977; Daugas and al., 1979]<sup>2</sup>.

This site was excavated under the responsibility of Jean-Pierre Daugas (1946-2011), the archaeologist who passed on to us almost everything we know about the archaeological methods and techniques in use in the 1980s. Using a set of archives from this site, I propose to demonstrate the possibilities of using digital methods and techniques to exploit and enhance archaeological field records.

On this site, the pioneering use of an *Apple IIe* personal computer was experimented with during the digging carried out from 1985 to 1990, using a dedicated computerised recording program called *Rivalo* that made it possible to record in .txt format all the information entered on paper field sheets on-site during the day, for each square of the dig. In 2009, I was able to recuperate — albeit not without difficulty — the data produced by this program, after having had to make a specific connector to link an *Apple IIe* to a PC running under Windows [Tufféry, 2022].

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<sup>2</sup> Known since the mid-nineteenth century, *Les Rivaux* site was mainly excavated starting in the second half of the twentieth century by Pierre Bout, and then from the end of the 1960s in the form of prospecting followed by rescue intervention and finally a scheduled dig.

In 2019, I was able to consult a number of personal field notebooks (Fig. 1) that had belonged to Jean-Pierre Dugas, already mentioned<sup>3</sup>.



Fig. 1: Covers of some of Jean-Pierre Dugas' field notebooks (Jean-Pierre Dugas archives).

These notebooks, which take the form of daybooks, contain a considerable quantity of scientific observations in the field, lists of people met or to contact, things to be done, or equipment to be acquired for current digs. Archives of this type are a hybrid genre, somewhere between personal journal, scientific field notation, and laboratory notebook. Some of the pages in the notebooks contain several examples of sheets of squared paper filled in by hand by the author or by one of the other researchers with whom he collaborated (Fig. 2).

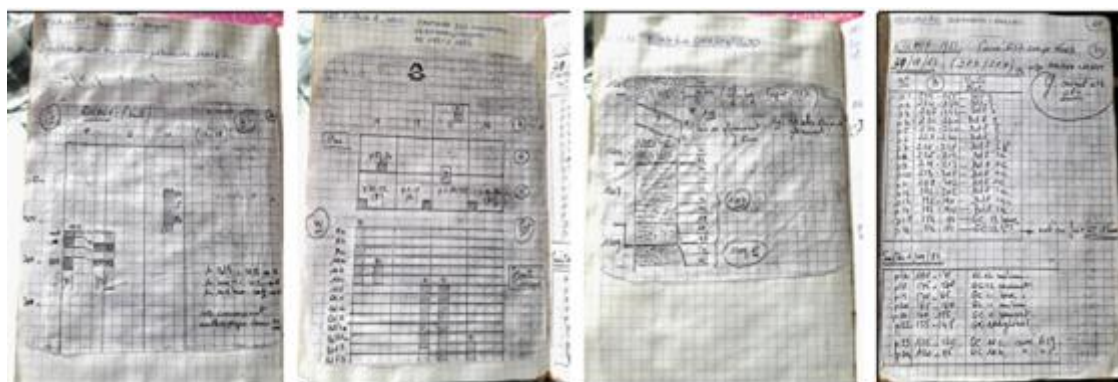


Fig. 2: Pages from one of Jean-Pierre Dugas' field notebooks (Jean-Pierre Dugas archives).

Finally, the documentary sources used in my research include part of the archives of *Les Rivaux* excavation site already mentioned.

### III CHANGES IN RECORDING METHODS: THE EXAMPLE OF THE DIG AT LES RIVAUX

Jean-Pierre Dugas deposited a large part of the archives of the dig at *Les Rivaux* with the CCE in Les Martres-de-Veyre during his lifetime. These dig archives are similar to many others of the same period that have been deposited with archive services and other Conservation and Study Centres (*Centre de Conservation et d'Etudes*). They comprise boxes

<sup>3</sup> I must give my warmest thanks to Jean-Pierre's wife, Chloë Dugas, who agreed to give me these archives, which she felt were private and as such had not been deposited as dig archives with the conservation and study centre (*Centre de Conservation et d'Etudes* - CCE) in Les Martres-de-Veyre. I would also like to thank Julie Charmoillaux and Christophe Gilabert for making it easier for us to consult *Les Rivaux* archives at the CCE and for having digitised all the reports available for this dig for our benefit.

of various types of document: paper sheets used for recording in the field, field notebooks, correspondence, photographs, drawings, sketches, plans, etc. (Fig. 3).



Fig. 3: View of an excavator entering a sketch on a record sheet (*Les Rivaux* archives, Jean-Pierre Daugas archives at the CCE in Les Martres-de-Veyre).

My research consisted of showing how the methods used both for excavation and for recording data changed between the time work began in 1970 and ended on the dig at this site in 1990, by analysing various types of first-hand sources of documents used on the site. Various models of paper record sheets were used at the site; the examples given here show some of the models used between the early 1970s and the late 1980s.

The various models comprise an upper part of the record sheet with sections for descriptions of the site and the area being excavated, and other sections for the structures observed and the various information collected (topography, photography) and samples taken. There are also handwritten notes in places, and references to the field notebook. In another of the models used at *Les Rivaux*, there are two boxes for entering text (description of layers and structures) and one box for a rough map showing the location of the areas being excavated. Lastly, a final box at the foot of the page could be used to list the archaeological material found in the area excavated (Fig. 4).

COUCHE: #		STRUCTURE FAR/GC136	REFERENCE ON REPORT
REMARKS		EROSION - GC14 - BOUTAT ? Fragments enclos par GC12 FAR/GC136 - GC12 - Boutat FO	①
STRUCTURES			
PLANS			
TENS		12 11 10 9 8 7 6 5 4 3 2 1 12 11 10 9 8 7 6 5 4 3 2 1 12 11 10 9 8 7 6 5 4 3 2 1	

Fig. 4: An example of a field record sheet used in the mid-1970s.

During the following excavation campaigns, other templates of record sheet were used.

The following example was used for each square metre and each archaeological layer (Fig. 5). My name appears as the author of the record. The date is the date of the first record on the sheet, not the last. Detailed data on the archaeological material was recorded. Once the find was discovered and detached, its X and Y coordinates within the square were recorded using a tape measure. These values were used to record the exact position and dimensions of the find, which subsequently allowed the distribution of the finds in each square and at each archaeological level to be mapped.

The finds were also described in terms of orientation, dip, dimensions, basic sketch or shape, designation and nature, and the archaeological layer or soil to which they belonged.

Page N° 1

**RIVAUX 80**      Le 14.8.80      CARRE : G13

Nom et adresse : TUFFERY Christophe      Visées faites sur :  $\Delta = \frac{L_{max}}{100}$  m.

Observations : (Y a-t-il un relevé, commentaire, photo, ... ?)

N° ou A	N°	X	Y	Z	$\Delta \pm z$	Relevé	Relevé	Relevé	Croquis forme	Désignation et nature	Niveau ou sol
M 1	60	84	291	-1291				35x4		Eclat de silex noir avec cailloux	1C
Marqués le 15 août 1980											
M 2	15	25	338	1338				2x25	1	Tesson	1C
M 3	128	65	422	1422	3-N			2x2	1	Tesson	1C
M 4	41	1	1148	1418				25x25		Tesson	1C
M 5	86	16	428	1428	0.5			15x2		Tesson	1C
M 6	13	31	479	1479				25x3		Marqués de peinture vive rouge	1C
M 7	13	36	488	1488				25x3		Tesson	1C
Marqués le 26 août 1980											

Fig. 5: Another example of field record sheet for locating and describing archaeological finds.

As this example shows, the presence of traces of earth and dirty fingerprints indicate that these sheets were used in the field. As I remember, the forms were attached to an A4-sized piece of lightweight wood (such as balsa) by a black metal clip, and were filled in using a pencil. During digging, pencils were either left on the wood backing, stuck in the metal clip, held between the excavator's teeth, or tucked behind the excavator's ear.

Lastly, there was one other very important documentary source for this site: two field notebooks (Fig. 6). Between 1972 and 1980, these documents were kept by a number of the excavators. While the first was filled in by a number of the excavators, the second was mainly filled in by the site manager. During the 1980s, these field notebooks gradually gave way to standardised field record sheets like those already presented.



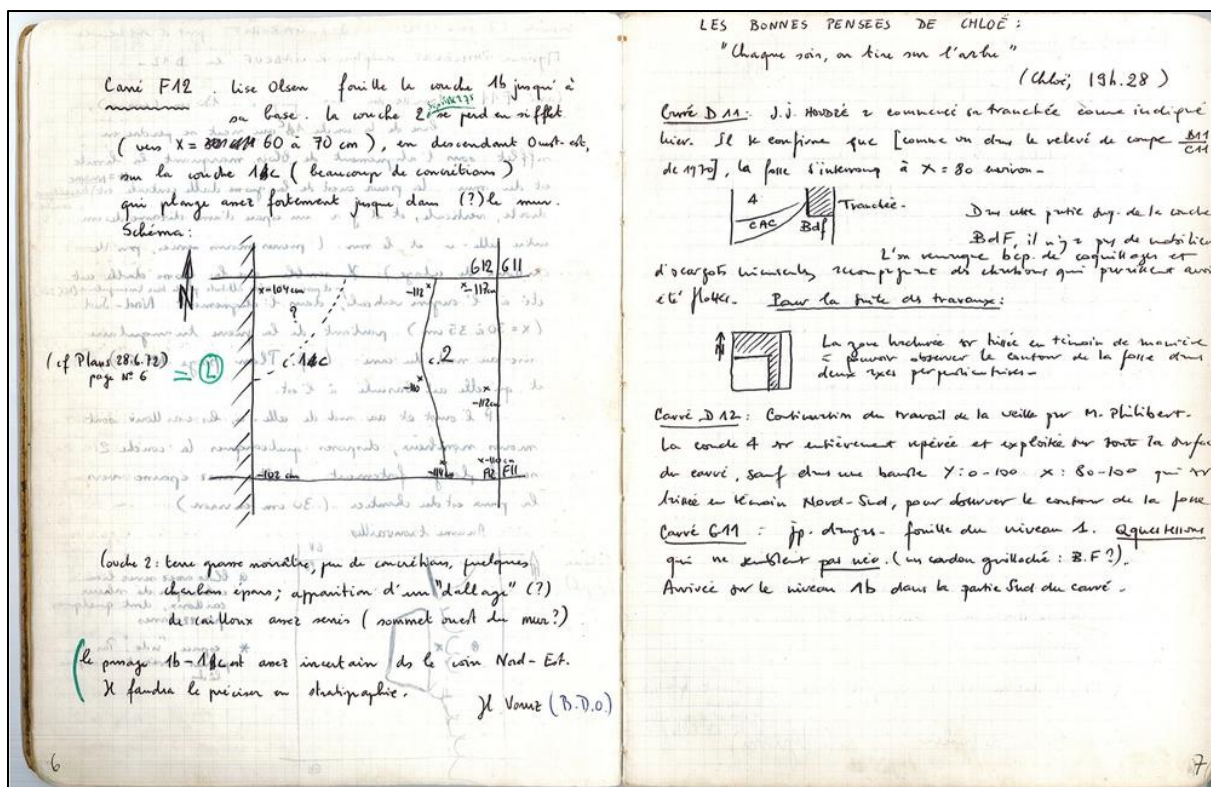


Fig. 6: Example of pages in one of the field notebooks of *Les Rivaux* in the 1970s (Jean-Pierre Daugas archives).

In order to analyse the content of these documents and their links with the other documentary sources available for the *Les Rivaux*, I used a variety of digital tools and methods.

## IV DIGITAL TOOLS AND PROCESSING METHODS

### 4.1 Transcription of field notebooks

First, I decided to digitise and then digitally transcribe the notebooks.

Digitising was carried out using a scanner at a resolution of 300 dpi. Displaying the files produced by this digitisation raising a number of problems. Firstly, entries in the notebooks had been made in black or blue, or sometimes red or green, ballpoint pen for the annotations, or in lead pencil, often erased, and less legible. Secondly, some of the phrases had been crossed out by their authors, making them difficult or even impossible to read.

Moreover, the writing on the back of some of the pages shows through on the front because in places the ink used has seeped through the paper of some of the pages.

Lastly, it is sometimes difficult to make out some of the sketches and diagrams because here again a number of different inks were used: some have remained clear, while others are now almost illegible.

In an attempt to resolve these problems, I carried out a number of processes using Adobe Illustrator software, particularly its B&W vectorisation function. Combined with the ordinary vectorisation function of Adobe Illustrator, it was possible to make the inks on the back of the pages concerned disappear. I was then able to obtain a version of the sketches and diagrams in vector format (Fig. 7).

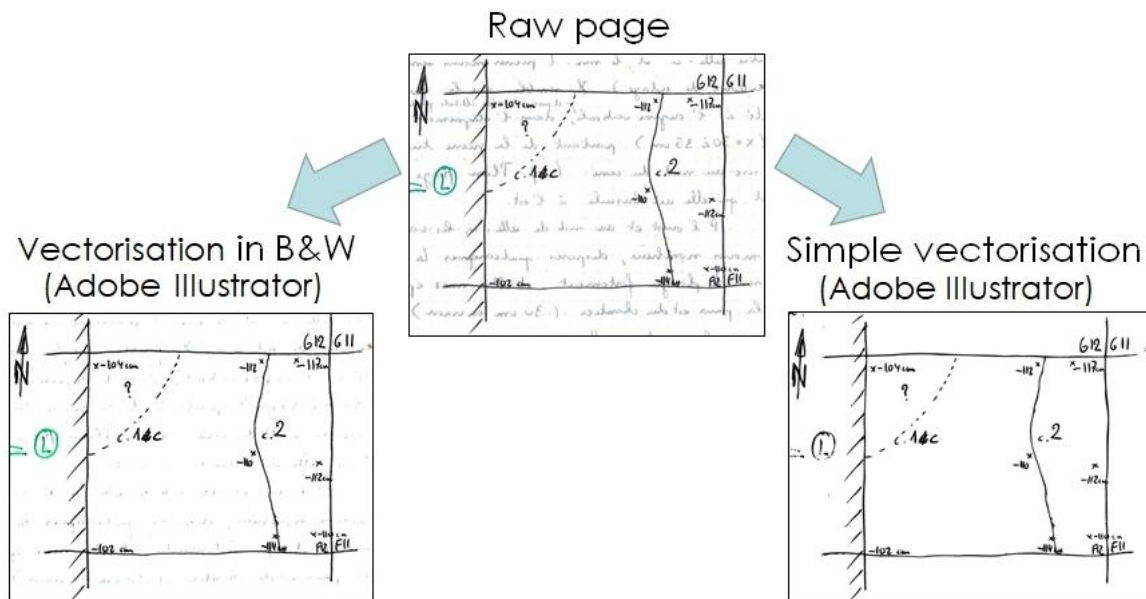


Fig. 7: Two types of processing carried out using Adobe Illustrator software on a sketch in a field notebook: B&W vectorisation function on the left, ordinary vectorisation on the right.

For some of the sketches, however, the ordinary vectorisation functions in Adobe Illustrator did not produce satisfactory results, so I used the free software PhotoFiltre, testing a number of processing functions. I used the Gamma Contrast and Correction functions, achieving results that were sometimes better than those of the ordinary vectorisation function in Adobe Illustrator (Fig. 8).

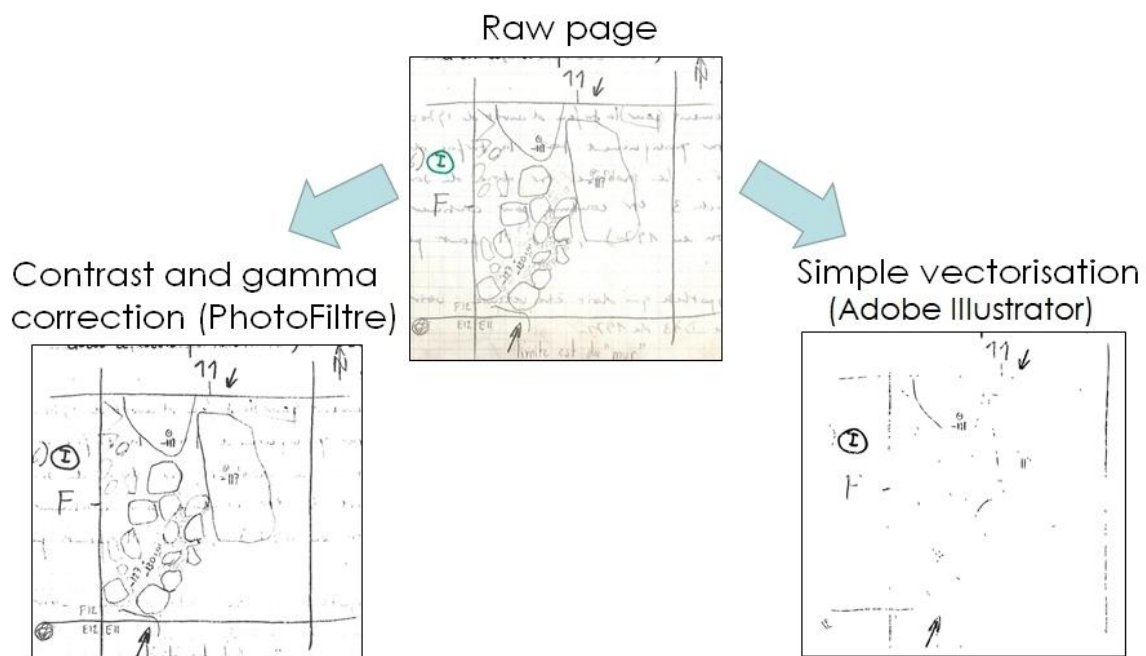


Fig. 8: Comparison of two types of processing carried out using two different softwares on a sketch in a field notebook: PhotoFiltre's 'gamma correction' function on the left, Adobe Illustrator's ordinary vectorisation function on the right.



Once I had processed all the digitised pages in the field notebook in order to make the texts and sketches as legible as possible, I decided to develop a digital transcription application, which I called *Archeotext*<sup>4</sup>.

The application operates in conjunction with an Internet browser (Chrome, Opera or Safari). It uses a series of forms for entering information in HTML5 format (Fig. 9). Alongside the pages in HTML5 format are some JavaScript code files and a CSS-type sheet.

The screenshot displays the 'Archeotext' web application interface. At the top, there are navigation tabs: 'Gestion', 'Enregistrements', 'Listes', and a help icon '?'. Below these are several dropdown menus for 'Secteur', 'Tranchée', 'Sondage', 'Ensemble', 'Fait', and 'US'. A 'Carré(s) :' field contains 'x E13'. Below this are 'Enregistrer' and 'Supprimer' buttons. A red heading reads 'Formulaire pour la transcription d'une page entière'. Underneath, a note says 'Pour ajouter des pages : menu Gestion > Importer des pages'. There are input fields for 'Numéro de Page' (with navigation buttons), 'Nom du fichier' (set to 'Page\_64.jpg'), and 'Date en début de page' / 'Date en fin de page' (both set to '15/05/1973'). On the right, a sidebar shows 'Avancement de la transcription' with checkboxes for 'Non-commencée', 'En cours', and 'Terminée' (checked). Below this is a 'Commentaires:' text area and a metadata section with 'Créé le : (AAAA-MM-JJ HH:MM) 2022-3-23 10:9' and 'Modifié le : (AAAA-MM-JJ HH:MM) 2022-8-16 10:31'. The main content area is split into two columns: 'Page numérisée :' on the left, showing a scanned page with a sketch, and 'Transcription :' on the right, showing the corresponding text transcription. At the bottom, a 'Type de page :' dropdown is set to 'Page du carnet'.

Fig. 9: Screenshot of the *Archeotext* application. Display of a page in the field notebook (on the left) and the result of its manual transcription (on the right).

To browse the transcribed pages of the field notebook (select a page in the list), the page number indicated by the first script for the notebook page to be displayed in *Archeotext* (on the left in .jpg format) and its transcription (on the right in text format) must be entered. The reference for the square to which this page is connected can be found in the Square section in the top right-hand corner of the *Archeotext* application (Fig. 16).

These sheets make it possible to enter the transcription data and other descriptive data as well as metadata in accordance with ISO15836 ('Dublin-Core'). All the data is stored in a *SQLite*

<sup>4</sup> Right now, *Archeotext* is not released under an open source licence, as it has been adapted from EDARC, a field recording system developed by Inrap. It cannot therefore be reused.

database on the user's device<sup>5</sup>. Data can be exported as a single file in.xml format and can also be used directly out of the *SQLite* database using computerised management system software such as *QGIS* without passing via an export file. This possibility also makes it possible to correlate the transcription data and the geometric data of the areas excavated on the site.

I transcribed all 150 pages of the most comprehensive of the two field notebooks, covering the period from 1972 to 1982. The second notebook, comprising some fifty pages, covers the period from 1980 to 1990.

Using *eScriptorium* on-line application and the LECTAUREP model<sup>6</sup>, I was able to explore its possibilities for a transcription of *Les Rivaux* field notebooks other than the one I had made using *Archeotext*. The *eScriptorium* application was developed for transcribing digitised handwritten medieval documents; it uses a technique for automatic character recognition called Optical Character Recognition and Handwritten Text Recognition (OCR/HTR)<sup>7</sup>. This uses *Kraken* character recognition, developed by Ben Kiessling. It is necessary to begin by training the engine, by transcribing manually the content of the first few pages of a handwritten document (Fig. 10). Once the automatic transcription has been carried out and checked, the result can be downloaded in text or XML format. I therefore wanted to use this *eScriptorium* application as well as the *Archeotext* application, and was able to assess its advantages and limits.

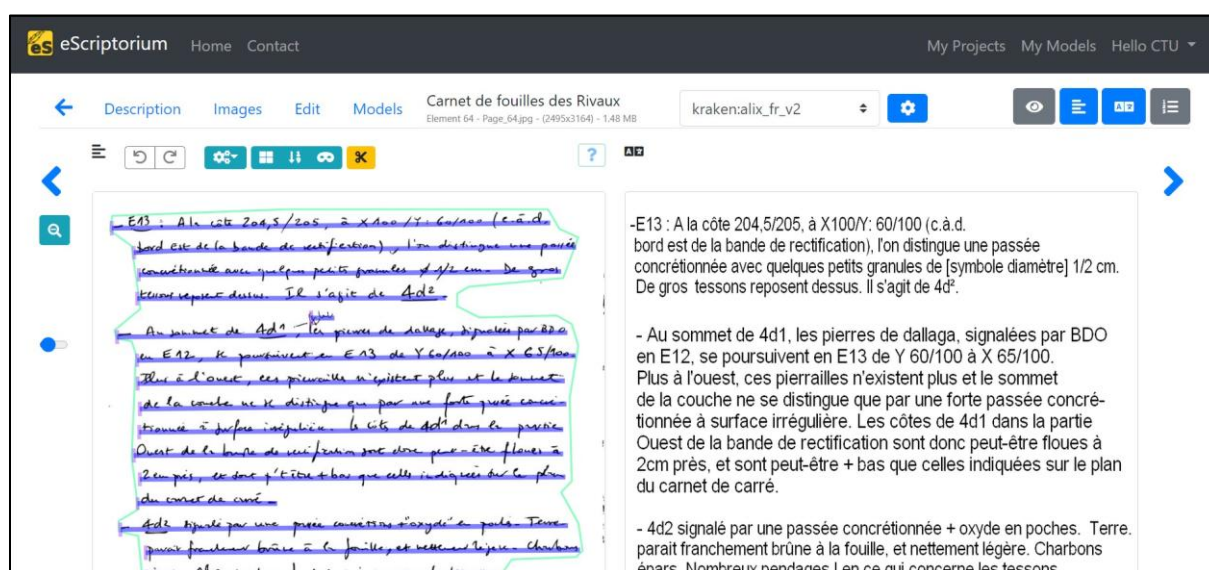


Fig. 10: Screenshot of the *eScriptorium* application. Display of a page in the field notebook (on the left) and result of its transcription (on the right).

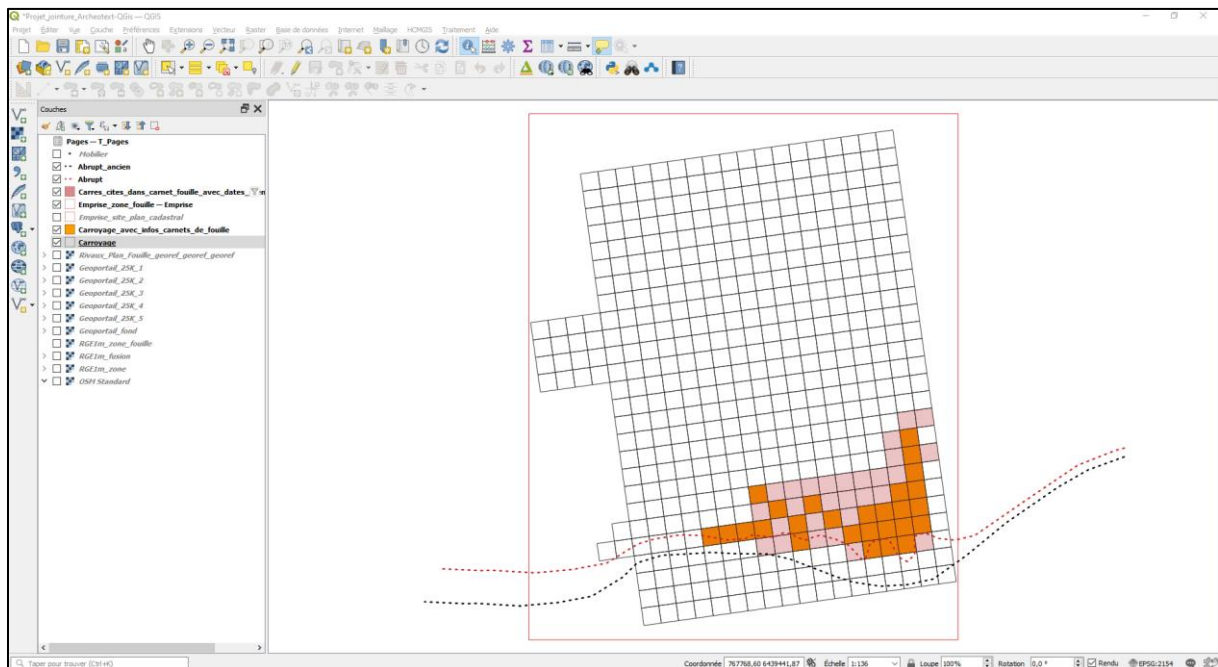
<sup>5</sup> This application could easily be adapted and used for the archives of other excavation sites.

<sup>6</sup> I must thank most warmly Peter Stokes of Paris Sciences et Lettres (PSL) and Alix Chagué. The LECTAUREP (LECTure Automatique de REpertoires) project, which started in 2018, is a joint initiative of the Minutier central des notaires de Paris of the Archives Nationales, the ALMANaCH (Automatic Language Modeling and Analysis & Computational Humanities) team of Inria and the EPHE (École Pratique des Hautes Études), in partnership with the Ministry of Culture.

<sup>7</sup> This project is part of the 'Scripta' *Initiatives de Recherches Interdisciplinaires et Stratégiques* (IRIS) at Paris Sciences et Lettres (PSL) (<http://ephenum.hypotheses.org/1412> and <http://escripta.hypotheses.org/>)

Each of the two applications - *Archeotext* and *eScriptorium* - has its own value and limits. Neither can claim alone to provide everything I required in researching the archive material represented by these field notebooks.

Using the *QGIS* geographical information system, I was able to retrace the perimeter of the dig from the 1970s to the 1990s by using various types of reference data (old georeferenced rough plan of the dig, the Institut Geographique National's on-line large-scale cartographic services, and the land registry plan).



The excavated squares shown in the first field notebook transcribed are mainly in the southern part of the dig, an area that has gradually disappeared as the result of erosion caused by the Borne stream from the late 1970s and through the 1980s.

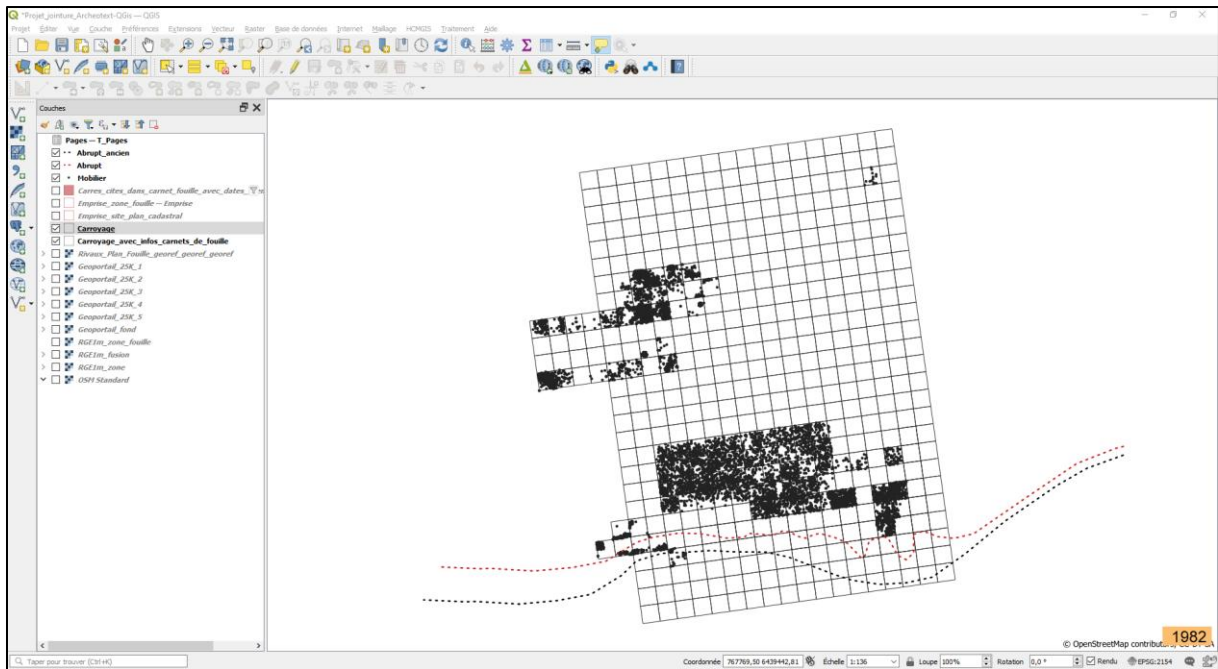


Fig. 12: Display in *QGIS* of archaeological finds (black dots)

The data on the archaeological finds comprises a range of descriptive information which can be accessed by selecting any one of them (Fig. 13).

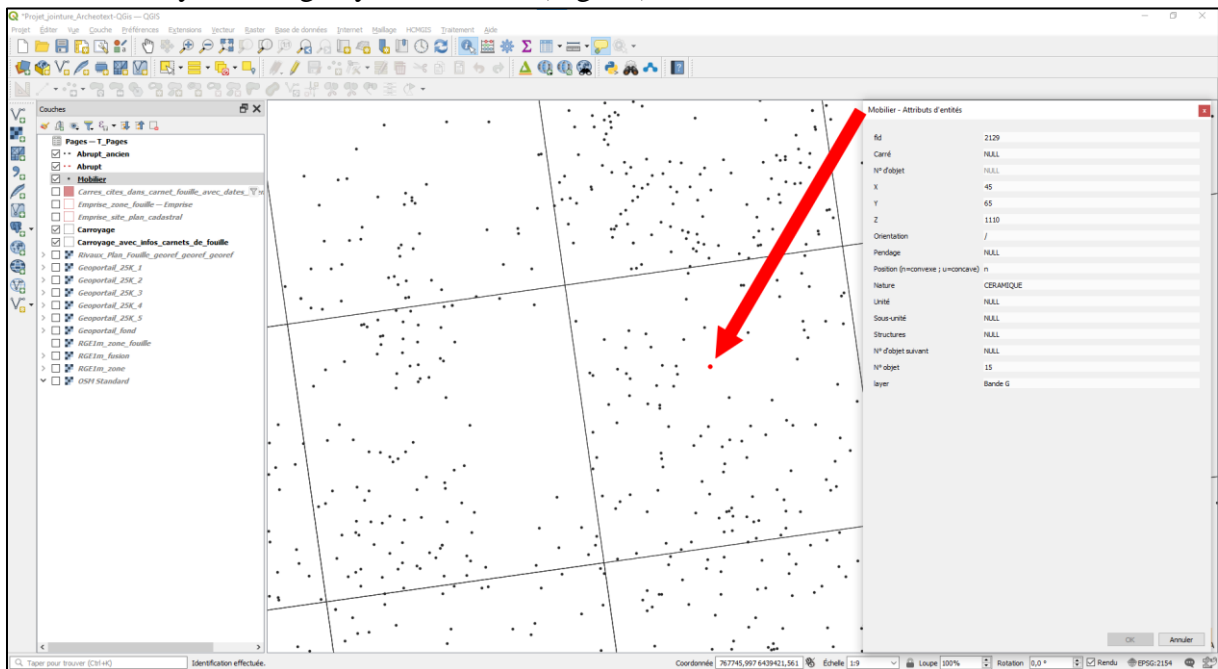


Fig. 13: Display descriptive data for an archaeological find identified in *QGIS*

Lastly, the transcription data created using the *Archeotext* application, which is stored in a *SQLite* database, can be consulted directly from *QGIS*. Using a script, transcribed content can be displayed in a window by clicking on the corresponding square (Fig. 14).

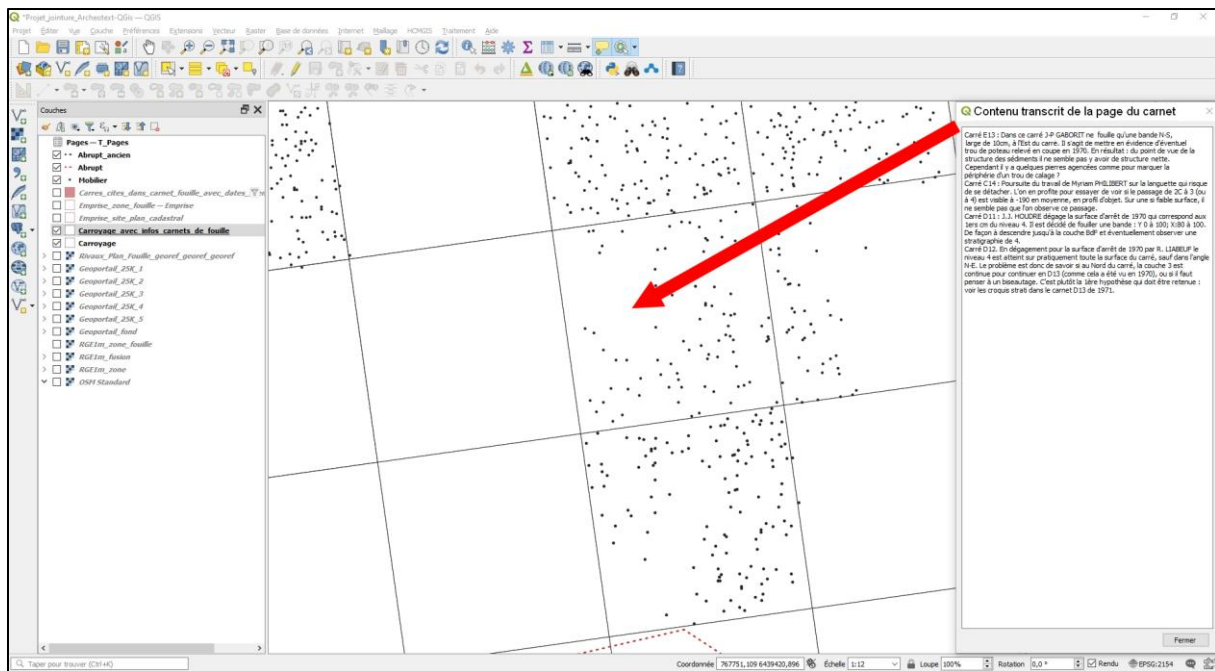


Fig. 14: Display in *QGIS* of the data in the field notebooks transcribed for square D13

The possibility of consulting the pages in the field notebook and the results of their transcription directly using *QGIS* provides an integrated access to these archives from the cartographic representation of the dig and the location of the dig units (the squares) and the items of archaeological material represented resulting from the data in the *Rivault* program. This integration of multi-source data in computerised management system software is one of the major advantages of using several technologies, such as those presented here, from a common consultation interface - in this case, from the cartographic interface of the *QGIS* software.

## CONCLUSION

Overall, this research work has made it possible to show the importance of noting information in the field and the use of certain traditional media in relation to both the exercise of the scientific skill of archaeologists and the life of the social group constituted by a dig team on-site. The archives such as those we studied attest to a variety of practices in terms of noting information in the field, and to the fact that the use of digital devices has increased in recent times.

Observations at Inrap since 2010 have shown that field notebooks seem to be losing their importance as a result of the deployment of the digital devices that are replacing them, at least in part. Collective daybooks for digs such as those used at *Les Rivaux* are not often used nowadays; this is particularly true during preventive archaeology operations, which is probably because the time factor exerts greater pressure than is the case for scheduled archaeological operations. At best, the dig manager keeps his/her own daybook. It would seem that this type of documentation is not as popular among archaeologists as it once was, particularly among those of the younger generation, who more usually record data in standard format, sometimes using digital applications on tablets and smartphones, rather than on paper sheets. But instead of the total disappearance of the traditional media for taking notes in the



field in favour of the exclusive use of digital media, I was able to observe a coexistence of both modes of recording information.

In his publications on places of knowledge, Christian Jacob refers to inscriptions as graphic places of knowledge. For [Jacob, 2014], whether they are textual or graphic, the places of knowledge that inscriptions constitute “are not only the media for fixing and archiving pre-extant knowledge. They construct that knowledge; objectivise it, materialise it. They are part of the field of view, interpretation, and social circulation. They are thus active devices, interfaces between the party that produced them and the party that decodes and uses them”<sup>8</sup>. This interaction between knowledge and the related players in society, those who produce knowledge and those who access it, whether as soon as it is produced or decades later, constitute one of the fields of inventorying, transcribing, decoding and publishing dig archives. This work echoes that proposed by [Bert and Lamy, 2021], revealing the often invisible dimension of the work of researchers, in three areas that are hard to dissociate - the places, the objects and the gestures of science. For these authors, “knowledge is inseparable from the conditions of its enunciation”. It is because I believe it is impossible to separate content from the authors of archaeological knowledge that archives should not be considered cold, disembodied objects that present the construction of knowledge in material form. These archives bear the traces of knowledge in the form of dynamic processes and human undertakings. That they are nowadays produced in native digital form, or that it is now possible to convert them into digital form after they are produced in a non-digital form, does not fundamentally revolutionise the fact that they are archives. In this sense, the digital humanities do not make it possible to reach a new level of scientificity, to use Michel Foucault’s definition of the notion of episteme [Foucault, 1969]. The British archaeologist J. Huggett stresses that the application of information technology to archaeology is still relatively recent and we are not in a position to imagine what the results of its effects on the production of archaeological knowledge will be in several decades’ time [Huggett, 2000]. However, the digital humanities already make it possible to renew our relationship with archaeological dig archives, giving them a second life and proposing new ways of using them, and perhaps occasionally making it possible to render visible something that seemed to be hidden, as in the very act of digging.

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<sup>8</sup> [Ces lieux de savoir graphiques au sens large] ”ne sont pas seulement les supports de fixation et d’archivage d’un savoir qui leur préexisterait. Ils construisent ce savoir, ils l’objectivent, ils le matérialisent. Ils l’inscrivent dans le champ du regard, de l’interprétation et de la circulation sociale. Ce sont donc des dispositifs actifs, des interfaces entre celui qui les a produits et celui qui les déchiffre et les utilise”.

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