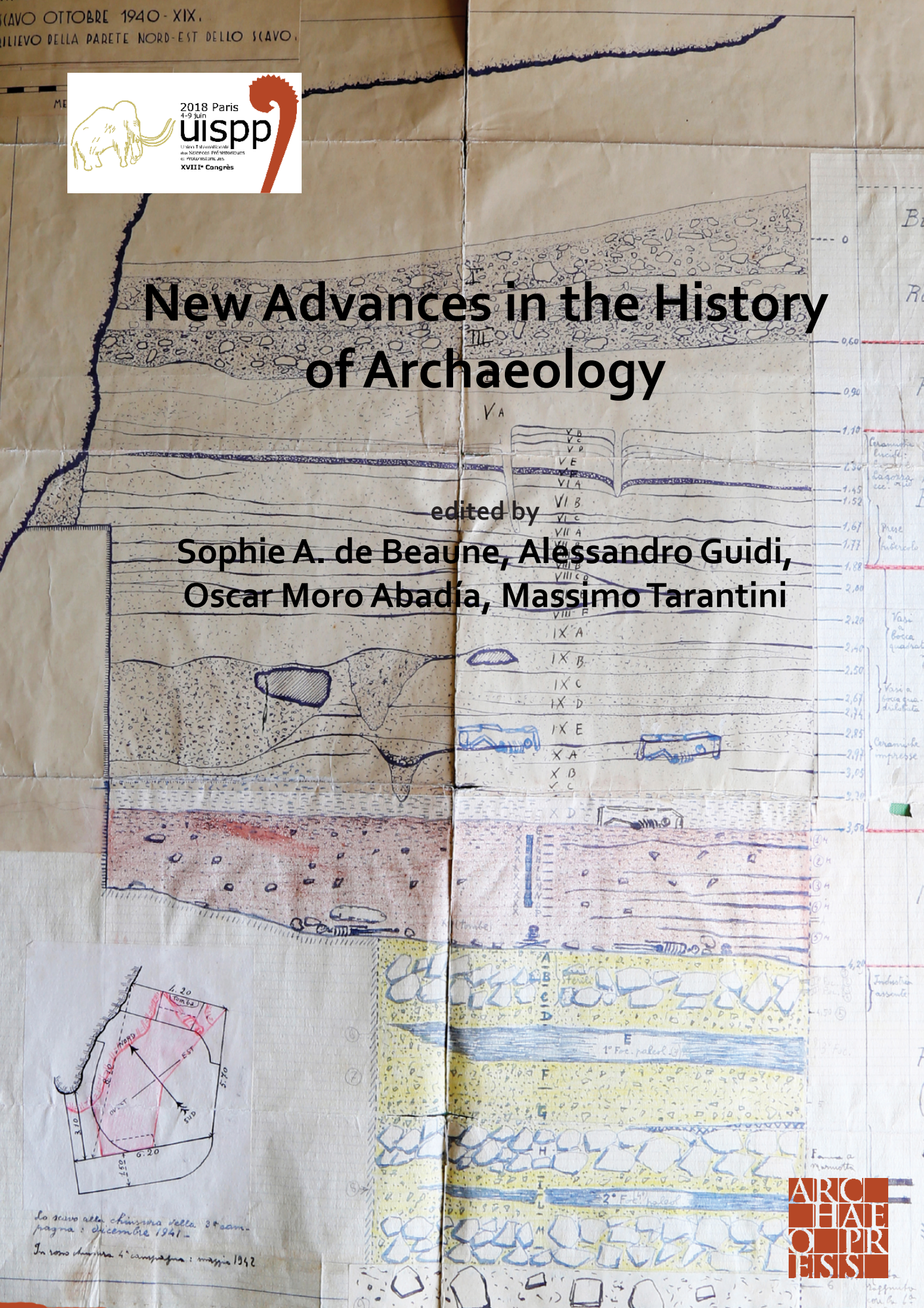


New Advances in the History of Archaeology

edited by

Sophie A. de Beaune, Alessandro Guidi,
Oscar Moro Abadía, Massimo Tarantini

ARC HAE O PR ESS

New Advances in the History of Archaeology

Proceedings of the XVIII UISPP World Congress
(4-9 June 2018, Paris, France)
Volume 16

Sessions Organised by the History of Archaeology Scientific Commission at the XVIII World UISPP
(4-9 June 2018, Paris, France)

edited by

Sophie A. de Beaune, Alessandro Guidi,
Oscar Moro Abadía, Massimo Tarantini

Archaeopress Archaeology

Archaeopress Publishing Ltd
Summertown Pavilion
18-24 Middle Way
Summertown
Oxford OX2 7LG

www.archaeopress.com

ISBN 978-1-80327-072-2
ISBN 978-1-80327-073-9 (e-Pdf)

This book is available direct from Archaeopress or from our website www.archaeopress.com

UISPP PROCEEDINGS SERIES VOLUME 16 – New Advances in the History of Archaeology

UISPP XVIII World Congress 2018

(4-9 Juin 2018, Paris)

VOLUME EDITORS:
Sophie A. de Beaune, Alessandro Guidi, Oscar Moro Abadía, Massimo Tarantini

SERIES EDITOR: The board of UISPP

SERIES PROPERTY: UISPP – International Union of Prehistoric and Protohistoric Sciences

KEY-WORDS IN THIS VOLUME: History of archaeology, stratigraphy, epistemology, interdisciplinarity

UISPP PROCEEDINGS SERIES is a printed on demand and an open access publication,
edited by UISPP through Archaeopress

Contents

List of Figures

Part I
From stratigraphy to stratigraphic excavation in pre- and protohistoric archaeology

E. Rossoni-Notter *et al.*: Démarche d'historien et de préhistorien ou comment pallier les manques dans l'étude

T. Rowan McLaughlin *et al.*: Santa Verna in 1911 and 2015: re-examining pioneering stratigraphic excavation methods

M. Tarantini: The multiple roots of an innovative excavation: G.A. Blanc at the Romanelli Cave

G. Reginelli Servais: **Paul Vouga à La Tène et à Auvernier : la stratigraphie à l'épreuve de la typologie**

F. Nomi *et al.*: **Pioneers of archaeological stratigraphical techniques**

S. Plutniak: **Abstraction in Archaeological Stratigraphy: a Pyrenean Lineage of Innovation**

Part II
Epistemology, History and Philosophy of Science: Interdisciplinary Perspectives on the History of Archaeology

R. Labrusse: **Primitif, précurseur, contemporain**

S.T. Hussain: **Compelling image-worlds**

Part III
Archaeology and interdisciplinarity, from the 19th century to present-day research

M.J. Toledo: ***Luján, l'Abbeville des pampas***

A. Pețan: **From mining to archaeology. An Austrian experiment in Transylvania**

M. Woźny: **Interdisciplinary research of the caves**

M. Tarantini: **Interdisciplinarity and institutions. The case of Italian prehistoric archaeology**

Foreword to the XVIII UISPP Congress Proceedings Series Edition

The UISPP commission 'History of Archaeology' has always been active in promoting scientific research relating to the history of pre- and protohistoric archaeology; over the years of activities, it has encouraged scientific research in the field providing a transversal and international perspective. This impressive volume represents only one of the numerous scientific publications edited by the commission from its institution to today.

The volume 'New Advances in the History of Archeology' is the result of the organization of three highly successful sessions within the XVIII World UISPP Congress held in Paris in 2018. This publication, structured in three parts, ranges from the history of the first stratigraphic excavations, to the interdisciplinary aspects of research and constitutes a valuable analysis of how modern archeology has reached this point today.

Published by some of the most important researchers on the international scene in this area (Sophie A. de Beaune, Alessandro Guidi, Oscar Moro Abadía, Massimo Tarantini), the volume undoubtedly contributes to increasing the prestige of the UISPP, demonstrating how it is a catalyst for researchers and ideas.

As secretary-general of the International Union of Prehistoric and Prot-historic Sciences, it was a great honor for me to write these few introductory lines, as this work underlines the success of the Paris congress and well demonstrates how the 'History of Archeology' commission constitutes a precious resource for the UISPP.

L'UISPP a une longue histoire, à partir de 1865, avec le Congrès International d'Anthropologie et d'Archéologie Préhistorique (C.I.A.A.P.), jusqu'en 1931, date de la Fondation à Berne de l'UISPP. En 1955, l'UISPP est devenu membre du Conseil International de philosophie et de Sciences humaines, associée à l'UNESCO. L'UISPP repose sur plus de trente commissions scientifiques qui représentent un réseau représentatif des spécialistes mondiaux de la préhistoire et de la protohistoire, couvrant toutes les spécialités de l'archéologie : historiographie, théorie et méthodes de l'archéologie ; Culture matérielle par période (Paléolithique, néolithique, âge du bronze, âge du fer) et par continents (Europe, Asie, Afrique, Pacifique, Amérique), paléoenvironnement et paléoclimatologie ; Archéologie dans des environnements spécifiques (montagne, désert, steppes, zone tropicale), archéométrie ; Art et culture ; Technologie et économie ; anthropologie biologique ; archéologie funéraire ; archéologie et sociétés.

Le XVIII° Congrès mondial de l'UISPP en 2018, accueilli à Paris en France par l'université Paris 1 Panthéon-Sorbonne et avec le soutien de toutes les institutions françaises liées à l'archéologie, comportait 122 sessions, plus de 1800 communications de scientifiques venus de près de 60 pays et de tous les continents.

Les actes du congrès, édités par l'UISPP comme dans des numéros spéciaux de revues scientifiques spécialisées, constitueront un des résultats les plus importants du Congrès.

Marta Azarello
Secretary-General /
Secrétaire général UISPP

Foreword to the volume

Following the volume edited for the 2014 Burgos Congress (G. Delley, M. Díaz-Andreu, F. Djindjian, V.M. Fernandez, A. Guidi, M.-A. Kaeser eds., *History of Archaeology: International Perspectives*, Oxford 2016), this book collects the papers presented at the 2018 Paris Congress in the three sessions devoted to the history of archaeology.

The title (*New Advances in the History of Archaeology*) reflects our intention to explore new topics in this field of study and, at the same time, to enlarge the yet fundamental results of the Burgos sessions.

The first session, *From stratigraphy to stratigraphic excavation in pre- and protohistoric archaeology* organized by Alessandro Guidi and Massimo Tarantini, focused on the development of stratigraphical methods in the archaeology in many European countries.

The second session, *Epistemology, History and Philosophy of Science: Interdisciplinary Perspectives on the History of Archaeology*, organized by Sophie A. de Beaune and Oscar Moro Abadía examined the intersections between archaeology and other disciplines like history and philosophy of science.

Most of the papers presented in the third session, *Archaeology and interdisciplinarity, from the 19th century to present-day research*, organized by Laura Coltofean, Géraldine Delley, Margarita Díaz-Andreu and Marc-Antoine Kaeser will be published somewhere else; we succeeded anyway to collect four papers dedicated to the development of different types of interdisciplinarity in Europe and South America.

Marcelo J. Toledo summarizes a long and interesting debate about 'fossil man' in Argentina involving fossil traders and reputed scientists (a strange but not unusual 'mix' in that period) in the second half of XIX century.

Aurora Peţan tells us the peculiar history of the first excavations in Sarmizegetusa in the early XIX century charachterized by an interesting and innovative collaboration between archaeologists and specialists trained in geology, mineralogy and metallurgy.

Marzena Woźny explores the history of the first excavations in the caves of Galicia carried on by the Academy of Arts and Sciences founded in Krakow in 1872. Also in this research archaeologists, geologists, anthropologists, botanists and historians were involved.

Massimo Tarantini's paper deals with the relationships, in Italian prehistoric archaeology, between the institutionalization processes and the slow and contrasted progresses of interdisciplinarity between 1875 and 1954.

To sum up, the papers that we present in this volume clearly demonstrate the importance of the history of archaeology to think more critically about our methods and aims of research.

Alessandro Guidi
President of the Commission 'History of Archaeology'
Executive Committee of the UISPP

Acknowledgements

The editors of this volume express their warmest thanks to all those who contributed to the organization of the Paris UISPP Conference and to the Archaeopress publishing team of the Conference Proceedings.

Furthermore, many of us are members of the InterArq research project (HAR2016-80271-P) (interarqweb.wordpress.com/) funded by the Spanish Research Agency (AEI) and the European Regional Development Fund (ERDF, EU), that contributed actively to our researches.

Part I

From Stratigraphy to Stratigraphic Excavation in Pre- and Protohistoric Archaeology

Session organized by Alessandro Guidi
and Massimo Tarantini

Introduction

Alessandro Guidi[1], Massimo Tarantini[2]
[1]Dipartimento di Studi Umanistici, Università Roma Tre
alessandro.guidi@uniroma3.it
[2]MiBACT – Soprintendenza Archeologia Belle Arti e Paesaggio Firenze
massimo.tarantini@beniculturali.it

Stratigraphic excavation is practically the foundation of archaeology; yet scholars have not yet attempted a detailed and comparative historical examination of its effective achievements.

We are not referring to the acknowledgment of an effective need to place archaeological material in a stratigraphic framework (accomplished in prehistory in the mid-19th century), but rather to the effective establishment of stratigraphy as a key factor in archaeological excavation, an innovation that we can date to the beginning of the 20th century.

The transition from a mere recognition of stratigraphy to the practice of stratigraphic excavation can be analyzed from various points of view:

- A practical dimension, concerning how an archaeological excavation is conducted. A stratigraphic excavation requires the presence of an archaeologist in the field, and it is well known that for many years this presence lacked continuity and mostly concerned the supervision of specialized workers. When can we say that archaeologists effectively began to excavate in person? Was the process favored by new administrative conditions, or was it the consequence of a new methodological awareness?
- A theoretical dimension. From the beginning the attribution of archaeological finds to a stratum was a method of relative chronology and, at the same time, the main way to reconstruct the connections between artifacts. Today we know that archaeological strata can provide information of their own, and that the horizontal distribution of the archaeological materials is just as important as their vertical distribution. To what extent did the progressive awareness of these (or other) factors determine the definitive affirmation of an effectively stratigraphic method of excavation?
- The context of the effective realization of the stratigraphic practice. Can different methods of excavation and recording of stratigraphy be detected in settlements, caves, and burials? If so, are there relationships between these different methods?
- Last but not least, the relationship between different fields of study. Normally we think of a sort of linear evolution from geology to prehistory, and from prehistory to other archaeologies. As a matter of fact, the process was not so linear. If geology is considered the 'cradle' of stratigraphy, what kind of excavation practice did it inspire? And to what extent was it involved in the subsequent development of archaeological excavation? Were other disciplines, starting with the other archaeologies, involved in the definitive affirmation of the stratigraphic excavation in prehistory?

We invited all interested scholars to debate these themes, without geographical limitations; we are interested in developments all over the world. The focus is on a chronological range between the mid-19th and mid-20th century.

The paper by *Elena Rossoni-Notter and colleagues* focuses on old collections of Balzi Rossi sites (Liguria, Italy) and the Observatoire cave (Monaco), excavated between the end of the 19th and the early 20th-century by the Canon Léonce de Villeneuve, first director of the Museum of Prehistoric Anthropology of Monaco. The authors argue that the study of old collections requires an epistemological and historiographical approach. The reconstruction of the context of these discoveries as well as excavation methods and techniques allows the authors to discuss the multiple and inherent biases of this type of collections.

T. Rowan McLaughlin and colleagues examine the long history of stratigraphic excavation methods used at prehistoric megalithic monuments in Malta, comparing the results of excavations carried out in 1911, 1961 and 2015 on a single site, Santa Verna. In this way they focus first on the introduction by Thomas Ashby of the concepts of archaeological stratigraphy in Malta. The new tools for the definition of a relative and absolute chronology are then analysed through the work of David Trump. Finally, the legacy of these stratigraphic excavations and the chronological sequences then established are reconsidered in the light of recent research based on scientific dating and Bayesian approaches.

Massimo Tarantini examines the research carried out by G.A. Blanc at the Romanelli Cave (Italy) in the early 20th century. This excavation stands out for various reasons: the distinction of materials by their layer of provenience; the use of the Cartesian coordinate system; the pedogenetic and paleoenvironmental analysis; and the continuous presence of Blanc himself on the site. The Romanelli excavation is considered as a case study to evaluate the multiplicity of factors at the origin of specific methodological innovations, involving international relations, institutional features, specific scientific questions and the development of ideas on ecology, as well as Blanc's own scientific education and social position.

Gianna Reginelli Servais compares the field practice of the Swiss archaeologist Paul Vouga at two different sites. She thus highlights a profound difference: at the Auvernier/La Saunerie site Vouga applied a rigorous stratigraphic method, and on this basis he laid the foundations of Swiss Neolithic chronology, while on the contrary at the La Tène site any stratigraphic contribution was deliberately excluded. Analysing this only apparent paradox, Reginelli Servais addresses the question of the relationship between stratigraphy and typology in the first half of the 20th century and the difficulty of fully integrating the stratigraphic method into the archaeologist's toolbox.

Federico Nomi, Massimo Cultraro, *Alessandro Guidi* and *Sebastiano Tusa* try to reconstruct the intellectual history of two pioneers of the modern Italian prehistoric archaeology, Luigi Bernabò Brea and Giorgio Buchner, highlighting the parallel stages of their career, in Italy (at the Arene Candide, in Sicily and at Lipari Bernabò Brea, in the lower Tyrrhenian islands Buchner) and abroad (Bernabò Brea excavated the important Aegean site of Poliochni) and, at the same time, the different approaches to the archaeological record.

Sébastien Plutniak deals with Georges Laplace's innovative use of the three-dimensional metric Cartesian coordinate system to record the positions of archaeological objects. Laplace's abstraction and formalisation of archaeological stratigraphy is largely described in its historical and geographical context and is followed in its long development. It is also discussed as a case study about methodological innovations in disciplinary histories. Plutniak argues that in some cases the quest for authorship of methodological innovations is of little historical interest and that the eponymisation of innovations is accompanied by their conceptual oversimplification.

The publication of this session allows us to pay tribute to the memory of our dear friend Gianna Reginelli Servais, who tragically passed away in January 2021.

Employed at the archaeological service of the State of Neuchâtel and a doctoral student at the University of Neuchâtel, Gianna was closely involved in the scientific networks of European Iron Age studies. Appreciated by all her colleagues for her generosity and great sensitivity, Gianna has played a central role in the resumption of studies on the eponymous site of La Tène, originally excavated between 1857 and 1917. Following the new surveys that she had directed on the site, she was entrusted with the general coordination of the ambitious 'La Tène project' initiated and lead by Professor Gilbert Kaenel (1949-2020), in which a large number of institutions and researchers, in Europe and the United States, are involved.

With her great attention to the often neglected contribution of the documentary archives, Gianna was able to convince the community of protohistorians of the enormous benefits that mainstream research can draw from the lessons of the history of archaeology. Thanks to her work, a major site in European prehistory could be completely re-excavated, as it were, by combining the study of collections, archival sources, and field results.

Marc-Antoine Kaeser, director of the Laténium, professor at the University of Neuchâtel, and former president of the UISPP commission 'history of archaeology'

Démarche d'historien et de préhistorien ou comment pallier les manques dans l'étude de collections anciennes ? Exemples des Balzi Rossi (Ligurie, Italie) et de la grotte de l'Observatoire (Monaco)

Elena Rossoni-Notter[1], Olivier Notter[1],
Patrick Simon[1], Suzanne Simone[1]

[1] Musée d'Anthropologie préhistorique de Monaco – Monaco
erossoni-notter@gouv.mc; Corresponding author
onotter@gouv.mc
psimon@gouv.mc
suzanne_simone@libello.com

Résumé

L'étude de vestiges archéologiques mis au jour anciennement nécessite une démarche épistémologique et historiographique. Ce préalable permet de jauger et préciser le contexte de leurs découvertes en même temps que pallier des biais, multiples, inhérents à ce type de collections. Reçues du Prince Albert Ier de Monaco, les méthodes et techniques appliquées, entre la fin du XIXe et le début du XXe siècle par le chanoine Léonce de Villeneuve, premier directeur du Musée d'Anthropologie préhistorique de Monaco, ont été rigoureuses et avant-gardistes. Les fouilles et les études menées dans certains sites des Balzi Rossi (Vintimille, Ligurie, Italie) et à la grotte de l'Observatoire (Monaco) en témoignent. Aussi, plus d'une centaine d'années après, ces collections peuvent faire l'objet de nouveaux travaux et analyses.

Mots-clés: Albert Ier, Villeneuve, Balzi Rossi, Monaco, historiographie

Abstract

Approaches of an Historian and a Prehistorian. How to fill gaps with old collections? Examples of Balzi Rossi sites (Liguria, Italy) and the Observatoire cave (Monaco).

The study of ancient archaeological remains requires an epistemological and historiographic approach. With these preliminaries, it is possible to gauge and specify the context of their discoveries to bridge the multiple and inherent biases of this type of collections. Received from Prince Albert I of Monaco, the methods and techniques used, between the end of the 19th and the beginning of the 20th century, by the Canon Léonce de Villeneuve, first director of the Museum of Prehistoric Anthropology of Monaco, were rigorous and pioneering. The excavations and studies conducted in some Balzi Rossi sites (Ventimiglia, Liguria, Italy) and in the Observatoire Cave (Monaco) are clear examples. More than a hundred years later, the collections can thus be the subject of new works and analyzes.

Keywords: Albert I, Villeneuve, Balzi Rossi, Monaco, historiography

1. Introduction

L'étude de vestiges mis au jour anciennement nécessite, en amont et plus que toute autre, une démarche épistémologique et historiographique. Ce préalable permet de jauger et préciser le contexte des découvertes, étayer l'historique des travaux menés, en même temps que pallier les biais inhérents à ce type de collections (*i.e.* données méconnues, manquantes, égarées ou absentes). Les exemples présentés ici intéressent plus particulièrement les collections paléolithiques de certains sites des Balzi Rossi (Vintimille, Ligurie, Italie) et de la grotte de l'Observatoire (Monaco), fruit de fouilles conduites à la demande du Prince Albert Ier par le chanoine Léonce de Villeneuve,

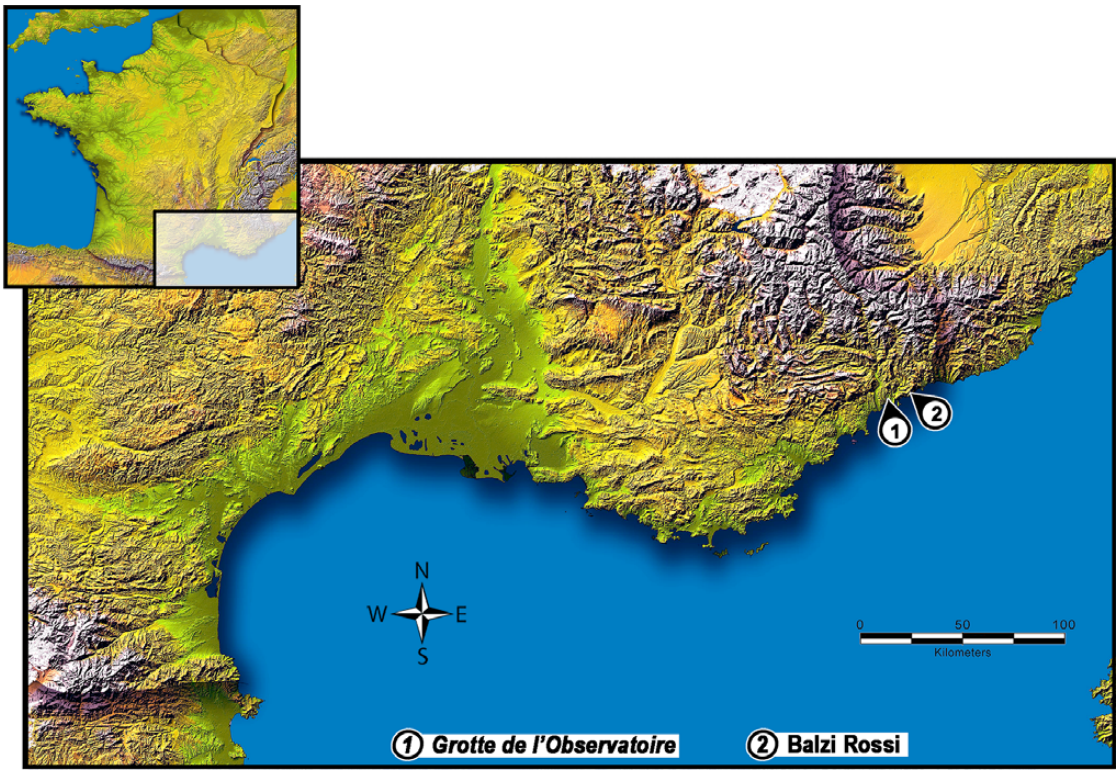


Figure 1. Carte de localisation des sites paléolithiques mentionnés dans cette étude (© Notter *in* Rossoni-Notter *et al.* 2016).

entre la fin du XIXe et le début du XXe siècle (Rossoni-Notter 2016; Rossoni-Notter *et al.* 2016a; Notter *et al.* 2017 ; Rossoni-Notter *et al.* 2020; Rossoni-Notter 2020). Ces gisements archéologiques sont à la fois significatifs pour le matériel mis au jour et pour l'histoire des sciences. Révisées en amont d'un point de vue historiographique, les nombreuses données inédites recueillies sur ces collections octroient une nouvelle base plus étayée et plus complète pour les recherches portant sur les modes de vie et les comportements technoculturels paléolithiques.

2. Présentation des sites et des collections

Les Balzi Rossi (Vintimille, Ligurie, Italie) et la grotte de l'Observatoire (Monaco) se situent à environ 25 km l'un de l'autre, sur le littoral liguro-provençal (Figure 1). Ces sites ont en commun d'avoir été fouillés et étudiés anciennement, dès la fin du XIXe siècle et le début du XXe siècle, sous l'égide du Prince Albert Ier de Monaco et sous la direction du chanoine Léonce de Villeneuve, premier directeur du Musée d'Anthropologie préhistorique.

2.2. Les Balzi Rossi (Vintimille, Ligurie, Italie)

Les Balzi Rossi (Vintimille, Ligurie, Italie), mieux connus sous le nom de grottes de Grimaldi, constitue un complexe de sites paléolithiques situé sur le territoire italien, à la frontière de Menton (Alpes-Maritimes, France) et de Vintimille (Ligurie, Italie). Il comprend une douzaine de sites de nature différente: grottes, abris et sites de plein air. Notre étude intéresse ici le matériel exhumé par l'équipe du Prince Albert Ier de Monaco à la grotte du Prince, la grotte des Enfants, la grotte du Cavillon, et l'abri Lorenzi (Figure 2).

La grotte du Prince (Balzi Rossi, Italie) fut acquise dès 1892 par le Prince Albert Ier (Capello 1893) et baptisée ainsi en 1903 (Villeneuve 1903). Elle livra aux premières équipes monégasques de riches témoins de l'occupation néandertalienne subdivisée en 5 grands ensembles (A à E), aujourd'hui datés d'entre OIS 5 et OIS 3 (Rossoni-Notter 2011; Moussous 2014).

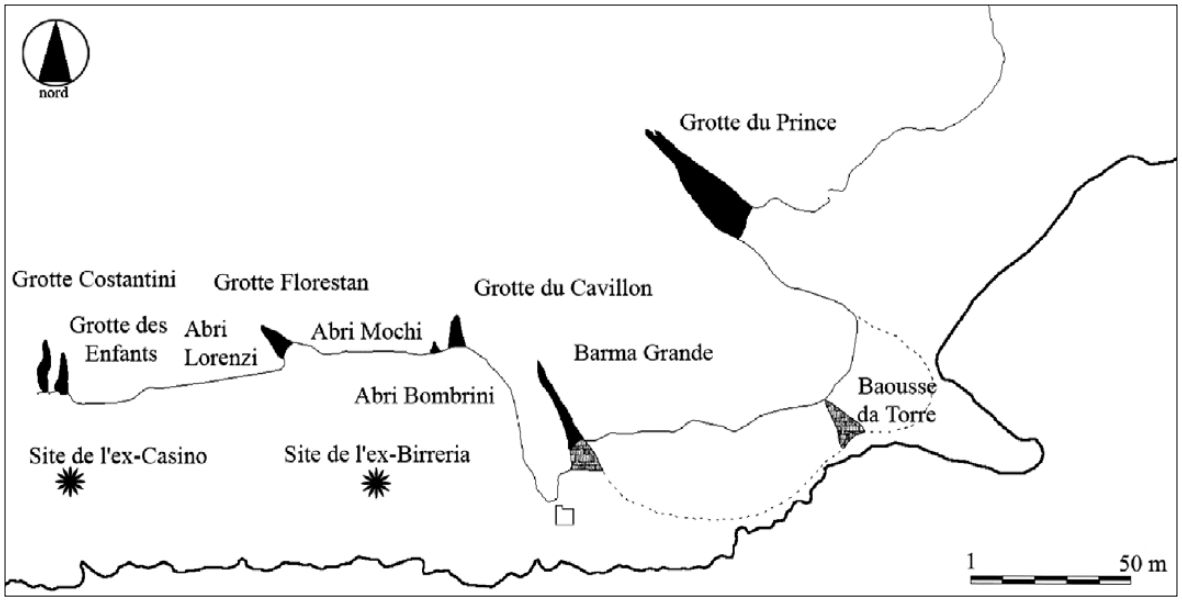


Figure 2. Carte des sites des Balzi Rossi (Vintimille, Ligurie, Italie).
© Notter d'après Lumley et Barral 1976.

La grotte des Enfants fut par la suite fouillée, à partir du 22 avril 1900 (Boule 1906; Barral et Simone 1998; Rossoni-Notter 2011), dans l'optique de mettre au jour des restes humains. Et, en effet, l'équipe du Prince Albert Ier exhuma des sépultures et des assemblages du Paléolithique supérieur, sus-jacents à deux ensembles moustériens (Villeneuve et Boule 1906-1912; Boule 1906; Verneau 1906; Rossoni-Notter 2011).

La grotte du Cavillon, à la suite des fouilles d'Emile Rivière, fit également l'objet d'explorations dès 1902, en vue de corrélations archéostratigraphiques intersites, l'équipe du Prince Albert Ier ayant des problématiques et des objectifs de recherches spécifiques déjà liés aux attributions et comparaisons stratigraphiques paléolithiques (Villeneuve 1906; Rossoni-Notter 2011). Le dernier ensemble de Rivière (Foyer Inférieur Rivière) et trois autres ensembles moustériens sous-jacents (FI, FII, FIII) furent découverts.

Enfin, en 1914, la deuxième caverne de l'inventaire de Rivière (Rivière 1878) référencée comme un abri prit le nom du chef de chantier en charge de ses fouilles (Hurel 2008; Rossoni-Notter 2011): Federico Lorenzi, préparateur au Musée d'Anthropologie préhistorique (Boule 1906; Cartailhac 1912). Les récoltes furent peu abondantes en regard des sites voisins (Rossoni-Notter 2011).

2.3. La grotte de l'Observatoire (Monaco)

La grotte de l'Observatoire (Monaco) se situe dans le quartier ouest de la Principauté, au cœur de l'actuel Jardin exotique. Antérieurement dénommée *la grotte de Caifo* ou encore *Le Baussou* (Rossoni-Notter 2016; Rossoni-Notter *et al.* 2016a; Notter *et al.* 2017), elle tient son nom actuel d'un ancien observatoire météorologique (Fouilleron et Carpine 2010; Rossoni-Notter *et al.* 2016a; Notter *et al.* 2017).

Elle fut fouillée de 1916 à 1920 par le chanoine Léonce de Villeneuve et ses ouvriers, bien qu'elle fit déjà l'objet de préoccupations archéologiques antérieures de la part du Prince Albert Ier. En effet, le Prince souverain de l'époque pressent très tôt le potentiel archéologique de la cavité et y fait prospecter le chanoine Léonce de Villeneuve: « À plusieurs reprises, le Prince m'avait envoyé visiter la grotte du Baoussou. L'expérience que lui donnait la pratique des fouilles préhistoriques la lui faisait juger bonne » (Boule et Villeneuve 1927). L'aspect logistique représenta néanmoins dans un premier temps un frein à toute entreprise de fouilles. Dès 1898,

Villeneuve rapporte: « J'ai visite jeudi les cavernes de (...) et de l'Observatoire. [Cette grotte] est impossible à fouiller » (1898). Des vestiges archéologiques ne furent ainsi mis au jour qu'une quinzaine d'années après, découverts fortuitement lors des travaux d'aménagement du futur Jardin exotique (Boule et Villeneuve 1927). Par la suite, le chanoine de Villeneuve fut officiellement chargé d'y conduire des fouilles systématiques, qui durèrent 4 ans (1916-1920). Elles révélèrent de nombreuses occupations paléolithiques successives, s'étendant de OIS 11-10 à OIS 2 (Viriot *et al.* 1991; Haussman in Simone 1993; Rossoni-Notter *et al.* 2016a; Notter *et al.* 2017).

3. Des méthodes et techniques archéologiques avant-gardistes: du Prince Albert Ier à Léonce de Villeneuve

Les méthodes appliquées *in situ* et au laboratoire, reçues directement du Prince Albert Ier de Monaco (Archives du Musée d'Anthropologie préhistorique de Monaco [M.A.P.]; Villeneuve 1896; correspondances C666, C709, C 720, C 801, C 808, Archives du Palais Princier de Monaco; Villeneuve 1906) par le chanoine Léonce de Villeneuve, ont été pour l'époque rigoureuses et novatrices. Le Prince Albert Ier avait en effet recommandé au premier directeur du Musée d'Anthropologie préhistorique de Monaco, responsable des chantiers de fouilles puis de l'étude des collections, un certain nombre de précautions scientifiques, acquises de ses expériences théoriques (cours, échanges) et pratiques (fouilles, terrain). De nombreux témoignages archivistiques et documentaires rendent compte de ces instructions et ainsi d'une implication scientifique directe du Prince savant, excluant une simple image de mécène. Nous présentons ici un certain nombre de ces directives, appliquées sur les chantiers de fouilles et en laboratoire qu'il aimait à visiter (1921).

3.1. Les chantiers de fouilles

Le Prince Albert Ier avait compris l'importance du sondage des terrains et de l'intérêt d'une fouille enregistrée et précise, pour avoir déjà fouillé lui-même à plusieurs reprises, lorsqu'il était Prince héritier comme à la Barma Grande aux Balzi Rossi (Comte de Colleville 1907; Boule 1927; Hurel 2008; Rossoni-Notter 2018).

Les Balzi Rossi l'ont ainsi intéressé très tôt de par leur potentiel et les découvertes précoces qui s'y faisaient par de nombreux amateurs dont faisait partie son grand-père, le Prince Florestan qui pratiqua une des premières explorations archéologiques dans la grotte qui conserve aujourd'hui son nom (Rossoni-Notter, 2011). « Déjà en 1882, le Prince Héritier avait formé le projet d'explorer ces grottes d'une façon méthodique, vraiment scientifique, qui échapperait à tout reproche. Il avait commencé à mettre ce projet à exécution, travaillant lui-même avec ses ouvriers, lorsque des circonstances imprévues ne le permirent pas de les continuer (...) Federico Lorenzi, fut chargé des travaux et de la surveillance des ouvriers (...) Se conformant strictement aux instructions du Prince et à celles de M. de Villeneuve, il notait les moindres détails des trouvailles, passant durant toute cette longue période, ses journées dans les grottes et ne laissant rien échapper de ce qui pouvait être intéressant » (Verneau 1933).

Ses équipes furent ainsi chargées de fouiller certains de ces sites et leurs sédiments, par ensembles homogènes et d'y apporter une attention capitale, soulignant la considération du Prince aux données archéostratigraphiques et altimétriques. Tout au long des fouilles, les couches archéostratigraphiques furent repérées par altitude (e.g. : une corde était placée à l'aplomb de la corniche de la grotte du Prince qui permettait de positionner les banquettes fouillées successivement dans les trois dimensions), décrites et dessinées très précisément (Figure 3): « Chaque couche est minutieusement explorée dans toute son étendue avant que la couche inférieure ne soit attaquée. Les cotes sont rigoureusement établies et, pour permettre le contrôle, des témoins sont laissés le long des parois, en même temps que les différents niveaux sont indiqués sur la roche elle-même au moyen de traits peints. Au fur et à mesure qu'on enlève une couche,

les objets recueillis sont soigneusement étiquetés et placés bientôt dans des cartons vitrés, attachés avec un ruban et scellés à la cire. De cette manière, il est impossible qu'il se produise le moindre mélange même accidentellement » (Verneau 1906).

Villeneuve a par ailleurs tenu, durant ces chantiers, des cahiers de fouilles et plusieurs de ses notes étaient fréquemment envoyées au Palais Princier en qualité de rapports d'activités et d'information sur les avancées des recherches. Le meilleur exemple est le chantier conduit à la grotte du Prince du fait de ses nombreux commentaires, levés de coupes, sections, dessins (Figure 4): « Auriez-vous la bonté de placer sous les yeux de Son Altesse Sérénissime la coupe et profil ci joints de la fouille? La teinte jaune figure le remplissage. La teinte violette la roche encaissante. Les lignes rouges retracent les niveaux d'habitation: ceux-ci sont au nombre de quatre: A.B.C.D. (...) » (Villeneuve 1917).

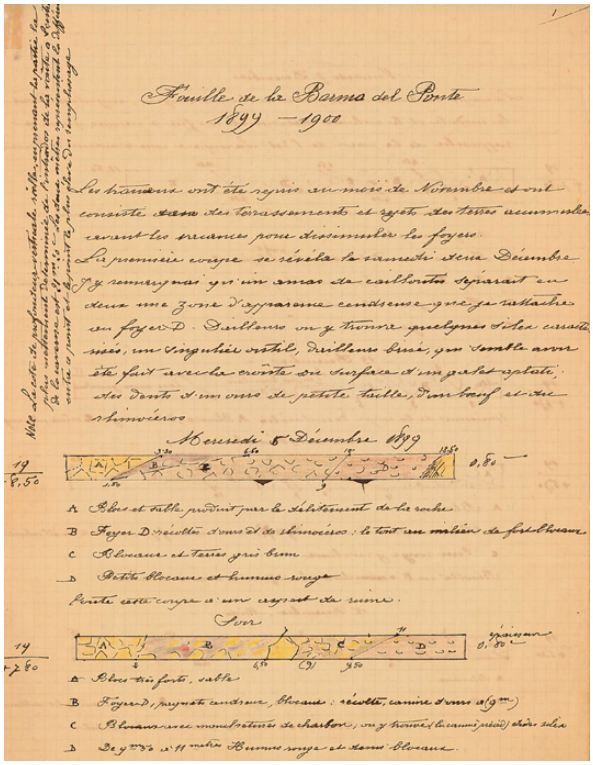

Fouille de la Barma del Ponte
1899 — 1900

Figure 3. Première page d'un carnet de note de la grotte du Prince (Barmal del Ponte) tenu par Léonce de Villeneuve 1899-1900. Inédit (©Archives du M.A.P. de Monaco).

Les techniques de fouilles pratiquées par l'exploration horizontale de petites banquettes et coupes successives coupes successives ont ainsi fourni une large documentation sur les levés de coupes, plans, sections des sites fouillés (Figure 5). Au cours de ces fouilles, et comme à l'heure actuelle, tous les renseignements observables sur le terrain étaient notés et retranscrits directement au sein de carnets / journaux. Ces archives incluent des légendes, couleurs et annotations (Villeneuve 1897), aussi bien pour Balzi Rossi par Villeneuve qu'à l'Observatoire avec M. Gamerdinger, dessinateur désigné, auxiliaire des Travaux Publics (Villeneuve 1919) ou avec R. Giordani (1882-1956). et pour la très grande majorité sont en cours de publications (ERN, ON).

3.2. Les activités post-fouilles et restitutions muséographiques

Les découvertes nombreuses et riches aux Balzi Rossi ont encouragé la création d'un musée préhistorique en Principauté. Le premier Musée d'Anthropologie préhistorique de Monaco fut fondé officiellement en 1902 par le Prince Albert Ier et localisé sur le Rocher de Monaco dans un bâtiment déjà existant (Villeneuve 1905; Comte de Colleville 1907; Boule 1923; Landwerlin 1986; Barral et Simone 1998; Carpine-Lancre 1998 et 2008; Hurel 2008; Lumley 2008; Rossoni-Notter et Simon 2016; Rossoni-Notter 2018; Rossoni-Notter 2020). Ces lieux incluait non seulement de grandes salles d'exposition thématiques et chronologiques, mais aussi des espaces pour la recherche (laboratoires de préparation, moulage, montage, cabinet photographique, bibliothèque scientifique, salle d'étude) (Comte de Colleville 1907; Rossoni-Notter 2018).

3.2.1. Conditionnement: inventaire préliminaire, conservation/exposition et restauration

Les pièces mises au jour lors des fouilles conduites par Villeneuve, et tout particulièrement les industries lithiques, ont fait l'objet d'un étiquetage systématique différentiel, en fonction de leur provenance géographique et stratigraphique (Figure 6). Ce travail est visible sur les artefacts

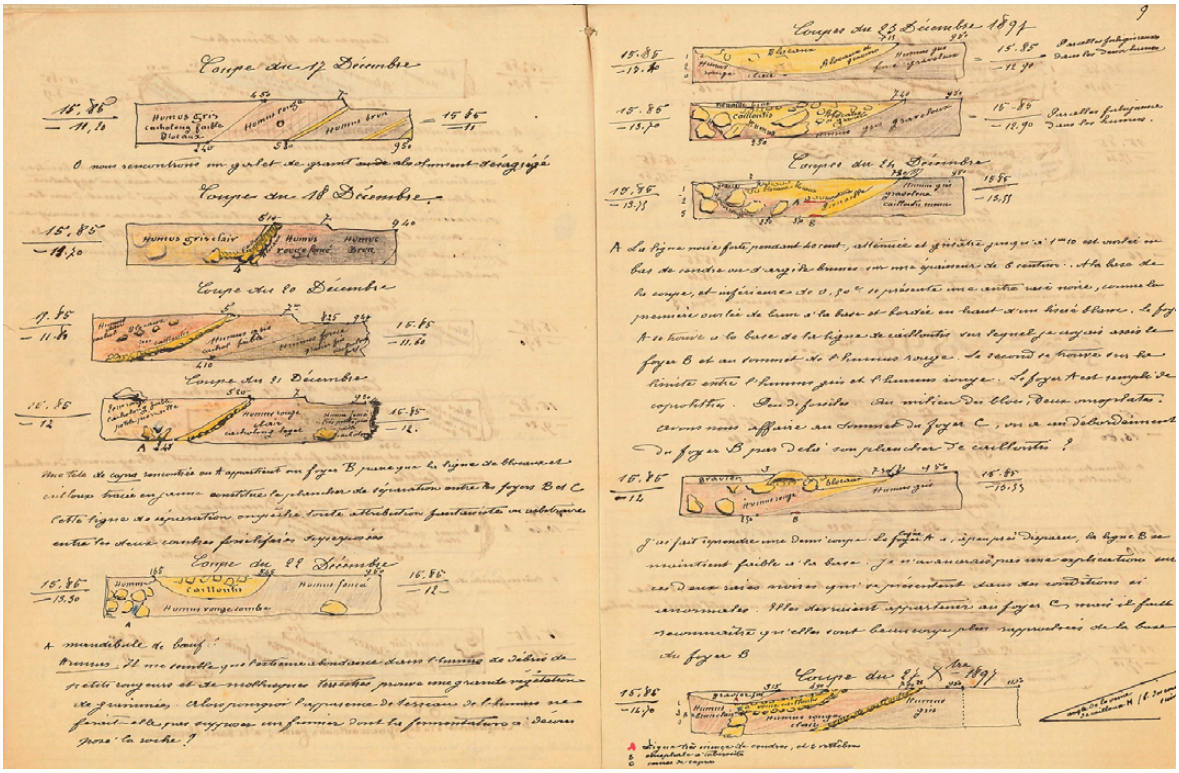


Figure 4. Troisième Journal de la grotte du Prince (Barma del Ponte), Coupes, décembre 1897, page 9. Inédit (©Archives du M.A.P.).

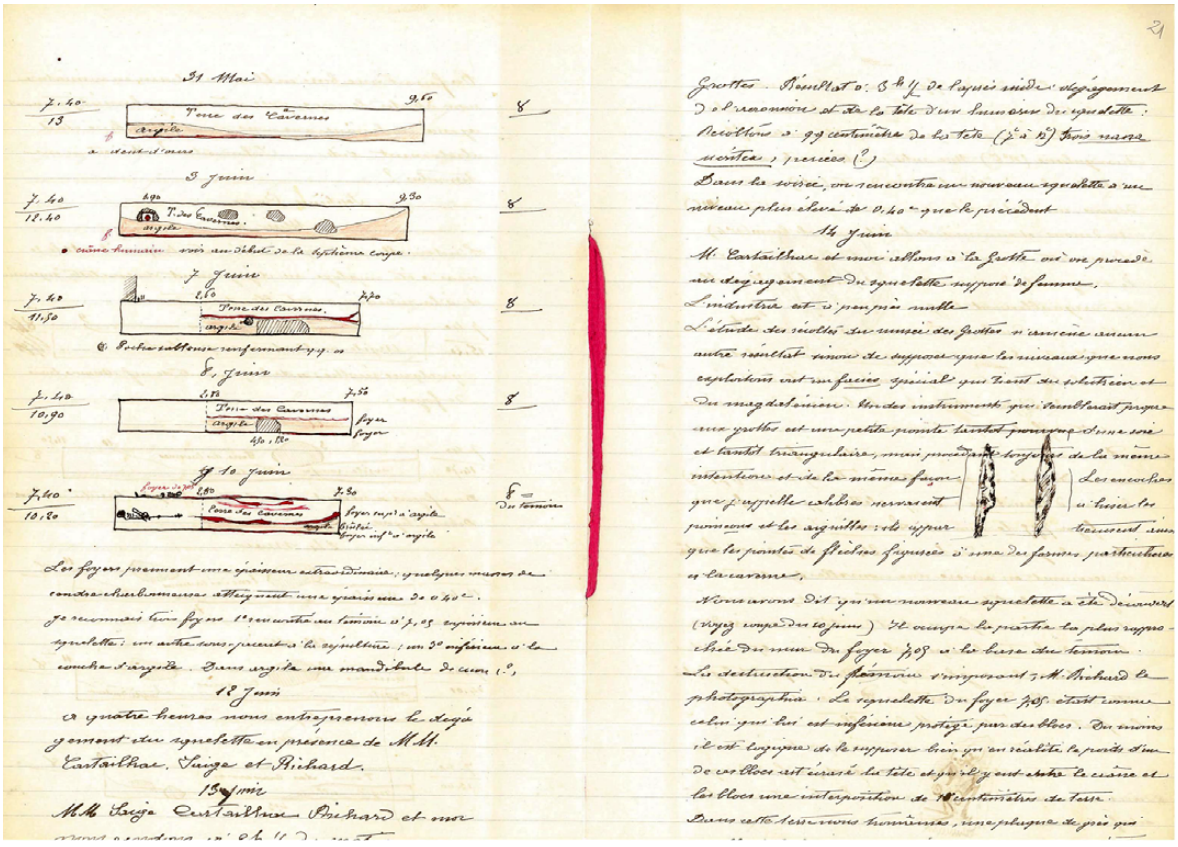


Figure 5. Extrait du Journal de la grotte des Enfants. Inédit (©Archives du M.A.P.).

moustériens des Balzi Rossi, exécuté immédiatement sur le site en cours de fouilles (cf. 3.1). À la grotte du Prince, chaque pièce lithique présente une pastille ronde accolée, de couleur différente en fonction de l'ensemble archéostratigraphique d'où elle provient: pastille verte pour le Foyer A (supérieur), rouge pour le Foyer B, bleue pour le Foyer C, jaune pour le Foyer D, violette pour le Foyer E (inférieur). Cet étiquetage est différent de celui de la grotte du Cavillon (triangle jaune, bleu, vert-noir, rouge). À l'Observatoire, un système d'annotation directement sur les pièces a vraisemblablement été préféré.

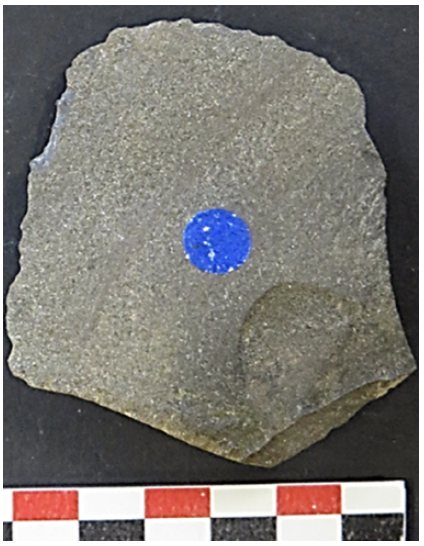


Figure 6. Exemple d'étiquetage d'une pièce lithique, pastille bleue à la grotte du Prince, Foyer C.

Ces collections furent premièrement conservées dans le premier Musée d'Anthropologie préhistorique de Monaco (cf. 3.1) suivant un classement cohérent et ordonné, à la fois géographique, stratigraphique, typologique et diachronique, au sein de ses réserves (Boule 1927; Verneau 1933; Rossoni-Notter 2018). Une partie des collections furent exposées et mises en valeur, selon ce même classement dans les salles d'exposition. Les collections des Balzi Rossi se trouvaient dans les vitrines du premier étage tandis que celles de l'Observatoire étaient exposées au rez-de chaussée (Archives du M.A.P.; Verneau 1933; Rossoni-Notter 2018).

Quelques pièces firent déjà à cette époque l'objet de restaurations magistrales à l'exemple d'un bois de cerf paléolithique de la grotte du Prince (Restauration et analyses 2018-2019: Emiliana Martini, rapport interne M.A.P. 2019).

Aujourd'hui, les collections sont conservées et pour certaines exposées dans l'actuel Musée d'Anthropologie préhistorique, nouveau bâtiment muséal au cœur du Jardin exotique depuis la fin des années 1950 (Vatrican 1959; Barral 1959; Barral & Simone 1968; Rossoni-Notter et Simon 2016a; Rossoni-Notter *et al.* 2018; Collectif 2019; Rossoni-Notter 2020).

3.3. Étude du matériel et publication

D'éminents spécialistes contemporains des découvertes faites aux Balzi Rossi et à l'Observatoire ont mené des études pluridisciplinaires sur le matériel; en sus de dessins, schémas et photographies. Mentionnons les contributions de René Verneau pour l'anthropologie, Marcellin Boule pour la géologie et la paléontologie, Emile Cartailhac pour l'industrie lithique. Leurs résultats de recherches ont fait l'objet de publications au sein de monographies de référence, relatives à l'étude des grottes de Grimaldi (Villeneuve *et al.* 1906-1912) et de l'Observatoire (Boule et Villeneuve 1927).

4. Résultats: les apports de l'historiographie à l'étude des collections

Les méthodes et les techniques avant-gardistes mises en œuvre, entre la fin du XIXe et le début du XXe siècle, par les équipes du Prince Albert Ier rendent aujourd'hui possible la reprise d'études des collections de la grotte du Prince, la grotte des Enfants, la grotte du Cavillon, l'abri Lorenzi et de l'Observatoire. Avant d'initier l'analyse critique d'assemblages mis au jour il y a une centaine d'années, il est apparu essentiel de pouvoir mieux comprendre le contexte des fouilles, des découvertes, de la stratigraphie explorée dans le but de vérifier et compléter les données à disposition. C'est pourquoi un récolement inédit archivistique a été réalisé par deux d'entre nous (E.R-N. et O.N.). Dans ce cadre, de nombreuses notes, photographies, dessins, correspondances des différents actants (e.g. Prince Albert Ier, Villeneuve, Verneau, Cartailhac, Boule), disponibles

à Monaco, et parfois à l'étranger, ont été consultés et exploités. La démarche historiographique conduite en amont de l'étude des assemblages lithiques a livré de précieux renseignements inédits.

4.1. Récolement muséographique

Compte tenu des traditions de dépôts, échanges et donations pratiqués antérieurement par les inventeurs et directeurs de musée, des lots de collections ont été recherchés au sein d'autres instituts et musées (tableau 1).

	Monaco	**France**			**Suisse**	**Italie**		
		Menton	**Paris**			**Vintimille**	**Florence**	**Rome**
	M.A.P.	*Musée de Préhistoire*	*I.P.H.*	*M.N.H.N.*	*Laténium*	*Musée des Balzi Rossi*	*Musée de Préhistoire*	*I.P.U.*
Abri Bombrini						X		X
Abri Lorenzi	X					X		X
Abri Mochi						X		X
Baousso da Torre					X			
Barma Grande	X	X		X		X	X	
Ex Casino						X		X
Ex Birreria								
Grotte Costantini							X	X
Grotte du Cavillon	X			X	X	X		
Grotte des Enfants	X					X	X	
Grotte Florestan								
Grotte du Prince	X		X			X		
Grimaldi	X		X	X		X	X	

Tableau 1. Répartition muséographique de pièces lithiques moustériennes provenant des Balzi Rossi (M.A.P.: Musée d'Anthropologie préhistorique; I.P.H.: Institut de Paléontologie Humaine; M.N.H.N.: Muséum National d'Histoire Naturelle; I.P.U.: Istituto Italiano di Paleontologia Umana) © Rossoni-Notter.

Certains ont été retrouvés en France dans les réserves de l'Institut de Paléontologie Humaine ou encore du Musée de l'Homme, à Paris (Rossoni-Notter 2011). Une trentaine d'artefacts intéressent la grotte du Prince (Foyers A, B, C, D, E), répartie entre la collection de Vayson de Pradenne (48.1) et une donation ancienne à l'IPH de la part du Musée d'Anthropologie préhistorique de Monaco.

Ces pièces ont pu être comptabilisées dans les nouveaux inventaires analytiques; étudiées, leurs observations ont pu être intégrées à l'étude globale des assemblages.

4.2. Redistribution géographique

Il a parfois été possible de retrouver la provenance géographique de certaines pièces, soit recouvrer le site dans lequel elles furent mises au jour. En effet, certains lots posaient problème car présentés aujourd'hui comme « indéterminés » ou bien avec un renseignement trop général, à l'exemple de « Grimaldi » pour les sites des Balzi Rossi.

D'anciennes photographies et des correspondances ont pu renseigner les provenances originelles de ces pièces dont l'origine avait été perdue. C'est le cas pour des lots lithiques de l'Abri Lorenzi (Balzi Rossi, Vintimille, Italie) (Figure 7).

4.3. Appréhension archéostratigraphique

Les archives et autres tenues de notes permettent de suivre les avancées des fouilles et des découvertes effectuées dans les sites susnommés, le long des explorations successives et

respectives de leurs ensembles archéologiques (Archives du M.A.P.; Tutrat 1904). La mise au jour, au sein du Foyer E de l'Observatoire, de la pièce bifaciale sur grand éclat en calcaire noire, de forme amygdaloïde, illustre ces récits fréquents et étayés, ici par un courrier adjoint à un croquis (Figure 8): « J'ai l'honneur de solliciter l'autorisation de fermer la grotte et de suspendre la fouille pendant la saison d'été. Le gisement profondément enfoui est très humide devient malsain. Le niveau le plus bas du remplissage nous a donné une industrie à *faciès* de Saint-Acheul. Je joins à cette lettre un dessin du dernier *coup de poing* qu'on y a recueilli » (Villeneuve 1919).

Figure 7. Lot d'industries lithiques provenant de l'abri Lorenzi (Balzi Rossi, Vintimille, Italie). Photographie datée de 1920. Archives du Musée d'Anthropologie préhistorique de Monaco. Réal. Rossoni-Notter.

L'exploitation de certains documents originaux a en outre conduit à corriger la répartition stratigraphique originelle de certaines couches archéologiques, comme cela a été les cas à la grotte du Cavillon grâce à des coupes originales levées (Villeneuve 1902). Boule avait publié (1906) la coupe stratigraphique de la grotte en dénommant les trois foyers géologiquement soit en partant de la base du remplissage, Foyer I, Foyer II et Foyer III, alors que le Chanoine Léonce de Villeneuve les avait appelés Foyer I, Foyer II et Foyer III depuis le sommet du remplissage, comme à la grotte du Prince et dans les autres sites fouillés (Archives, M.A.P). Ces ajustements sont d'une importance majeure quant à l'interprétation chronostratigraphique du matériel.

Figure 8. Dessin du dernier biface découvert à la grotte de l'Observatoire (Monaco) en 1919. Archives du Palais Princier de Monaco.

4.4. Réattribution stratigraphique des artefacts

À plusieurs reprises, il a été possible de retrouver non seulement la localisation du site originel du matériel mais également le niveau archéostratigraphique des pièces. Les photographies des expositions antérieures ont joué un rôle important dans cette démarche, tout comme les illustrations adjointes aux courriers et autres notes d'activités. Le matériel du Cavillon (Figure 9 et de la grotte du Prince (Figure 10) dont les données archéostratigraphiques avaient été perdues/ effacées (cf. pastilles) ont été concernés.

Pour certaines pièces encore, ce sont les planches publiées au sein des monographies (1906-1912; 1927) qui ont permis leur réattribution.

Les indications sur les pièces elles-mêmes ont également été riches en renseignements. Les grands éclats de l'Observatoire présentent en effet des indications altimétriques et/ou stratigraphiques (tableau 2) qui n'avaient pas été exploitées jusqu'à récemment (Rossoni-Notter *et al.* 2016a). Ces

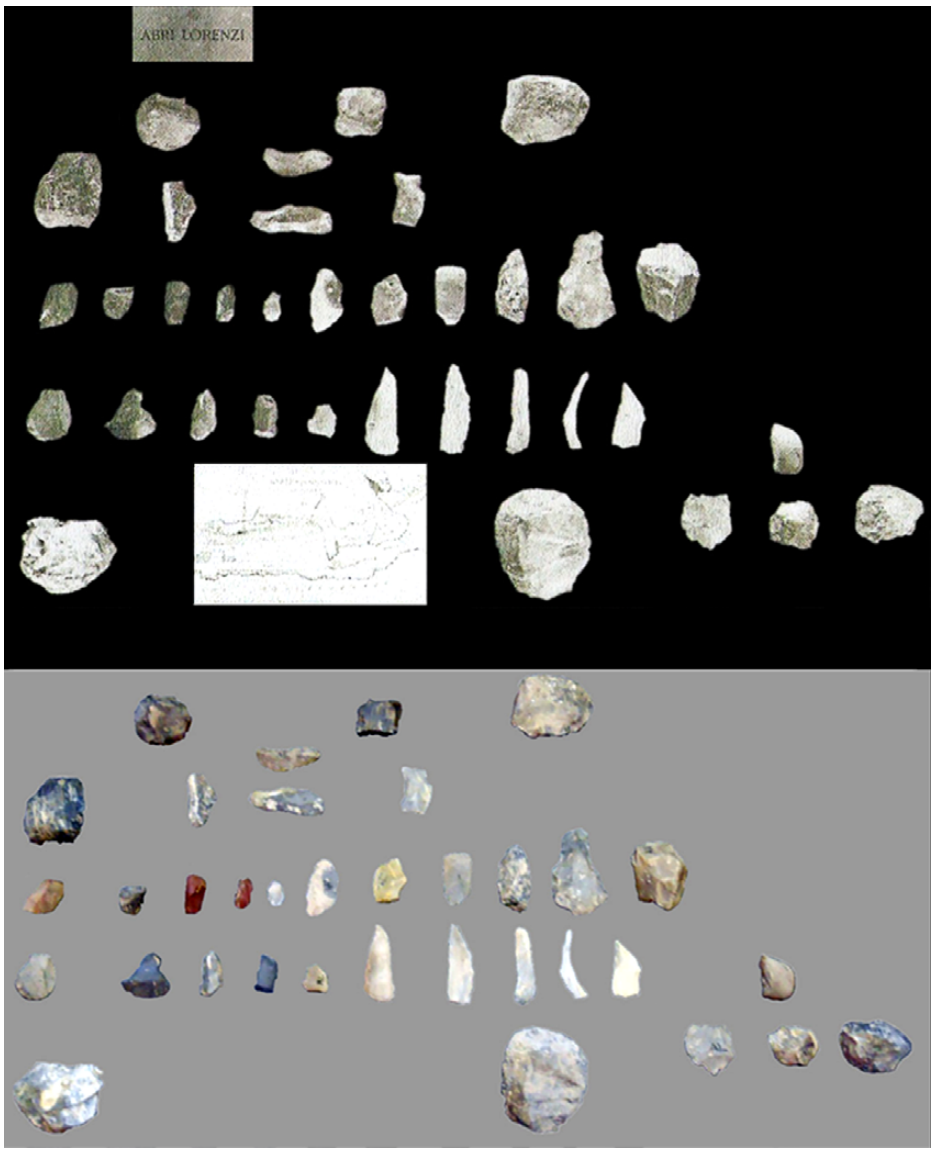


Figure 9. Lot d'industries lithiques provenant de la grotte du Cavillon (Balzi Rossi, Vintimille, Italie) et présenté par foyers au sein d'une vitrine du premier Musée d'Anthropologie préhistorique de Monaco. Photographies datée de 1920 et d'aujourd'hui. Archives du Musée d'Anthropologie préhistorique de Monaco. Réal. Rossoni-Notter.

annotations ont permis de répartir de nouveau les artefacts en fonction de leur attribution archéostratigraphique qui n'apparaissait pas de façon exhaustive dans la première publication (Boule 1927).

Figure 10. Lot d'industries lithiques provenant du Foyer A de la grotte du Prince (Balzi Rossi, Vintimille, Italie). Photographie datée du 5 décembre 1896. Archives du Palais Princier de Monaco.

5. Discussion

L'étude d'un matériel provenant de fouilles anciennes reste toujours délicate: disparition d'objets au cours du temps, mélange de pièces ou de collections, mauvais étiquetage ou perte/estompage des pastilles de couleur, et compte tenu de l'histoire des sciences, tri du matériel au cours des fouilles, absence de répartition spatiale, manque de données archéostratigraphiques etc.

Les recherches préparatoires conduites sur les collections lithiques des Balzi Rossi et de l'Observatoire, mises au jour par l'équipe du Prince Albert Ier, entre la fin du XIXe et le début du XXe siècle, ont contribué à vérifier et compléter les bases de données informatives existantes: muséographiques, historiographiques, géographiques, archéostratigraphiques. L'objectif ultime – étant l'interprétation des artefacts et l'appréhension des occupations paléolithiques – s'en est trouvé alors enrichi puisque cette démarche préalable a livré des compléments d'informations sur le contexte des artefacts et interrogé la fiabilité analytique de ces assemblages. Cette étude inédite, aux résultats plus proches de la réalité du fait d'un Prince-savant précurseur dans la méthodologie archéologique, démontre que « les vieilles collections » n'ont pas terminé

Excavations	Stalag. floor	Layer	NB in 2018	*In* Boule et Villeneuve 1927
1916-1920	II			
		d	6	8 artefacts, 2 handaxes, 1 point
		e	7	
		f	1	
	III			
		h	6	18 flakes
	IV	i	13	several 'boules', large flakes
		k	167	several 'boules', 87 large flakes, 1 long handaxe, 1 kind of side-scraper
		i-k	80	
		vrac	10	
1982-1987		l	166	
Total			**456**	

Tableau 2. Nouvel inventaire archéostratigraphique des assemblages lithiques du Paléolithique inférieur de la grotte de l'Observatoire (Monaco). © Notter *et al.* 2017.

d'éclairer nos connaissances. Néanmoins, de nombreuses questions restent encore en suspens: certaines problématiques intrinsèques aux anciennes collections constitueront inévitablement des écueils pérennes, d'autres pourront certainement être partiellement éclairées.

5.1. Une étude inévitablement limitée

Les limites de la démarche historiographique appliquée aux collections de fouilles anciennes reposent intimement sur l'histoire même des sciences, de ses problématiques et techniques de fouilles. Aussi, au-delà de la méthodologie scientifique promulguée par le Prince Albert Ier et appliquée par Villeneuve et ses équipes, de nombreux obstacles empêchent une interprétation assurée et absolue.

En effet, compte tenu de l'époque, les fouilleurs étaient essentiellement des ouvriers et sélectionnaient préférentiellement les objets en fonction de leurs dimensions (grande taille), leur typologie (objets reconnaissables, caractéristiques d'une culture), leur pétrologie (prédominance pour le silex), à la recherche de la « belle pièce ». Ces constations sont toutefois, dans notre cas, légèrement à nuancer du fait de la présence, dans les assemblages étudiés, d'artefacts en matériaux variés, de déchets de taille et de pièces parfois microlithiques (Rossoni-Notter 2011; Rossoni-Notter *et al.* 2016b; 2016c, 2016d, 2017; Rossoni-Notter et Simon 2016b; Notter *et al.* 2017). Seule la reprise de fouilles, comme le chantier de la grotte de l'Observatoire en 2016 (O.N. et E.R.N.) pourront peut-être amener quelques éléments de réponses à la représentativité du matériel (Rossoni-Notter *et al.* 2020).

Les imprécisions et les lacunes sédimentologiques et archéostratigraphiques (ex: fouilles par foyers[1] et non par niveaux), les manques de relevés planimétriques et spatiales, sont dues aux techniques de fouilles de l'époque. Les anciennes données même détaillées ne peuvent rendre compte du contexte exacte des découvertes, car trop globales et donc biaisées.

Enfin, le temps écoulé, entre la mise au jour du matériel archéologique et notre étude, soit plus d'une centaine d'années d'écart, est à conserver en mémoire. L'impact sur le conditionnement et la conservation des assemblages a été important et dommageable pour les informations originelles (cf. 3.2). Dans notre cas, le transfert des collections d'un premier à un second bâtiment muséal (depuis le Rocher de Monaco au Jardin exotique) dans les années 1950, a en outre favorisé cette perte de données difficiles de recouvrir dans son intégralité.

5.2. Perspectives de recherches

Les résultats obtenus à partir de l'étude de quatre collections (Prince, Enfants, Cavillon, Observatoire), significatifs et pertinents, soulignent l'intérêt et l'apport de recherches historiographiques et épistémologiques, en amont de l'étude de tout matériel issu de fouilles anciennes.

Il apparait, d'autre part, intéressant de pouvoir poursuivre le travail initié, afin d'étayer ces premiers résultats et tenter de répondre à d'autres types de questionnements soulevés par les assemblages. D'autres archives sont également sujets à investigations à l'exemple de carnets de notes et autres documents inédits conservés et en cours d'études au Musée d'Anthropologie préhistorique de Monaco et ailleurs, en Italie.

En parallèle, la reprise de chantiers de fouilles, déjà initiés pour l'Observatoire (Rossoni-Notter *et al.* 2016a; Notter *et al.* 2017) et en programmation pour la grotte du Prince (Rossoni-Notter *et al.* 2016b, 2016c, 2016d, 2017), saura certainement nourrir les interrogations sur la répartition fine des occupations, la distribution spatiale et la représentativité du matériel (cf. 5.1).

[1] « J'ai adopté de confiance le mot foyer pour caractériser un dépôt de cendres auquel des débris de cuisine et des pointes de silex éclatés se trouvent associés », Rapport sur l'état de la fouille dans la Barma del Ponte par Villeneuve, 1897-1898, C 801, Archives du Palais Princier, Monaco, p. 7.

D'autres problématiques intéressent aussi des collections à ce jour manquantes. Mentionnons le matériel de la grotte Florestan et une partie des assemblages de la Baousso da Torre (Balzi Rossi, Vintimille, Italie). La première cavité a été vidée de ses sédiments meubles avant les fouilles d'Emile Rivière aux Balzi Rossi (Rivière 1878), son matériel restant aujourd'hui introuvable (Verneau 1933; Rossoni-Notter 2011). La seconde appelée aussi *Barma di Baussu da Ture, Balzo della Torre ou Barma della Ciappa di ponte alle tavole* détruite par une carrière de moellons en exploitation au XIXe siècle (Boule 1906) fut fouillée par plusieurs équipes notamment par Emile Rivière (Rivière 1916; Rossoni-Notter 2011). Villeneuve y a sondé et détouré des sédiments (1906; Archives du M.A.P., exemple de la conservation d'un fragment coquillier).

Remerciements

Nous adressons de vifs remerciements à tous les Instituts ayant autorisé et favorisé les avancées de nos recherches: les Archives et à la Bibliothèque du Palais Princier (dir. T. Fouilleron) pour la consultation de documents inédits et leurs publications, l'Institut de Paléontologie Humaine et le Musée de l'Homme à Paris.

Bibliographie

Anonyme (1921). *Coupe de la grotte de l'Observatoire, point le plus bas visité par S.A.S. le Prince Souverain*. Archives du Palais Princier de Monaco.

Barral, L. (1959). *Le Musée d'anthropologie préhistorique de Monaco*. Livret-guide XVIe session Congrès préhistorique de France, Imprimerie nationale de Monaco, pp. 61-64.

Barral, L. et Simone, S. (1968). *Préhistoire de la Côte d'Azur orientale*. Imprimerie nationale, Monaco, 132 p.

Barral, L. et Simone, S. (1998). Albert I er, défenseur de la paléontologie humaine. *Revue P.E.N*. Monaco, n°1, pp. 2-7.

Boule, M. (1906). *Les grottes de Grimaldi (Baoussé-Roussé). Géologie et Paléontologie*, t. I, fascicule II, Monaco. Imprimerie de Monaco, pp. 73-362.

Boule, M. (1923). *L'*œuvre anthropologique du Prince Albert I er de Monaco. Masson et Cie Editeurs, 111 p.

Boule, M., Villeneuve, L. (1927). La *grotte de l'Observatoire à Monaco*. Archives de l'Institut de Paléontologie humaine, Fondation Albert 1er de Monaco, Mémoire 1, Masson et Cie Editeurs, Paris, 113 p.

Capello (1893). *Courrier*, daté du 12 mars 1893, C801. Archives du Palais Princier de Monaco.

Carpine-Lancre, J. (1998*). Albert I er Prince de Monaco, des œuvres de science, de lumière et de paix*. Monaco, Palais de S.A.S. le Prince, 205 p.

Carpine-Lancre, J. (2008). Le Prince Albert I er de Monaco et la Science. *In* 1895-2005 : Bilan et perspectives des connaissances sur les peuplements néandertaliens et les premiers hommes modernes de l'Europe méditerranéenne, Colloque Histoire et actualité de l'œuvre scientifique de S.A.S. le Prince Albert I er de Monaco placé sous le Haut Patronage de S.A.S. le Prince Rainier III de Monaco. *Archives de l'Institut de Paléontologie Humaine*, 2 mars 2005, Mémoire n°39, Paris, pp. 13-26.

Cartailhac, E. (1912). *Les grottes de Grimaldi (Baoussé-Roussé), Archéologie*, t. II, fascicule 2. Imprimerie de Monaco, Monaco, pp. 219-246.

Collectif (2019). *Un jardin extraordinaire, Jardin exotique de Monaco*. Mairie de Monaco, 72 p.

Comte de Colleville (1907). *Albert de Monaco intime*. Librairie Felix Juven, Paris, 282 p.

Fouilleron, T. et Carpine-Lancre, J. (2010). Les pionniers des sciences à Monaco. In Centre scientifique de Monaco 1960-2010, 50 ans de recherche, Allemand, D., (dir.), C.S.M., Monaco, pp. 10-19.

Hurel, A. (2008). Le Prince Albert Ier et la préhistoire. In 1895-2005: Bilan et perspectives des connaissances sur les peuplements néandertaliens et les premiers hommes modernes de l'Europe méditerranéenne, Colloque Histoire et actualité de l'œuvre scientifique de S.A.S. le Prince Albert I er de Monaco placé sous le Haut Patronage de S.A.S. le Prince Rainier III de Monaco. *Archives de l'Institut de Paléontologie Humaine*, 2 mars 2005, Mémoire n°39, Paris, pp. 27-35.

Landwerlin, J.-F. (1986). La contribution monégasque à la recherche en Préhistoire. *Bulletin du Musée d'Anthropologie préhistorique de Monaco*, n°29, pp. 99-120.

Lumley, H. de (2008). Bilan des fouilles préhistoriques du Prince Albert Ier de Monaco. *In* 1895-2005 : Bilan et perspectives des connaissances sur les peuplements néandertaliens et les premiers hommes modernes de l'Europe méditerranéenne, Colloque Histoire et actualité de l'œuvre scientifique de S.A.S. le Prince Albert I er de Monaco placé sous le Haut Patronage de S.A.S. le Prince Rainier III de Monaco. *Archives de l'Institut de Paléontologie Humaine*, 2 mars 2005, Mémoire n°39, Paris, pp. 37-41.

Lumley, H., de, et Barral, L., (Eds.) (1976). *Sites paléolithiques de la région de Nice et grottes de Grimaldi*, IXe congres U.I.S.P.P, 13-18 septembre 1976. Livret-guide de l'excursion, Nice, p. 157.

Moussous, A. (2014). *Approche biostratigraphique et évolution des paléoenvironnements au cours du Pléistocène supérieur, d'après l'*étude des grands mammifères des grottes de Balzi Rossi (Ligurie, Italie). Thèse de doctorat, Université de Perpignan Via Domitia, 569 p.

Notter, O., Rossoni-Notter, E., Simone, S. et Simon, P. (2017). Les comportements techniques singuliers des acheuléens de la grotte de l'Observatoire (Monaco). *Bulletin du Musée d'Anthropologie préhistorique de Monaco,* n° 57, pp. 7-46.

Rivière, É. (1878-1887). *De l'Antiquité de l'homme dans les Alpes-Maritimes*. Mémoires de la Société Française de numismatique et d'archéologie, fascicule de 1878, Paris 153 p., pl.

Rivière, É. (1916). Le renne et les gisements quaternaires du versant méditerranéen des Alpes-Maritimes (grottes, abris-sous-roche et brèches osseuses). *Bulletins et Mémoires de la Société d'Anthropologie de Paris*, VI° Série, tome 7, fascicules 3-4, pp. 176-197.

Rossoni-Notter, E. (2011). *Les cultures moustériennes des Balzi Rossi, Grimaldi, Ligurie. Les collections du Prince Albert 1er de Monaco*, thèse de doctorat, Université de Perpignan Via Domitia, 461 p.

Rossoni-Notter, E. In Comité National des Traditions Monégasques (2016). De la Grotte de l'Observatoire à la Tour Odéon. *Untra Nui*, Chroniques monégasques, décembre 2016, 4 p.

Rossoni-Notter, E. (2018). Étude préliminaire. Le Musée d'Anthropologie préhistorique de Monaco. Un écrin monégasque pour l'étude, la protection et la valorisation du Patrimoine de l'Humanité. *Bulletin du Musée d'Anthropologie préhistorique de Monaco*, n°58, pp. 133-152.

Rossoni-Notter, E., Notter, O., Simone, S. et Simon, P. (2016a). Acheulean in Monaco: Observatoire cave and its singular occupations. *Quaternary International*, 411, pp. 212-235. http://dx.doi.org/10.1016/j.quaint.2016.01.073

Rossoni-Notter, E., Notter, O., Simone, S. et Simon, P. (2016b). Balzi Rossi (Liguria, Italy): research studies of the Museum of Prehistoric Anthropology of Monaco regarding Acheulean and Mousterian technic behaviors. New insights and future programs in Prince cave. *IIPP, Incontri Annuali Di Preistoria e Protostoria*, Il Paleolitico e il Mesolitico in Italia: nuove ricerche e prospettive di studio, The Palaeolithic and Mesolithic in Italy: new research and perspectives, 4-5 février 2016, Genova, pp. 35-37.

Rossoni-Notter, E., Notter, O., Simone, S. et Simon, P. (2016c). Acheulean breccia of Prince cave (Liguria, Italy): new insights and regional issues. *Quaternary International*, 411, pp. 236-253. http://www.sciencedirect.com/science/article/pii/S1040618216001415

Rossoni-Notter, E., Notter, O., Simone, S. et Simon, P. (2016d). Balzi Rossi (Ventimiglia, Imperia): research studies of the Museum of Prehistoric Anthropology of Monaco regarding Acheulean and Mousterian technic behaviors. New insights and future programs in Prince cave. *Bulletin du Musée d'Anthropologie préhistorique de Monaco*, 56, pp. 160-162.

Rossoni-Notter, E., Notter, O., Simone, S. et Simon, P. (2017). Recherches à la grotte du Prince (Vintimille, Ligurie) et études des collections anciennes des Balzi Rossi. *Notiziario di Preistoria e Protostoria*, Paleolitico e Mesolitico. Firenze: Istituto Italiano di Preistoria e Protostoria, pp. 2-5.

Rossoni-Notter, E. et Simon, P. (2016a). Le Musée d'Anthropologie préhistorique de Monaco. Entre Histoire et Préhistoire. *Cahiers d'histoire du Cnam*, 5, pp. 151-155. http://technique-societe.cnam.fr/les-musees-scientifiques-et-techniques-innovent--844764.kjsp

Rossoni-Notter, E. et Simon, P. (2016b). Pétroarchéologie et techno-économie: pour une valorisation des collections moustériennes des Balzi Rossi (Grimaldi, Vintimille, Ligurie, Italie). In Tomasso, A. *et al.* eds., *Ressources lithiques, productions et transferts entre Alpes et Méditerranée* (Séances de la SPF, 5). Paris : Société préhistorique française, pp. 153-184.

Rossoni-Notter E. (2020). Découvertes d'hier et d'aujourd'hui en Principauté. L'Apport des recherches archéologiques, Agir pour le Patrimoine, Xe Rencontres internationales Monaco et la Méditerranée, Actes, Association monégasque pour la Connaissance des Arts, pp. 202-221.

Rossoni-Notter, E., Notter, O., Moussous, A., Romandini, M., Perez, E. (2020). L'archéologie monégasque révélée. Relance des programmes de recherches archéologiques en Principauté de Monaco. *Bulletin du Musée d'Anthropologie préhistorique de Monaco*, N°59, pp. 9-17.

Simone, S. (1993). Varia – Préhistoire de Monaco. *Bulletin du Musée d'Anthropologie préhistorique de Monaco*, 36, pp. 59-63.

Trutat (1904). *Photographie de la grotte du Cavillon*, datée du 5 may 1904, Fonds Trutat.

Vatrican, L. (1959). Le Jardin exotique de Monaco. In *Livret-guide, XVIe session Congrès préhistorique de France.* Monaco: Imprimerie nationale, pp. 69-72.

Verneau, R. (1906). *Les grottes de Grimaldi (Baoussé-Roussé). Anthropologie*, tome II (1). Monaco: Imprimerie de Monaco, pp. 291-320.

Verneau, R. avec le concours de Labande, H. (1933). *Catalogue. Musée d'Anthropologie préhistorique*. Monaco.

Villeneuve, L. de (1896). *Courrier de L. Villeneuve au Secrétaire du Commandement*, datée du 15 octobre 1896, C801. Archives du Palais Princier de Monaco.

Villeneuve, L. de (1897). *Rapport sur l'état de la fouille dans la Barma del Ponte*, C 801. Archives du Palais Princier de Monaco.

Villeneuve, L. de (1898). *Courrier de L. Villeneuve au Secrétaire des Commandements*, datée du 26 mars 1898. Archives du Palais Princier de Monaco.

Villeneuve, L. de (1902). *Coupe schématique de la Fouille du Cavillon montrant les trois foyers inférieurs, Coupe transversale.* Archives du Musée d'Anthropologie préhistorique de Monaco.

Villeneuve, L. de (1903). *Courrier de L. Villeneuve au Prince Albert Ier*, datée du 28 novembre 1903, C801. Archives du Palais Princier de Monaco

Villeneuve, L. de (1905). *Courrier de L. Villeneuve au Secrétaire Particulier*, datée du 30 octobre 1905. Archives du Palais Princier de Monaco.

Villeneuve, L. de (1906). *Courrier de L. Villeneuve au Secrétaire Particulier*, datée du 14 février 1906. Archives du Palais Princier de Monaco.

Villeneuve, L. de (1917). *Courrier de L. de Villeneuve au Secrétaire*, datée du 25 janvier 1917. Archives du Palais Princier de Monaco.

Villeneuve, L. de (1919). *Courrier de L. de Villeneuve au Secrétaire Particulier*, datée du 3 juin 1919. Archives du Palais Princier de Monaco.

Villeneuve, L. de, Boule, M., Verneau, R., Cartailhac, E. (1906-1912). *Les Grottes de Grimaldi*, 2 vol., Monaco: Imprimerie de Monaco.

Viriot, L., Zany, D., Chaline, J., Courant, F., Brunet-Lecomte, P., Simone, S. (1991). Compléments aux faunes de rongeurs des gisements d'Aldène (Cesseras, Hérault) et de l'Observatoire (Monaco). *Bulletin du Musée d'Anthropologie préhistorique de Monaco*, 34, pp. 7-16.

Santa Verna in 1911 and 2015: re-examining pioneering stratigraphic excavation methods in Malta

T. Rowan McLaughlin[1], Eóin Parkinson[2], Catriona Brogan[3], Simon Stoddart[4], Caroline Malone[5]

[1] School of Natural and Built Environment, Queen's University Belfast
r.mclaughlin@qub.ac.uk – Corresponding author
[2] Department of Archaeology, University of Cambridge
[3] Department of Classics and Archaeology, University of Malta
[4] Department of Archaeology, University of Cambridge
[5] School of Natural and Built Environment, Queen's University Belfast

Abstract

We discuss the methodological context of early 20th-century excavations of prehistoric sites in Malta, and how modern scientific work is building on the legacy of those who introduced concepts of archaeological stratigraphy to the study of the remarkable megalithic monuments for which Malta is widely famed. We focus on one site, Santa Verna, comparing the results of excavations in 1911, 1961 and 2015, and explaining how high-quality early stratigraphic excavations provide a short-cut to modern-day attempts to refine chronological sequences using scientific dating and Bayesian approaches to chronological modelling.

Keywords: megalithism, Malta, Bayesian modelling

Resumé

Malte est célèbre pour son archéologie mégalithique. Dans cet article, nous discutons du contexte méthodologique des fouilles de sites mégalithiques à Malte au début du XXe siècle et de la manière dont les travaux scientifiques modernes s'appuient sur l'héritage de ceux qui ont introduit à Malte les concepts de stratigraphie archéologique. Nous nous concentrons sur un site, Santa Verna, en comparant les résultats des fouilles de 1911, 1961 et 2015 et en expliquant en quoi des fouilles stratigraphiques précoces de haute qualité constituent un raccourci par rapport aux tentatives modernes pour affiner les séquences chronologiques à l'aide de datations scientifiques et d'approches Bayésiennes à la chronologie.

Mots-clés : mégalithisme, Malte, modélisation bayésienne

1. Introduction

Some of the most elaborate and complex Neolithic monuments in Europe are found in the islands of Malta in the Central Mediterranean (Figure 1). These sites date from the Late Neolithic, contemporary with the Italian Copper Age, and were associated with the unique 'Temple Period' culture that flourished on the islands between 3800 and 2300 BC. Many Temple sites were rebuilt or re-modelled many times, which resulted in a well-stratified sequence of earth floors and stone foundations that are well suited to stratigraphic analysis. In a modern-day methodological context, excavations of these sites undertaken by the ERC-funded 'FRAGSUS' project have taken place with the primary objective of obtaining radiocarbon samples from the rich archaeological stratigraphy present at these sites. These radiocarbon results are calibrated and used to develop models of each site's chronology using Bayesian statistics, leading to a refined and nuanced view of the sequence of events at these internationally important sites.

This new work follows in the footsteps of many others who have realized the potential for studying the stratigraphy of these important monuments. Among the first international scholars to explore

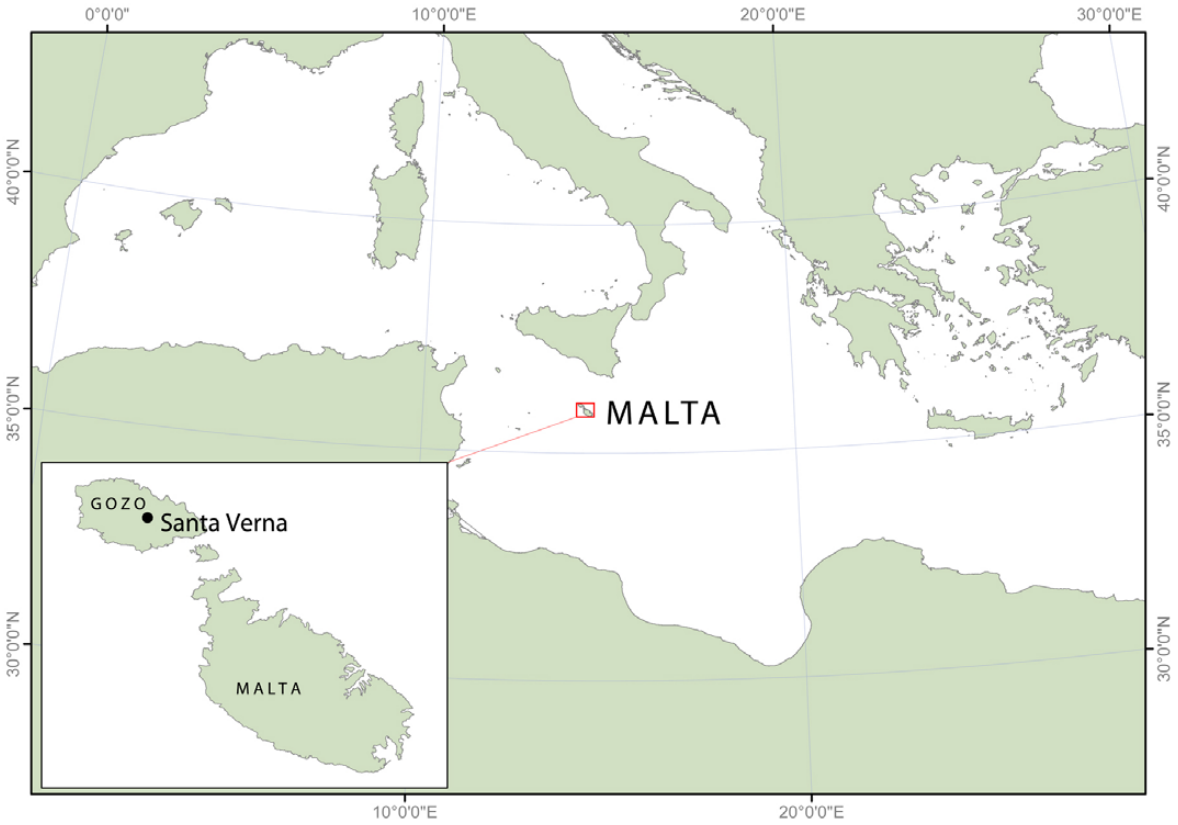


Figure 1. Map of the Central Mediterranean region showing the location of the Maltese Islands and the site of Santa Verna.

scientifically Maltese megalithic remains was Thomas Ashby (1872-1931; Figure 2), who was appointed director of the British School at Rome in 1906, and made his first visit to Malta in 1908. Ashby, who had already excavated important Roman sites in England was keen to expand the remit of the British School at Rome through further fieldwork throughout Italy and the western Mediterranean, a move that was perhaps motivated by a friendly rivalry with the British School at Athens (Hodges 2000). At this time Arthur Evans of the Athens school was undertaking his pioneering excavation of the Palace of Knossos on Crete, which had been particularly successful in applying the idea of stratigraphy to layers of soil and debris. However, mounting political tensions meant he faced considerable difficulties in obtaining the necessary consents to undertake fieldwork work in Italy (Hodges 2000). In overcoming this, Ashby turned to the Maltese Islands, which then still part of the British Empire presented an opportunity to undertake

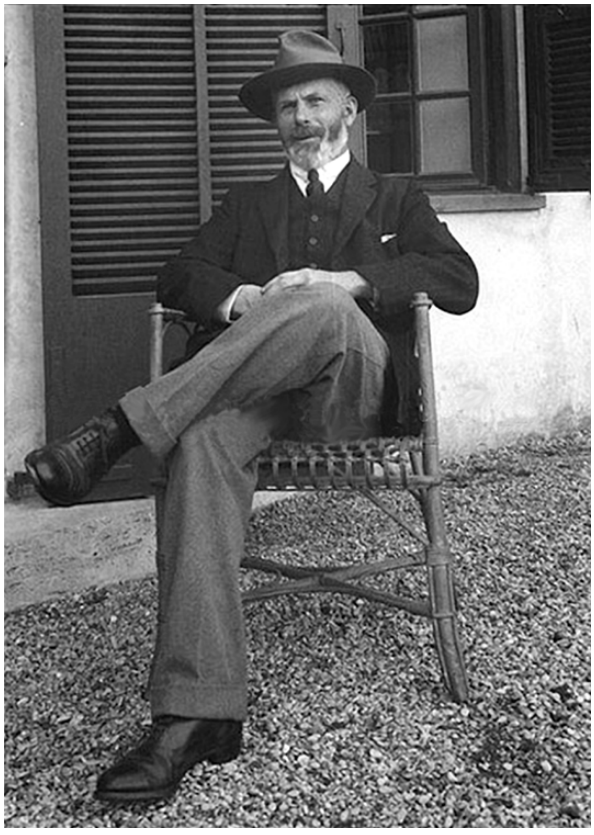


Figure 2. Portrait of Thomas Ashby 1874-1931 (BSR copyright).

excavation. The significance of the archipelago's location within the Mediterranean along what was then considered the route of diffusion of the Mediterranean megalithic 'complex'. This was a recurring theme in archaeological discourse in the early 20th century, and would have likely to have contributed to the British School at Rome's interest in prehistoric Malta. As Vella and Gilkes (2001) have noted, the School's interest in the islands of the central Mediterranean had been initiated by collaboration with Duncan MacKenzie on the prehistoric architecture of Sardinia in 1906 (Mackenzie 1910, 1913). MacKenzie had a reputation as being skilled in scientific and stratigraphic excavation methods, stemming from his time working with Arthur Evans at Knossos from 1900 onwards, and maintained his collaboration with Ashby over the following years by means of active correspondence with each other (Momigliano 1999). In general therefore, the work in Malta occurred during an expansion of the School's remit into several different western Mediterranean projects. In Malta, Ashby found a thriving tradition of archaeology among the local scholars, Fr. Manuel Magri, N. Tagliaferro and the leading figure in Maltese archaeology, Sir Themistocles Zammit (Ellul-Micallef 2013: 239-241). Keen to foster good relations with the Maltese government and thus enable fieldwork, Ashby developed a close relationship with Zammit that would endure throughout the 1910s, and facilitate his important early contribution to Maltese prehistory.

With support of Zammit, the British School at Rome, led by Ashby and his student Eric Peet (later Professor of Egyptology at the University of Liverpool and author of *The Stone and Bronze Ages in Italy and Sicily*), was then able to undertake several excavation campaigns between 1908 and 1911 at megalithic sites in Malta. This work introduced to Malta the art of stratigraphic excavation, and considerably influenced and refined the field methods of Zammit and others, who were already excavating the island's megalithic remains with considerable energy. Naturally, Ashby was drawn to some of the spectacular and well-preserved megalithic complexes, and conducted work at the sites of Kordin, Ħaġar Qim, Mnajdra and later Tarxien (Ashby *et al.* 1913; Evans 1973) on the island of Malta – the latter three megalithic complexes now UNESCO world heritage sites.

2. Ashby, Bradley and Santa Verna

In addition to these famous sites, Ashby also undertook an excavation on behalf of the Maltese authorities at the less known site of Santa Verna on the north-western island of Gozo. The record of this excavation, as documented by Robert Bradley in his contribution to Ashby *et al.* (1913) and his *Malta and the Mediterranean Race* (1912) book, is worth a more detailed focus. Located in a field west of the town of Xagħra on the island of Gozo, Santa Verna was, and still is, a relatively obscure megalithic site, battered and denuded of most of its stones and visible architectural features. Today the site is identified by three unassuming Coraline limestone blocks that originally formed part of the façade of the temple. The site is part of a wider important prehistoric landscape, comprising also of the well preserved Ġgantija megalithic complex and the rich burial site at the Brochtorff-Xaghra Stone Circle (Grima, Malone and Stoddart 2009). It seems in 1911 that the site was no more spectacular than it is today (Figures 3, 4); indeed it had only been 'discovered' by a local government official, Mr Nicola Said, and the antiquarian Father Emmanuel Magri, around the turn of the 20th Century. Why was Ashby then interested in this site, a battered monument, where only a few large stones from the temple survived above the ground? It seems likely he was hoping that the monument was still relatively intact below the ground, and that it would yield important information about the prehistoric past when studied using the principles of stratigraphy. The ruinous state of the monument was a blessing in this regard as the sequence of deposits under the site could be studied without the labour of moving enormous megaliths, yielding a maximum of gain with the minimum of effort. And so, in the summer of 1911, Santa Verna was excavated. Furthermore, the unassuming nature of Santa Verna left it undisturbed by antiquarians and grand tourists alike, who had long visited Malta for its folk culture and megaliths. For Ashby, however, a twist of fate intervened. He fell ill with dysentery almost as

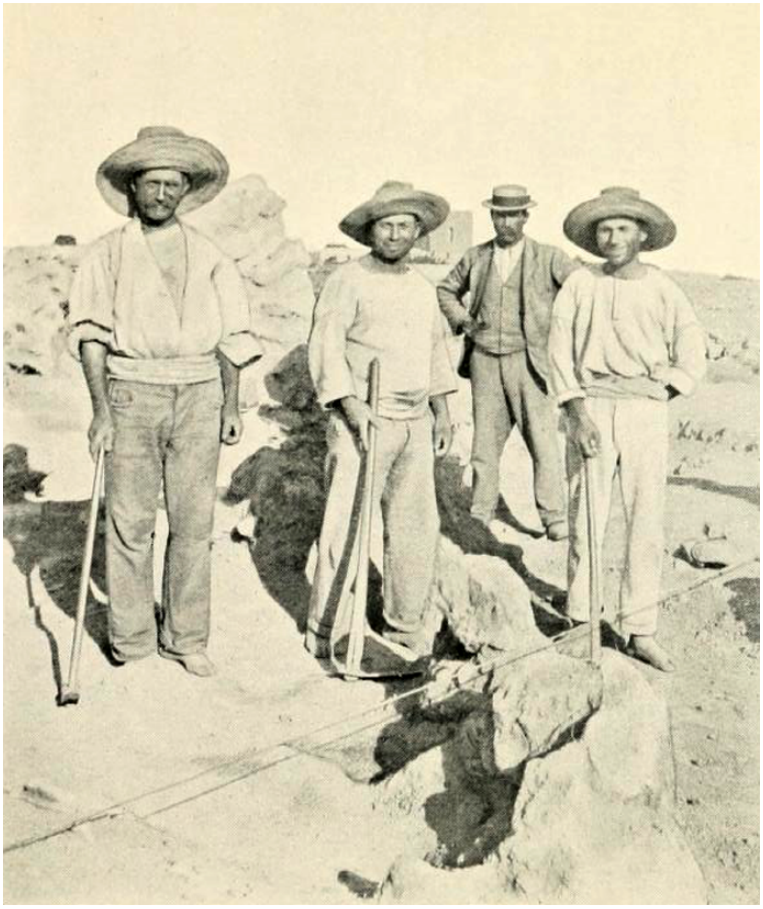


Figure 3. Santa Verna in 1911 (Bradley 1912).

Figure 4. Santa Verna in 2015.

soon as the ground was broken and was forced to retire from the excavation. His assistant, Robert Bradley, completed the excavation in his stead.

Bradley had experience of excavating on other British School at Rome archaeological field programmes in Malta, although his academic interests lay in what might now be termed physical anthropology that explored the relationship between physical characteristics of

Figure 5. Sub-adult skeleton exposed at Santa Verna in 1911 (Bradley 1912).

the human body, culture and ancestry. In this respect the Santa Verna excavation played to his strengths, as unusually for a Maltese megalithic 'Temple' complex, two burials set within stone lined graves were uncovered in a mound of earth on the southern edge of the site. These consisted of an adult male and a child, with hints of further burials underneath (Figure 5). Bradley's study of the skeletal remains from Santa Verna led to the publication of an eclectic and eccentric volume entitled *Malta and the Mediterranean Race* (Bradley 1912), that discussed racial classification and the origin of prehistoric and modern Mediterranean populations – themes which are now considered racist, but characterised physical anthropology in the early 20th century (Ellison 2018). Remarkably for an early 20th century excavation, Bradley left the burials *in situ* in order to preserve the structure of the temple and grave structures (Bradley 1912).

Although acknowledging the difference between the burial rites when comparing the Santa Verna burials and those he excavated at the Ħal-Saflieni hypogeum, as described in his 1912 volume, Bradley mistakenly assumed the skeletons were prehistoric, even though they were clearly buried under some sort of Christian rite. They were orientated east-west and buried in an extended position, unlike the flexed position favoured in Malta during the Late Neolithic (Malone *et al.* 2009). However, Bradley did recognize the burials were later than the main structure of the temple, describing them as being found in a 'cut' feature. According to the 1911 excavation report (Ashby *et al.* 1913: 110), the male skeleton '... lies for the most part on a *torba* floor, but in parts upon the underlying loose stones... The feet rest against a rubbish heap, which appears to have been dug into for the purpose of burial... it would appear, therefore, that the burials were made in the rubbish heap, which was dug into the level of the torba, and even through it'. The description of the burials as being 'dug into' the earlier deposits acknowledged that they were stratigraphically later and shows an appreciation that some material was *in situ*, whilst other strata were disturbed.

Aside from the burials, the work at Santa Verna revealed a remarkable sequence of intact floors that lay a few centimetres below the ground. These consisted of two different levels of '*torba*' or pounded limestone, rendered into smooth surfaces, placed upon a foundation of fist-sized stones gathered from the local fields. Below the *torba* lay two further beaten-earth

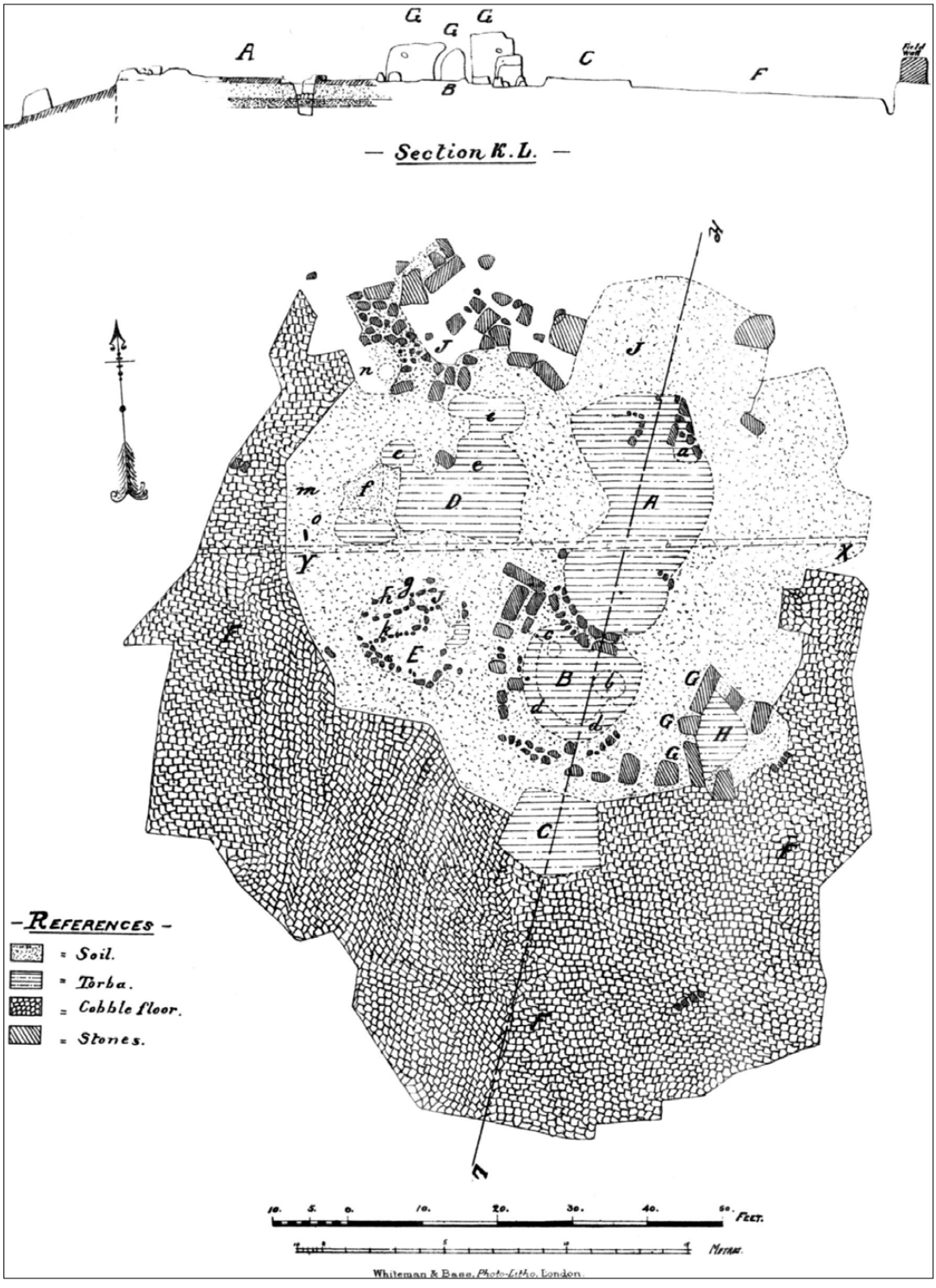


Figure 6. Measured plan, profile and section drawing of Santa Verna, Gozo (Ashby *et al.* 1913).

floors, each with a similar foundation of stones, which were founded upon a natural deposit of red earth. These findings were recorded and written up to a high standard, and the excavation records included accurate measured plans, likely produced with a plane table, and section drawings (Figures 6, 7), and a description of the relative sequence of events inferred from the stratigraphy. In addition to recording the location of megaliths and structural features, the plan also contained information on the location and extent of different archaeological deposits, in a similar fashion to modern recording methods (Figure 6). Arguably however, without the

guiding hand of Thomas Ashby, whose illness meant he had no first-hand experience of these discoveries, the overall significance of the site was overlooked and it subsequently fell back into obscurity.

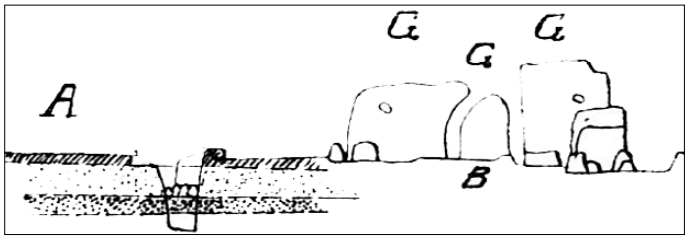


Figure 7. Detail illustrating the vertical section through deposits at Santa Verna.

Bradley's account of the excavations, in both the 1912 summary and 1913 excavation report, showed a remarkable level of maturity for the early 20th century. In addition to noting the stratigraphic placement of the burials, the excavation reports also attempted to draw stratigraphic relationships between layers within the temple structure and those outside – perceiving contemporaneity between that inner and outer floor surfaces (Bradley 1912: 73). Described in detail in the 1913 published report, Bradley (1913: 113) remarks that the lowest level of the inner floor of the temple was contemporary with a cobbled floor surface located uncovered at the entrance to the temple. In his 1913 report, Bradley also offers detailed descriptions of trench locations and size, alongside measurements of individual section layers. In a similarly mature discussion, Bradley (1912) pondered over the site's duration of use, remarking that the occupation of the site may have been very short – but his discussion on this subject is flavoured with a hint of frustration. The level of detail and style of presentation in the Santa Verna 1913 excavation report shows more similarities with modern excavation reports than most other published excavation reports that were produced for Maltese prehistory for the next 50 years. Bradley's (1912) short note on his excavation of a chamber at Hal-Saflieni, the famous hypogeum on Malta, also displays a level of detail that is not otherwise apparent in other accounts of work at that important site, highlighting his competence as an archaeologist during a time when archaeology was still in the process of transitioning from its antiquarian roots.

3. Santa Verna, Malta and the Mediterranean: Excavations by Trump

A very brief excavation at the site in the 1960s was also undertaken by David Trump as part of his refinement of the prehistoric sequence for Malta (Trump 1961, 1966). Then curator of the National Museum of Archaeology, Trump (1966) revealed that the lowermost strata at Santa Verna was associated with Early Neolithic pottery (*Għar Dalam* and *Skorba* wares), and that the overlying sequence of floors associated with the megalithic structure contained a seriation of different pottery styles encompassing all of the Late Neolithic 'Temple Period' wares. The sequence at Santa Verna was also documented by Trump at temple sites on Malta, namely Mġarr and during his landmark excavations at Skorba, the site of a temple and earlier Neolithic village. Trump was able to date each layer relatively, based on this seriation, using a comparative culture-sequence first developed by John Evans (1959) and later refined by his own fieldwork at Skorba, Kordin III, Mġarr and Santa Verna itself. At Skorba, Trump had obtained a series of radiocarbon dates to back up his pottery sequence, and the prehistoric chronology for Malta he published (Trump 1966) still provides the framework for identifying and dating the phases of Maltese prehistory.

Trump's work at Santa Verna implied that the site would be ideal for providing radiocarbon samples and ultimately a new and more precise absolute chronology for the prehistoric sequence of the Maltese Islands. For this very reason, Santa Verna was targeted by the ERC-funded 'FRAGSUS' project which has, since 2013, been engaged in examining the environmental impact of human settlement in Malta. In 2015 permission was granted by the Superintendence of Cultural Heritage, Malta and Heritage Malta to excavate at Santa Verna, re-examining the British School of Rome's work there, and providing the basis for new Bayesian radiocarbon chronologies for the site (McLaughlin *et al.* 2020).

4. Santa Verna 2015: New excavations, new methods

The first challenge for the 2015 dig was in locating the 104-year old trenches of the 1911 excavation. This was achieved through geophysical survey, surface clearance and excavation, and by geo-referencing Ashby *et al.* (1913) excavation plan to establish an approximate location of the original trenches. On finding the 1911 trenches, we encountered the same stratigraphy and structural features as Ashby and Bradley had in 1911 (Figures 8, 9). The

Figure 8. Ashby and Bradley's 1911 *sondage* re-excavated in 2015.

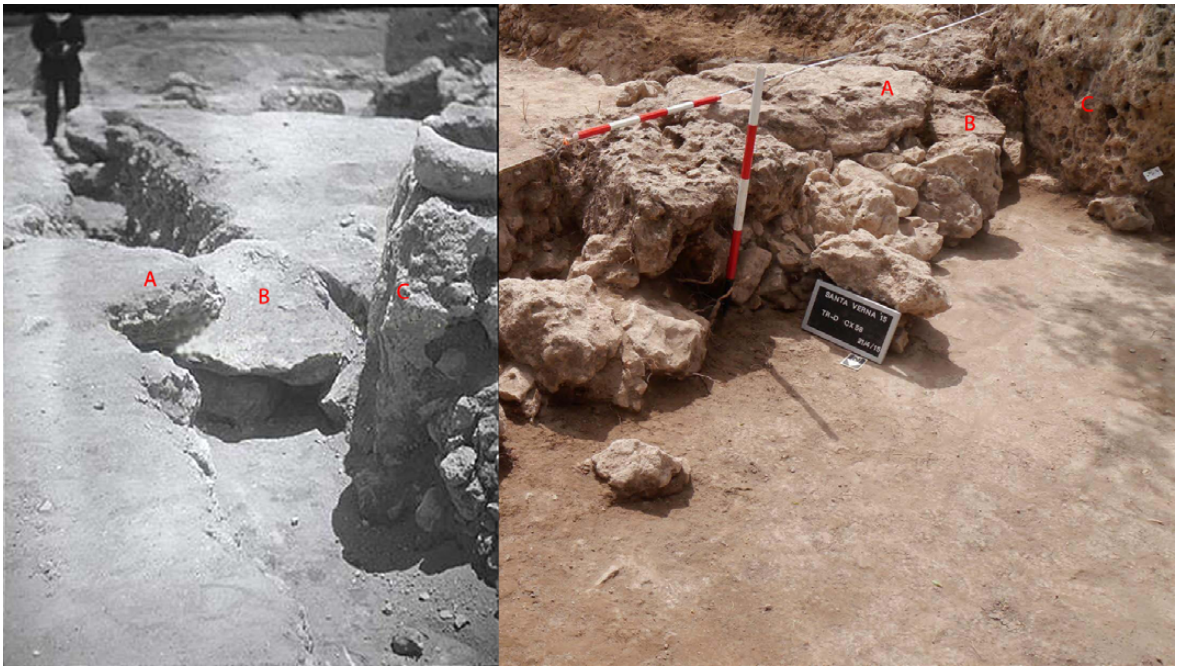


Figure 9. Structural features at Santa Verna in 1911 (left) and 2015 (right).

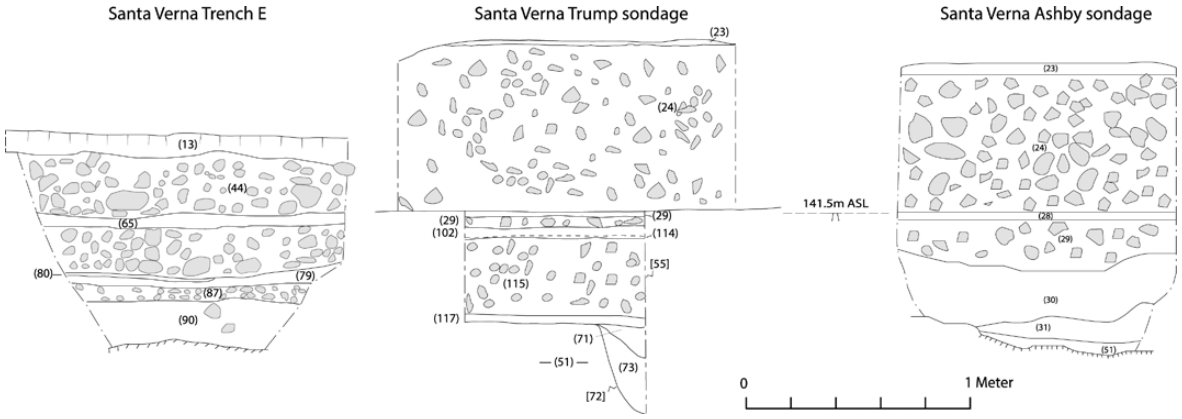


Figure 10. Section drawings from the 2015 excavations at Santa Verna.
Compare with Figure 7.

2015 excavation revealed that in each location where the 1911 team had excavated, a slightly different stratigraphy was encountered (Figure 10). Combining the stratigraphic and spatial information from the 1911 and 2015 excavations, we can now see that the megalithic structure evolved though five different phases and was substantially rebuilt at least once during its life. One of the major advancements of the 2015 fieldwork from the 1911 excavation was the clarification of the layout and orientation of Santa Verna, which similar in size, shape and orientation of the nearby Ġgantija temple. The 1911 fieldwork was therefore more efficient at achieving and understanding of the sequence of the site, over establishing its layout and spatial characteristics. Bayesian modelling of radiocarbon dates from these layers can date the construction of the site to around 3700 BC, and identify that a major remodelling of the structure occurred around 3450 BC (Figure 11). Bayesian modelling brings the methodology used to understand a site like Santa Verna full circle; laboratory measurements of ^{14}C provide an absolute chronology, but the stratigraphy first described by Bradley has allowed these age estimates to be refined and constrained. Furthermore, we can make formal estimates of the date of structures such as megalithic walls that are impossible to date directly, and use Bayesian statistics to estimate how long certain phases lasted, or the duration of any hiatus between successive phases of activity. These developments go some way to answering many of the questions left open by the early 20th-century work, and will be continued to be refined and debated in the future as new data come to light and improvements to scientific dating techniques are made.

5. Conclusions

The robust and objective dating techniques now available would have been far beyond the wildest dreams of archaeologists of the early 20th Century. However, the pioneering work of Thomas Ashby and Robert Bradley of the British School at Rome at Santa Verna is significant because it documented not only the spatial layout of the megalithic remains, but also the characteristic fine-grained deposits that were associated with the megalithic foundation, and importantly, their relative sequence. In a modern-day methodological context, where we are acutely aware of the finite nature of the archaeological resource, the 2015 re-excavation highlights the value of re-opening old excavations of sites where the stratigraphy is well-understood. Old excavations are a short-cut to building new absolute chronologies that utilize the latest dating methods and the statistical tools now available for their analysis. This is especially so in cases of sites such as Santa Verna, where previous excavations of the structure were so vital in defining and developing prehistoric culture sequences, as demonstrated by the work of Trump (1966) for the Maltese Islands. The work of Thomas Ashby, Robert Bradley and their colleagues from the Maltese Islands has stood the test of time in more ways than

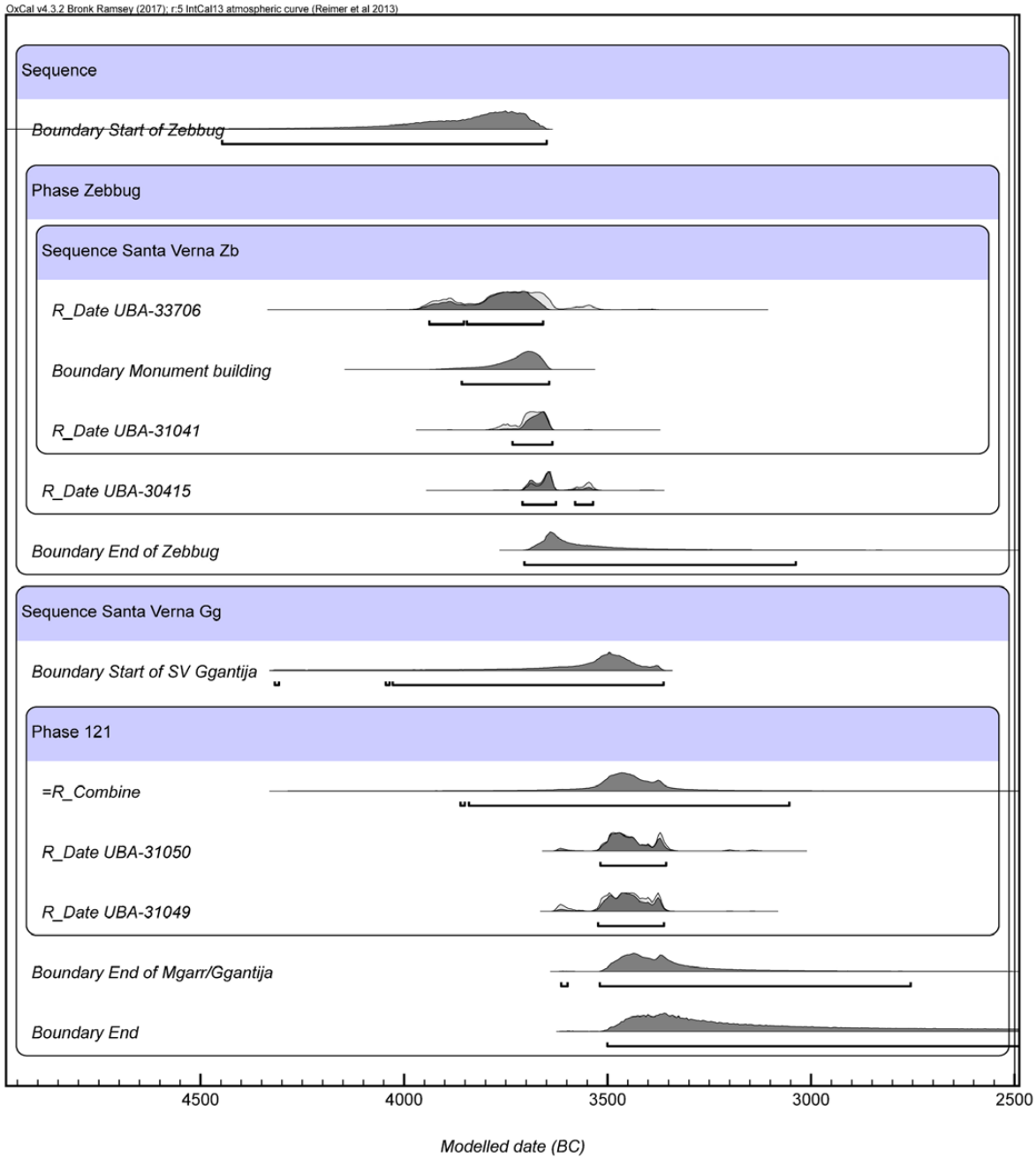


Figure 11. Bayesian model for the sequence of radiocarbon dates associated with the Santa Verna 'temple' megalithic building.

one, and the record of their work is a monument to the careful and progressive spirit in which it was originally undertaken, and a legacy and challenge for those who wish to follow in their footsteps.

Acknowledgements

We acknowledge Heritage Malta and the Superintendence of Cultural Heritage, Malta for permission to undertake fieldwork in Malta and the programme of radiocarbon dating mentioned in this paper. Many thanks to the reviewers and the editors of this volume for their helpful suggestions, which have helped us improve this paper. Funding for this work has been provided by the European Research Council Advanced Grant 323727 'FRAGSUS' (PI Caroline Malone, Queen's University Belfast).

References

Ashby, T., Bradley, R.N., Peet, T.E. and Tagliaferro, N. (1913). Excavations in 1908-11 in various megalithic buildings in Malta and Gozo. *Papers of the British School at Rome*, 6, pp. 1-126.

Bradley, R.N. (1912). *Malta and the Mediterranean Race*. London: Fisher.

Ellison, P.T. (2018). The Evolution of Physical Anthropology. *American Journal of Physical Anthropology*, 165(4), pp. 615-625.

Ellul-Micallef, R. (2013). *Zammit of Malta: his times, life and achievements.* Volume 2. Valletta: Allied Publications.

Evans, J.D. (1959). *Malta*. London: Thames & Hudson.

Evans, J.D. (1973). *The Prehistoric Antiquities of the Maltese Islands*. London: Athlone Press.

Grima, R., Malone, C. and Stoddart, S. (2009). The ritual environment: the context of the circle. In Malone, C., Stoddart, S., Bonanno, A. and Trump, D.H., eds. *Mortuary Customs in Prehistoric Malta. Excavations at the Brochtorff Circle at Xagħra (1987-94).* Cambridge: McDonald Institute for Archaeological Research, pp. 57-62.

Hodges, R. (2000). *Visions of Rome: Thomas Ashby, archaeologist*. London: British School at Rome.

Mackenzie, D. (1910). The Dolmens, Tombs of the Giants, and Nuraghi of Sardinia, *Papers of the British School at Rome*, 5, pp. 89-137.

Mackenzie, D. (1913). Dolmens and Nuraghi of Sardinia, *Papers of the British School at Rome*, 6(3), pp. 127-170.

Malone, C., Stoddart, S., Trump, D. and Bonanno, A. (2009). *Mortuary customs in Prehistoric Malta: Excavations at the Brochtorff Circle at Xaghra, Gozo, (1987-1994)*. Cambridge: McDonald Institute for Archaeological Research.

McLaughlin, R., French, C., Parkinson, E., Boyle, S., Bennett, J., Stoddart, S., and Malone, C. (2020). Santa Verna. In Malone, C., Grima, R., McLaughlin, R., Parkinson, E.W., Stoddart, S., and Vella, N., eds. *Temple places: Excavating cultural sustainability in prehistoric Malta*. McDonald Institute, Cambridge, pp. 123-168.

Momigliano, N. (1999). *Duncan McKenzie: a cautious canny highlander & the Palace of Minos at Knossos.* Bulletin of the Institute of Classical Studies. Supplement 72.

Trump, D.H. (1961). Skorba, Malta and the Mediterranean. *Antiquity*, 35, pp. 300-303.

Trump, D.H. (1966). *Skorba. Excavations Carried out on Behalf of the National Museum of Malta 1961-1963*. Oxford: Society of Antiquaries of London.

Vella, N.C. and Gilkes, O. (2001). The Lure of the Antique: nationalism, politics and archaeology in British Malta (1880-1964). *Papers of the British School at Rome*, 69, pp. 353-384.

The multiple roots of an innovative excavation: G.A. Blanc at the Romanelli Cave, Italy (1914-1938)

Massimo Tarantini
Soprintendenza Archeologia Belle Arti e Paesaggio, Firenze – Italy
massimo.tarantini@beniculturali.it

Abstract

In 1914 Gian Alberto Blanc, a physicist and co-founder of the Italian Committee for Research in Human Palaeontology, conducted an innovative excavation at the Romanelli Cave (Apulia, Italy) which was published in an equally exemplary fashion beginning in 1920. The project featured a rigorous application of the distinction of materials by their layer of provenience and the use of the Cartesian coordinate system. Furthermore, each stratum was analysed on the pedogenetic level and as a bearer of paleoenvironmental information.

How do we explain the development of so many innovations in excavation technique and sediment study procedure? In this paper the Romanelli Cave excavation and analyses are employed as a case study to evaluate the multiplicity of factors at the origin of specific methodological innovations, involving international relationships, institutional features, specific scientific questions and the development of ideas on ecology, as well as Blanc's own scientific education and social position.

Keywords: stratigraphy, Cartesian coordinate, geoarchaeology, international relationships, excavation methods

Résumé

En 1914, le physicien Gian Alberto Blanc, cofondateur du *Comité de recherche pour la paléontologie humaine*, conduit une fouille exemplaire à la Grotta Romanelli, dans les Pouilles, publiée de manière tout aussi exemplaire à partir de 1920. Nous trouvons ici l'application rigoureuse de la distinction des matériaux en fonction de la couche de provenance et l'utilisation de coordonnées cartésiennes. Chaque couche a également fait l'objet d'études pédogénétiques et est conçue comme une source d'informations paléo-environnementales.

Comment expliquer le développement de cette approche novatrice dans les techniques d'excavation et d'étude des sédiments? La Grotta Romanelli est ici considérée comme une étude de cas pour montrer la multiplicité de facteurs à prendre en compte pour parvenir à une reconstruction historique non réduite à des explications monocausales. Par conséquent, les relations internationales, les aspects institutionnels, les questions scientifiques, le développement des idées sur l'écologie, ainsi que la position sociale et la formation scientifique de Blanc seront pris en compte.

Mots-clés : stratigraphie, coordonnées cartésiennes, géoarchéologie, relations internationales, méthodes de fouille

1. Introduction

In 1914 Gian Alberto Blanc (1879-1966) (Figure 1), an Italian physicist specialising in geochemistry and co-founder (the year before) of the *Comitato per le ricerche di Paleontologia Umana* (Committee for Research in Human Palaeontology – CRHP), carried out an exemplary excavation at Grotta Romanelli, a cave in the south-eastern tip of Apulia (Figure 2), which was subsequently published in an equally exemplary fashion starting in 1920.

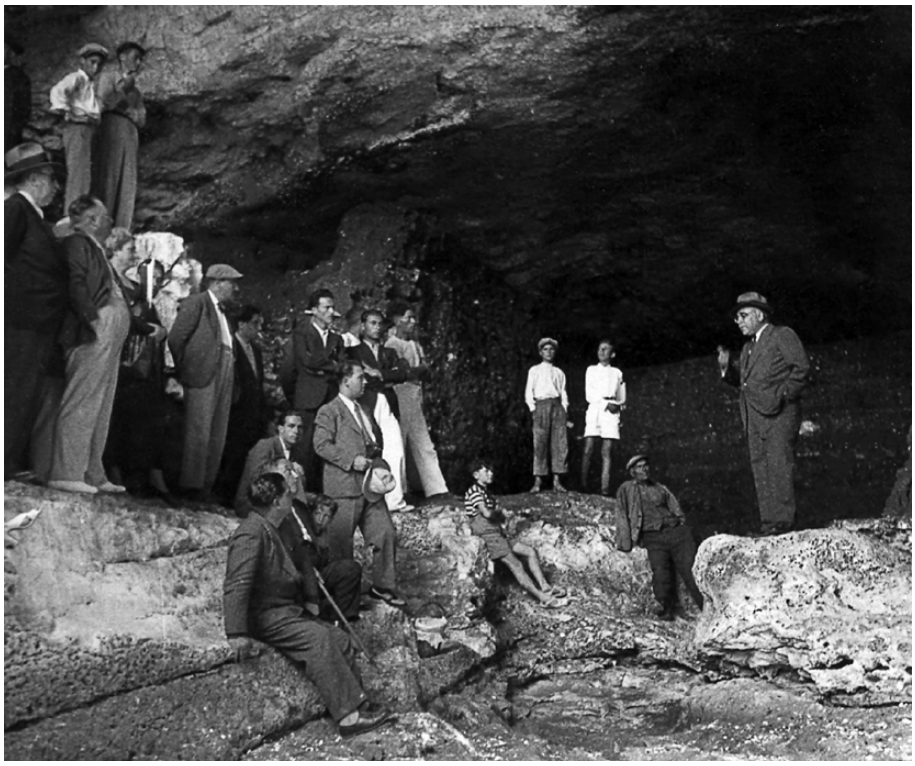


Figure 1. Gian Alberto Blanc (1879-1966), on the right side, illustrates the cave to a group of visitors in the 1930s (Archivio dell'Istituto Italiano di Preistoria e Protostoria).

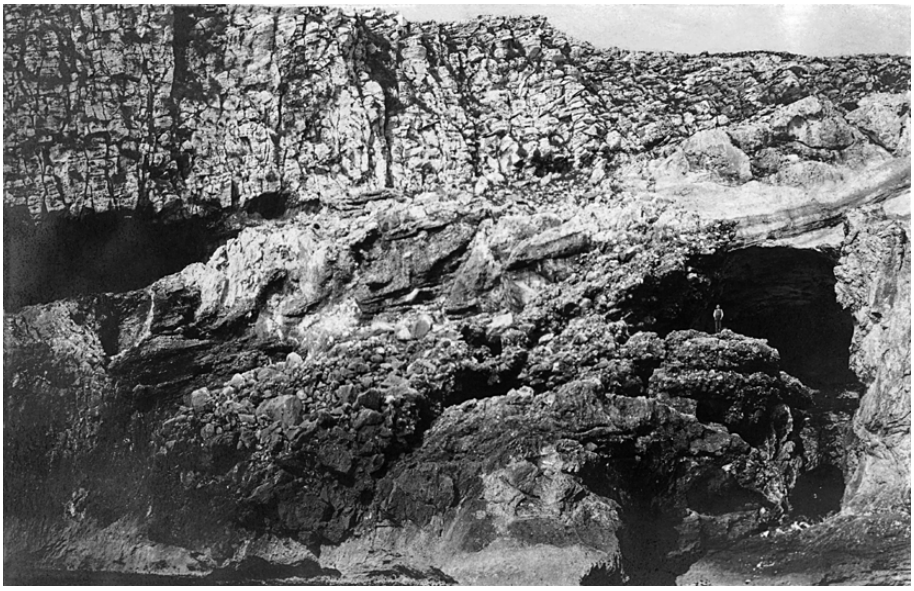


Figure 2. Grotta Romanelli view from the sea in 1914 (Archivio dell'Istituto Italiano di Preistoria e Protostoria).

Grotta Romanelli was a key site in the main scientific debate of the day. It was there, in fact, that in 1904 the Upper Paleolithic had been identified for the first time in Italy, and this interpretation was severely criticised by Luigi Pigorini (1842-1925), the institutional leader of Italian prehistory. This marked the start of a controversy that also involved the value of an interdisciplinary approach to prehistoric archaeology. The controversy became particularly heated, and it was in this context that the CRHP was founded in 1913 to foster an approach to Palaeolithic studies based on the natural sciences (Tarantini 2000; Tarantini and Parenti 2011).

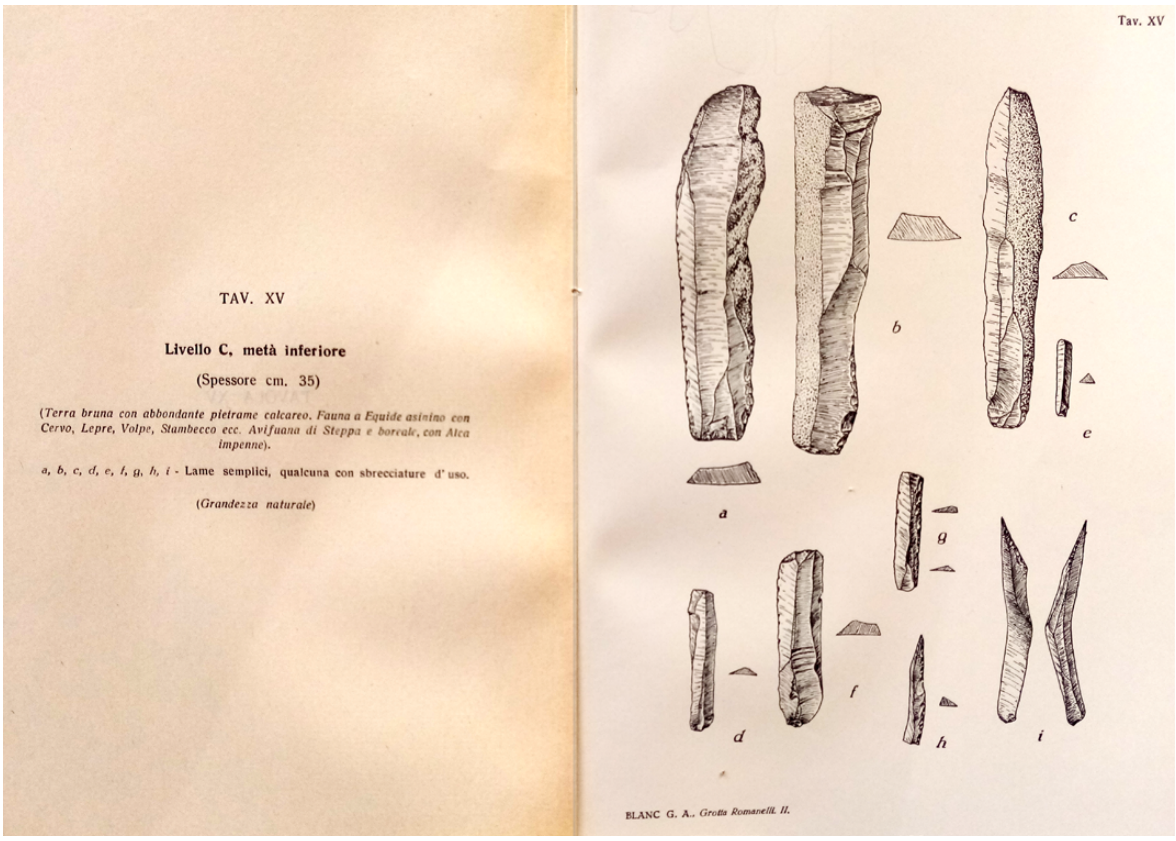
Accordingly, Blanc proposed a resumption of the excavation at Grotta Romanelli as part of the activities sponsored by the CRHP, using the utmost methodological rigor in the stratigraphic investigation. His aim was to put the debate about the Upper Paleolithic in Italy on a solid stratigraphic footing.

I will not enter into the minutiae of the deposits and the lithic industries documented in the cave. On the contrary, however, I will illustrate Blanc's methodology and strategy in order to better understand subsequently the origin of the methods employed. The reconstruction of the research on Romanelli Cave is adopted as a case study to evaluate the multiplicity of factors at the origin of specific methodological innovations.

2. Methodology and strategy of Blanc's research

Four main aspects can be identified in Blanc's research at Grotta Romanelli:

1) first and foremost, Blanc himself was continuously present at the site for its three-month duration (April-July 1914, interrupted by the beginning of WWI). He personally followed all of the operations, often assisted by other researchers, in particular Ruggero Schiff-Giorgini (1882-1940). On the contrary, at the beginning of the twentieth century, as is well-known (e.g. Manacorda 1982, for Italy; Coye 1997, for France), excavations were typically entrusted to hired labourers, who were directed and monitored occasionally rather than continuously;
2) the finds were rigorously distinguished by their layer of provenience, as is clearly demonstrated in the publication of the finds: the beautiful and numerous illustrative plates that appeared in 1928 are sufficient proof (Figure 3) (Blanc 1930);
3) the Cartesian coordinate system was used to locate the finds and define the borders of the individual layers on plans. To the best of my knowledge, this represents the first use of Cartesian mapping in archaeology. Unfortunately, neither a journal nor a plan for the excavation has ever been published or found; moreover, it is important to note that the horizontal distribution of the finds is not described in the publication or included in the interpretation. Our only sure source of information is Blanc's own description of the excavation: 'A permanent coordinate system allowed the exact position of every find


TAV. XV

Livello C, metà inferiore

(Spessore cm. 35)

(*Terra bruna con abbondante pietrame calcareo. Fauna a Equide asinino con Cervo, Lepre, Volpe, Stambecco ecc. Avifauna di Steppa e boreale, con Alca impenne*).

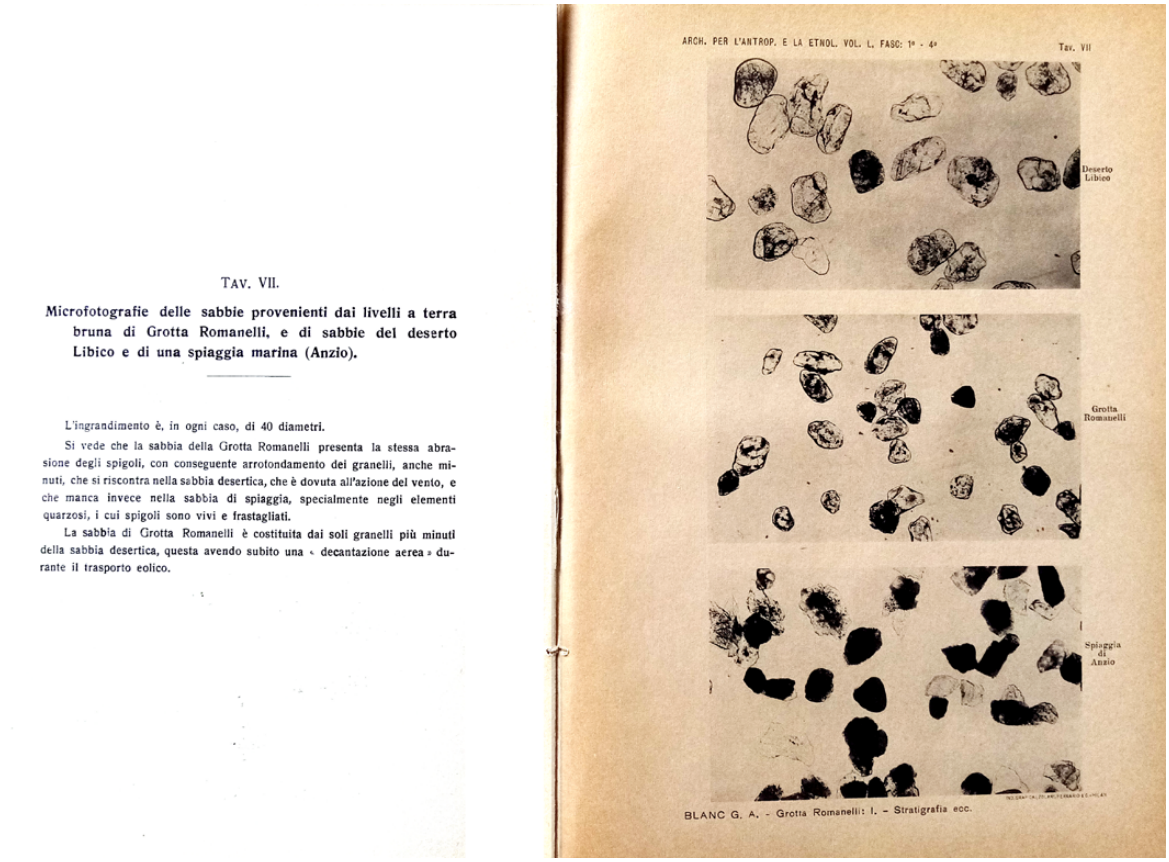
a, b, c, d, e, f, g, h, i - Lame semplici, qualcuna con sbrecciature d' uso.

(*Grandezza naturale*)

Tav. XV

BLANC G. A., *Grotta Romanelli. II.*

Figure 3. Numerous and beautiful illustrative plates published in Blanc 1928 demonstrate that the finds were rigorously distinguished by their layer of provenience.



Tav. VII.

Microfotografie delle sabbie provenienti dai livelli a terra bruna di Grotta Romanelli, e di sabbie del deserto Libico e di una spiaggia marina (Anzio).

L'ingrandimento è, in ogni caso, di 40 diametri.

Si vede che la sabbia della Grotta Romanelli presenta la stessa abrasione degli spigoli, con conseguente arrotondamento dei granelli, anche minuti, che si riscontra nella sabbia desertica, che è dovuta all'azione del vento, e che manca invece nella sabbia di spiaggia, specialmente negli elementi quarzosi, i cui spigoli sono vivi e frastagliati.

La sabbia di Grotta Romanelli è costituita dai soli granelli più minuti della sabbia desertica, questa avendo subito una « decantazione aerea » durante il trasporto eolico.

Figure 4. G.A. Blanc carried out microscopic observation to verify the hypothesis of an aeolian origin for the sands found in Romanelli Cave; several microphotographs were published (from Blanc 1928).

to be located unequivocally. Every find was definitively identified by three coordinates corresponding to its location within a system of three orthogonal axes passing through a fixed point, which was indelibly marked on the roof of the cave. This method [...] exactly determines the relative position of every object recovered, the contours of the layers, etc.' (Blanc 1920);

4) every layer was analysed in terms of both the mechanisms of pedogenetic formation and the paleo-ecological information that it might contain. In the 1920 publication, for example, Blanc examined the granulometry, the level of 'edge abrasion,' and the brightness of the sands found in the brown soil levels. Thus Blanc intended to verify the hypothesis of an aeolian origin for these sands, which were analysed using microscopic observation revealing rounded and abraded quartz; several microphotographs were published (Figure 4). Later, in the 1930s, Blanc performed a geochemical study of the Grotta Romanelli deposits in order to understand if soils could provide 'an indication of the climatic regime and the ecological conditions of the environment' in which they were formed (Blanc 1938).

Such were the innovative features of the Grotta Romanelli excavation. How were they developed? What, if any, were Blanc's precedents and models, and which aspects did he modify independently? What were his scientific motivations?

3. Searching for an historical explanation

My search for an explanation was first directed towards international relationships. Here it is necessary to know that Blanc was very familiar with France for family reasons. His family was from Savoy, therefore fluent in both Italian and French, and he was the son of an important diplomat

who served as foreign minister of Italy for three years at the end of the nineteenth century. It was not by chance that his first article on prehistory, dedicated to surface discoveries made in Savoy, was published in 1906 in *Revue Préhistorique*, then directed by Paul Raymond (1859-1944). From 1907 until 1909 Blanc lived in Paris, working as a physicist in the laboratory of Marie Curie, and in that period he became familiar with other French scholars. But it was his later encounter with Henri Breuil, which (to the best of my knowledge) happened only in 1911, that played a decisive role.

In 1912, at Breuil's (and Hugo Obermaier's) invitation, Blanc worked at El Castillo in Spain, a kind of excavation-laboratory frequented by researchers from all over the world, such as Pierre Teilhard de Chardin (1881-1955), Nels C. Nelson (1875-1964), Paul Wernert (1889-1972) and Miles Burkitt (1890-1971) (Lanzarote-Guiral 2011; Díaz-Andreu 2013). He went on to visit with Breuil numerous other excavations and even participated in the surveys at La Ferrassie led by Breuil and Capitan as part of the commission charged to verify the Upper Paleolithic attribution of the burials discovered there. Once again, Breuil's 'strategy' of inviting and involving young scholars in his research, as happened with many others (from Miles Burkitt to Louis Pericot: Díaz-Andreu 2015), proved to have been extremely fruitful. Archaeology can be learned and transmitted only through a direct relationship between scholars and the concrete sharing of research practice.

Blanc already had a specific training in excavation, earned through frequent visits to the excavations in the Roman Forum carried out by Giacomo Boni (1859-1925), which were famous for the application of methodological and stratigraphic rigor in a Classical context (Blanc and Blanc 1958-59; Guidi and Tarantini 2017). Boni, moreover, had been in close contact with the Blanc family since the end of the nineteenth century: it was he who, as architect, designed the great villa of the Blanc family in Rome.

In addition, ever since his first excavation, carried out in Savoy, Blanc (1913) paid attention to important aspects such as the natural dynamics at the origin of the formation of cave deposits. This first excavation had been carried out with great care, so as to recognize the numerous pellets left by birds of prey which contained the remains of various species of rodents (used for the chronological attribution of the layer) and to identify a hearth only 3-5 cm in thickness, which Blanc described in terms of its spatial organization (presence of large stones and, close to these, flint chips and bone remains in such quantity as to suggest that the cave had been frequented for a very short period).

Being already aware of the issue, therefore, Blanc later found a further and decisive reference in Breuil's excavation methodology. Not by chance Blanc would write to Breuil many years later, 'Dordogne, Castillo, Altamira, Savoy, Dauphiné, Charente, Somme, the outskirts of Paris which I visited with you were, for me, the most precious preparation for starting the excavation at Romanelli' (Blanc 1958; our translation). And in another letter referring to the preparation for the Romanelli excavation, this time addressed to an Italian colleague, he wrote, 'If human remains were to be discovered, I would collect them using the methods which I was fortunate to see practised by Martin at La Quina and by Capitan and Breuil at La Ferrassie.' (Blanc 1914; our translation).

The international outlook of the research and the practical transmission of the excavation techniques were therefore two decisive elements in the development of Blanc's excavation methodology at Grotta Romanelli.

At Castillo, in particular, Blanc certainly was able to appreciate two things:

1) the importance of the continuous presence of the archaeologist on-site, as well as the fact that the archaeologist also had to excavate in person – an activity that was only then beginning to be considered essential for understanding the stratigraphy of a site. This was

a very important and innovative consideration and one of the aspects most characteristic of the Castillo excavation (Lanzarote Guiral 2011: 72-73; Hurel 2011: 221). Already conscious of this approach when he accepted Breuil's invitation, Blanc wrote, 'You can immediately announce to Obermaier that he can count on an extra workman who is not afraid to use the pick-axe and push the wheelbarrow!' (Blanc 1912; our translation);

2) the separation of the materials by layer of provenience, within an international context in which stratigraphy was gaining a decisive role in the resolution of several open questions. Incidentally, it was precisely those years which saw the end of the so-called Aurignacian Battle, won by Breuil thanks to his precise stratigraphic observations versus the typological sequence of De Mortillet (Coye and Schlanger 2006; Coye 2011: 61). Not by chance, moreover, Blanc himself emphasized that only new and rigorously grounded excavations could resolve the heated debate of the day on the existence of the Upper Palaeolithic in Italy. He wrote about this in the letter to Breuil cited above: 'It is almost impossible to find the basis for a serious discussion since we do not have even one excavation conducted in a satisfactory manner' (Blanc 1912). In the execution of an excavation, therefore, the need for a particular methodological rigor, and even methodological innovations, can originate in the attempt to answer questions that have a pressing immediacy for the scientific research of the moment. For Breuil the impetus was the 'Aurignacian Battle', for Blanc it was the need to demonstrate – contrary to the theories of Luigi Pigorini – the existence of the Upper Paleolithic in Italy.

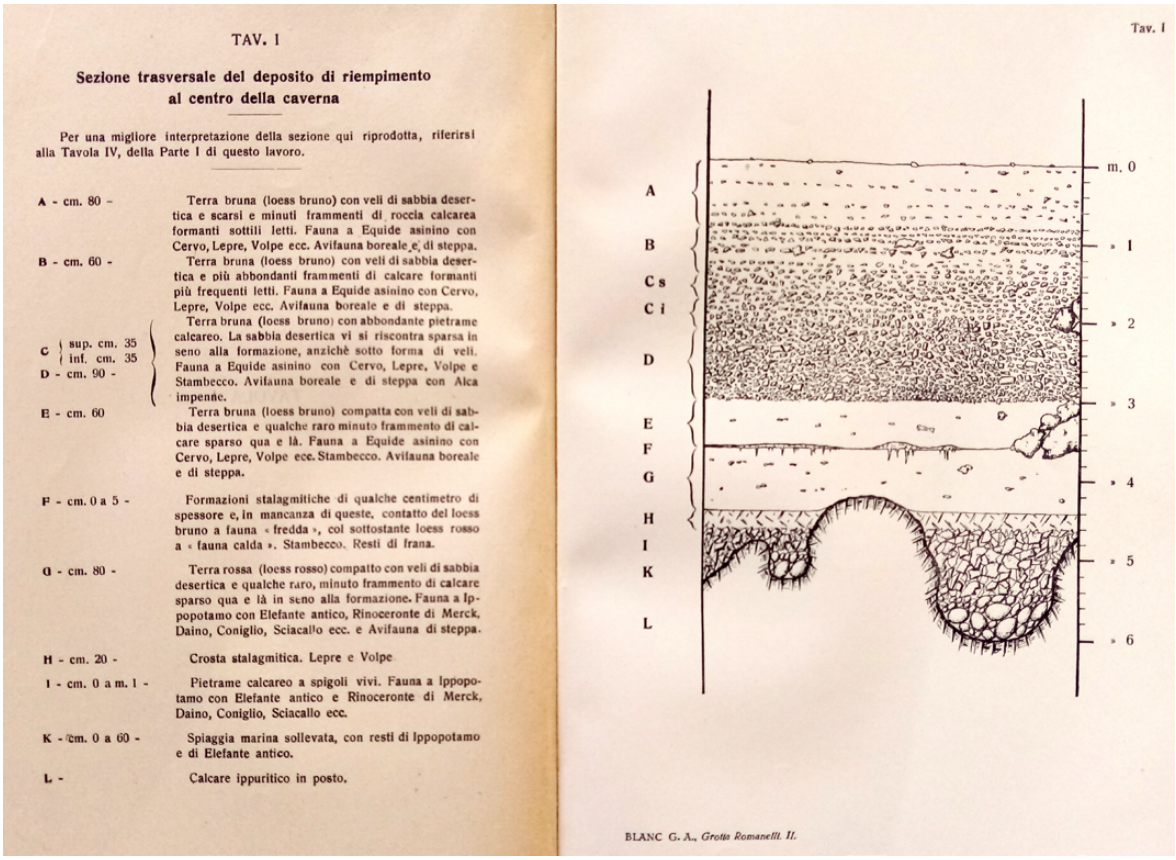
Nevertheless Blanc's participation in the excavation at El Castillo does not explain either his use of Cartesian coordinates or the methodologies employed to understand the formation processes and the paleo-ecological value of the archaeological stratification. Therefore we must look elsewhere to understand the genesis of these methods employed at Grotta Romanelli.

In terms of the application of Cartesian coordinates, I have been unable to find precedents which might have served as a model for Blanc. As is known, the use of the Cartesian system for mapping was formalized for the first time in 1954 by Louis Meroc and Georges Laplace, although it had been used by numerous researchers since the 1920s (Plutniak, this volume). The only explanation that I am able to offer at the moment is based on Blanc's scientific education.

As mentioned earlier, Blanc was a physicist whose research focus on radioactivity had produced very important results in the same years in which this scientific discipline took its first steps (Segre 1967). In 1905 he published (some months before Otto Hahn: Hoffmann 2001) a new radioactive element, later named Radiothorium, and in 1907 he was the first person to determine its atomic disintegration constant (Blanc 1907). These results earned him an invitation from Marie Curie (who had already won her first Nobel Prize) to join her for two years in her Paris laboratory, in the period in which its activity was concentrated on the clarification of the properties of radio-elements or on the verification of results published by other laboratories (Boudia 2001), hence also his participation in the publication of the *Tables des constantes radioactives* in 1909 (Blanc *et al.* 1909).

Blanc therefore had significant laboratory experience, developed at the highest levels. The application of Cartesian coordinates, in Blanc's practice, can thus be considered a transposition of the need for ordered data collection characteristic of laboratory work to archaeological excavation. In this sense the Cartesian system could represent an example of the transfer of a criterion of scientific inquiry from the laboratory to the field.

Blanc's scientific education is also decisive for understanding his interest in the paleo-ecological significance of soils, which was reconstructed via an analysis that was not only petrographic but also – and especially – geochemical. As we have seen, already in the publication of 1920 Blanc was concerned with trying to reconstruct the (natural) formation processes of the deposit in its stratigraphic sequence and in relation to the climatic changes of the Quaternary. He



TAV. I

Sezione trasversale del deposito di riempimento al centro della caverna

Per una migliore interpretazione della sezione qui riprodotta, riferirsi alla Tavola IV, della Parte I di questo lavoro.

A - cm. 80 - Terra bruna (loess bruno) con veli di sabbia desertica e scarsi e minuti frammenti di roccia calcarea formanti sottili letti. Fauna a Equide asinino con Cervo, Lepre, Volpe ecc. Avifauna boreale e di steppa.

B - cm. 60 - Terra bruna (loess bruno) con veli di sabbia desertica e più abbondanti frammenti di calcare formanti più frequenti letti. Fauna a Equide asinino con Cervo, Lepre, Volpe ecc. Avifauna boreale e di steppa.

C { sup. cm. 35 / inf. cm. 35 } D - cm. 90 - Terra bruna (loess bruno) con abbondante pietrame calcareo. La sabbia desertica vi si riscontra sparsa in seno alla formazione, anzichè sotto forma di veli. Fauna a Equide asinino con Cervo, Lepre, Volpe e Stambecco. Avifauna boreale e di steppa con Alca impenne.

E - cm. 60 - Terra bruna (loess bruno) compatta con veli di sabbia desertica e qualche raro minuto frammento di calcare sparso qua e là. Fauna a Equide asinino con Cervo, Lepre, Volpe ecc. Stambecco. Avifauna boreale e di steppa.

F - cm. 0 a 5 - Formazioni stalagmitiche di qualche centimetro di spessore e, in mancanza di queste, contatto del loess bruno a fauna « fredda », col sottostante loess rosso a « fauna calda ». Stambecco. Resti di frana.

G - cm. 80 - Terra rossa (loess rosso) compatto con veli di sabbia desertica e qualche raro, minuto frammento di calcare sparso qua e là in seno alla formazione. Fauna a Ippopotamo con Elefante antico, Rinoceronte di Merck, Daino, Coniglio, Sciacallo ecc. e Avifauna di steppa.

H - cm. 20 - Crosta stalagmitica. Lepre e Volpe

I - cm. 0 a m. 1 - Pietrame calcareo a spigoli vivi. Fauna a Ippopotamo con Elefante antico e Rinoceronte di Merck, Daino, Coniglio, Sciacallo ecc.

K - cm. 0 a 60 - Spiaggia marina sollevata, con resti di Ippopotamo e di Elefante antico.

L - Calcare ippuritico in posto.

Tav. I

A B Cs Ci D E F G H I K L

m. 0 » 1 » 2 » 3 » 4 » 5 » 6

BLANC G. A., *Grotta Romanelli. II.*

Figure 5. The stratigraphy of the Romanelli cave, published by G.A. Blanc in 1928.

distinguished (1) an upper complex with brown soils (‘*terre brune*’), Upper Palaeolithic tools and cold climate fauna (layers A-E, thickness 360 cm) and (2) a lower complex characterised by red soils (‘*terre rosse*’), Mousterian tools and warm climate fauna (layers G-K, thickness 60-80 cm). A stalagmite layer (layer H, thickness 25 cm) represents a humid and possibly cold period. At the bottom was a beach deposit (thickness 0-60 cm) (a recent review in Sardella *et al.* 2018) (Figure 5).

Blanc hypothesised that the deposits of brown and red soils were not the result of a pedogenetic process *in situ*, but instead had an aeolian origin. Observation of the bathymetric chart and consideration of the marine regressions and transgressions suggested that in the past there had been a large coastal plain in front of the cave. Therefore he interpreted the brown and red soil formations as two dunes formed by the aeolian transport of both powdery and sandy material. To verify this hypothesis Blanc focused on the nature and origin of the thin sand levels observed in the Romanelli deposits. He examined these sands under the microscope and, through a comparative petrographic examination, identified some features (generalized abrasion of the edges and opaque patina) of the desert sand that distinguished it from the beach and river sands.

Blanc was evidently interested in reconstructing the natural formation processes of the layers. In doing this he applied advanced analytical methods, linking himself to the complex debate on the origin of the ‘red soils,’ and in particular to the point of view of agricultural chemistry. We will return to this aspect after tracing the further developments of the soil analysis conducted by Blanc on the stratigraphy of Grotta Romanelli. Here we jump to the 1930s. Blanc’s research in physics had moved gradually from radioactivity towards geochemistry, with particular emphasis on applied geochemistry. One of the main fields of application for geochemistry since the second half of the nineteenth century had been agricultural soil chemistry, aimed at analysing the

chemical composition of contemporary soils in order to determine their agricultural potential. Blanc explicitly placed itself in this tradition of research, which underwent an important change in the 1930s when the ordered crystallographic nature of clays was demonstrated by S.B. Hendrincks (cited by Blanc) through X-ray analysis (Yaalon 1997).

The theoretical approach to soil studies advanced by Blanc in 1938, borrowed precisely from these studies of contemporary soils conducted for research in agricultural chemistry, aimed at 'establishing the relationships between the nature of the molecular aggregates constituting the various types of soil and the climatic and ecological conditions' (Blanc 1938). Blanc proposed the application of this approach, designed for modern soils, to the study of Pleistocenic deposits. This connection invites us to reflect on the fact that stratigraphic analysis in archaeology might have developed in part independently of geology, which is traditionally considered to have been the only source of new approaches to the study of archaeological layers.

It is also useful to highlight the close connection between Blanc's interest in the paleo-ecological information in soils and the need – clearly delineated by Blanc – to relocate 'the study of human origins from the pure and simple field of prehistoric archaeology to a much broader field, that of ecology' (Blanc 1931). In his second publication on Romanelli Cave Blanc emphasized how 'the palethnological interpretation of a Quaternary site implies first and foremost the greatest possible knowledge of the environment in which the activity of Man took place, namely the paleogeographic conditions of the region in which he lived, of the climatic regime to which it was subjected and of the biological complex of which he was both active and passive element' (Blanc 1928).

An up-to-date and multifaceted scholar, Blanc did not hesitate to look for information for paleo-environmental reconstruction in the archaeological strata. Starting in 1938 he dedicated to the subject a series of studies that had the explicitly experimental value of verifying a working hypothesis, that the geochemical content of a fossil soil could carry paleo-environmental information (Blanc 1938, Blanc and Cortesi 1941). The primary reasons that led him to consider the layer itself as the object of study, and not only the archaeological and paleontological materials contained in it, are to be found precisely in this way of looking at the human past as ecology.

4. The influence of the Romanelli excavation method

Grotta Romanelli exercised great influence on the subsequent practice of Italian archaeological excavation. Admired in France (the methodology was explicitly praised in a review published in *L'Anthropologie* by M. Boule) (Boule 1923), the excavation certainly set a standard in Italy, at least within the CRHP, which in 1927 was renamed the Italian Institute of Human Paleontology (IIHP). As a matter of fact, with the resumption of excavations at Romanelli Cave in 1927, the site served as a training ground for young scholars who soon became key figures in Italian Palaeolithic archaeology, such as Alberto Carlo Blanc (1906-1960), the son of Gian Alberto, Paolo Graziosi (1906-1988) (Figure 6) and Luigi Cardini (1898-1971).

The influence of the excavation method applied at Romanelli was undoubtedly favoured by the concerted resumption of research activities on the ground promoted by the IIHP at the end of the 1920s (Tarantini and Parenti 2011). Beginning in 1928 attention focused in particular on the Balzi Rossi in Liguria, a classic location of Palaeolithic research investigated mainly by French scholars since the nineteenth century; there the IIHP established a systematic research program. In these excavations, as in others conducted in other Italian regions (e.g. at Grotta all'Onda in 1931: Graziosi 1944), the separation of materials by layer was by then an established practice, as were general observations on stratigraphy, its natural formation processes and some forms of faunal bioturbation. A similar line of research was also employed starting in 1939 in the excavations at Arene Candide, which played a fundamental role in putting Neolithic archaeology in the Mediterranean on a stratigraphic basis (Guilaine 2003).

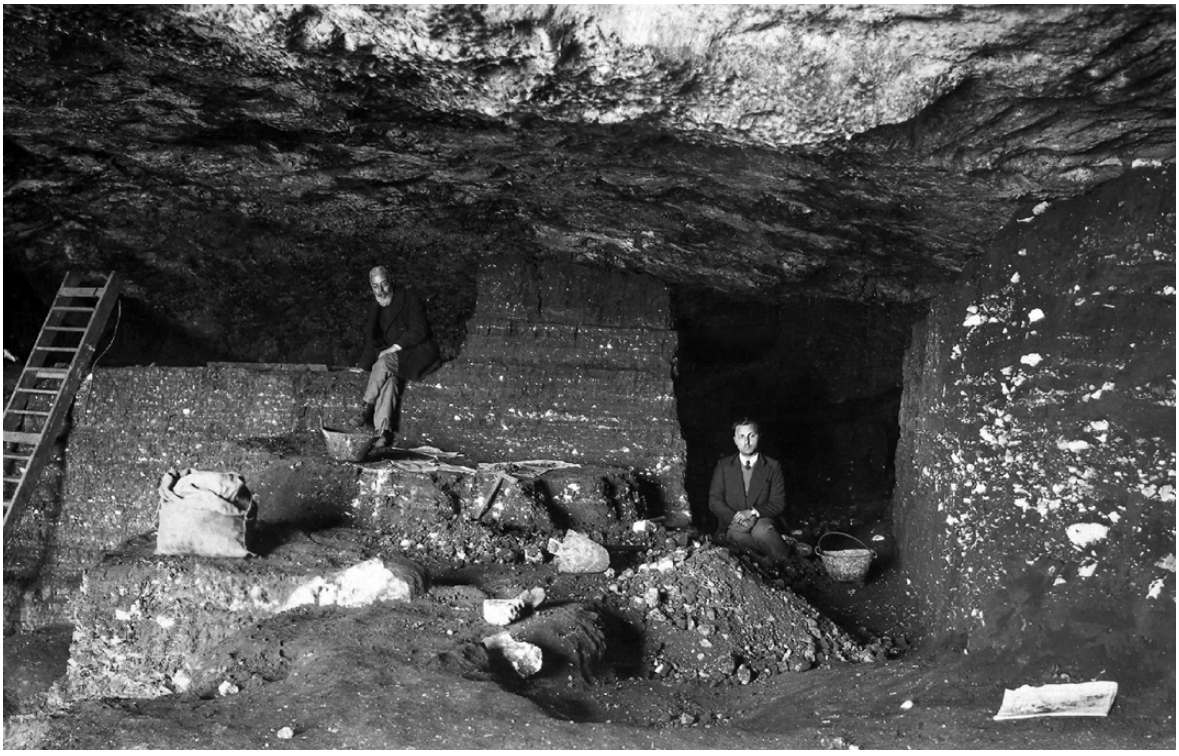


Figure 6. Paolo Graziosi (1906-1988), on the right side, at Romanelli cave in the 1930s (Archivio dell'Istituto Italiano di Preistoria e Protostoria).

The excavations at Balzi Rossi in turn had a direct and immediate influence on Italian archaeology in general. The IIHP's research in Liguria was in fact a model for Nino Lamboglia, a key figure in the development of the stratigraphic approach to Classical archaeology in the western Mediterranean (Guidi and Tarantini 2017).

On the contrary, neither the geochemical analysis of soils nor the application of Cartesian coordinates seems to have had as much influence. Blanc himself did not make any use of the data obtained from the Cartesian survey. The Cartesian coordinate system does not appear to have been present in the excavations cited above, and its use seems to have become generalized in Italy only due to the influence of George Laplace (Plutniak and Tarantini 2016).

5. Conclusions

The stratigraphic method is undoubtedly and foremost an element which we can define as 'technical'. As such, its transmission can take place only through direct contact between scholars and the sharing of research methodologies. So it was for Blanc, in the framework of a solid network of international relationships; and so it was for the young scholars who later trained at Romanelli.

The decisive impulse to experiment with a rigorous and innovative excavation technique was, however, closely linked to the questions which the excavation was designed to answer. These questions were not only theoretical, but more often strictly contingent. In the case of Grotta Romanelli, the desire to investigate stratigraphic questions arose in the context of the entirely Italian controversy over the actual presence of the Upper Paleolithic. Blanc was driven by the precise intention of demonstrating the impossibility of ignoring stratigraphic information in the dating of a layer, in opposition to those, like Pigorini, who believed it was possible to date a layer only on the basis of its archaeological contents. Blanc instead considered the paleontological component an essential part, and in doing this he was closely connected to the great debate on the succession of various climatic phases initiated by the work of Penck and Brüchner.

But Blanc did not stop there. He proposed using also the pedological features of a layer to reconstruct the paleoenvironment, and consequently to date it. Here the emergence of a highly innovative analytical perspective appears to be linked to (theoretical and practical) progress in other disciplines, in this case agricultural chemistry.

However, interest in reconstructing the paleoenvironment was connected not only to the possibility of an additional dating tool. Rather, it was inscribed in a precise perspective, namely the need to place human beings in their environmental context. Beginning in the 1920s Blanc was a lucid advocate of an explicitly defined, ecological approach to the study of human prehistory. In this sense, Blanc's research allows us to highlight a clear relationship between new perspectives in stratigraphic study and the affirmation of the concept of ecology.

Furthermore, Blanc's entire scholarly activity was inscribed in a fortuitous institutional framework (first the period of foundation of the CRHP, then the IIHP), highlighting once again the decisive role played by the material context of research in favouring (or not) specific methods.

Finally, Blanc's particular social status cannot be forgotten. It greatly facilitated his development of international relationships and enabled him to lead a substantially self-financed excavation for three consecutive months.

In conclusion, Blanc's research at Grotta Romanelli shows the multiplicity of factors that must be taken into consideration in order to understand the genesis of specific methodological innovations. In the history of science, or in history *tout court*, single-factor explanations based on univocal cause-effect relationships always appear as misconceptions of a more complex and interesting reality.

Acknowledgements

This paper has been realized in the framework and with the support of the Inter-Arq project (ref. HAR2016-80271-P), funded by the Spanish Agencia Estatal de Investigación (AEI) and the Fondo Europeo de Desarrollo Regional (FEDER).

References

Blanc, G.A. (1906). Hache a rainure trouvée dans le lac du Bourget. *Révue préhistorique*, 1, pp. 326-329.

Blanc, G.A. (1907). Die Zerfallskonstante des Radiotoriums. *Physikalische Zeitschrift*, 7 (10), pp. 321-324.

Blanc, G.A. (1912). *Letter to Henri Breuil*. [letter] Bibliothèque centrale du Muséum National d'Histoire Naturelle, Fonds Breuil, Br. 27, Paris.

Blanc, G.A. (1913). Sur l'existence, en Savoie, de gisements des temps intermédiaires entre la période quaternaire et l'actuelle. *Congrès International d'Anthropologie et d'Archéologie préhistoriques*, Compte rendu de la XIVe session (Genève 1912), pp. 572-579.

Blanc, G.A. (1914). *Letter to Elio Modigliani*. [letter] Archivio Museo Fiorentino di Preistoria, Firenze.

Blanc, G.A. (1920). Grotta Romanelli. I. Stratigrafia dei depositi e natura e origine di essi. *Archivio di Antropologia ed Etnologia*, 50, pp. 65-103.

Blanc, G.A. (1928). Grotta Romanelli. II. Dati ecologici e paletnologici. *Archivio di Antropologia ed Etnologia*, 58, pp. 365-411.

Blanc, G.A. (1931). Il metodo ecologico in paletnologia. Commemorazione di Aldobrandino Mochi. *Archivio di Antropologia ed Etnologia*, 60-61, pp. 15-20.

Blanc, G.A. (1938a) Interpretazione geochimica delle formazioni quaternarie di Grotta Romanelli (Terra d'Otranto). I – Dati del problema e metodo di ricerca, *Rendiconti dell'Accademia Nazionale dei Lincei, Classe di Scienze Fisiche Matematiche e Naturali*, s. VI, 27, pp. 189-197.

Blanc, G.A. (1938b). Interpretazione geochimica delle formazioni quaternarie di Grotta Romanelli (Terra d'Otranto). II. I complessi colloidali, *Rendiconti dell'Accademia Nazionale dei Lincei, Classe di Scienze Fisiche Matematiche e Naturali*, s. VI, 28, pp. 75-84.

Blanc, G.A. and Cortesi, C. (1941). Interpretazione geochimica delle formazioni quaternarie di Grotta Romanelli (Terra d'Otranto). III. Le sostanze umiche fossili, *Rendiconti dell'Accademia Nazionale dei Lincei, Classe di Scienze Fisiche Matematiche e Naturali*, s. VII, 3, pp. 33-54.

Blanc, G.A. (1958). *Letter to Henri Breuil.* [letter] Bibliothèque centrale du Muséum National d'Histoire Naturelle, Fonds Breuil, Br. 27, Paris.

Blanc, G.A and Blanc, A.C. (1958-59). Il bove della stipe votiva del Niger Lapis nel Foro. *Bullettino di Paletnologia Italiana*, 67-68, pp. 7-57.

Blanc G.-A., Bloch, L., Danne, J., Godlewski, T., Hahn, O. *et al.* (1909). Tables des constantes radioactives. *Le Radium. Journal de Physique*, 1909, 6 (1), pp. 1-4.

Boudia, S. (2001). *Marie Curie et son laboratoire. Sciences et industrie de la radioactivité en France*. Paris: Éditions des archives contemporaines.

Boule, M. (1923). Compte-rendu: Blanc (G.-A.). Grotta Romanelli I. Stratigrafia dei depositi e natura e origine di essi. *L'Anthropologie,* XXXIII, pp. 212-215.

Coye, N. (1997). *La préhistoire en parole et en acte. Méthodes et enjeux de la pratique archéologique (1830-1950)*. Paris: L'Harmattan.

Coye, N. (2011). L'Institut de paléontologie humaine dans le mouvement des idées en archéologie préhistorique : l'abbé Henri Breuil. In H. De Lumley and A. Hurel, eds., *Cent ans de préhistoire. L'Institut de Paléontologie Humaine,* Paris: CNRS, pp. 57-63.

Coye, N. and Schlanger, N. (2006). L'expérience stratigraphique de l'abbé Breuil: au cœur de la pratique archéologique. In N. Coye, ed., *Sur les chemins de la préhistoire. L'abbé Breuil du Périgord à l'Afrique du Sud*, Paris: Somogy, pp. 151-161.

Díaz-Andreu, M. (2013). The Roots of the first Cambridge Textbooks on European Prehistory: An Analysis of Miles Burkitt´s formative Trips to Spain and France. *Complutum*, 24, pp. 109-120.

Díaz-Andreu, M. (2015). Les théories voyageuses: l'accueil britannique réservé aux connaissances sur le Paléolithique nées en France au cours de la première moitié du XXe siècle. In A. Fenet and L. Lubtchansky, eds., *Pour une histoire de l'archéologie XVIIIe siècle-1945. Hommage de ses collègues et amis à Ève Gran-Aymerich*, Bordeaux: Ausonius, p. 281-300.

Graziosi, P. (1944). La Grotta all'Onda secondo gli scavi dell'Istituto Italiano di Paleontologia Umana (1931). *Archivio per l'antropologia e l'etnologia*, 74, pp. 73-120.

Guidi, A. and Tarantini, M. (2017). The emergence of stratigraphic archaeology in Mediterranean Europe. The Italian case-study (1900-1950). *Acta Archaeologica*, 88, pp. 139-154.

Guilaine, J. (2003). La néolithisation de la Mediterranée. De l'oeuvre de Luigi Bernabò Brea aux débats actuels. In *Atti XXXV riunione scientifica dell'Istituto Italiano di Preistoria e Protostoria,* Firenze, vol. II, pp. 649-663.

Hoffmann, K. (2001). *Otto Hahn: Achievement and Responsibility.* New York: Springer.

Hurel, A. (2011). *L'abbè Breuil. Un préhistorien dans le siècle.* Paris: CNRS.

Lanzarote Guiral, J. (2011). La stratigraphie d'un vie consacrée à la préhistoire. Hugo Obermaier, sa chaire et les fouilles du Castillo. In H. De Lumley and A. Hurel, eds., *Cent ans de préhistoire. L'Institut de Paléontologie Humaine*, Paris: CNRS, pp. 65-82.

Manacorda, D. (1982). Cento anni di ricerche archeologiche italiane: il dibattito sul metodo. *Quaderni di Storia*, 16, pp. 85-119.

Plutniak, S. and Tarantini, M. (2016). An influental outsider. Georges Laplace in Italy between French institutions and Italian Prehistory. In G. Delley *et al.* eds., *Histories of archaeology. International perspectives*, Oxford: Archaeopress, pp. 79-90.

Sardella, R. *et al.* (2018). Grotta Romanelli (Southern Italy, Apulia): legacies and issues in excavating a key site for the Pleistocene of the Mediterranean. *Rivista Italiana di Paleontologia e Stratigrafia / Research in Paleontology and Stratigraphy*, 124, pp. 247-264.

Segre, A.G. and Segre, E. (1968). Blanc, Gian Alberto. *Dizionario biografico degli italiani*, vol. 10, pp. 144-148.

Tarantini, M. (2000). Tradizioni e tensioni disciplinari nell'archeologia preistorica italiana tra Ottocento e Novecento. *Origini*, XXII, pp. 7-43.

Tarantini, M. and Parenti, F. (2011). L'origine de l'Institut Italien de Paléontologie Humaine: science, institutions et relations internationales (1911-1936). In H. De Lumley and A. Hurel, eds., *Cent ans de préhistoire. L'Institut de Paléontologie Humaine,* Paris : CNRS, pp. 120-132.

Yaalon, D.H. (1997). History of soil science in context: international perspective. In D.H. Yaalon and S. Berkowicz, eds., *History of soil science: international perspective*, Reiskirchen: Verlag, pp. 1-14.

Paul Vouga à La Tène et à Auvernier : la stratigraphie à l'épreuve de la typologie

Gianna Reginelli Servais (†)
Office du Patrimoine et de l'Archéologie, Neuchâtel – Suisse
Institut d'Archéologie, Université de Neuchâtel, – Suisse

Résumé

Au début des années 1920, la pratique de terrain de l'archéologue suisse Paul Vouga illustre la difficulté que représente l'intégration pleine et entière de la méthode stratigraphique à la panoplie des méthodes de l'archéologue. D'un côté, en effet, Vouga pose les bases de la typo-chronologie du Néolithique suisse, à partir de la fouille stratigraphique de la célèbre station d'Auvernier/La Saunerie. De l'autre, il fouille et étudie le site de La Tène, éponyme du Second âge du Fer européen, en écartant délibérément tout apport stratigraphique. Nous analyserons ici cet apparent paradoxe et tenterons de caractériser l'utilisation de la stratigraphie dans la pratique de Vouga à travers la première moitié du 20e siècle. Des habitats palafittiques aux occupations en grottes, en passant par les tertres funéraires, nous chercherons à mettre en lumière les présupposés qui ont guidé son approche de la stratigraphie archéologique.

Mots-clès : La Tène, stratigraphie, typologie, Auvernier, technique et méthodes de fouille

Abstract

In the early 1920s, the field practice of the Swiss archaeologist Paul Vouga illustrated the difficulty of fully integrating the stratigraphic method into the archaeologist's toolbox. On the one hand, Vouga laid the foundations of Swiss Neolithic typology and chronology, based on the stratigraphic excavation of the famous Auvernier/La Saunerie station. On the other hand, he excavated and studied the site of La Tène, the eponymous site of the European Second Iron Age, deliberately excluding any stratigraphic contribution. We will analyze this apparent paradox and attempt to characterize the use of stratigraphy in Vouga's practice throughout the first half of the 20th century. From palafittic habitats to cave dwellings and burial mounds, we will seek to highlight the assumptions that guided his approach to archaeological stratigraphy.

Keywords: La Tène, stratigraphy, typology, Auvernier, excavation techniques and methodes

1. La Tène, un site de référence, de sa découverte aux fouilles scientifiques

Le site de La Tène, à l'extrémité nord-est du lac de Neuchâtel, en Suisse (Figure 1), a été découvert en 1857. L'abondance et la qualité des objets en fer mis au jour conduisent à la caractérisation de l'âge du Fer, dont La Tène devient le site éponyme à partir de 1874 pour sa deuxième partie (Hildebrand 1876 ; Kaeser 2004a : 317-321).

L'histoire des fouilles de La Tène est généralement divisée en trois phases (Reginelli Servais 2007). Le site est d'abord immergé et se présente sous la forme d'un champ de pieux. Semblable aux stations lacustres identifiées depuis peu au bord des lacs suisses (Kaeser 2004b), La Tène est alors considérée comme l'une d'elles. Les premières fouilles, entre 1857 et 1866, se déroulent ainsi sous l'eau, de manière aléatoire, exploitant des concentrations d'objets réparties sur plusieurs points du site. Plus de 1200 objets, mis au jour durant cette période, rejoignent les collections des premiers explorateurs. Le problème de leur datation se pose d'emblée. Cependant, il est rapidement admis que La Tène se rattache à la dernière période du Système des Trois âges, l'âge du Fer.

Figure 1. Position du site de La Tène, dans la baie d'Épagnier, à l'extrémité nord-est du lac de Neuchâtel, près de la rivière Thielle. Aujourd'hui canalisée, celle-ci déverse les eaux du lac de Neuchâtel dans celui de Bienne. Photographie B. Arnold. Infographie OPAN/J. Spielmann.

Le site se retrouve à l'air libre à partir de 1878-79, à la suite de la forte baisse du niveau du lac, consécutive aux travaux de la Correction des eaux du Jura (1868-1882), une opération de génie civil de grande ampleur visant à réguler le système des Trois Lacs (Neuchâtel, Bienne et Morat). Une deuxième période d'explorations débute alors, qui autorise la reconnaissance formelle d'un ancien chenal de la rivière Thielle, traversé par deux ponts et bordé de divers aménagements de berges et de bâtiments, que l'on interprète comme des entrepôts. Accessible à pied sec, le gisement fait l'objet de fouilles en creux, qui livrent encore plus d'un millier d'objets, principalement en fer. L'affinement progressif des chronologies préhistoriques permet de resserrer la datation du site au milieu du Second âge du Fer.

Durant ces deux premières périodes de fouilles, la stratigraphie est appréhendée comme un cadre géologique large ou comme une stratigraphie-type, censée servir de modèle pour l'ensemble des stations lacustres du lac de Neuchâtel (Reginelli Servais, en prép.).

C'est sur la troisième période de l'exploration de La Tène que se concentre la présente contribution, à travers le travail de l'archéologue neuchâtelois Paul Vouga (Figure 2). Ses recherches se déroulent

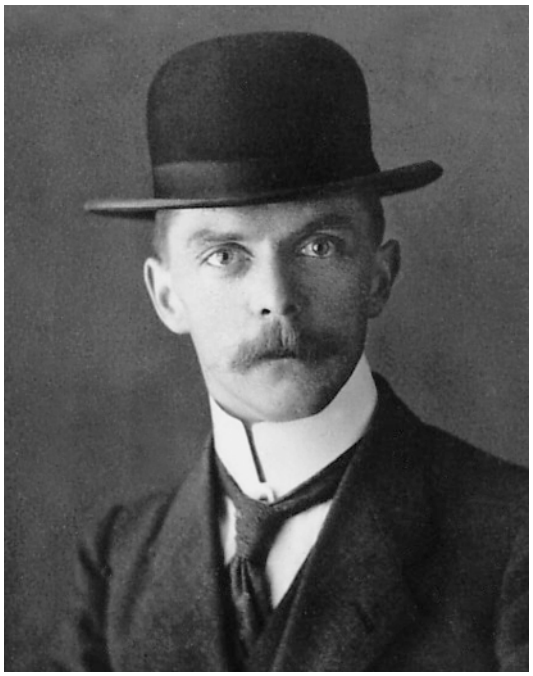


Figure 2. Paul Vouga (1880-1940) à l'âge de 25 ans environ. Professeur d'histoire et de français à l'école de Commerce de Neuchâtel, il s'occupe en outre, en dehors de son poste et sans rémunération, de la collection archéologique du Musée historique et des travaux archéologiques dans le canton de Neuchâtel. Entre 1909 et 1917, il dirige les fouilles de La Tène, après le décès du premier directeur, William Wavre (1851-1909). Archives du Laténium.

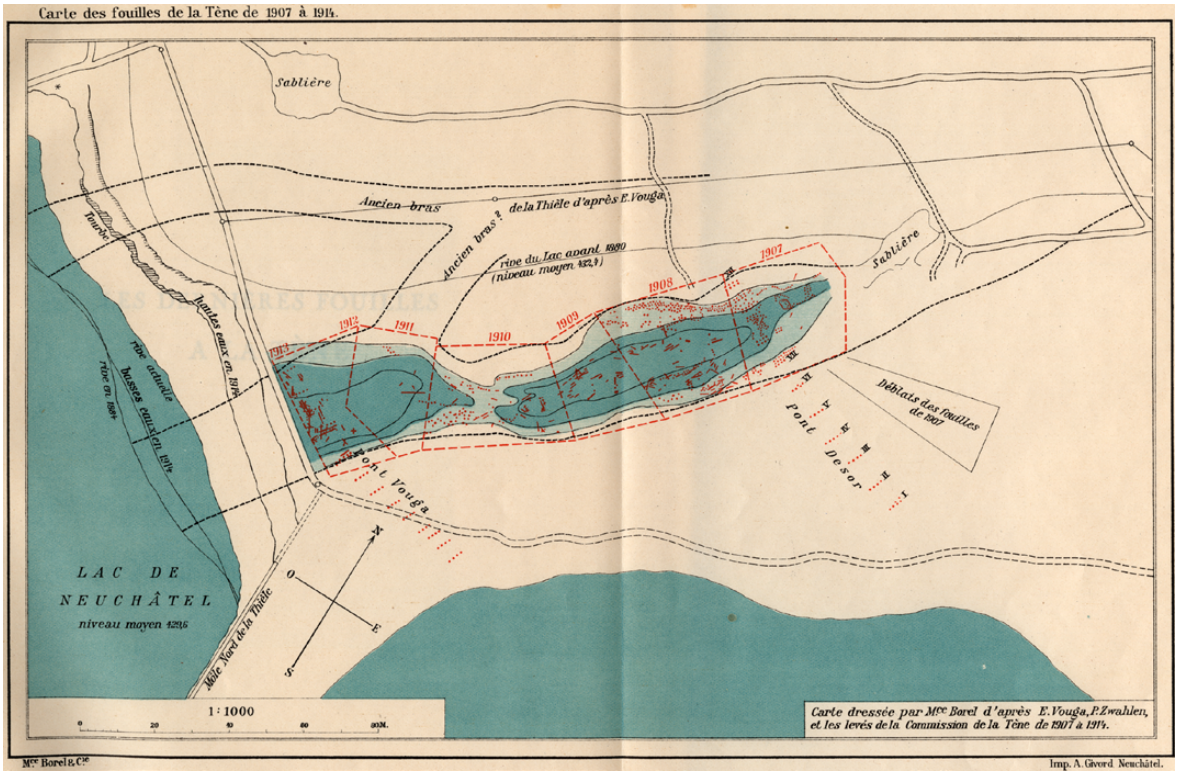


Figure 3. En 11 ans, les fouilles officielles de La Tène ont touché une surface de 170 mètres de long, par 25 à 40 de largeur et jusqu'à plus de 4 mètres de profondeur. Commencées en aval du pont Desor, elles vident progressivement l'intégralité du comblement du chenal protohistorique de la Thielle, mettant au jour divers groupements de pieux verticaux et de bois couchés, des ossements, et près d'un millier d'objets. (Vouga 1914).

entre 1907 et 1917 et ont un caractère « institutionnel », dans la mesure où elles sont planifiées, organisées et financées (en partie du moins) par des autorités publiques, alors que les précédentes interventions relevaient d'initiatives privées. De plus, les fouilles dites « officielles » se veulent scientifiques, par opposition au qualificatif de « fouilles sauvages » attribué aux opérations antérieures. Pour satisfaire à cette exigence, il fallait procéder à des investigations exhaustives et systématiques (Figure 3), progressant régulièrement d'un bout à l'autre du site, de manière à vider intégralement le chenal comblé d'un ancien cours de la Thielle (Figure 4). Il fallait de plus que l'opération soit documentée, ce qui n'avait pas été le cas des premières explorations. La mise en œuvre de ces méthodes et techniques devait garantir la scientificité de l'opération.

Les fouilles officielles donnent donc lieu à une abondante production de documentation – croquis, relevés graphiques de coupes, de profils, de plans, photographies, etc. – accompagnant un *Journal des fouilles* tenu quotidiennement et des rapports destinés aux autorités et au public. Si les données stratigraphiques occupent une bonne part de cette documentation, elles sont cependant enregistrées de manière inégale, en qualité comme en quantité : à côté de relevés stratigraphiques détaillés des dépôts sédimentaires existent des croquis sommaires de coupes, ainsi que de simples profils du fond du chenal (Figure 5) ; par ailleurs, les coupes peuvent être nombreuses à certains endroits et manquer presque totalement à d'autres. En résumé, l'absence de protocole enregistrant de manière homogène les observations recueillies sur l'ensemble du site témoigne d'un intérêt mesuré pour l'environnement stratigraphique et sédimentaire des objets.

2. La mise à l'écart de la stratigraphie

Cette attention inégale au terrain durant les fouilles se transforme en une réelle mise à l'écart dans l'ouvrage de synthèse que publie Vouga en 1923, intitulé *La Tène : Monographie de la station*

Figure 4. Les fouilles progressent par tranchées perpendiculaires au chenal comblé de l'ancienne Thielle, mettant en évidence de spectaculaires coupes. La Tène, 28.09.1911. Archives du Laténium.

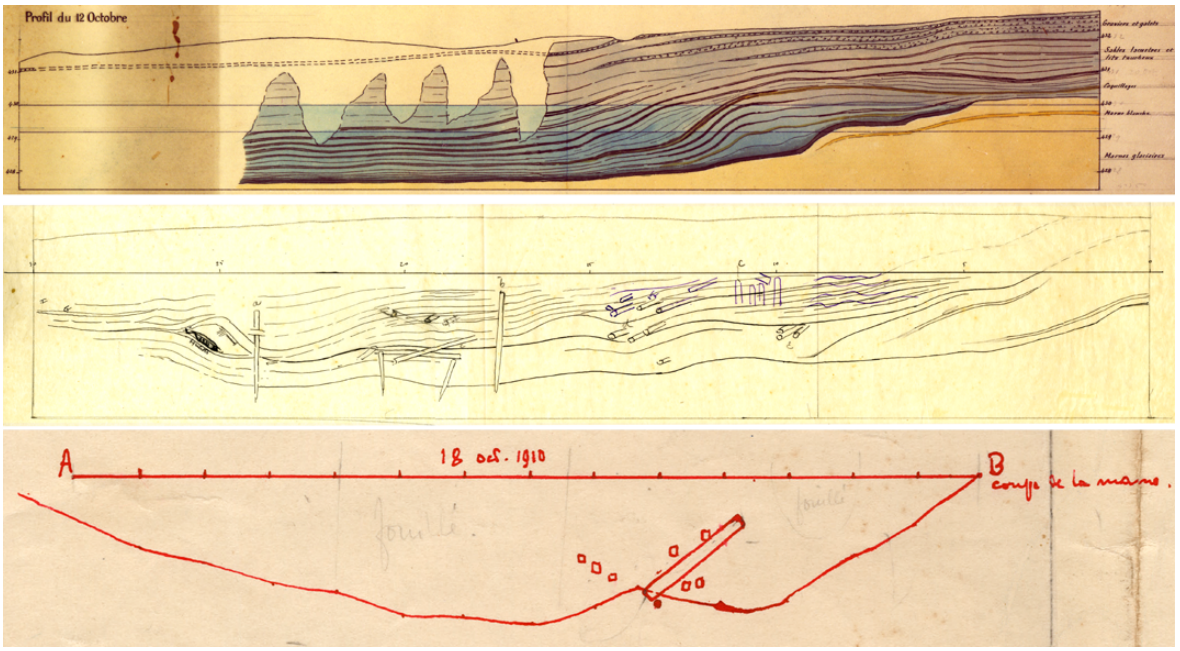


Figure 5. Du relevé de détail au simple profil, les coupes stratigraphiques du site de La Tène ont été inégalement documentées durant les fouilles officielles. Archives du Laténium. Infographie OPAN/J. Spielmann.

publiée au nom de la Commission des fouilles de la Tène. Il y affirme en effet : « *La valeur archéologique de La Tène dépendant moins des circonstances stratigraphiques que de la variété et de l'abondance des trouvailles, nous traiterons en quelques mots l'historique des découvertes pour consacrer notre monographie à l'étude des objets recueillis dans la station depuis sa découverte* » (Vouga 1923 : 1). Il précise plus loin que « *Suivant la place d'où ils auront été entrainés, la nature des matériaux charriés par le flot, et peut-être aussi leur poids, les objets peuvent avoir été recueillis à tous les niveaux ; tantôt dans le sable, tantôt dans la tourbe ou le gravier. [...] Comme tous les objets recueillis, à quel [sic] niveau qu'ils apparaissent, se révèlent contemporains, leur position stratigraphique est sans valeur ; aussi n'en tiendrons-nous pas compte.* » (Vouga 1923 : 24-25).

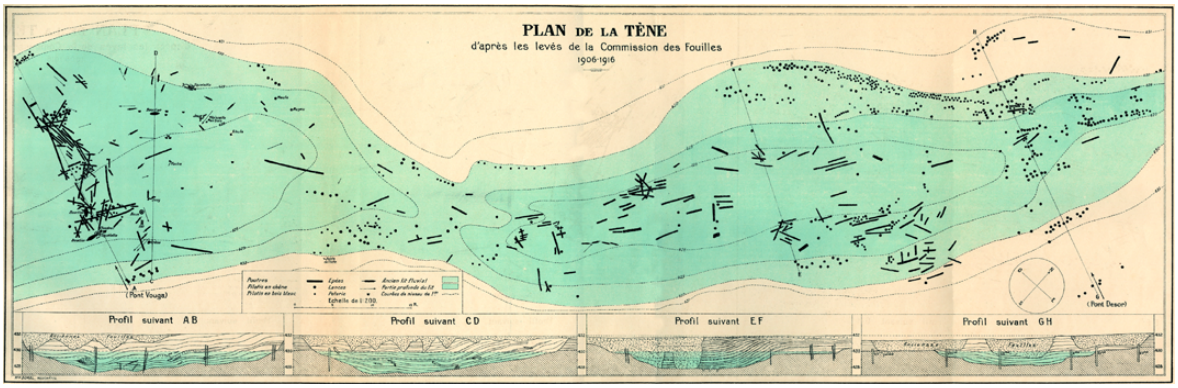


Figure 6. Le plan que donne Vouga dans sa monographie reflète sa conception du site, où tout est contemporain. (Vouga 1923).

Et de fait, la *Monographie* ne contient aucune description de la stratigraphie du site éponyme : un chapitre est bien consacré à la géologie de la zone exutoire, mais les couches sédimentaires y sont analysées sous l'angle de l'histoire de leur formation et de la géomorphologie de la baie d'Épagnier. Tout au plus trouve-t-on quelques informations éparses sur la position de certains objets, dans les chapitres dédiés à la description du matériel, qui occupent la plus grande partie de l'ouvrage. Le plan général du site, livré sur un dépliant en fin de volume (Figure 6), traduit la conception que Vouga se fait de La Tène: sans profondeur chronologique, le plan est accompagné de coupes, figurées en-dessous, qui, non commentées dans le texte, témoignent non d'une succession chronologique de couches, mais de la morphologie du remplissage du chenal, ainsi que des zones encore intactes du site, par rapport à celles précédemment fouillées.

3. La Tène *versus* Auvernier

Or c'est justement dans les années d'élaboration de la *Monographie* sur La Tène que Vouga entreprend la fouille stratigraphique de la station lacustre d'Auvernier/La Saunerie (Arnold 2009 : 124-126), à quelque dix kilomètres de là, sur la rive nord du lac de Neuchâtel. Il s'agit d'une opération archéologique pionnière par son ambition et sa démarche, conduite dans des conditions difficiles, qui fera la renommée de Vouga. Il publie entre 1920 et 1922 trois rapports relatant ses fouilles et explicitant sa démarche (Vouga 1920; Vouga 1921; Vouga 1922). Celle-ci se veut basée non plus sur l'exploitation des collections de musées, mais sur des faits, entendus comme des données positives recueillies sur le terrain. Dans cette perspective, il pratique une fouille stratigraphique, par enlèvement de couches successives (Figure 7), décrites de manière détaillée dans leur composition et leur morphologie ; il relève en outre exactement la position de tous les objets dans leur couche respective. Cette méthode lui permet *in fine* de distinguer et de caractériser quatre sous-périodes dans le Néolithique lacustre suisse, période demeurée indivisée jusque-là.

Écartée à La Tène, centrale à Auvernier, l'utilisation de la stratigraphie par Vouga apparait d'abord comme paradoxale. Cependant, l'analyse que propose Noël Coye du travail de Vouga à Auvernier éclaire sa pratique (Coye 2006). Coye relève en effet qu'après la fouille, Vouga compare entre eux les corpus de chaque couche, dans le but d'isoler des fossiles directeurs et de repérer des différences dans les mobiliers courants. Les travaux à Auvernier sur la subdivision chronologique du Néolithique consistent ainsi en une validation de la méthode typologique, dans une « *volonté de recaler stratigraphiquement des éléments diagnostiques d'un point de vue typologique pour en constituer des lots dont la cohérence n'est plus fournie par les seuls caractères intrinsèques mais par la position stratigraphique* » (Coye 2006: 90). Coye met ainsi en évidence que dans la démarche de Vouga à Auvernier, c'est la typologie qui guide les opérations, et non la stratigraphie. La préférence de l'archéologue pour la méthode typologique à Auvernier rejoint alors la primauté accordée à celle appliquée à La Tène et le paradoxe est levé.

Figure 7. Paul Vouga et la stratigraphie néolithique d'Auvernier/La Saunerie, le 20 sept. 1919. Photographie Samuel Perret, Archives du Laténium.

4. La typologie avant la stratigraphie

4.1. Un facteur biographique

Parmi les raisons qui guident la démarche et les choix de Vouga, la première est biographique. Sur les fouilles de La Tène, le premier directeur, William Wavre, est philologue, comme l'est son successeur Vouga. En tant que tels, ils mettent l'accent sur l'étude des textes, et des objets. Or ceux-ci, à La Tène, sont en quasi-totalité attribuables au La Tène II. Cet état de fait facilite le choix de la typologie comme clé d'interprétation. Vouga est explicite à ce sujet, comme le montre la citation déjà mentionnée : « *Comme tous les objets recueillis, à quel [sic] niveau qu'ils apparaissent, se révèlent contemporains, leur position stratigraphique est sans valeur ; aussi n'en tiendrons-nous pas compte.* » (Vouga 1923: 25). Autrement dit : si la typologie suffit à démontrer la contemporanéité des objets, alors la stratification des couches et la position des objets dans celles-ci n'ont pas d'importance.

Les philologues s'étaient pourtant donné la possibilité de procéder autrement : inexpérimentés dans la conduite de travaux de si grande ampleur et ambition, Wavre et Vouga font appel à l'expertise du vaudois Albert Naef (1862-1936), premier archéologue cantonal de Suisse. Médiéviste formé à l'Ecole du Louvre, impliqué également dans le financement public des fouilles de La Tène, Naef a, de plus, une grande expérience de terrain (Reginelli Servais 2013). Associé aux préparatifs des fouilles officielles, il incite les Neuchâtelois à prendre en compte le contexte archéologique – soit l'environnement stratigraphique et architectural – au lieu de se limiter à la recherche d'objets. Dans ce but, il indique quoi documenter sur le chantier, et comment. Cependant, l'écart constaté entre les consignes de Naef et la documentation de terrain d'une part, et la *Monographie* d'autre part, montrent qu'une certaine incompréhension a régné d'emblée : les archéologues neuchâtelois ne comprennent manifestement pas pourquoi ils font des relevés, ce qui les conduit à en faire relativement peu, de manière *a priori* aléatoire et non homogène d'un bout à l'autre du site. Cette incompréhension fondamentale conduit à évoquer le deuxième facteur à l'origine de la préférence pour l'outil typologique.

4.2. De la problématique historique à la catastrophe

La problématique à la base des fouilles recouvre deux aspects : il s'agit, premièrement, de découvrir qui a occupé le lieu et, deuxièmement, de déterminer les causes de son abandon.

La première question est formulée dans l'introduction du premier rapport de fouilles et adopte clairement une perspective historique et évènementielle : « *Mais qu'était-ce au juste que cette station ? À quoi était-elle destinée ? Par qui avait-elle été construite et par qui a-t-elle été détruite? D'où venaient les guerriers qui avaient choisi cet emplacement favorable entre tous à un établissement tant commercial que militaire puisqu'il était situé au confluent des trois lacs de Morat, Neuchâtel et Bienne ? Autant de questions, autant d'hypothèses !* » (Wavre et Vouga 1908 : 63).

Quant à la question de la fin du site, Vouga propose de l'attribuer, et cela est nouveau, à un cataclysme naturel. Des évènements historiques ont bien été invoqués d'abord, puis écartés, car l'archéologue suspecte que le remplissage de l'ancien cours puisse être, en fait, le résultat d'une catastrophe, d'un évènement naturel unique et violent : « *Peut-être arrivera-t-on à prouver que l'abandon de la Tène est dû à l'inondation, ou plus probablement au brusque reflux de la rivière — dont le courant, aujourd'hui encore, change fréquemment de direction ?* » (Vouga 1923 : 155). L'introduction de l'hypothèse catastrophiste sépare de fait la question de la fonction du site et celle de sa fin qui, dans l'hypothèse historique pouvaient ou devaient être liées. La fin du site devient le résultat d'un évènement naturel incontrôlable et non signifiant pour la compréhension de la nature de l'établissement. L'évènement aurait charrié les couches des alentours dans le chenal, en le comblant progressivement et en y mêlant les objets dans toutes les couches ; c'est du moins ce que ses observations le conduisent à penser : « *Suivant la place d'où ils auront été entrainés, la nature des matériaux charriés par le flot, et peut-être aussi leur poids, les objets peuvent avoir été recueillis à tous les niveaux ; tantôt dans le sable, tantôt dans la tourbe ou le gravier.* » (Vouga 1923: 24). Il s'ensuit implicitement que ni les couches ni les objets ne sont dans leur situation originelle, raison suffisante pour écarter la prise en compte du contexte spatial – une éviction plus difficile à faire dans le cas de l'adoption d'une explication historique, qui nécessite la reconnaissance d'une succession d'évènements et d'une chronologie.

En définitive, la problématique historique et la catastrophe naturelle constituent pour Vouga deux raisons d'écarter tout apport contextuel du terrain.

4.3. L'éponymie comme limite

Un dernier facteur semble avoir conduit Vouga à écarter toute prise en compte du contexte : il s'agit de la valeur que son éponymie est censée conférer à La Tène. Cela semble représenter un réel souci pour l'archéologue, comme le montrent deux passages de la monographie : « *Aujourd'hui que le nom de la Tène est universellement admis pour désigner le deuxième âge du fer [...] c'est cette notoriété même qui nous engage à publier sur la Tène un ouvrage d'ensemble, destiné à mettre en valeur l'importance exceptionnelle du gisement qui a eu l'honneur d'être choisi comme station éponyme.* » (Vouga 1923 : 1) ; « *Le nom de La Tène désigne donc le deuxième âge du fer tout entier ; mais l'étude des objets recueillis à la station éponyme démontre que les trois phases ne s'y trouvent pas représentées et que La Tène jouit ainsi d'un titre partiellement usurpé.* » (Vouga 1923 : 4).

Ce souci de légitimation de l'éponymie de La Tène, tel qu'il est formulé dans ces extraits, répond implicitement, selon nous, à des attaques dont fait l'objet le site depuis le début du 20e siècle de la part des archéologues français de la Marne (e.a. Fourdrignier 1904 ; Guelliot 1915 ; Bossavy 1916 ; Corot 1926), qui réagissent à l'adoption progressive de la dénomination « La Tène » pour désigner l'ensemble du deuxième âge du Fer.

Deux motivations guident leur révolte. Premièrement, le terme *Marnien* leur semble plus adéquat pour désigner la première phase du Second âge du Fer (LT I ou ancienne), en raison des innombrables découvertes effectuées dans leur région, d'ailleurs à l'origine de la définition de la sous-période. Celles-ci proviennent de plus des contextes fiables – les ensembles clos – que sont les tombes. Ils ne conçoivent donc pas pourquoi le terme « La Tène » serait utilisé pour désigner la période la plus ancienne du Second âge du Fer, caractérisée par des objets non représentés sur le site éponyme.

Deuxièmement, des motivations nationalistes sont vraisemblablement à l'œuvre, visant l'origine allemande de la dénomination « La Tène », puisque proposée par l'archéologue allemand Otto Tischler en 1885 (Tischler 1885). La démarche des archéologues de la Marne s'inscrit alors dans le contexte de la détérioration des relations franco-allemandes, consécutive à la défaite française de 1870 (Bretz-Mahler 1971 : 8 ; Demoule 1999 : 12, 15-16 ; Kaenel 2008 : 333 ; Demoule 2009 : 25 ; Reginelli Servais, en prép.). Pris dans les tensions de son temps, Vouga ressent vraisemblablement le désir de justifier et d'affirmer le statut de La Tène. Dans ce but, il va s'efforcer de faire de La Tène un site « pur de tout mélange » en attribuant tous les vestiges non laténiens découverts dans le paléochenal à des sites autres, distincts de La Tène, plus ou moins proches dans la baie d'Épagnier. Ces objets non laténiens seraient des sortes de pollutions, arrivées dans le chenal par accident. Cette réattribution de vestiges à d'autres sites vise à démontrer que le site éponyme a connu une seule occupation, celle du LT II. Dans ces conditions, reconnaitre une stratigraphie à La Tène aurait été équivalent à reconnaitre un temps long au site, ce que ne voulait justement pas Vouga. D'où la mise à l'écart du cadre chronostratigraphique.

En somme, ce qui distingue La Tène d'Auvernier dans la démarche de Vouga tient au fait qu'il n'admet qu'une occupation pour le site éponyme, alors qu'il en conçoit plusieurs à Auvernier, et cela en amont du travail de terrain. Ainsi, si la démarche à Auvernier avait pour but de subdiviser la chronologie d'une période (le Néolithique), là n'était pas ce qu'on attendait de la fouille de La Tène : le Second âge du Fer connait déjà alors des subdivisions chronologiques et on admet depuis longtemps que le site ne livre des objets que de la phase moyenne du Second âge du Fer. Les attentes portent davantage sur les fouilles en elles-mêmes : celles-ci doivent représenter l'opération scientifique qui rendra La Tène, enfin, digne de son statut de site éponyme.

On notera, pour terminer à propos de l'éponymie, que si la réaction de Vouga répond à un souci de légitimation, elle montre par ailleurs, à l'instar de celle de ses contemporains champenois, une conception très rigoriste de l'éponymie en ce début de 20e siècle.

5. Fouilles des tumuli et des grottes

Alors qu'il conduit encore les fouilles de La Tène, Vouga entreprend d'explorer quelques tumuli, dès 1910, et quelques grottes, dès 1916, du canton de Neuchâtel (Reginelli Servais 2013).

Concernant les tumuli, Cynthia Dunning a distingué trois techniques de fouilles mises en œuvre par Vouga, mêlant fouilles en décapages horizontaux et creusement de tranchées (Dunning 2006). Des observations stratigraphiques sont possibles et parfois effectuées ; celles-ci ne sont cependant jamais mobilisées dans la réflexion, même quand toutes les tombes ne sont pas contemporaines. Comme dans les autres chantiers de Vouga, c'est bien la typologie qui permet de reconstituer la chronologie. Ainsi par exemple, quand il découvre que la tombe centrale du tumulus de Cressier/La Baraque, qu'il vient de fouiller, date du Bronze Moyen (1500-1450 av. J.-C.), il remet en cause la datation hallstattienne des tombes périphériques, et même la datation hallstattienne du tumulus de Coffrane/Les Favargettes, que Desor avait utilisé en 1868 pour définir le premier âge du Fer (Vouga 1936 ; Kaeser 2004a : 321-325). Ni la position des tombes, ni la stratigraphie du tumulus ne sont mobilisées pour expliquer le puissant écart chronologique. Celui-ci est au contraire réduit, car pour lui, toutes les tombes d'un tumulus doivent être contemporaines (Kaenel 1990 : 25 ; Dunning 2006 : 102).

En ce qui concerne les grottes, les fouilles entreprises sous la direction de Vouga répondent à des problématiques très diversifiées, qui nécessiteraient une étude comparative approfondie pour parvenir à des généralisations quant à l'usage de la stratigraphie. Ce que l'on peut dire en l'état, c'est que quand la méthode stratigraphique est mobilisée, elle répond à des problématiques géologiques, comme par exemple à Rochefort/Cotencher par le géologue Auguste Dubois (Dubois et Stehlin 1933). La grotte voisine de Boudry/Baume du Four, en revanche, n'a fait l'objet que de fouilles « typologiques », conduites par un archéologue amateur, Gustave Bellenot (Kaenel et Carrard 2007).

Ainsi, dans les tumuli comme dans les grottes, la méthode stratigraphique n'est encore qu'un outil secondaire par rapport à la typologie, ainsi que dans l'utilisation qu'en font les archéologues.

6. Un archéologue de son temps

Par l'utilisation de la méthode stratigraphique à Auvernier, Vouga montre son inscription dans les débats de son temps. Dans ce contexte, il suit le courant défendu par Henri Breuil (1877-1961), dont l'intérêt renouvelé pour l'outil stratigraphique se manifeste par exemple dans la querelle aurignacienne qui oppose deux courants méthodologiques durant les années 1905 à 1913 (Hurel 2011 : 180-185). Si Vouga prend la peine en 1923 d'expliquer sa démarche, c'est qu'il a conscience de l'horizon d'attente de ses lecteurs, en particulier des archéologues ; s'il semble même par moments défendre ou justifier son choix, c'est qu'il a pris acte des avancées méthodologiques de la discipline et qu'il a parfaitement conscience, pour l'avoir expérimenté, du potentiel de l'analyse stratigraphique dans l'étude d'un site. À l'égard des lecteurs de la monographie sur La Tène, amateurs et surtout collègues, il se devait donc de justifier les raisons l'ayant conduit à écarter cette approche pour le site éponyme.

En résumé, plusieurs raisons le poussent à s'en distancier : l'homogénéité typologique de la très grande majorité des objets, la problématique historique à la base de la démarche interprétative, la vision catastrophiste de la fin du site et, enfin, la conception rigoriste de l'éponymie. À cela s'ajoute le fait que la méthode stratigraphique ne bénéficie pas encore des apports de la sédimentologie, une discipline bien plus récente. Sans la sédimentologie, la stratigraphie n'est pas encore perçue comme pourvoyeuse de données qui concernent l'archéologie. De plus, cette discipline étudie des processus sur le long terme, des modes de formation, des transformations, dans une perspective assez éloignée du mode de pensée évènementiel et historique dominant alors chez les archéologues. Vouga, comme probablement la plupart de ses contemporains, cherche à tout expliquer par des évènements qui, non seulement relèvent de l'Histoire dans le cas de La Tène, mais qui de plus, même quand ils sont naturels, ne laissent souvent justement pas de traces sédimentologiques.

Ce que montre cette comparaison de la conception de la stratigraphie chez un seul et même archéologue, entre La Tène et Auvernier, c'est que l'adoption de l'approche stratigraphique ne signifie pas l'abandon préalable ou concomitant des autres outils méthodologiques. La méthode typologique reste ainsi prédominante chez Paul Vouga et peut donner lieu à des pratiques totalement opposées : mobiliser le contexte stratigraphique d'un côté, à Auvernier ; le mettre résolument à l'écart de l'autre côté, à La Tène.

Malgré une sensibilisation à l'importance du contexte, de nombreux présupposés théoriques empêchent sa considération pleine et entière. Le lien entre le terrain et les problématiques choisies se fait préférentiellement par le biais des objets. Dans ces conditions, les techniques de fouille présentent une certaine déconnexion, tant par rapport aux questions posées au départ que par rapport au résultat final que représente la publication des travaux. L'inadéquation est totale entre la problématique, la méthode et les techniques de fouille (Coye 1989 ; Coye 2011). La méthode et les techniques servent à légitimer le statut scientifique des fouilles, sans connexion avec la problématique historique, angle sous lequel Vouga aborde son travail, puis écrit sa synthèse.

La Tène n'est certainement pas le seul exemple de cette inadéquation, elle en est cependant particulièrement représentative.

Bibliographie

Arnold, B. (2009). *À la poursuite des villages lacustres neuchâtelois : un siècle et demi de cartographie et de recherche*. Archéologie neuchâteloise, 45. Neuchâtel : Office et musée cantonal d'archéologie de Neuchâtel.

Bossavy, J. (1916). Revendication française à propos du Marnien (Second âge du Fer). *Bulletin de la Commission des Antiquités et des arts de Seine-et-Oise,* 36, pp. 84-89.

Bretz-Mahler, D. (1971). *La civilisation de La Tène I en Champagne : le faciès marnien.* Paris : Ed. du Centre national de la recherche scientifique.

Corot, H. (1926). Au sujet des vocables 'Marnien' et 'La Tène'. *Bulletin de la Société archéologique champenoise,* 20, pp. 18-20.

Coye, N. (1989). Une conscience pour le fouilleur : méthode et techniques de terrain en archéologie préhistorique avant 1950. *Travaux du Lapmo,* 1989, pp. 7-28.

Coye, N. (2006). Paul Vouga et la classification du 'néolithique lacustre suisse'. L'empirisme à l'assaut des antagonismes méthodologiques (1920-1934). In M.-A. Kaeser, ed., *De la mémoire à l'histoire : l'œuvre de Paul Vouga (1880-1940). Des fouilles de La Tène au 'néolithique lacustre'.* Archéologie neuchâteloise, 35. Neuchâtel : Office et musée cantonal d'archéologie de Neuchâtel, pp. 83-99.

Coye, N. (2011). Une discipline en reconstruction : la préhistoire française de la première moitié du XXe siècle. In Ph. Boissinot, ed., *L'archéologie comme discipline ?* Paris : Seuil, pp. 199-220.

Demoule, J.-P. (1999). Chapitre I – Historique des recherches et objectifs de l'étude. *Revue archéologique de Picardie. Numéro spécial : Chronologie et société dans les nécropoles celtiques de la culture Aisne-Marne, du VIe au IIIe siècle avant notre ère,* 15, pp. 11-18.

Demoule, J.-P. (2009). Le contexte chronologique. *Revue archéologique de Picardie. Numéro spécial Bucy-Le-Long (Aisne). Une nécropole de La Tène ancienne (Ve-IVe siècle avant notre ère). Volume I. Présentations et études : une approche de la population, des sépultures et du mobilier,* 26(1), pp. 25-30 ; 603-604.

Dubois, A. et Stehlin, H.G. (1933). La grotte de Cotencher, station moustérienne : deuxième partie. *Abhandlungen der Schweizerischen palaeontologischen Gesellschaft = Mémoires de la Société paléontologique suisse*, 53, pp. 179-292.

Dunning, C. (2006). Paul Vouga et la fouille des tumuli neuchâtelois. À la recherche d'une nouvelle technique de fouille. In M.-A. Kaeser, ed., *De la mémoire à l'histoire : l'œuvre de Paul Vouga (1880-1940). Des fouilles de La Tène au 'néolithique lacustre'.* Archéologie neuchâteloise, 35. Neuchâtel : Office et musée cantonal d'archéologie de Neuchâtel, pp. 101-109.

Fourdrignier, É. (1904). L'âge du Fer (Hallstatt – Le Marnien – La Tène). *Bulletin de la Société préhistorique de France,* I, pp. 205-215, 222-236.

Guelliot, O. (1915). Marnien ou La Tène I ? *Bulletin de la Société Préhistorique de France,* XII, pp. 226-238.

Hildebrand, H. (1876). Les commencements de l'âge du Fer en Europe. *CIAAP, compte rendu de la 7e session, Stockholm, 1874*. Stockholm : Imprimerie centrale, pp. 592-601.

Hurel, A. (2011). *L'abbé Breuil : un préhistorien dans le siècle.* Paris : CNRS.

Kaenel, G. (1990). *Recherches sur la période de La Tène en Suisse occidentale. Analyse des sépultures*. Cahiers d'archéologie romande, 50. Lausanne : Bibliothèque historique vaudoise.

Kaenel, G. (2008). Entre histoire et typologies : les chronologies de la période de La Tène. In A. Lehoërff, ed., *Construire le temps : histoire et méthodes des chronologies et calendriers des derniers millénaires avant notre ère en Europe occidentale.* Bibracte, 16. Glux-en-Glenne : Centre archéologique européen.

Kaenel, G. et Carrard, F. (2007). La Baume du four (Boudry, canton de Neuchâtel) : un temple helvète ? In *L'âge du Fer dans l'arc jurassien et ses marges. Dépôts, lieux sacrés et territorialité à l'âge du Fer. Actes du colloque de l'AFEAF, Bienne – 5-8 mai 2005*. Besançon: Presses universitaires de Franche-Comté, pp. 499-535.

Kaeser, M.-A. (2004a). *L'univers du préhistorien. Science, foi et politique dans l'œuvre et la vie d'Edouard Desor (1811-1882).* Paris : L'Harmattan.

Kaeser, M.-A. (2004b). *Les Lacustres: Archéologie et mythe national*. Le savoir suisse, 14. Lausanne : Presses polytechniques et universitaires romandes.
Reginelli Servais, G. (2007). *La Tène, un site, un mythe, 1. Chronique en image (1857-1923).* Archéologie neuchâteloise, 39. Neuchâtel : Office et Musée d'archéologie de Neuchâtel.
Reginelli Servais, G. (2013). Organisation et financement des fouilles de La Tène (1907-1917) : la construction des cadres administratifs de l'archéologie neuchâteloise jusqu'en 1940. *Les Nouvelles de l'archéologie,* 133, pp. 28-34.
Reginelli Servais, G. (en préparation). *La Tène, de 1857 à aujourd'hui : analyse historiographique et archéologique du site éponyme du second âge du Fer européen.* PhD. Université de Neuchâtel.
Tischler, O. (1885). Über die Gliederung der La-Tène-Periode und über die Eisenwaffen in dieser Zeit. *Korrespondenz-Blatt der Deutschen Gesellschaft für Anthropologie, Ethnologie und Urgeschichte*, 14, pp. 157-161, 172.
Vouga, P. (1914). *Les dernières fouilles à La Tène. Plaquette offerte au Congrès international d'Ethnographie siégeant à Neuchâtel du 1er au 5 juin 1914.* Neuchâtel : Imprimerie Wolfrath et Sperlé.
Vouga, P. (1920). Essai de classification du Néolithique lacustre d'après la stratification, premier rapport publié au nom de la Commission neuchâteloise d'archéologie. *Indicateur d'antiquités suisses,* 22, pp. 228-235.
Vouga, P. (1921). Essai de classification du Néolithique lacustre d'après la stratification, deuxième rapport publié au nom de la Commission neuchâteloise d'archéologie. *Indicateur d'antiquités suisses,* 23, pp. 89-100.
Vouga, P. (1922). Essai de classification du Néolithique lacustre d'après la stratification, troisième rapport publié au nom de la Commission neuchâteloise d'archéologie. Indicateur d'antiquités suisses, 24, pp. 11-22.
Vouga, P. (1923). *La Tène : Monographie de la station publiée au nom de la Commission des fouilles de la Tène.* Leipzig : Karl W. Hiersemann.
Vouga, P. (1936). Cressier (distr. de Neuchâtel, Neuchâtel) : La Baraque, forêt de l'Eter. *Annuaire de la Société Suisse de Préhistoire*, 28, pp. 39-42.
Wavre, W. et Vouga, P. (1908). La Tène : Fouilles de 1907. *Musée Neuchâtelois,* 45, pp. 59-69.

Pioneers of archaeological stratigraphical techniques: Luigi Bernabò Brea (1910-1999) and Giorgio Buchner (1914-2005)[1]

Federico Nomi[1], Massimo Cultraro[2], Alessandro Guidi[1], Sebastiano Tusa (†)

[1]Dipartimento di Studi Umanistici, Università degli studi Roma Tre – federico.nomi@uniroma3.it – alessandro.guidi@uniroma3.it

[2]Consiglio Nazionale delle Ricerche (CNR), Catania massimo.cultraro@cnr.it

Abstract

In the period between the two World Wars, characterized by a general decay in the archaeological practice of the Italian prehistorians, Luigi Bernabò Brea and Giorgio Buchner developed new and advanced methods of documentation and study of the archaeological stratigraphies.

While Buchner, born in Naples and son of a Deutsch geologist, developed his skills working on islands like Ischia, Vivara and Capri, Bernabò Brea, after a degree in Law, went to the Italian Archaeological School in Athens, where he participated to the excavation at Poliochni, the largest EBA settlement on the Lemnos island. Both scholars served as functionaries in the State Antiquity Service (Buchner at Naples, Bernabò Brea at Taranto) in the same years also if, contrarily to Bernabò Brea, Buchner never became Head of an Antiquity Office; in their scientific evolution a big role was played by Luigi Cardini, an amateur archaeologist with a solid naturalist background, who directed in 1941 – together with Carlo Alberto Blanc – the excavations of the Grotta delle Felci in Capri where the young Buchner participated, and helped Bernabò Brea between 1941 and 1950 in the exploration of the Arene Candide Cave, in Liguria.

In the late Forties Bernabò Brea (who in those years become Superintendent in Sicily) and Buchner collaborated in some excavations in the Aeolian Islands, in the Fifties while Bernabò Brea explored the big protohistoric settlement of Lipari acropolis and other sites of the archipelago writing an important page in the study of Italian Pre- and Protohistory, Buchner carried out the excavations of the necropolis of the Greek colony of Pithekoussai in the San Montano valley, at Ischia, a site which he devoted himself until his death.

The paper tries to analyze the characteristics of the approach to the stratigraphy of these two pioneers of modern Italian archaeology.

Keywords: stratigraphic excavation, Luigi Bernabò Brea, Giorgio Buchner

Résumé

Dans la période entre les deux guerres mondiales, caractérisée par une dégradation générale de la pratique archéologique des préhistoriens italiens, Luigi Bernabò Brea et Giorgio Buchner ont développé des méthodes nouvelles et réalisé des avancées de documentation et d'étude des stratigraphies archéologiques.

Alors que Buchner, né à Naples et fils d'un géologue allemand, a développé ses compétences en travaillant sur des îles comme Ischia, Vivara et Capri, Bernabò Brea, après un diplôme en droit, est allé à l'école archéologique italienne d'Athènes, où il a participé aux fouilles de Poliochni, la plus grande colonie du Bronze Ancien sur l'île de Lemnos. Les deux savants ont servi comme fonctionnaires au Service national des antiquités (Buchner à Naples, Bernabò Brea à Tarente) dans les mêmes années également. Si, contrairement

[1] We dedicate this joint article to the memory of prof. Sebastiano Tusa (1952-2019), who like Luigi Bernabò Brea and Giorgio Buchner has dedicated many years of his scientific career to the pre-protohistory of the central Mediterranean islands. In addition to his prestigious capacity as a scholar, he has been a key element of the Institutions, constantly striving to find synergies and new research possibilities with a full desire to make the archaeological Heritage of his beloved Sicily accessible to all, scholars and the great audience. The internal division of the paragraphs of the contribution is organized as follows: Federico Nomi = 1 + 6; Massimo Cultraro = 2 + 4; Alessandro Guidi = 3 + 6; Sebastiano Tusa = 5.

à Bernabò Brea, Buchner n'est jamais devenu chef d'un bureau d'antiquités; dans leur évolution scientifique un grand rôle a été joué par Luigi Cardini, un archéologue amateur avec une solide formation naturaliste, qui a dirigé en 1941 – avec Carlo Alberto Blanc – les fouilles de la Grotta delle Felci à Capri où le jeune Buchner a participé et aidé Bernabò Brea entre 1941 et 1950 à l'exploration de la grotte Arene Candide, en Ligurie.

À la fin des années 40, Bernabò Brea (qui devient alors surintendant en Sicile) et Buchner ont collaboré à des fouilles dans les îles Éoliennes, dans les années 50, tandis que Bernabò Brea a exploré la grande colonie protohistorique de l'acropole de Lipari et d'autres sites de l'archipel en écrivant une page importante de l'étude de la pré- et protohistoire italienne, Buchner a effectué les fouilles de la nécropole de la colonie grecque de Pithekoussai dans la vallée de San Montano, à Ischia, site auquel il s'est consacré jusqu'à sa mort.

L'article tente d'analyser les caractéristiques de l'approche de la stratigraphie de ces deux pionniers de l'archéologie italienne moderne.

Mots-clé : fouilles stratigraphiques, Luigi Bernabò Brea, Giorgio Buchner

1. Introduction

> 'Probably the most important single excavation in this field is that by Dr. Giorgio Buchner on the island of Ischia, at Pithecusa, the earliest and farthest north of the Greek colonies on the west coast of Italy. This was a major entrepòt for trade with Etruria and the full publication of the meticulously excavated contents of its early cemeteries will throw light on many dark places of ltalian archaeology.
> Among the finds is an eighth century BC, geometric drinking vessel inscribed with a doggerel verse comparing it to the cup of Nestor. Another excavation which deserves special mention, both for the high quality of its execution and for the imaginative display of its results, is that of Professor Bernabo Brea on the island of Lipari.
> Side by side with this continued concern with the Greek sites of the south, one detects a welcome shift of interest towards the native peoples, who were their political and commercial neighbours.'
>
> (Ward Perkins 1968)

Exactly 50 years before the presentation of our paper (04. 06. 2018), J.B. Ward Perkins, then Director of the British School at Rome, from the columns of The Times recalled us that macro-geographical context where in ancient times the Greeks and then the Romans, in different chronologies and ways, had developed and expanded their societies and their trades, the Italian peninsula. To do this, he reviewed the main evidences and archaeological excavations, essentially in the last quarter of the post-WWII period, carried out and in progress. In this diagnosis only two archaeologists, operating in these contexts, are openly cited and praised by the authoritative British scholar, both for the importance of their excavations and for the methodologies introduced in them, 'Dr. Giorgio Buchner' and 'Professor Bernabò Brea', who ventured in those years mainly in two real 'laboratories' of geo-archaeological investigations, the islands of the Parthenopean gulf (Flegrean archipelago and Capri) and the Aeolian archipelago.

The history of studies and palethnological research of the Phlegraean archipelago *stricto sensu* (islands of Ischia, Procida and Vivara) are closely linked with a scholar who in just fifteen years laid their foundations, which still are today, fortunately or unfortunately, extremely topical. We are talking about Dr. Giorgio Buchner (Figure 1), who between the mid-1930s and around 1952 addressed the issue of the pre-protohistoric population of the island contexts of the middle-lower Tyrrhenian sea in a global and inter-district way, carrying out research among Pontine, Phlegrean and Aeolian archipelagos.

Provided with a geological formation by his father Paul, a well-known professor of zoology in Germany, in this first phase of his scientific production Buchner chose the palethnological branch,

Figure 1. Giorgio Buchner (1914-2005).

which allowed him to make interdisciplinary his early and personal investigations. The graduation thesis, matured with Ugo Rellini at the Sapienza – University of Rome in 1938 (Buchner 1938, unpublished), had as its palethnological themes the field research that he himself carried out between 1935-36 at Castiglione d'Ischia (Casamicciola) and in 1937 in Vivara (Procida), as well as multiple diachronic (up to Roman times) surface investigations (for example, Monte Vico, Lacco Ameno) on almost all sides of the island. Concerning the methodological approach, the convictions of the scholar are clearly evident: *'credo che da queste pagine risalti chiaramente come nelle ricerche preistoriche la raccolta anche dei più miseri avanzi, apparentemente senza alcun significato, non sia da disprezzare e può condurre a risultati non privi d'interesse. Se non altro è apparsa per la prima volta l'intensità delle dimore umane nell'isola d'Ischia, durante i periodi più antichi. Si ha inoltre un esempio dell'utilità, anzi della necessità, di una stretta unione tra ricerche preistoriche e geologiche. Soltanto una profonda conoscenza della situazione geologica permette di valutare giustamente i rinvenimenti preistorici e di stabilire quelle regioni ove ulteriori scoperte sono rese possibili'* (Buchner 1938, unpublished thesis). A 26-year-old Buchner, under the moral and scientific guidance of his father, had already very clear the importance of the geo-archaeological approach, which can be found perhaps much more in the rigorous scientific panorama of the last twenty-five years of the nineteenth century, crowded with scholars coming from the natural sciences, than to what happened (also academically) during the first quarter of the following century.

In the two aforementioned Phlegrean localities, the young scholar made the first discovery of Aegean sherds known on the Tyrrhenian side (Castiglione) and among them the oldest examples of these same imported ceramics (Vivara). In this islet connected in ancient times by a cliff to the island of Procida, the young scholar carried out 12 archaeological soundings of which only 6 were documented (Figure 2):

- Saggio I = '...alla Punta di Mezzogiorno, a soli 20 m. circa sul mare. I cocci ivi rinvenuti, non molto copiosi invero, hanno l'aspetto di appartenere in parte ad una fase un po' più antica del materiale restante...'
- Saggio Punta dell'Alaca/Punta Mezzogiorno = '...in una località ove copiosissimi erano i cocci giacenti in superficie, dimostrò come tutto questo materiale fosse slavato dall'alto in tempi posteriori'
- Saggio H = '...nell'unico punto ov'era rimasto un po' di terreno, circa nel mezzo tra quota 109 e quota 96, confermò l'esistenza dell'abitato sull'alto della dorsale...'
- Saggio F = '...in basso presso la Punta dell'Alaca...mise in luce uno strato originale di scarico, contenente pochi cocci preistorici...'. Probabilmente intaccò gli strati soprastanti lo strato di pomici di P. d'Alaca, con materiale fluitato.
- Saggio B = '...sulla dorsale sopra Punta Capitello, a ca. 50 m sul mare...si trovò uno strato di terra nera, con cocci, poche ossa (avanzo di pasti) e minuti frammentini di carbone,

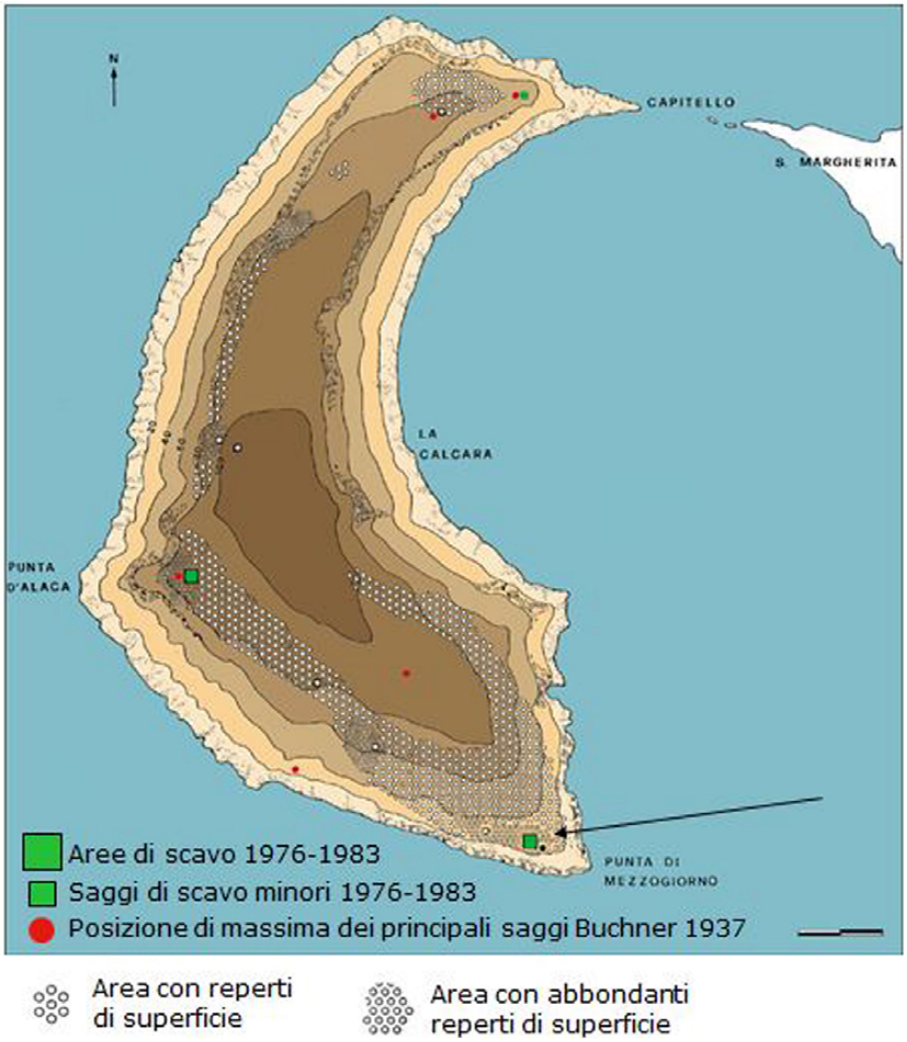


Figure 2. Vivara island, in red point the Buchner's trenches (from Cazzella *et al.* 1981).

evidentemente l'avanzo di un fondo di capanna...tutto il materiale preistorico rinvenuto in questo saggio è quello tipico per la fase seriore della civiltà appenninica...due piccoli cocci del Tardo Minoico III...'*

- Saggio E = '...più in basso, a circa 25 m sul mare...il materiale rinvenuto è in parte lo stesso, tipico per la fase seriore della civiltà appenninica, trovato nel saggio B, in parte appartiene ad un tipo alquanto diverso...'

From the first descriptions (Buchner 1938, unpublished thesis), it is already clear how Buchner perfectly understood the diachronic sequences between the various settlement areas of the island and their chronostratigraphy, analyzing the primary and secondary locations. The analysis of the materials allowed Buchner to understand the anteriority of the finds of Punta Mezzogiorno (MBA 1), the following period of Punta d'Alaca (MBA 2), the final phase of the settlement with the finds of Punta Capitello (MBA 3) (for a synthesis based also on the most recent excavations see Cazzella *et alii* 1981).

As mentioned in our *incipit*, a figure who interconnects with Giorgio Buchner in many things, but at the same time differs in many others, both in this specific scientific field of the pre-protohistoric population of the smaller island contexts of the central Mediterranean, and in the methodological and multidisciplinary advances in the geo-archaeological field of this central phase of the 20th century in Italy, is certainly Luigi Bernabò Brea (Figure 3). Unlike Giorgio Buchner, Luigi Bernabò Brea completes a course of study exactly opposite to that of the 'Bavarian', who, as we will see,

starting from a 'holistic' palethnological approach, with a strong paternal inheritance of geological matrix, will end his scientific career in an area, such as that of Greek colonization in the West from the 8th century. B.C. onwards, which has always been competence of classical archeologists. The 'Ligurian', on the other hand, graduated with Giglioli at the same Sapienza – University of Rome in 1935, after having obtained a primary degree in Law (family of notaries) in Genua. In these years, in the same Roman Athenaeum, even though 4 years younger, Giorgio Buchner was present (born in 1914, while Bernabò Brea was born in 1910). To date, we do not have any correspondences that can prove an early knowledge, or even collaboration, between the two young university students, but certainly the years '36 -'37 are fundamental for both, for the experience in the field and for discoveries which see them protagonists in important island scenarios in the Mediterranean.

Figure 3. Luigi Bernabò Brea (1910-1999).

Buchner, as we have seen, in this period discovers the proto-historic settlement of Castiglione (with the yet mentioned first Mycenaean attestations known, then, in the Tyrrhenian area) and Monte Vico in Ischia and Vivara in Procida. Luigi Bernabò Brea, on the other hand, has the opportunity to have an international experience (an aspect that will characterize him greatly in his research and heritage protection activities throughout his career; for his part, Buchner also had many foreign collaborations, but with a less pronounced dynamism – perhaps for a different temperament – than his colleague), having in the meantime become a student member of the Italian Archaeological School of Athens (from now onwards SAIA) under the guidance of the then Director Alessandro Della Seta. Here he excavated the prehistoric and multi-layered settlement of Poliochni in Lemnos (a site discovered five years earlier by SAIA, which will have an international echo for a long time, being considered the oldest 'urban' attestation on European soil) and found, thanks to the surveys conducted by him personally always on the north-eastern Aegean island, the Tyrrhenian sanctuary (VII century BC, with continuity of use until the IV century AD) of the Kabirion of Chloe.

The insular connotation, the importance of anthropic presences and the peculiarity of intercultural contacts are immediately central to the formation of these two eminent Mediterranean scholars.

Another aspect that unites them is the process of improvement of stratigraphic excavation techniques (Cazzella 2011, Guidi and Tarantini 2017), an aspect that in Italy, after important pioneers of the late '800 / early' 900, had expired during the Fascist regime, which in the the field of research exalted aspects such as the pomp of Roman times and ancient Italic origins (the same mission of the SAIA on Lemnos had been encouraged by the discovery of the 'Tyrrhenian' stele of Kaminia) and this approach certainly had not facilitated the development and conservation of scientific and methodological criteria of archaeological investigations in Italy. In this recovery on the advancement of field techniques, some main academic figures played a role in the more or less parallel path of the two scholars.

Figure 4. Salvatore Maria Puglisi (1912-1985).

In 1936 both deal with Salvatore Maria Puglisi (Figure 4), then a Rellini's young assistant, a scholar who gave strong importance to the methodological accuracy of the stratigraphic investigation, with which Buchner excavated the Bronze Age deposit of Punta Manaccora (Buchner 1936-37), while Bernabò Brea shared the experience in the Aegean, since in those years also Puglisi was a student member of the SAIA. Another framework with which they will share the collaboration, but never working together, is the Italian Institute of Human Paleontology (from now onwards IIPU), of which they both then become members. *'Fin dal tempo del mio arrivo a Genova nel Luglio 1939 io pensavo a riprendere gli scavi nel Finalese allo scopo di stabilire se fosse possibile... la serie degli strati archeologici nelle caverne... Intravvedevo che dovevano esistere notevoli differenze corrispondenti a diverse fasi... Ma non era possibile farsi un'idea chiara, nella totale confusione dei materiali...Non volevo tuttavia iniziare da solo uno scavo di questo genere perché sentivo la mia debolezza nel campo paletnologico non avendo mai fatto scavi in caverne e non avendo le necessarie basi di conoscenze naturalistiche'* (from excavation diaries, Superintendancy for the archaeological heritage of Liguria archives. See also Maggi *et alii* 2014). Altough being a 29 years old neo-Superintendant archaeologist in Liguria (we will see that Buchner will have a very different career), from these writings it is clear that there was full awareness in Bernabò Brea of the difficulties of the investigations in the palethnological field and how the aid of the IIPU could be fundamental for the excavation of a multi-layered site (between Holocene and Pleistocene), such as that of the Arene Candide (Finale Ligure), and for its personal growth as a stratigrapher.

The IIPU was also involved in the important 1941 excavation campaign in Capri (Grotta delle Felci), which instead saw Buchner officially involved by the Superintendency of Antiquities of Naples as delegate of the research and documentation activities (Figure 5). In this circumstance, in addition to the better know Alberto Carlo Blanc (eminent scholar in the palethnological panorama of the mid-twentieth century), is certainly fundamental, precisely for the practical activities on the field (he coordinated this type of research also at the Arene Candide), the figure (less in the spotlight) of Luigi Cardini (Figure 6), a school teacher with the passion for paleonthology and prehistory who was trained in all the main excavations of the Institute, overall in caves occupied during the Pleistocene, like Barma Grande and Balzi Rossi in Liguria or Grotta Romanelli in Apulia, becoming soon one of the main scholars of this Institution, taking in hand later for at least a decade (1960-1970) the fate of the IIPU and in part also of the teaching of Palethnology of the University of Rome, immediately after the the untimely death of Blanc himself.

Another line of research by Giorgio Buchner (and in part by Luigi Bernabò Brea), connected with his strong expertise in the volcanological field, was the identification of the sources of supply for obsidian in Neo-Eneolithic trade (Buchner 1949) in the central Mediterranean. Especially in the Pontine and Aeolian deposits, those who mostly interconnected with the Phlegrean reality, he made more than one inspection and study. It was very important, for example, the understanding that the flow of the Rocche Rosse in Lipari could not be active as an obsidian quarry as early as the Neolithic. The discoveries of an obsidian workshop in the Papesca area (Figure 7), were connected by him with the now known flow of 'Pomiciazzo', in the Gabelotto valley, near Canneto. Still with

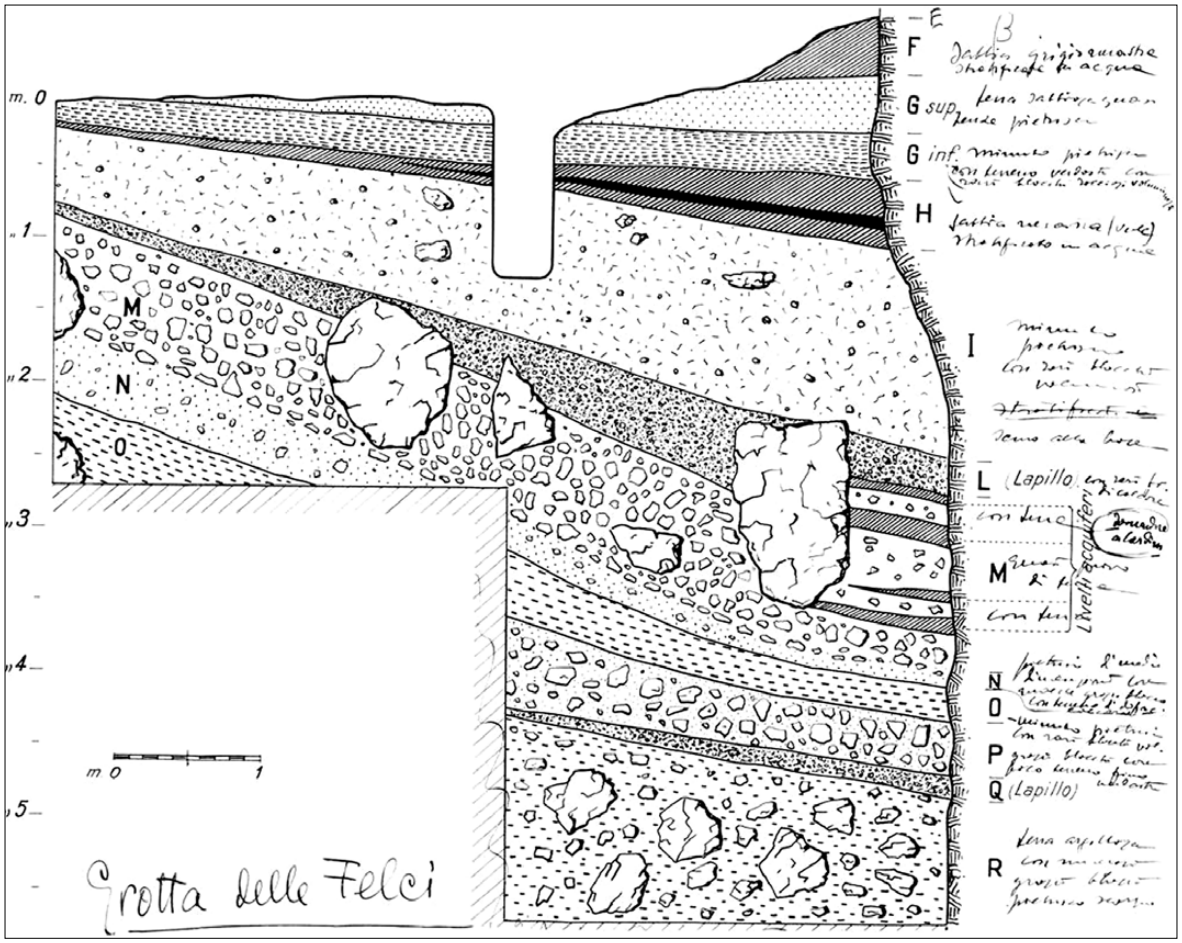


Figure 5. Grotta delle Felci, Buchner's documentation of section South of principal trench IIPU excavation (1941) (courtesy Istituto Italiano di Paleontologia Umana [ISIPU]).

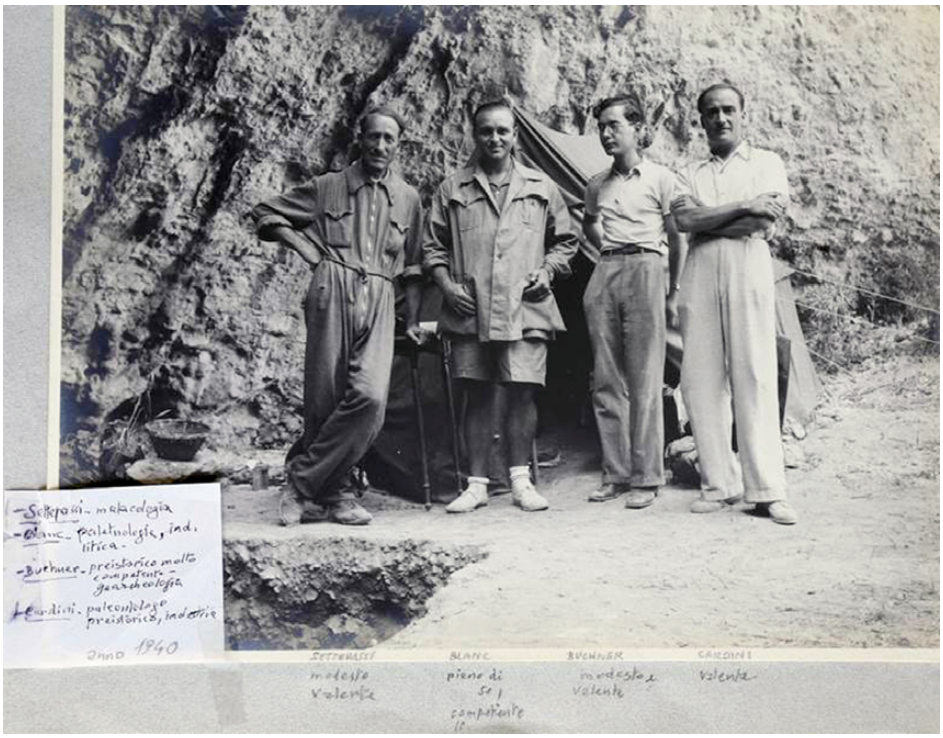


Figure 6. Grotta delle Felci_IIPU Multidisciplinary Research Team: Luigi Cardini (1898-1971), first at right and then Buchner, Blanc and Settepassi (courtesy Istituto Italiano di Paleontologia Umana [ISIPU]).

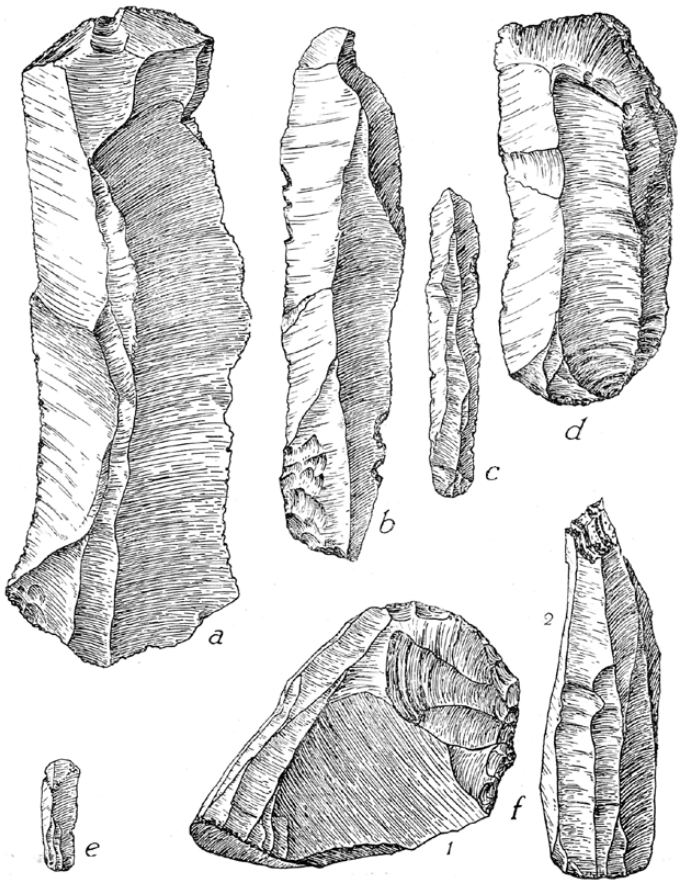


Figure 7. Papesca; obsidian tools found by Buchner (1949).

regard to the obsidian network, in Timpone del Fuoco in Stromboli he found another processing area. Other obsidian industries were found in Ponza (in Monte della Guardia, Chiaia di Luna, Cala dell'Acqua and Punta del Fieno), in Zannone and in Palmarola itself (Monte Guarniere).

A figure who will combine, in this geological context, the histories of the two scholars in question is the Swiss Alfred Rittmann (Figure 8), founder of the modern volcanology, who chose among his privileged investigation laboratories precisely the smaller islands of the low Tyrrhenian Sea. In the 1940s the research activities of this scholar were certainly in the Phlegraean context and the collaboration with Paul Buchner, as well as with Giorgio, was also strong. In 1948 these three scholars created the first Civic Museum of the Island of Ischia, comprising a volcanological section (which will also be repeated in Lipari) and a catalogue of the same. In addition to understanding the deposits and overlapping them or not with anthropized paleosols, Buchner concentrated heavily on studies of the supply of obsidian. This study (Buchner 1949), after investigating the Phlegraean and Ponzian islands, as we have seen, inevitably led Buchner to start researches in the Aeolian Islands, allowing him to unequivocally define the 4 obsidian deposits in the central Mediterranean. The Aeolian experience, after almost 15 years of probable knowledge and confrontation between the two interlocutors, was the first and remained the only opportunity for true collaboration on the field together. Luigi Bernabò Brea at the end of 1941, in fact, by decree of the Fascist Regime that scrambled all the managerial structures of the time in one night, had become Superintendent of Antiquities of Eastern Sicily, spending the first years in a macroscopic protection activity and conservation of local cultural heritage in the war and post-war phases.

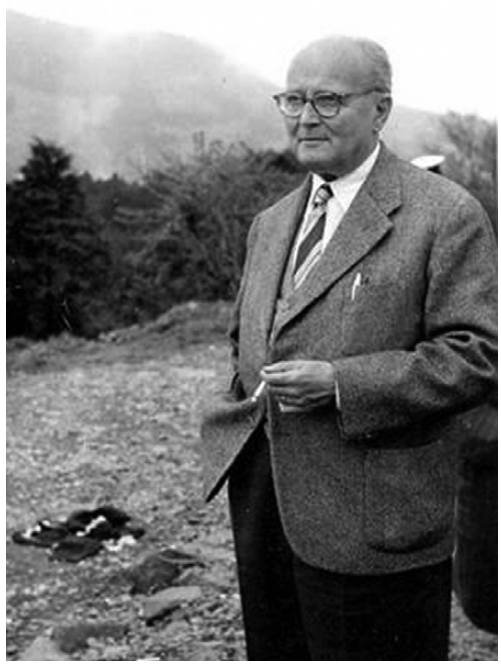


Figure 8. Alfred Rittmann (1893-1980).

In 1947 the scholar undertook the first Aeolian researches at Piano Quartara in Panarea. The following year Buchner arrived for his investigations in Lipari and in 1950 the excavation

Figure 9. Buchner at Punta Milazzese settlement (Panarea) and A&B huts (from Mastelloni 2020, p. 184, fig. 2).

began at Punta Milazzese, also in Panarea. Buchner, who in 1949 had finally entered the ranks of the Superintendency for Antiquities of Naples (since 1947 he was temporary wage earner, after he had maintained, during the war, collaborating with the English allies landed in Ischia, thanks to his good language skills, and seeing himself barred since 1939 every possibility of ministerial assumption not having clearly joined, together with his father, to the fascist regime), managed the digging of the huts A and B of the village of the Middle Bronze Age on the Milazzese promontory (Figure 9). After this unique occasion of collaboration, which left few traces on a scientific level (Bernabò Brea and Cavalier 1968, pp. 123-132), the paths of these two scholars are divided clearly, both in their fields of action that will make them further known in the international scientific panorama in the following fifty years, without an apparent trace (not found, at least by me) of some form of (epistolary or not) communication.

(F.N.)

2. Luigi Bernabò Brea and the first experimental excavation methodology in Greece

Luigi Bernabò Brea (1910-1999), a multifaceted scholar ranging through different topics of Field Archaeology, represents the formalization of the excavation technique and methodology in the Italian context in the years immediately after the Second War World (for general overview: Pelagatti and Spadea 2004; Cultraro 2020).

The Italian scholar experimented the first modern stratigraphic excavation in Greece, when he was alumnus of the Italian Archaeological School at Athens in 1936-37 (La Rosa 2002). On Lemnos's island two main archaeological sites were the 'training fields', where Bernabò Brea has moved the first paths, the Bronze Age settlement at Poliochni and the Classical Kabirion Sanctuary at Chloe. Despite of the differences of the chronology and of the architectural evidence, both sites seem to be similar in the conceptual and methodological approach of the stratigraphic excavation.

Poliochni presents an articulated multilayered stratigraphy that reflects the long-term occupational phases from the Late Chalcolithic to the Late Bronze Age (Bernabò Brea 1964). Following the director of the Italian School, Alessandro Della Seta (1879-1944), the stratigraphy of Poliochni was interpreted as the sequence of three main architectural phases, where the each level was characterized by specific aspects either in the material culture and in the plan buildings (Cultraro 2006 and 2019). This method of correlation between architectural data and pottery assemblage has been influenced by the work of Ugo Rellini (1870-1943), professor of Prehistory in the Rome University, to which many students of the Italian Archaeological Schools belonged (Cultraro 2016).

Bernabò Brea has developed this methodology, focusing on the 'micro-stratigraphy' and the relationships between building structures and layers in order to reconstruct the sequence of strata into a specific house complex. His exploration in the Building Complex XII shows the definitive adoption of the stratigraphic excavation method, proceeding by removing a single stratum in its entirety, as well as to evaluate the soil composition ad to put each artifact relating to its indication of provenance (Bernabò Brea 1964, pp. 328-332; Cultraro 2019) (Figure 10). Comparing this much more elaborated method, which is at the same time conceptual and operative, it cannot be found a similar scientific approach among the other Italian scholars working in the same years at Poliochni.

The unpublished notebooks of 1936 (archive of Italian Archaeological School at Athens) give important information for reconstructing the stratigraphic approach of the Italian scholar. The first path was to delimitate a large trench whose limits would have been abandoned after the finding of walls houses. Therefore, the new excavation perimeter became the area delimited by architectural elements. He also proceeded to remove the archaeological depot doing a sequence

Figure 10. Poliochni, Lemnos. A stratigraphical section in the Room 819, Bernabò Brea excavation 1936 (Archive of the Italian Archaeological School at Athens).

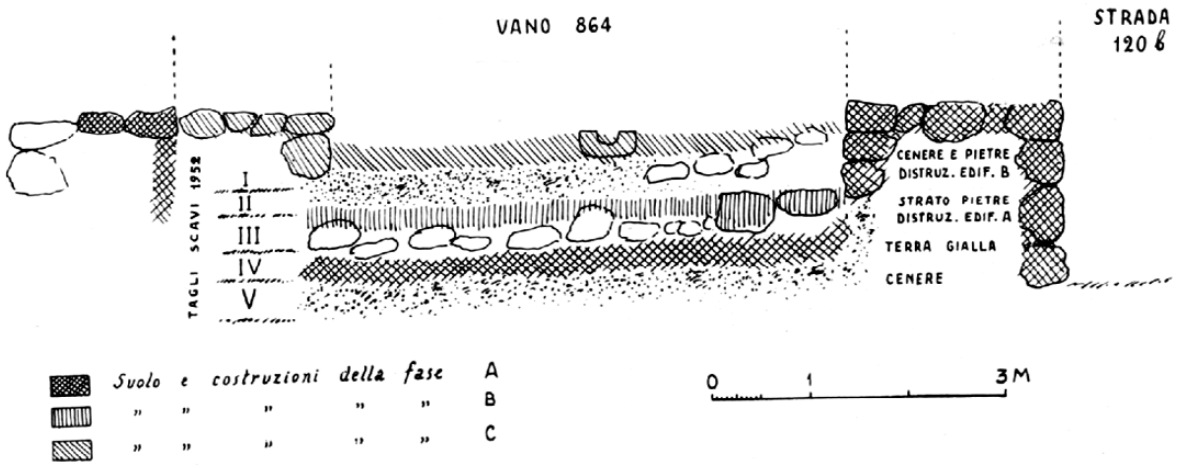


Figure 11. Poliochni, Lemnos. Stratigraphical section of Room 864 by Bernabò Brea 1952 (after Bernabò Brea 1964).

of small cuts. In the case of a pavement or a solid layer, the removing of the archaeological find depot has been stopped and it proceeded to reconstruct the layer, if necessary, joining more cuts. The example of this method is the excavation of the Rooms 804-808, where the micro-stratigraphy of each building was reunified in order to evaluate the complete stratum sequence of the entire complex houses (Bernabò Brea 1964, pp. 328-329). When the Italian scholar came back to Poliochni in 1952, this methodology was further defined in the stratigraphy of Room 864, where layers, architectural remains and pavements are related in the same sequence (Bernabò Brea 1964, pp. 395-399, fig. 229) (Figure 11).

Other features of the scientific method by Bernabò Brea should be paid in attention. The first is the focus on the compositional elements of each stratum, as colour, petrography, consistency and presence or absence of charcoals. The second is the evaluation of the whole archaeological depot, where the key factors are identified by the homogeneity of material cultural, mostly the pottery classes, for creating a useful tool of a relative chronology. Generally speaking, the stratigraphic approach carried out at Poliochni by Bernabò Brea is strictly connected to the typological study of the pottery, as confirm the later reconstruction of the Bronze Age sequence published in 1962, where to each 'architectural period' labeled as a color, corresponds a typologically defined pottery assemblage (Bernabò Brea 1964: 29-30).

The second site is the Sanctuary of Kabirion explored for the first time by BB in the northern coast of Lemnos. If we compare the excavation of Poliochni, the exploration of the Classical sanctuary shows significant differences concerning method and approach. First of all, the stratigraphic sequence is deeply conditioned by the development of the buildings and its planning. Only in few cases it is possible to identify a stratigraphy into each rooms composing the sanctuary, because the main stratigraphic indicators were the pavement and the abandon depot.

In other words, the differences in the nature and composition of the archaeological context clearly determine a deep conditioning of the choice and applying of the stratigraphic excavation method.

Unpublished archival data (Bernabò Brea archive in Syracuse; Cultraro 2020) indicate that it is likely that the application of this modern approach to the archaeological excavation might be related to the University education training of Bernabò Brea in Rome, when he was student of the aforementioned Ugo Rellini, who carried out some excavations in the Gargano in August 1934 involving some students of the La Sapienza University.

(M.C.)

3. Bernabò Brea in Liguria: the Arene Candide excavation

In 1938 Luigi Bernabò Brea was hired as a government official in the National Museum of Taranto; few months later, on 1/7/1939, thanks also to his first degree in Law (De Lachenal and Maggi 2012, p. 131), he was appointed Head of the newborne Liguria State Antiquity Office, created as a consequence of the first Monuments and Archaeological Sites Protection Act.

Bernabò Brea didn't want to leave the Taranto Museum and the important excavations carried on in Apulia and sent a letter in this sense (dated 3/7/1939) to Bottai, the Public Instruction Minister (Italian State Archive, Retired Personnel 1972, Box 6), but notwithstanding this was compelled to move.

In Liguria his first preoccupation was to carry on the exploration of the caves with prehistoric remains in the district of Finale Ligure, interested by excavations since the XIX century (Rossi *et alii* 2014).

To this aim he made an official meeting in October of 1940 with the Genua municipal authorities and Baron Gian Alberto Blanc, then President of the Italian Institute of Human Paleontology and his son Alberto Carlo Blanc, the two main Italian Paleolithic specialists (Maggi *et alii* 2014). Bernabò Brea wanted the collaboration of the Institute, so asked to Blanc to give him – I quote from the minutes of the meeting – 'the necessary instructions to carry on the excavations with the same adjustments and techniques utilized in the diggings made by the Institute in quaternary sites' (Maggi 2014, p. 432; translation by the Author).

Blanc accepted to collaborate and sent Luigi Cardini, who six years before had been appointed secretary of the Institute, to Bernabò Brea to help him in the excavations, .

Quite accidentally, the site choosen during a first survey was the Arene Candide Cave, object of various excavations since 1864: the first soundings by a pioneer of Italian paleethnology, Arturo Issel, in 1864 and 1876, Yeats Brown-Brooke (1874), Barrili (1874), Perrando (1874), Wall (1883), Morelli (1883-1888).

Bernabò Brea and Cardini decided to work in the south-eastern portion of the cave. In the first four campaigns, between 1940 and 1942, a stratigraphical sequence 8.50 meters high datable between 28000 years ago and the Roman period was put to light giving us a sort of 'milestone' for the chronology of pre- and protohistory in Northern Italy.

In the original drawing preserved in the offices of the ISIPU (the present denomination of the Italian Institute of Human Paleontology) you can clearly detect the first 3.50 meters studied over all from Bernabò Brea and pertaining to the time span between Neolithic and Roman period and the remaining color section (5 meters) with the Pleistocene sequence reconstructed by Cardini (Figure 12); here the most important finding were an Epipalaeolithic necropolis with 19 graves and, in a more deep level, the famous Upper Paleolithic burial of the 'Prince' (Formicola 2003).

In the first sketch of the section made on the north-eastern wall of the excavation is well detectable the division inside the 12 strata of the sequence in artificial horizontal levels, as is evident also in the drawings from the original field report by Bernabò Brea (Figure 13). We know that after other four campaigns on the site, between 1948 and 1950, Cardini came back for a little sounding in 1970, a year before his death. Again, his original sketch of the section shows clearly a division of the sequence in artificial horizontal arbitrary levels (Figure 14A); the same methodology is used in the 1968 excavation of Grotta Giovanna, in Sicily, as it's clear in the stratigraphical sketch (Figure 14B) that very kindly Simona Pianese Longo, then one of his students that took the degree on the Grotta Giovanna (SE Sicily) excavations allowed me to utilize (Pianese 1968-69, umpublished dissertation).

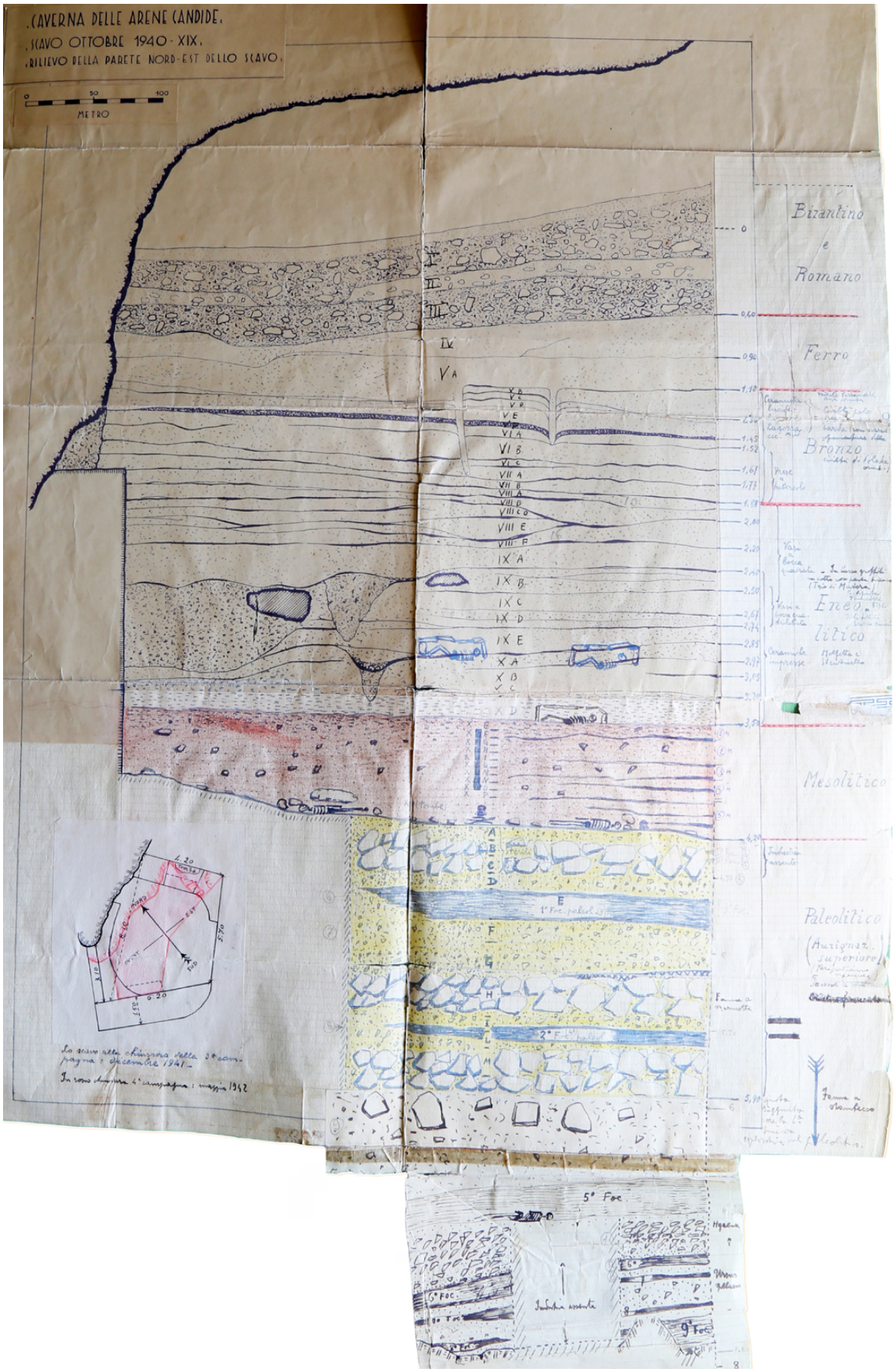


Figure 12. Arene Candide, excavations 1940-42, main NE stratigraphic section (courtesy Istituto Italiano di Paleontologia Umana [ISIPU]).

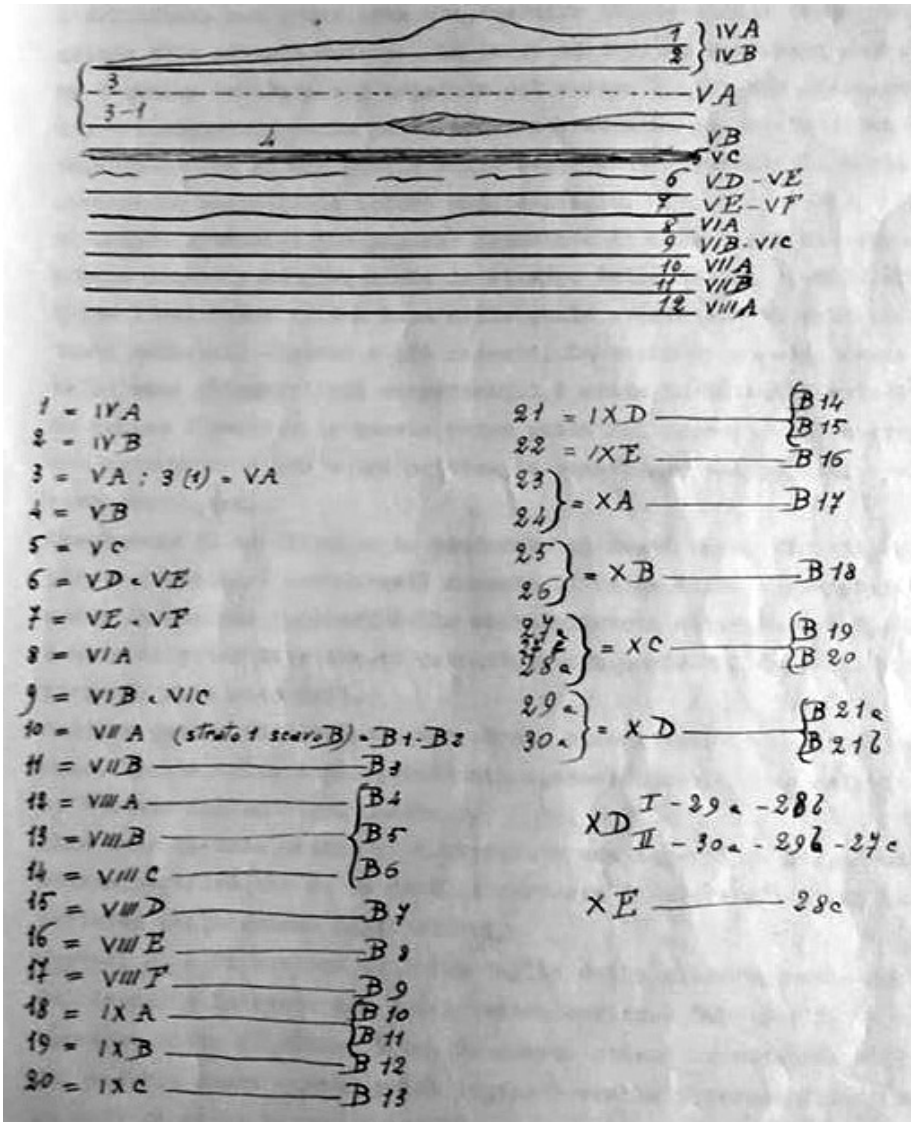


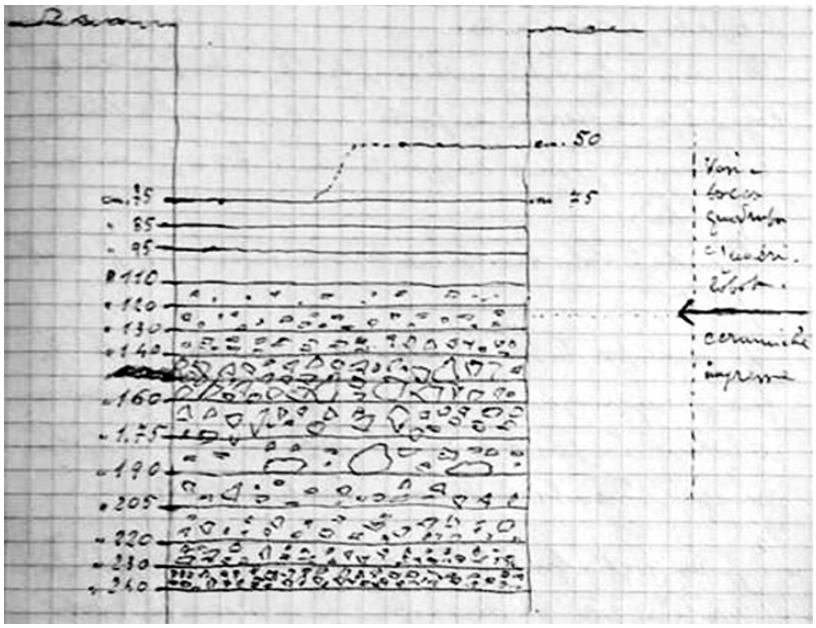
Figure 13. Arene Candide, field sketch of the upper part of the same section by Bernabò Brea (courtesy ISIPU).

After all, also in recent years, although following the strata, many archaeologists continued to use the more comfortable artificial horizontal arbitrary levels, trying an always difficult match between these and the strata (Massimo Tarantini, oral communication).

The analysis of Cardini's original notebooks shows however his skill in the study of lithic material (Figure 15) and of the faunal remains. He followed very carefully the excavation of the Epigravettian graveyard (Figure 16), leaving also (Figure 17) a precious photographic documentation constituting the base for new analyses on the skeletal remains and their distribution, in a recent study made possible over all thanks to the accuracy of original documentation (Sparacello *et alii* 2018).

Unfortunately he didn't succeed to publish anything of the cave's Pleistocene sequence during his life also if Bernabò Brea in the Sixties wrote under his dictation a definitive report on these strata that was the starting point for the posthumous work published only in the following years (Bietti 1994).

Cardini was also unlucky; in July 1943, when he was 45 years old, tried to participate to a university competition for professorship that, due to the dramatical political events of that year in August was cancelled (Gazzetta.Ufficiale 20/8/1943; La Nazione, 20/8/1943). Only in 1952 he obtained the



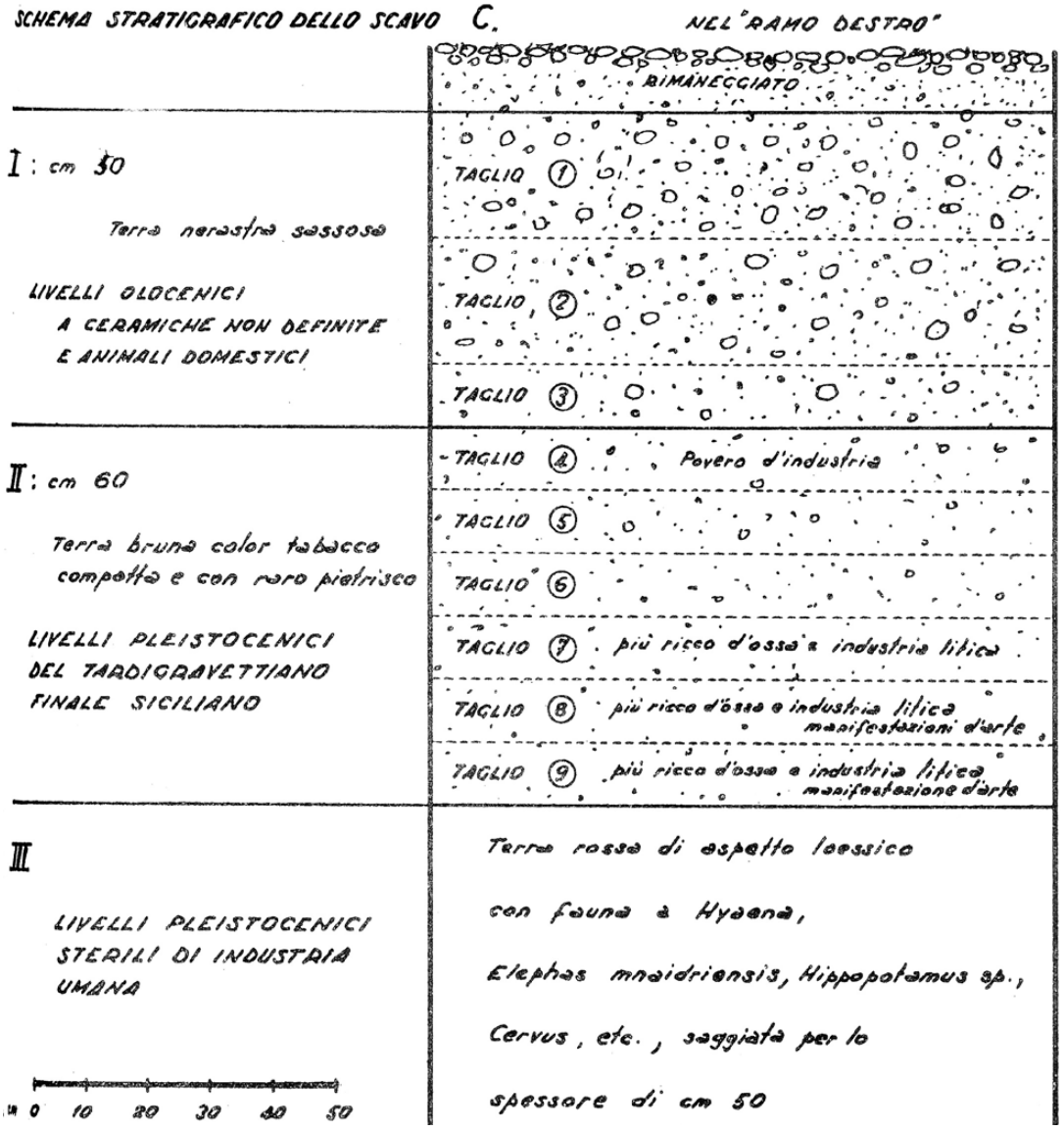


Figure 14. A. Arene Candide, 1970 campaign; stratigraphic sketch by Cardini B. Stratigraphic sketch of 1968 Grotta Giovanna C excavations (from Pianese 1968-69) (courtesy ISIPU).

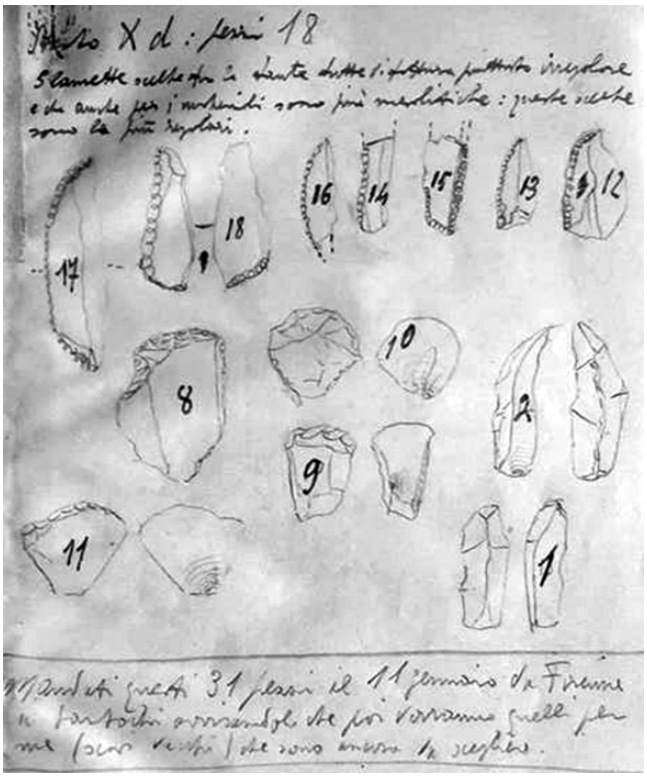


Figure 15. Arene Candide, drawings of lithic material by L. Cardini (courtesy ISIPU).

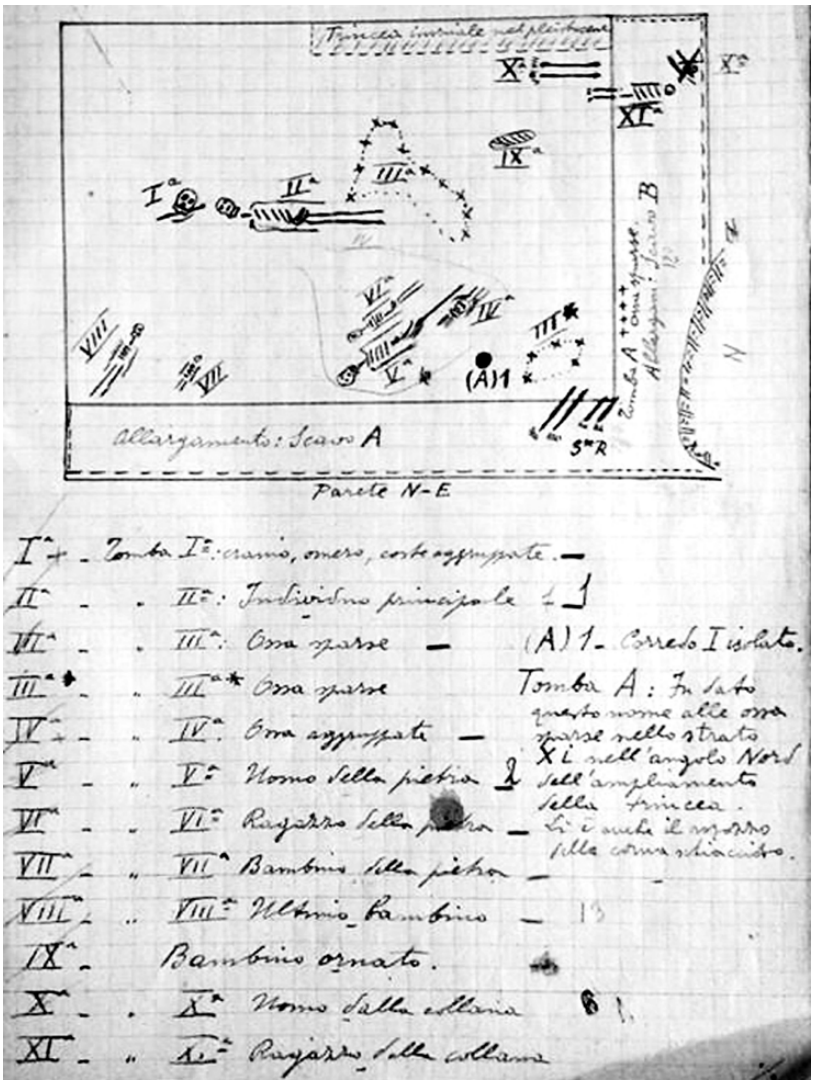


Figure 16. Arene Candide, sketch plan of part of the Epigravettian graveyard by L. Cardini (courtesy ISIPU).

professorship (Italian State Archive, Min. PP.II., Liberi Docenti 1930-1950 Second Serie, Envelope 100, sheet 11) and five years later he was confirmed between the archaeology professors of Rome University, where after the premature death of Alberto Carlo Blanc he taught a course of Prehistoric Ecology from 1963 to 1970 in which many students of that generation learnt to dig.

Not by chance, when Cardini died the Italian Institute of Human Palaeontology entrusted Bernabò Brea to coordinate the publication of the ceramic material dug by him between 1965 and 1970 in the little cave near to Grotta della Madonna (Praia a Mare, Cosenza) called in his honour 'Grotta Cardini'; in the foreword of the book, edited in 1989, Bernabò Brea defined Cardini as 'friend and *maestro*' and himself as '*disciple*' (Bernabò Brea *et alii* 1989: 10; italics are mine).

(A.G.)

Figure 17. Arene Candide, photograph of grave VIII by L. Cardini (courtesy ISIPU).

4. The early pioneering activity in Sicily (1941-1951)

In 1939 Bernabò Brea, upon becoming Superintendent of Antiquities of Liguria, requested the support of the Italian Institute of Human Paleontology (IIHP) (Tarantini and Parenti 2011), for carrying out new extensive field researches at the Cave at Balzi Rossi and further in the cavern at Arene Candide (1940-42), where a new rigorous excavation methodology has been significantly defined in the main principles.

At the end of 1941 Bernabò Brea was transferred to Syracuse as director of the Superintendence of Eastern Sicily at Syracuse, which he directed for 32 years until his retirement in 1973 (De Lachenal and Maggi 2012).

The first contact to the archaeology of Sicily implied different approaches in the investigation and evaluation of the archaeological sites. Space prevents mention of several archaeological contexts explored during the first ten years of activity of Bernabò Brea in Sicily. Due to the wide number of sites, I prefer to focus on those sites containing a prehistoric depot, which have been explored by Bernabò Brea in the years between his arrival in Sicily and the edition of his main book, *Sicily before Greeks* (1957), that represents the first reassessment of Prehistory of the island after the activity of Paolo Orsi.

Bernabò Brea focused on the exploration of some cave depots related to the Upper Palaeolithic and to Neolithic Period, connecting to his previous activity carried out at the Arene Candide (Bernabò Brea 1950).

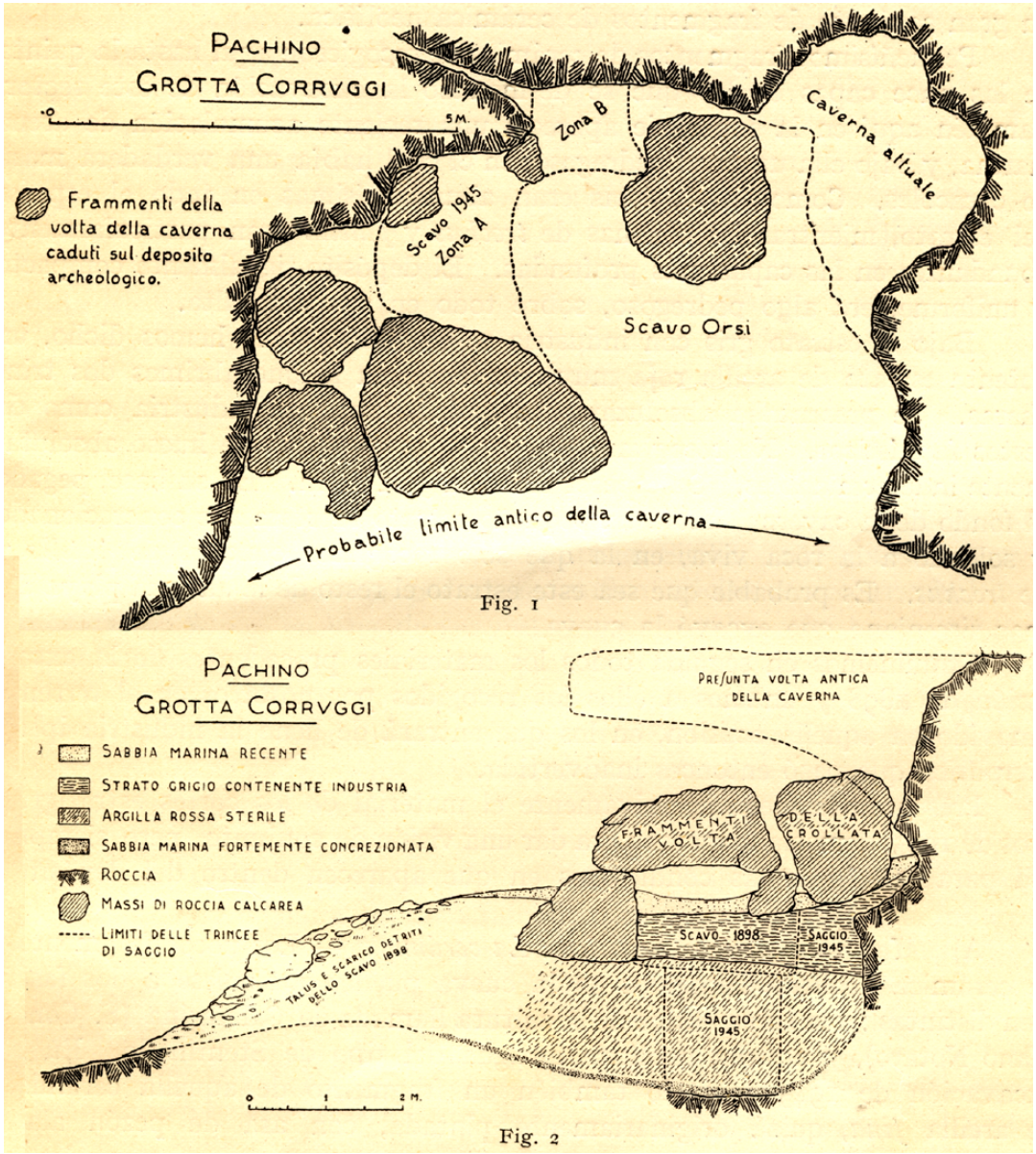


Figure 18. Grotta Corrugi, Pachino (Sr), plan and stratigraphical section by Bernabò Brea 1945 (after Bernabò Brea 1949).

The exploration of Grotta Corrugi near Pachino (Sr), in south-eastern coastline of Sicily, is the better example of the stratigraphic excavation method carried out in Greece and later in Northern Italy (Bernabò Brea 1949). In 1945 the Italian scholar carried out two diggings close to the oldest sectors explored by Orsi. The deposit was investigated by short cuts (10 cm), which *a posteriori* were unified according the main characteristics of soil (Figure 18). Another key factor for dating was the evaluation of the lithic assemblage, according its typology and typometry, and also the evidence of marine fauna, mostly marine mollusks, which have been analyzed by Luigi Cardini. It worth noting that the archaeological analysis was also supported by sieving of smallest fragments of artefacts and ecofacts, as charchoal and faunal remains, for reconstructing the relationships between humans and landscape. The final result has been that a long-term diachronic sequence was reconstructed from the Upper Palaeolithic to the Late Neolithic Period.

Furthermore, the same methodological approach was carried out in the exploration of cave Fontana Nuova at Marina di Ragusa (1945), showing a Mesolithic deposit, and in the Grotta di Polifemo (1942) on the promontory of Milazzo (Me), where unfortunately no evidence of Prehistoric occupation

was identified under a 7.000 mt. deposit containing Classical Greek and Roman pottery (Bernabò Brea 1947a, pp. 240-241).

During a long journey of scientific lectures in England, France and Spain in the years 1951-1953, Bernabò Brea produced the first comprehensive synthesis of the Sicilian prehistory. This general reassessment is the consequence of three different interactive factors; the first one is the overall reexamination of the Orsi's fieldwork and of important archaeological complexes, of which the cultural material assemblage is generally lacking in well-defined chronological sequences. The second factor is the long-time experience in Greece and in Liguria has oriented Bernabò Brea to focus on specific multilayered depots with long-time stratigraphic sequence. Indeed, the last factor is a permanent attention to the formation process of stratigraphy for reconstructing dynamics and relationships between human communities and landscape.

These three main principles of the new approach to the excavation methodology have been applied by Bernabò Brea in the archaeological exploration of the Aeolian Islands, where long-time stratigraphic sequences gave to the Italian scholar the opportunity to refine the concept of archaeological stratum and its relationship with one or more cultural *facies* (Peroni 2004).

(M.C.)

5. A new unsuspected scenario: the Aeolian Islands

After a brief activity at Piano Quartara, Panerea, where an important stratigraphic sequence between Copper Age and early Bronze Age was identified (Bernabò Brea 1947b), Bernabò Brea focused on the Acropolis, or Castello, at Lipari. The investigation of the huge stratified deposit, under the Medieval building levels, was organized into seven explorative fields from 1950-52 until 1965, followed by further works in the '70th (Bernabò Brea and Cavalier 1980).

Comparing themselves these field works carried out into twenty years ca., we could examine some general aspects of the stratigraphic excavation method proposed by the Italian scholar. Despite many studies have been aimed at reconstructing the cultural sequences on the Acropolis at Lipari since the Neolithic until the Late Bronze Age, a general reflection on the stratigraphic approach and its transformation in time is still missing.

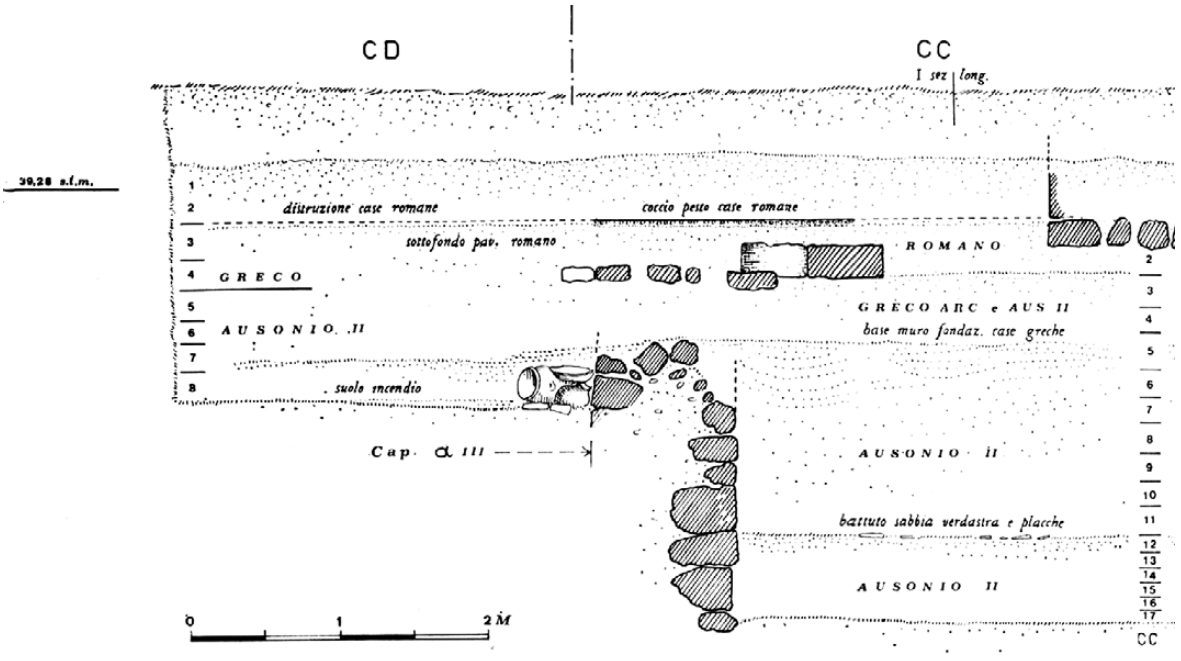


Figure 19. Lipari, Acropolis, stratigraphical section in the Insula IV (after Bernabò Brea and Cavalier 1980).

The first excavation of 1950-55 is organized into three main long trenches, which were conditioned by the emergence of the modern buildings (Bernabò Brea and Cavalier 1980: 6-14). There is a large production of stratigraphic sections, which were regularly drawn on site maps (Figure 19). During this first explorative activity Bernabò Brea didn't apply specific labels for classifying the material culture. It can be explained that the first assessment of the Prehistory of Sicily is later and it is dated to the first edition of his book *Sicily Before Greeks* published in English in 1957. However, the specific attention paid on the sedimentology of archaeological layers, focusing on the inclination and thickness, reflects an influence of the prehistoric cave excavation methodology, which Bernabò Brea applied in Liguria (Balzi Rossi and Arene Candide) and in Sicily (Grotta Corrugi) (Figure 19).

In the second main explorative campaigns (1964-1965) Bernabò Brea continued the indication of large trenches, but this classification will be substituted later by the introduction of labels for buildings (i.e the sequence of Hut Alpha of Ausonian I Period) or by the concentration of specific areas named as Settore (i.e. AO Z etc.) (Bernabò Brea and Cavalier 1980: 587-590).

During this second work field there is a much more application of cumulative sections and, in many cases, these stratigraphic sections are the result of excavating in adjacent trenches. The method of short cuts, which is well-documented since the first excavation in 1950, now seems to depend on the final reconstruction of a sequence of correlate *strata* in terms archaeological, as well geological too. For example, the area at East of Hut Alpha III (Sector CC-BD), has been revealed a thick deposit (2 mt. ca.) which was explored through 21 cuts. In the final publication these cuts were assigned to each chronological period, focusing on two different strata related to the same Ausonian II Period (Bernabò Brea & Cavalier 1980: 710-713) (Figure 20).

To conclude, the excavation activity by Bernabò Brea on the Acropolis at Lipari illustrate the definitive adoption of the stratigraphic excavation method and its adaptation to specific

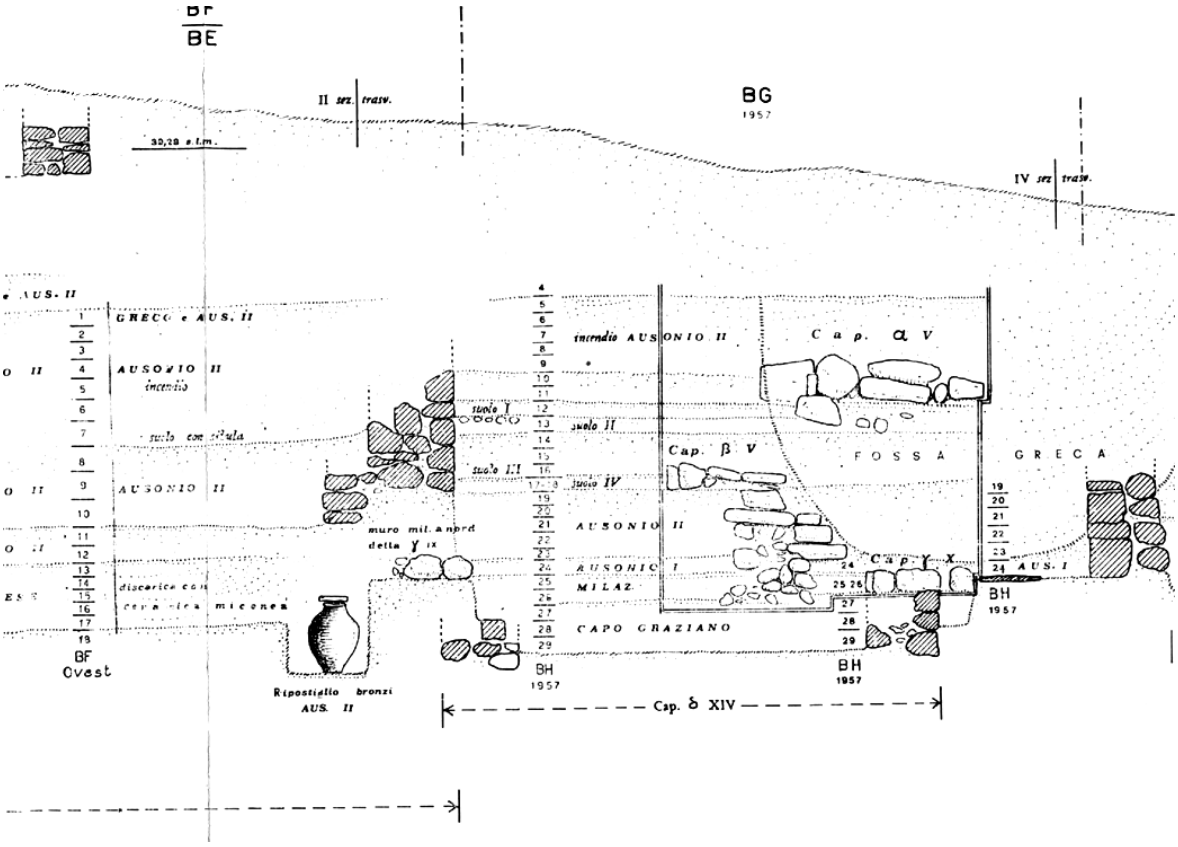


Figure 20. Lipari, Acropolis, stratigraphical section in the area oh Ausonian hut *Alpha* II (after Bernabò Brea and Cavalier 1980).

archaeological evidence. The influence of prehistoric cave methodology is evident either in the use of sections and in the specific attention to the formative processes of stratigraphy. Finally, the integrated approach is evident foremost in the focus on specific elements in the excavations, as fauna remains, charcoals and other data useful for reconstructing the interconnections between human activity and natural landscape.

(S.T.)

6. Two parallel lives: Buchner and Bernabo' Brea in the post-war years

As previously said, after the only occasion of collaboration in Panarea in 1950, which left almost no trace on a scientific level, the paths of these two scholars are clearly divided (see diagram at Figure 21) , both in their spheres of action that will make them further known in the international scientific panorama.

Obviously, also in this phase there are some distinctions to be made, probably also due to the different institutional connotation that they covered in the following years. Despite almost peers, there are 11 years (1938-1949) of difference in the beginning of the Ministerial career in favor of Bernabò Brea who, after 'only 1 year', immediately became Superintendent of Liguria (and after two years of eastern Sicily, where he remained until retirement in 1973), while Buchner never achieved this degree of career (laboriously, only a few years before retirement, he became associate Superintendent) in part by his own will, in part for aspects that we could define as 'environmental', and also for the relationships with his superiors (especially Superintendent A. De Franciscis in the 60s and 70s, who tried to block many times the research activity of Buchner in Ischia) that were very conflicting, due to his variable dedication to the routine activities of an official with

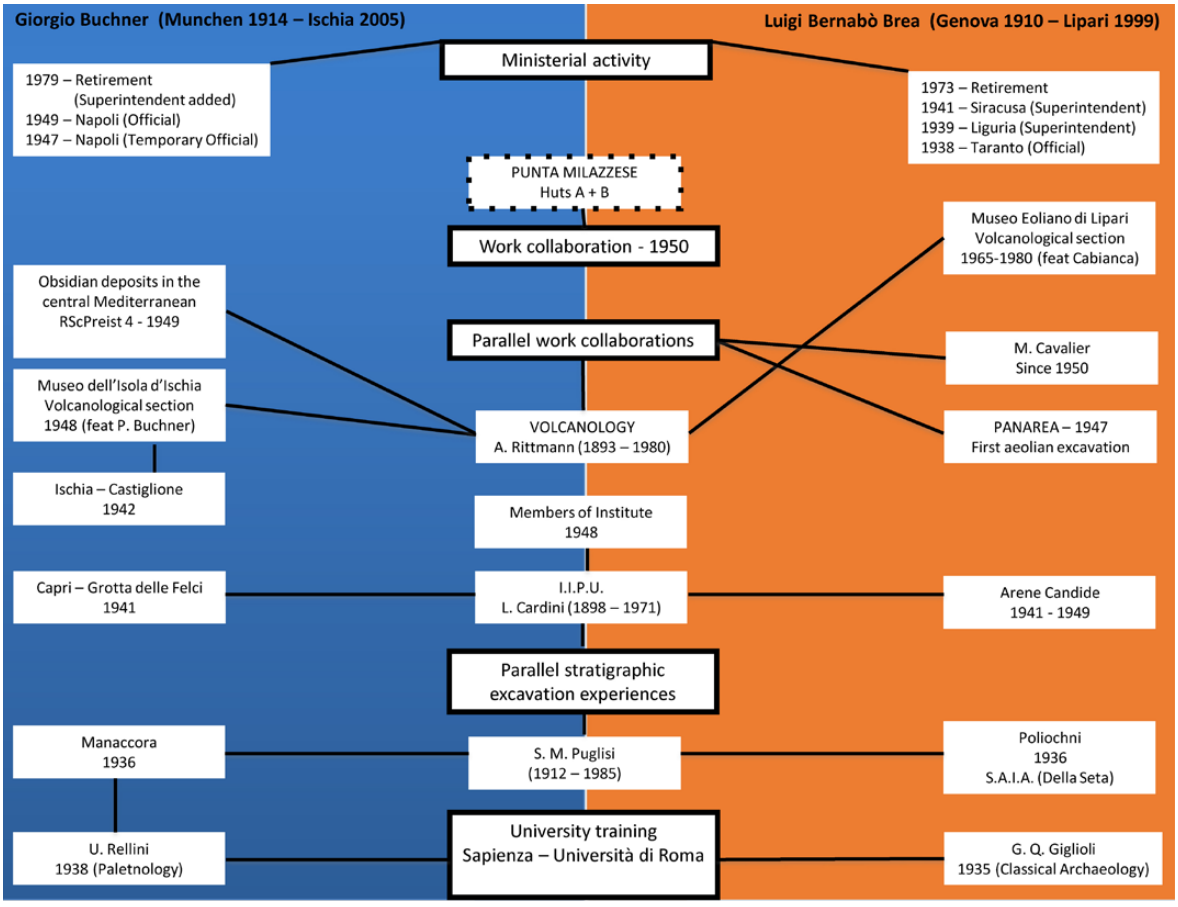


Figure 21. Scheme with the two 'parallel' lives of the two scholars.

territorial competence. The 'Ligurian', on the other hand, in eastern Sicily created a real operational framework, in which he provided himself with several trusted and valid collaborators (the main ones: Cavalier, Pelagatti, Tinè and Voza), which gave him the opportunity to control a vast territory. This institutional apparatus of which he had full control, allowed Bernabò Brea to produce a greater amount of data than Buchner and to keep over the years even more open research fronts, such as the Arene Candide, the Aeolian Islands and Poliochni itself, where he returned to work in the 1950s under Doro Levi's direction of SAIA.

Between 1950 and 1952, the systematic and demanding archaeological investigations that are mostly attributable to their figures, the pre- and protohistoric settlement of Lipari acropolis and the necropolis of the Greek colony of Pithekoussai in the bay of San Montano in Ischia, began for both and lasted for two (the first) and for three (the second) decades and were edited in detail between the 80s (Bernabò Brea and Cavalier 1980) and 90s (Buchner and Ridgway 1993).

At this moment (Bernabò Brea - Cavalier 1980), as we said, their paths are divided (see Figure 3), but precisely in these two distinct and personal enterprises (in the Aeolian activity of Bernabò Brea one cannot in any way forget the fundamental contribution by M. Cavalier, as for the Phlegraean activity, the post-excavation support for the analysis of ceramic materials by D. Ridgway), we can trace a last *fil rouge*, thanks to a flash-back. Both as regards the Acropolis of Lipari, and as regards Pithekoussai, the history of research first of all has its roots, around the 1800s, in figures of local scholars (F. De Siano in 1798 for Ischia and Baron E. Piraino di Mandralisca di Cefalù in 1864 for Lipari), followed by scholars of higher scientific importance such as J. Beloch, with his work *Campanien* (1879, a text that inspired Buchner himself for his investigations in Lacco Ameno), and G. Libertini, with the volume *The Aeolian Islands in Greek and Roman antiquity*' (1921). But the figure that begins, in first person, the explorations in the Aeolian Islands (1928, with reconnaissance in Lipari and Salina and excavations in the Diana district; Orsi 1929) and, indirectly, tries to give an important input at the beginning of the investigations in Ischia was the one who characterized the palethnological research (and not only) of many areas of the South in the first 35 years of the 1900s (the moment in which both Bernabò Brea and Buchner complete their university training phase), Paolo Orsi (Figure 22). The scholar from Rovereto wrote in 1913 to Vittorio Spinazzola (Superintendent of the excavations and museums of Naples, Caserta, Avellino, Salerno, Benevento and Campobasso):

> '*Egregio collega, Le comunico una notizia di una scoperta indiziale, che a mio avviso può avere molto valore.*
> *L'architetto tedesco Meurer, che lavora qui da una settimana, mi ha fatto vedere il disegno di un grande frammento di terracotta architettonica arcaica (VI), da lui rinvenuto sulla spianata del monticello soprastante alla torre S. Restituta presso Lacco Ameno nell'isola d'Ischia. Colà vi sono dei terreni a vigne, e nei muretti il Meurer ha notato molti altri fram. di terrecotte, che egli*

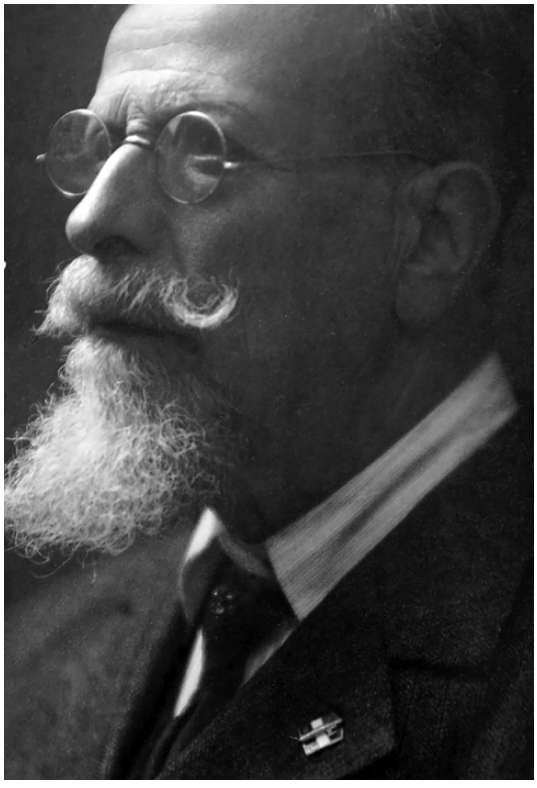


Figure 22. Paolo Orsi (1859-1935).

però non assicura siano architettoniche. Il luogo si presta magnificamente ad un santuario arcaico. Io penso che un attento esame del sopralluogo e delle macerie, ed ampie informazioni attinte dei villani, ed infine qualche saggio di scavo, potranno metter La sulla via di buone scoperte. Tanto più che nella greca Pithecusa od Aenaria, per quanto io sappia, non si sono mai fatte esplorazioni sistematiche. E sarebbe gran cosa trovare la prima stazione dei Kymei. Augurando Le buon successo nella ricognizione, gradisca cordiali saluti dal Suo devotiss. P. Orsi' (Buchner and Ridgway 1993, Preface, pp. 9-10).

It should surely not be surprising that the two figures that most characterized the following 50 years, with fundamental discoveries for the central Mediterranean (and beyond), have completely resumed activities or research proposals of the one who, with military attitude, conducting a mass of investigations that still today surprise us, had laid the foundations for the knowledge of a large part of our South of Italy.

(F.N.)

The life of Luigi Bernabò Brea in the post-war years, until his retirement in 1973, was rich of satisfactions in his activity as Superintendant of Eastern Sicily and, at the same time, as a widely known and respected scholar of Italian and Mediterranean prehistory invited worldwide for conferences and congresses.

The only problem regards his frustrated attempts to begin an academic career.

In 1948, at the age of 38 he obtained the professorship thanks to a commission formed by Giovanni Patroni, Sergio Sergi and Raffaello Battaglia (Italian State Archive, Envelope 39, Sheet 623); 12 years later Rome University called a competition for professorship in Prehistory.

After the yet mentioned death of Alberto Carlo Blanc, Bernabò Brea seemed to be the natural solution for that chair; despite this, the competition was won from his fellow student at Manaccore Cave and at the Athens Italian Archaeological School, Salvatore Maria Puglisi.

In 1966 (seven years before the retirement!) Bernabò Brea got a professorship in Prehistory from Palermo University, but after resigning from the State Antiquity Offices decided to return to his own steps and to remain at his place (Italian State Archive, Retired Personnel 1972, Box 6).

Bernabò Brea retired on 31/1/1973, four years before the end of his work life.

There are two different versions of this decision.

According to Antonio Giuliano, a well known classical archaeologist who shared with him the experience of the creation of the Ministry for Environmental and Cultural Affairs, Bernabò Brea received a complaint for his activity to save from destruction a Roman villa and decided immediately to retire (Giuliano 2004).

In the same volume, the proceedings of a congress held to commemorate Bernabò Brea two years after his death, Giuseppe Voza writes that he exploited a law that allowed to the State executives to retire with a well-paid pension (Voza 2004, p. 43).

As often happens, the truth is in the middle; Bernabò Brea, who effectively received a complaint, a sort of 'revenge' for his activity, in the second half of the Sixties, was stressed for the difficulty to protect the archaeological heritage of eastern Sicily from any sort of speculations and for the slowness of the Italian justice to acknowledge his innocence that determined an heavy climate of suspect in his own office (De Lachenal and Maggi 2012, p. 139). At the same time, he was probably frustrated by the short time available for his researches, so he happily exploited an occasion to get out of this situation.

Bernabò Brea finally moved to Lipari and for other 27 years could dedicate himself to his beloved interests, the Museum and the prehistory of the Aeolian Islands; here he died unexpectedly in 1999.

(A.G.)

References

Bernabò Brea, L. (1947a). Milazzo. Saggi nella grotta di Polifemo, *Notizie degli Scavi di Antichità*, pp. 240-241.

Bernabò Brea, L. (1947b). Panarea. Esplorazione archeologica dell'isola e scavo di una stazione neolitica al Piano Quartara, *Notizie Scavi:*, pp. 222-260.

Bernabò Brea, L. (1949). La cueva Corrugi en el territorio de Pachino, *Ampurias*, 11, pp. 1-23.

Bernabò Brea, L. (1950). The Prehistoric Culture-Sequence in Sicily, *University of London. Institute of Archaeology Annual Report* VI, pp. 13-29.

Bernabò Brea, L. (1957). *Sicily Before Greeks*. London: Thames & Hudson.

Bernabò Brea, L. (1964). *Poliochni. Città preistorica nell'isola di Lemnos.* I, Roma: L'Erma di Breitschneider.

Bernabò Brea, L. and Cavalier, M. (1980). *Meligunìs Lipara IV. L'acropoli di Lipari nella Preistoria.* Palermo: Flaccovio.

Bernabò Brea, L. and Cavalier, M. (1984). *Meligunìs Lipàra*, vol. III. *Stazioni presietoriche delle isole Panarea, Salina e Stromboli.* Palermo: Flaccovio.

Bernabò Brea, L., Biddittu, I, Cassoli, P.F., Cavalier, M., Scali, S., Tagliacozzo, A., Vagnetti, L. (1989). La grotta Cardini (Praia a Mare-Cosenza): giacimento del bronzo. Roma 1989. Istituto Italiano di Paleontologia Umana.

Bietti, A. ed. (1994). *The Upper Pleistocene deposit of the Arene Candide Cave (Savona, Italy) new studies on the 1940-42 excavations,* Quaternaria Nova IV, 1994, Roma.

Buchner, G. (1936-37). Saggio di scavo nel villaggio preistorico sopra Punta Manaccore (Peschici), in *Bullettino di Paletnologia Italiana*, 56, pp. 158-160.

Buchner, G. (1938). *Vita e dimora umana nelle isole flegree, dall'epoca preistorica ai tempi romani (Ischia, Procida, Vivara)*, tesi di laurea in Paletnologia (relatore: Ugo Rellini), Università degli Studi di Roma, 1938.

Buchner, G. (1949). Ricerche sui giacimenti e sulle industrie di ossidiana in Italia. I, in *Rivista di Scienze Preistoriche* 3-4, pp. 162-186.

Cazzella, A. (2017). Giorgio Buchner come precursore dei moderni metodi di scavo stratigrafico, in C. Gialanella – P.G. Guzzo (eds.), *Dopo Giorgio Buchner. Studi e ricerche su Pithekoussai,* Atti del Convegno (Lacco Ameno 2009), Pozzuoli, pp. 35-42.

Cazzella, A., Marazzi, M., Moscoloni, M., Tusa, S. (1981). La preistoria dell'isola di Vivara, in *Vivara. 'Oasi di protezione naturale' geologia, flora, fauna, archeologia e paesaggio*, Napoli, pp. 105-152.

Cultraro, M. (2006). Islands out of Time: richness and diversity of prehistoric studies on the northern Aegean, in P. Darcque, M. Fotiadis, O. Polychronopolou (eds.), *Mythos. Les recherches prehistorique en Gréece*, «BCH» Suppl. 46, Athènes, pp. 279-290.

Cultraro, M. (2019). Per una revisione critica delle sequenze stratigrafiche dell'abitato preistorico di Poliochni (Lemnos) a partire dagli scavi di Giovanni Rizza (1953-1956), in *Sicilia Antiqua* XVI, *Studi in memoria di Giovanni Rizza*, pp. 55-63.

Cultraro, M. (2020). L'archivio Luigi Bernabò Brea presso la Soprintendenza Regionale BB.CC. AA. di Siracusa (1941-1973), in A. Pessina, M. Tarantini (eds.), *Archivi dell'Archeologia Italiana* (Pubblicazioni degli Archivi di Stato saggi n. 119), Poligrafico dello Stato, Roma, pp. 291-307.

De Lachenal, L., Maggi, R. (2012). Luigi Bernabò Brea, s.v., *Dizionario Biografico dei Soprintendenti Archeologi (1904-1974)*, Bologna, pp. 131-141.

Formicola, V. (2003). La sepoltura del 'Principe' a sessant'anni dalla scoperta, *in Archeologia in Liguria intorno a Luigi Bernabò Brea.* Bollettino Musei Civici Genovesi XIX-XXI, n. 55-63, pp. 23-27.

Giuliano, A. (2004). Per Luigi Bernabò Brea, in Pelagatti, Spadea 2004, pp. XXI-XXII.

Guidi, A. ed., *150 anni di Preistoria e Protostoria in Italia*, Studi di Protostoria 1, 2014. Firenze; Istituto Italiano di Preistoria e Protostoria

Guidi, A., Tarantini, M. (2017). The emergence of stratigraphic archaeology in Mediterranean Europe, in *Acta Archaeologica* 88.1, pp. 139-154.
La Rosa, V. (2002), Il vento s'e l'è preso, l'ultimo degli Eolìdi. La scomparsa di Luigi Bernabò Brea, in M. Cavalier, M. Bernabò Brea (eds.), *In memoria di L. Bernabò Brea*, Palermo: 273-288.
Maggi, R., Martino, G., Riel-Salvatore, J. (2014). Caverna delle Arene Candide, gli scavi 1941-42: la scoperta del Paleolitico, in Guidi 2014, pp. 431-436.
Mastelloni, M.A. (2020). Lipari (Messina) 1942-1987: da un sopralluogo alla creazione di un grande istituto. Storie di impegno sociale, ricerca e studio, in R. Panvini ed., *Archeologia in Sicilia nel secondo dopoguerra* (Atti del Convegno, Catania 4-5/10/2019), Catania, pp. 179-193.
Pelagatti, P., Spadea, G. (2004). eds., *Dalle Arene Candide a Lipari. Scritti in onore di Luigi Bernabò Brea*, *BdA* vol. spec. Roma.
Peroni, R. (2004). La lettura critica delle sequenze stratigrafiche a partire dall'opera di L. Bernabò Brea, in *Dalle Arene Candide a Lipari. Scritti in onore di Luigi Bernabò Brea*, in Pelagatti, Spadea 2004, pp. 145-147.
Pianese, S., *Il giacimento di Grotta Giovanna in provincia di Siracusa nel quadro del Paleolitico superiore siciliano*, Tesi di laurea inedita, Università degli Studi di Roma, A.A. 1968-69.
Rossi, S., Panelli, C., De Pascale, A., Maggi, R. (2014). 'Di una caverna ossifera di Finale': evidenze di archeologia ottocentesca nella Caverna delle Arene Candide, in Guidi 2014 pp. 238-246.
Sparacello, V.S., Rossi, V., Pettitt, P., Roberts, C., Riel-Salvatore, J., Formicola, V. (2018). New insights on Final Epigravettian funerary behavior at Arene Candide Cave (Western Liguria, Italy), *Journal of Archaeological Sciences* 96, pp. 1-24.
Tarantini, M. & Parenti, F. (2011). L'origine de l'Institut Italien de Paléontologie Humaine: science, institutions et relations internationales (1911-1936), in H. De Lumley & A. Hurel (eds.), *Cent ans de préhistoire, L'Institute de Paléontologie Humaine*, Paris, CNRS, pp. 120-132.
Voza, G. (2004). Luigi Bernabò Brea e I grandi Musei archeologici della Sicilia Orientale, in Pelagatti, Spadea 2004, pp. 37-50.

Abstraction in Archaeological Stratigraphy: a Pyrenean Lineage of Innovation (late 19th–early 21th century)

Sébastien Plutniak
École française de Rome and Lisst-Cers (Toulouse, France)
sebastien.plutniak@posteo.net

Abstract

Methodological innovations, as they can be widely adopted and anonymised, have a special status in disciplinary historiographies. In the 1950s, this occurred to Georges Laplace's innovative use of 3-dimensional metric Cartesian coordinate system to record the positions of archaeological objects. This paper proposes a conceptual and social history of this process, with a focus on its spatial context, the Pyrenean region (Spain, Basque Country, and France). Main results of this research based on archives, publications, and bibliometric data, include: 1) a critical discussion of the notions concerning authorship of such methodological innovations; 2) a presentation of the lesser-known aspects of Laplace's method, showing its contribution to the abstraction and formalisation of archaeological observations and data recording; and 3) the identification of an international Pyrenean intellectual lineage of innovation regarding stratigraphy and excavation methods, from the late 19th century to the early 21th century.

Keywords: archaeological methods, stratigraphy, authorship, geography of innovation, Pyrenees

Résumé

Les innovations méthodologiques, pouvant être largement adoptées et anonymisées, possèdent un statut particulier dans les historiographies disciplinaires. Ce fut le cas du système de coordonnées Cartésiens métriques employé dès les années 1950 par Georges Laplace pour enregistrer la position des objets archéologiques. Fondé sur ce cas, et accordant une attention particulière à son contexte spatial – l'espace international pyrénéen (Espagne, Pays Basque, France) – cet article propose une histoire conceptuelle et sociale de ce processus. Les résultats de cette recherche, basée sur les publications, des archives, et des données bibliométriques, comprennent : 1) une approche critique de l'attribution d'autorité dans le cas des innovations méthodologiques ; 2) l'analyse d'aspects plus méconnus de la méthode Laplace, et leur contribution au processus d'abstraction et de formalisation des observations et de l'enregistrement des données en archéologie ; 3) la mise en évidence, de la fin du XIXe siècle au début du XXIe siècle, d'un lignage pyrénéen international d'innovation.

Mots-clefs : méthodes archéologiques, stratigraphie, autorité, géographie de l'innovation, Pyrénées

1. Introduction

Stratigraphic methods have a long and complex history as they have been subjects of debate in geohistory since the 18th century (Rudwick 2005: 534–536), and then in emerging subdisciplines in geology, namely lithostratigraphy and biostratigraphy (Schweizer 2008). Today, these methods play a foundational and almost tacit role in archaeology, as reflected by the absence of entry on these methods in the 483 articles of a recent *Encyclopedia of Archaeological Sciences* (López Varela 2018). However, the development of these methods has been frequently commented on by archaeologists who are interested in the history of their discipline. They address two aspects in particular.

First, the characterisation of conceptual changes regarding time, focusing on the liminal relations between geology and prehistoric archaeology during the 19th century (Moro Abadía

2002; Hurel and Coye 2011) and on the 1920s controversial 'stratigraphic revolution' in North American archaeology (Lyman and O'Brien 2006). There are multiple and ambiguous definitions of 'stratigraphic excavation' in archaeological literature (Lyman and O'Brien 1999: 57-61), but a working definition is nevertheless required for this paper. Here I use the differences highlighted by the authors to define *stratification* as the 'presence of (generally) vertically discrete layers of deposition or excavation', and *stratigraphy* as 'an interpretation of the chronological meaning of layers' (Lyman and O'Brien 1999: 58). It is noteworthy that, in practice, the word stratigraphy is often used to refer to stratification. This involves a confusion (deliberate or unconscious) between physical reality and the process and result of a representation of this reality; in other words, that a stratigraphy is a model, more or less formalised, of a stratification. In this context, O'Brien and Lyman (2002) distinguished between *empirical* units and *ideational* (either theoretical or descriptional) units in archaeology. This rather elementary distinction is of particular importance because various methods and authors have been associated with 'stratigraphic excavations' in historical studies without taking into consideration such conceptual distinctions.

Identifying prominent actors who contributed to this issue was the second focus of these studies. As emphasised by historians of science, disciplinary histories often used such 'pioneers' as a means to legitimise a discipline.[1] Pioneers associated with stratigraphic methods can be categorised into two groups. First, those who are remembered for using these methods early in archaeology, including:

- William Pengelly's (1812-1894) work in the Kents Cavern between 1858 and 1880 (McFarlane and Lundberg 2005);
- Flinders Petrie (1853-1942) for his excavation in 1890 at Tell el-Hesy in present-day Israel (Petrie, 1891), cited by Negev and Gibson (2001: 228) and Gran-Aymerich (1998: 290);
- Jacques de Morgan (1857-1924), for the pseudo-stratigraphic method used during his excavation of the Susa site in Iran (Morgan 1912), cited by (Gran-Aymerich 1998: 290-291);
- William Baker Nickerson (1865-1926) and Frederick Starr (1858-1933) for their excavations in the Midwest of the U.S.A during the 1920s (Browman, 2013);
- Marthe Péquart (1884-1963) and Saint-Just Péquart (1881-1944) for their excavations in Brittany (Péquart and Péquart 1928a, 1928b), cited by Groenen (1994: 109-111);
- André Leroi-Gourhan's (1911-1986) early methodological handbook (Leroi-Gourhan 1950), and his horizontally expanded excavations at Arcy-sur-Cure (Leroi-Gourhan 1961) and Pincevent (Leroi-Gourhan and Brézillon 1966).

The second group of actors is characterised by being associated to an eponymous stratigraphic method, including:

- Mortimer Wheeler (1890-1976) and his excavation method (Wheeler 1954);
- Edward Harris (1946-) for his *Principles of Archaeological Stratigraphy* and his 'Harris Matrix' (Harris 1979);
- Georges Laplace (1918-2004) and Louis Méroc (1904-1970) for their '*Méthode des Coordonnées Cartésiennes*', published in 1954 and commonly called '*méthode Laplace*' or '*méthode Laplace-Méroc*' (Laplace-Jauretche and Méroc 1954a).

In the literature, the '*méthode Laplace*' is commonly cited to refer to the innovative use of 3-dimensional metric Cartesian coordinates to record the positions of archaeological findings. This paper focuses on this case, which is of particular interest in advancing three arguments.

First, as a method which was first eponymised and then anonymised, it addresses the problem of authorship of methodological innovations.

[1] See the discussion of Lavoisier's case for the history of chemistry and on the uses and functions of disciplinary histories (Bensaude-Vincent 1983).

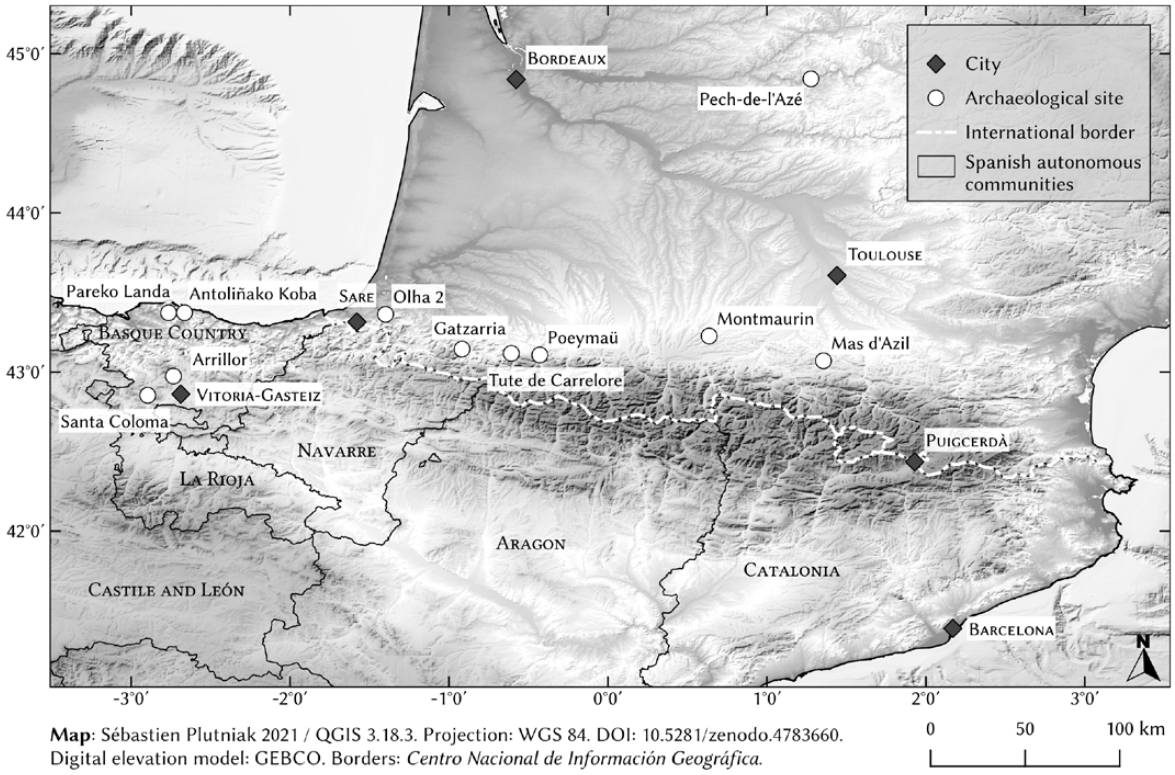


Figure 1. Map of the archaeological sites and municipalities mentioned in the text.

Second, such an eponymisation comes with a conceptual oversimplification of the original proposition. The use of a 3-dimensional coordinate system was an important step in the use of abstraction in stratigraphy, which is considered as a method to represent archaeological stratification. Despite being reduced to one of its aspects, Laplace's method was more, since it also dealt with standardising data recording and organising excavations. This requires a definition of the conceptual framework to address all the facets and complexities of the method.

Third, Laplace's method was part of a series of innovations which were developed in and around the Pyrenean region during the 20th century. Its archaeological and bibliographic success has to be understood in the framework of Southwest European archaeology and, in particular, in the Pyrenees which was a key region for archaeology (Figure 1). Laplace's method is a relevant case to study the effect of spatial location on innovation in science.

This paper is based on publications, bibliometric data, unpublished archive materials, and interviews with researchers.

2. The 'Cartesian coordinate method' as a type of methodological innovation for which a single authorship is difficult to establish

2.1. Precursors of 'pioneers'

Laplace and Méroc are often credited as the authors of the 'Cartesian coordinate method'. However, it is possible to identify previous uses of such a reference grid in archaeological excavations, prior to their 1954 paper; in other words, the precursors of these 'pioneers' can be determined.

An early use of a 3-dimensional metric reference system was used in Switzerland in 1916. The geologists Auguste Dubois (1862-1923) and Hans Georg Stehlin (1870-1914) applied this method to excavate the Palaeolithic levels of the Cotencher Cave, near Neuchâtel (Dubois and Stehlin 1933).

EXEMPLE :

Nº	Description	Coordonnées	Observations	Croquis
1	Vase de terre noire polie, à 3 pieds.	39 N × 25 E	Position norm.	
2	Assiette de terre couleur café.	40 N × 30 E	Renversée.	
3	Pierre sphérique de jade.	40 N × 30 E	Sous l'objet précédent.	

Figure 2. The method used to record the position of objects by Caso Andrade and Marquina 1938: 269.

Other examples can be found outside of Europe. In Mexico, Alfonso Caso Andrade (1896-1970) and Ignacio Marquina used a 3-dimensional coordinate system during their excavations of the pre-Colombian site of Monte Albán in 1931 and 1939 (Figure 2). They described their method as follows:

> 'The objects discovered in the gravestone are numbered, localised on a map, and recorded in an inventory, which are both realised during the excavation. Each object is recorded in the inventory with its number, a brief description and its coordinates, namely its position in relation to the two walls of the grave which are chosen as coordinates axis. If the objects are not on the ground of the grave but have a higher position, one adds a third coordinate which gives the height in relation to the ground.' (Caso Andrade and Marquina 1938: 269-270).

Other cases come from Africa during the 1930s. For example Eric Axelson's (1913-1998) investigation in South Africa (Axelson 1938); see plans by Axelson reproduced in (Fauvelle-Aymar 2012, figs 5 and 6: 133) and the surveys conducted by Oliver Myers (1903-1966) during the 1930s and 1940s in the Egyptian desert. Myers divided the space to be surveyed into squares using a virtual grid, and then used the count of remains by square to compute density contours and determine the spatial dispersion of remains (Myers 1950). It is not a coincidence that Myers collaborated with Petrie, author of the famous book *Inductive Metrology. Or, the Recovery of Ancient Measures from the Monuments* and pioneer statistical methods in archaeology (Petrie 2013). A final example is related to archaeological research in North Africa. Pierre Cintas (1908-1974) was a French colonial officer for archaeology in Tunisia (namely *Inspecteur des Antiquités*). From the 1930s he conducted many surveys and excavations in Tunisia, Algeria and Morocco. Explaining the method he employed for his excavation of the Punic sanctuary in Sousse (Tunisia), he wrote:

> 'To excavate the *area* of a sanctuary is essentially to destroy it. [...] Looking for the objects included in the deepest layers requires the prior removal of the objects of the surface levels. In order to preserve, in spite of this destruction, a synthesis of the excavation, fixed coordinates were chosen, and meter by meter a survey of the position of all the objects encountered was carefully kept. A catalogue has been created. All objects were numbered and the same number was reported on the plans. The examination of these plans now allows us to situate immediately in space any monument coming from the excavation, both in isolation and in groups.' (Cintas 1947: 3).

Therefore, there are many examples of using metric coordinates in archaeological excavations prior to those of Laplace and Méroc. Further research would probably identify other, and perhaps earlier, examples: *e.g.*, Massimo Tarantini emphasised the case of Gian Alberto Blanc in the Romanelli cave (Tarantini, *infra*). Since earlier uses of the method have been identified, Laplace and Méroc's authorship of this method should be considered more carefully. However, regarding the case of Cartesian coordinates in archaeology –and also more generally– feeding priority conflicts is not an interesting aim for historians of science.

2.2. A typical case of multiple discoveries

There is no doubt that the use of Cartesian coordinates was a scientific innovation, but it was what type of innovation? Different categories of innovations can be distinguished: those concerning methodological procedures, the design of new instruments, and conceptual changes, for example. The processes leading to these innovations are not the same, and neither is the recognition different authors received for their 'inventions'. Furthermore, some of these innovations are more likely to have been 'discovered' multiple times. The importance of these multiple discoveries in the history of sciences (by different people at the same or different times) has been highlighted since the list of 148 duplicate independent inventions was published and analysed by William Ogburn and Dorothy Thomas (1922), and subsequently by sociologist Robert Merton who wrote an important paper promoting the statistical analysis and sociological theory of this question (Merton 1961).

In the case of a Cartesian coordinate grid to locate archaeological remains, Cintas, one of its 'early adopters' made a crucial observation in an article about his excavation in the city of Tipaza in Algeria. He wrote:

> 'I am tired, indeed, to listen to people around me arguing that the results of excavation depend on chance alone. It must be known: there is a method for research, just as there is, after the discovery, a technique for the excavation. This method has formal rules; rules that can be learned, *if one lacks such intuition that one is unable to use them without this effort on the field, by the mere use of subconscious reasoning*. These rules may change with the nature of the research to be undertaken, but none the less exist, rigid, absolute.' (Cintas 1948: 264, my emphasis.)

For Cintas, excavations methods, including the precise localisation of findings, could be developed from intuitive logical principles that all scientists employ.

This view could be discussed in general but, regarding the use of a Cartesian coordinate grid in archaeological excavations, I argue that Cintas' statement is relevant. This localisation method is not an innovation which is 'discovered'; it is rather:

1) The easiest and most obvious method to adopt if one aims to rigorously record spatial information.
2) A quantitative approach similar to methods in scientific fields which a prehistoric archaeologist would have consulted in the 1940s, namely: physical anthropology (e.g. the multidisciplinary *L'Anthropologie* French journal), Quaternary geology, and classical archaeology (in which relatively accurate topographical plans were commonly made by architects). Furthermore, many prehistoric archaeologists had another profession which would have made them familiar with basic quantitative methods: physicians, engineers, and military officers, for example.

Regarding Laplace, this idea is supported by examining his files, and in particular, the forms he used to synthesise his notes, which included his knowledge in mathematics, arithmetic and geometry (Figure 3). The methods he developed drew on this knowledge.

3. Laplace's method was a new step towards formalising archaeological stratigraphy, the organisation of excavations and data recording

3.1. From a fieldwork practice to the publication of a formalised method

Studies on the relationships between tacit and explicit knowledge in science emphasise the gradual difference between a practice, its objectification, and its systematised expression as a method (Collins 2010: 157-164). Hence, using a spatial reference system, or theorising and writing about it, involves a process of making the system more explicit. From the simple use of Cartesian coordinates,

Laplace developed a systematic and general method aimed at systematising and formalising stratigraphy in archaeology. In this section, I examine the chronology of publications related to this development, and the components of the method.

From 1947 to 1952, Laplace took part in excavations led by Méroc in the Montmaurin quarry (near Toulouse, Vialet 2019). There, he was exposed to the metric coordinate system used by Méroc. He immediately applied it in his own excavations, for example in 1948 in the Tute de Carrelore site (Figure 4):

> 'This publication is the first to report excavations carried out according to the method of applying a grid on the site and the precise notation of the position of each piece, recommended by L. Méroc. Its use is becoming more widespread in the 10th district of Prehistoric Antiquities.' (Laplace-Jauretche 1949: 232).[2]

From 1952, he used this system in the Gatzarria cave (Laplace, 1964), and from 1953 in the Olha 2 cave, two sites in the northern Basque country.

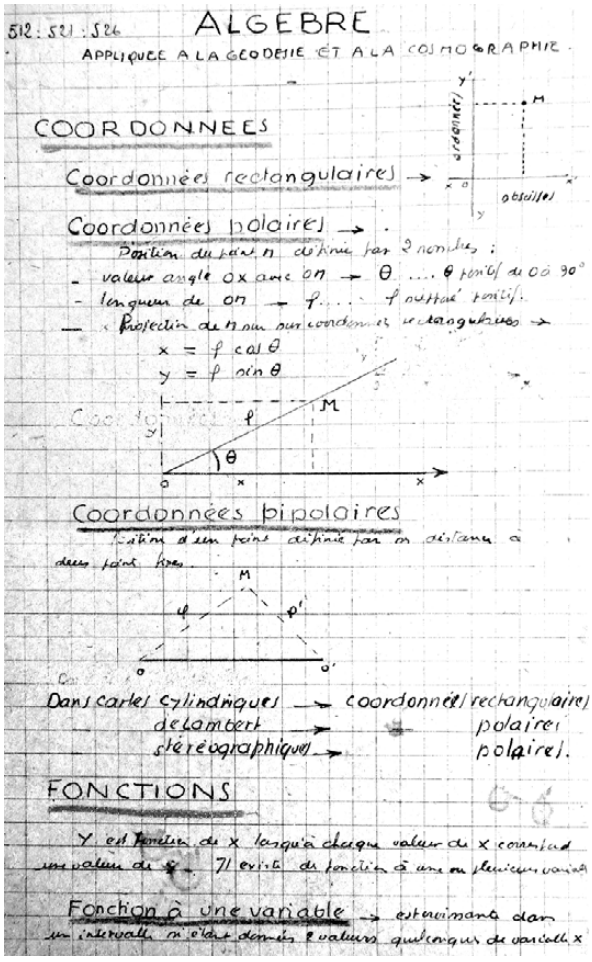


Figure 3. 'Algebra applied to geodesy and cosmography': an example of a card from Laplace's files about Cartesian, polar, and bipolar coordinate systems. Source: the private files of Fabrizio Millesimi (Laplace's nephew).

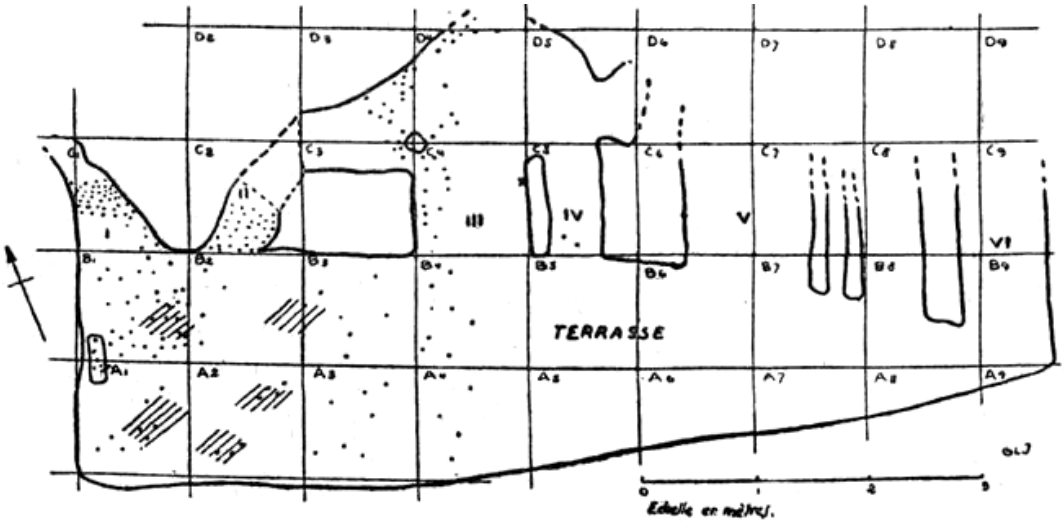


Figure 4. Graphic representation of the Cartesian grid used during the excavation of the Tute de Carrelore site by Laplace. The dots show the location of the objects uncovered (Laplace-Jauretche 1949: 228).

[2] From 1949 Laplace authored his publications as Laplace-Jauretche (adding his first wife's surname); from 1958 onward, he authored as Laplace.

In 1954, Laplace and Méroc published two short articles together in the *Bulletin de la Société préhistorique française* (BSPF). They presented the method using examples from the Montmaurin, Gatzarria, and Olha 2 sites. Although they published together, Laplace actually wrote the first entitled 'Application of Cartesian coordinates to the excavation of an archaeological deposit', (Laplace-Jauretche and Méroc 1954a), and Méroc wrote the second entitled 'Complement to our note on the application of Cartesian coordinates to the excavation of an archaeological deposit' (Laplace-Jauretche and Méroc 1954b). Indeed, in a letter sent to François Bordes (1919-1981), Laplace emphasised that his own methodological proposition, initially based on Méroc's method, had become quite different (see archive document: Laplace 1954).

Some twenty years later, in 1970, Laplace was invited by the Basque archaeologist Jesús Elósegui Irazusta (1907-1979), editor of the *Munibe* journal, to contribute to a special issue in honour of José Miguel de Barandiarán y Ayerbe (1889-1991) (see archive document: Laplace 1970). Laplace, who did his earliest archaeological surveys in the northern Basque country with Barandiarán in 1947, accepted and proposed a revised presentation of his method (Laplace 1971).

In summary, traces of Laplace's method include these three publications, which are complemented by the field notes he and his collaborators wrote in the excavation sites throughout France, Spain, and Italy where the method was applied. It is important to stress that what the 'Cartesian coordinate method' refers to partly changed over time, due to a series of revisions and its multiple applications.

3.2. The components of Laplace's stratigraphic method

Sáenz de Buruaga (1991: 85-90) identified three components to summarise Laplace's method: 1) the division of the surface with a grid; 2) the localisation of the objects; and 3) a procedure to excavate the sediments. I propose a slightly different analysis which distinguishes four components:

- The use of a device, namely a *physical grid* which visually divides the excavation space, but also defines various abstract spatial entities such as plans, squares, and axes (Figure 5).
- The quantification of distances between objects, using a metric reference system (Figure 6).
- The conceptual distinction between observed and reconstructed stratigraphy. Laplace specifically distinguished between 'stratigraphic profile' and (objects') 'position diagrams'.
- A method for naming spatial entities and recording archaeological objects.

Laplace's method considered the excavation volume to be composed of various spatial entities, including *squares*, *subsquares*, and *layers*, constructed from different axes and plans. Later, he also defined a '*taille*' as 'the sediment slice between two horizontal planes at a distance of 1 decimetre' (Laplace 1971: 228). A systematic method was employed to name these entities. For example, a layer is named by the acronym of the apocope of the words in its description in natural language: 'cbci', for example, stands for '*couche brune à cailloutis inférieur*' ('lower brown layer with gravel'). There is a standard description of colours using a geological reference chart, the *Code expolaire*, which is an alternative to the well-known Munsell code (Cailleux and Taylor 1963). By generalising this standardisation for all spatial information, Laplace proposed a systematic method to record the location of each sampled object during an excavation. Qualitative information (the sedimentary properties of the spatial entities) and quantitative information (Cartesian coordinates of the located object) were combined in alphanumerical sequences, *e.g.*, 'Gat D7 4 (9) 36.72.85 cbcif', stands for an object located at z=36 cm, x=72 cm, y=85 cm in the inferior *taille* number 4 of sub-square 9, square D7 of the Gatzarria site.

In summary, this method involved different types of information and different levels of abstraction. An analysis of this method would benefit from a more general analysis of the conceptual

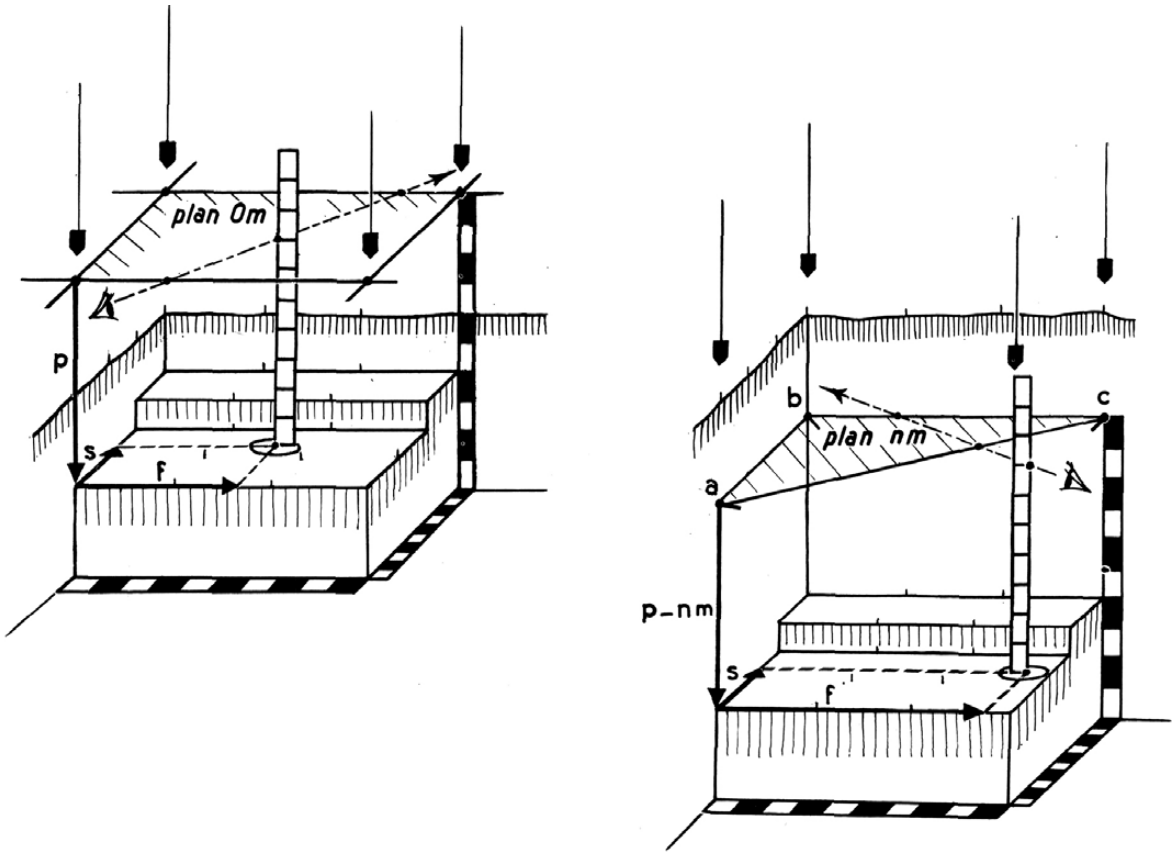


Figure 5. Illustration of two methods to record the location of an object during an excavation: above the surface level with reference to the plan Om; below the surface, with reference to the plan of the nm triangle (Laplace 1971, p. 228).

couche	carré	nº	x	y	z	nature	Observations
II	B7	594	152	72	27	éclat silex	brisé dans le gisement, base du foyer F2.
II	B7		154	55	44	plaquette calc. (12 × 25 × 40)	Horizontale, base F2.
II	B7	595	156	60	72	dent *Equus*	contact c. III.
III	B7		170	25	44	galet	éclaté par gel.

Figure 6. Example of a field recording form (Laplace-Jauretche and Méroc 1954a: 62).

constructions underlying the various stratigraphic methods developed throughout the history of archaeology.

3.3. Toward a conceptual analysis of the systematisation of archaeological stratigraphy

Mid-20th-century methodological propositions on stratigraphy are an interesting starting point to define such a general framework of analysis: during this period there was intense concern for the precision, standardisation, and formalisation of the ways scientists expressed their observations and analytical procedures. Based on the comparison of five stratigraphic methods, according to five criteria, this section presents an orientation for future research (Table 1).

	Piette	Myers	Méroc	Laplace	Harris
Publication date	1880s	1950	1930s	1954	1979
Entity to locate	points	surfaces	points	pts, surf., vol.	volumes
Naming of spatial entity	N.L.	none	N.L.	coding	coding
Spatial dimensions	1	2	3	3	1
Use of measurement	yes	no	yes	yes	no
Qualitative spatial relation	no	yes	no	no	yes

Table 1. Comparison of various formalisations of stratigraphic information used by archaeologists in the 19th and 20th centuries (N.L. stands for 'natural language').

This table shows how unsatisfactory a general analysis of the history of the stratigraphic methods in archaeology would be if it is seen as a change from a 'qualitative' to 'quantitative' approach, or as an increase in the number of spatial dimensions recorded. Even if the idea of increasing abstraction might be qualified, one must consider that the introduction of a more abstract approach (as Laplace's generalisation of the use of Euclidean space) did not imply that more analogical methods of graphic representation were abandoned. For example, Laplace's 'position diagram' is a plot of the findings according to their Cartesian coordinates; reading this diagram is similar to reading a stratigraphic profile, even if it shows something which cannot be directly observed in the field. Similarly, Philippe Sabatier and Jean-Louis Voruz, who participated in the seminars organised by Laplace during the 1970s, later developed a method coined *verticalisation des données planimétriques* and applied it to the Gardon cave in Bourgogne (Sabatier 1995).

In other words, it is possible to adopt a research agenda which aims to record the history of abstraction in scientific practices and to apply it to the case of stratigraphic methods in archaeology. Such a study should also take into account the historical conditions (spatial and temporal) in which these methodological innovations were developed. The last section of this paper focuses on a series of stratigraphic innovations developed in the Pyrenean region over a period of about one century.

4. Laplace's method as part of a trans-Pyrenean lineage of stratigraphic innovations

This section first focuses on the dissemination of Laplace's method throughout the Pyrenean region, and finally argues for the existence of a trans-Pyrenean lineage of stratigraphic innovations.

4.1. The spatial dissemination of Laplace's method

4.1.1. Reasons for an effective diffusion

During the 1950s, in addition to its use in Montmaurin, the 'Cartesian coordinates' method was used in other excavations sites in the Southwest of France. There are four main reasons for this:

1) At the time Montmaurin was one of the few large prehistoric excavations in France, that many people joined to practice the most advanced methods; Laplace participated from 1949 to 1952 and Bordes in 1949 and 1951.
2) Méroc was influential as he was the *Directeur de la 10e circonscription des Antiquités préhistoriques* from 1947 to 1970 and responsible for managing prehistoric archaeology in this part of France.
3) The method was published in one of the most important journals for prehistoric archaeology (BSPF).
4) Laplace was also involved in many other excavations in the Southwest of France, in the Béarn and the Basque country, as well as in Dordogne, which increased the potential diffusion of the method.

4.1.2. From Southwestern France to North Africa and back

In 1950 and 1951 Bordes excavated the Pech de l'Azé cave in Carsac-de-Carlux, Dordogne. He benefited from the help of Laplace and Ernest Gobert (1879-1973), who all applied the Cartesian coordinates method: 'The excavation was conducted using the method of locating each piece by three Cartesian coordinates, the ground having been "cut" into 1-metre cubes.' (Bourgon and Bordes 1951: 523). Pierre Boucher (1909-1997), a former collaborator of Laplace in the northern Basque country, also contributed to this excavation (Boucher and Peyran 2013; Ebrard 2013).

Gobert, who specialised in prehistoric archaeology, was also a public officer (*Inspecteur des Antiquités préhistoriques*) responsible for this field of research in Tunisia. There, he frequently collaborated with Cintas (mentioned previously). Later, Laplace conducted fieldwork and also collaborated with Gobert in Algeria (1953 and 1954), and in Tunisia (1954 and 1955). It is most likely that they shared their experiences on excavation methods, especially since Laplace had contributed to debates on methodology, as evidenced by his survey archives (Plutniak 2017a: 123-124).

4.1.3. The typology seminars at Arudy

Laplace's method was also disseminated by the excavations he led (in particular at Gatzarria, Olha 2, and Poeymaü sites), and the annual seminar he organised from 1969 to 1989 in Arudy (a small town where the Poeymaü site is located). Entitled '*Séminaires de Typologie d'Arudy*', these meetings attracted up to 50 participants mainly from France, Italy, and Spain (Plutniak 2017c: 126-141). They presented and discussed methodological and theoretical work related to prehistoric archaeology, but also encompassing applied mathematics, linguistics, and computing. The contents of these works were published in the *Dialektikê* bulletin. Note that articles in this bulletin did not deal directly with the Cartesian coordinate method. However, in the late 1970s and early 1980s, Laplace generalised the same approach to the analysis of lithic objects and published a sophisticated set of metrology and statistical methods (Laplace 1977; Laplace 1982). Looking at the distribution of the number of participants in these seminars, we observe that during the 1980s the number of Spanish participants, and Basque ones in particular, notably increased (Plutniak 2017b: 521-522).

4.1.4. Reception in Spanish-speaking countries and the Krei group

The diffusion of the Cartesian coordinate method was particularly wide-spread in Spanish-speaking countries, in Spain in particular. This supports the idea of the Pyrenean region as a key region for the development of archaeological methods.

In 1956, two years after the publication of the Laplace-Méroc paper, the Spanish and Mexican archaeologist José Luis Lorenzo Bautista (1921-1996) published an annotated translation of this paper (Laplace-Jauretche and Méroc 1956). This translation was republished in 1991 in a volume in honour of Bautista (Laplace-Jauretche and Méroc 1991). Furthermore, it is noteworthy that Laplace published the revised version of his method in the Basque journal *Munibe* (Laplace 1971). In 1973, the Catalan archaeologist Francesc Martí Jusmet (1946-) published a translation into Spanish in a hydrology and karstology journal (Laplace 1973).

At a more general level of analysis, through a bibliometric analysis, Spain is observed to have been critical in the diffusion of the method (Figure 7). The language of the texts which cite the two major publications on the method were analysed, assuming they reflect the geographical location where the texts were produced. The analysis shows that *Laplace-Jauretche and Méroc 1954a* was mainly cited in the French literature until the late 1990s, whereas *Laplace 1971* was rarely cited. The reception of *Laplace, 1971* was almost exclusively Spanish, and references to *Laplace-Jauretche and Méroc 1954a* only increased after the late 1990s. This late reception in Spain has already been emphasised (Estévez Escalera and Vila i Mitjà 1999: 67). Estévez and Vila were Catalan archaeologists who contributed to

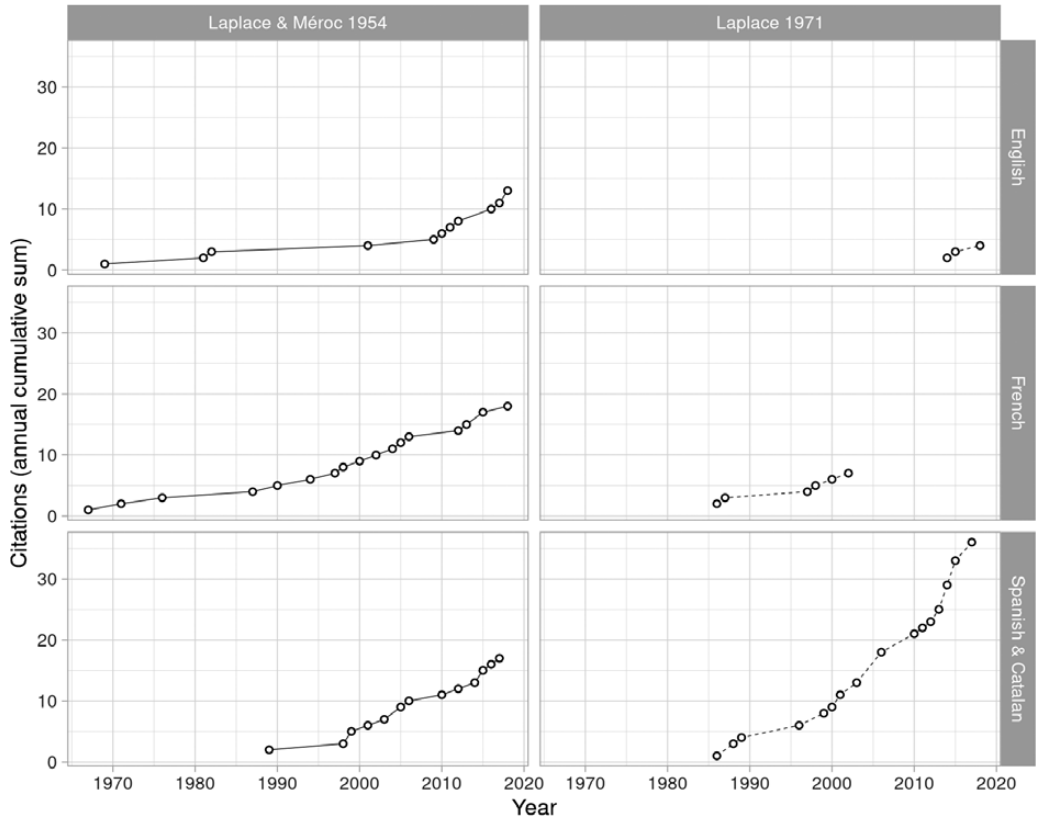


Figure 7. Annual cumulative sum the citations of Laplace-Jauretche and Méroc 1954a, and Laplace 1971, between 1967 and 2018 (data: *Google Scholar*).

the renewal of archaeological theory and methods in Spain after the Francoist period, participating in Laplace's seminars in Arudy on a regular basis. Besides Catalonia, the southern Basque country was the second and main place in Spain where Laplace's method was received.

The collaborations Laplace made with southern Basque country archaeologists date back to the immediate post WWII era. At that time, Laplace worked with José Miguel de Barandiarán who was exiled in Sare, a northern Basque village. Laplace was also involved in various Basque and Pyrenean scientific societies during the 1950s (Plutniak 2017c: 122-123). Thirty years later, part of the young post-Francoist generation of southern Basque country archaeologists found the renewal they had been looking for in Laplace's seminar. In return, Laplace also gave lessons at Vitoria-Gasteiz University in 1983, 1985 and 1986.

Andoni Sáenz de Buruaga played a notable role during this time. He was one of the closest and last collaborators of Laplace and he completed his PhD on the results of Laplace's excavation in Gatzarria (Sáenz de Buruaga 1991). In 1996, he set up a research group in Vitoria called *Krei. Círculo de Estratigrafía Analítica* ('Circle of analytical stratigraphy') which edited an eponymous journal from 1996 to 2015. The group was dedicated to using and enhancing Laplace's methodological propositions, in particular stratigraphy. The method they created, coined 'analytical stratigraphy', was explicitly considered as 'a deepening of Laplace's system' about stratigraphy (Sáenz de Buruaga 2006), note that the collective volume in which this text was published was dedicated in honour of Laplace). This method detailed two tools for representing stratigraphy: 1) an alphanumerical code system (Figure 8) –called 'analytical formulas', based on the coding system developed by Laplace to code lithic objects; and 2) an organisation chart inspired by Harris' 'matrix'. The development of this method was closely related to the sites excavated by the *Krei* group in the southern Basque country, in particular the Cueva de Arrillor (Múrua-Zigoitia), Antoliñako Koba (Gautegiz-Arteaga), Pareko Landa (Sollube), and Santa Coloma (Aprícano) sites (for a comprehensive list of the 30 sites

[AlaR] = [Ala] = [Lam] = [Lmc] = [Armb] = [Armc {Armc-h}] = [Ara] = [Armkl {Armkl-h}] = [Ara2 {Ara2-cr}] = [Arrk] = [Agp] = (Aras) = [Arrk2] = [Ara3 {Ara3-cr}] = [Arrk3] = [Agp2] = (Aras2) = (Arrk4) = [Ara(m)4 {Ara(m)4-cr}] = [Arrk5 {Arrk5-h}] = (Agp3) = [Ara5 {Arr} (=) {Ara5-cr1} {Ara5-cr2}] = [Arrk6] = (Agp4) = [Ara6 {Ara6-cr}] = [Ara6 = <Zi-Ara6>] = [<Hs-Amk> = Amk] [Arrk7 {Arrk7-h} = (Agp5) = [Ara7] ...

Figure 8. An 'analytical formula' representing the stratigraphy of the Cueva de Arrillor. The sign [] represents the stratigraphic structure, = the superposition of structures, {} the inclusion of structures, _ the structure in the case of composed expressions, () the structures with uncertain relations (Ormazabal 1996: 34).

interpreted by the 'analytical stratigraphy', see López Quintana and Sáenz de Buruaga (2015: 65-66).

4.2. A trans-Pyrenean lineage of stratigraphic innovation

Historical studies of science can address various spatial units of analysis. National borders are a very common choice to study scientific activities in a country or scientific relationships between different countries. Concerning the history of stratigraphic methods, such a national-based perspective is illustrated by studies on the U.S.A. (Lyman and O'Brien 1999; Browman 2013), or Italy (Guidi and Tarantini 2017). Here I focus on the Pyrenean region and opt for a different definition based on the geophysical properties of a territory. In this context, the relevance of considering the Pyrenean territory in itself is also supported by a long-standing history of exchanges between archaeologists in this area. This is illustrated by a series of scientific conferences, including the Congresos de Estudios Vascos organised by the scientific society Eusko Ikaskuntza (from 1918 to the 18th conference in 2018; see Larronde (2003), the *Congresos Internacionales de Estudios Pirenáicos* (from 1950 to the 7th and last conference in 1983), or the series of *Col·loqui Internacionales d'Arqueología de Puigcerdà* (from 1976 to the 15th and last conference in 2011 – note that the 14th conference was dedicated in honour of Laplace; see Mercadal i Fernàndez 2009).

In this context, the series of stratigraphic innovations developed in or around this mountainous region is striking and includes the following:

- 19th century work with a particular focus on stratigraphy: that conducted in Ariège by the geologist and palaeontologist Jean-Jacques Pouech (1814-1892), and by Édouard Piette (1827-1906).
- Later in Ariège, the excavations conducted by the Péquart couple between 1935 and 1944 in the Mas d'Azil cave (Péquart and Péquart 1941).
- Research made by Méroc in the 1930s and especially his excavation in Montmaurin from 1948.
- From the 1950s to the late 1980s, Laplace's work, mainly in the Béarn and in the northern Basque country.
- From the early 1990s, the collective developments of the *Estratigrafía Analítica* by the *Krei* group in the southern Basque country.

Some actors and methods of this series were strongly related, while others had no direct relationships. However, all researchers were aware of the existence of former works. For this reason, they constitute an 'intellectual and research lineage', in the sense the sociologist Andrew Abbott gave to this term to analyse the developments of the various branches of sociology in the U.S.A. (Abbott 2001).[3]

[3] Abbott had not refined the concept of lineage in his applications to the study of sciences, in which he only established an analogy with kinship lineages. Later he developed the concept, in relation to the ontology of personalities and social groupings, not with reference to intellectual lineages (Abbott 2016).

5. Conclusion

In the historiography of archaeology, regions associated with the development of stratigraphic methods in 20th century generally include the U.S.A. in the 1930s, the Soviet area, northern France (with Leroi-Gourhan's excavations, inspired by Soviet methods), and Great Britain in the 1960s. My aim in this paper was not to claim the importance of the Pyrenean region over the other regions, but to show how an intellectual lineage of scientific innovations can grow through the common ground authors share by working in the same territory.

This paper also contributes to recent interest on the history of stratigraphic methods, stressing the need for a careful use of the concepts regarding the authorship of methodological innovations. Furthermore, several perspectives for future research have been proposed: 1) the stories behind and between each component of the trans-Pyrenean lineage should be addressed in more detail within a socio-historical perspective; and 2) the framework for the conceptual analysis of the various formalisations of stratigraphy should be refined and applied to an extended set of methods.

Acknowledgements

This research was made with the support of the collective project *PAVO – Préhistoire Ancienne de la Vallée d'Ossau*. I thank Fabrizio Millesimi and François-Xavier Chauvière for the information they shared with me; Claire Manen for her help in accessing some publications; and Massimo Tarantini, Jean-Marc Pétillon, and François Fouriaux for their useful suggestions on previous versions of this paper.

References

Abbott, A. (2001). *Chaos of Disciplines*. Chicago: University of Chicago Press.

Abbott, A. (2016). *Human Nature in Processual Thinking*. Chicago: University of Chicago Press.

Axelson, E. (1938). Discovery of the Farthest Pillar Erected by Bartholomew Dias. *South African Journal of Science*, 35, pp. 417-429.

Bensaude-Vincent, B. (1983). A Founder Myth in the History of Sciences? The Lavoisier Case. In L.R. Graham, W. Lepenies, and P. Weingart, (eds), *Functions and Uses of Disciplinary Histories*. Dordrecht: D. Reidel. pp. 53-78. DOI: 10.1007/978-94-009-7035-9_3.

Boucher, P. and Peyran, X. (2013). P. Boucher (1909-1997): Éléments d'une histoire de vie. In D. Ebrard, (ed.), *50 ans d'archéologie en Soule. Hommage à Pierre Boucher (1909-1997)*. Mauléon-Licharre: Ikerzaleak, pp. 17-23.

Bourgon, M. and Bordes, F. (1951). Le gisement du Pech de l'Azé Nord. Campagnes 1950-1951. Les couches inférieures à Rhinoceros Mercki. *Bulletin de la Société préhistorique de France*, 48 (11-12), pp. 520-538. DOI: 10.3406/bspf.1951.2963.

Browman, D.L. (2013). The Origin of the 'Chicago Method' Excavation Techniques: Contributions of William Nickerson and Frederick Starr. *Bulletin of the History of Archaeology*. 23 (2), pp. 1-9. DOI: 10.5334/bha.2324.

Cailleux (de), A. and Taylor, G. (1963). *Code Expolaire*. Paris: Édition N. Boubée et Cie.

Caso Andrade, A. and Marquina, I. (1938). La technique des fouilles au Mexique. *Mouseion*. 43-44, pp. 263-275.

Cintas, P. (1947). Le sanctuaire punique de Sousse. *Revue africaine*. 91, pp. 1-80.

Cintas, P. (1948). Fouilles puniques à Tipasa. *Revue africaine*. 92, pp. 263-330.

Collins, H.M. (2010). *Tacit and Explicit Knowledge*. Chicago: University of Chicago Press.

Dubois, A. and Stehlin, H.-G. (1933). *La Grotte de Cotencher, station moustérienne*. Bâle: Société paléontologique suisse.

Ebrard, D. (2013). L'archéologuere Pierre Boucher (1909-1997). In D. Ebrard, (ed.), *50 ans d'archéologie en Soule : Hommage à Pierre Boucher (1909-1997)*. Mauléon-Licharre: Ikerzaleak. pp. 25-29.

Estévez Escalera, J. and Vila i Mitjà, A. (1999). *Piedra a piedra: Historia de la construcción del Paleolítico en la Península Ibérica*. Oxford: Archaeopress.

Fauvelle-Aymar, F.-X. (2012). La croix de Dias. Genèse d'une frontière au sud de l'Afrique. *Genèses*. 86 (1), pp. 126-148. DOI: 10.3917/gen.086.0126.
Gran-Aymerich, È. (1998). *Naissance de l'archéologie moderne 1798-1945*. Paris: CNRS Éditions.
Groenen, M. (1994). *Pour une histoire de la préhistoire. Le Paléolithique*. Grenoble: Jérôme Millon.
Guidi, A. and Tarantini, M. (2017). The Emergence of Stratigraphic Archaeology in Mediterranean Europe. The Italian Case Study (1900-1950). *Acta Archaeologica*. 88 (1), pp. 139-154. DOI: 10.1111/j.1600-0390.2017.12180.x.
Harris, E.C. (1979). *Principles of archaeological stratigraphy*. London: Academic Press.
Hurel, A. and Coye, N., (eds), (2011). *Dans l'épaisseur du temps. Archéologues et géologues inventent la préhistoire*. Paris: Publications scientifiques du Muséum national d'histoire naturelle.
Laplace-Jauretche, G. (1949). Gisement azilien de la Tute de Carrelore, à Lurbe (Basses Pyrénées). Découvertes et outillages. *Bulletin de la Société de sciences naturelles de Toulouse*. 84, pp. 227-236.
Laplace, G. (1954). *Letter to François Bordes, 14-02-1954*. [letter] SRA de Nouvelle-Aquitaine. Bordeaux.
Laplace, G. (1964). Le problème de l'origine de l'Aurignacien à la lumière des fouilles de la Grotte de Gatzarria. *Bulletin de la Société des Sciences, Lettres et Arts de Pau*. 24, pp. 24-26.
Laplace, G. (1970). *Letter to Jesús Elósegui Irazusta, 22-01-1970*. [letter] Aranzadi archives. Donostia.
Laplace, G. (1971). De l'application des coordonnées cartésiennes à la fouille stratigraphique. *Munibe: Revista de la Sociedad de Ciencias Naturales Aranzadi*. 23 (2-3), pp. 223-236.
Laplace, G. (1973). Sobre la aplicación de las coordenadas cartesianas en la excavación estratigráfica. *Speleon: Revista española de hidrología, morfología cárstica y espeleología*. 20, pp. 139-159.
Laplace, G. (1977). Notes de typologie analytique. Orientation de l'objet et rectangle minimal. *Dialektikê: Cahiers de typologie analytique*. 6, pp. 32-53. DOI: 10.5281/zenodo.2584046.
Laplace, G. (1982). Recherches sur le passage de la latéralité à la transversalité. *Dialektikê: Cahiers de typologie analytique*. 10, pp. 30-38. DOI: 10.5281/zenodo.2584235.
Laplace-Jauretche, G. and Méroc, L. (1954a). Application des coordonnées cartésiennes à la fouille d'un gisement. *Bulletin de la Société préhistorique de France*. 51 (1-2), pp. 58-66. DOI: 10.3406/bspf.1954.12427.
Laplace-Jauretche, G. and Méroc, L. (1954b). Complément à notre note sur l'application des coordonnées cartésiennes à la fouille d'un gisement. *Bulletin de la Société préhistorique de France*. 51 (7), pp. 291-293.
Laplace-Jauretche, G. and Méroc, L. (1956). Técnica de exploración arqueológicas. Empleo de las coordenadas cartesianas según G. Laplace-Jauretche y L. Meroc. *Tlatoani*. 10, pp. 18-21.
Laplace-Jauretche, G. and Méroc, L. (1991). Técnica de exploración arqueológicas: empleo de las coordenadas cartesianas según G. Laplace Jauretche y L. Meroc. In L. Mirambell Silva, (ed.), *Prehistoria y Arqueología. José Luis Lorenzo*. México: Instituto Nacional de Antropología e Historia.
Larronde, J.-C. (2003). Histoire du VIIème Congrès d'Études Basques. Biarritz, 1948. In Jean-Claude Larronde (ed.). *VIIème Congrès d'Études Basques*. Donostia: Eusko Ikaskuntza. pp. 17-61.
Leroi-Gourhan, A. (1961). Les fouilles d'Arcy-sur-Cure (Yonne). *Gallia Préhistoire*. 4 (1), pp. 3-16. DOI: 10.3406/galip.1961.1182.
Leroi-Gourhan, A. (1950). *Les fouilles préhistoriques. Technique et méthodes*. Paris: A. et J. Picard.
Leroi-Gourhan, A. and Brézillon, M.N. (1966). L'habitation magdalénienne no 1 de Pincevent près Monterau (Seine-et-Marne). *Gallia préhistoire*. 9 (2), pp. 263-385. DOI: 10.3406/galip.1966.1264.
López Quintana, J.C. and Sáenz de Buruaga, A. (2015). Recorrido y reflexiones en torno al pensamiento analítico de Georges Laplace: movimiento, interdependencia y arquetipos en la construcción de una Arqueología científica. In A. Calvo, A. Sánchez, M. García-Rojas, and M. Alonso-Eguíluz, (eds), *Seis décadas de tipología analítica. Actas en homenaje a Georges Laplace*. 2015 Vitoria-Gasteiz: Facultad de Letras de la UPV/EHU. pp. 61-91.
López Varela, S.L., (ed.), (2018). *The Encyclopedia of Archaeological Sciences*. Oxford: Wiley-Blackwell. DOI: 10.1002/9781119188230.
Lyman, R.L. and O'Brien, M.J. (1999). Americanist Stratigraphic Excavation and the Measurement of Culture Change. *Journal of Archaeological Method and Theory*. 6 (1), pp. 55-108. DOI: 10.1023/A:1022976726447.
Lyman, R.L. and O'Brien, M.J. (2006). American Stratigraphic Excavation. In *Measuring Time with Artifacts: A History of Methods in American Archaeology*. Lincoln: University of Nebraska Press.
McFarlane, D.A. and Lundberg, J. (2005). The 19th Century Excavation of Kent's Cavern, England. *Journal of Cave and Karst Studies*. 67 (1), pp. 39-47.

Mercadal i Fernàndez, O. (ed.), (2009). *Els Pirineus i les àrees circumdants durant el Tardiglacial: Mutacions i filiacions tecnoculturals, evolució paleoambiental (16000-10000 BP)*. Puigcerdà: Institut d'Estudis Ceretans.
Merton, R.K. (1961). Singletons and Multiples in Scientific Discovery: A Chapter in the Sociology of Science. *Proceedings of the American Philosophical Society*. 105 (5), pp. 470-486.
Morgan (de), J. (1912). Observation sur les couches profondes de l'acropole à Suse. In J. Morgan (de), (ed.), *Céramique peinte de Suse et petits monuments de l'époque archaïque*. Paris: Ernest Leroux. pp. 1-25.
Moro Abadía, O. (2002). Towards a Definition of Time in Archaeology: French Prehistoric Archaeology (1850-1900). *Papers from the Institute of Archaeology*. 13, 51-63.
Myers, O.H. (1950). *Some Applications of Statistics to Archaeology*. Le Caire: Service des Antiquités de l'Égypte.
Negev, A. and Gibson, S., (eds), (2001). *Archaeological Encyclopedia of the Holy Land*. 2nd (ed.) New York: Continuum.
O'Brien, M.J. and Lyman, R.L. (2002). The Epistemological Nature of Archaeological Units. *Anthropological Theory*. 2 (1), pp. 37-56. DOI: 10.1177/1463499602002001287.
Ogburn, W.F. and Thomas, D.S. (1922). Are Inventions Inevitable? A Note on Social Evolution. *Political Science Quarterly*. 37 (1), pp. 83-98. DOI: 10.2307/2142320.
Ormazabal, A. (1996). El depósito prehistórico de Arrillor (Murua, Zigoitia; Araba): aplicación de la Estratigrafia Analítica. *Krei: Círculo de Estratigrafía Analítica*. 1, pp. 21-36.
Petrie, W.M.F. (2013). *Inductive Metrology. Or, the Recovery of Ancient Measures from the Monuments*. Cambridge: Cambridge University Press. DOI: 10.1017/CBO9781107325265.
Petrie, W.M.F. (1891). *Tell El Hesy (Lachish)*. London: Palestine Exploration Fund.
Péquart, M. and Péquart, S.-J. (1928a). Techniques de fouilles préhistoriques. *Revue des Musées et Collections archéologiques*. 14 (3), pp. 2-19.
Péquart, M. and Péquart, S.-J. (1928b). Techniques de fouilles préhistoriques (suite). *Revue des musées et collections archéologiques*. 16 (4).
Péquart, M. and Péquart, S.-J. (1941). Nouvelles fouilles au Mas d'Azil. *Préhistoire*. 8, pp. 7-42.
Plutniak, S. (2017a). L'innovation méthodologique, entre bifurcation personnelle et formation des disciplines : les entrées en archéologie de Georges Laplace et de Jean-Claude Gardin. *Revue d'histoire des sciences humaines*. 31, pp. 113-139. DOI: 10.4000/rhsh.435.
Plutniak, S. (2017b). *L'opération archéologique. Sociologie historique d'une discipline aux prises avec l'automatique et les mathématiques. France, Espagne, Italie, 2e moitié du XXe siècle*. PhD. École des hautes études en sciences sociales.
Plutniak, S. (2017c). The Professionalisation of Science – Claim and Refusal: Discipline Building and Ideals of Scientific Autonomy in the Growth of Prehistoric Archaeology. The Case of Georges Laplace's Group of *Typologie Analytique*, 1950s-1990s. *Organon*. 49, pp. 105-154.
Rudwick, M.J.S. (2005). *Bursting the Limits of Time. The Reconstruction of Geohistory in the Age of Revolution*. Chicago: University of Chicago Press.
Sabatier, P. (1995). Chronologie de la grotte du Gardon. Méthodologie de l'approche verticale. In J.-L. Voruz, (ed.), *Chronologies néolithiques. De 6000 à 2000 avant notre ère dans le bassin rhodanien*. Ambérieu-en-Bugey: Éditions de la Société préhistorique rhodanienne, pp. 113-122.
Sáenz de Buruaga, A. (1991). *El paleolítico superior de la Cueva de Gatzarria (Zuberoa, País Vasco)*. Leioa: Instituto de Ciencias de la Antigüedad, Servicio Editorial, Universidad del País Vasco.
Sáenz de Buruaga, A. (2006). Estratigrafía Analítica: una profundización de la sistemática laplaciana en el movimiento estratigráfico. In F. Gusi i Jener, (ed.), *Dialektikê. Cahiers de Typologie Analytique: Hommage à Georges Laplace*. Castelló de la Plana: Diputació de Castelló, Servei d'Investigacions Arqueològiques i Prehistòriques. pp. 126-139.
Schweizer, C. (2008). Stratigraphy in the Early Nineteenth Century: A Transdisciplinary Approach, with Special Reference to Central Europe. *Annals of Science*. 65 (2), pp. 257-274. DOI: 10.1080/00033790701723477.
Vialet, M. (2019). Interruption dans le processus de transmission du savoir : exemple des grottes préhistoriques de Montmaurin (Haute-Garonne) fouillées par Louis Méroc (1904-1970). In M. Sot, *Pratiques de la médiation des savoirs*. Paris: Éditions du Comité des travaux historiques et scientifiques. DOI: 10.4000/books.cths.5352.
Wheeler, M. (1954). *Archaeology from the Earth*. Oxford: Clarendon Press.

Part II

Epistemology, History and Philosophy of Science: Interdisciplinary Perspectives on the History of Archaeology

Session organized by Sophie A. de Beaune
and Oscar Moro Abadía

Introduction

Sophie A. de Beaune[1], Oscar Moro Abadía[2]
[1]Jean Moulin University – Lyon 3, Lyon & UMR 7041 ArScAn, Nanterre – France
sophie.de-beaune@univ-lyon3.fr
[2]Memorial University of Newfoundland – Canada
omoro@mun.ca

Over the past 25 years, archaeologists have shifted from rejecting and trivializing the history of archaeology (traditionally considered as a harmless amusement for their leisure hours) to considering that this discipline plays a central role in the understanding of archaeological research. This resurgence has been spurred by the emergence of a new generation of scholars who have met modern historiographical standards and practices. In this setting, historians of archaeology have benefited a great deal from a growing dialogue with historians, philosophers and sociologists of science. It is not by chance, for instance, that most of the French-speaking historians who have played a role in the reinvigoration of the history of archaeology in the last two decades are historians and epistemologists of science. However, there are still few studies on the many epistemological, philosophical and sociological facets of archaeological knowledge. In this setting, this session seeks to explore the relationships between the history of archaeology and other disciplines, include history, epistemology and sociology of science. In the first place, we invited historians of archaeology and historians of other sciences to think about the relationships between their disciplines. This dialogue sought to explore how historians of archaeology can enrich their work with a better understanding of the *methods*, *techniques* and *concepts* used in the history of science. In the second place, we seek to promote an interdisciplinary dialogue beyond the limits of historiographical studies. To do so, we invited specialists in the epistemology and philosophy of science to consider how recent debates on their disciplines may intersect with the study of the history of archaeological knowledge.

Sophie A. de Beaune explores the many links that can be established between technology and prehistoric archaeology through the work of three major figures that have largely marked French archaeology from the second half of the 19th century to the end of the 20th century, Augustus Lane Fox Fitt Rivers, André Leroi-Gourhan and François Sigaut. All three developed an interdisciplinary approach to material culture. However, no matter how close their interests were, the three of them were marked by their different historical contexts.

Oscar Moro Abadía examines the tragic fate of heroic precursors in the history of archaeology with reference to the case of Boucher de Perthes. As it is well-known, Jacques Boucher de Perthes is often celebrated for being the first to establish the prehistoric antiquity of humankind. However, as Moro Abadía examines in his paper, these hagiographical approaches are problematic. Without denying that Boucher de Perthes made significant contributions to the history of archaeology, an entirely different picture of this 'heroic discoverer' emerges when we put him in his historical context.

Rémi Labrusse wonders about the reasons that led the first prehistorians (Lartet and Christy, Mortillet, Piette, etc.) to put forward the question of art, alongside technique, to characterize the Palaeolithic. In so doing, he explores the encounter between art history and prehistory in the second half of the 19th century.

Giorgos Vavouranakis and *Georgia Kourtessi-Philippakis*' paper focuses on the early Prehistory, which is here taken to include the whole Stone Age, from the Palaeolithic to the Neolithic. In the 1960s',

Greece became the place of a lively fermentation of the various currents that forged the identity of research in ancient Prehistory by making it independent from the stereotypes of Archeology, as it had been practiced since the end of the 19th century, and by freeing it from this heavy heritage. More generally, the authors examine the impact of new (or processual archaeology) upon European archaeology in the same years.

Shumon T. Hussain uses the French-Anglophone divide in Palaeolithic stone artefact analysis as an example to show that identified differences in approach and conceptualization between the two involved communities of practice can be recovered by comparing the 'image worlds' they promulgate. Examining the pictorial structure of these worlds and the frequency of certain image types therein sheds new light on the distinctive nature of French and Anglophone styles of reasoning in lithic research.

Three career itineraries that linked prehistory, archaeology, and technology: Augustus Lane Fox Pitt Rivers (1827-1900), André Leroi-Gourhan (1911-1986) and François Sigaut (1940-2012)

Sophie A. de Beaune
Jean Moulin University – Lyon 3, Lyon & UMR 7041 ArScAn, Nanterre – France
sophie.de-beaune@univ-lyon3.fr

Abstract

There are numerous bridges between technology and prehistoric archaeology. The author will illustrate them herein by reference to three major figures who marked 150 years of history from the middle of the xixth century to today. The first, Pitt Rivers, can be seen as a forerunner even if the second, Leroi-Gourhan, does not seem to have read his work or, at least, does not cite him in his own writing. Conversely, François Sigaut, the third main figure of our itinerary both read his work and was responsible for him being discovered in France at the end of the 1980s when he was still unknown, as it were. Common interests can be observed in the work of these three personalities such as the link between humans and technology and they also question humanity's specific features. All three had the same attention to details combined with openness to neighbouring disciplines. But, however close their centres of interest were, all three were nonetheless highly influenced by the major questions of their own eras.

Keywords: Technology, Prehistory, Augustus Lane Fox Pitt Rivers, André Leroi-Gourhan, François Sigaut

Résumé

Les passerelles entre la technologie et l'archéologie préhistorique sont nombreuses. L'auteur les illustrera ici par trois figures majeures qui ont jalonné 150 ans d'histoire, du milieu du XIXe siècle à aujourd'hui. Le premier Pitt Rivers, peut faire figure de précurseur, même si le second, Leroi-Gourhan ne semble pas l'avoir lu, ou du moins ne le cite pas dans ses écrits. En revanche, François Sigaut, le troisième acteur de notre parcours, l'a non seulement lu mais est à l'origine de sa découverte en France à la fin des années 1980 alors qu'il y était pour ainsi dire inconnu. On perçoit dans l'œuvre de ces trois personnalités des préoccupations communes telles que le lien entre l'homme et l'outil et la recherche de ce qui fait la spécificité de l'homme. Tous trois se caractérisent aussi par une même attention aux détails et en même temps une ouverture vis-à-vis des disciplines voisines. Mais on perçoit aussi que, pour proches que soient leurs centres d'intérêt, chacun d'entre eux est cependant empreint des grandes questions de leur temps.

Mots-clefs : Technologie, Préhistoire, Augustus Lane Fox Pitt Rivers, André Leroi-Gourhan, François Sigaut

1. Introduction

There are numerous bridges between technology and prehistoric archaeology. I shall illustrate them herein by reference to three major figures who marked 150 years of history from the middle of the xixth century to today. The first, Augustus Lane Fox Pitt Rivers, can be seen as a forerunner even if the second, Leroi-Gourhan, does not seem to have read his work or, at least, does not cite him in his own writing. Conversely, François Sigaut, the third main figure of our itinerary both read his work and was responsible for him being discovered in France at the end of the 1980s when he was still unknown, as it were (Sigaut 1990).

2. Augustus Lane Fox Pitt Rivers (1827-1900)

Augustus Lane Fox Pitt Rivers is known today for the museum in Oxford named after him. As a career soldier, he took part in British Army missions and particularly the Crimea expedition in 1850 as a general staff officer. His speciality was ballistics and in the field he was given the task of instructing officers on the use of firearms (Thompson 1977; Bowden 1991). He was a multi-facetted person; he founded two museums, was a landowner, archaeologist, anthropologist and Inspector of Ancient Monuments. His greatest desire was to contribute to the education of the people but it was his research in archaeology and his monumental collection which made him famous.

Many British archaeologists consider the General to be 'the father of scientific archaeology'. Sir Mortimer Wheeler himself declares that he was his disciple. Conversely, others see him as an amusing eccentric with his own private band and menagerie of exotic animals (Bowden 1991: 1). Pitt Rivers took part in digs on over forty sites ranging from the classical through the Palaeolithic eras up to the Middle Ages. However, he was also one of the first and most fervent advocates of Darwinian gradualist theory. He considered that nature did not make jumps, instead evolving gradually, and it was his profound conviction that these natural laws could be applied to human societies (Lane Fox,[1] e.g. 1906 [1868]: 96; 1875: 307-308).

He was part of a group of intellectuals made up of the most recognized British archaeologists and academics of the era, including Thomas Henry Huxley, Herbert Spencer, Sir John Evans, Sir John Lubbock (who became his son-in-law), Augustus Franck and Darwin himself, not to mention other recognized personalities in geology, philology and anthropology. He played a driving role in this group from the 1860s until the end of the century and was strongly involved in several academic societies. This led him to be appointed Inspector of Ancient Monuments in 1882.

His work as an archaeologist seems particularly original to us today because it presented three specific characteristics (Bowden 1991):

1) He excavated a very large variety of archaeological sites whereas his contemporaries were obsessed by excavating burrows. He did not neglect funeral monuments but also considered that 'the relics found in camps and dwellings are the things that were in everyday use, and, therefore, give us better insight into the social conditions of the people' (Pitt Rivers 1883: 65).[2] Like his contemporary, the Dane Worsaae, he understood the documentary interest of pieces as humble as shards of ceramic or bone fragments.
2) The General was aware of the interest of the context in which an object was discovered while his contemporaries were content just to know which site an artefact came from. He insisted on the need to note the exact findspot and its relation with characteristic structures to reconstruct the history of the site. His stratigraphic surveying was very meticulous but his excavation methods left something to be desired (Bowden 1991: 94). Although he had understood the importance of stratigraphy, he continued to dig in spits and not by layers (*ibid.* 94). Nevertheless, the 'level of supervision of Pitt Rivers' excavations was extremely high by nineteenth-century standards' (*ibid*. 156).
3) He took analysis of relics further than his contemporaries. For instance, he had the idea of measuring the bones of modern-day animals and comparing them with those found in excavations. He also carried out experiments such as knapping flints (initiated by John Evans) and digging using bone and antler tools. He also studied the silting of ditches. All these approaches were only taken up again in the second half of the xxth century (*ibid*. 158).

[1] He signed his first articles as Lane Fox then changed his name in 1880 to Pitt Rivers, 'according to the wishes of the second Lord Rivers' (Pitt Rivers, 1891, n. 1), after having inherited the family estate – an immense property in Dorset. His archaeological activity which began at the start of the 1860s then continued with excavations on his own land.
[2] He excavated megalithic sites, hillforts, flint mines and other sites from all eras ranging from the Palaeolithic (only 2 sites) and Neolithic eras, the Bronze and Iron Ages, Roman Britain to the Middle Ages.

He would have liked there to have been subtler, in-detail analysis techniques to enable the constitutive elements and origins of ceramics to be determined. He was a visionary and thought it possible that one day there would be a sufficient number of archaeologists for them to be organized and integrated into a specific profession (*ibid*. 158).

One of the General's most relevant traits was that he was a compulsive collector who put his acquisitions into order through meticulous study (*ibid*. 9). Starting in the 1850s and for the following twenty years or so, he gathered a huge collection of objects of all sorts from 'savage' societies. Also from the 1860s onwards, he collected objects from archaeological sites as his interest in the past grew. He donated this collection of around 20,000 objects to the museum in Oxford in 1884. After the donation to Oxford, he continued to collect objects from 1880 to 1900 for his new museum in Farnham, Dorset, near the family estate which he had inherited. The total of his two collections is estimated at around 50,000 objects.[3]

His objective for these collections was above all scientific because they were intended to demonstrate and promote his theory on the evolution of technical objects. His theory of progress is based on his intuitive idea that the shapes of objects reflect ideas. He thus established this hypothesis: 1, that links can be established between different objects through an analysis of their shape; 2, that relations between shapes are crucial because they enable the mental operations they must involve to be reconstructed; 3, that ideas lead to other ideas and feed off each other which means they follow the same laws as those of evolution of living beings (de Beaune 2013a). Like the products of the animal and vegetal kingdoms, human ideas can be classified into genera, species and varieties and their evolution can be retraced 'from the simple to the complex and from the homogeneous to the heterogeneous' because they obey the same laws (Lane Fox 1875: 307). Basically, his programme consisted of transposing Charles Darwin's ideas about the evolution of living organisms to the productions of human minds to reconstruct the sequence of ideas which enabled humanity to progress 'from the condition of the lower animals' to today's condition and to thus 'provide really reliable materials for a philosophy of progress' (*ibid*. 300).

As objects are the only evidence of the mental operations which led to their production, the way these are arranged in the museum aims to show how human ideas have evolved throughout time. Beginning with objects created by modern 'savages' and tracing back to objects made by prehistoric humans, he attempts to rewrite history in reverse by retracing, step by step, this evolution. This explains, for instance, his interest in ethnology which he judges essential for prehistorians (Pitt Rivers 1887: 265). Indeed, his first archeological fieldworks were explicitly carried out in the aim of completing his long-term typological series –it should indeed be noted that the term typology seems to have been introduced into archaeology by him – before he realized the intrinsic interest of archaeology (Bowden 1991: 55). This explains the importance (rare among his contemporaries) which he attributed to the succession of geological strata which is vital to establish the chronology of early men in Great Britain.

Pitt Rivers based his whole exhibition system on evidence of this evolution from the prehistoric to modern 'savage' eras in such a way that the objects were placed in lines supposed to give a visual representation of the mental and cultural development of humanity (see de Beaune 2013a, on the museographic application of his theory). The radial presentation system he imagined was intended to enable even less well-informed students to easily understand the evolution from any object at all by simply observing its position with reference to the centre of the rotunda (Pitt Rivers 1888, 1891). Thus, the museum's dual scientific and pedagogical objectives could be brought together.

He applied his evolutionist's vision to social progress which he thought could only occur through evolution rather than revolution and through the education of the masses, justifying the existing

[3] A complete biography, all Pitt Rivers' work and the catalogues of his collections are all available on the remarkable 'Rethinking Pitt Rivers' website created by the Pitt Rivers museum team: http://web.prm.ox.ac.uk/rpr/

world order – including the expansion of the British Empire – and thus opening the door to a dangerous form of racism (Bowden 1991: 56).

3. André Leroi-Gourhan (1911-1986)

André Leroi-Gourhan lived just as full a life as Pitt Rivers -a life which it is difficult to sum up in a relatively short text.[4] He was an ethnologist, anthropobiologist, orientalist, linguist, museographer, technologist, prehistorian, etc. Although he had multiple interests, his early years were above all devoted to the technical field. He was part of the group of young people who contributed to the renovation of the *Musée du Trocadéro* and the constitution of the future *Musée de l'Homme,* working with Georges-Henri Rivière and Paul Rivet from 1932 to 1935. He was put in charge of reorganizing the museum's Arctic section and creating the card classification system for the objects. This work inspired him to write his first book in 1936 when he was just 25, *La civilisation du Renne* which focuses on the relations humans have with animals, and also his first written work on technology which were published in l'*Encyclopédie française* (1936a and b).[5] This first writing reveals the desire to grasp Man's activities both in technical details and in their interaction with the environment.

In 1937, he received a grant from the Japanese government and spent two years in Japan where he carried out an ethnological study of the Ainu people and made a vast collection of documents which he later used in the technology studies he ended after the war.[6]

He first worked for the CNRS on a grant then as a researcher from 1940 to 1945 replacing Philippe Stern for the curation of the *Musée Guimet*. His passion for objects and his museographic skills led him to publish *L'Homme et la Matière* in 1943 and *Milieu et Techniques*, in 1945. In the same year he defended his thesis on the *Archaeology of the North Pacific* under the direction of Marcel Mauss and published it the following year.

In 1944, he was appointed senior lecturer in Colonial Ethnology in Lyon where he taught comparative technology based on the study of Lyon's colonial museums' collections of ethnographical objects. His conception of ethnology had to include fieldwork and therefore he travelled all over the Mâcon region with his students who he provided with an initiation into what he was later to call 'prehistoric ethnology'. His first excavations date from this period in Furtins cave in the Saône-et-Loire region (in 1946) then in the Arcy-sur-Cure caves (Yonne region) in 1947.

In 1946, he was appointed deputy director of the *Musée de l'Homme* and senior CNRS researcher. He was influenced by the work of 1930s Russian archaeologists and developed a field method involving horizontal excavation which means relics can be found in the places they occupied when people abandoned them there. In an excavation manual published in 1950, he advocated systematic, exhaustive recording of all categories of relics and insisted on the fact that the relics in themselves count less than their inter-relations (Leroi-Gourhan 1950).

In 1954, his desire to combine cultural and biological aspects in one subject area led him to defend a second *ès-sciences* doctoral thesis devoted to the craniology of vertebrates entitled *Tracés d'équilibres mécaniques du crâne des vertébrés terrestres* thus returning to his very early interest in skulls which he had collected during his adolescence and to the courses he studied at the *École d'Anthropologie de Paris* (Soulier 2003). It was only published around thirty years later in 1983.

[4] The biographical details given herein come from several distinct sources: three special editions which journals devoted to A. Leroi-Gourhan shortly after he passed away (*Terrains*, 1986 ; *Bulletin de la Société préhistorique française*, 1987 et *Les Nouvelles de l'Archéologie*, 1992) as well as a book of interviews with Claude-Henri Rocquet in 1982. A comprehensive biography has just been published (Soulier, 2018).

[5] We have republished this text in the *Documents pour l'Histoire des Techniques* (de Beaune, 2011).

[6] An issue of the Journal *Techniques & culture* was dedicated to Leroi-Gourhan's Japanese studies: 'Geste et matière. Leroi-Gourhan, découvertes japonaises' (Joulian, 2011).

Until 1956 he combined his teaching in Lyon with the post of deputy director of the *Musée de l'Homme*, living in both Paris and Lyon. In 1956, following the accidental death of Marcel Griaule, he succeeded him at the Sorbonne, transforming the chair of General Ethnology into the chair of Prehistoric Ethnology.

In 1962, when the Mournouards Hypogeum (Marne region) was saved, he used his model for excavation methods in the mortuary field of archaeology. He showed how meticulous study of the arrangement of the mortuary monument and the position of the bones can enable archaeologists to discover funeral gestures and post-depositional disturbance. He thus simultaneously founded taphonomic analysis and funerary archaeology.

He started excavating on the Pincevent site in the Seine-et-Marne region in 1964 and here he put his field methods into practice, founding a real excavation school. The site is still today used for teaching purposes as a work-school where students from Paris 1 University learn about excavation methods.

In 1964's *Le Geste et la parole*[7] he attempted to show how the interaction between nature and culture produced an inseparably cultural and biological evolution from the first hominins to modern humans.

He continued his annual excavations in Pincevent until the end of his life but also found a new source of curiosity – decorated Palaeolithic caves. As a life-long collector, he set out to collect all the available data on decorated caves which led, in 1965, to a monumental work: the *Préhistoire de l'Art occidental*. As well as this work's interest as a document, it featured a new structuralist approach even if he was not the only person to have developed it.

In 1969, he was elected to the Collège de France then became a member of the Institute as an orientalist which was like a distant echo of his youth. He took institutional retirement in 1981.

André Leroi-Gourhan was self-taught with an encyclopaedic knowledge and rightly acclaimed as a 'passer-through-walls' of the mind. He was interested in bringing up questions. Once the question had been asked and answers could be glimpsed in the distance, he moved on to another subject. He had ploughed, others could harvest.

4. Points in common between Leroi-Gourhan and Pitt Rivers

The two men had the same favourite subjects and their points of view were often very close. In what follows, I will examine some of their common areas of interest:

1) *Collectionism*: Leroi-Gourhan left school at the age of 14 to start an apprenticeship. He spent the little spare time left him by various menial jobs at the flea market. He meticulously listed and drew the objects he bought in notebooks. He began a highly varied collection of human and animal skulls, objects from Africa and America and pottery. Both men collected skulls, carved flint objects and ethnographic weapons and tools.
2) *Bioanthropology* (*particularly craniometry*): At the age of 18, Leroi-Gourhan was studying on a course in physical anthropology at the *École d'Anthropologie de Paris* and, as discussed above, in 1954 he defended a second doctoral thesis (*ès-sciences* this time*)* devoted to the craniology of vertebrates. We may also recall that Pitt Rivers measured both skulls from his excavations and those of his living contemporaries (Bowden 1991: 51). However, while Pitt Rivers' ideas were not far from the racialist theses of his era – for which he cannot be criticized in retrospect – Leroi-Gourhan had a very different standpoint. For him, the determinist logical principles which ruled nature also apply to human productions and he

[7] English translation – *Gesture and Speech*, 1993.

studied the craniology of terrestrial vertebrates exactly in the same way as a problem of mechanical balance.

3) *The classification of techniques*: Pitt Rivers based his classifications on the evolution of forms independently of time and place, whereas Leroi-Gourhan's classification is arborescent and based on modes of action upon materials, worked materials and their technical applications (transport, production, acquisition and consumption techniques). Leroi-Gourhan classificatory system was based on the physical properties of materials and the means used to transform them. Leroi-Gourhan himself admitted that, while his 'systematic technology' created using 40,000 technical reference cards which was the subject of the two volumes of *Evolution et Techniques* (1943 and 1945) was an essential basis for work, but 'the tool is truly only within the gesture which makes it technically effective' (Leroi-Gourhan 1965a: 35). This ambition to study technical action rather than tools alone brings him closer to the ideas of François Sigaut who will be discussed later. It should be noted that when Leroi-Gourhan studied prehistory, he did not really study techniques and preferred the reconstitution of daily life which he called prehistoric ethnology.
4) *The evolutionist vision of technical progress*: Both men made a parallel between technical and biological evolution. 'When looking for the true roots of Technology, one must turn to Paleontology and Biology in their broadest sense. At all instants, technical elements can be felt to follow on from each other and organize themselves in the same way as living organisms and human creation, through its continuity, retraces the universal creation.' (Leroi-Gourhan 1945: 472). Leroi-Gourhan and Pitt Rivers had no doubt that there was a continuity between prehistoric techniques and those of the more recent past. Interestingly, both were wrong on this point because techniques do not evolve according to the laws of nature. While natural evolution is of course Darwinian, with living beings adapting to their conditions through natural selection, the evolution of techniques is closer to Lamarckian theory. Lamarck believed that evolution was bushy and occurred through the direct transmission of inheritance of acquired characteristics and through a tendency towards growing complexity and diversification. The same can be said of the evolution of techniques to a greater or lesser extent which explains how it can occur much quicker than natural evolution. This is perhaps the reason why Sigaut never focused on the evolution of techniques to explain the differences between them but rather on their cultural context.
5) *Their interest in museography*: This began early in Leroi-Gourhan's life as his projects for display cases for the *Musée du Trocadéro* show. In this work, he highlighted both the presentation of techniques and their context of use. Pitt Rivers is known to have considered his 'panoplies' as true scientific demonstrations.
6) *Their excavation methods*: Both Pitt Rivers and Leroi-Gourhan advocated rigorous excavation methods with relics listed as exhaustively as possible. Both men shared the same concerns about the quality of excavation techniques and the same desire to find elements which would help understand daily life. However, times had changed and he advocated horizontal excavation to preserve the layers of occupation floors that have to be 'followed' to meticulously pick up everything that can be found and thus leave the ground as it was when abandoned by the people who lived there. Leroi-Gourhan was not obsessed at all about the succession of stratigraphic layers but of course this was no longer a problem in the 1960s when the then newly discovered radiocarbon dating method had enabled archaeologists to obtain direct datings.

5. François Sigaut (1940-2012)

François Sigaut was trained as an agronomist and is best known for his work on the history of agriculture and for teaching the anthropology of techniques in pre-industrial societies at the School of Advanced Studies in the Social Sciences (*École des Hautes Études en Sciences Sociales*). Early

in his career he focused on three main fields.[8] The first was the subject of his thesis defended in 1975 at the *École Pratique des Hautes Études*, namely the history of agriculture. Nevertheless, he also became interested in food techniques which are at the other end of the technical chain. As of 1980, he began studying general technology which gradually led to his interest in archaeology firstly for the analysis of techniques and secondly concerning the question of the origins of tools.

He worked on distinguishing the succession of different production operations from the first work on preparing fields to obtaining finished, edible products through ploughing, harvesting and maintenance of crops, then storage and the preparation of the final product. In doing so, he made efforts to identify the techniques themselves which were defined as the diverse alternative methods enabling a certain operation to be carried out but also studied how such operations fitted together in the technical system. His ambition was to develop identification, description and classification processes for the creation of the most complete corpus possible of the diverse agricultural techniques recorded worldwide. This was to run from the period as far back in the past for which information was available to the end of pre-industrial agriculture. For each stage, the idea is to identify operations by situating them in the society or societies where they were recorded as having existed.

Nonetheless, identifying, describing and classifying technical facts and events brings up numerous difficulties. In order to solve the challenge of identification, description is essential to avoid being confused by the use of a vocabulary likely to have evolved over time and which included meanings that varied according to the authors or even the regions involved.

Classification, which had to follow identification rather than precede it, brings up other challenges. To attempt to solve such difficulties, François Sigaut advocated remaining as close as possible to reality and advancing using small corpora without attempting a classification aimed at being too general. Thus his categorization of seed harvesting techniques can be considered exhaustive insofar as all the harvesting methods recorded in the available literature are included (Sigaut 1978, 1991a and 2012a).

This comparative and analytical approach is based on a broad use of ethnographical, historical and technical literature from the xviith century onwards. This is because he was interested in the social and cultural conditions in which technical action evolved as well as the analysis of that action in itself. He always attempted to highlight the links that exist between different techniques in the same network of activities and and between techniques and other elements of the social system.

And yet to develop concepts of general validity enabling comparative analysis, much older sources have to be compared with recent field research. This interest in working on a very long time scale and searching for the origins explains how François Sigaut gradually came to work with archaeologists and even prehistorians during his years of study.

To understand how activities at the basis of the way so-called pre-industrial societies functioned were shared out, he advocated carrying out 'technographic' description of those activities and also taking into account how technical actions were organized as *tasks* and how these were grouped into *ateliers* (*workshops*), a term he borrowed from Le Play as had Paul Descamps who adapted it to the study of what he called '*sociétés sauvages*' (primitive societies, Descamps 1923 and 1925). The word *atelier* designates the way in which a certain activity is shared out within a social group as simultaneous or successive tasks that are nonetheless linked.

This led him to focus on how tasks were shared out according to gender and age in simple or so-called *undivided* societies (to use Clastres's terminology – Clastres 1974) and also to take an interest

[8] The biographical information presented herein was based on François Sigaut's conference proceedings from the archives of the EHESS, from his bibliography and from memories of conversations (see also de Beaune 2013b).

in more in-depth specializations in more complex societies. He also studied processes aimed at forcing or authorizing certain individuals to break rules forbidding them from carrying out activities specific to their gender (slavery, cross-dressing, etc.) and also the specialization of groups themselves which led them to become castes and to the structuring of Western European societies according to the notion of professions.

In another register, his essay published a few days before he passed away provides an appealing hypothesis on the origin of humans' activities involving tools ('*action outillée*') (Sigaut 2012). He believed that this was specific to humans because it is linked to the development of mental capacities only humans possess such as sharing experience, joint attention and taking pleasure in succeeding. And these capacities are themselves linked to establishing an exchange between partners of different genders which does not occur in animal societies, however structured they may be. He insisted on the fact that this pleasure derives from both succeeding in a material action and from the recognition of that success by another person. Being deprived of this pleasure is the cause of true suffering as work sociologists well know (Sigaut 1991b and 2009).

For him, activity involving tools ('*action outillée*') had a central place in human life systems which is why he always opposed the relative disinterest of historians, geographers and anthropologists in techniques (Sigaut 1981 and 2010).

He considered that in the field of the history of techniques, all authors considered themselves the first and imagined they had to reinvent everything from scratch and so advocated linking broken threads of thought (Sigaut 1987b) to escape from this vainly repetitive situation. To achieve this, the often very remarkable results of research from the past had to be rescued from anonymity. This is what he tried to do by contributing to the rediscovery of neglected authors, including Franz Reuleaux or Augustus Lane Fox Pitt Rivers (Sigaut and Cresswell 1987; Sigaut 1990) and by republishing some of them such as Charles-Georges Leroy and Paul Lacombe (Leroy 2006 [1768]; Lacombe 2009 [1889]).

6. Points in common between Sigaut and his two predecessors

Sigaut liked to create bridges between archaeology and the anthropology of techniques and very often highlighted the methodological contribution that archaeology could make to the study of techniques in current societies. He was not a prehistorian but became interested in this field towards the end of his life to better understand the origins of activity involving tools. There are points in common between his work and that of Pitt Rivers and Leroi-Gourhan.

1) *The classification of techniques*: Unlike his two predecessors, he thought that any holistic classification system was destined to fail, that large scale inventories were of no use and that it is best to content oneself with well-targeted classifications. His systematic classification of gestures (for example how harvesting tools were held) was strongly inspired by Haudricourt's work. His interest in technical gestures brought his thought closer to that of Leroi-Gourhan but he more readily accepted that he had inherited André-Georges Haudricourt's way of thinking (Sigaut 1987a).
2) *The description of techniques*: Here again, while Pitt Rivers and Leroi-Gourhan had an ahistorical vision of techniques, Sigaut considered it essential to situate them in their historical and social context to better measure differences and understand the way in which they were part of a network of activities. Although Leroi-Gourhan did not formalize the notion of the workshop including complementary activities, he did, however, have a relatively equivalent idea about technical changes within a group with the progressive substitution of an activity by another which keeps the situation well-balanced particularly in terms of working time (Leroi-Gourhan 1945: 309).

3) *The relation between humans and tools*: Both Pitt Rivers and Leroi-Gourhan considered tools to be a simple prolongation of the hand unlike Sigaut who thought tools did not work in the same way as the organs they were supposed to prolong. On the contrary, he suggested that 'the limb or organ which is assisted [can] be considered as an instrument and even detached from the body or at least considered separately. This implies the existence of a mental model of activity involving tools and secondly, through a kind of reversal, this model being applied to the body itself. [...] And instead of a hammer or club being an "enhanced fist", does the fist not rather simulate, quite ineffectively moreover, a club or hammer?' (Sigaut 2012: 97). In this way, for him, all technical actions involve equipment even when tools are apparently absent.
4) *The link between technology and prehistory*: While Pitt Rivers worked on the two activities at the same time, Leroi-Gourhan shifted from the study of technology to the study of prehistory. Sigaut was never a prehistorian but he thought that prehistorians' approach to techniques could bring new insight into the anthropology of techniques, particularly through attention paid to traces and marks and the experimental reconstitution of technical gestures (e.g. grinding).
5) *The evolution and origin of techniques*: Sigaut never attempted to portray an evolution of techniques. Conversely, he studied the origins of activity involving tools which was a recurrent theme in his articles and was discussed at length in his last book (2012). However, he did not discuss prehistorical tools at all to shed light on this question and instead used ethology to explain the emergence of tools in the era of ancient hominins. Thus each species lives in 'its' own world defined by its physiology, requirements, behavioural schemas, perceptual system, etc. This is Jacob von Uexküll's concept of the *Umwelt*. And yet the involvement of tools opens up this closed world because humans' universe was no longer directly connected to their biology.

7. Conclusion

How has posterity treated these three personalities? Pitt Rivers was fairly quickly forgotten before his reputation was reinstated. He was considered a great archaeologist in the 1930s particularly by Sir Mortimer Wheeler (Bowden 1991: 166). At Oxford, a whole team of researchers are studying his work and his remarkable collection (see the website 'Rethinking Pitt Rivers'). In France, François Sigaut brought him back to people's attention at a seminar at the School of Advanced Studies in the Social Sciences (EHESS) devoted to the birth and development of technology (Sigaut 1990).

Leroi-Gourhan left a circle of 'disciples' who carried out varied fieldworks on all the continents. Today, a new generation of prehistorians trained by these disciples is working in Leroi-Gourhan's spirit, namely a paleoethnological approach. In particular, this is the case of the *Ethnologie Préhistorique* team, the heirs of the laboratory of the same name founded by Leroi-Gourhan in 1967 (Valentin *et al.* 2015). However, this work on technology has not spread much elsewhere although it is cited a great deal (see for example Beaune 2000). In the field of ethnology, he taught students at the *Centre for Education in Ethnological Research* (CFRE) which he created in 1947, some of whom became professional researchers such as Hélène Balfet and Robert Cresswell (Soulier 2015). However, to my knowledge, no ethnologists today consider themselves to be following on from Leroi-Gourhan's works.

Without really attempting to do so, François Sigaut created a genuine school of thought. He taught many of his students – some of whom became career researchers – the importance of attention to details and the need for a true 'technography' which he considered the only ways to escape from the too general or artificial categories with which people too often content themselves. However he passed away too recently for us to determine what his legacy will be in coming decades.

François Sigaut drew a parallel between Pitt Rivers and Leroi-Gourhan. He suggested that, for both men, the object remained the central concern and action only interested them if it enabled them to understand an aspect of an object. This is the contrary of other authors like Haudricourt, building on Marcel Mauss, who considered techniques as schemes of action in which objects only play a secondary role (Sigaut 1990: 34). Sigaut noted with irony that Pitt Rivers did not cite his contemporaries (Frantz Reuleaux and Lewis Morgan among others). Similarly, Leroi-Gourhan cited his contemporaries and predecessors as little as possible and indeed never quoted his most direct predecessor, Pitt Rivers, whose work he probably had not read. Sigaut noted that both slightly vainly opted for intellectual solitude and thus hindered the principle of continuity in progress which was conversely so dear to them. 'No innovation, which means no science, is possible if all researchers believe they are forced, like Sisyphus, to roll the same rock back up the hill' (Sigaut 1990: 34).

Common interests can be observed in the work of these three personalities such as the link between humans and technology and they also question humanity's specific features. All three had the same attention to details combined with openness to neighbouring disciplines. But, however close their centres of interest were, all three were nonetheless highly influenced by the major questions of their own eras. In this way, Pitt-Rivers' quest for a portrait of the general evolution of techniques echoes his contemporaries' obsession for chronology. Leroi-Gourhan, on the other hand, paid great attention to the interactions between humans and their environment which could reflect the burgeoning interest in this subject in the middle of the xxth century. Finally, Sigaut above all worked on the insertion of techniques into activities as a whole from a more inclusive standpoint and even studied very contemporary questions such as suffering at work. Three men, three eras but the same quest for humans' specific characteristics and their relations with tools, their environment and the society in which they live and evolve. Fundamentally, three humanists.

References

Beaune, S.A. de (2000). *Pour une archéologie du geste. Broyer, moudre, piler, des premiers chasseurs aux premiers agriculteurs.* Paris: CNRS Éditions.

Beaune, S.A. de (2011). La genèse de la technologie comparée chez André Leroi-Gourhan. Introduction à son article 'L'homme et la nature', paru dans *L'Encyclopédie française* en 1936. *Documents pour l'Histoire des Techniques*, 20, pp. 197-223.

Beaune, S.A. de (2013a). Le musée comme lieu d'administration de la preuve. Genèse et destin de deux collections du XIX[e] siècle. *Gradhiva. Revue d'anthropologie et d'histoire des arts*, 18, pp. 166-199.

Beaune, S.A. de (2013b). François Sigaut (1940-2012), agronome et technologue. *Revue de Synthèse*, 134, 6e s.(1), pp. 115-124. Available at: doi:10.1007/s11873-013-0211-1 [Accessed 14 Oct. 2019].

Bowden, M. (1991). *Pitt Rivers. The Life and Archaeological Work of Lieutenant-General Augustus Henry Lane Fox Pitt Rivers*. Cambridge: Cambridge University Press.

Collectif (1986). Hommage à André Leroi-Gourhan. *Terrain, Carnets du Patrimoine ethnologique*, 7, pp. 61-76.

Collectif (1987). Hommage de la SPF à André Leroi-Gourhan. *Bulletin de la Société préhistorique française*, 84 (10-12), pp. 291-425.

Collectif (1992). Un homme... une œuvre : André-Leroi-Gourhan. *Les Nouvelles de l'Archéologie*, 48-49, pp. 5-54.

Clastres, P. (1974). *La Société contre l'*État. Paris: éditions de Minuit.

Descamps, P. (1923). L'atelier chez les sauvages. *Revue de l'Institut de sociologie*. 4th year, I(3), november, pp. 352-378.

Descamps, P. (1925). *Les causes du matriarcat*. Paris: Mercure de France.

Joulian, F., dir. (2011). Geste et matière. André Leroi-Gourhan, découvertes japonaises. *Techniques & culture*, 57. Available at: https://journals.openedition.org/tc/5261 [Accessed 14 Oct. 2019].

Lacombe, P. (2009) [1889]. *Mariage, famille et parenté selon Paul Lacombe – I – L'évolution du mariage*. Paris: Ibis Press, coll. Résurgences. Foreword François Sigaut, Texts Françoise Héritier, Martine Segalen and Jean-Luc Jamard.

Lane Fox, A.H. (1906). Primitive warfare II. In Lane Fox Pitt-Rivers, *Evolution of culture and other essays*. Oxford: Clarendon Press, pp. 89-143 [1st ed. *Journal of the Royal United Service Institution*, 1868, XII, pp. 399-489].

Lane Fox, A.H. (1875). On the principles of classification adopted in the arrangement of his anthropological collection, now exhibited in the Bethnal Green Museum. *Journal of the Anthropological Institute,* 4, pp. 293-308. Available at: http://web.prm.ox.ac.uk/rpr/index.php/article-index/12-articles/192-principles-of-classification.html [Accessed 14 Oct. 2019].

Leroi-Gourhan, A. (1936a). *La civilisation du renne*. Paris: Gallimard.

Leroi-Gourhan, A. (1936b). L'homme et la nature. *L'Encyclopédie française* VII : 7'10-3 à 7'10-16 et p. 7'12-1 à 7'12-4.

Leroi-Gourhan, A. (1943). *Évolution et techniques. I. L'homme et la matière*. Paris: Albin Michel.

Leroi-Gourhan, A. (1945). *Évolution et techniques. II. Milieu et techniques*. Paris: Albin Michel.

Leroi-Gourhan, A. (1950). *Les fouilles préhistoriques. Techniques et méthodes*. Paris: Picard.

Leroi-Gourhan, A. (1965a). *Le geste et la parole. II. La mémoire et les rythmes*. Paris: Albin Michel.

Leroi-Gourhan, A. (1965b). *Préhistoire de l'Art occidental*. Paris: Mazenod.

Leroi-Gourhan, A. (1982). *Les racines du monde. Entretiens avec Claude-Henri Rocquet*. Paris: Belfond.

Leroi-Gourhan, A. (1983). *Mécanique vivante. Le crâne des vertébrés du poisson à l'homme*. Paris: Fayard.

Leroy, C.-G. (2006) [1768]. *L'intelligence des animaux*. Preface Boris Cyrulnik, Texts and analysis François Sigaut, Jean-Luc Renck, Véronique Servais and Dr. Robinet, Paris: Ibis Press.

Pitt Rivers, A.H. Lane Fox (1883). Address to the Antiquarian Section at the Annual Meeting of the Archaeological Institute, held at Lewes. *Archaeological Journal*, 41, pp. 58-78.

Pitt Rivers, A.H. Lane Fox (1887). Inaugural Address to the Annual Meeting of the Archaeological Institute, held at Salisbury. *American Journal*, 44, pp. 261-277.

Pitt Rivers, A.H. Lane Fox (1888). Address as President of the Anthropological Section of the British Association, Bath, September 6, 1888. *Report of the British Association for the Advancement of Science*, pp. 825-835. Available at: http://web.prm.ox.ac.uk/rpr/index.php/primary-documents-index/14-general/728-baas-september-1888-1888 [Accessed 14 Oct. 2019].

Pitt Rivers, A.H. Lane Fox (1891). Typological museums, as exemplified by the Pitt Rivers Museum at Oxford, and his provincial museum at Farnham, Dorset. *Journal of the Society of Arts*, 40, pp. 115-122. Available at: http://web.prm.ox.ac.uk/rpr/index.php/article-index/12-articles/189-typological-museums.html [Accessed 14 Oct. 2019].

Sigaut, F. (1978). Identification des techniques de récolte des graines alimentaires. *Journal d'Agriculture Tropicale et de Botanique Appliquée*, 25(3), pp. 145-161.

Sigaut, F. (1981). Pourquoi les géographes s'intéressent-ils à peu près à tout sauf aux techniques ? *L'espace géographique*, 4, pp. 291-293.

Sigaut, F. (1987a). Haudricourt et la technologie. Preface. In A.-G. Haudricourt, *La technologie science humaine*. Paris: Maison des Sciences de l'Homme, pp. 9-34.

Sigaut, F. (1987b). Renouer le fil. *Techniques & Culture*, 9, pp. 1-15.

Sigaut, F. (1990). De la technologie à l'évolutionnisme, l'œuvre de Pitt Rivers. *Gradhiva. Revue d'anthropologie et d'histoire des arts*, 8, pp. 20-37.

Sigaut, F. (1991a). Les techniques de récolte des grains : identification, localisation, problèmes d'interprétation. In M.-C. Cauvin, dir., *Rites et rythmes agraires*. Lyon: Maison de l'Orient méditerranéen, pp. 31-43.

Sigaut, F. (1991b). Folie, réel et technologie. À propos de Philippe Bernardet, Les Dossiers noirs de l'internement psychiatrique, Paris, Fayard, 1989. *Techniques & Culture*, 15, pp. 167-179 [republished in 2004, *Travailler*, 12, pp. 117-130].

Sigaut, F. (2009). Techniques, technologies, apprentissage et plaisir au travail... *Techniques & Culture, 52-53,* pp. 40-49.

Sigaut, F. (2010). Les techniques et l'histoire – D'où vient l'incompatibilité ? In S. A. de Beaune, dir., *Écrire le passé, la fabrique de la préhistoire et de l'histoire à travers les siècles.* Paris: CNRS Éditions, pp. 251-260.

Sigaut, F. (2012). *Comment* Homo *devint* faber. *Comment l'outil fit l'homme.* Paris: CNRS Éditions, coll. Le passé recomposé.

Sigaut, F. and Cresswell, R., dir., (1987). Des idées pour observer. *Techniques & Culture*, special volume, 9.

Soulier, P. (2003). André Leroi-Gourhan et l'anatomie humaine : De la craniologie à la fouille des sépultures. In *Sens dessus dessous. La recherche du sens en Préhistoire. Revue archéologique de Picardie*, special n°, 21, pp. 23-50.

Soulier, P. (2015). André Leroi-Gourhan, un anthropologue encyclopédiste au XX^{e} siècle. In P. Soulier, dir., *André Leroi-Gourhan., « l'homme tout simplement »*, Paris: éditions de Boccard, Travaux de la Maison de l'Archéologie et de l'ethnologie, René-Ginouvès, 20, pp. 15-46.

Soulier, P. (2018). *André Leroi-Gourhan (1911-1986). Une vie*. Paris: CNRS Éditions, coll. Le passé recomposé.

Thompson, M.W. (1977). *General Pitt Rivers. Evolution and Archaeology in the Nineteenth Century*. Bradford-on-Avon: Moonraker.

Valentin, B., Olive, M., Valla, F., Audouze, F., Beaune, S.A. de, Soulier, P., Chambon, P. and Bodu, P. (2015). Où en est l'ethnologie préhistorique ? In P. Soulier (dir.), *André Leroi-Gourhan., « l'homme tout simplement »*. Paris: éditions de Boccard, Travaux de la Maison de l'Archéologie et de l'ethnologie, René-Ginouvès, 20, pp. 173-186.

The tragic fate of heroic precursors in the history of archaeology: the case of Boucher de Perthes

Oscar Moro Abadía
Memorial University of Newfoundland – Canada
omoro@mun.ca

Abstract

During the first part of the twentieth century, the history of science was mainly conceived as the story of those precursors that had contributed to scientific progress. This historiography was grounded on a hagiographical conception of history according to which, quoting Thomas Carlyle's famous sentence, 'the history of the world was but the biography of great men'. In the case of the history of archaeology, pioneers were typically praised for making 'great discoveries' about the past and, therefore, for contributing to the establishment of modern scientific archaeology. Among these precursors, Jacques Boucher de Perthes was celebrated as the 'father' of prehistoric archaeology. In short, he was unanimously acclaimed for being the first to establish the prehistoric antiquity of humankind. However, as I examine in this paper, hagiographical approaches are problematic. Without denying that Boucher de Perthes made significant contributions to the history of archaeology, an entirely different picture of this 'heroic discoverer' emerge when we put him in his historical context.

Keywords: Boucher de Perthes, Prehistory, Precursors, Pioneers

Résumé

Pendant la première moitié du XXe siècle, l'histoire de la science a été conçue comme l'histoire de ces précurseurs qui avaient contribué au progrès scientifique. Cette historiographie était fondée sur une conception hagiographique de l'histoire selon laquelle, citant la célèbre phrase de Thomas Carlyle, « l'histoire du monde n'était que la biographie de grands hommes ». Dans le cas de l'histoire de l'archéologie, ces précurseurs étaient généralement félicités pour avoir fait de grandes découvertes sur le passé et avoir contribué à l'établissement de l'archéologie scientifique moderne. Parmi ces précurseurs, Jacques Boucher de Perthes a été souvent célébré comme le « père » de l'archéologie préhistorique. En effet, il a été presque unanimement considéré comme le premier à avoir établi l'antiquité préhistorique de l'homme. Cependant, comme je l'examine dans cet article, cette approche hagiographique pose problème. Sans nier la contribution significative de Boucher de Perthes à l'histoire de l'archéologie, une image entièrement différente de ce « découvreur héroïque » émerge lorsque nous le plaçons dans son contexte historique.

Mots-clés: Boucher de Perthes, Préhistoire, précurseurs, pionniers

1. Introduction

> 'The history of archaeology is commonly seen as the history of great discoveries: the tomb of Tutankhamun in Egypt, the lost Maya cities of Mexico, the painted caves of the Old Stone Age, such as Lascaux in France, or the remains of our human ancestors buried deep in the Olduvai Gorge in Tanzania' (Renfrew and Bahn 2005: 21).

These words from Colin Renfrew's and Paul Bahn's *Archaeology: Theories, Methods, and Practice* (2007) illustrate a narrative that dominated the history of archaeology until the end of the twentieth century. This historiography may be characterized by, at least, two main features. In the first place, the history of archaeology was understood as the story of the great discoveries about the past. In other word, historians typically focused on those discoveries that captured the imagination of audiences eager to learn more about the most emblematic archaeological sites, such as the

Valley of the Kings, the Egyptian pyramids and the ruins of Pompeii. In the second place, the history of archaeology was seen as the history of the 'great men' who made those discoveries. Archaeologists such as Wincklemann, Thomsen, Pitt-Rivers and Petrie were praised by their great contributions to the history of their discipline. This historiographical model (sometimes known as the 'development-by-accumulation model') was by no means exclusive to archaeology. As Rachel Laudan has pointed out, 'the presumption that scientific knowledge is progressive has provided the dominant historiographic framework until very recently. It has given a rationale for narrative as the appropriate historical form' (Laudan 1993: 2). In short, fabulous tales of past discoveries largely dominated the historiography of science from the beginnings of the nineteenth century to the mid-twentieth century.

In the 1960s and the 1970s, some relevant historians suggested that the abovementioned historiographical model was no longer adequate (Kuhn 1962; Toulmin 1965; Bloor 1991). To begin, they pointed out that the history of science could not be conceived as the inevitable conquest of error by truth. For instance, Thomas Kuhn argued that 'perhaps science does not develop by the accumulation of individual discoveries and inventions' (Kuhn 1962: 2). Moreover, according to these authors, the idea of 'discovery' that was at the core of the 'old' history of science (according to which discoveries were self-evident and unproblematic events) was defective in many ways (e.g. Hanson 1958; Grmek *et al.* 1981). They suggested that discoveries could be rarely individualized and, in most cases, they were retrospective labels that served as marks of identity for the scientific community (Nickles 1980; Zahar 1983). Finally, they argued that concepts such as 'precursor' or 'heroic discoveries' were equally inadequate to understand the history of science. For instance, Thomas Kuhn suggested that 'rather than seeking the permanent contributions of an older science to our present vantage, [historians have to] attempt to display the historical integrity of that science in its own time' (Kuhn 1962: 3). To sum up, in the 1960s, 'study of the history of science [...] changed of all recognition. In a word, it [was] "professionalized"' (Russell 1984: 777). The raising of professional standards had as a main consequence the development of a 'new' historiography in many scientific disciplines. In the case of archaeology, scholars such as Bruce Trigger (1980, 1984, 1989) and Alain Schnapp (1977, 1993) developed new approaches in the 1980s that were mainly concerned with exploring the social, political and economic factors that had influenced the interpretation of archaeological data.

However, traditions die hard and there is a certain kind of historiography that keep telling heroic tales about past glories of science. This is particularly true in the case of archaeology, a discipline in which great discoveries still inspire a sense of mystery, wonder and fascination (Fagan 1994, 1996; 2007; Bahn 1995, 1996, 1999). Additionally, archaeologists keep promoting hagiographical views on their predecessors. For this reason, I examine in this paper some of the problems associated to the concept of 'precursor' in the history of science. To do so, I begin by considering a number of critiques to this concept elaborated by French historians and philosophies of science. Then, I focus on Boucher de Perthes, one of the most celebrated pioneers in the history of archaeology. This choice is not random. First, in many ways, Boucher de Perthes is a paradigmatic precursor. He is not only praised for being the first to establish the prehistoric antiquity of humankind but, also, he is considered as the 'father' of prehistoric archaeology (Daniel 1981; Renfrew & Bahn 2005, Groenen 2009). Second, last year (2018) we celebrated the one hundred and fifty years of his death. On that occasion, a number of activities were organized to celebrate his legacy. In this setting, I thought that it would be interesting to take into consideration some alternative viewpoints about this eminent archaeologist.

2. The French School of Historical Epistemology and the Concept of 'Precursor'

As we have seen in the previous section, the history of science was first conceived as the story of those 'discoverers', 'genius', 'pioneers', 'precursors' and 'forerunners' that had contributed to the progress of science. While these terms are all different, historians of science often use them

interchangeably to refer to those 'great men' that had contributed to the progress of science (for a more detailed account, please see Moro Abadía & Pelayo 2010). Early historians of science typically attributed two main qualities to these 'great men'. In the first place, scientific men were considered people of extraordinary intellect and talent able to make contributions in one or many branches of knowledge. Isaac Newton became the architype of these qualities. For instance, in one of the first Newton's scientific biographies, David Brewster mentioned 'how interesting must it be to follow the most exalted genius through the incidents of common life; to mark the steps by which he attained his lofty pre-eminence, to see how he performs the function of the social and the domestic compact, how he exercises his lofty powers of invention and discovery (Brewster 1835: 2). In the second place, heroic discoverers were typically defined as 'precursors' of 'forerunners', that is, scholars who went in advance to announce the 'triumph of truth'. For example, in his book *The Founders of Geology* (published in 1897), Archibald Geiki suggested that 'if all history is only the amplification of biography, the history of science may be most instructively read in the life of the men by whom the realm of Nature was successively won' (Geikie 1962: 3-4). In other words, early histories of science were mainly the story of those 'precursors' who had contributed to the progress of scientific knowledge.

While the preeminent position of 'precursors' in the history of science remained largely unquestioned in England and the United States until the second half of the twentieth century, a number of French philosophers and historians called into question the role of this 'great men' in the history of science in the 1920s and the 1930s. Particularly relevant in this context was the 'French School of Epistemology' (or the 'French School of Historical Epistemology'), a label used in the English-speaking world to refer to the work of a number of French scholars that, during the 20th century, reflected on the history and the epistemology of science. The philosophers Gaston Bachelard and Georges Canguilhem, the mathematician Jean Cavaillès and the historians Hélène Metzger and Alexandre Koyré are usually included in this group. While they developed different approaches to the study of science, they all shared a number of traits. In particular, they proposed a *historization* of science; that is, they defined science as an activity that is fully rooted in its historical context. In this setting, they reflected on the historical dimensions of science and rejected the grand narratives of scientific progress. Philosophers like Bachelard, Canguilhem or Foucault suggested that the history of science was not the story of the long journey from superstition to rationality, but the history of those obstacles, discontinuities and displacements that were correlative to the constitution of scientific knowledge.

The first historians to question the notion of 'precursor' were Alexandre Koyré and Hélène Metzger. In the 1930s, the historian of chemistry Hélène Metzger discusses the role of precursors in the evolution of science (Metzger 1937-1939). She argued that positivist histories were stories full of excitement and of exciting personalities, stories based on the determination of individuals such as Newton or Lavoisier. Nevertheless, Metzger wondered whether precursors were, to a certain extent, the creation of historians. From a positivist point of view, a precursor is a prophet who announces the truth ignored by his contemporaries. Because of his contribution, he is immediately placed on the side of those who made science advance, sheltered from those superstitions which delay scientific progress. Nevertheless, as Metzger demonstrated in her works on Newton and Van Helmont, forerunners are people in whom science, politics and religion are inextricably mixed.

Influenced by Metzger's and Koyre's works, George Canguilhem criticized what J.T. Clark had called the 'virus of precursor' (Clark 1959); i.e. the tendency among historians to look for and celebrate predecessors. According to Canguilhem, the aim of the history of science is to understand scientific practices in their historical context. This is only possible if we assume that science is a contingent activity; that is, an activity subjected to change. However, the concept of precursor denies the contingent nature of science: 'If precursors existed, then the history of science would lose all meaning, for science itself would have a historical dimension only in appearance' (Canguilhem 1968: 21). According to Canguilhem, the positivist definition of precursors as forerunners

neglects the historical and contingent dimension of science because it implies that predecessors belong to two different ages: the past in which they lived and the future that they anticipated. This juxtaposition of ancient and contemporary times hinders historical knowledge. Therefore, Canguilhem concluded that we need to eliminate the notion of precursor from the history of science.

While these arguments should be enough to be suspicious about the 'great genius' of science, the example of Boucher de Perthes can illustrate some of the concrete problems associated to this notion.

3. Boucher de Perthes as the precursor of prehistoric archaeology

Without a doubt, Jacques Boucher de Perthes is unanimously considered as the 'father' of prehistory. It is sufficient to take a glance at some recent publications to realize about his eminent role in the history of archaeology. For instance, Paul G. Bahn has recently written that 'the final milestones in the establishment of human antiquity came in France, and the most responsible for providing the final proof was Jacques Boucher de Perthes [who] demonstrated in a very influential manner that stone tools could be found well stratified in the same layers as bones of mammoth and woolly rhino' (Renfrew and Bahn 2005: 10). Together with these hagiographical approaches, the last years have witnessed the publication of a number of works on Boucher de Perthes that have promoted a more critical approach to this scholar (e.g. Cohen & Hublin 1989; Hublin 1989; Goodrum 2009; Blanckaert 2010; Hurel & Coye 2011; Sacket 2000, 2014; Schlanger 2012, 2015). Taking as reference these works, I examine in this paper some well-established assumptions about Boucher de Perthes.

To begin, let's remember Boucher de Perthes' story as it is told in a traditional historiographical account,

> 'Jacques Boucher de Crevecœur de Perthes (1788-1868) was a minor customs official at Abbeville [...] He became interested in what he called the pre-Celtic or diluvial remains of man in the form of roughly chipped flints, and the bones of extinct animals found in quarriers near Abbeville [...] His finds were at first not believed in and he was regarded as a crank [...] In 1847 he published the first volume of a three-volume work entitled *Antiquités Celtiques et Antédiluviennes* [...] Most of the contemporary French geologists were still catastrophists and many did not even believe in the human nature of what Boucher de Perthes claimed as artifacts [...] In England in 1858, in quarrying the rock which overlooks Brixham Harbour, across the bay from Torquay, a new cave was found. Pengelly carried out excavations there from the summer of 1858 to the summer of 1859: they revealed indisputable proof of the association of flint tools with the bones of extinct animals [...] But meanwhile English geologists and archaeologists had visited the Somme gravels and found the claims of Boucher de Perthes convincing [...] The tide had turned: the antiquity of man was established' (Daniel 1981: 51-53).

Daniel's words summarize a number of traits that are common to most historiographical accounts on Boucher de Perthes. In the first place, Boucher de Perthes is typically considered as the first scientist who suggested the prehistoric antiquity of humankind. For this reason, he has been elevated to the rank of 'precursor' of prehistoric archaeology. As Matthew Goodrum has pointed out, 'many authors consider Boucher de Perthes to be important because he recognized the meaning of these flint implements earlier than did many others' (Goodrum 2009: 341). In other words, he is considered as a pioneer of prehistoric archaeology because he supported the prehistoric antiquity of humankind *before* such statement was accepted by the scientific establishment. In the second place, Boucher de Perthes has been generally depicted as a prominent scientist fighting hard to defeat the prejudices of his time. Boucher de Perthes's tireless battle is usually described as the clash of the future against the past, the conflict between his brilliant mind and those reactionaries who opposed the progress of science. For instance, in the first English translation of *Les Hommes*

Fossiles, Marcelin Boule wrote: 'Far from being discouraged, Boucher de Perthes continued, with fine perseverance and good nature, to combat this systematic and often sarcastic opposition' (Boule 1923: 10). Significantly, this description is very similar to the one proposed by Marc Groenen in 2009: '[In 1849] Boucher de Perthes decided to publish his book, but opposition was strong, and during 10 years, first he was forced to fight against the disdainful silence of his adversaries, then he had to confront violent opposition and, finally, he had to combat prejudices' (Groenen 1994: 25-26). In other words, the case of Boucher de Perthes illustrates the kind of historiography that interprets the history of science as a fight between progressive and reactionary elements. In the third place, as the historian Herbert Butterfield pointed out, this way of interpreting the history of science leads to an over-dramatization of the historical narrative. In particular, the impact of precursors is typically exaggerated as if they were the only responsible for certain dramatic changes in the history of science. Boucher de Perthes' depiction in more histories of archaeology illustrates this overdramatization. In particular, he is typically depicted as the responsible of a massive and quick *conversion* in the history of science (e.g. Daniel 1981; Renfrew and Bahn 2005).

It is beyond doubt that Boucher de Perthes played a role in the recognition of the idea of 'prehistory'. It is equally true that he was among the first to elaborate this idea in *Antiquités Celtiques et Antédiluviennes*. Nevertheless, the image of Boucher de Perthes promoted by the traditional historiography is defective in many ways. In particular, his fight has often been exaggerated and some of his ideas have not been adequately contextualized. In the first place, Boucher de Perthes is often depicted as someone ahead of his contemporaries, someone who anticipated the truth about the prehistoric origins of humankind. However, as some recent works have shown (e.g. Blanckaert 2010, Schlanger 2015), he was certainly not too modern for his time. To begin, he opposed Darwinism and all those theories 'suggesting that man descended from apes' (Boucher de Perthes 1864: 630). He insisted that God created humans in their current form and, therefore, that humans had not evolved from a common ancestor. As a matter of fact, Boucher de Perthes never renounced to the creationist paradigm. His use of the term '*antédiluvien*' is particularly relevant concerning this point. Moreover, as many authors have pointed out, he was not a scientist, but an amateur that developed 'an almost visionary view in his search of lost time in which enthusiasm replaced empirical rigor' (Blanckaert 2010: 7). In this setting, from a methodological view, his work can certainly not be considered as particularly advanced from his time.

Moreover, Boucher de Perthes' passionate defense of the prehistoric antiquity of humankind has been typically exaggerated. While he supported this idea, 'he did not belong to scientific circles. He possessed neither the codes nor the discipline of scientists' (Blanckaert 2010: 8). As early as 1865, John Lubbock wrote that 'for seven years, M. Boucher de Perthes made few converts; he was looked upon as an enthusiast, almost as a madman' (Lubbock 1865: 269). More recently, historians of archaeology have insisted that he 'was perceived as little more than a provincial amateur using outdated theories and presenting spurious data' (Meltzer 2015: 29). As these examples illustrate, notorious scientists paid little attention to Boucher de Perthes before 1859. For instance, in a letter addressed to Charles Lyell on March 17, 1863, Charles Darwin wrote: 'I know something about his errors, and looked at his book many years ago, and am ashamed to think that I concluded the whole was rubbish!' (Darwin 1898: 200). In other words, Boucher de Perthes did not belong to the scientific community and, therefore, he was not in the position of making an impact among world-renowned scholar.

Finally, Boucher de Perthes's impact in the history of archaeology has also been inflated. In fact, the name of Boucher de Perthes has eclipsed the role of other scholars in the process of recognition of human antiquity. This is particularly true in the case of Casimir Picard. As it is well-known, Boucher de Perthes spent most of his life as a custom official at Abbeville and he became interested in archaeology only when, later in his life, he met Casimir Picard, a physician and naturalist who played an important role in the development of lithic studies during the nineteenth century. As several historians have commented, Boucher de Perthes built on Picard's

work to suggest the prehistoric antiquity of humankind: 'Dr. Casimir Picard (1806-1841) might easily have become the hero of our story had he not tragically succumbed to pneumonia at the age of thirty-four. He, unlike Boucher, was a hard headed empiricists who believed that a scientific antiquarian must first gain a detailed knowledge of the intrinsic makeup of artefacts themselves before becoming overly concerned about their possible culture-historical significance' (Sackett 2014: 5). In other words, Boucher de Perthes 'prophetic figure par excellence, finds himself in the position of a "*précurseur 'précursé'*" (Schlanger 2012: 42). However, with the remarkable exception of Léon Aufrere's work (1936, 2007, 2015), the works of Casimir Picard have deserved little recognition until recently. Moreover, the cliché according to Boucher de Perthes' *Antiquités Celtiques et Antédiluviennes* provoked the conversion of the entire scientific world is a doubtful one. As several historians have pointed out, the critical event that led to the 'conversion' of the scientific establishment was not Boucher de Perthes' book but the excavation of at Brixham cave by members of the Geological Society of London to reassess the evidence for human antiquity in 1858 and 1859. In other words, the publication of *Antiquités Celtiques et Antédiluviennes* did not lead to the recognition of prehistory. On the contrary, it was the excavation at Brixham cave that led to the *ad hoc* recognition of *Antiquités Celtiques et Antédiluviennes* as an important work in the history of archaeology.

4. Some Concluding Thoughts

The image of Boucher de Perthes promoted by traditional historians is very much the product of a positivist view of the history of archaeology. This historiography is embedded in the assumption that science makes progress thanks to the works of a number of 'genius' or 'precursors'. Following this logic, precursors are depicted as people too advanced for their time. However, as the case of Boucher de Perthes illustrates, this is rarely the case. Precursors are usually quite typical of their time and they are affected by the climate of opinion in which they live. Boucher de Perthes had only one head. The same person who suggested the prehistoric antiquity of humankind was also a fervent supporter of creationism. In this setting, if we aspire to understand the contributions of past scientists we need to consider them in their complexity.

Historians and philosophers of science have demonstrated that 'precursor' is a weak and flawed term that can be easily refuted. In this setting, we can legitimate wonder whether we should completely renounce to this concept in the field of the history of science. This is problematic for a number of reasons. First, this term is so widespread among historians of science that it is difficult to imagine a history of science without 'precursors' and 'discoveries'. Second, precursors play an important role in the establishment of scientific traditions, the institution of scientific disciplines, and the securing of a disciplinary identity. For these reasons, instead of eliminating a concept that is as old as the history of science itself, it is probably more productive to use it in a more critical way. This is what I tried to achieve in this paper.

References

Aufrère, L. (1936). *Essai sur les premières découvertes de Boucher de Perthes et les Origines de l'Archéologie Primitive (1838-1844)*. Paris: Librairie L. Staude.

Aufrère, L. (2007). *Le cercle d'Abbeville. Paléontologie et préhistoire dans la France Romantique*. Turnhout: Brepols Publishers.

Aufrère, L. (2015). *Boucher de Perthes. Imaginer la préhistoire.* Paris: CNRS.

Bahn, P.G. (1995). *100 Great Archaeological Discoveries*. New York: Barnes & Noble.

Bahn, P.G. (1996). *The Story of Archaeology: The 100 Great Discoveries*. London: Weidenfeld & Nicolson.

Bahn, P.G. (1999). *Wonderful things: Uncovering the World's Great Archaeological Treasures.* London: Weidenfeld & Nicolson.

Blanckaert, C. 2010. Les 'Trois Glorieuses De 1859' [Broca, Boucher de Perthes, Darwin] et la genèse du concept de races historiques. *Bulletins et Mémoires de la Société d'Anthropologie de Paris*, 22, pp. 3-16.

Bloor, D. (1991). *Knowledge and Social Imagery* (First published in 1976). Chicago: University of Chicago Press.
Boule, M. (1923). *Fossil Men. Elements of Human Paleontology*. Edinburgh: Oliver and Boyd.
Brewster, D. (1875). *Life of Sir Isaac Newton*. London: William Tegg.
Canguilhem, G. (1968). L'objet de l'histoire des sciences. In G. Canguilhem 1983, Études d'*Histoire et de Philosophie des Sciences*. Paris: Vrin, pp. 9-23.
Clark, J.T. (1951). The Philosophy of Science and the history of science. In M. Clagett, ed., *Critical Problems in the History of Science*, Madison: University of Wisconsin Press, pp. 103-140.
Cohen, C. and Hublin, J.-J. (1989). *Boucher de Perthes. Les origines romantiques de la préhistoire*. Paris: Belin.
Darwin, C. 1898. *Life and Letters of Charles Darwin*. New York: D. Appleton and Company.
Hublin, J.-J. (1989). Hommes fossiles vrais et faux. L'essor de la paléoanthropologie européenne au milieu du XIXe siècle. *Bulletins et Mémoires de la Société d'anthropologie de Paris*, *Nouvelle Série* 1 (3-4), pp. 153-163.
Hurel, A. and Coye, N., (eds.) (2011). *Dans l'*épaisseur du temps: archéologues et géologues inventent la préhistoire. Paris: Publications Scientifiques du Muséum National d'Histoire Naturelle.
Daniel, G. (1981). *A Short History of Archaeology*. London: Thames and Hudson.
Fagan, B.M. (1994). *Quest for the Past: Great Discoveries in Archaeology.* Prospect Heights: Waveland Press.
Fagan, B.M. (1996). *Eyewitness to Discovery: First-person Accounts on more than Fifty of the World's Greatest Archaeological Discoveries*. Oxford: Oxford University Press.
Fagan, B.M. (2007). *Discovery! Unearthing the New Treasures of Archaeology*. New York: Thames and Hudson.
Geikie, A. 1962. *The Founders of Geology* [First Published in 1891]. New York: Dover.
Grmek, M., Cohen, R.S. and Cimino, G. (1981). *On Scientific Discovery.* Dordrecht: Reidel.
Groenen, M. (2009). Les pionniers de l'archéologie préhistorique. In A. Leroi-Gourhan, *L'art parietal. Langage de la préhistoire*. Grenoble: Jérôme Millon, pp. 15-34.
Goodrum, M.R. (2009). The history of human origins research and its place in the history of science: Research, problems and historiography. *History of Science*, xlvii, pp. 337-357.
Hanson, N.R. (1958). *Patterns of Discovery.* Cambridge: Cambridge University Press.
Laudan, R. (1993). Histories of the sciences and their uses: A review to 1913. *History of Science*, xxxi, pp. 1-34.
Lubbock, J. (1865). *Pre-historic Times, as illustrated by ancient remains, and the manners and customs of modern savages.* London: Williams and Norgate.
Meltzer, D.J. (2015). *The Great Paleolithic War. How Science Forged and Understanding of America's Ice Age Past.* Chicago: The University of Chicago Press.
Metzger, H. (1937-1939). Le role des précurseurs dans l'évolution de la science. Thalès, 4, pp. 199-209.
Moro Abadía, O. and Pelayo, F. (2010). Reflections on the concept of 'precursor': Juan de Vilanova and the discovery of the Altamira. *History of the Human Sciences*, 23 (4), pp. 1-20.
Nickles, T., ed. (1980). *Scientific Discovery. Logic and Rationality.* Dordrech: Reidel.
Kuhn, T. (1962). *The Structure of Scientific Revolution*. Chicago: Chicago University Press.
Renfrew, C. and Bahn, P. (eds.) (2005). *Archaeology. The Key Concepts*. London: Routledge.
Renfrew, C. and Bahn, P. (2008). *Archaeology: Theories, Methods, and Practice* (Fifth Edition). London: Thames and Hudson.
Russell, C. (1984). Whigs and professionals, *Nature*, 308 (26), pp. 777-778.
Sackett, J. (2000). Human Antiquity and the Old Stone Age: The Nineteenth Century Background to Paleoanthropology. *Evolutionary* Anthropology, 9 (1), pp. 37-49.
Sackett, J. (2014). Boucher de Perthes and the Discovery of Human Antiquity. *Bulletin of the History of Archaeology*, 24 (2), pp. 1-11.
Schaffer, S. (1986). Scientific Discoveries and the End of Natural Philosophy. *Social Studies of Science*, 16 (3), pp. 387-420.
Schlanger, N. (2012). Inverter la préhistoire. Pratiques antiquaries et naturalisations historiographies. *Les Nouvelles de l'Archéologie*, 129, pp. 42-46.

Schlanger, N. (2015). Boucher de Perthes au travail. Industrie et préhistorie au XIXe siècle. In K. Raj and H. Otto Sibum, eds., *Historie des sciences et des saviors. Tome 2. Modernité et Globalisation.* Paris: Seuil, pp. 267-282.
Schnapp, A. (1977). Per una discussione sul classicismo nell'età dell'imperialismo. Archéologie et nazisme. *Quaderni di Storia*, 5, pp. 1-26.
Schnapp, A. (1993). *La Conquête du passé. Aux Origines de l'archéologie*. Paris: Carré.
Toulmin, S. and Goodfield, J. (1965). *The Discovery of Time*. Chicago: University of Chicago Press.
Trigger, B.G. (1980). Archaeology of the image of American Indian. *American Antiquity*, 45(4), pp. 662-76.
Trigger, B.G. (1984). Alternative archaeologies. Nationalist, colonialist, imperialist. *Man*, 19(3), pp. 355-70.
Trigger, B.G. (1989). *A History of Archaeological Thought*. Cambridge: Cambridge University Press.
Zahar, E. (1983). Logic of discovery or psychology of invention? *British Journal for the Philosophy of Science*, 34, pp. 243-261.

Primitif, précurseur, contemporain. Approches de l'art paléolithique au fondement de la pensée moderne

Rémi Labrusse
Université Paris Nanterre – France

Abstract

As soon as the idea of prehistory was invented, art structurally resisted the desire of the first prehistorians to build up a fully historicized reading of reality. Concurrently, the so-called 'artistic' artefacts of Upper Palaeolithic societies crystallized the modern fascination for prehistory. A conflict was thus evinced between a super-history supposedly made possible by the invention of prehistory and the desire to get rid of history as a global interpretative prism. The questioning of evolutionism was at the core of this conflicting feeling. In this context, three positions can be identified, which embody the inner contradictions of the ideology of progress: the integration of art into the system of cultural evolution; its exclusion from this system; eventually, the defusing of a historical approach in favor of an immediate perception of the works' physical presence. The concepts of primitiveness, precursority and contemporaneousness, respectively, can capture the essence of these three positions.

Keywords: Anachronism, Evolutionism, History of Art, Palaeolithic art, Primitive

Résumé

Dès l'invention de l'idée de préhistoire, l'art oppose une résistance structurelle au désir d'historicisation globale de la réalité qui sous-tend le projet scientifique des premiers préhistoriens. Parallèlement, la fascination pour la « préhistoire » se concentre sur la création dite « artistique » des sociétés du Paléolithique supérieur. Dans ce contexte, trois approches de l'historicité de cet art coexistent et révèlent les contradictions internes de l'évolutionnisme culturel. La première intègre l'art au processus global de la civilisation, en l'identifiant chronologiquement au « primitif ». La deuxième voit dans la création artistique l'expression d'un instinct immuable, justifiant la mise en évidence d'une continuité anachronique entre passé et présent, ce que reflète le terme de « précurseur ». La troisième se fonde sur la perception immédiate des œuvres paléolithiques, notamment dans les grottes ornées, pour désamorcer la question de l'évolutionnisme, au profit d'une sensation vécue de contemporanéité qu'exprime aussi le concept d'immémorial.

Mots-clés: Anachronisme, art paléolithique, évolutionnisme, histoire de l'art, primitivité

Une première constatation : dès les années 1850 et 1860, les représentations figurées ont joué un rôle central dans la formation et le développement de l'idée de préhistoire humaine. Avec la réflexion sur l'outil, la question de l'art constitue un des deux grands axes des *Antiquités celtiques et antédiluviennes* de Boucher de Perthes, dont le sous-titre rend explicite la double orientation : *Mémoire sur l'industrie primitive et les arts à leur origine* (Boucher de Perthes 1847-1864). Certes, les « pierres-figures » de Boucher de Perthes étaient en réalité des pierres naturelles ou des éclats de silex sans intention figurative. Mais sur un plan théorique, la réflexion du savant a ouvert la voie à l'idée d'un homme préhistorique « artiste » autant qu'« ouvrier » (*ibid.*, 1, 1847, p. 15). A sa suite, les premiers préhistoriens ont insisté sur l'art, autant que sur l'outil, pour caractériser le Paléolithique, par opposition au Néolithique et aux Âges des métaux, où la question de l'outil et donc du progrès technique prédomine nettement dans les recherches. Un exemple inaugural est celui de John Lubbock qui, dans *Pre-Historic Times* en 1865, distingue d'emblée le Néolithique par ses « armes et instruments de belle facture » tandis que le Paléolithique est défini par un mode de vie, quand « l'homme partageait l'Europe avec le Mammouth [...] et autres animaux disparus » (Lubbock 1865, p. 2). Plus loin, dans le chapitre consacré aux « hommes des cavernes », il développe l'opposition entre un Paléolithique voué à l'art et des périodes postérieures recentrées sur les

inventions techniques : « On n'a pas encore trouvé [...] dans les villages lacustres de l'âge de pierre, une seule copie, quelque grossière qu'elle soit, d'un animal ou d'une plante. Ces représentations sont si rares, même sur les objets de l'âge de bronze, qu'il est douteux qu'on en puisse citer un seul cas authentique. Or on a trouvé dans ces antiques cavernes à ossements un grand nombre de jolies esquisses faites sur os, ou sur pierre, probablement avec la pointe d'un silex. [...] En considérant la condition probable de ces antiques habitants des cavernes, nous devons reconnaître leur amour de l'art » (*ibid*., p. 254-255).

Cette insistance sur la dimension artistique dans les premières caractérisations du Paléolithique a impliqué des liens méthodologiques et rhétoriques précoces entre science préhistorique et histoire de l'art. Les préhistoriens partagent avec l'histoire de l'art une attention scrupuleuse à la matérialité et à l'apparence des objets, impliquant des techniques de description communes. Certes, les œuvres dites « préhistoriques » sont avant tout considérées comme des documents (sur l'apparence physique des animaux et des hommes ou sur les comportements sociaux) tandis que la question esthétique est reléguée à la marge. Il n'empêche que, très tôt, le vocabulaire de la critique d'art s'immisce discrètement dans les textes de « palethnologie », pour reprendre le concept de Gabriel de Mortillet (Mortillet 1883, p. 2) : ce dernier, par exemple, parle d'une « population éminemment artiste » (*ibid*., p. 416) ; il a été précédé par Edouard Lartet et Henry Christy qui évoquent « l'artiste » paléolithique et sa « main sûre et exercée » (Lartet et Christy 1864, p. 259), tandis que Henri Breuil et Emile Cartailhac célèbrent « l'œuvre de véritables artistes » dont le « trait est toujours merveilleusement assuré » (Breuil et Cartailhac 1906, p. 60).

Il ne s'agit pas seulement de vocabulaire : Oscar Moro Abadía a montré, en effet, que la jeune science préhistorienne a aussi recouru à certaines catégories fondatrices des raisonnements en histoire de l'art (Moro Abadía, González Morales et Palacio Pérez 2012 ; Moro Abadía 2013 ; Moro Abadía 2015). Il en va ainsi des distinctions entre art et artisanat, entre figure et ornement ou entre naturalisme et schématisme, voire entre individualisme artistique, attesté par des « signatures », et styles collectifs ou « procédés d'école » (Piette 1894, p. 142). Dans ce contexte, les préhistoriens se montrent plutôt conformistes. Ils reprennent notamment la distinction traditionnelle de l'histoire de l'art académique entre arts majeurs et arts décoratifs, alors même que les recherches contemporaines – notamment les débats sur la question de l'ornement moderne – tendent à les remettre en cause, depuis le milieu du XIXe siècle au moins (Labrusse 2018). Parce qu'il semble conforme à la doctrine académique de la mimésis, l'art mobilier paléolithique, en particulier, est abordé comme appartenant aux « beaux-arts » : Mortillet évoque de « petits chefs-d'œuvre » (Mortillet 1883, p. 416) et Piette la « naissance des beaux-arts pendant l'ère quaternaire » (Piette 1894, p. 146). Plus largement, les analyses sur l'art paléolithique adoptent, sur des bases archéologiques évidemment fragiles, le schéma quadripartite et cyclique de la naissance, du développement, de l'épanouissement et de la « dégénérescence » des styles, traditionnel chez les historiens de l'art depuis Vasari et Winckelmann (Groenen 1994, p. 327).

Cette question de l'évolutionnisme en art, fondée sur des présupposés biologisants, se place au cœur des relations entre préhistoire et histoire de l'art. La science préhistorienne a longtemps structuré les âges « préhistoriques » sur des modèles globalement évolutionnistes, qu'ils soient strictement linéaires ou qu'ils prennent la forme de cycles successifs (Moro Abadía 2013, citant Elkins 2002, Elkins 2005 et Carrier 2008). Le premier domaine à partir duquel ont été construits ces modèles est celui des inventions techniques : ce sont elles qui fondent la distinction entre les trois Âges (pierre, bronze et fer) ; elles aussi qui justifient, au sein de l'Âge de pierre, la division entre le Paléolithique et le Néolithique, auxquels Gabriel de Mortillet a voulu ajouter (sans succès) l'Eolithique pour qualifier les premières industries du Paléolithique inférieur et moyen, et Jacques de Morgan le Mésolithique (De Morgan 1909, p. 136 ; Schlanger 2013, pour une archéologie plus large de l'invention du terme « Mésolithique »). Autrement dit, pour prouver la validité de l'évolutionnisme culturel, on a privilégié des critères matériels et techniques qui correspondaient à l'idéologie contemporaine du « progrès », plutôt que des critères existentiels et artistiques. Ainsi

pouvait-on proclamer la pertinence des idées de progrès et de « civilisation » sur le très long terme à partir d'une perspective particulière, la technique, que le présent industriel situait au cœur de sa propre identité et pour laquelle il apparaissait en effet au sommet d'un processus évolutif.

L'art, en revanche, opposait une résistance à cette perspective d'ensemble. Il apparaissait en effet difficile d'établir, au sein de la préhistoire, une progression qui fût conforme aux canons esthétiques contemporains, du schématisme au naturalisme ou du simple au complexe, que ce soit au sein du Paléolithique ou entre ce dernier et le Néolithique. Face à ces difficultés, il est possible de distinguer trois grands types de réponses.

*

La première solution a consisté à intégrer coûte que coûte l'art à une vision évolutionniste globale et, par conséquent, à caractériser l'art paléolithique comme un art « primitif », c'est-à-dire à la fois initial sur un plan chronologique et rudimentaire sur un plan matériel et esthétique. Dans cette optique, l'admiration qu'il a immédiatement suscitée ne procédait pas tant de sa valeur esthétique ou morale, forcément limitée, mais de sa valeur logique, en tant que fondation première, condition de possibilité pour assurer sa stabilité à l'ensemble de la trajectoire du « progrès » : la pauvreté esthétique de ces débuts était la raison même qui fondait leur valeur épistémologique. Dès lors qu'on pouvait construire l'évolution de l'art paléolithique sur un modèle historique, avec un début, des étapes et une fin, on se trouvait aussi en mesure de restituer la cohérence générale d'un *récit* de la préhistoire qui, en dépit de l'absence de textes, associait histoire naturelle et anthropologie, arts, techniques, constructions symboliques et usages sociaux. Ainsi Edouard Lartet identifie-t-il les étapes de l'art paléolithique à partir de l'évolution des espèces animales et donc des rapports des hommes avec leur environnement (Lartet 1861) et Edouard Piette à partir des types d'outillages (Piette 1907). Henri Breuil autonomise, quant à lui, l'évolution de l'art en fonction d'une dynamique interne, mais il n'en aboutit pas moins à la désignation de séquences narratives ordonnées sous forme de deux grands cycles culturels globaux : l'Aurignacien et le Magdalénien, avec chacun leurs étapes de croissance et de déclin (Breuil 1935).

Pour les tenants de ces narrations évolutionnistes, il restait cependant à lever une difficulté majeure : comment justifier la nature effectivement « primitive » d'un art (ou de la première phase d'un art) que ses puissantes qualités mimétiques – notamment dans les motifs animaliers – rendaient apparemment conformes aux exigences les plus « évoluées » de l'art académique moderne ? Pour ce faire, il fallait écarter la question proprement dite de l'art et recourir aux méthodes de l'ethnologie plutôt que de l'histoire de l'art. C'est ce qu'a permis le comparatisme ethnographique, sur lequel s'appuie par exemple Ernst Grosse afin de trouver une explication au caractère réaliste des « débuts de l'art » (Grosse 1894). Comme Ingeborg Reichle l'a mis en évidence (Reichle 2012), Grosse puise son inspiration à la fois chez Darwin, pour l'aspect naturaliste, et chez Taine, pour l'aspect social, et parvient ainsi à définir la primitivité des « débuts » de l'art à partir d'éléments périphériques à la forme artistique en tant que telle : les matériaux, les techniques, les usages sociaux. Selon lui, le réalisme artistique ne fait que refléter les contraintes de la lutte pour la vie propres à des sociétés originaires de chasseurs cueilleurs ; ce qui aurait pu apparaître comme un renversement de la logique évolutionniste en constitue au contraire la confirmation : « Leur réalisme est [...] la meilleure preuve de leur grande ancienneté » (Grosse 1894, p. 191). En revanche, puisque (par postulat) ces sociétés sont encore peu « évoluées », la valeur de la création artistique en tant que telle doit forcément demeurer faible. Grosse s'empresse donc de rejeter l'hypothèse de cultures centrées sur la création esthétique et symbolique, pour ne pas risquer de fissurer l'édifice idéologique de la loi du progrès : « L'horizon de l'art primitif est trop borné, ses matériaux sont trop pauvres et trop grossiers pour qu'il puisse avoir une profonde influence sociale. Quelque remarquables que puissent être certaines œuvres primitives, le caractère de la civilisation qui les a produites serait le même si l'art y faisait défaut » (*ibid.*, p. 197). En dépit de la séduction exercée au départ par le naturalisme, des arguments esthétiques viennent alors renforcer les arguments

ethnologiques attestant la primitivité de ces premières cultures et donc la cohérence globale de l'évolutionnisme culturel, comme lorsque Grosse critique l'absence de maîtrise de techniques spécifiquement artistiques comme la « perspective » qui, écrit-il, « laisse beaucoup à désirer, même dans les meilleures œuvres » (*ibid*., p. 185).

Dix ans plus tôt, Gabriel de Mortillet, tout en adoptant une interprétation culturelle tout à fait différente de ces premières sociétés, avait recouru à des raisonnements analogues pour intégrer l'art à une conception globale de la primitivité. Ethnologiquement, chez des hommes qui, estimait-il, « avaient l'esprit léger, manquaient de réflexion et de prévoyance » (Mortillet 1883, p. 421), il avait postulé l'absence d'intention symbolique (ce qui l'avait obligé, comme on sait, à ne pas reconnaître l'authenticité des grottes ornées, après la découverte d'Altamira en 1879). Et esthétiquement, dans les œuvres d'art mobilier paléolithique, il avait souligné une incapacité à structurer de véritables compositions narratives, même si les motifs étaient en eux-mêmes convaincants : « Si les artistes magdaléniens savaient parfaitement représenter des animaux isolés, ils étaient tout à fait gauches et maladroits pour les grouper et en faire des tableaux » (*ibid*., p. 417).

Malgré leurs efforts rhétoriques, ces analyses se sont cependant heurtées à des obstacles dirimants. D'une part, les preuves archéologiques étaient – et sont toujours – fragiles et largement indéterminées, qu'il s'agisse des datations ou de la signification symbolique et de la valeur sociale du mince corpus des œuvres d'art paléolithiques. D'autre part, si le comparatisme ethnographique est relativement efficace en ce qui concerne les techniques, il l'est beaucoup moins du point de vue esthétique, dans la mesure où les productions artistiques des chasseurs cueilleurs récents d'Australie, d'Afrique australe ou du Grand Nord diffèrent profondément de ce que les préhistoriens ont pu identifer dans le contexte paléolithique européen. Enfin et surtout, sur le plan de la perception, dès les premières découvertes, les œuvres mises au jour n'ont pas seulement provoqué un intérêt intellectuel pour les « débuts » de l'aventure humaine mais une authentique émotion esthétique, autonome par rapport à l'histoire, qui a contredit les efforts d'intégration de l'art à un évolutionnisme progressiste.

*

Cette émotion esthétique, aussi intense que spécifique, est à l'origine d'un deuxième type d'interprétation de la création artistique, par rapport à la loi générale du progrès. A l'inverse de la précédente, elle a consisté à exclure l'art des séquences narratives de l'évolution humaine, en proclamant sa nature innée. Dans cette perspective, le talent artistique, sous ses formes paléolithiques, n'est plus à proprement parler « primitif » : il est plutôt « précurseur ». Par opposition à une « primitivité » technologique et sociale des premières cultures humaines, il affiche d'emblée une forme d'accomplissement et il établit ainsi *par anticipation* des ponts entre le plus ancien passé et les réalisations les plus « avancées » de l'art moderne. Contrevenant à la loi du progrès, il ne s'intègre pas à l'histoire mais s'affirme comme *anachronique*.

Cette nature innée de l'art, inintégrable au grand récit évolutionniste, apparaît de manière précoce chez Boucher de Perthes, même si elle se trouve, dans ses analyses, grevée de fréquentes contradictions. Globalement, son approche de la création artistique s'inscrit dans une optique fixiste. Il rattache en effet « l'instinct d'imitation » à une constante de la nature humaine, tandis qu'il intègre au contraire le domaine des techniques à une vision évolutionniste : « Nous venons de dire que la nature affectionne certaines formes. Ce sont aussi ces mêmes formes que saisit d'abord l'instinct d'imitation, sentiment inné chez tous les êtres. Et je ne parle pas seulement de l'être humain : ce sentiment nous est commun avec les animaux. Le singe imite l'homme, il le dessine à sa manière, il copie ses gestes comme les oiseaux copient sa voix. Quant à l'homme, il copie à la fois l'homme et les animaux. Si cette remarque est vraie, et je crois qu'elle l'est, les premières ébauches artistiques ont dû être chez tous les peuples des imitations des scènes de la vie » (Boucher de Perthes, 1, 1847, p. 11). Boucher de Perthes en conclut alors facilement « qu'un peuple peut être

artiste et poète avant d'être civilisé » (*ibid*., 3, 1864, p. 61) et que les savants doivent donc mettre les arts de côté s'ils veulent avoir accès à la vérité évolutionniste des processus de « civilisation » : « C'est au perfectionnement de ses outils ou de ses moyens d'œuvres utiles et nourricières qu'on peut reconnaître la croissance véritable d'un peuple, [...] pas à ses poèmes » (*ibid*., p. 443). Sa position n'est pourtant pas dépourvue d'ambiguïtés : son attachement à l'évolutionnisme est tel, en effet, qu'il est souvent amené, dans le cours de ses analyses, à superposer des arguments évolutionnistes à son postulat de la nature innée de l'art, en constatant que les formes d'art « antédiluviennes », bien qu'expressions d'un instinct immuable, sont fondamentalement maladroites, comparées à ce qui les a suivies. Cette pseudo constatation est d'autant plus facile, on le sait, que l'archéologue a d'abord sélectionné des objets – éclats de silex ou simples pierres naturelles – particulièrement informes, qui n'avaient en fait rien d'artistique et sur lesquels il a donc pu projeter à loisir ses fantasmes.

Il n'en reste pas moins que ses réflexions sur les « pierres-figures » (*ibid*., p. 481) ont rendu intellectuellement possible, quelques années plus tard, la reconnaissance de véritables œuvres d'art paléolithiques. Chez Edouard Lartet et Henry Christy, en 1864, l'admiration esthétique pour ces petits objets « préhistoriques » récemment mis au jour conduit plus explicitement, désormais, à désuniversaliser la loi générale du progrès, en en retranchant le domaine de l'art : après avoir constaté que ces « œuvres d'art », par leur beauté remarquable, « s'accordent mal avec l'état de barbarie inculte dans lequel nous nous représentons ces peuplades aborigènes », ils en déduisent que « le progrès et la perfection dans les arts ne se manifestent pas toujours en conformité des gradations chronologiques » (Lartet et Christy 1864, p. 264). Plus tard encore, Salomon Reinach adopte la même approche et reprend même à Boucher de Perthes son concept d'« instinct » en notant que « *l'instinct* des arts du dessin n'est pas seulement un fruit de la civilisation » (Reinach 1889, p. 170).

Ces réflexions savantes doivent être mises en regard des images populaires qui, quant à elles, ont spontanément mis en avant la qualité esthétique des œuvres d'art paléolithiques et leur non-conformité, par conséquent, avec la notion commune de primitivité – et ce d'autant plus volontiers qu'il s'agissait d'objets trouvés sur le sol européen et qu'on pouvait ainsi les opposer aux productions des peuples non-européens dits « sauvages » (Dagen 1998). Dans les nombreuses représentations du premier homme « artiste », ont s'est plu à célébrer des accomplissements qui n'avaient rien à envier aux études animalières des élèves de l'Ecole des beaux-arts et qui différaient en tout, en revanche, des représentations caricaturales qu'on se faisait alors des « fétiches » et autres masques « primitifs » d'Afrique ou d'Océanie. La lithographie d'Emile Bayard intitulée *Les Précurseurs de Raphaël et de Michel-Ange*, montrant des artistes paléolithiques à l'ouvrage, pour illustrer l'ouvrage de vulgarisation de Louis Figuier, *L'Homme primitif*, est caractéristique de ce point de vue (Figuier 1870, ill. 67, p. 131). Comme l'ont montré Alain Roussot (Roussot 2003) et Catherine Schwab (Schwab 2016), dans la première édition du livre, parue en 1870, des personnages certes déguenillés mais anatomiquement conformes aux canons de la beauté grecque sont absorbés dans les plaisirs d'une création qui n'a rien de « primitif ». Dans la quatrième édition, en 1876, le comparatisme ethnographique a imposé ses principes évolutionnistes, de sorte que les hommes sont désormais semblables aux Lapons contemporains et que la composition insiste sur leurs pauvres conditions d'existence (un tipi sur la gauche) ainsi que sur leurs techniques rudimentaires (le débitage d'un bois de cervidé au silex) (Figuier 1876, ill. 88, p. 167). Néanmoins, la légende de l'image est restée presque exactement la même. En dépit des arguments ethnographiques, la tension entre « précurseur » et « primitif » se maintient donc dans toute sa force : le premier terme, utilisé pour le titre de l'illustration, désigne l'invention artistique dans sa constance anachronique et se démarque ainsi discrètement de l'emprise globale de l'évolutionnisme, impliquée par l'emploi du second terme pour le titre général de l'ouvrage.

On a vu qu'une préférence *intellectuelle* pour le « primitif » (Gombrich 2002), en tant qu'étape initiale du schéma évolutionniste, s'est affirmée idéologiquement dans une grande partie des premières

analyses scientifiques de l'art « préhistorique ». A cette curiosité a fait pendant une préférence *émotionnelle* pour le « précurseur », qui appartient plutôt au domaine de l'imaginaire collectif et a été d'emblée sensible à la supposée « modernité » de ces œuvres d'art créées dans la nuit des temps. L'idée de précurseur est fondamentalement anti-historique dans la mesure où elle établit un lien entre des périodes éloignées les unes des autres comme si le présent était déjà contenu *a priori* dans le passé. Tandis que le regard historique raconte le passage d'un stade à un autre de l'évolution et le mouvement inexorable des significations et des formes dans le temps, l'anachronisme s'attache à malmener la différence des temps jusqu'à l'abolir. Certes, le terme de « précurseur » a également été employé dans un cadre évolutionniste strict : ce fut le cas en anthropologie physique, pour caractériser les « anthropopithèques » ou autres « pithécanthropes » annonciateurs de l'*homo sapiens* (Richard 1993). Néanmoins, dans le champ de l'anthropologie culturelle, les connotations anachroniques de ce même terme de « précurseur » ont dominé, confortées par la puissance de suggestion des œuvres paléolithiques exhumées par les archéologues.

Une sensation de court-circuitage temporel a nourri la fascination collective pour la préhistoire, en se fondant sur sa dimension dite « artistique ». C'est ce qui explique qu'on ait rattaché avec prédilection, dans les représentations collectives, cette notion générique de préhistoire au Paléolithique supérieur, plutôt qu'aux périodes antérieures ou postérieures, et qu'au sein du Paléolithique supérieur lui-même, l'attention se soit concentrée sur les manifestations artistiques – art mobilier ou surtout, à partir du début du XXe siècle, art pariétal. La « préhistoire », sous couvert d'être scientifiquement un *terminus ab quo* parachevant le grand récit d'un processus universel d'hominisation et reliant logiquement entre elles d'innombrables strates du temps, a aussi alimenté un puissant désir de résistance à cette historicisation totalisante de la réalité. Il s'agissait en effet – et il s'agit toujours – de faire obstacle à l'immersion totale des significations dans le flux de l'histoire et de contrebalancer le sentiment d'angoisse produit par cette instabilité radicale du sens de la réalité. Cette angoisse est l'affect majeur de la modernité : elle associe à un progressisme exacerbé l'appréhension d'un effondrement plus ou moins imminent. La concomitance – souvent chez le même individu – de ces postulations contradictoires se définit en tant que position tragique. Pour en désamorcer la puissance destructrice, il fallait en quelque sorte relativiser le relativisme historique, en repérant et en exaltant tous les phénomènes susceptibles d'ébranler la logique universelle du progrès. Cela se formule avec force, notamment, lors de la confrontation entre artisanats non-européens et objets industriels européens à la « Great Exhibition of All Nations » de Londres en 1851, à l'occasion de laquelle le principal responsable de la délégation française, Léon de Laborde, évoque, à propos des objets « d'Orient », un « art vieux comme le monde, stable, immobile, se répétant à satiété et plein de jeunesse, de sève, de charme et de nouveauté » (de Laborde 1856, p. 243). Il renchérissait ainsi sur le reporter Alexis de Valon, qui écrivait pour sa part dans la très respectable *Revue des deux mondes* : « Ce n'est pas à nous de faire la leçon aux paysans d'Afrique et d'Asie, c'est à nous, au contraire, d'apprendre en étudiant leur travail. [...] Où donc est l'art ? où le progrès ? où la civilisation ? Que de doutes écrasants renferme un tel phénomène ? » (de Valon 1851, p. 205). L'idée de préhistoire a puissamment contribué à conforter ce type de sensibilité et les pensées qui en résultent. Gabriel de Mortillet, positiviste et ardent progressiste, l'a bien perçu en critiquant les résonances *anti*-historiques du terme d'« antéhistoire », parfois encore employé à son époque, et en lui préférant celui de préhistoire, plus adapté, à ses yeux, à une approche globalement évolutionniste et donc historiciste : « Dans le commencement il y a eu hésitation entre l'emploi des mots *antéhistorique* et *préhistorique*. C'est l'emploi de ce dernier qui l'a enfin emporté avec juste raison. En effet, le préfixe *anté* a un double sens : il signifie avant ou contre ; ainsi antéhistorique peut s'interpréter comme antérieur ou opposé à l'histoire » (Mortillet 1883, p. 2 ; Blanckaert 2017, p. 73). Mais les mots n'ont pas suffi à faire barrage aux affects ni à domestiquer les idées : l'engagement positiviste de la science préhistorienne en faveur d'une historicisation totale du réel n'a pas effacé le désir d'*anti*-histoire (plutôt que d'antéhistoire) présent dans l'idée même de préhistoire, telle qu'elle fut forgée par les sociétés des grandes nations industrielles au cours de la seconde moitié du XIXe siècle.

*

Ces deux orientations – du « primitif » inscrit dans une hyper-histoire, du « précurseur » inscrit dans une anti-histoire – reflètent donc les contradictions intimes du champ préhistorique, vécu à la fois comme accomplissement et comme renversement du plan historique. Les images de l'homme artiste « éternel » y concurrencent celles de la lutte pour la vie chez des êtres simiesques et misérables : vision darwinienne, historicisée, et vision idéaliste, essentialisée, ne cessent de s'entremêler et de s'affronter pour « fabriquer » la préhistoire dans l'imaginaire moderne. Ces tensions tendent cependant à se dissoudre, sur le plan de la perception, dans l'expérience immédiate de l'art paléolithique et plus particulièrement dans celle des grottes ornées. Déjà, dans les années 1880, le terrain a été préparé sur un plan scientifique par l'insistance sur « l'isolement » de « l'art des chasseurs de rennes » dans « la suite des temps », suivant l'expression de Salomon Reinach, qui recourt à la poésie d'Ovide pour donner plus de force à son idée : « *Prolem sine mater creata, mater sine prole defuncta* » (enfant créé sans mère, mère morte sans enfant) (Reinach 1889, p. 168). Sans constituer ni une étape dans l'évolution ni l'expression d'un instinct immuable, ces petits objets mobiliers paraissaient rompre la chaîne causale des généalogies et, aussi bien, l'enchaînement narratif des récits, comme une sorte de bloc de sens indéchiffrable en suspens dans l'histoire. Puis, la fraîcheur préservée des gravures et des peintures pariétales dans les grottes ornées paléolithiques a porté à l'incandescence une telle impression et l'a diffusée au-delà du monde des savants, à partir de la pleine reconnaissance scientifique et médiatique de ces ensembles, au début du XXe siècle. Dans ce contexte, c'est moins le caractère « précurseur », anachronique, des productions artistiques du Paléolithique supérieur qui fascine que leur effet de présence en quelque sorte *a-chronique*, lié à leur statut « subsémiotique », au sens que James Elkins a donné à cette notion (Elkins 1995).

En amont de toute pensée de la temporalité, l'expérience immédiate du lieu souterrain et des traces humaines, selon des modalités immersives, semble manifester physiquement une présence dont la vertu magique, pour l'individu moderne, est de suspendre l'historicité en tant que telle. Au vacarme des récits historiques entrechoqués et à l'angoisse qui en résulte, l'art de la « préhistoire » répond par un silence impénétrable qui, loin d'accroître la sensation de vide, la contrebalance par un sentiment inexprimable de plénitude. Tel que les sociétés modernes se le sont approprié fantasmatiquement, cet art a ainsi opposé à l'expérience tragique de l'histoire l'impression d'une union des contraires. D'un côté, il intensifiait notre vécu temporel par l'évidence de son appartenance à un passé profond que les avancées de la géologie et des méthodes de l'archéologie ont permis de mesurer avec toujours plus de précision, étendant les bornes d'une mise en ordre chronologique du monde. D'un autre côté, il trouait l'écran de l'histoire par un effet de *présence* qui semblait le situer de plain-pied avec le *présent*, au travers d'une expérience physique immédiate, hors récit et même hors langage. Cette coexistence harmonieusement vécue entre évidence du passé et évidence du présent relève de *l'immémorial*, qui diffère de l'oubli par le sentiment d'une épaisseur temporelle et qui diffère tout autant de la mémoire par l'impossibilité d'attacher un récit à cette expérience. Très concrètement, les traces intactes des gestes, perçues sans l'étai d'une grille d'interprétation culturelle, conduisent à faire de l'homme « préhistorique » notre contemporain et, symétriquement, à donner une densité « préhistorique » à notre propre contemporanéité. Cette sensibilité aurait pu rester à l'état latent. Si elle est montée en puissance dans les sociétés du début du troisième millénaire, c'est qu'elle revêt une importance symbolique corroborée par le culte croissant dont les grottes ornées font l'objet, au point d'être souvent scellées, interdites d'accès – sinon pour quelques savants –, comme la *cella* des temples antiques, réceptacle d'un sacré qui, en l'occurrence, s'identifie à la promesse d'avènement d'un autre régime de la temporalité.

Au total, trois grandes orientations se dessinent ainsi dans l'approche de l'art paléolithique. Formées très vite après son « invention » au milieu du XIXe siècle, elles constituent encore aujourd'hui, selon des modalités diverses, l'armature épistémologique et émotionnelle de notre rapport à la préhistoire. Toutes trois se confrontent à l'évolutionnisme, soit pour le célébrer, soit pour le

critiquer, soit, enfin, pour le désamorcer. Elles font coexister, au sein du regard sur la préhistoire, des approches d'ordre historique et archéologique, pour insérer cette dernière dans une histoire totalisante, des approches anthropologiques, pour dégager des dimensions invariantes dans l'activité créatrice humaine, et des approches phénoménologiques, pour substituer aux tensions du temps historique une expérience du temps vécu sans médiations. Ces trois approches, avec leurs champs sémantiques respectifs, peuvent être synthétisées de la façon suivante :

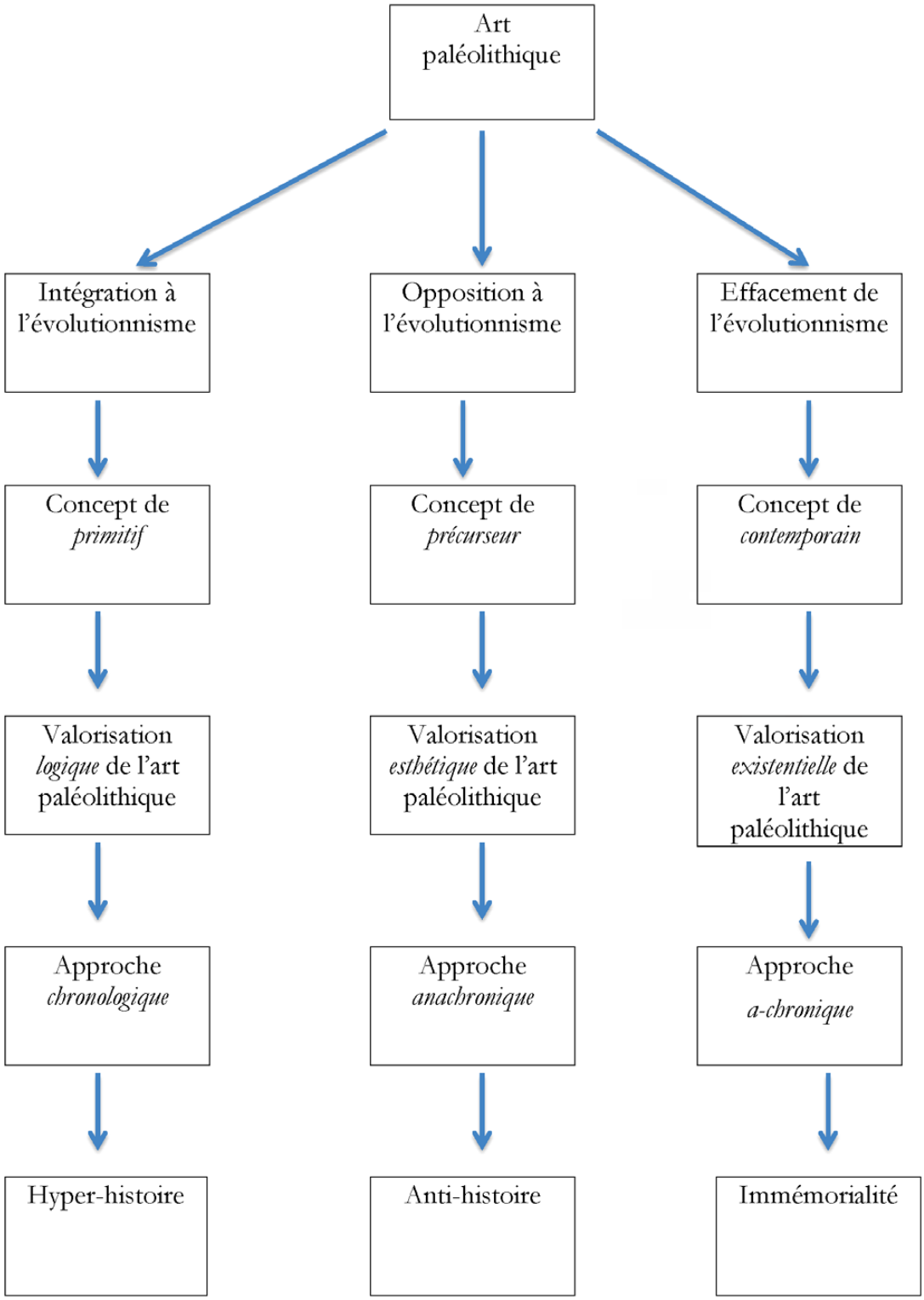


Figure 1. Typologie des approches modernes de l'art paléolithique.

*

Dans ce cadre, l'histoire de l'art a irrigué très tôt les pratiques scientifiques de la préhistoire et son appréhension générale par le public. Elle y a transmis la tension qui la caractérise elle-même, depuis ses propres origines, entre approche documentaire des œuvres, dont les instruments sont principalement historiques, et approche esthétique, dont les procédés, quant à eux, relèvent davantage de la philosophie.

Mais l'antécédence de l'histoire de l'art sur la préhistoire, en tant que discipline, n'empêche pas que la seconde, après avoir emprunté certains aspects de sa démarche et de ses concepts à la première, l'a ébranlée à son tour en profondeur, en la privant de ses instruments traditionnels les plus fondamentaux : la recherche de l'auteur, la constitution d'un récit de la création, le décryptage des strates de sens d'une image, transposée en langage par le biais de l'iconologie. Ces privations expliquent le silence durable des historiens d'art à l'égard de l'art paléolithique, dont l'analyse, pendant longtemps, a été presque exclusivement prise en charge par les préhistoriens eux-mêmes (Guy 2011).

L'ébranlement produit sur l'histoire de l'art par le surgissement de l'art paléolithique n'en a pas moins poursuivi son action en quelque sorte souterraine : on peut en effet penser que la sensibilité croissante aux courts-circuits temporels, dans l'esprit d'Aby Warburg (Warburg 2000), et les rapprochements de plus en plus nombreux entre histoire et anthropologie de l'art, depuis le début du XXe siècle, ont non seulement rendu l'histoire de l'art plus réceptive au champ « préhistorique » mais sont aussi la conséquence de l'impact général de ce dernier sur nos représentations et sur notre rapport au temps.

Bibliographie

Blanckaert, C. (2017). Nommer le Préhistorique au XIXe siècle. Linguistique et transferts lexicaux. *Organon*, 49, pp. 57-103.

Boucher de Perthes, J. (1847-1864). *Antiquités celtiques et antédiluviennes. Mémoire sur l'industrie primitive et les arts à leur origine.* Paris : Treuttel et Wurtz, Derache, Dumoulin, V. Didron, 3 vol.

Breuil, H. (1935). L'Évolution de l'art pariétal dans les cavernes et abris ornés de France. In *Congrès préhistorique de France, XIe session (Périgueux 1934).* Paris, Société préhistorique française, pp. 102-118.

Breuil, H. et Cartailhac, E. (1906). *La Caverne d'Altamira à Santillane près Santander (Espagne).* Monaco : Imprimerie de Monaco.

Carrier, D. (2008). *A World Art History and Its Objects.* Pittsburgh: Pennsylvania State University Press.

Dagen, Ph. (1998). *Le Peintre, le Poète, le Sauvage. Les voies du primitivisme dans l'art français*, Paris, Flammarion.

De Morgan, J. (1909). *Les Premières Civilisations. Etudes sur la préhistoire et l'histoire jusqu'à la fin de l'Empire macédonien.* Paris: Ernest Leroux.

Elkins, J. (1995). Marks, Traces, 'Traits', Contours, 'Orli' and 'Splendores': Nonsemiotic Elements in Pictures. *Critical Inquiry*, 21 (4), pp. 822-860.

Elkins, J. (2002). *Stories of Art*. New York : Routledge.

Elkins, J. (2005). *Master Narratives and Their Discontents*. New York : Routledge.

Figuier, L. (1870). *L'Homme primitif, ouvrage illustré de 30 scènes de la vie de l'homme primitif composées par Émile Bayard et de 232 figures représentant les objets usuels des premiers âges de l'humanité dessinées par Delahaye*. Paris : Hachette, Tableau de la nature. Ouvrage à l'usage de la jeunesse, 1st ed.

Figuier, L. (1876). *L'Homme primitif, ouvrage illustré de 30 scènes de la vie de l'homme primitif composées par Émile Bayard et de 232 figures représentant les objets usuels des premiers âges de l'humanité dessinées par Delahaye*. Paris : Hachette, Tableau de la nature. Ouvrage à l'usage de la jeunesse, 4th ed.

Gombrich, E.H. (2002). *The Preference for the Primitive. Episodes in the History of Western Taste and Art*, London and New York, Phaidon.

Groenen, M. (1994). *Pour une histoire de la préhistoire. Le paléolithique*, Grenoble, Jérôme Millon.

Grosse, E. (1894). *Die Anfänge der Kunst*. Freiburg im Breisgau et Leipzig : Verlagsbuchhandlung von J.C.B. Mohr (Paul Siebeck).
Guy, E. (2011). *Préhistoire du sentiment artistique – L'invention du style il y a 20 000 ans.* Dijon : Les Presses du réel.
Laborde, L. de (1856). *De l'union des arts et de l'industrie,* vol. I, *Le Passé.* Paris : Imprimerie impériale.
Labrusse, R. (2018). *Face au chaos. Pensées de l'ornement à l'âge de l'industrie.* Paris : Les Presses du réel.
Lartet, E. (1861). Nouvelles recherches sur la coexistence de l'homme et des grands mammifères fossiles réputés caractéristiques de la dernière période géologique. *Annales des sciences naturelles comprenant la zoologie, la botanique, l'anatomie et la physiologie comparée et l'histoire des corps organisés fossiles*, IV (15), *Zoologie*, pp. 177-253.
Lartet, E. et Christy, H. (1864). Sur des figures d'animaux gravées ou sculptées et autres produits d'art et d'industrie rapportables aux temps primordiaux de la période humaine. *Revue archéologique,* 9, pp. 233-267.
Lubbock, J. (1865). *Pre-historic Times, as Illustrated by Ancient Remains and the Manners and Customs of Modern Savages*. London and Edinburgh: Williams and Norsac.
Moro Abadía, O. (2013). Rock Art Stories: Standard Narratives and Their Alternatives. *Rock Art Research*, 30 (2), pp. 139-173.
Moro Abadía, O. (2015). The Reception of Palaeolithic Art at the Turn of the Twentieth Century: Between Archaeology and Art History. *Journal of Art Historiography*, 12, on line.
Moro Abadía, O., González Morales, M.R., et Palacio Pérez, E. (2012). Naturalism and the Interpretation of Cave Art. *World Art*, 2 (2), pp. 219-240.
Mortillet, G. de (1883). *Le Préhistorique. Antiquité de l'homme*. Paris : Bibliothèques des Sciences contemporaines.
Piette, E. (1894). Notes pour servir à l'histoire de l'art primitif. *L'Anthropologie*, pp. 129-146.
Piette, E. (1907). *L'Art pendant l'âge du renne.* Paris : Masson.
Reichle, I. (2012). Vom Ursprung der Bilder und dem Anfang der Kunst. Zur Logik des interkulturellen Bildvergleichs um 1900. In Baleva, M., Lerone Schultz, O., Reichle, I., ed., *IMAGE MATCH. Visueller Transfer, « Imagescapes » und Intervisualität in globalen Bild-Kulturen*. Munich: Wilhelm Fink Verlag, pp. 131-150.
Reinach, S. (1889). *Antiquités nationales. Description raisonnée du musée de Saint-Germain-en-Laye. I. Époque des alluvions et des cavernes.* Paris : Firmin-Didot.
Richard, N. (1993). La Fabrique du précurseur. In : *Des sciences contre l'homme*, 1 (8), pp. 64-79.
Roussot, A. (2003). Aryen ou Lapon ? L'homme primitif vu par Louis Figuier en 1870. In Dagen, P., Lafont-Couturier, H., Loizeau, S., et San Agustin-Filaretos, M.P., ed., *Vénus et Caïn. Figures de la préhistoire 1830-1930.* Paris : Réunion des musées nationaux, Bordeaux : musée d'Aquitaine, pp. 76-83.
Schlanger, N. (2013). One day hero. Jules Reboux at the crucible of prehistory in 1860s Paris. *Complutum*, 24 (2), pp. 73-88.
Schwab, C. (2016). L'art mobilier au Musée d'Archéologie nationale : présentation et contextualisation . In Cleyet-Merle, J.-J., Geneste, J.-M., Man-Estier, E., ed., *L'Art au quotidien. Objets ornés du Paléolithique supérieur. Actes du colloque international. Paléo*, numéro spécial, pp. 67-85.
Valon, A. de (1851). Le tour du monde à l'exposition de Londres. *Revue des deux mondes*, 2, pp. 193-228.
Warburg, A. (2000). *Der Bilderatlas Mnemosyne* (1927-1929), Warnke, M., Brink, C., ed.. Berlin : Akademie Verlag.

Antiquity all over the place: evolutions and revolutions in early prehistoric research in Greece during the 1960s

Giorgos Vavouranakis[1], Georgia Kourtessi-Philippakis[1]
[1] National and Kapodistrian University of Athens – Greece
gvavour@arch.uoa.gr; gkphil@arch.uoa.gr

Abstract

Research on the early prehistory in Greece made a spectacular leap during the 1960s. New administrative infrastructures in a favorable socio-political context contributed to this. Research on the Palaeolithic and the Mesolithic was literally supported by the Foreign Schools of Archeology, which set up the epistemological and methodological framework of the archaeological discipline in the country, although the role of some Greek pioneers should not be neglected. Neolithic research was oriented towards the use of stratigraphic methods, the setting up of the chronological framework and the exploration of interconnections with the Near East and the Balkans. Sporadic attempts towards the paradigm of processual archeology should also be noted. Although the actual archaeological research remained strongly attached to the study of the Bronze Age, the work accomplished opened new perspectives for the study of the early prehistory in the country.

Keywords: Greece, early Prehistory, 1960s, culture historical archaeology, processual archaeology

Résumé

La recherche sur la Préhistoire ancienne de la Grèce a connu un bond spectaculaire au cours de la décennie 1960. De nouvelles infrastructures administratives dans un contexte sociopolitique favorable y ont contribué. Pour ce qui est le Paléolithique et le Mésolithique elle a été littéralement portée par les Ecoles Etrangères d'Archéologie qui ont mis en place le cadre épistémologique et méthodologique de la discipline sans négliger le rôle de quelques pionniers grecs. La recherche néolithique a été orientée vers l'emploi des methodes stratigraphiques, la mise en place du cadre chronologique et l'exploration des interconnections avec le Proche Orient et les Balkans. On note aussi des tentatives sporadiques vers le paradigme de l'archéologie processuelle. Bien que la recherche archéologique actuelle reste encore vivement attachée à l'étude de l'Age du Bronze, les travaux réalisés ont ouvert des nouvelles perspectives pour la Préhistoire ancienne du pays.

Mots-clés: Grèce, Préhistoire ancienne, 1960, archéologie historico-culturelle, archéologie processuelle

1. Introduction

The usual impression of prehistoric archaeology in Greece after World War II is one of extensive excavations at Bronze Age sites, such as Akrotiri at Santorini or even the so-called 'Palace of Nestor' at Pylos. In addition, research seems to have remained largely within the traditional paradigm and to have retained a tendency towards culture-historical and frequently ethnocentric interpretative narratives (Kotsakis 2008). Lesley Fitton (1995) has argued that the 1950s and 1960s marked the methodological and wider epistemological consolidation of prehistoric archaeology in Greece. The present paper aims to challenge the above view and focuses on early Prehistory, which is taken here to include the whole Stone Age, from the Palaeolithic to the Neolithic.

The choice of focus is not random. Palaeolithic and Mesolithic archaeology remained downplayed in Greece for a long period of time, causing the material record of these two periods to remain fragmentarily known, despite recent advances (for the Palaeolithic see indicatively Tourloukis and Harvati 2017; for the Mesolithic see Galanidou and Perlès 2003; recent summary by Sampson 2010).

By contrast, the Neolithic period is much more studied and is often connected to the Bronze Age (e.g. Tomkins 2010), which remains as the cutting-edge topic of Greek Prehistoric archaeology. Thus, the Palaeo-/Mesolithic and the Neolithic research in Greece resemble two sides of the same coin, both inseparable and a world apart.

Several archaeologists have attempted to bridge the gap and produce a new, different type of discourse during the 1960s. For this reason, it is important to compare and contrast advances in the two research subfields of Stone Age archaeology. A detailed examination of the most important field and other projects of the time may substitute the established image of epistemological stillness with a picture of successive and essential transformations in the theoretical approaches, the methodology of archaeological data analysis and excavation techniques. In this respect, the 1960s are here presented more as a period of intense research fermentation, which set the tone for the following decade and the advent of New or Processual Archaeology, formally introduced by Colin Renfrew's 'The Emergence of Civilisation' (1972).

2. The socio-political, administrative and research framework

The 1960s are marked by several important changes not only in the research framework of prehistoric archaeology in Greece, but also in its administrative infrastructure and the wider socio-political background that defined both the administrative institutions and the carrying out of research itself. At the political level, the shift from ultra conservative to centrist governments and the explosion of social and student movements was followed by a military coup d'état and the period of the so-called 'Dictatorship of the Colonels' (1967-1974). Despite the political instability, the Archaeological Service, the sole government curatorial institution in Greece, was reinforced. In 1960, the Archaeological Service left the Ministry of Education, where it had belonged since its establishment in the 19th century, and was transferred as an autonomous service under the Ministry of the Presidency of the Government. Its archaeological personnel gradually increased from 55 to 207, while the re-organisation of the Archaeological Receipts and Expropriations Fund in 1961 increased the availability of resources for the management of archaeological heritage (Petrakos 1982).

Despite these changes, the Archaeological Service maintained its pre-war character as a small group of researchers, namely an elite government corps strongly related to the academic milieu (recent review and further references by Vavouranakis 2018). An indicative example of the status of the Archaeological Service is the election of Christos Karouzos, then Director of the National Archaeological Museum of Athens, as a member of the Athens Academy of Arts and Sciences in 1955 (Petrakos 1995). The Archaeological Service also retained its conservative epistemological constitution, which emphasised the empirical study of conventional archaeological remains such as architectural features and artefacts only.

This conservatism was due to the context of the time, as Greece was still recuperating from World War II. The archaeological monuments of Greece had suffered major damages during the Nazi occupation, while most museum collections had remained buried deep underground for protection. The reconstitution of archaeological heritage was a herculean task carried out by very few archaeologists. Despite the aid by the Marshal Plan (Hatzivassileiou 2014), many rooms of the National Archaeological Museum of Athens remained closed to the public until the end of the 1950s. It was the 1960s that saw the completion of the reconstitution work (Petrakos 1995), whose practical needs and its national importance for the country allowed the Archaeological Service to consider itself the steward of both the national heritage and identity of Greece. Thus, the Archaeological Service's profile became codified and the potential for methodological advancement was stifled. In addition, in the last part of the 1960s the character of archaeological research was further affected due to the nationalist propaganda of the Dictatorship of the Colonels exploiting Greek antiquities. Despite this unfortunate event, the administrative status of the Archaeological Service improved,

as the latter became -and it still is- the majority faction of the Ministry of Culture, which was established in 1973, a year before the fall of the Dictatorship (Kokkinidou and Nikolaidou 2004).

Another institution that operated in tandem with the Archaeological Service was the Athens Archaeological Society. This is a non-government and non-profit institution that is allowed to conduct field research. The Society, as it is frequently dubbed, continued to support the Archaeological Service regarding the excavation and restoration of archaeological sites and monuments in Greece; at a time when agricultural practices were modernised, the urban and tourist development was amplified and thus the number of rescue excavations progressively increased. Excavations at prehistoric sites included Mycenae, the Mycenaean fortification of Glas, Archanes and other Minoan sites in Crete and Neolithic Dimini and Sesklo in Thessaly. For the Archaeological Society, the 1960s comprised a decade of stability and continuous growth of excavation and restoration activity (Petrakos 1987).

Other active institutions in 1950s and 1960s Greece were the so-called foreign schools of archaeology, the British School at Athens (BSA) being one of the most prominent at the time. The BSA managed to successfully overcome the temporary negative repercussions of the 1955-1960 anti-colonial struggle of Cyprus and was engaged in many field projects. Its strength lay in the strong support by the British Academy, then under the direction of Sir Mortimer Wheeler, who had the vision of exporting British archaeological practices all around the world (Whitley 2000). These included the Wheeler-Kenyon excavation technique with its emphasis on stratigraphy and the opening of box trenches according to a 5m grid. This specific technique was followed by all British projects in Greece at the time (Karadimas 2015).

The American School of Classical Studies (ASCSA) also attained a strong presence in post-war Greece. Two persons played a key-role as regards prehistoric research: Carl Blegen and his student John L. Caskey, who succeeded him both as Director of the ASCSA in the 1950s and as professor at Cincinnati in the 1960s and 1970s. Both archaeologists followed the traditional paradigm with an emphasis on the empirical aspect of field research (For Blegen's methodology see Tzonou-Herbst 2015; For Caskey, see Gorogianni 2009-2010). An exception to the wider orientation of the American prehistoric research was William A. McDonald, also a student of Blegen's, who teamed up with British Richard Hope Simpson in 1958 and applied the methods and techniques of the later New Archaeology in their first surface surveys in Messenia, which focused on later Prehistory and the historical periods. These field activities evolved into the University of Minnesota Messenia Expedition and fully embraced the novel at the time and emerging archaeological paradigm (McDonald 1978).

The German Institute of Archaeology at Athens (Deutche Archäologisches Institut – Athen, DAI-Athen) overcame the phase of re-organisation after World War II and went back into full action in the 1950s (Jantzen 1986). German scholarship remained reserved against New Archaeology and maintained a strict empirical (if not empiricist) methodology (Bittel 1980). This was considered a safe solution in order to create distance from the Nazi propaganda, such as its exploitation of ancient Greece and the assumed Neolithic Aryan racial diffusion from central Europe to southern Europe, including Greece (Marchand 1997). The French School at Athens (Ecole française d'Athènes, EfA) managed to survive the immediate post-war period of underfunding. Although it retained its overall Classicist orientation, it also attempted to open upnew research directions. These advances were reinforced by the restructuring of the CNRS in 1966 and the wider changes in the French academia after the movement of May 1968 (Valenti 2006).

3. Palaeolithic and Mesolithic research in Greece

At the end of the 1950s, several non-Greek researchers came across chipped stone tools, by chance. This type of artefact had been poorly known up until that point and was studied by the

archaeological community of Greece (Kourtessi-Philippakis 2014a. Elefanti *et al.* 2016). These accidental findings opened new horizons and became the springboard of systematic research on two ill-known periods, namely the Palaeolithic and the Mesolithic, during the 1960s. Surveys and excavations at several sites took place particularly in continental Greece and the Ionian Islands. In addition, the Mesolithic was traced in stratigraphic sequences and it was thus better defined. Alertness towards chipped stone tools was also raised through Colin Renfrew's research on the obsidian from Melos (Renfrew, Cann and Dixon 1965) and his publications on the lithic industry of Neolithic Saliagos. This work constitutes a turning point in lithic studies in Greece (Evans and Renfrew 1968).

The four foreign schools of archaeology in Greece played a leading role in Palaeolithic and Mesolithic research. Each of them became active in different geographical areas of Greece: the British under Eric Higgs worked in Epirus, the French with André Leroi-Gourhan and his associates in Elis, the Germans with Vladimir Milojčić and his team in Thessaly, and the Americans under the direction of Thomas Jacobsen in the Argolid. Although each of these teams conducted its own research with distinct methods and objectives, they all contributed to the systematic collection of material remains and the execution of the first large-scale systematic excavations.

The British mission surveyed western Macedonia in 1962 with poor results. They then turned to the neighbouring area of Epirus (Dakaris, Higgs and Hey 1964). The British discovered the site of Kokkinopilos, where they were able to trace lithics industries dating to the Middle or Upper Palaeolithic. This site became the type-site for Palaeolithic occupation in terra rossa, a soil sediment frequently found in western Greece. Many researchers have since focused on its examination in order to define the characteristics of its formation and to understand whether it is a palimpsest or if it is possible to discern stratigraphic sequences (Tourloukis, Karkanas and Wallinga 2015). In addition, the British mission conducted excavations at the rock-shelter of Asprochaliko, where it uncovered a stratified micromousterian facies and in the cave of Kastritsa, which had been occupied during the Upper Palaeolithic. Finally, the same mission discovered many important open air sites in Thesprotia, western Epirus. It thus broke ground for future projects of the Finnish Institute (Forsen 2009) and the Department of Archaeology and History of Art of the National and Kapodistrian University of Athens (Kourtessi-Philippakis, Pomonis and Sakkas 2019). Higg's essentially paleo-economic approach led him to propose a model of spatial organisation for the hunter-gatherers of Epirus based on seasonal movement between coastal and inland areas (for a discussion of the model see Kourtessi-Philippakis 1983). The question of the function of sites that he examined for his project was revisited by later researchers (Elefanti 2003).

The American surface survey for Palaeolithic tools in the Argolid led to the discovery of the Franchthi cave in 1958. The excavation started in 1967 and continued over a decade with alternating excavation and study seasons. Franchthi has facilitated many studies on Prehistoric Greece. Most importantly, the cave yielded a long sequence with a stratified Mesolithic phase for the first time in the whole eastern Mediterranean. In addition, the Franchthi project attained a multi-disciplinary character and thus set the example for Palaeolithic excavations in a country where archaeologists were usually the only research personnel on the project. Finally, the publication plan of the project afforded a series of important monographs, which assured the diffusion of its scientific results (indicatively see Jacobsen 1987).

In 1960, the Belgian J. Servais found Palaeolithic tools in Elis. His discovery was followed by an extensive surface survey of the region in 1962-1964. The project was directed by A. Leroi-Gourhan, who was accompanied by F. Hours, J. and N. Chavaillon. The survey yielded about 50 open air sites in the regions of Amaliadas and Kastron. The French researchers additionally worked on the stratigraphic correlation between different sites, allowing for a reliable classification of the lithic industries in a context where the use of pebbles as raw materials did not allow safe chrono-cultural

attributions (Chavaillon, Chavaillon and Hours 1967; 1969). However, no site was excavated, nor was there any follow-up to this enterprise (Treuil 1996).

In Thessally, where V. Milojčić, professor at the University of Heidelberg, had been directing a German mission since 1953, flint tools and animal bones were brought to light along the banks of the Pineios river in 1958. These finds prompted a survey (1958-1959) and the tracking of open air sites along the river. The work of the German team included the stratigraphy, the study of the fauna and of the tools. It gave birth to the first monograph on the Palaeolithic, which also documents the multidisciplinary character of the work that had been accomplished (Milojčić *et al.* 1965). Dimitrios Theocharis, Ephor of Antiquities of Thessaly, director of the local bureau of the Archaeological Service at the time, was associated with this enterprise. He also conducted new surveys in Thessaly after 1960 and even discovered Palaeolithic sites in Thrace (Theocharis 1971).

Finally, Augustus Sordinas became interested in the Palaeolithic and in chipped stone tools during the excavation of Abri Pataud in France, wherein he participated with Hallam Movius, his professor at Harvard University. In 1964-1966, and as part of his doctoral research, he conducted surveys and excavations on Corfu, his home island, as well as on other Ionian Islands. He discovered terra rossa sites in most of the Ionian Islands, where he collected stone tools dating to the Middle and Upper Palaeolithic. At the cave of Grava on Corfu he uncovered an Epigravettian sequence, similar to those of Kastritsa and Franchthi. Thus, he brought new data to light and demonstrated the importance of the Ionian Islands for the study of the Palaeolithic (Sordinas 1969). Contrary to what happened on Mainland Greece and the Ionian Islands, the islands of the Aegean did not experience the same Palaeolithic intensive research. With the exception of a few artefacts collected by Theocharis (1970) in the island complex of the Sporades, only northern Euboea yielded surface survey finds attributed, unequivocally, to the Middle Palaeolithic (Sackett *et al.* 1966).

A question that problematised researchers working in Greece during the 1960s concerned the technology and the morphological features of stone tools. It was argued that the lithic industries of Thessaly and Elis were a-typical in comparison to the robust typologies of western Europe. Theocharis responded that the lack of typical features was perhaps an indication of a particular Greek Levallois-Mousterian lithic tradition (discussion and references in Kourtessi-Philippakis 1986). Another debate, this time with a paleoanthropological focus, was prompted by the discovery of a human cranium, today attributed to a Homo heidelbergensis. It was unearthed by locals in the Petralona cave at Chalkidiki in 1960. Unfortunately, the exceptionality of the discovery (Harvati 2009) and the publicity it attracted have not allowed research to make the best out of this find. There are still many questions and debates over the human occupation of the cave and the validation of the lithic industries. The project of the 1960s became the basis for the later publication of environmental studies (Van Andel and Shackleton 1982) which painted a whole new picture of the Greek littoral zones during the Last Glacial Maximum. Such discoveries prompted a new conception of insularity in relation to the exploitation of the environment by hunter-gatherers.

All the above research had a rather positive impact upon Greek archaeologists, whose interests had largely been defined by the long-standing tradition of Greek archaeology, which had been oriented towards the study of Protohistory and Classical Antiquity. Many researchers manifested a robust interest in the Palaeolithic and in chipped stone tools. The achievements of the foreign schools encouraged other archaeologists to involve in this type of research and to publish relevant papers. As already mentioned above, Theocharis, Ephor of Antiquities in Thessaly, was one of them. He participated in the German field projects and became passionate about the study of the Palaeolithic. He was introduced to it while at the Musée de l'Homme in Paris. Through his teaching at the Aristotle University of Thessaloniki, the publication of Palaeolithic tools in Greek for the first time, and with appropriate illustrations, he created a drive towards these new topics of research (Theocharis 1967). Then Sotirios Dakaris, initially Ephor of Antiquities in Epirus and

Professor at the University of Ioannina since 1965, joined the English team from the University of Cambridge. He participated in surveys and excavations, reported about their finds annually to the Archaeological Service (Dakaris 1964), and enriched his teaching accordingly. Spyridon Marinatos published a paper about chipped stone tools from Kephalonia, his native island, dating to all periods. Although he had expressed his reservations about Markovits's finds during the Interwar period, he noted the early 1960s 'Palaeolithic enthusiasm' of the Greek archaeological milieu in a positive manner (Kourtessi-Philippakis 2014b).

The 1960s attained a foundational role at several levels. The archaeological activity in the country was marked by research orientated on the Palaeolithic, affecting the years that followed. One of the distinct principles of this archaeology subfield became clear: the excavation of a Palaeolithic site may not be the oeuvre of one person but the work of a multi-disciplinary team. Admittedly, the emphasis on field research and cultural sequences through especially stratigraphic excavations in caves or rock-shelters and the typological analysis of finds were not alien to Greek archaeology and the culture-historical paradigm it had been following. This traditional culture-historical paradigm infiltrated the burgeoning research and it may have even been reinforced by the advances in the new field of early Prehistoric research, since its practitioners sought chrono-cultural milestones. Furthermore, pushing the beginnings of human presence in Greece back into early Prehistory potentially fueled the dominant culture-historical and ethnocentric narratives about an assumed unbroken evolution of Greece from Prehistory to the present day. However, and while research on the Palaeolithic was from the outset placed in an essentially similar framework to traditional culture-history, these early hunter-gatherers were not considered automatically affiliated with the rest of the prehistoric ancestors and, by extension, with the modern inhabitants of Greece (Kourtessi-Philippakis 2006). This first period of research activity led to understanding the necessity of its inscription within the geographical and environmental framework of south-eastern Europe. Nonetheless, it is clear that despite this archaeological turn of Greece towards the Balkans, which was disciplinary as much as it was political, the archaeological borders were unfortunately to remain closed for many more years to come.

4. Research on Neolithic Greece

Neolithic research constitutes the second part of archaeological activity which underwent important methodological changes. There was an effort to escape the traditional epistemological framework wherein it had been inscribed by Christos Tsountas, the very founder of Neolithic archaeology in Greece. This framework was the so-called 'Altertumswissenschaft', the German version of Classical studies of the 19th and early 20th century that combined the historical, philological and archaeological study of the past. Since emphasis was placed upon Greek and Roman Antiquity, Prehistory was regarded as 'Pre- history', namely the early and qualitatively lesser stage of the evolutionary process that culminated with Classical Greece. Tsountas was not only aware of the German scholarship, but he explicitly attempted to fit the Neolithic period into this culture-historical scheme.

For example, in his final report on the excavation of the Neolithic settlements at Dimini and Sesklo, Tsountas regarded their enceinte walls as the predecessors of Mycenaean citadels. He attributed their building to the Pelasgians, a pre-Greek ethnic group known from ancient texts, and hypothesised that they had been peacefully absorbed by the Danaeans, namely Indoeuropean tribes that had arrived from the North (Tsountas 1908). Furthermore, Tsountas's (1928) book on the history of ancient Greek art starts with the Neolithic. It has been argued that this book strengthened the then ethnocentric discourse on the continuous culture-historical evolution of Greece from the Stone Age until modern times (Voutsaki 2017). Later studies (e.g. Wace and Thompson 1912) finetuned Tsountas's views but their focus remained on the descent of the Greeks from the North, either via the Balkans or central Europe. As already mentioned above, these views were exploited by Nazi propaganda for the supremacy of the Aryan race during World War II; one

Nazi mission excavated the Neolithic site of Magoula Visviki in Thessaly in order to backup this propaganda (Alram-Stern and Dousougli-Zachos 2015).

The above detailed reference to pre-World War II research presents the background of the Neolithic projects in central and northern Greece during the 1960s, when the question of typological, chronological and cultural correlations between the southern Balkans, Greece, the wider Aegean and Asia Minor remained open. The irrevocable abandonment of Nazi interpretations had concentrated focus on the Neolithic way of life itself, the mode of its adoption to Greece, and the source of its spreading, which was sought either in central and northeastern Europe or in the Near East. These questions were addressed by at least three excavation projects at Dikili Tash, Nea Nikomedeia, and Sitagroi in northern Greece, which aimed at establishing stratigraphic sequences and managed to orientate research towards Balkan archaeology, a research field that had remained hermetically closed until then.

Dikili Tash (Deshayes 1992), lies close to the modern town of Drama, in eastern Macedonia. It was discovered by Louis Renaudin in the 1920s. In 1961, Jean Deshayes from the EfA and Dimitrios Theocharis, on behalf of the Athens Archaeological Society, started the systematic excavation of the site, with the aim of tracking the transition from the Neolithic to the Early Bronze Age. The excavators documented both the stratigraphy and the architectural features with exemplary detail for the time. The same year, the British Robert J. Rodden commenced the excavation of Nea Nikomedeia, an Early Neolithic settlement in central Macedonia (Wardle 1996). The excavation lasted until 1964. Its methodology was not as avant-garde as at Dikili Tash, since the fill was removed in arbitrary layers. However, the stratigraphy was difficult to observe. The aim of the excavation was understanding the diffusion of the Neolithic as a way of life, rather than as a type of culture and whether it came from the North or the East. This aim reflects the paradigmatic transition of archaeology from Gordon Childe's (1957) culture-history to questions on socio-economic organization introduced by Grahame Clark (1957; 1965), who also participated in this excavation. Another important participant was Jane Renfrew, who collected archaeobotanical remains through flotation of soil samples. She also participated in other excavations, such as Sitagroi and Saliagos (see below), and her work led to her PhD thesis on 'Palaeoethnobotany and the neolithic period in Greece and Bulgaria' (Renfrew 1969).

The connection of Greece, the Near East and the Balkans in regards to the transition from the Neolithic to the Early Bronze Age was also targeted by the excavation at Sitagroi. This is another site in the area of Drama, similarly to Dikili Tash, which was excavated by Colin Renfrew and Marija Gimbutas from 1968 to 1969. The publication of the first volume of the final report (Renfrew, Gimbutas and Elster 1986) places emphasis on typology, which points towards the traditional paradigm of culture-history served by Gimbutas. The excavation of Sitagroi occurred during a turning point of Gimbutas's research trajectory. It came out after she had introduced the Kurgan hypothesis, arguing that the Indoeuropeans came from eastern Europe (Gimbutas 1956) and before she started interpreting the Neolithic figurines as representations of a Mother Goddess (Gimbutas 1974). Gimbutas's views are expressed in the chapter she wrote about the figurines of Sitagroi, but the final site report as a whole bears Renfrew's influence and reflects the views of New Archaeology that he advanced. For example, the excavation technique followed the Wheeler-Kenyon system. The research agenda emphasized the adaptation of the Sitagroi community upon their natural environs. The development of metallurgy was examined in relation to subsistence strategies and the relations of Sitagroi to their neighbouring regions. The concluding chapter is not about culture-historical diffusion that would be expected from a traditional archaeologist such as Gimbutas; instead they focus on issues of socio-economic organization.

By contrast, the excavations of Vladimir Milojčić in Thessaly followed the traditional method regarding both the excavation itself and the analysis of the material remains that were uncovered. For example, the establishment of stratigraphic sequences followed the pre-World War II practices

and hinged primarily upon the distinction of architectural phases first, soil changes and pottery typology second. Milojčić's interpretations remained reserved, although he had stated that the aim of his research was the movement of people and the transformation of cultural groups in the area from the Balkans to the Near East (Kotsakis 2008). This aim placed Milojčić in the same research trajectory with Gimbutas, which was related to the post-Nazi agenda of central European archaeology. Regardless of his intellectual and epistemological affiliations, Milojčić's work inscribed central Greece in the debate about the Neolithic of the southern Balkans and dissociated it from the Classicist tradition that remained prominent in southern Greece.

In a similar manner, Dimitrios Theocharis, friend and associate of Vladimir Milojčić, conducted multiple excavations at Neolithic sites in Thessaly and adopted a multidisciplinary methodology, which included the analysis of ecofacts. Theocharis's positive disposition towards analytical work is to a great extent an offspring of New Archaeology, which also influenced his interpretative approaches. For example, Theocharis saw the Neolithic way of life as the result of human adaptation upon the natural environment. For these reasons, it has been argued that Theocharis paved the way for the adoption of New Archaeology in Greece (Kotsakis 2008). Nevertheless, and much as Theocharis's contribution is not to be downplayed, the latter did not break away from the traditional paradigm, while other archaeologists, more conservative than him, expressed similar views at the time. Even Spyridon Marinatos, the most traditional and ethnocentrist of them all, had acknowledged the dynamic relation between man and nature for the development of the Neolithic and then of the Minoan society on Crete. He had also accepted the need for a positivist shift in archaeology through the adoption of scientific methods and techniques (Vavouranakis 2014).

The traditional and even Classicist archaeological research of southern Greece remained strong, as already mentioned above, but not completely unchallenged. The excavation of Saliagos, an islet off Paros in the Cyclades by John Evans and Colin Renfrew (1968), documented for the first time the presence of a Neolithic population in the Aegean islands, which had, at that point, been exclusively known for the regionalized Cycladic civilisation of the Early Bronze Age. The excavation followed the Wheeler-Kenyon system and included novel and detailed examinations of chipped stone tools, archaeozoological and archaeobotanical remains. The study of the latter also led to the reconstruction of the paleonevironment of Neolithic Saliagos. This excavation with its final report may be taken to constitute a stepping stone for Renfrew's doctoral work and later his book titled 'The Emergence of Civilisation' (1972), which marks the official launch of New Archaeology in Greece.

Before closing the review of the advances in Neolithic research, it is necessary to mention the two-volume work by Christian Zervos, titled 'Naissance de la civilisation en Grèce' (1963). This publication presents high quality photographs of the most important Neolithic artifacts from Greece, comparatively framed by other items of similar dating from Cyprus, Asia Minor and the Levant and the Balkans. The text of the book also refers to the Palaeolithic period. It is argued that the passage to the Neolithic way of life was introduced to Greece from the East and it was then diffused northwards to the Balkans and the rest of Europe. These views were criticized for recycling Tsountas's dated interpretations (Weinberg 1965).

However, Zervos was not an archaeologist but an art critic, known for the publication of the works of Picasso, with whom he also retained a long-standing friendship. Subsequently, the book did not aim to speak to the specialists but to the intellectuals of the wider public. It wished to raise their awareness of the Prehistoric roots of ancient Greek art as a means of self-reflection upon human identity, both past and current. Zervos (1957) had explicitly stated this aim in his previous books about the art of Crete and the art of the Cyclades. In the latter he expressed the idea that prehistoric art, like primitive art, expresses the spirit of humanity in a clear and direct manner. Thus, the Prehistoric remains of Greece may fuel a radical and substantial renewal of

modern art. Unfortunately, Zervos's attempt for such a dynamic discourse between art criticism and archaeology was not met with enthusiasm, as it was not in tune with the scientific turn that archaeological research was about to take. Two decades had to pass before Renfrew (1991) evoked the notion of the spirit again and contrasted Cycladic and modern art, albeit from a different perspective.

5. Conclusions

It has been demonstrated that the archaeological activity in Greece during the 1960s was marked by an intense institutional, epistemological, and methodological fermentation. A similar process had already been completed in Europe, especially Britain, and in North America by the end of the 1950s. In this respect Greece followed the overall progress of the archaeological discipline at a relatively slow pace. The traditional ethnocentric paradigm was not abandoned. Throughout the period in question and in the decades that followed, the archaeological discourse on the prehistory of Greece continued to emphasise the Bronze Age, which featured its fabulous palaces and was considered as a cultural and historical precursor of Classical Greece. Nevertheless, the 1960s should not be considered as a 'Lost Spring', the title that the novelist Stratis Tsirkas gave to his book on the period just before the 1967 Dictatorship. This period is marked by intense activity oriented towards surface surveys and excavations at sites that later developed into the main pivots of early Prehistoric research in Greece. These pioneering projects by international teams of researchers established the multidisciplinary character of fieldwork. Research was also marked by strong personalities, such as Jacobsen, Milojčić, Renfrew, and Theocharis, whose work transgressed the dividing line between the Paleo-/ Mesolithic and Neolithic research that had been established early in the 20th century. All this progress set the foundation for a complete change of discourse on prehistoric Greece, which was accomplished in the decades that followed.

Acknowledgements

The authors would like to thank S.A. de Beaune, M.-A. Kaeser, and O. Moro Abadía for including this paper in the UISPP 2018 Session VII-4, Epistemology, History and Philosophy of Science: Interdisciplinary Perspectives on the History of Archaeology; S.A. de Beaune, A. Guidi, O. Moro Abadía, and M. Tarantini for having the paper reviewed and accepted for publication; J. M. Hitchcock for editing the English; the National and Kapodistrian University of Athens for covering part of the authors' travel expenses. However, all responsibility for any shortcomings of the paper remains with the authors.

References

Alram-Stern, E. and Dousougli-Zachos, A. (2015). *Die deutschen Ausgrabungen 1941 auf der Visviki-Magula, Velestino: die neolithischen Befunde und Funde*. Bonn: R. Habelt.

Bittel, K. (1980). The German Perspective and the German Archaeological Institute. *American Journal of Archaeology* 84, pp. 271-277.

Chavaillon, J., Chavaillon, N. and Hours, F. (1967). Industries paléolithiques de l'Elide. I. Région d'Amalias. *Bulletin de Correspondance Hellénique* 91, pp. 151-201.

Chavaillon, J., Chavaillon, N. and Hours, F. (1969). Industries paléolithiques de l'Elide. II. Région du Kastro. *Bulletin de Correspondance Hellénique* 93, pp. 97-151.

Childe, V.G. (1957). *The Dawn of Civilisation*. London: Routledge and Keegan Paul.

Clark, G. (1957). *Archaeology and Society. Reconstructing the Prehistoric Past*. London: Methuen.

Clark, G. (1965). *Prehistoric Societies*. London: Hutchinson.

Dakaris, S.I. (1964). Άγιος Γεώργιος. *Αρχαιολογικόν Δελτίον* 18(Β, Χρονικά), pp. 154-156.

Dakaris, S.I., Higgs, E.S., and Hey, R.W. (1964). The climate, environment and industries of Stone Age Greece: Part I. *Proceedings of the Prehistoric Society* 30, pp. 199-244.

Deshayes, J. (1992). *Dikili Tash: village prehistorique de Macedoine Orientale I, Fouilles de Jean Deshayes (1961-1975)*, edited by R. Treuil, BCH Supplement 24. Paris: De Boccard.

Elefanti, P. (2003). *Hunter-gatherer Specialised subsistence Strategies in Greece during the Upper Palaeolithic from the Perspective of Lithic Technology*. Oxford: Oxbow Books.

Elefanti, P., Andreasen, N., Karulias, P.N. and Marshall, G. (2016). *Lithics Past and Present. Perspectives on chipped Stone Studies in Greece.* Uppsala: Åströms Förlag.

Evans, J.D. and Renfrew, C. (1968). *Excavations at Saliagos near Antiparos*, BSA Supplement 5. London: British School at Athens.

Fitton, J.L. (1995). *The Discovery of the Greek Bronze Age*. London: British Museum Press.

Forsen, B. (2009). Thesprotia *Expedition I. Towards a Regional History*, Papers and Monographs of the Finnish Institute at Athens XV. Helsinki: Suomen Ateenan Instituutin säätiö.

Galanidou, N. and Perlès, N. (2003). An introduction to the Greek Mesolithic. In C. Perlès and N. Galanidou, eds., *The Greek Mesolithic: Problems and Perspectives*, BSA Studies 10. London: British School at Athens, pp. 27-32.

Gimbutas, M. (1956). *The Prehistory of Eastern Europe. Part I: Mesolithic, Neolithic and Copper Age Cultures in Russia and the Baltic Area.* American School of Prehistoric Research, Harvard University Bulletin No. 20. Cambridge, MA: Peabody Museum.

Gimbutas, M. (1974). *The Goddesses and Gods of Old Europe, 7000 to 3500 BC: Myths, Legends and Cult Images*. London: Thames and Hudson.

Gorogianni, E. (2009-2010). Site in transition: John L. Caskey, Ayia Irini and archaeological practice in Greek Archaeology. *Aegean Archaeology* 10, pp. 105-120.

Harvati, K. (2009). Petralona: link between Africa and Europe? In L.A. Schepartz, S.C. Fox and C. Bourbou, eds., *New Directions in the Skeletal Biology of Greece*, Hesperia Supplement 43. Boston: American School of Classical Studies at Athens, pp. 31-48.

Hatzivassileiou, E. (2014). Shallow waves and deeper currents: The U.S. experience of Greece, 1947-1961. Policies, historicity, and the cultural dimension. *Diplomatic History* 38(1), pp. 83-110.

Jacobsen, T.W., ed. (1987). *Excavations at Franchthi Cave, Greece.* Bloomington and Indianapolis: Indiana University Press.

Jantzen, U. (1986). *Einhundert Jahre Athener Institut 1874-1974*, Das Deutsche Archäologische Institut, Geschichte und Dokumente 10. Mainz am Rhein: Philipp von Zabern.

Karadimas, N. (2015). Wanderings. 'Home of the Heroes'. An Interview with Sinclair Hood (part 2) [online] Aegeus – Society for Aegean Prehistory. Available at: *https://www.aegeussociety.org/en/wanderings/home-of-the-heroes-an-interview-with-sinclair-hood-part-2/* [Accessed 13th Jun. 2019].

Kokkinidou, D. and Nikolaidou, M. (2004). On the stage and behind the scenes. Greek archaeology in times of dictatorship. In M. L. Galaty and C. Watkinson, eds., *Archaeology Under Dictatorship*. Boston: Springer, pp. 155-190.

Kotsakis, K. (2008). Paths to modernity: Dimitrios R. Theocharis and post-war Greek prehistory. In D. Damaskos and D. Plantzos, eds., *A Singular Antiquity: Archaeology and Hellenic Identity in Twentieth-Century Greece*, Benaki Museum 3rd Supplement. Athens: Benaki Museum, pp. 175-183.

Kourtessi-Philippakis, G. (1983). *Réflexions sur l'hypothèse d'un déplacement saisonnier des chasseurs paléolithiques en Epire. Séminaire sur les structures de habitat. Circulation et échanges. Le déplacement et le séjour*. Paris: Collège de France.

Kourtessi-Philippakis, G. (1986). *Le Paléolithique de la Grèce continentale: État de la question et perspectives de recherche.* Paris: Publications de la Sorbonne, pp. 220-223.

Kourtessi-Philippakis, G. (2006). Chasseurs-cueilleurs paléolithiques dans le monde égéen: Veut-on de ces ancêtres ? In P. Darcque, M. Fotiadis and O. Polychronopoulou, eds., *Mythos: La préhistoire égéenne du XIXe au XXIe s. ap. J.-C*. BCH Supplément 46. Athènes: École française d'Athènes, pp. 245-256.

Kourtessi-Philippakis, G. (2014a). Pierres de foudre et pierres taillées: l'émergence de la Préhistoire en Grèce, 1836-1905. In *La Grèce des origines, entre rêve et archéologie*. Paris: Réunion des Musées Nationaux, pp. 20-27.

Kourtessi-Philippakis, G. (2014b). Μελετώντας τα λίθινα στα Ιόνια νησιά: Η συμβολή του Σπ. Μαρινάτου. In E. Μαντζουράνη and N. Μαρινάτου, eds., *Σπυρίδων Μαρινάτος 1901-1974. Η ζωή και το έργο του*. Athens: Kardamitsa, pp. 265-283.

Kourtessi-Philippakis, G., Pomonis, P. and Sakkas, D.N. (2019). Η αρχαιολογική έρευνα επιφανείας στη λεκάνη του Μέσου Καλαμά Θεσπρωτίας, 2011-2015: Πρώτα αποτελέσματα. In G. Chouliaras and G.T. Pliakou, eds., *Thesprotia I*. Ioannina: Hellenic Minsitry of Culture and Sports, pp. 1-20.

McDonald, W.A. (1978). Preface. In G. Rapp Jr. and S.E. Aschenbrenner, eds., *Excavations at Nichoria in Southwest Greece, Volume I: Site, Environs and Techniques*. Minneapolis: The University of Minnesota Press, pp. xvii-xxviii.

Marchand, S.L. (1997). *Down from Olympus: Archaeology and Philhellenism in Germany, 1750-1970*. Princeton: Princeton University Press, pp. 340-371.

Milojčić, V., Boessneck, J., Jung, G. and Schneider, H. (1965). *Paläolithikum um Larissa in Thessalien*. Bonn: R. Habelt.

Petrakos, V. (1982). *Δοκίμιο για την αρχαιολογική νομοθεσία*, Δημοσιεύματα του Αρχαιολογικού Δελτίου 29. Athens: Ταμείο Αρχαιολογικών Πόρων και Απαλλοτριώσεων, pp. 50-60.

Petrakos, V. (1987). *Η εν Αθήναις Αρχαιολογική Εταιρεία: η ιστορία των 150 χρόνων της; 1837-1987*. Βιβλιοθήκη της εν Αθήναις Αρχαιολογικής Εταιρείας 104. Athens: Athens Archaeological Society, pp. 143-189.

Petrakos, V. (1995). *Η περιπέτεια της ελληνικής αρχαιολογίας στον βίο του Χρήστου Καρούζου*, Βιβλιοθήκη της εν Αθήναις Αρχαιολογικής Εταιρείας 150. Athens: Athens Archaeological Society, pp. 105-106.

Renfrew, C. (1972). *The Emergence of Civilisation: The Cyclades and the Aegean in the Third Millennium BC*. London: Methuen.

Renfrew, C. (1991). *The Cycladic Spirit: Masterpieces from the Nicholas P. Goulandris Collection* London: Thames and Hudson.

Renfrew, C., Cann, J.R. and Dixon, J.E. (1965). Obsidian in the Aegean. *Annual of the British School at Athens* 60, pp. 225-247.

Renfrew, C., Gimbutas, M. and Elster, E., eds. (1986). *Excavations at Sitagroi I. A Prehistoric Village in Northeast Greece*. Monumenta Archaeologica 13. Los Angeles: Cotsen Institute of Archaeology, University of California.

Renfrew, J. (1969). *Palaeoethnobotany and the Neolithic period in Greece and Bulgaria*. PhD. University of Cambridge.

Sackett, L.H., Hankey, V., Howell, R.J., Jacobsen, T.W. and Popham, M.R. (1966). Prehistoric Euboea: contributions towards a survey. *Annual of the British School at Athens* 61, pp. 33-112.

Sampson, A. (2010). *Μεσολιθική Ελλάδα 9000-6500 π.Χ. παλαιοπεριβάλλον, οικονομία, τεχνολογία*. Athens: Ion.

Sordinas, A. (1969). Investigations of the Prehistory of Corfu during 1964-66. *Balkan Studies* 10, pp. 394-424.

Theocharis, D. (1967). *Η Αυγή της Θεσσαλικής Προϊστορίας*. Volos: Φιλάρχαιος Εταιρία Βόλου.

Theocharis, D. (1970). Αρχαιότητες και Μνημεία Θεσσαλίας: Παλαιολιθικά Ευρήματα από την Αλόννησο. *Αρχαιολογικόν Δελτίον* 25, pp. 276-279.

Theocharis, D. (1971). *Prehistory of Eastern Macedonia and Thrace*, Ancient Cities 9. Athens: Athens Center of Ekistics.

Tomkins, P. (2010). Neolithic antecedents. In E.C. Cline, ed., *The Oxford Handbook of the Bronze Age Aegean*. Oxford: Oxford University Press, pp. 31-49.

Tourloukis, V. and Harvati, K. (2018). The Palaeolithic Record of Greece: A Synthesis of the Evidence and a Research Agenda for the Future. *Quaternary International* 466(A), pp. 48-65.

Tourloukis, V., Karkanas, P. and Wallinga, J. (2015). Revisiting Kokkinopilos: Middle Pleistocene Radiometric Dates for Stratified Archaeological Remains in Greece, *Journal of Archaeological Science* 57, pp. 355-369.

Treuil, R. (1996). L'Ecole française d'Athènes et la préhistoire/protohistoire du monde égéen. *Bulletin de Correspondance Hellénique* 120, pp. 407-439.

Tsountas, C. (1908). Αι προϊστορικαί Ακροπόλεις Διμηνίου και Σέσκλου, Βιβλιοθήκη της εν Αθήναις Αρχαιολογικής Εταιρείας 14. Athens: Athens Archaeological Society.

Tsountas, C. (1928). Ιστορία της αρχαίας ελληνικής τέχνης. Athens: Eleutheroudakis.

Tzonou-Herbst, I. (2015). From the mud of Peirene to mastering stratigraphy: Carl Blegen in the Corinthia and Argolid. In N. Vogeikoff-Brogan, J. L. Davis and V. Florou, eds., *Carl W. Blegen: personal and archaelogical narratives*. Atlanta: Lockwood Press, pp. 39-62.

Valenti, C. (2006). *L'École française d'Athènes*. Paris: Belin, pp. 130-146.

Van Andel, T.H. and Shackleton, J. (1982). Late Paleolithic and Mesolithic Coastlines of Greece and the Aegean. *Journal of Field Archaeology* 9(4), pp. 445-454.

Vavouranakis, G. (2014). Η ερμηνευτική δεινότητα του Σπυρίδωνος Μαρινάτου: Απόπειρα επιστημολογικής ανατομίας της ερευνητικής του προσωπικότητας. In E. Μαντζουράνη and N. Μαρινάτου, eds., *Σπυρίδων Μαρινάτος 1901-1974. Η ζωή και το έργο του*. Athens: Kardamitsa, pp. 286-313.

Vavouranakis, G. (2018). Archaeological Resource Management in Greece: state, private, public and common. In S. Antoniadou, G. Vavouranakis, I. Poulios and P. Mavragani, eds., *Culture and Perspective: State Structures, Private Initiative and the Public Character of Cultural Heritage*. Oxford: Oxbow, pp. 22-39.

Voutsaki, S. (2017). The Hellenization of the prehistoric past: the search for Greek identity in the work of Christos Tsountas. In S. Voutsaki and P. Cartledge, eds., *Ancient Monuments and Modern Identities: A Critical History of Archaeology in 19th and 20th Century Greece*. London and New York: Routledge, pp. 130-147.

Wace, A.J.B. and Thompson, M.C. (1912). *Prehistoric Thessaly*. Cambridge: The University Press, pp. 250-271.

Wardle, K.A., ed. (1996). *Nea Nikomedeia I: The Excavation of an Early Neolithic village in Northern Greece 1961-1964*, directed by R.J. Rodden, BSA Supplement 24. London: British School at Athens.

Weinberg, S. (1965). Review of C. Zervos, Naissance de la civilisation en Grèce, *Archaeology* 18(2), pp. 166-168.

Whitley, J. (2000). Why study Greek archaeology? A brief history of some British rationalizations. In R. Étienne, ed., *Les politiques de l'archéologie du milieu du XIXe siècle à l'orée du XXIe*, Champs helléniques modernes et contemporaines 2. Paris: Ecole française d'Athènes, pp. 33-42.

Zervos, C. (1957). *L'art des Cyclades*. Paris : Cahiers d'art.

Zervos, C. (1963). *Naissance de la civilisation en Grèce*. Paris: Cahiers d'art.

Compelling image-worlds: a pictorial perspective on the epistemology of stone artefact analysis in Palaeolithic archaeology

Shumon T. Hussain [1,2,3,*]

[1] Department of Archaeology and Heritage Studies, School of Culture and Society, Aarhus University, Moesgård Allé 20, 8270 Højbjerg, Denmark
[2] CRC 806 'Our Way to Europe', University of Cologne, Bernhard-Feilchenfeld-Str. 11, 50969 Cologne, Germany
[3] Palaeolithic Research Unit (FAST), Institute for Prehistoric Archaeology, University of Cologne, Weyertal 125, 50931 Cologne, Germany
s.t.hussain@cas.au.dk

Abstract

This contribution discusses the role of lithic imagery – e.g. drawings, photographs and conceptual schemata mobilized to understand ancient stone tools – as active devices of scientific practice and cognition. Even though images undoubtedly serve diverse and often prolific purposes in scientific research and can be instrumental in disclosing otherwise unattainable insights, they have hitherto been treated primarily as media of representation. In the wake of the 'pictorial turn' in the humanities and social sciences, scientific imagery, however, has come into view as a distinct epistemic operator shaping research processes from the onset. Rather than relying on a narrow definition of scientific images, I view them as versatile cognitive resources, which may variously be deployed and manipulated to reach specific epistemic goals, unlock new arguments or afford novel understandings. This shift in perspective provokes a serious concern with the ontology of scientific imagery. Scientific images may then be recognized as enabling appliances of 'making visible', with a potent capacity to structure, guide and transform scientific knowledge-production on multiple levels. Nonetheless, scientific image-use is always linked to broader concerns of inquiry, and thus remains deeply interwoven with other coordinates of scientific epistemology. Specific 'image worlds' may for instance earmark schools of thought, research programmes and practice or larger communities of practice. As a result, the analysis of scientific imagery provides novel opportunities to characterizing and better understanding the fragmentation of the research landscape in various fields or academic disciplines. I deploy the French-Anglophone divide in Palaeolithic stone artefact analysis as an example here and show that previously identified differences in approach and conceptualization between the two communities of practice can be recovered by comparing the 'image worlds' they promulgate. Examining the pictorial structure of these worlds, the frequency of supported image types and the overarching logic of image use sheds new light on the distinctive nature of French and Anglophone styles of lithic reasoning. Based on these findings, it is argued that image analysis is a promising field of future investigation with considerable potential to for clarifying the stakes of scientific practices and holds considerable promise to enhance them. The idea of 'pictorial engineering' is finally introduced as a potential nexus to seize this opportunity of constructive image-work in archaeology and beyond.

Keywords: Pictorial turn, archaeological visualization, philosophy and history of science, lithic technology, French-Anglophone divide

Résumé

Cet article traite du rôle de l'imagerie lithique – dessins, photographies et schémas conceptuels mobilisés pour comprendre les outils anciens en pierre – en tant que dispositifs actifs de la pratique et de la cognition scientifique. Bien que les images servent à des fins scientifiques diverses et qu'elles puissent contribuer à révéler des idées autrement inaccessibles, elles ont jusqu'à présent été traitées principalement comme des moyens de représentation. Après le « tournant pictural » des sciences humaines et sociales, l'imagerie scientifique doit cependant être reconnue comme ayant été dès le départ une force épistémique qui façonne la recherche scientifique. Plutôt que de m'appuyer sur une définition étroite des images scientifiques, je

les considère comme des ressources cognitives qui peuvent être déployées et manipulées de diverses manières pour atteindre des objectifs épistémiques spécifiques. Ce changement de perspective suscite de sérieuses préoccupations quant à l'ontologie de l'imagerie scientifique. Les images scientifiques peuvent alors prendre le devant de la scène en tant que dispositifs permettant de « rendre visible » avec une puissante capacité à structurer et à guider la recherche scientifique. L'utilisation de l'image scientifique est toujours liée à des préoccupations d'enquête plus larges et est donc inextricablement liée à d'autres coordonnées de l'épistémologie scientifique. Des « mondes de l'image » spécifiques peuvent par exemple caractériser des écoles de pensée, des programmes de recherche distincts ou des communautés de pratique plus larges. Par conséquent, l'analyse de l'imagerie scientifique offre de nouvelles possibilités de tracer une voie rentable pour caractériser et peut-être mieux comprendre la fragmentation du paysage de la recherche dans divers domaines ou disciplines universitaires. J'utilise la disparité entre la recherche française et la recherche anglaise dans l'analyse des artefacts paléolithiques en pierre comme exemple pour montrer que les différences d'approche et de conceptualisation déjà connues entre ces deux communautés peuvent être récupérées en comparant les « mondes d'images » qu'elles promulguent. L'examen de la structure picturale de ces mondes et de la fréquence de certains types d'images qui s'y trouvent jette un éclairage nouveau sur le caractère distinctif des styles de raisonnement français et anglophone dans la recherche lithique. La contribution propose de considérer l'analyse d'images comme un champ d'investigation constructif et prometteur, avec un potentiel considérable pour clarifier les enjeux des pratiques scientifiques et, en définitive, pour améliorer ces pratiques. L'idée de « l'ingénierie picturale » est finalement introduite comme un lien potentiel pour saisir cette dernière opportunité.

Mots-clés : tour pictural, visualisation archéologique, philosophie et histoire des sciences, technologie lithique, fracture francophone-anglophone

Introduction

The history of science has traditionally been portrayed as a history of people (Brinton 1950). In a similar vein, the history of archaeology has long been conveyed as a story of the lives, struggles and achievements of the supposed great father figures of the discipline (cf. Daniel 1981; 1983; Fagan 2018). In modern science studies (Hess 1997; Biagioli 1999; Lynch 2012), however, this mode of portraying disciplinary history has come under strong criticism not only because it ignores the sociological dynamics of research (Merton 1957; Kitcher 1990; Bloor 1999; Vinck 2010), but also because after what is sometimes referred to as the 'anthropological turn', scholarship in the history and philosophy of science (Latour and Woolgar 1979; Knorr-Cetina 1981; Shapin and Schaffer 1985; Lynch and Sharrock 2011) has revealed that scientific practice is almost never the exclusive business of people (Hacking 1983; Lynch 1993; Turner 1994; Mayo 1994; Pickering 1999; Soler *et al.* 2014). Especially the *Science and Technology Studies* (STS) have extensively documented that science is more like a nexus or 'mangle' where heterogeneous agents interact in manifold and often surprising ways to forge, consolidate and perpetuate what we recognise as scientific knowledge (Pickering 1995; 2010; Pickering and Guzik 2008). This nexus of scientific research includes non-human entities such as laboratories, instruments, analogue and digital technologies as well as a range of immaterial things created during the research process, which may then easily develop their own efficacy, that is, 'act back' on the scientists who are traditionally addressed as the sole shareholders of knowledge (Lynch 1985; Latour 1987; Bauspies *et al.* 2005; Pickering 2010). Modern archaeological excavations are excellent examples of such a messy, multi-agential process of knowledge-production (Boissinot 2015); they showcase that scientific discoveries are often made not through some genius foreclosed mind, but rather through the creative orchestration of students, helpers, senior researchers, excavation tools, field laboratories, total stations, drones and the materiality and unique possibilities of the field site itself (see e.g. contributions in Edgeworth 2006; cf. Shanks and McGuire 1996; Wylie and Chapman 2015). In fact, archaeological fieldwork is distinctively 'experimental' in that excavation equals destruction and therefore in principle forecloses the replication of the respective scientific operations (Bradley 2015).

While there is presently much interest in the vibrancy and resonance of material things across wider science studies (Rheinberger 1992; 1997; Pickering 2010), the prototypical 'immaterial entities' thought to play a decisive role in the progression of the scientific enterprise are *theories*, *concepts* and *ideas* (e.g. Gillispie 1960). Philosophers and historians of science have debated ever since whether these abstract entities can be said to have an epistemic agency of their own and may hence exert an impact on the form and content of scientific knowledge independently of human subjects. The coalescence of the *history of ideas* as a vocal subfield in the history and philosophy of science stands for an affirmation of this claim (e.g. LaCapra 1990; Bevir 1999; Moran 1999; Grafton 2006; Dorschel 2010). Although recent work in the history and epistemology of archaeology has paralleled some of these developments (Trigger 2006), criticising the traditional 'hagiographic' and often overly subject-centred approach to understanding the foundations of the discipline (e.g. Nye 2006; Porter 2006; Greene 2007; Söderqvist 2007), it has also placed the study of scholarly biographies on a new and arguably productive methodological footing (e.g. Givens 1992; Kaeser 2003; 2013; Murray 1999), emphasizing the mutual impregnation of 'micro' and 'macro-historical' perspectives on various strands of archaeological knowledge-production.

This being said, the significance of *pictures* and *images*[1] – forming a highly ambivalent category of potential epistemic agents – has long been marginalized in mainstream theorizing of science, only recently experiencing renewed scholarly attention (Latour 1986; Lynch and Woolgar 1990; Daston and Galison 1992; Daston 2014). Under the rising influence of modern interdisciplinary *image studies* [*Bildwissenschaften*] (e.g. Schultz 2005; Bredekamp *et al.* 2008), scholars of science have begun to acknowledge that images, too, hold a peculiar and non-passive position within the complex, polyphonic process of scientific knowledge-formation (Lynch and Woolgar 1988; 1990; Topper 1996; Daston 2008 Coopmans *et al.* 2014).

Again, archaeological research may furnish a particularly interesting example of this active inrollment of images due to its long-standing reliance on visualization and illustration (Moser 2001; Bateman 2006). Tracing the discipline's historical roots back to antiquarian interests (Schnapp 1993), archaeology has always been primarily a *science of ancient objects* (cf. Moser 2014). Although this object-centred orientation has only recently been placed on a convincing theoretical foundation (Olsen 2003; 2010; Olsen *et al.* 2012), archaeological reasoning was always 'visual' in so far as variable imaging techniques enable immediate 'object-understandings' (Shelley 1996; Smiles and Moser 2004). For example, drawing archaeological artefacts remains a core practice of the discipline (Dauvois 1976; Adkins and Adkins 1989; Lopes 2009), with assemblages of objects being prone for re-interpretation and re-evaluation based on the critical analysis of their visual evidence alone. There can be no doubt that archaeological imagery does substantial epistemic work and it is time to interrogate their role in different research contexts in more detail (Molyneaux 1997; Perry 2009; Conkey 2010; Juwig and Kost 2010). There can be no doubt that archaeological 'imagination' has always been visual to a large extent.

This contribution takes up the impetus of the ongoing 'pictorial turn' in wider science studies (e.g. Mitchel 1994; 2005; Curtis 2009; Baetens 2013) and re-considers the role of images in archaeological practice (Moser 1992; 1993; 1998; 2001; 2014). I argue that a serious scrutinization of image-work in science requires a definitive move beyond the notion that images are simply a means to 'represent' (cf. Bredekamp *et al.* 2008; Belting 2014; Daston 2014). Instead, it seems important to examine and clarify what images enable, how they re-configure the interaction between scientists and their objects of study and which cognitive affordances they provide.

[1] Albeit 'picture' and 'image' denote slightly different discursive orientations and remain contested notions among proponents of diverging projects within the wider field of visual studies (see esp. the debate in Boehm and Mitchell (2009); cf. footnote 2), the two terms are employed in a broadly synonymous fashion throughout this study. This does not imply that I wish to downplay the achievements and insights tied to the careful theorization of each of them, but rather signals that my exploration can only be a first step in the critical examination of lithic imagery in archaeology and that the present investigation operates on a fairly general level of analysis.

After unpacking this necessary return to the ontology of scientific imagery, the contribution explores the interweaving of image spaces with distinct styles of reasoning. I contend that imagery is frequently overlooked as an integral part of scientific world-making, even though it critically aids in reproducing specific modes of knowledge production both within and between academic disciplines (Knorr-Cetina 2003); it is suggested here that the medium-specific possibilities of insight (McLuhan 1967) created by scientific images can only be exploited if the dynamic cross-fertilization between image, cognition and practice is explored and elucidated. The critical and epistemologically informed analysis of imaging-practices in science, in other words, may be a key precondition for improving these very practices. In what follows, I use the example of divergent strategies of stone artefact visualization in Palaeolithic archaeology to illustrate this argument. A quantitative meta-analysis of lithic inquiry at the interface of French and Anglophone research traditions is conducted to demonstrate that images can be a strong discriminator between different communities of practice. The overall ambition is to spark new interest into the changing yet foundational role of images in archaeological research and to incentivise practitioners to be reflexive about their modes of visualization, deploy their imagery creatively and imaginatively, experiment with alternative imaging-techniques and ultimately embark on the charting of new terrain in visual practice.

From representation to the ontology of scientific imagery

Traditional image theories presume that the significance of images resides in their ability to 'represent' (Mirzoeff 2009: 44). The idea is that images are *expressive* of something else in the world and thus complement verbal language in conveying *semantic* content. According to this view, an image can be understood primarily as a communicative vehicle, administering meaningful relationships between itself and its reference(s). Semiotic renditions of image function, for example, form a sub-group of this family of image theories (e.g. Eco 1997; Crow 2010). A weakness of this perspective on imagery, especially in the context of scientific inquiry, is the privilege of *meaning* over *usage* and the unnecessary reduction of the total space of pictorial significance (cf. Hoel 2018; Engelmann *et al.* 2019). In other words, representational theories of image practice tend to fall short of recognizing the versatility of the image medium (Bredekamp and Schneider 2005). In part at least, the specificity of images derives from their capacity to perform multiple tasks at the same time, for instance to 'objectify' – e.g. to fixate and stipulate a circumstance in the world – while nonetheless leaving plenty of room for different interpretations, inferences and narratives. Additionally, theories of representation are misleading in suggesting that images specify merely the 'outcome', 'result' or 'payoff' of cognitive endeavours, instead of recognizing that they often serve as crucial aids, prerequisites or even mandatory operators of reasoning (Cleveland 1993; Wilkinson 2012; Bueno 2016) – in the words of Daston (2014: 320), images collapse the 'distance between presentation and representation'. The idea that images merely 'express, demonstrate or illustrate a theory' (Lüthy and Smets 2009: 399), rather than helping to explore alternative possibilities of interpretation and understanding, has hampered an adequate perception of the epistemic efficacy of imagery in science (Lynch 1994; Burri 2013). If nothing else, the ongoing 'pictorial turn' in the humanities and social sciences – partly a countermovement against the 'linguistic' enslavement of humanistic thought throughout most of the 20th century – has made clear that images are as much *resources* of cognition as they are the fruits thereof (Mitchel 1994; 2005; Baetens 2013).[2]

[2] Note that modern visual studies are powered by a number of 'turn'-like re-orientations in the epistemology, theory and practice of attending to pictures and images. In contradistinction to Rorty's (1967) influential proclamation of the 'linguistic turn', image scholars have evoked the 'iconic turn' (Boehm, 1994), 'imagic turn' (Fellmann, 1991), 'visualistic turn' (Sachs-Hombach, 1993) and the 'pictorial turn' (Mitchell, 1994). All of these turns foreground the critical re-consideration of images in order to lay a new foundation for the rationality of science, criticising in particular the notion of *pictorial innocence* (cf. Bringéus, 1984: 5). By conjuring Mitchell's (1994) 'pictorial turn', I deliberately direct attention to the medial and material qualities of images in an attempt to analyse their entanglement with the politics of scientific knowledge-production. As far as I can see, this endeavour is in line with Mitchell's (1994; 2005) original concern to re-examine images in order to uncover their intersection with political and social issues, very much inspired by the work Panofsky, McLuhan and Foucault.

A complete understanding of the role of imagery in scientific research therefore requires abandoning the foothold of representation and to begin a serious conversation about the ontology of images, their distinct mode of 'being-in-the-world' and their influence on the possibilities of knowledge-production (Daston 2014). This shift in perspective foregrounds the social and epistemic *consequences* of deploying images – as 'suspended between imagination and perception' (Engelmann *et al.* 2019) – and underscores the unique *cognitive space* they disclose. Image-use in this sense can be read through a Maussian lens – as a traditional transformative action deployed by distinct communities of scientific practice. This rendition of imaging-practices already indicates that they are likely conducive of cultivating and reproducing communal identities within larger disciplinary landscapes (cf. Burri 2008); they can easily serve as anchoring and reference points for divergent modes of scientific cognition and practice. For this reason alone, the analysis of scientific imagery promises to elucidate the conditions of knowledge production characterizing specific research communities at the sub-disciplinary level. Image analysis therefore offers a potent tool for complementing other lines of evidence and investigation in the history and philosophy of science and science studies more generally (Gooding 2004).

Lithic imagery as a promising locus of investigation

The large majority of archaeological research into the origins of our species, conducted under the disciplinary umbrella of Palaeolithic archaeology, relies on stone artefacts – sharp-edged objects manufactured, used and transformed by our hominin cousins and relatives. The deliberate production of these lithic implements dates back at least 3 million years (Harmand *et al.* 2015) and opens up a complex story of human-technology interactions, pre-empting the 'hyper-technologized' lifestyles of the present-day (Kelly 2016). In Palaeolithic archaeology, stone artefacts of various kind are commonly utilized to devise chronologies, to identify patterns of past hominin behaviour and to grasp the cultural horizons of long-vanished societies (e.g. Isaac 1980; Bordes 1968; Shea 2013; Boëda 2013). Consequently, a large portion of our knowledge on the deep past hinges on the capacity of scholars to present, analyse and interpret stone tools in a convincing and effective manner (Hussain 2019). For this reason alone, the illustration and visualization of lithic objects is at the centre stage of practices of stone artefact analysis since the emergence of Palaeolithic archaeology as an academic discipline (e.g. Dauvois 1976; Laurent 1985; Addington 1986; Martingell and Saville 1988; Adkins and Adkins 1989). Manually drawing lithic tools in order to describe their shape, surface scars and other technical features ranks among the 'Ur-techniques' of the discipline.

At the same time, it is widely agreed that drawing lithic artefacts is inescapably interpretive, demanding much more from the illustrator than merely correctly 'representing' the objects in question (Dauvois 1976). For example, the interlocking between specific methods of 'reading' stone artefacts and particular ways of picturing them is showcased by the intimate co-evolution of *chaîne opératoire* methodology and attendant techniques of lithic drawing as well as visually encoding technical characteristics (Inizan *et al.* 1999: 126-127). A more specific example in this context is the development of the so-called *diacritical approach* of the French technology school which relies on the careful study of surface biographies on lithic objects and the translation of this information into knowledge-generating imaging-practices (cf. Soriano 2002: Annexe 2; Chevrier 2012: Annexe 3.1-3.5). Thus, performing a diacritical analysis almost-always requires to carefully draw the examined artefact. Visualization and analysis are not just incidentally associated here – the respective tie turns out to be *research-logical* and the act drawing coequals an act of analysis. More generally speaking, specific methods of lithic analysis often depend on specific methods of rendering the objects of study, while these methods, conversely, often promote specific ways of understanding the pictured stone artefacts. Lithic imagery can thus clearly tell us much about the epistemology, research interest and rationale of stone artefact analysis and it may additionally assist us in reconstructing and perhaps even disentangling long-standing research conflicts in the field.

Needless to say, modern, state-of-the-art lithic research is not confined to traditional imaging techniques such as drawing and photographing and can muster a surge of new digital tools to visualize and render stone tools, such as photogrammetry, 3D scanning, digital shape-crafting systems and a broad and diverse spectrum of computer-aided drawing software (e.g. Magnani 2014). This proclaimed 'visual revolution' (Shott 2014) has dramatically extended the range of imaging possibilities and offers an opportunity for practitioners to tinker with new ways of visualizing their objects of study. The increasing popularity of 2D and 3D geometric-morphometric approaches in lithic studies is an evident example (e.g. Cardillo 2010; Buchanan *et al.* 2014; Archer *et al.* 2016; Okumura and Araujo 2019), showing how novel ways of picturing lithic objects can foster new techniques of measuring object size and shape or promote the development of new statistical tools for describing the geometry of stone artefacts in unprecedented detail (Shott and Trail 2010). Yet, the primary concern of this technology-driven expansion of the imaging space is often to increase the *accuracy*, *precision* and *reproducibility* of the lithic images in question (Lycett and Chauhan 2010); typically, the ambition is to render imaging-practices more 'objective' and to digitize morphological information encoded in lithic objects to create standardized, freely available and readily comparable lithic datasets and digital archives (e.g. Lycett 2009; O'Brien 2010). In essence, this mode of deploying images continues to draw on traditional theories of representation and eventually hopes to substitute the original artefact with its digital or virtual counterpart.

By contrast, the pictorial turn endeavours to oppose such 'representational' exploitations of images. Instead of tearing down the boundaries between the original and its rendering, the difference between the two is voluntarily exaggerated and even radicalized in order to recover specific (and often novel) imaging tasks or to remain responsive to the inherent potential, logic and rationality of the image itself (Weedman 2002; Burri 2012). Creating an image, from this perspective, comes to the fore as a key technique for envisioning the original in alternative ways and to explore hitherto concealed, vague or non-intuitive significances. The renewed interest in images across science studies is thus partly grounded in the 'othering' capacity of these images, rather than in their faculty to 'preserve' exploited by approaches underpinned by theories of representation. Image and reference, in this view, serve complementary epistemic functions, and it is the recognition of this complementarity rooted in difference that promises to advance the scientific enterprise.

It has to be said here, of course, that not all artefact images are 'iconic' and albeit depicting physical objects remains a core task of lithic imagery, 'non-iconic' figures and graphs organizing and plotting metric, attribute and/or trait data are often of equal importance. The key point is the *plurality* of images characterizing and shaping the lithic discourse (Hussain 2019: 103-110) – a pictorial diversity that not only testifies to the exceptional visual nature of lithic studies, but also promises to expose and explicate deep-seated research epistemologies and therefore calls for detailed conceptual examination.

In his seminal discussion of visual practice in archaeology, even though focussed almost exclusively on drawings and thus merely scratching the surface of the available image space, Lopes (2009) distinguishes three key dimensions that contribute to the epistemic work of an image. The first dimension concerns the *image type*, which conveys the kind of image deployed. Prototypical examples of image types are drawings, 3D scans or photographs, but also more abstract diagrammatical representations, schemas or different graphs and tables. The image type tends to vary depending on the research method employed, and statistical software packages or state-of-the-art programming environments often promote signature image-types. The second dimension is the *imaging task*. This vector of image practice, already touched upon previously, conveys the purpose or function of an image in the knowledge-production process. A single image may perform multiple imaging tasks at the same time, it may even do differential epistemic work under varying circumstances and for diverse groups of scholars. Basic imaging tasks include providing evidence, illustrating or supporting an argument, specifying and presenting data, performing inferences,

delineating different hypotheses or conducting some sort of proof. The determination of a picture's imaging task is thus rarely straightforward and typically context-dependent. The third dimension is the *image context*, specifying the disciplinary, topical, discursive and/or working context of the image employed. The image context commonly varies in conjunction with different media of scientific dissemination (e.g. monographs, multi-author volumes, field reports or specialized journal articles) and the choices made in designing and setting up a research project. The image context also tends to differ when disparate research questions are prioritized, it can even respond to how these questions are operationalized. Similarly, the image context regularly depends on the kind of data mustered. In practice, *image type* and *image context* often condition each other and changing the latter often affords directed variation in the former. A strong reliance on quantitative lithic data, for example – typically provided in a conventional, well-defined format – frequently results in a pictorial emphasis on graphs and tables – image types naturally supporting these data and aiding in their organization, digestion and interpretation. Although all three dimensions of visual practice should in principle be expected to influence each other (Gooding 2004), it remains an open empirical question in which ways, to what extent and to what effect in a given research context this holds true.

In any case, the consanguinity of the three dimensions of visual practice proves advantageous and disadvantageous at the same time. The most serious disadvantage is the implied epistemic equifinality of each dimension when taken in isolation. The same image type, for instance, may enact varying imaging tasks, depending on the image context concerned. Thus, caution is required when analysing small datasets or one particular image category. One also needs to resist the temptation of simply treating the presence of a specific instance of one dimension as a proxy for the other two dimensions. Yet, in practice and partly due to research-pragmatic concerns, the image type, keeping the above-mentioned epistemological insecurities in mind, tends to offer a shortcut to the total epistemic work of an image in a given research context. The reason, again, is the highly conventionalized nature of most scientific practices, obeying the standards of well-defined methods and relying on routinized strategies of exploiting and interpreting the utilized imagery. The advantage of the correlative quality of the triad of image type, imaging task and image context, in other words, lies in the peculiar 'rhetoric' or 'immediacy' of images (Wolff 2012). Because scientific images are part of specific research environments and tend to co-evolve with them, both their cognitive value and significance becomes quickly ingrained for those who deploy and regularly rely on them (e.g. Burri 2012; Bueno 2016). For this reason, images have an exceptional propensity to encapsulate and condense distinct styles of reasoning (*sensu* Hacking 1985; 2002); they may accordingly be analysed as *microcosms* of situated research endeavours.

The here-presented meta-analysis of scientific imagery mobilized in the literature provides an initial entry point to examine and compare such different microcosms of research and to investigate the relationships between image type, imaging task and image context in varying communities of scientific practice. Again, the image type provides a suitable point of departure for this undertaking because it can easily be determined and analysed. The target corpus of images only needs to be classified into meaningful types and the distribution of these types mapped across the specified communities of research. The case study presented in the following section, aiming to illustrate some of the points made so far, to explore them further and to drive home the argument, is based on a macro-scale approach to characterizing different 'image worlds' in Palaeolithic stone artefact analysis.

When 'image worlds' collide: the visual ramifications of the French-Anglophone divide in lithic studies

Whereas traditional histories of science, intermittently caricaturized as conveying the 'received view' of scientific knowledge-production, have portrayed the development of scientific practice

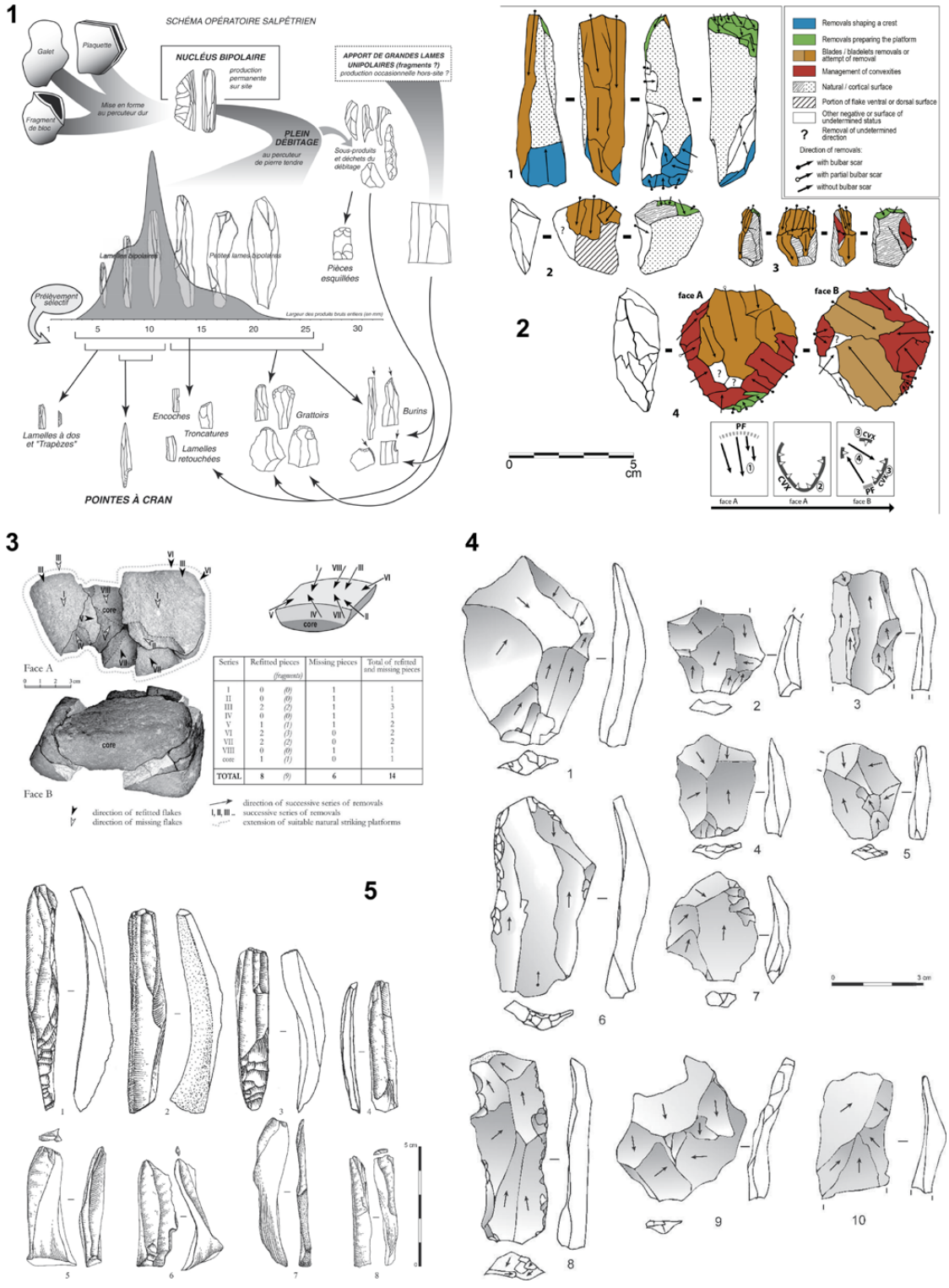


Figure 1. Selection of lithic imagery from the French subsample. (1) Diagram of idealized technological relationships including *débitage* modes, blank shapes, tool types and object frequencies (Bazile and Boccaccio 2008: fig. 26); (2) artefact drawing with complex symbolic and colour coded information on reduction biographies and volume management (Soriano *et al.* 2015: fig. 16); (3) (complex) diagrammatic representation combining idealized management of core volume, photograph of refit series, technical symbology and tabulated information (Delagnes and Roche 2005: fig. 7); (4) artefact drawings grouped via technological criteria (Levallois) with technical symbology (Bourguignon and Meignen 2010: fig. 6); (5) artefact drawings grouped because of their common technological background (preparatory burin spall-like elements of 'transversal' Badegoulian bladelet production) (Chehmana *et al.* 2007: fig. 11). Note the 'more-than-representational' role of lithic object renderings in all of the shown cases.

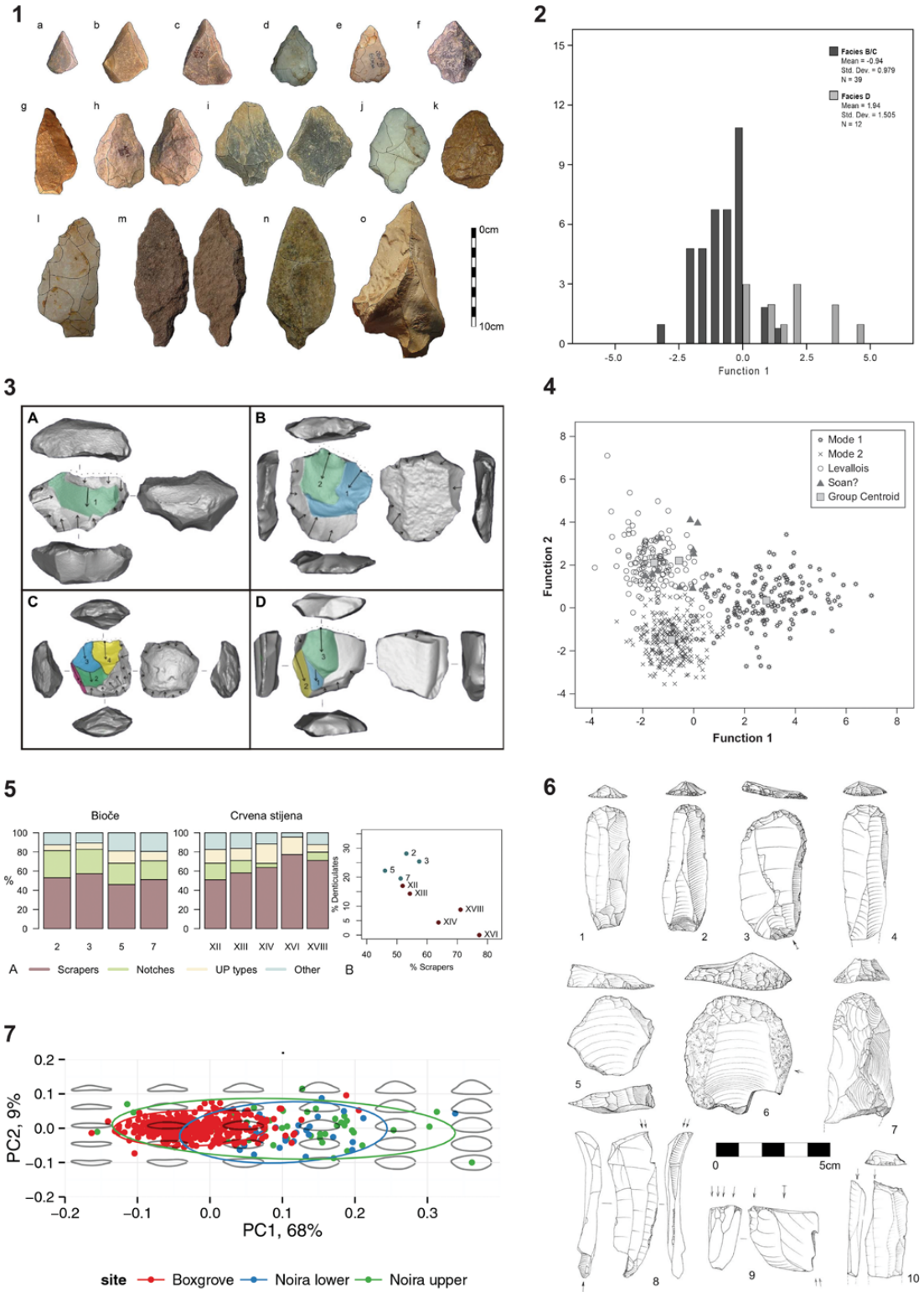


Figure 2. Selection of lithic imagery from the Anglophone subsample. (1) Artefact photographs of specific point types with added contour lines and scar outlines (Blinkhorn *et al.* 2015: fig. 6); (2) graph conveying the results of a discriminant function analysis (Culley *et al.* 2013: fig. 13); (3) combinatory representation based on 3D-scanned cores with technological symbology (Haslam *et al.* 2012: fig. 10); (4) graph plotting the statistical distance (discriminatory function) between various technical entities (Lycett 2007: fig. 2); (5) bar-plot graph of type frequencies and biplot of site similarity (Tamara Dogandzic and Duricic 2017: fig. 21); (6) artefact drawings grouping disparate tool types (Kuhn *et al.* 2009: fig. 9); (7) graph displaying the shape variation results of a Principal Component Analysis (PCA) within an idealized shape space (Iovita *et al.* 2017: fig. 11). Note that object renderings tend to invoke similar classes of objects or to illustrate the character of an assemblage, most images, however, process non-iconic, quantitative lithic data.

as a directed, necessary and largely 'rational' movement (e.g. Popper 1965; Lakatos 1970; Kuhn 1977, 1996), more recent work in wider science studies has made sufficiently clear that conflict, friction and discursive disunity are at least equally important drivers of scientific progress (Kellert *et al.* 2006; Chang 2012; Soler *et al.* 2014). The notion of 'progress' remains of course controversial in this context, yet the recognition that epistemic disharmony, discord and division are often the status quo and regularly turn out to be beneficial to the scientific conduct as a whole can hardly be overrated, not only unveiling contested assumptions and effective knowledge gaps but also underscoring the significance of adhering to pluralistic principles on all levels of inquiry (Hussain 2019). The near-ubiquity of ongoing and emerging scientific conflicts – once captured by the now largely anachronistic notion of 'science wars' (Parsons 2003) – also calls for the conceptual clarification of the nature and stakes of the respective bifurcations and their implications for the status of the discordant forms of scientific knowledge. The analysis of imaging-practices can make an important contribution here and promises to press forward to the underlying core issues, which are often epistemological in nature.

One of the most controversial and long-standing bifurcations of the lithic research landscape in Palaeolithic archaeology, regularly perpetuating itself and arguably keeping stone artefact experts occupied, pertains to the difficult relationship between French lithic inquiry, predominately conducted under the umbrella of *chaîne opératoire* studies, and Anglophone research on lithic technology with a focus on the examination of *reduction sequences* and attribute-based analyses (cf. e.g. Clark and Lindly 1991; Clark 2001; Straus 2002; De la Torre and Mora 2009; Tostevin 2011; Perlès 2016). As I have shown in my previous work, the two discordant communities of practice rely on a set of theoretical and conceptual resources with little overlap, and the nature of their division – baptized 'French-Anglophone divide' for the sake of brevity – is fundamentally epistemological (Hussain 2019). Lithic research cultivated and developed by these two communities of scientific practice is based on incompatible presumptions about the human past, technology and the nature of lithic data. The clashing approaches to the lithic evidence, often yielding antithetical interpretations of the same corpus of ancient stone artefacts, normally also don't agree on a unified theory of corroboration and insist on different standards of validity, argument, truth and scientific knowledge. It in fact appears that the epistemological diversity within the two communities of practice is smaller than the total diversity between the two, thus supporting a *pluralistic* condition of lithic research in Palaeolithic archaeology (Hussain 2019: Chapter 6). Both communities of lithic practice have developed a unique potential of insight and neither of their research epistemologies can profitably be reduced to the respective 'other' without conflating the standards of scientific knowledge from which their potency derives.

With these arguments for scientific pluralism in mind, the French-Anglophone divide offers the ideal testbed for investigating the role of lithic imagery in negotiating and potentially reinforcing conflicting trajectories of knowledge-production in Palaeolithic archaeology. Image analysis may not only confirm and substantiate the previous findings of research-historical and conceptual studies, it may also help to spark new queries and identify currently overlooked issues. Noteworthy research questions here concern, for instance, the magnitude of observable differences between the two community's 'image-worlds', including their internal structure, the numerical distribution of specific image types between the two, the range and scope of the required imaging tasks as well as the role of visual evidence, if any, in lithic knowledge-production. Already basic observations promise to be highly informative here, and may accordingly pave the way for fresh perspectives on a long-standing issue in Palaeolithic research. Since it is reasonable to assume that imaging-practices will only become more important as the field matures (cf. Shott 2014; Marchand 2017), image analysis offers practitioners a much-needed tool to isolate the key functions of already-harnessed images and to develop new means of constructing and deploying images based on what is visually required but not yet available.

Image macro-types	General characteristics
Graphs	Charts, plots and other visual devices organizing data points and other pieces of information, e.g. using a x-y-axis system
Tables	Various tabulations of quantitative and qualitative lithic data
Artefact drawings	Images centred on line drawings of individual lithic artefacts
Combined and artefact photographs	Images combining artefact drawings with other kinds of visualization and images utilizing photographic elements to picture individual lithic artefacts
Diagrams	Abstract, non-standardized and often-idealized figures specifying relationships and expectations by heterogeneous visual means, sometimes integrating other macro-types of lithic imagery

Table 1. The five major image-types analysed in this study.

A preliminary test-case

For testing the potential of image analysis in discriminating between counteracting communities of scientific practice, a sample of 100 scientific contributions dealing with lithic data and published by proponents of the French and Anglophone research enterprise between 2003 and 2017 was compiled (Appendix 1). These contributions were mostly published in high-profile, peer-review journals and tend to be authored by established, well-known lithic scholars in the field. Each community of lithic research is represented by 50 contributions. The selection criteria of representative authors were strictly sociological and grounded in an in-depth socio-historical survey of the larger research landscape at the French-Anglophone interface conducted in the course of my doctoral dissertation (Hussain 2019: Appendix I). Each selected contribution was assigned to one of the two target research communities based on the socio-intellectual legacy of its first (and sometimes last) author. The decisive factor was the institutional context of the author's doctoral and early post-doctoral research since it seems reasonable to assume that scholars are most susceptible to external influences and institutional framings, including the adoption and consolidation of distinct cognitive orientations, during this formative, early-career period. The attribution of contributions to a French or Anglophone context of lithic research was strictly *independent* of their image content. This condition is of course of key importance since the conducted meta-study of lithic imagery endeavours to investigate whether the socio-epistemological bifurcation implied by the French-Anglophone divide can be recovered and reconstructed by assessing the lithic 'image worlds' that its representatives promulgate in their primary research outputs.

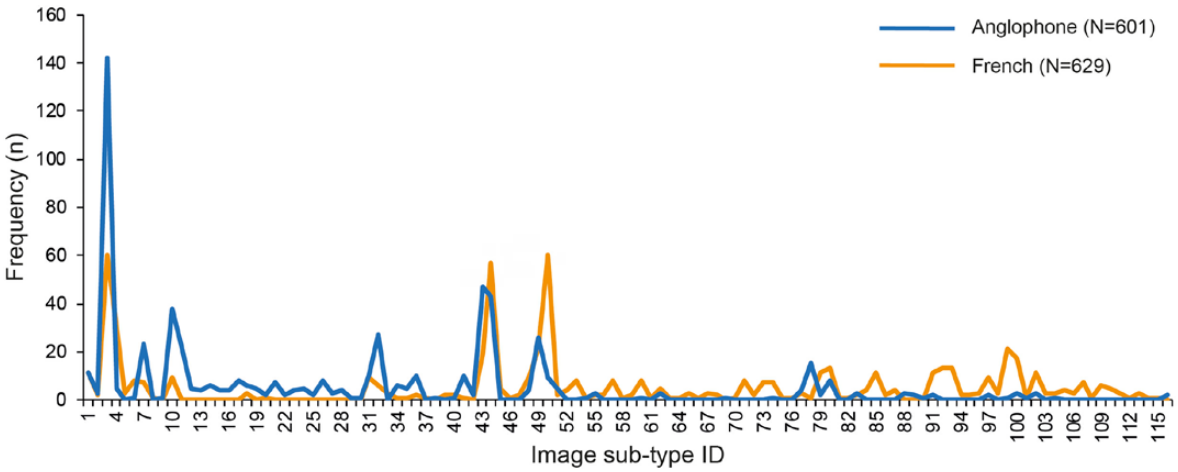


Figure 3. Comparison of absolute frequency values of image sub-types recorded in the French and Anglophone samples. For an explanation of sub-type IDs, refer to Appendix 2.

For each selected contribution, the contained lithic imagery was first classified according to five major image types and various sub-types and then carefully recorded in a database (Table 1; cf. Appendix 2-3; Figures 1, 2). Special attention was paid to the frequency of each image type and to its positioning within the research output. An important question was not only whether these visual data allow for inferences about the underlying epistemological framework of lithic research, but also to assess the discriminatory sensitivity and value of these data. In other words, the relative strength of the previously established division between French and Anglophone styles of lithic research may depend on the granularity of the visual classification, but it of course remains an open question what an 'effective' scale of observation is in this context. The examination of this question requires to test the statistical difference between the French and Anglophone data samples on varying scales of analysis. The chosen approach was to preliminary investigate similarities and differences in visual strategies by comparing the structure and frequency of the realized image types between the two communities of scientific practice on the level of five amalgamated macro-types of lithic imagery and the 119 image sub-types identified in total.

Figure 3 presents the frequency distribution of all image sub-types across the two sets of lithic-centred contributions. The retrieved patterns of French and Anglophone lithic research outputs are substantially different, a finding that is preserved on the macro-level of analysis and thus seems to hold independently of granularity (Figure 4). While the analysed French approaches rely more heavily on abstract, synoptic and often-idealized diagrams than their Anglophone counterparts, Anglophone lithic research is firmly anchored in the mobilization of graphs and tables, often organizing numeric data or discrete artefact traits and artefacts (Figures 5, 6). Another key observation pertains to the visualization logic of stone artefacts themselves: while both communities of practice rely on picturing their primary subject-matter in some fashion, object-images are much more commonplace in French outputs and French technologists also tend to be more 'playful' and idiosyncratic in deploying their lithic images, combining various picturing techniques (e.g. drawings, photographs, and technical symbology) or tinkering with hybrid constructions. There is also a clear trend among Anglophone scholars to present 'raw', un-modified artefact photographs in research outputs. This situation calls attention to a larger and often-overlooked issue in visual practice: in the Anglophone case, lithic imagery conveying the analysed artefacts themselves is often conjured to assure the reader that the objects have physically been studied and to give the reader an impression of what the lithic assemblage

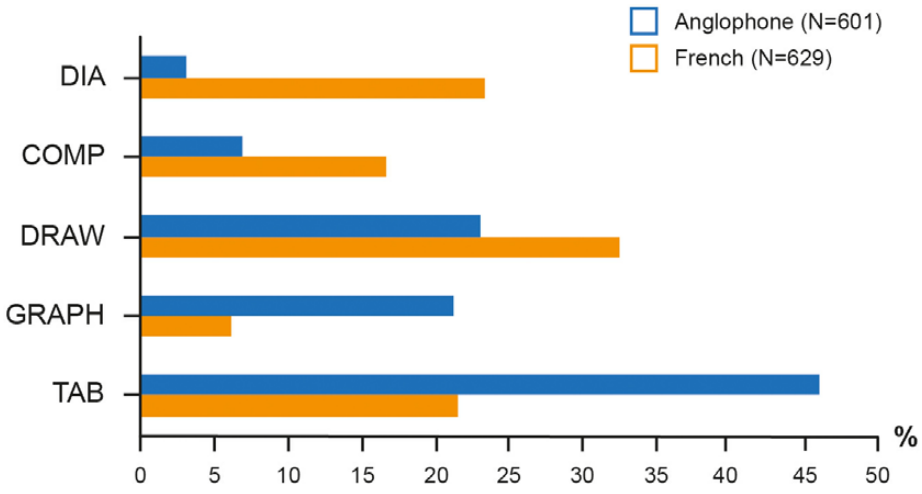


Figure 4. Comparison of relative frequency (%) of macro-types of lithic imagery recorded in the French and Anglophones samples. DIA = Diagrams; COMP = Combined and artefact photographs; DRAW = Artefact drawings; GRAPH = Graphs; TAB = Tables.

looks like; the imagery's function is frequently and quite literally to illustrate the stone artefact material as well as the assemblage context of the presented research. A symptom of this *illustrative* mode of deploying object-imagery in Anglophone lithic research is the positioning of the respective images in research outputs; lithic object-imagery of this kind can typically be found in introductory sections, before any substantial analysis is presented, or, alternatively, is exiled to the appendices and plate sections at the terminal end of the contribution, indicating the non-essential, 'additive' status of the there-elicited information. By contrast, in prototypical French *chaîne opératoire* research, lithic artefact-centred imagery is routinely treated as direct and irreplaceable 'visual evidence' and thus plays a *demonstrative* and at times even *argumentative* role in lithic knowledge-production. This kind of lithic imagery is consequently to be found in the core sections of the research output, where the analysed stone artefact material is presented, discussed and interpreted. It is interesting to note that the previously noted idiosyncrasy of French image mobilization might be a result of this overall configuration. The pronounced diversity of picturing lithic artefacts themselves clearly testifies to the need of highlighting different aspects of the study objects under shifting analytical conditions, depending for example on the precise argument(s) to be promoted. Inversed relationships in the frequency of image types between the two communities of lithic practice, e.g. a reversed reliance on diagrams, graphs and tables, point to complementary divergences in the operational logic of the respective image types and their imaging task (cf. Figure 4).

Undoubtedly then, the configuration of the two reconstructed 'image worlds' is consistent with the expectations derived from foregoing work on the French-Anglophone divide in lithic studies and supports the respective findings (Hussain 2019). The strong tendency of deploying and harnessing different types of images can be interpreted as an expression of the varying epistemic needs of both communities of lithic practice. The epistemic needs that particular types of images embody neatly resonate with the identified modes of reasoning on which French and Anglophone approaches to the lithic data gravitate. The salient contrast between quantitative and qualitative reasoning, an important pillar of the divide, can illustrate this co-dependency and is also expressed in the nature of visual and non-visual data encountered in the here-studied sample of French and Anglophone lithic research. The interpretive-relational

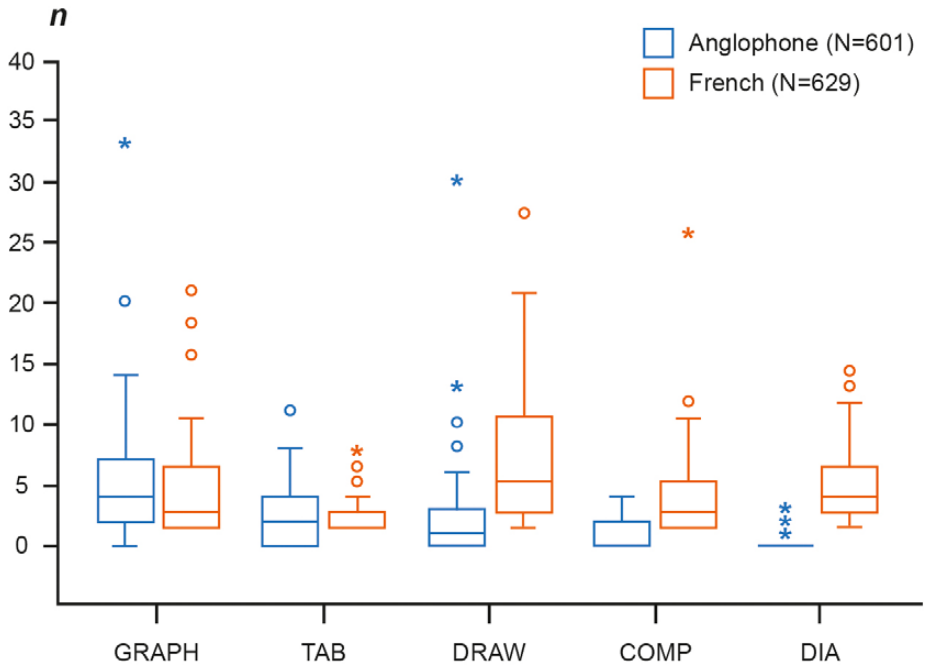


Figure 5. Comparative boxplot of macro-types of lithic imagery recorded in the French and Anglophone samples. GRAPH = Graphs; TAB = Tables; DRAW = Artefact drawings; COMP = Combined and artefact photographs; DIA = Diagrams.

take on lithic technology characteristic for the French research enterprise and epitomized by ongoing research programmes such as *Ethnologie préhistoire*, *Technologie préhistoire* or *Paléohistoire* relies on the qualitative ordering of objects and the inference of higher-order technical infrastructures (cf. Tixier *et al.* 1980; Boëda 1994; Pelegrin 1995; Valentin 2008; 2011; Bon 2009). The hallmark of this mode of understanding stone artefacts is the reconstruction of a technical and systemic 'logic'. Images that serve this ambition need to render the specific technical context of individual assemblage parts both visible and intelligible, they need to excel at isolating and specifying technologically meaningful inter-artefact relations and be able to provide an abstracted, condensed and somewhat idealized overview of the total operation of integrated technical systems. Naturally, diagrams and object-referencing images are much more conducive to achieving this end than, say, prototypical graphs and tables. The strong reliance on the latter group of images by Anglophone practitioners can inversely be explained. Anglophone lithic scholarship tends to embrace quantitative research methodologies and tends to be primarily concerned with the visualization of quantitative data, coded in traits, attributes or object metrics (cf. Clark and Stafford 1982; Shennan 1997, 2004; Lycett and Chauhan 2010). Tables and graphs serve this purpose exceptionally well and are, as a result, often more complex in design and informational value than the tables included in French research outputs, which often merely contain descriptive information about the composition of the studied lithic assemblage(s). Notably and in sharp contradistinction to the imaging task of abstract diagrams in French lithic research, the use of such diagrams by Anglophone researchers is frequently linked to the presentation and specification of the research problem itself, the formulation of the examined hypotheses or the explication of causal relationships which feed into the design of the research, rather than to enable, legitimate and register an integrated reading of lithic technology. These diagrams often feature in introductions or materials and methods sections where the primary lithic analysis is motivated and set up they are regularly 'theoretical' by design rather than 'empirical' or 'data-referencing'. The French mobilization of abstract diagrams, in contrast, tends to be intertwined with the primary analysis of lithic data or is at least tied to the synthetization of heterogeneous information to provide a holistic view of a technological whole – these image types are thus commonly located at the end of research outputs, often near to the conclusion of the contribution in question.

This divergent logic of employing scientific images reinforces the previous conclusion that the French-Anglophone divide is co-extensive with the separation between *analytic* and *synthetic*

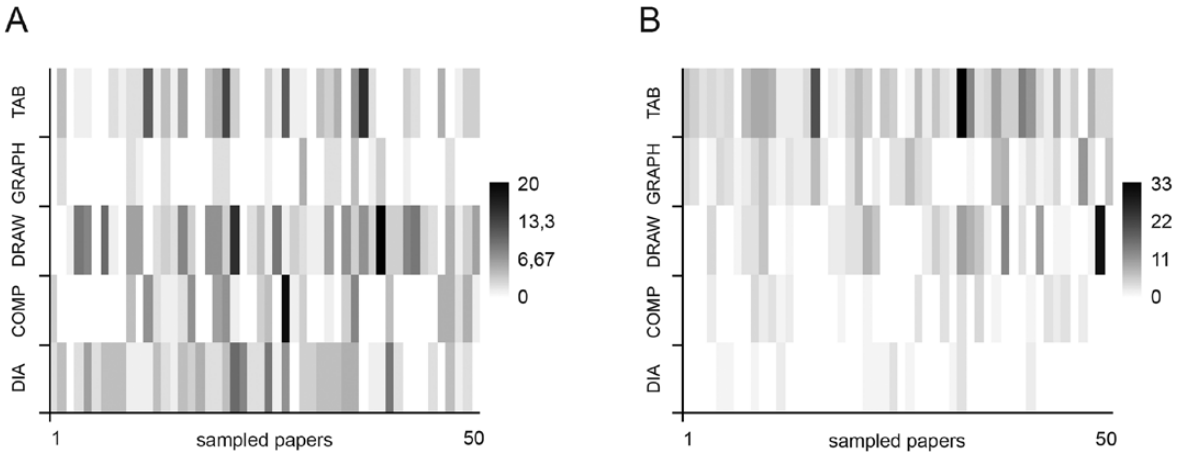


Figure 6. Matrix plots of the structure of macro-types of lithic imagery in the French and Anglophone samples. Frequency scales are not identical. The x-axis represents the two stacks of 50 examined lithic research outputs, the y-axis displays the recorded macro-types. TAB = Tables; GRAPH = Graphs; DRAW = Artefact drawings; COMP = Combined and artefact photographs; DIA = Diagrams. Matrix plots were calculated in PAST v2 (Hammer *et al.* 2001).

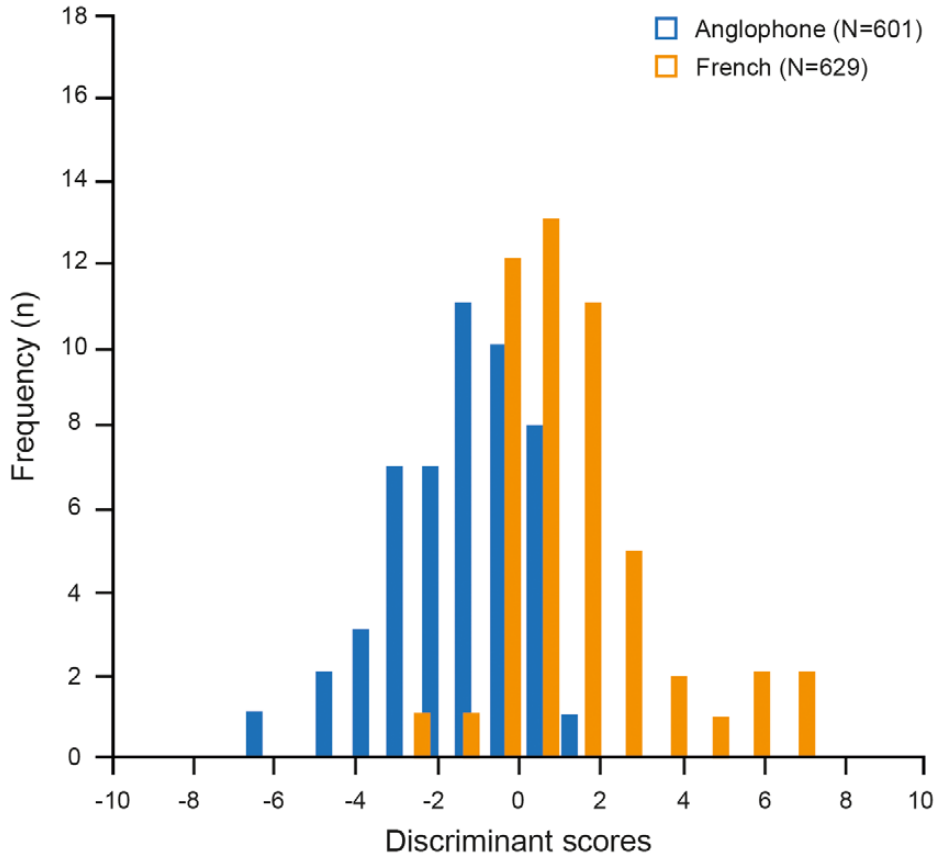


Figure 7. Results of discriminant function analysis of lithic macro-type image data. The number of examined cases is 100; the N refers to the total number of images within the two sets of cases hypothesized to be distinct. The x-axis displays the retrieved discriminant scores, the y-axis shows the number of instances falling into each of the calculated score classes. 84% of the 100 examined cases of lithic research were assigned to the predicted category (French/Anglophone). The statistical difference between the French and Anglophone sample is highly significant (p(same) Hotelling's t2 = 0,000000000004061). The analysis was conducted in PAST v2 (Hammer *et al.* 2001).

research orientations (Hussain 2019: 237-240). The distinction between the two is rooted in an antithetical apprehension of part-whole relations and what is sometimes referred to as the problem of 'mereology' (e.g. Calosi and Graziani 2014). Whereas the analytic mode of scientific inquiry considers parts as the privileged entry points of knowledge production and assumes their epistemological primacy, research in the synthetic mode rejects the idea that parts can exist independently of the wholes that correspond to them (Pepper 1942: 141-150). In the latter view, the key to understanding parts lies in an adequate grasp of wholes, rather than the other way around. The ongoing conflict between analytic and synthetic science thus provokes the question whether wholes can reasonably be said to encapsulate 'more than the sum of their parts'. An important consequence of this conflict concerns the negotiation and portrayal of these contested part-whole relations through visual resources. Here, analytic and synthetic modes of research are expected to produce different image types and to profit from the same types in different ways. Analytic research requires visualization techniques helping to characterize parts in a reliable manner and to promote their detailed comparison as well as the exploration of their latitudinal variability. Synthetic inquiry, by comparison, seeks to deploy images facilitating the placement of parts into their larger meaning-giving contexts as well as discerning qualitative articulations and co-dependencies among them, in this way serving as prosthetic aids of 'reaching out' to emergent technical wholes. The synthetic orientation of the French research enterprise

in lithic studies is thus not coincidentally linked to imaging-practices placing strong emphasis and capitalizing on conceptual and often strongly synoptic diagrams. The analysed Anglophone cases of lithic research are, in a similar manner, logically tied to image types helping in the exploration of the individual traits and features of stone artefacts and exploring their similarity, correlation and overall space of part-based variability.

Figure 7 displays the results of a multivariate discriminatory analysis conducted on the French and Anglophone samples in order to quantitatively evaluate whether and to what extent the hypothesis of structural dissimilarity, formulated independently of image considerations, is supported by the collected image data. The results are statistically significant ($p < 0.001$) and strongly suggest that visual resources are susceptible to epistemological framing in Palaeolithic stone artefact analysis (cf. Figure 7). These results therefore support the previous conclusions and show that consequential segregations of the epistemological landscape on the sub-disciplinary level can be recovered by means of image analysis. The results also highlight the rather profane, everyday ramifications of such segregations in the realm of visual practice, demonstrating that their effects can be pervasive, even though they are often overlooked because the navigation and reproduction of visual worlds is quickly internalized. Altogether, the analysed image data substantiates the finding that French and Anglophone communities of lithic practice are predisposed to develop and harness divergent cognitive resources in order to perpetuate and advance their respective quest for lithic knowledge.

Moving ahead: the potential of pictorial engineering

Rather than merely heralding the outcome of scientific investigations, images are potent media of scholarly thought and practice. They assist researchers in conceptualization, data analysis, argumentation and interpretation; they help to motivate new research projects, to devise alternative questions, and to develop novel methodological approaches. Their active role in the research process implies that image use tends to be inseparable from other coordinates of scientific epistemology. The study of scientific imagery across diverse fields of learning but also within a given disciplinary context therefore promises to disclose unique windows into the imperatives, assumptions and tacit theories propelling and defining various research enterprises. What I have termed 'image analysis', in other words, is capable of shedding new light on the many conflicts, segregations and divisions within science, when conceptions, methods and interpretations in a shared domain of inquiry notably clash and knowledge claims seem irreconcilable. The careful examination of 'image worlds' can then be instrumental for clarifying the involved styles of reasoning and in assessing what is put at stake in these cases.

The French-Anglophone divide in Palaeolithic stone artefact analysis is a striking example of such a clash of research perspectives and epistemologies, and it also showcases the utility of analyzing visual practice. Not only is it possible to recover previously established, deep-running polarities of scientific practice between the two involved communities of practice by means of image analysis alone, the comparative examination of mobilized image types, their frequencies and imaging tasks also allows to pinpoint hitherto neglected qualities of the implicated modes of scientific world-making. Furthermore, the results of the here-presented analysis of lithic imaging-practices at the French-Anglophone interface indicate that images serve different epistemic purposes in the two research communities, thus emanating as the 'gatekeepers' of unique and non-reducible trajectories of lithic knowledge-production. Arguably, this capacity of images to alter and/or reinforce the course of reasoning and to provide pictorial affordances of various kind offers tantalizing opportunities for analysts of science and empirical researchers alike.

Image analysis in science arguably supplies a platform where specialists of scientific conceptualization, for instance historians and philosophers of science, and experts in specific

methods of data analysis, e.g. archaeologists, sociologists and biologists, may cooperate in novel and effective ways. While the former group can pinpoint the key issues, problems and questions but can also bring into play the required epistemological background knowledge to tackle them, empirical scientists can explore the respective issues by means of modern data science and test meta-scientific hypotheses with their own certified methods and research tools. The analysis of scientific imagery is particularly well suited for this cooperative endeavour because the object of investigation, images deployed in scientific research, is well defined and data collection often relatively straightforward. The promise is to eventually compile large datasets and to explore latitudinal patterns of imaging-practice within and between scientific fields and disciplines.

Image analysis is also a potent catalyst of reflexivity and may accordingly prompt innovation in empirical research itself. The empirical examination of scientific imagery, in other words, may be regarded as an important first step towards enhancing the corresponding imaging-practices themselves. A key here, again, is the realization that images offer unique resources of cognition with the propensity to promote otherwise unattainable insights. Since image analysis clarifies the epistemic work that scientific images do in specific research contexts and in relation to particular problem fields, it can provide practitioners with baseline knowledge and concepts against which they can start to reconsider the image types they employ, the range of imaging tasks they require and possible ways of improving them. Researchers can then reflect more explicitly and in a more focussed and solution-directed manner on their analytical and interpretive requirements and goals. This should help scholars in making informed decisions on whether new digital technologies or other more traditional techniques may assist them in reaching these goals, and whether these can perhaps inspire the development of entirely new pictorial 'crutches'. The potential here is thus to engage in productive forms of *pictorial engineering*.

Pictorial engineering can be understood in analogy to the nascent and increasingly popular practice of 'conceptual engineering' in philosophy of science (e.g. Simion 2017; Sawyer 2018; Nado 2019). The core impetus of conceptual engineering is the mounting dissatisfaction with the analytical and explanatory value of some of our inherited key concept. There is an increasing recognition that many concepts that continue to structure our reasoning are not necessarily 'ideal' for disclosing the realities we seek to understand with their help. It might thus be beneficial to re-think and modify these concepts, so that they 'work' more effectively in the epistemic tasks assigned to them (Nado 2019). In the extreme, researchers may even reach the conclusion that some issues can hardly be adequately addressed with the conceptual resources currently available to the scientific community. Rather, the concepts have to be *engineered* first, sometimes even from scratch. Just like its philosophical counterpart, 'pictorial engineering' therefore elicits a *normative* orientation, seeking to improve current best-practices of visualization and to engender new, more powerful images to help understanding the world in which we live. I would argue that image analysis holds the potential to establish the initial baseline from which scholars can begin to ask what their scientific images *should do* in contrast to the work they are presently doing. The answer, of course, must not always be new images, but can also lie in the refurbishment of already used imagery and the discovery of unrealized imaging tasks. In the case of Palaeolithic stone artefact analysis, practitioners may for instance re-assess the work of their images in capturing the 'logic' of a technological system, assigning each lithic object or object-type its proper place within an integrated technical infrastructure. Scholars may similarly re-consider the manner in which the organization of lithic technology on a landscape-scale can be displayed and visually encoded to better reflect the multi-dimensionality and scalability of past technology-landscape interactions, I including aspects such as temporality, place-making, seasonality and human-animal connections.

Image analysis paired with the proactive exploration of hitherto untapped imaging possibilities can be a useful tool to break off long-standing, deadlocked and polarized discussions and to

infuse them with new discursive dynamics. As Frederick (2019) has convincingly argued, visual practice holds great potential to decolonise deeply engrained assumptions and ideas and can thus serve as a powerful means of critique, or a first stepping-stone for the development of alternative narratives of the past. Acknowledging the active and generative role of imagery within processes of knowledge production is an important cornerstone for nurturing the reflexivity of scientific research.

As this contribution has tried to demonstrate, pictorial issues in archaeology are not merely of secondary interest, they intimately resonate with broader concerns of knowledge production and archaeological theory, and researchers should pay more attention to visual issues. Reconsidering and reflecting upon archaeological imagery can help reframe old questions, may shed new light on the history of archaeology and might even allow us to make better sense of intra- and inter-disciplinary conflicts and controversies. Just as the history of archaeology remains essential to archaeological theorizing broadly conceived (Murray 2013; Kaeser 2017), the visuality of archaeology is arguably fundamental to both of them. That said, the analysis of archaeological images not only promises to clarify intricate and multi-vocal trajectories of archaeological knowledge-formation and to articulate the politics of knowledge in the field, it also yields the unique opportunity to refine and improve current best-visual-practices. One can only hope that lithic practitioners seize this opportunity and take up the impetus of the 'pictorial turn' for carefully scrutinizing the manifold visual resources employed in archaeological research in a future-oriented perspective.

Acknowledgements

This contribution builds on my doctoral research project 'Epistemology of lithic analysis: the French-Anglophone divide in Palaeolithic archaeology' funded by the Studienstiftung des Deutschen Volkes (German Academic Scholarship Foundation). I am grateful to Raymond Corbey, Marie Soressi and Krist Vaesen at Leiden University for their enduring support, trust and enthusiasm in supervising my doctoral dissertation. I also wish to thank Jürgen Richter for accommodating me at the CRC 806 'Our Way to Europe' in Cologne during the second half of 2019. Last but not least, I am thankful to Sophie de Beaune (Lyon) and Oscar Moro-Abadía (Newfoundland) for hosting the thematic session 'Epistemology, History and Philosophy of Science: Interdisciplinary Perspectives on the History of Archaeology' at the UISPP World Congress in Paris 2018 on which this chapter is based, and to kindly urge me time and again to deliver my paper in writing, which I, undoubtedly, would not have done otherwise.

References

Addington, L. (1986). *Lithic Illustration: Drawing Flaked Stone Artifacts for Publication*. Chicago: The University of Chicago Press.

Adkins, L. and Adkins, R. (1989). *Archaeological illustration*. Cambridge: Cambridge University Press.

Archer, W., Pop, C.-M., Gunz, P. and McPherron, S. (2016). What is Still Bay? Human biogeography and bifacial point variability. *Journal of Human Evolution*, 97, pp. 58-72.

Baetens, J. (2013). Image and visual culture after the pictorial turn: an outsider's note. *Visual Studies*, 28(2), pp. 180-185.

Bateman, J. (2006). Pictures, Ideas, and Things. The Production and Currency of Archaeological Images. In M. Edgeworth, ed., *Ethnographies of Archaeological Practice: Cultural Encounters, Material Transformations*. Lanham: Altamira Press, pp. 68-80.

Bauchspies, W., Croissant, J. and Restivo, S. (2005). *Science, Technology, and Society: A Sociological Approach*. Oxford: Wiley-Blackwell.

Bazile, F. and Boccaccio, G. (2008). Le Salpêtrien ancien. Un technocomplexe épisolutréen redéfini. *Gallia Préhistoire*, 50, pp. 103-141.

Belting, H. (2014). *An Anthropology of Images. Picture, Medium, Body*. Translated by Th. Dunlap. Princeton: Princeton University Press.
Bevir, M. (1999). *The Logic of the History of Ideas*. Cambridge: Cambridge University Press.
Biagioli, M., ed. (1999). *The Science Studies Reader*. New York: Routledge.
Blinkhorn, J., Achyuthan, H. and Ajithprasad, P. (2015). Middle Palaeolithic point technologies in the Thar Desert, India. *Quaternary International*, 382, pp. 237-249.
Bloor, D. (1999). Anti-Latour. *Studies in the History and Philosophy of* Science, 30, pp. 81-112.
Boëda, E. (1994). *Le Concept Levallois: variabilité des méthodes*. Paris: CNRS Éditions.
Boëda, E. (2013). *Techno-logique & Technologie. Une Paléohistoire des objets lithiques tranchants*. Paris: @rchéo-éditions.
Boehm, G. (1994). *Was ist ein Bild?* München: Fink.
Boehm, G. and Mitchell, W. (2009). Pictorial versus Iconic Turn: Two Letters. *Culture, Theory & Critique*, 50(2-3), pp. 103-121.
Boissinot, P. (2015). *Qu'est-ce qu'un fait archéologique?* Paris: EHESS.
Bon, F. (2002). *L'Aurignacien entre Mer et Océan. Réflexion sur l'unité des phases anciennes de l'Aurignacien dans le sud de la France*. Paris: Société préhistorique française.
Bordes, F. (1968). *The Old Stone Age*. New York: McGraw-Hill.
Bourguignon, L. and Meignen, L. (2010). Ioton (Gard) 30 ans après: nouvelles considérations technologiques et techno-économiques sur l'industrie moustérienne. *Bulletin de la Société préhistorique française*, 107(3), pp. 433-451.
Bradley, R. (2015). Repeating the unrepeatable experiment. In A. Wylie, and R. Chapman, (eds.), *Material Evidence. Learning from Archaeological Practice*. London: Routledge, pp. 23-41.
Bredekamp, H. and Schneider, P., (eds.) (2005). *Visuelle Argumentationen: Die Mysterien der Repräsentation und die Berechenbarkeit der Welt*. Munich: Verlag Wilhelm Fink.
Bredekamp, H., Schneider, B. and Dünkel, V., eds. (2008). *Das Technische Bild. Kompendium zu einer Stilgeschichte wissenschaftlicher Bilder*. Berlin: Akademie Verlag.
Bringéus, N.-A. (1984). Gedanken über Bilder. *Volkskunst*, 7, pp. 5-7.
Brinton, C. (1950). *Ideas and Men: The Story of Western Thought*. New York: Prentice Hall.
Buchanan, B., O'Brien, M. and Collard, M. (2014). Continent-wide or region-specific? A geometric morphometrics-based assessment of variation in Clovis point shape. *Archaeological and Anthropological Sciences*, 6(2), pp. 145-162.
Bueno, O. (2016). Visual Reasoning in Science and Mathematics. In L. Magnani, and C. Casadio, (eds.), *Model-Based Reasoning in Science and Technology*. New York: Springer, pp. 3-19.
Burri, R. (2008). Bilder als soziale Praxis: Grundlegungen einer Soziologie des Visuellen. *Zeitschrift für Soziologie*, 37(4), pp. 342-358.
Burri, R. (2012). Visual rationalities: Towards a sociology of images. *Current Sociology*, 60(1), pp. 45-60.
Burri, R. (2013). Visual Power in Action: Digital Images and the Shaping of Medical Practices. *Science as Culture*, 22(3), pp. 367-387.
Calosi, C. and Graziani, P., eds. (2014). *Mereology and the Sciences. Parts and Wholes in the Contemporary Scientific Context*. Bern: Springer.
Cardillo, M. (2010). Some Applications of Geometrics Morphometrics to Archaeology. In A. Elewa, ed., *Morphometrics to Nonmorphometricians*. Berlin: Springer, pp. 325-341.
Chehmana, L., Liard, M. and Bodu, P. (2007). De nouveaux arguments pour un rattachement au Badegoulien des séries dites « à grands burins transversaux » de la vallée de la Claise. *Bulletin de la Société préhistorique française*, 104(4), pp. 681-697.
Chevrier, B. (2012). *Les assemblages à pièces bifaciales au Pléistocène inférieur et moyen ancien en Afrique de l'Est et au Proche-Orient : nouvelle approche du phénomène bifacial appliquée aux problématiques de migrations, de diffusion et d'évolution locale*. Unpublished Doctoral Dissertation, Université de Paris X-Nanterre.
Clark, G. (2001). Observations on the epistemology of human origins research. In R. Corbey, and W. Roebroeks, (eds.), *Studying Human Origins. Disciplinary History and Epistemology*. Amsterdam: Amsterdam University Press, pp. 139-146.
Clark, G. and Stafford, C. (1982). Quantification in American Archaeology: A Historical Perspective. *World Archaeology*, 14(1), pp. 98-119.

Clark, G. and Lindly, J. (1991). On Paradigmatic Biases and Paleolithic Research Traditions. *Current Anthropology*, 32(5), pp. 577-587.
Cleveland, W. (1993). *Visualizing Data*. New Jersey: Hobart Press.
Conkey, M. (2010). Images without words: the construction of prehistoric imaginaries for definitions of 'Us'. *Journal of Visual Culture*, 9(3), pp. 272-283.
Coopmans, C., Vertesi, J., Lynch, M. and Woolgar S., eds. (2014). *Representation in Scientific Practice Revisited*. Cambridge (MA)/London: The MIT Press.
Crow, D. 2010. *Visible Signes. An Introduction to Semiotics in the Visual Arts*. Lausanne: AVA Publishing.
Culley, E., Popescu, P., Clark, G. (2013). An analysis of the compositional integrity of the Levantine Mousterian facies. *Quaternary International*, 300, pp. 213-233.
Curtis, N. (2009). 'As if': Situating the Pictorial Turn. *Culture, Theory & Critique*, 50(2-3), pp. 95-101.
Daniel, G., ed. (1981). *Towards a History of Archaeology*. London: Thames & Hudson.
Daniel, G. (1983). *A Short History of Archaeology*. London: Thames & Hudson.
Daston, L. (2008). On scientific observation. *Isis*, 99, pp. 97-110.
Daston, L. (2014). Beyond Representation. In C. Coopmans, J. Vertesi, M. Lynch and S. Woolgar, (eds.), *Representation in Scientific Practice Revisited*. Cambridge (MA)/London: The MIT Press, pp. 319-322.
Daston, L. and Galison, P. (1992). The Image of Objectivity. *Representations*, 40, pp. 81-128.
Delagnes, A. and Roche, H. (2005). Late Pliocene hominid knapping skills: The case of Lokalalei 2C, West Turkana, Kenya. *Journal of Human Evolution*, 48, pp. 435-472.
De la Torre, I. and Mora, R. (2009). Remarks on the Current Theoretical and Methodological Approaches to the Study of Early Technological Strategies in Eastern Africa. In E. Hovers and D.R. Braun, (eds.), *Interdisciplinary Approaches to the Oldowan*. Dordrecht: Springer, pp. 15-24.
Dogandzic, T. and Duricic, L. (2017). Lithic production strategies in the Middle Paleolithic of the southern Balkans. *Quaternary International*, 450, pp. 68-102.
Dorschel, A. (2010). *Ideengeschichte*. Göttingen: Vandenhoeck & Ruprecht.
Eco, U. (1979). *A Theory of Semiotics*. Bloomington: Indiana University Press.
Edgeworth, M., ed. (2006). *Ethnographies of Archaeological Practice: Cultural Encounters, Material Transformations*. Lanham: Altamira Press.
Engelmann, L., Humphrey, C. and Lynteris, C. (2019). Introduction: Diagrams beyond Mere Tools. *Social Analysis*, 63(4), pp. 1-19.
Fagan, B. (2018). *A Little History of Archaeology*. New Haven: Yale University Press.
Fellmann, F. (1991). *Symbolischer Pragmatismus. Hermeneutik nach Dilthey*. Berlin: Rowohlt.
Frederick, U. (2019). Old Flames. Rekindling ideas of fire, humanity and representation through creative art practice. In M. Porr and J. Matthews, (eds.), *Interrogating Human Origins. Decolonisation and the Deep Human Past*. London: Routledge, pp. 115-138.
Gillispie, C. (1960). *The Edge of Objectivity. An Essay in the History of Scientific Ideas*. Princeton: Princeton University Press.
Givens, D. (1992). The role of biography in writing the history of archaeology. In J. Reyman, ed., *Rediscovering our Past: Essays on the History of American Archaeology*. Avebury: Aldershot, pp. 51-66.
Gooding, D. (2004). Cognition, Construction, and Culture: Visual Theories in the Sciences. *Journal of Cognition and Culture*, 4, pp. 551-593.
Grafton, A. (2006). The History of Ideas. Precept and Practice, 1950-2000 and Beyond. *Journal of the History of Ideas*, 67(1), pp. 1-32.
Greene, M. (2007). Writing scientific biography. *Journal of the History of Biology*, 40(4), pp. 727-759.
Hacking, I. (1983). *Representing and Intervening. Introductory Topics in the Philosophy of Natural Science*. Cambridge: University of Cambridge Press.
Hacking, I. (1985). Styles of scientific thinking. In J. Rajchman, and C. West, (eds.), *Postanalytic philosophy*. New York: Columbia University Press, pp. 145-165.
Hacking, I. (2002). 'Style' for historians and philosophers. In I. Hacking, ed., *Historical Ontology*. Cambridge (MA): Harvard University Press, pp. 178-199.

Hammer, **Ø.,** Harper, D. and Ryan, P. (2001). PAST: Paleontological statistics software package for education and data analysis. *Palaeontologia Electronica*, 4(1), p. 9.

Harmand, S., Lewis, J., Feibel, C., Lepre, C., Prat, S., Lenoble, A., Boës, X., Quinn, R., Brenet, M., Arroyo, A., Taylor, N., Clément, S., Daver, G., Brugal, J.-Ph., Leakey, L., Mortlock, R., Wright, J., Lokorodi, S., Kirwa, C., Kent, D. and Roche, H. (2015). 3.3-million-year-old stone tools from Lomekwi 3, West Turkana, Kenya. *Nature*, 521, pp. 310-316.

Haslam, M., Clarkson, C., Roberts, R., Borad, J., Korisettar, R., Ditchfield, P., Chivas, A., Harris, C., Smith, V., Oh, A., Eksambekar, S., Boivin, N. and Petraglia, M. (2012). A southern Indian Middle Palaeolithic occupation surface sealed by the 74 ka Toba eruption: Further evidence from Jwalapuram Locality 22. *Quaternary International*, 258, pp. 148-164.

Hess, D. (1997). *Science Studies: An Advanced Introduction*. New York: New York University Press.

Hoel, A. (2018). Operative Images. Inroads to a New Paradigm of Media Theory. In L. Feiersinger, K. Friedrich and M. Queisner, (eds.), *Image – Action – Space. Situating the Screen in Visual Practice*. New York: de Gruyter, pp. 11-27.

Hussain, S. (2019). *The French-Anglophone divide in lithic research: A plea for pluralism in Palaeolithic archaeology*. Unpublished Doctoral Dissertation, Leiden University.

Inizan, M.-L., Reduron-Ballinger, M., Roche, H. and Tixier, J. (1999). *Technology and Terminology of Knapped Stone*. Translated by J. Féblot-Augustins. Paris: C.R.E.P.

Iovita, R., Tuvi-Arad, I., Moncel, M.-H., Despriée, J., Voinchet, P. and Bahain, J.-J. (2017). High handaxe symmetry at the beginning of the European Acheulian: The data from la Noira (France) in context. *PLoS ONE*, 12(5), e0177063.

Isaac, G. (1980). Casting the net wide: a review of archaeological evidence for early hominid land-use and ecological relations. In L.K. Konigsson, ed., *Current Argument on Early Man*. London: Pergamon, pp. 226-251.

Juwig, C. and Kost, C. (2010). Bilder in der Archäologie – eine Archäologie der Bilder? Einleitende Bemerkungen. In C. Juwig and C. Kost, (eds.), *Bilder in der Archäologie – eine Archäologie der Bilder?* Münster: Waxmann, pp. 13-32.

Kaeser, M.-A. (2003). La science vécue. Les potentialités de la biographie en histoire des sciences. *Revue d'Histoire des Sciences Humaines*, 8, pp. 139-160.

Kaeser, M.-A. (2013). Biography, science studies and the historiography of archaeological research: Managing personal archives. *Complutum*, 24(2), pp. 101-108.

Kaeser, M.-A. (2017). Who is theory for? The social relevance of a critical approach to archaeology. In A. Gardener, M. Lake and U. Sommer, (eds.), *The Oxford Handbook of Archaeological Theory*. New York: Oxford University Press. [DOI: 10.1093/oxfordhb/9780199567942.013.002]

Kellert, S., Longino, H., Waters, C., eds. (2006). *Scientific Pluralism*. Minneapolis: University of Minnesota Press.

Kelly, R. (2016). *The Fifth Beginning. What Six Million Years of Human History Can Tell Us About Our Future*. Oakland: University of California Press.

Kitcher, P. (1990). The division of cognitive labor. *Journal of Philosophy*, 87(1), pp. 5-22.

Knorr-Cetina, K. (1981). *The Manufacture of Knowledge. An Essay on the Constructivist and Contextual Nature of Science*. Oxford: Pergamon Press.

Knorr-Cetina, K. (2003). *Epistemic Cultures. How the Sciences Make Knowledge*. Cambridge (MA): Harvard University Press.

Kuhn, S., Stiner, M., Güleç, E., Özer, I., Yılmaz, H., Baykara, I., Açıkkol, A., Goldberg, P., Martínez Molina, K., Ünay, E. and Suata-Alpaslan, F. (2009). The early Upper Paleolithic occupations at Üçağızlı Cave (Hatay, Turkey). *Journal of Human Evolution*, 56, pp. 87-113.

Kuhn, T. (1977). Objectivity, value judgment, and theory choice. In A. Bird, and J. Ladyman, (eds.), *Arguing About Science*. London: Routledge, pp. 74-86.

Kuhn, T. (1996) [1972]. *The Structure of Scientific Revolutions*. Third Edition. Chicago: The University of Chicago Press.

LaCapra, D. (1990). *Rethinking Intellectual History. Texts, Contexts, Language*. Ithaca: Cornell University Press.

Lakatos, I. (1970). Falsification and the Methodology of Scientific Research Programmes. In I. Lakatos, and A. Musgrave, (eds.), *Criticism and the Growth of Knowledge*. Cambridge: Cambridge University Press, pp. 91-196.

Latour, B. (1986). Visualization and cognition: Thinking with eyes and hands. *Knowledge in Society*, 6, pp. 1-40.
Latour, B. (1987). *Science in Action: How to Follow Scientists and Engineers through Society*. Cambridge (MA): Harvard University Press.
Latour, B. and Woolgar, S. (1979). *Laboratory Life: The Construction of Scientific Facts*. Beverly Hills: Sage Publications.
Lopes, D. (2009). Drawing in a Social Science: Lithic Illustration. *Perspectives on Science*, 17(1), pp. 5-25.
Lüthy, C. and Smets, A. (2009). Words, Lines, Diagrams, Images: Towards a History of Scientific Imagery. *Early Science and Medicine*, 14(1-3), pp. 398-439.
Lycett, S. (2007). Is the Soanian techno-complex a Mode 1 or Mode 3 phenomenon? A morphometric assessment. *Journal of Archaeological Science*, 34, pp. 1434-1440.
Lycett, S. (2009). Quantifying Transitions: Morphometric Approaches to Palaeolithic Variability and Technological Change. In M. Champs and P. Chauhan, (eds.), *Sourcebook of Paleolithic Transitions. Methods, Theories, and Interpretations*. New York: Springer, pp. 79-92.
Lycett, S. and Chauhan, P. (2010). Analytical Approaches to Palaeolithic Technologies: An Introduction. In S. Lycett and P. Chauhan, (eds.), *New Perspectives on Old Stones. Analytical Approaches to Paleolithic Technologies*. New York: Springer, pp. 23-41.
Lynch, M. (1985). *Art and Artifact in Laboratory Science: A Study of Shop Work and Shop Talk in a Research Laboratory*. London/Boston: Routledge and Kegan Paul.
Lynch, M. (1993). *Scientific Practice and Ordinary Action: Ethnomethodology and Social Studies of Science*. Cambridge/New York: Cambridge University Press.
Lynch, M. (1994). Representation is overrated: some critical remarks about the use of the concept of representation in science studies. *Configurations*, 2(1), pp. 137-149.
Lynch, M. (2012). *Science and Technology Studies: Critical Concepts in the Social Sciences*. 4 Volumes. Oxon/New York: Routledge.
Lynch, M. and Woolgar, S. (1988). Introduction: Sociological orientations to representational practice in science. *Human Studies*, 2-3(11), pp. 99-116.
Lynch, M. and Woolgar, S. (1990). *Representation in scientific practice*. Cambridge (MA): The MIT Press.
Lynch, M. and Sharrock, W. (2011). *Ethnomethodology*. 4 Volumes. Los Angeles: Sage.
Magnani, M. (2014). Three-Dimensional Alternatives to Lithic Illustration. *Advances in Archaeological Practice*, 2(4), pp. 285-297.
Marchand, G. (2017). Préface. In L. Mevel, *Sociétés en Mouvement. Évolution des Sociétés Magdaléniennes et Aziliennes des Alpes du Nord Françaises*. Paris: CTHS, pp. 9-10.
Martingell, H. and Saville, A. (1988). *The Illustration of Lithic Artefacts: A Guide to Drawing Stone Tools For Specialist Reports*. Northampton: The Lithic Studies Society.
Mayo, D. (1994). The new experimentalism, topical hypotheses, and learning from error. In *PSA: Proceedings of the Biennial Meeting of the Philosophy of Science Association*. New York: Philosophy of Science Association, pp. 270-279.
McLuhan, M. 1967. *The Medium is the Message*. London: Penguin Books.
Merton, R. (1957). Priorities in scientific discovery: a chapter in the sociology of science. *American Sociological Review*, 22(6), pp. 635-659.
Mirzoeff, N. (2009). *An Introduction to Visual Culture*. London/New York: Routledge.
Mitchel, W. (1994). *Picture Theory: Essays on Verbal and Visual Representation*. Chicago: The University of Chicago Press.
Mitchel, W. (2005). *What do Pictures Want? The Lives and Loves of Images*. Chicago: The University of Chicago Press.
Molyneaux, B. (1997). *Cultural life of images: visual representation in archaeology*. London: Routledge.
Moran, S. (1999). Intellectual History/History of Ideas. In K. Boyd, ed., *The Encyclopedia of Historians and Historical Writing*. London/New York: Routledge, pp. 589-592.
Moser, S. (1992). The visual language of archaeology: a case study of the Neanderthals. *Antiquity*, 66, 831-844.
Moser, S. (1993). Picturing the prehistoric. *Metascience*, 4, pp. 58-67.
Moser, S. (1998). *Ancestral Images. The Iconography of Human Origins*. Stroud: Sutton.

Moser, S. (2001). Archaeological Representation. The Visual Conventions for Constructing Knowledge about the Past. In I. Hodder, ed., *Archaeological Theory Today*. Cambridge: Polity Press, pp. 262-283.
Moser, S. (2014). Making expert knowledge through the image: antiquarian images and early modern scientific illustration. *Isis*, 105(1), pp. 58-99.
Murray, T. (1999). Epilogue: The Art of Archaeological Biography. In T. Murray, ed., *Encyclopedia of Archaeology. The Great Archaeologists*. Santa Barbara: ABC-Clio, pp. 869-883.
Murray, T. (2013). Why the history of archaeology is essential to theoretical archaeology. *Complutum*, 24(2), pp. 21-31.
Nado, J. (2019). Conceptual engineering, truth, and efficacy. *Synthese*, pp. 1-21. [https://doi.org/10.1007/s11229-019-02096-x].
Nye, M. (2006). Scientific biography: History of science by another means? *Isis*, 97(2), pp. 322-329.
O'Brien, M. (2010). The Future of Paleolithic Studies: A View from the New World. In S. Lycett and P. Chauhan, (eds.), *New Perspectives on Old Stones. Analytical Approaches to Paleolithic Technologies*. New York: Springer, pp. 311-334.
Okumura, M. and Araujo, A. (2019). Archaeology, biology, and borrowing: A critical examination of Geometrics Morphometrics in Archaeology. *Journal of Archaeological Science*, 101, pp. 149-158.
Olsen, B. (2003). Material culture after text: re-membering things. *Norwegian Archaeological Review*, 36 (2), pp. 87-104.
Olsen, B. (2010). *In Defense of Things: Archaeology and the Ontology of Objects*. Lanham: Altamira Press.
Olsen, B., Shanks, M., Webmoor, T. and Witmore, C. (2012). *Archaeology: The Discipline of Things*. Berkeley: University of California Press.
Parsons, K., ed. (2003). *The Science Wars: Debating Scientific Knowledge and Technology*. Amherst: Prometheus Books.
Pelegrin, J. (1995). *Technologie lithique : le Châtelperronien de Roc-de-Combe (Lot) et de La Côte (Dordogne)*. Paris: Éditions de CNRS.
Pepper, S. (1942). *World Hypotheses. Prolegomena to Systematic Philosophy and a Complete Survey of Metaphysics*. Berkeley: University of California Press.
Perlès, C. (2016). La technologie lithique, de part et d'autre de l'Atlantique/ Paths that rarely cross: approaches to lithic technology across the Atlantic. *Bulletin de la Société préhistorique française*, 113(2), pp. 221-240.
Perry, S. (2009). Fractured media: challenging the dimensions of archaeology's typical visual modes of engagement. *Archaeologies*, 5(3), pp. 389-415.
Pickering, A. (1995). *The Mangle of Practice: Time, Agency, and Science*. Chicago: The University of Chicago Press.
Pickering, A. (1999). *Constructing Quarks: A Sociological History of Particle Physics*. Chicago: The University of Chicago Press.
Pickering, A. (2010). Material Culture and the Dance of Agency. In D. Hicks and M.C. Beaudry, (eds.), *The Oxford Handbook of Material Culture Studies*. New York: Oxford University Press. DOI: 10.1093/oxfordhb/9780199218714.013.0007.
Pickering, A. and Guzik, K. (2008). *The Mangle in Practice: Science, Society, and Becoming*. Durham (NC): Duke University Press.
Popper, K. (1965). *The Logic of Scientific Discovery*. New York: Harper & Row.
Porter, T. (2006). Is the life of the scientist a scientific unit? *Isis*, 97(2), pp. 314-321.
Rheinberger, H.-J. (1992). *Experiment, Differenz, Schrift. Zur Geschichte epistemischer Dinge*. Marburg/Lahn: Basilisken-Presse.
Rheinberger, H.-J. (1997). *Toward a History of Epistemic Things*. Stanford: Stanford University Press.
Rorty, R. ed. (1967). *The Linguistic Turn: Recent Essays in Philosophical Method*. Chicago/London: The University of Chicago Press.
Sachs-Hombach, K. (1993). *Das Bild als kommunikatives Medium. Elemente einer allgemeinen Bildwissenschaft*. Köln: Herbert von Halem.
Sawyer, S. (2018). The Importance of Concepts. *Proceedings of the Aristotelian Society*, 118(2), pp. 127-147.

Schnapp, A. (1993). *The Discovery of the Past*. Translated by I.A. Kinnes, G. Varndell. London: British Museum Press.
Schultz, M. (2005). *Ordnungen der Bilder. Eine Einführung in die Bildwissenschaft*. München: Fink.
Shennan, S. (1997). [1988]. *Quantifying Archaeology*. Iowa City: University of Iowa Press.
Shennan, S. (2004). Analytical Archaeology. In J. Bintliff, ed., *A Companion to Archaeology*. Oxford: Blackwell, pp. 3-20.
Shanks, M. and McGuire, R. (1996). The Craft of Archaeology. *American Antiquity*, 61(1), pp. 75-88.
Shapin, S. and Schaffer, S. (1985). *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life*. Princeton (NJ): Princeton University Press.
Shea, J. (2013). Lithic Modes A-I: A New Framework for Describing Global-Scale Variation in Stone Tool Technology Illustrated with Evidence from the East Mediterranean Levant. *Journal of Archaeological Method and Theory*, 20(1), pp. 151-186.
Shelley, C. (1996). Visual Abductive Reasoning in Archaeology. *Philosophy of Science*, 63(2), pp. 278-301.
Shott, M. (2014). Digitizing Archaeology: A Subtle Revolution in Analysis. *World Archaeology,* 46, pp. 1-9.
Shott, M. and Trail, B. (2010). Exploring New Approaches to Lithic Analysis: Laser Scanning and Geometric Morphometrics. *Lithic Technology*, 35(2), pp. 195-220.
Simion, M. 2017. The 'should' in conceptual engineering. *Inquiry: An Interdisciplinary Journal of Philosophy*, 61(8), pp. 914-928.
Smiles, S. and Moser, S., (eds.) (2004). *Envisioning the Past: Archaeology and the Image*. Oxford: Blackwell.
Soler, L., Zwart, S., Israel-Jost, V. and Lynch, M. (2014). Introduction. In L. Soler, S. Zwart, V. Israel-Jost and M. Lynch, (eds.), *Science After the Practice Turn in the Philosophy, History, and Social Studies of Science*. London: Routledge, pp. 1-43.
Soriano, S. (2000). *Outillage bifacial et outillage sur éclat au Paléolithique ancien et moyen : coexistence et interaction*. Unpublished Doctoral Dissertation, Université de Paris X-Nanterre.
Soriano, S., Villa, P., Delagnes, A., Degano, I., Pollarolo, L., Lucejko, J., Henshilwood, C. and Wadley, L. (2015). The Still Bay and Howiesons Poort at Sibudu and Blombos: Understanding Middle Stone Age Technologies. *PLoS ONE*, 10(7), e0131127.
Söderqvist, T., ed. (2007). *The History and Poetics of Scientific Biography*. Aldershot: Ashgate.
Strauss, L. (2002). 'American' Perspectives on the European Upper Palaeolithic? An Introduction. In L. Straus, ed., *The Role of American Archeologists in the Study of the European Upper Paleolithic*. Oxford: Archaeopress, pp. 1-5.
Tixier, J., Inizan, M.-L. and Roche, H. (1980). P*réhistoire de la pierre taillée 1: Terminologie et technologie*. Paris: C.R.E.P.
Tostevin, G. (2011). Levels of Theory and Social Practice in the Reduction Sequence and Chaîne Opératoire Methods of Lithic Analysis. *PaleoAnthropology*, 2011, pp. 351-375.
Topper, D. (1996). *Towards an Epistemology of Scientific Illustration*. Toronto: University of Toronto Press.
Trigger, B. (2006). *A History of Archaeological Thought*, 2nd Edition. Cambridge: Cambridge University Press.
Turner, S. (1994). *The Social Theory of Practices: Tradition, Tacit Knowledge and Presuppositions*. Cambridge: Polity Press.
Valentin, B. (2008). *Jalons pour une paléohistoire des derniers chasseurs (XIVe-VIe millénaire avant J.-C.)*. Paris: Publications de la Sorbonne.
Valentin, B. (2011). *Le Paléolithique*. Paris: PUF.
Vinck, D. (2010). *The Sociology of Scientific Work. The Fundamental Relationship between Science and Society*. Cheltenham: Edward Elgar.
Weedman, J. (2002). Thinking with Images: An Exploration into Information Retrieval and Knowledge Generation. *Proceedings of the American Society for Information Science and Technology,* 39(1), pp. 376-382.
Wolff, J. (2012). After Cultural Theory: The Power of Images, the Lure of Immediacy. *Journal of Visual Culture*, 11(1), pp. 3-19.

Wylie, A. and Chapman, R., eds. (2015). *Material Evidence. Learning from Archaeological Practice*. London: Routledge.

Appendices

	Anglophone			French		
Paper Nr.	**Authors**	**Year**	**Venue**	**Authors**	**Year**	**Venue**
1	Monnier and Missal	2014	*Quaternary International*	Ducasse	2012	*Quaternary International*
2	Iovita and McPherron	2011	*Journal of Human Evolution*	Langlais *et al.*	2016	*Quaternary International*
3	McCall	2006	*Journal of Human Evolution*	Bordes and Teyssandier	2012 [reprint]	*Quaternary International*
4	Tostevin	2003	Edited Volume	Teyssandier	2006	*L'Anthropologie*
5	Kuhn *et al.*	2009	*Journal of Human Evolution*	Valentin *et al.*	2014	*Bulletin de la Société préhistorique française*
6	Archer and Braun	2010	*Journal of Archaeological Science*	Renard and Ducasse	2015	Edited Volume
7	Braun *et al.*	2008	*Journal of Archaeological Science*	Bodu *et al.*	2013	Edited Volume
8	Petraglia *et al.*	2007	*Science*	Mevel	2013	*Antiquity*
9	Olszweski *et al.*	2005	*Journal of Field Archaeology*	Delagnes and Rendu	2011	*Journal of Archaeological Science*
10	Groucutt	2014	*Quaternary International*	Delagnes *et al.*	2012	*Journal of Human Evolution*
11	Conard and Will	2015	*PLoS ONE*	Tsanova *et al.*	2011	*L'Anthropologie*
12	Ruebens	2013	*Journal of Human Evolution*	Roussel *et al.*	2016	*Journal of Human Evolution*
13	Jones	2016	*Quaternary International*	Nicoud	2013	*Mitteilungen der Gesellschaft für Urgeschichte*
14	Blinkhorn *et al.*	2015	*Quaternary International*	Soressi	2004	*Mitteilungen der Gesellschaft für Urgeschichte*
15	Lycett	2007	*Journal of Archaeological Science*	Rocca *et al.*	2016	*Quaternary International*
16	Lycett and Gowlett	2008	*World Archaeology*	Moncel and Deaujard	2012	*Quaternary International*
17	Scerri *et al.*	2014	*Journal of Human Evolution*	Dawson *et al.*	2012	*Paléo*
18	McNabb and Cole	2015	*Journal of Archaeological Science Reports*	Bourguignon *et al.*	2004	*Paléo*
19	Tyron	2006	*Current Anthropology*	Soriano and Ploux	2003	*Paléorient*
20	Shea and Hildebrand	2010	*Journal of Field Archaeology*	Delagnes and Roche	2005	*Journal of Human Evolution*
21	Wallace and Shea	2006	*Journal of Archaeological Science*	Soriano *et al.*	2015	*PLoS ONE*

Appendix 1. List of examined lithic research papers (N=100 [50]).

	Anglophone			French		
22	Culley *et al.*	2013	*Quaternary International*	Chevrier	2006	*Gallia préhistoire*
23	Rose *et al.*	2011	*PLoS ONE*	Klaric	2013	Edited Volume
24	Monigal	2003	Edited Volume	Slimak	2008	*Journal of Archaeological Science*
25	Cole	2015	*Cambridge Archaeological Journal*	Boëda *et al.*	2013	*Quaternary International*
26	Reti	2016	*PLoS ONE*	Le Brun-Ricalens	2005	Edited Volume
27	Kuhn	2006	Edited Volume	Pesesse and Michel	2006	*Paléo*
28	Braun and Harris	2003	*Treballs Archaeologia 9*	Carmignani *et al.*	2017	*PLoS ONE*
29	Pargeter	2016	*Journal of Archaeological Science: Reports*	Forestier *et al.*	2014	*Comptes Rendus Palevol*
30	Brandt *et al.*	2012	*Quaternary International*	Yang *et al.*	2015	*Quaternary International*
31	Adler and Tushabramishvili	2004	Edited Volume	Naudinot and Jacquier	2014	*Journal of Anthropological Archaeology*
32	Bates *et al.*	2014	*Quaternary Science Reviews*	Faivre *et al.*	2014	*Quaternary International*
33	Dinnis	2012	*Antiquity*	Faivre	2013	*Lithic Technology*
34	Barton and Jennings	2012	Edited Volume	Deschamps	2016	*Quaternary International*
35	Williams and Bergman	2010	*Paleorient*	Chehmana *et al.*	2007	*Bulletin de la Société préhistorique française*
36	White and Pettitt	2011	*Journal of World Prehistory*	Blaser *et al.*	2012	*Bulletin de la Société préhistorique française*
37	Straus *et al.*	2011	*Munibe*	Bourguignon and Meignen	2010	*Bulletin de la Société préhistorique française*
38	Lewis *et al.*	2014	*Quaternary International*	Montoya *et al.*	2013	*Journal of Human Evolution*
39	Dogandzic and Duricic	2017	*Quaternary International*	Bazile and Boccaccio	2008	*Gallia préhistoire*
40	Jochim	2006	*Journal of Anthropological Archaeology*	Brenet *et al.*	2010	Edited Volume
41	Nasab and Clark	2014	*Archäologische Mitteilungen aus Iran und Turan*	Bon	2003	Edited Volume
42	Thompson *et al.*	2010	*Journal of Human Evolution*	Thiébaut *et al.*	2009	*Bulletin de la Société préhistorique française*
43	Kuman and Gibbon	2017	*Quaternary International*	Jaubert *et al.*	2009	Edited Volume

Appendix 1. Continued.

	Anglophone			French		
44	Walker *et al.*	2014	*PLoS ONE*	Crassard	2009	*Comptes Rendus Geoscience*
45	Shipton *et al.*	2013	*PLoS ONE*	Renard	2011	*World Archaeology*
46	Haslam *et al.*	2012	*Quaternary International*	Cretin *et al.*	2007	*Bulletin de la Société préhistorique française*
47	Fisher	2006	*Journal of Anthropological Archaeology*	Wei *et al.*	2017	*Quaternary International*
48	Iovita *et al.*	2017	*PLoS ONE*	Hérisson *et al.*	2016	*Quaternary International*
49	Dibble *et al.*	2009	*PaleoAnthropology*	Aureli *et al.*	2016	*Quaternary International*
50	Yellen *et al.*	2005	*PaleoAnthropology*	Porraz *et al.*	2010	*Gallia préhistoire*

Appendix 1. Continued.

Macro-type	Corresponding sub-type IDs
Graphs	1-25
Tables	26-42
Artefact drawings	43-59
Combined and artefact photographs	60-91
Diagrams	92-119

Appendix 2. Cross-tabulation of image macro-types and the sub-types they include (for a general description of macro-types, see Table 1, for a detailed description of sub-types, see Appendix 3).

ID	Code	Description
1	**graph_line[met]**	Quantitative line graph with x and y axis (metric values)
2	**graph_line[type]**	Quantitative line graph with x and y axis (typological categories)
3	**graph_line[tech]**	Quantitative line graph with x and y axis (technological categories, often 2nd order or higher)
4	**graph_line[s]**	Schematic quantitative line graph with x and y axis
5	**graph_linebar[met]**	Quantitative graph with x and y axis (metric values), combining line and bar graphs
6	**graph_bar[met]**	Quantitative bar graph with x and y axis (metric values, including weight etc.)
7	**graph_bar[type]**	Bar quantification of typo-technological categories (typological values)
8	**graph_bar[tech]**	Quantitative bar graph with x and y axis (technological values, e.g. reduction stage representation)
9	**graph_bar[histspec]**	Quantitative bar graph/histogram showing specialized statistical scores

Appendix 3. List of identified image sub-types

ID	Code	Description
10	**graph_pie**	Simple quantitative pie chart
11	**graph_2Dscatte**r	2-Dimensional scatter plot of metric values
12	**graph_2Dscatter[c]**	2-Dimensional scatter plot of metric values, color-coded
13	**graph_2Dscatter[mixed]**	Scatter plot of two different types of variables (e.g. metric and % of a type)
14	**graph_boxplot**	Box plot comparison of quantitative data (e.g. indices vs. dating)
15	**graph_regressionscatte**r	Scatter plot of transformed regressions
16	**graph_regressionscatter_pgeo**	Scatter plot of transformed regressions with integrated photographs and idealized geometric shapes
17	**graph_PCA[2D]**	Scatter plot of PCA analysis
18	**graph_PCA[2D]_gmmm**	Scatter plot of PCA analysis with integrated idealized 3D geometric morphometric shapes
19	**graph_PCA[3D**]	Scatter plot of PCA analysis
20	**graph_discriminant**	Scatter plot of multivariate-discriminant analysis
21	**graph_discriminant[bar]**	Bar plot of discriminant analysis
22	**graph_corresp**	Scatter plot of correspondence analysis
23	**graph_hcluster**	Hierarchical cluster analysis dendrogram
24	**graph_3Dmodel**	Graph of a specialized 3D model
25	**graph_stat[spec]**	Graph of a specialized statistical model
26	**tab_art**	Simple tabulation of artefact counts (undifferentiated)
27	**tab_var**	Simple tabulation of variables used
28	**tab_quantyp**	Quantitative table with typological counts (e.g. tool-types, blank-types, raw-material types etc.)
29	**tab_quantt**	Quantitative table with technological categories
30	**tab_quantt[s**]	Quantitative table with technological categories, including schematic drawings
31	**tab_quanttypt**	Quantitative table with technological categories and typological counts
32	**tab_qual**	Qualitative tabulation of technological and/or typological categories and/or variables
33	**tab_qual[more]**	Qualitative tabulation of technological and/or typological categories relative to non-lithic domains/types (e.g. camp type, faunal remains etc.)
34	**tab_qual[tech**]	Qualitative tabulation of characteristics of and differences between reduction sequences
35	**tab_stat**	Tabulation of statistical values (e.g. mean, median, indices etc.)
36	**tab_stat[spec**]	Specialized tabulation of statistical variance values and or difference values
37	**tab_statqual**	Tabulation of statistical values with qualitative summary of most important results
38	**tab_complex**	Tabulation integrating trait frequencies, metric/descriptive statistical key values (e.g. mean, median), corresponding p-values and qualitative observations

Appendix 3. Continued.

ID	Code	Description
39	**tab_p/regressio**n	Tabulation of p values and/or regression results and similar things (e.g. r-squared tests)
40	**tab_p/regression_qual**	Tabulation of p values and/or regression results and similar things (e.g. r-squared tests) with qualitative information (e.g. data on what these differences amount to qualitatively)
41	**tab_coef**	Tabulation of coefficient values (typically of some kind of variation)
42	**tab_PCAv**	Tabulation of PCA eigenvalues/factors etc.
43	**d_**	Simple lithic drawings, object-particulars are shown
44	**d_ret**	Simple lithic drawings, organized according to tool types (typically, hybrid 'particular-generals' are shown)
45	**d_ret_tcsym**	Simple lithic drawings, technologically organized according to tool types, technological and color symbology, 'particular-generals' are shown
46	**d_ret_s**	Simple lithic drawings combined with schematic representation(s), organized according to tool types
47	**d_ret_scsym**	Simple lithic drawings combined with schematic representation(s), organized according to techno-types with color symbology
48	**d_core**	Simple lithic drawings, organized according to core types (typically, hybrid 'particular-generals' are shown)
49	**d_bla**	Simple lithic drawings, organized according to blank types (typically, hybrid 'particular-generals' are shown)
50	**d_t**	Simple lithic drawings, technologically organized (typically, hybrid 'particular-generals' are shown)
51	**d_tsym**	Simple lithic drawings with technological symbology, technologically organized (typically, hybrid 'particular-generals' are shown)
52	**d_tcsym**	Simple lithic drawings, technologically organized and with color symbology (typically, hybrid 'particular-generals' are shown)
53	**d_refit**	Simple drawing of refit-set/group, object-particulars are shown
54	**td_**	Simple technological drawings
55	**td_tsym**	Technological drawings with technological symbology
56	**td_bla_tsym**	Technological drawings of blanks, technologically organized and with technological symbology (typically, 'particular-generals' are shown)
57	**td_ret_tcsym**	Technological drawings of tools, technological and color symbology, sometimes object-particulars are shown and sometimes 'particular-generals'
58	**td_core**	Simple technological drawings of cores
59	**td_core_tcsy**m	Technological drawings of cores, technologically organized, technological and color symbology (typically, hybrid 'particular-generals' are shown)
60	**cpd_**	Combined lithic drawings and photographs, object-particulars are shown

Appendix 3. Continued.

ID	Code	Description
61	**cpd_t**	Combined lithic drawings and photographs, organized according to technical aspects (typically, 'particular-generals' are shown)
62	**cdp_tsym**	Combined lithic drawings and photographs with technological symbology, object-particulars are shown
63	**cdtd_bla**	Combined drawings and technological drawings, organized according to blank types (typically, 'particular-generals' are shown)
64	**cdtdp_bla**	Combined drawings, technological drawings and photographs, organized according to blank types (typically, 'particular-generals' are shown)
65	**cdtd_coretsym**	Combined drawings and technological drawings, organized according to core types with technological symbology, (typically, 'particular-generals' are shown)
66	**cdtd_ttsymb**	Combined simple drawings and technological drawings, technologically organized with technological symbology (typically, 'particular-abstracts' are shown)
67	**ctdp_rettsym**	Combined technological drawings (incl. contour line with removal directions) with photographs, technological symbology, organized according to tool types (typically, 'particulars-generals' are shown)
68	**ctdp_rettcsym**	Combined technological drawings (incl. contour line with removal directions) with photographs, technological and color symbology, organized according to tool types (typically, 'particulars-generals' are shown)
69	**ctdps_cor**e	Combined technological drawings with photographs and schemes, organized according to core-reduction types (typically, 'particular-generals' are shown)
70	**ctdp_coretsym**	Combined technological drawings with photographs, technologically organized/according to core-reduction types, technological symbology (typically, 'particular-generals' are shown)
71	**ctdp_coretcsym**	Combined technological drawings with photographs, technologically organized/according to core-reduction types, technological symbology with color symbology (typically, 'particular-generals' are shown)
72	**p_**	Simple photographs, object-particulars are shown
73	**p_t**	Simple photographs, technically organized (e.g. biface with corresponding *façonnage* products)
74	**p_core**	Simple photographs, organized according to core-types, object-particulars are shown
75	**p_bla**	Photographs of blanks, object-particulars or 'particular-generals' are shown
78	**p_prep**	Photographs of preparational products, organized according to techno-function (typically, 'particular-generals' are shown)
79	**p_ret**	Photographs of tools, organized according to tool types, object-particulars are shown

Appendix 3. Continued.

ID	Code	Description
80	**p_ret_tsym**	Photographs of retouched pieces, organized according to tool type with technological removal symbology (typically, 'particular-generals' are shown)
81		
82	**p_ret_ts**	Photographs of retouched pieces, according to tool or techno-type combined with schematization(s) (typically, 'particular-generals' are shown)
83	**p_core_tsym**	Photographs of cores, technologically organized, with technological removal symbology (typically, 'particular-generals' are shown)
84	**p_core_ts**	Photographs of cores, technologically organized with technological schematization (typically, 'particular-generals' are shown)
85	**p_bla_s**	Photographs of blanks, technologically organized with (volumetric) schematization (typically, 'particular-generals' are shown)
86	**p_refit**	Photographs of refit-sets, non-organized ('all-we-have' principle)
87	**p_refit_t**	Photograph of refit-sets, technologically organized (typically, 'particular-generals' are shown)
88	**p_refit_tsymb**	Photograph of refit-sets, technologically organized and with technological symbology (typically, 'particular-generals' are shown)
89	**cdp_refit_tsymb**	Combined photographs and drawings of cores and refits, technologically organized and with technological symbology (typically, 'particular-generals' are shown)
90	**cps_refit_tsym**	Combined photographs and volume exploitation schemas of core refits, technological symbology (typically, 'particular-generals' are shown)
91	**3D_tsymb**	3D-scan of artefacts with technological symbology
92	**dia[quant]_st**	Diagram showing quantitative patterns, using schemas and text (typically, accumulated 'particular-generals' are shown)
93	**dia[quant]_stp**	Diagram showing quantitative patterns, using schemas, text and photographs (typically, accumulated 'particular-generals' are shown)
94	**dia[sod]_d**	Structure of *débitage/façonnage* diagram using drawings, 'abstracts' are shown
95	**dia[sod]_cdp**	Structure of *débitage/façonnage* diagram using both drawings and photographs, 'abstracts' are shown
96	**dia[sod]_cpds**	Structure of *débitage/façonnage* diagram using drawings, photographs and abstract schemas, 'abstracts' are shown
97	**dia[sod]_ctpd**s	Structure of *débitage/façonnage* diagram using drawings, photographs, abstract schemas and text, 'abstracts' are shown
98	**dia[sod]_ds**	Structure of *débitage/façonnage* diagram using both drawings and abstract schemas, 'abstracts' are shown
99	**dia[sod]_dt**	Structure of débitage/façonnage diagram using drawings and text, 'abstracts' are shown
100	**dia[sod]_dst**	Structure of *débitage/façonnage* diagram using drawings, schemas and text, 'abstracts' are shown

Appendix 3. Continued.

ID	Code	Description
101	**dia[sod]_s**	Structure of *débitage/façonnage* diagram using abstract schemas, 'abstracts' are shown
102	**dia[sod]_ts**	Structure of *débitage/façonnage* diagram using abstract schemas and text, 'abstracts' are shown
103	**dia[sod]_ps**	Structure of *débitage/façonnage* diagram using photographs and schemas, 'abstracts' are shown
104	**dia[sod]_**t	Structure of *débitage/façonnage* diagram using only text, 'abstracts' are shown
105	**dia[tl]_ts**	Schematic diagram of techno-logical organization using text and schemata
106	**dia[tl]_ts_GEO**	Schematic diagram of techno-logical organization using text and schemata, addressing geographical distribution issues
107	**dia[tl]_tp_GEO**	Schematic diagram of the distribution of technological aspects in geographic space using text and photographs
108	**dia[tl]_dt_GE**O	Schematic diagram of techno-logical organization using text and drawings, addresses geographical distribution issues
109	**dia[tl]_cdpt_GE**O	Schematic diagram of techno-logical organization combining text, photographs and drawings, addressing geographical distribution issues
110	**dia[tl]_td**	Schematic diagram of techno-logical organization using text and drawings
111	**dia[tl]_tds**	Schematic diagram of techno-logical organization using text, drawings and schematics
112	**dia[tl]_tsp**	Schematic diagram of techno-logical organization using text, schemata and photographs
113	**dia[tc]_txt**	Diagram of technological change, no artefacts are shown, only 'abstracts' are shown
114	**dia[tc]_ctdp**	Diagram of technological change combining text, lithic drawings and photographs, 'abstracts' are shown
115	**dia[dendro]**	Classificatory diagram with dendrogram-structure
	dia[tc]_ctd_bargraphs	Diagram of technological change combining text and lithic drawings, integrated bar graphs on type frequencies, 'abstracts' are shown
116	**dia[mob]_s**	Schematic mobility-diagram, 'abstracts' are shown
117	**dia[syn]_t**	Schematic and synoptic integration of various lines of lithic and non-lithic evidence using text
118	**dia[syn]_tds**	Schematic and synoptic integration of various lines of lithic and non-lithic evidence using text, drawings and schematization (incl. icons)
119	**dia[dendro]**	Schematic 'dendrogrammatic'/tree-like representation of technological relationships, typically including text and lines only

Appendix 3. Continued.

Part III

Archaeology and interdisciplinarity, from the 19th century to present-day research

Session organized by Laura Coltofean, Géraldine Delley, Margarita Díaz-Andreu and Marc-Antoine Kaeser

Luján, l'Abbeville des pampas. Amateurs, traders, and scholars behind the search of the pampean fossil man (1865-1884)

Marcelo Javier Toledo
Instituto de Geociencias de Buenos Aires (IGEBA). Universidad de Buenos Aires – Argentine
loessoide@gmail.com

Abstract

Since the beginning of the 19th century 'diluvial man' issues and the Somme valley events of 1859, were not unknown by the collectors of Buenos Aires. In 1865 François Seguin, a French fossil trader, announced the discovery of the 'fossil man' and exhibited it in the Paris Universal Exposition of 1867. The 'Palaeolithic' controversies were begun in Argentina by Florentino Ameghino who embarked upon a systematic search for the '*hombre plioceno*', exhuming modified megafaunal bones associated with lithics in the Luján valley. In 1876, a biased field certification of the *Sociedad Científica Argentina* (SCA) concluded that Ameghino had mistakenly attributed a 'diluvian' age to very recent geologic layers, strongly eroding his reputation. Disproved and displeased, he assisted to the 1878 Paris exhibition where renowned prehistorians accepted the cohabitation of fossil man with giant armadillos. Here we analyze the role of forerunners and the peripheral network that accompanied Ameghino during its initial stage of research.

Keywords: Ameghino, megafauna, taphonomy, paleolithic, pampa, Luján

Résumé

Depuis le début du XIXe siècle les collectionneurs de Buenos Aires étaient au courant de l'existence de l'homme du diluvium' et des événements de la Somme en 1859. En 1865, François Seguin, un commerçant français de fossiles, annonça la découverte de «l'homme fossile» argentin et la présenta à l'Exposition Universelle de Paris de 1867. Cependant, les controverses «paléolithiques» furent lancées par Florentino Ameghino exhumant des os modifiés de mégafaune associés à des pièces lithiques dans la vallée de Luján. En 1876, une certification sur le terrain de la *Sociedad Científica Argentina* (SCA) concluait qu'Ameghino avait attribué erronément à un âge «diluvien» à des couches géologiques très récentes, érodant fortement sa réputation. Contrarié et déçu, il a assisté à l'Exposition Universelle de 1878 où des préhistoriens renommés ont accepté la cohabitation de l'homme fossile avec le grand tatou. Nous analysons ici le rôle des précurseurs et du réseau local qui a accompagné Ameghino au cours de sa période initiale de recherche.

Mots-clés : Ameghino, mégafaune, taphonomie, paléolithique, pampa, Luján

1. Introduction

In the 1860s, the multiplication of excavations in Europe brought to light thousands of stone and bone artifacts while the existence of cut marks and striations on bone surfaces was rapidly noticed, and considered, after passionate debates, as a valid proof of human presence (Groenen 1994; Richard 2008; Toledo 2009: 23-28). These European debates became known in the scientific circles of Buenos Aires from press reports, the French and British scientific literature, and directly from the Italian university professors who arrived in Argentina at the beginning of the 1860's (Camacho 1971), therefore the question of 'fossil man' was not unknown by the pampean collectors and traders of fossils.

Florentino Ameghino (1853-1911) who between 1870 and 1877 was only 17-24 years old, discovered several archaeological sites between the villages of Mercedes and Luján (Figure 1). In particular his 'eolithic' sites, that he atributed to the Pliocene, contained bones of extinct fauna with

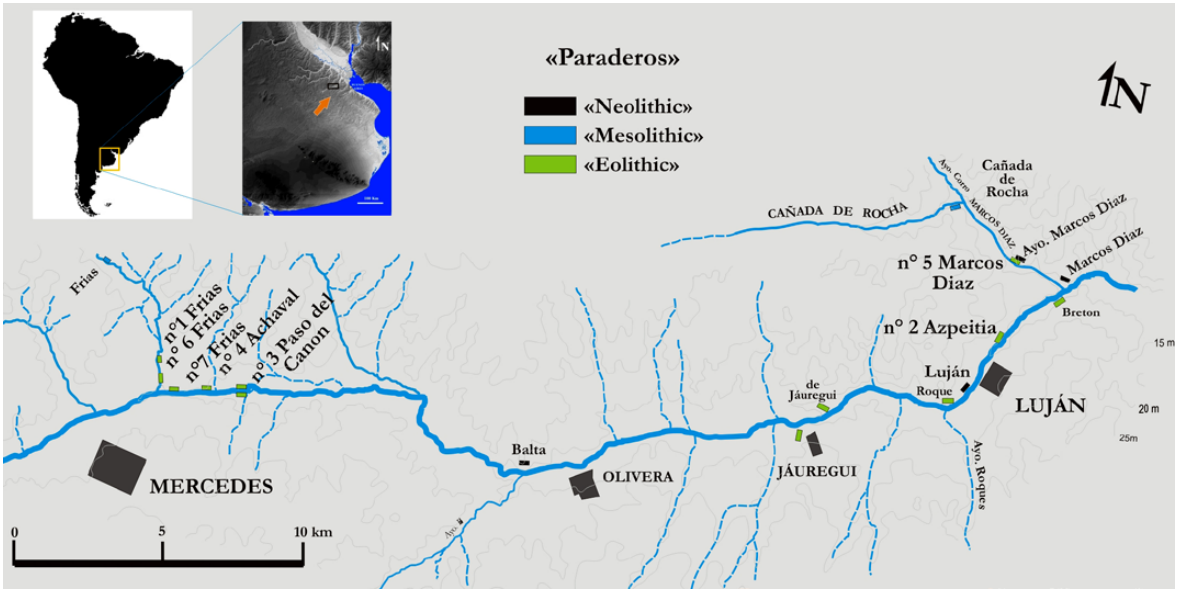


Figure 1. Location of the '*Paraderos*' of Ameghino in the valley of the Luján river between the cities of Luján and Mercedes. Sites 1-7 correspond to the terminal Pleistocene (OIS 2 – OIS3) 'eolithic' sites.

diverse anthropic modifications, associated with scarce and simple lithics (Figures 1, 17). He tried unsuccessfully to convince the scientific institutions of Buenos Aires of the importance of his findings. Epistemologically, we cannot dissociate the materials exhumed, the related landscapes, the access to European treatises, the reports in local newspapers, the provincial social context, eventual alliances, and the relation of tensions with the central science social system. During this period, Ameghino failed to be part of the official networks, and to have their findings and ideas examined and questioned. This social tension stigmatized for a century the archaeological prospection of Pampean plains 'Palaeolithic' sites (Toledo 2016).

The objective of this paper is to analyse his activities and discoveries and their relation with the social science networks as academia, museums, publishers, fossil traders, collectors, and amateurs during his lujanian period (1870-1877), his journey to France (1878-1881) and his return to Argentine (1881-1884). We will focus on the taphonomic evidence and on little-known characters such as professor Giovanni Ramorino, the photographer Pedro Annaratone, the journalist Luis Alberto Mohr, the illustrator Zacharias Bommert the land surveyor Manuel Eguía and the baker Antonio Larroque, who collaborated with Ameghino at the very beginning of his career.

2. Luján, the cradle of pampean paleontology and the early references to the fossil man (1787-1864)

Luján was one of the most important villages of the Buenos Aires countryside since the 18th century, as part of the border with the natives until 1752, when the Mercedes frontier fort is established 30 kilometres westward. From 1772 it becomes official post of the royal road to Perú and in 1864 was built its rail road station (Figures 2, 7). The Luján Valley was already known as an extraordinary deposit of megafauna remains since the discovery of a complete *Megatherium* skeleton in 1787 (Figure 2). The implication of this discovery has been the subject of numerous studies (see Palcos 1944; Hoffstetter 1959; Boyd 1958; Orione 1991; Lopez Piñero 1988; López Piñero and Glick 1993; Pelayo 1993; Rudwick 1997 and Argot 2008, among others). Later, between 1828 and 1847, a country doctor, Dr. Francisco Javier Muñiz (1795-1871) explored the banks of the Luján River, being the first to describe a stratigraphic column and gatherer a first paleontological collection donated to the *Museum* in 1842 (MNHN, 1843). After these events Luján will be frequented by collectors,

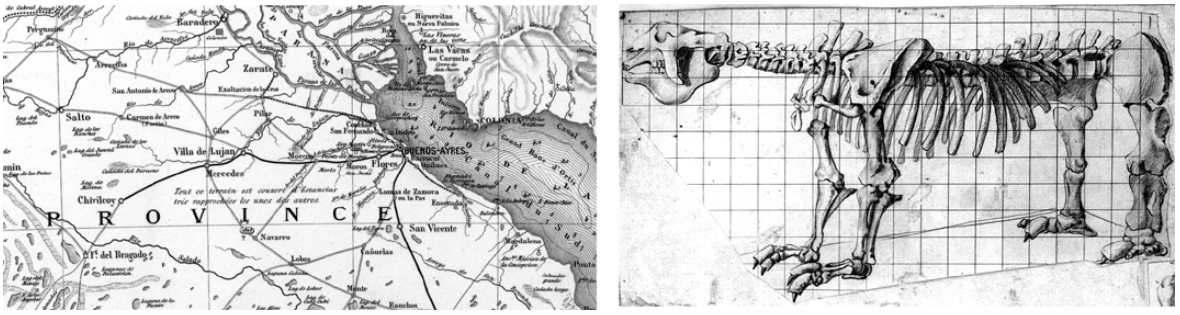


Figure 2. Map of the northern part of the Buenos Aires Province after Martin de Moussy (1866). The cities of Luján and Mercedes are part of the *Ferrocarril del Oeste* with end of the rail in Chivicoy. The *Megatherium* of Luján, original drawing by Laurillard published by Cuvier in 1804 (MS 634, MNHN).

frequently Frenchmen, such as Auguste Bravard, or simple diggers on their behalf like Seguin or the Bretón brothers.

Neapolitan Pedro de Angelis (1784-1859) was also an active player in the fossil business (Sabor 1995; Podgorny 2009; Toledo 2009). Between 1827 and 1849 he held a rich epistolary exchange with Carlos Zucchi, nephew of Napoleon, where he foreshadows the problems that haunted his tenacious search of fossils and related the pecuniary reward (de Angelis 1842a). Also he ask Zuchi's to negotiate fossils sales with Villaderbo (de Angelis 1842a). De Angelis was aware of the fossil man since ironized with Zucchi: '*Que ce ne soit pas le fameux homme fossile, il restera toujours, une nouvelle découverte'* (de Angelis 1842b).

The Luján river valley will also be explored by the Auverge geologist Auguste Bravard, graduated from the School of Mines of Saint-Etienne. He had explored the Forez and Puy-de-Dome regions (Mege 1886). He was in relationship with Crouzet, Christol, Ferussac and Cuvier. In his catalog (Bravard 1856), he cites 'Luján' as a discovery location and in his *Geología de las Pampas* he also quotes this locality (Bravard 1857, 1858). The labels of two boxes of his collections indicate 'Mercedes' (MNHN 1856).

He moved to Argentina in 1852, land he described as '*El Dorado*' for the paleontologists, after reading the narratives of d'Orbigny, Darwin and Wooodbine Parish (Mege 1886). Bravard had searched for fossils in Auvergne and intervened on the famous Denise affair in 1844. In 1847 he mentioned 'human fossils' to Laurillard (MNHN 1856). Evidently Bravard already was acquainted with the 'fossil men' controversies before arriving in Argentina where he met the baker and fossils trader Seguin, also Auvergnat (Mege 1866).

3. Francois Seguin, confectioner and trader of fossils: unearthing the first 'fossil man' (1864)

In 1863 Burmeister, director of the Buenos Aires museum, negated in his *Annals* the fossil man existence, but shortly after, in 1864, Seguin vaguely announced the discovery of 'diluvian man' in the Carcarañá valley (Figure 3). Seguin refuses to show the remains to Burmeister, who displeased, denounced these events in the Museum Annals (Burmeister 1864-1869). Seguin had arrived in Buenos Aires in 1843, made a fortune with the confectionary business, being able to dedicate to full time fossil hunting from 1853 (Seguin, Quentin; ms). He met Bravard and returned to France, where he formalized contacts with the Museum. Seguin and Burmeister met accidentally, and argued, on the same steamship back from Europe in 1861. This disagreement originated the first Argentinean heritage law in 1863. He definitively leave Argentina to exhibit the fossil man at the 1867 Paris Universal Exhibition, sale it to the Museum in 1871 and retired to Auvergne to die in 1878 (Mege 1886).

Figure 3. François Seguin portrayed at the *Exposition Universelle de Paris* of 1867. Human teeth and 'associated' lithic artefacts of Carcarañá man (Coll. MNHN).

The Carcarañá man (Toledo 2017: 499-503) will be described by Paul Gervais in 1872 in his *Journal de Zoologie* considering that the discoveries by Seguin and Lund constituted '*le premier jalon pour l'histoire des habitants du continent américain*'. This discovery was the first evidence from the pampas and constitutes a bridge between the fossil man of the diluvium gravels of Amiens, and with the discoveries of the 1870s in the argentine plains. From 1869, the Luján Valley will became a modest Argentinean Somme under the tireless work of an, still a teenager, Ameghino.

4. A Tournal for the end of the world: Florentino Ameghino (1869-1884)

Florentino Ameghino (1853-1911) was born near Genoa in 1853 (Figure 4). His parents immigrated to Argentina in 1855, settling in Luján where some relatives and other Genoese immigrants already resided. He spent his childhood in Luján and in 1869, he moved to Mercedes as a schoolteacher. Between 1869 and 1877 he explored with his brothers Juan and Carlos the Luján river outcrops, obsessed to prove man-megafauna association. Between 1878 and 1881, he resided in Paris. After his return to Argentina, he studied the Patagonian tertiary mammalian fauna and developed a theory of the local origin of the genus *Homo*. He died in La Plata in 1911.

Between 1869 and 1877 unearthed from his 'paraderos' or archaeological sites (Figure 1) anthropically modified bones associated to líthic artefacts embedded on the 'lujanian' layers which attributed to the Pliocene. The '*paradero*' became his geoarchaeological analysis unit, based on their relative cultural chronology and the geological context, being the first local researcher to incorporate a stratigraphic dimension to site formation analysis (Fernández 1982; Stagnaro 1993). He realized that the faunal associations and the degree of complexity in the lithics flaking increases upward and then, following de Mortillet (1873) he classified his sites as paleolithic, mesolithic and neolithic. Ameghino formed himself on the taphonomic and geological significance of the lujanian material consulting the works of Gervais, Lyell, Figuier and Lubbock among others, at the Public library and the Museum library of Buenos Aires. In particular Ameghino (1876, 1881) explored and described in great detail the stratigraphy and content of sites N° 1 (Frias) and N° 2 (Luján) since he considers them to be the oldest and the ones with the greatest evidences supporting a 'Pliocene' age. In a recent geoarchaeological revision we conclude that his 'Pliocene' deposits and 'eolithic' layers belong to the OIS 2 and OIS 3 (13-45 ka BP) stages (Toledo 2009, 2011, 2017). Ameghino discovered these sites between 1870 and 1877. By 1875 he already possesses a factual and conceptual data corpus of his 'eolithic' sites with considerable parts of his memoirs and several chapters of his book '*La Antigüedad*' already written. He spent the whole year of 1876 after the certification and acceptance of his findings by the Argentinean Scientific Society rejected his manuscripts or dilated its verdicts.

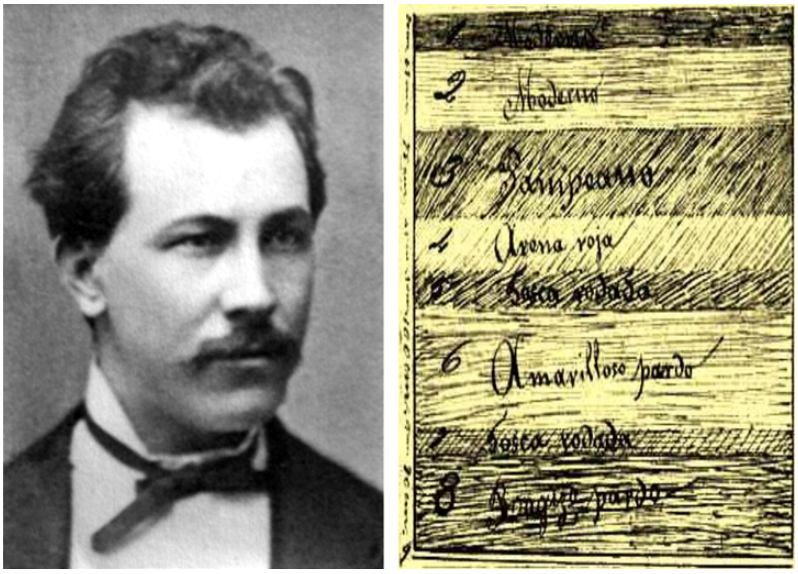


Figure 4. Florentino Ameghino in 1878 (AGN). First stratigraphic section drawn of the Lujan river banks near *Paradero n° 2* (Ameghino 1876).

For an integral study of social networks the history of Frías and Luján sites is particularly representative. Epistemologically it is not possible to dissociate site location, unearthed materials, European treaty readings, eventual alliances and the relationship of tension to rupture, with the social systems of the central science. Until his return from Paris in 1881 Ameghino interacted with this network but without being able to have their findings and ideas examined, and even less, accepted. The *paraderos* will be completely forgotten to the point that they will not be revised, and its material ignored, during the visit of Hrdlicka and collaborators in 1910.

5. Exploring the Luján valley and constructing a pampean prehistory: Ameghino local network (1869-1881)

Ameghino's biographers leave us with a heroic and romantic biased image: a young man of modest origin, self-taught and exploring the pampas alone (see Mercante 1911; Lugones 1915; Gabriel 1940; Ingenieros 1951; Marquez Miranda 1951 and Arrili 1954 among others), although Ameghino had an intense interaction with other collectors from neighbouring villages. If we examine the network of the first years we discover a dynamic relation of exchanges of paleontological, archaeological and scientific pieces with the bakers Antonio y Juan Larroque, the brothers Bretón, the land surveyor Eguía, the professor Ramorino and with Estanislao Zeballos. Ameghino escapes the classifications of formal social scientific networks, far from to be a mere amateur he became an integrated self-made research entity, where the field collector and cabinet scientist are amalgamated.

5.1. Juan, Pedro Bretón & Bonnement: Compagnie Française de Production et Exploitation des fossiles pampeens

Very little known personalities, except for the frequent allusions that Ameghino makes in his books, nevertheless Ameghino's narratives and unpublished documents allow us to reconstruct their intense excavation activities and the role they played in the fossil trade '*petit monde*'. Frenchmen, and residing in Luján, they carried out systematic excavations with exclusively commercial objectives. In 1864, the government authorized Pedro Bretón to prospect on account of the Museum of Buenos Aires. In 1871, two glyptodont cuirasses were found 'by a French worker who was looking for fossil bones on behalf of a Mr. Bonnement of Buenos Aires' (Ameghino 1881: 433) associated with cut marked horse bones and a piece of flint. Bonnement sent the bones to Charles Barbier in Paris, and the lithic was sent to Ramorino. This was the first documented archaeological discovery, occurred in the left bank of Lujan River near the arroyo flowing through the propriety of Jean-Jacques Roques (Ameghino 1881: 529).

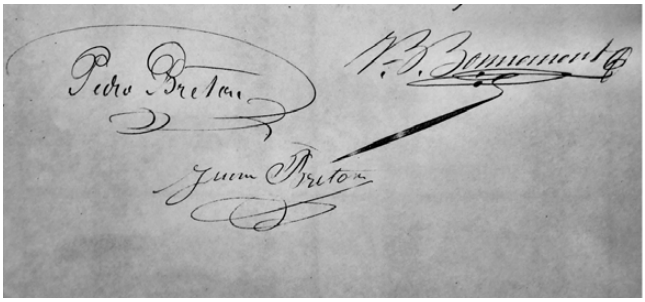


Figura 5. Bonnement and Breton brothers signatures in a letter to Burmeister, 13 July 1872 (Archive MACN) Anthropically modified ftanite nodule (coll. Ameghino MNLP) unearthed in 1876 by the Breton brothers from OIS 3 deposits, associated with *Toxodon* sp. bones, near the Marcos Diaz section.

In 1872 pecuniary interest leads to quarrels over the 'fossiliferous deposits' near Lujan with the Ameghinos, the court verdict favored the brothers, constituting one of the first antecedents of Argentine jurisprudence on paleontology concessions. The first land rights request was done in 1787 by J.M. de Torres to the viceroy of Buenos Aires, asking for exclusivity around the *Megatherium* excavations. On August 1, 1843 Muñiz also claimed governor Juan Manual de Rosas exclusive rights for prospecting the Luján banks area.

In 1872 the Bonnement-Bretón society offered for sale his collection to the government, evidencing that they were organized with a precise distribution of roles: The Bretón brothers took care of the field prospection and the excavation, whereas Bonnement, more educated and with contacts, acted as an intermediary vis-à-vis the potential local and European customers (Figure 5). We will find later Ameghino negotiating the sale of the collection Bonnement sent to Paris in 1878 (Torcelli 1934). Ameghino refered to 'several catalogs and handwritten notes of the Bretón brothers' (Ameghino 1881: 315) but unfortunately, was not possible to locate any of these documents. The good business times ended irrevocably around 1876 when the government demanded the embargo of all the fossils in their possession (Balbin 1876). This is probably the first requisition of paleontological patrimony in Argentina.

5.2. Amateurs & collectors: the land surveyor Manuel Eguía, the baker Antonio Jose Larroque and Italian agent Antonio Pozzi

Ameghino maintained a rich exchange of information and archaeological and paleontological objects with local amateurs and collectors. José Antonio Larroque, a baker and owner of a mill in Mercedes, explored the Rio Areco 30 kilometres north from Lujan, and sent a collection to the Paris Exhibition. In 1873 he found a skeleton of *Mylodon* sp. associated with a lithic artefact (Larroque 1873). This epistolary exchange also indicates a very dynamic commercial activity, modulated by the tensions and the eventual alliances with the competitors.

Manuel Eguía was a well-known land surveyor in Buenos Aires, shared fossils commercial concerns and exchanged objects and scientific literature with Ameghino. Eguía had helped Francisco Moreno to classify his Vitel collection and was recognized as 'competent' by Hermann Burmeister, being one of the founders of the *Sociedad Paleontológica*. Between 1873 and 1875 Ameghino kept him informed about the Frías excavation, sent him some material, while Eguía, in turn, facilitated books, as the *Annales* of Burmeister (Torcelli 1935, letters n° 2-4).

Another trader and collector was Antonio Pozzi, who arrived in Argentina in 1866 employed by Burmeister as taxidermist (Farro 2009). He was in contact with Ameghino at least between 1872 and 1875 (Torcelli 1935, letters n° 7, 12, 126). After a letter of May 1872, Ameghino appears to be a mere supplier while Pozzi seems rushed to obtain complete pieces for sale in Italy. In December

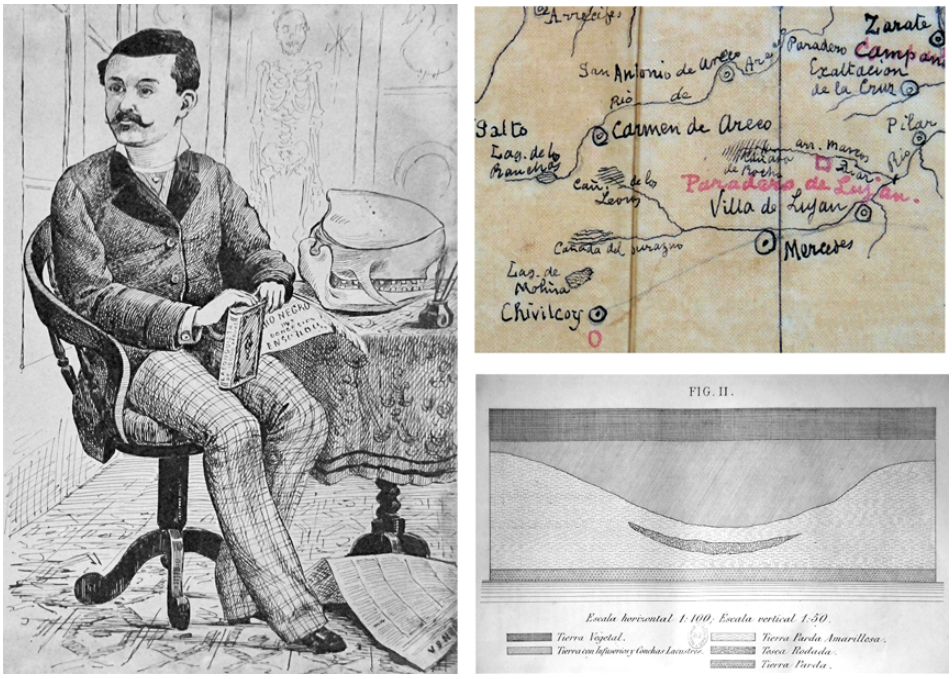


Figure 6. Caricature of Estanislao Severo Zeballos in 1879, with symbolic references to his youth activities: paleontology, anthropology, the media and explorations (AyBEZ). Luján sector of Zeballos hand-made map accompanying a manuscript dealing with the history of argentinean 'fosil man' discoveries, *circa* 1910. Note that Zeballos named '*Paradero de Luján*' to the '*Paradero de Rocha*' and did not indicate the Frías site. Marcos Diaz section after Reid and Zeballos (1876).

1875 Ameghino enquired Pozzi about Frias first remains and solicited him to communicate his new discovery to Antonio Stoppani, who was a collaborator of Cornaglia and professor of *Geognosia* at the *Instituto Tecnico Superiore* of Milan and published the first treatise on Italian geology between 1871 and 1873 (Stoppani 2014: 137).

At least during his youth, Estanislao Zeballos (1854-1923) and Francisco Moreno (1852-1919) could be assimilated to the amateur-collectors group. Zeballos also maintains an epistolary exchange (Torcelli 1935, letters n° 13, 28, 32, 33), received 'duplicates' of Ameghino's collection, and ask for pieces of the Rocha site (Figure 6). Strangely, Zeballos presents himself as a '*simple aficionado*' but shortly thereafter he will publish on the fossil man with the support of the SCA and in direct competition with Ameghino. Moreno (Torcelli 1935, letters n° 34-35) shows itself more distant, declaring conceptual disagreements with Ameghino, while he also had had access to all the manuscripts sent to the SCA by Ameghino in 1876.

5.3. The French engineers: Octavio Nicour and Charles Barbier

Both arrived to Argentina to work in different projects with the government. We do not know in what circumstance Octavio Nicour and Charles Barbier (1841-1915) meet Ameghino as they are almost forgotten by the Argentinean historiography. Octavio Nicour had sent Ameghino archeological material from the shell bars of Uruguay, triggering Ameghino's excursion to this country in 1876. They exchanged also bibliography, because in November of that year Nicour claimed the return of two numbers of the *Societe de Geographie* magazine (Torcelli 1935, letter n° 29).

Octavio Nicour, an engineer in topography and hydraulics arrived in 1870. In 1872 he worked on the feasibility of a road to Chile in San Juan and, in 1874, he was hired in Uruguay to study a rail

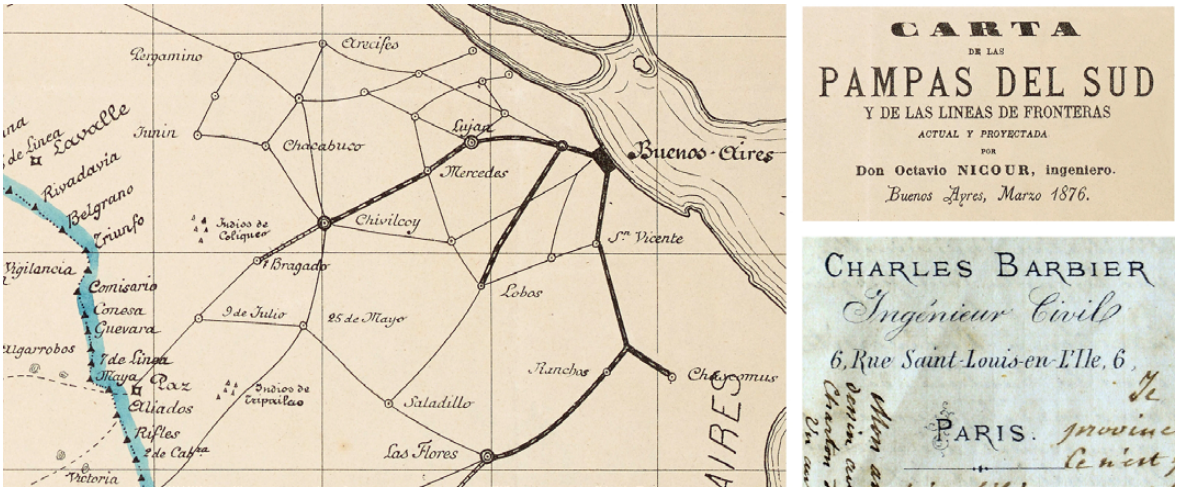


Figura 7. Map of fortifications on the border with the natives located, in 1876, just 180 kilometers from Mercedes, surveyed by the engineer Octavio Nicour in 1876. Note that the railway to Bragado was under construction not far from the settlements of the cacique Coliqueo tribe. Letterhead from engineer Charles Barbier in a letter addressed to Estanislao Zeballos from Paris on February 18, 1878.

line between Maldonado and Minas (Seijo 1999: 27). He also was in charge of surveying a map of Montevideo city, where he collected lithics artefacts in the Cerro (Torcelli 1935: 32-33). In 1876 he obtained a patent for a cigarette factory. He collaborated with the engineer Alfred Ebelot (1839-1920), both from Toulouse, mapping the pampean indian frontier (Figure 7) and the construction of the famous 'Ditch of Alsina' (Ebelot 1880). In November 1876 Nicour writes to Ameghino: '*Je tiens a votre disposition trois pierres de Montevideo qui sont indiennes, des dépôts coquilliers, que vous les envoirai par retour du courrier*'. After this notice Ameghino was very enthusiastic about the possibility to discover sites as the *Kjokkenmoddings*, then in December he sail to Montevideo in the English steam 'Saturn' and stay in the property the the Figueira family had in the Cerro (Langguth 1957). A few days before the newspaper 'El Siglo' had published the explorations of the 'Gruta del Palacio' by Prof. Mario Isola who found inside some flakes of agate. Ameghino gave a great importance to this discovery (Ameghino 1877), although a few months later the steam printing of 'El Siglo' published a note by Mario Isola and a lithograph by Diogenes Hecquet, attributing, mistakenly, this natural formation to an Indian construction.

Charles Barbier a civil engineer and collector, interested in agronomic studies, had fluid contacts with Bonnement (Torcelli 1935, letter n°70) and Zeballos (Barbier-Zeballos, Coll. Zeballos, AyBEZ), and frequently acted as an intermediary agent in Paris for the sale and reception of fossils, archaeological and bibliographic material. He was interested in the introduction in France of two iconic Argentine products: the mate and the *criollo* horse (Barbier 1877, 1878).

5.4. Photographers and draftsmen: Pedro Annaratone and Zacharie Bommert

During the works of the Argentine stand of the 1878 Paris Exhibition Ameghino meets Zacharie Bommert employee in the Argentine section, that was already in relation with Charles Barbier. Bommert will draw all the engravings of *La Antiguedad* plates (Figure 9), and build with Ameghino a solid friendship, imagining a future of economic independence as industrial and commercial '*entrepreneurs*'. On November 16, 1878 they patented in Paris a chemical based on potassium permanganate, strong oxidant, as an 'universal bleach' of fabrics and papers. Ameghino confesses later to Moreno that he tried the business in Argentina with total failure and loss of patent rights. Bommert would probably have the idea since we found him as an exhibitor, wining a prize at the Exhibition in the section of embroidery and upholstery. The correspondence indicates that they

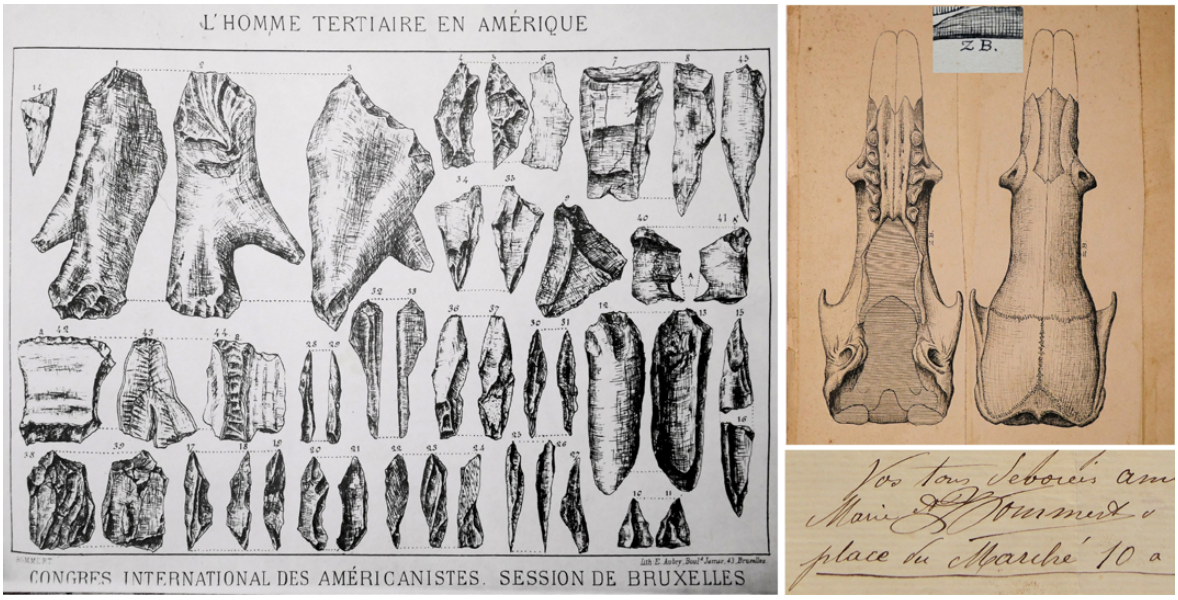


Figure 8. First Ameghino's lithographic plate realized by Zacharias Bommert for the 1879 Congress of Americanists of Brussels (Ameghino 1879). This sheet, printed in the Aubry lithography of Brussels, would become the Plate n° XIX of *'La Antiguedad'*, with modifications in the numbering of objects, and printed in Paris in 1881 by Mahy. Original drawing by Zacharias Bommert and its initials, *circa* 1889. Signature of Bommert in the letter to Ameghino of July 21, 1881.

became close friends, on July 21, 1881, Bommert and his '*petite femme*' Marie invited the Ameghinos to his new house, 10 Place du Marché (Bommert 1881).

Towards 1885 he settled with his wife in Asunción with a carpentry business but projecting to collect and sale objects of natural history from Paraguayan jungles. In 1887 he was hired by the Argentine commission of the 1989 Paris exhibition to make a timber collection from Misiones and asked Ameghino for a job recommendation recalling his services in the exhibition of 1878 and as draftsman. He describes the expeditions in the forest as painful and only bearable if one has the '*feu sacre*' while he try to find archaeological material for Ameghino. In 1888 Bommert made hundreds of engravings, working round the clock, for the Atlas of *Contribution* (Ameghino 1889: V-VI). In the preface, Ameghino acknowledged specially the hard working of his friend (Torcelli 1935, letter n° 354, 488 and 500).

Pedro Annaratone, a photographer-apothecary, belonged with Ameghino to the Italian friendly society '*Reciproco Amore*' of Mercedes. In an internal record of the society Annaratone supported Ameghino, saying that although he was Italian, he had misconduct because he had been 'educated in America', being a suplemenary proof of his, deeply argued, Argentinean citizenship. In 1874, Florentino collected a strange catfish in the Luján River and named it *Typupiscis Lujanensis*. Excited, he ask Annaratone to do some shoots (Figure 9) that showed to the Museum director (Burmeister 1870-1874 II: 421). Later in 1877, He photographed the lithic material from the *Banda Oriental*, constituting with the catfish pictures, probably the first intentionally scientific photographs in Argentina (Ferrari 1993, 1995; Toledo 2017: 542).

Annaratone contributed with 1000 francs to cover the expenses of Ameghino in Paris (Torcelli 1935, letter n° 40). He was also interested in its scientific production, in June 1884 he asked for a copy of *Filogenia* and a copy of the conference about droughts and floods. Annaratone probably was a pharmacist in Suipacha since, in December 1887, he sent to Ameghino some boxes of a medicine named '*El Pastor*' to be forwarded to the 1888 industrial exhibition of La Plata (Annaratone 1887-1888). By October 1888, moved to Buenos Aires and ask Ameghino about a possible job position at

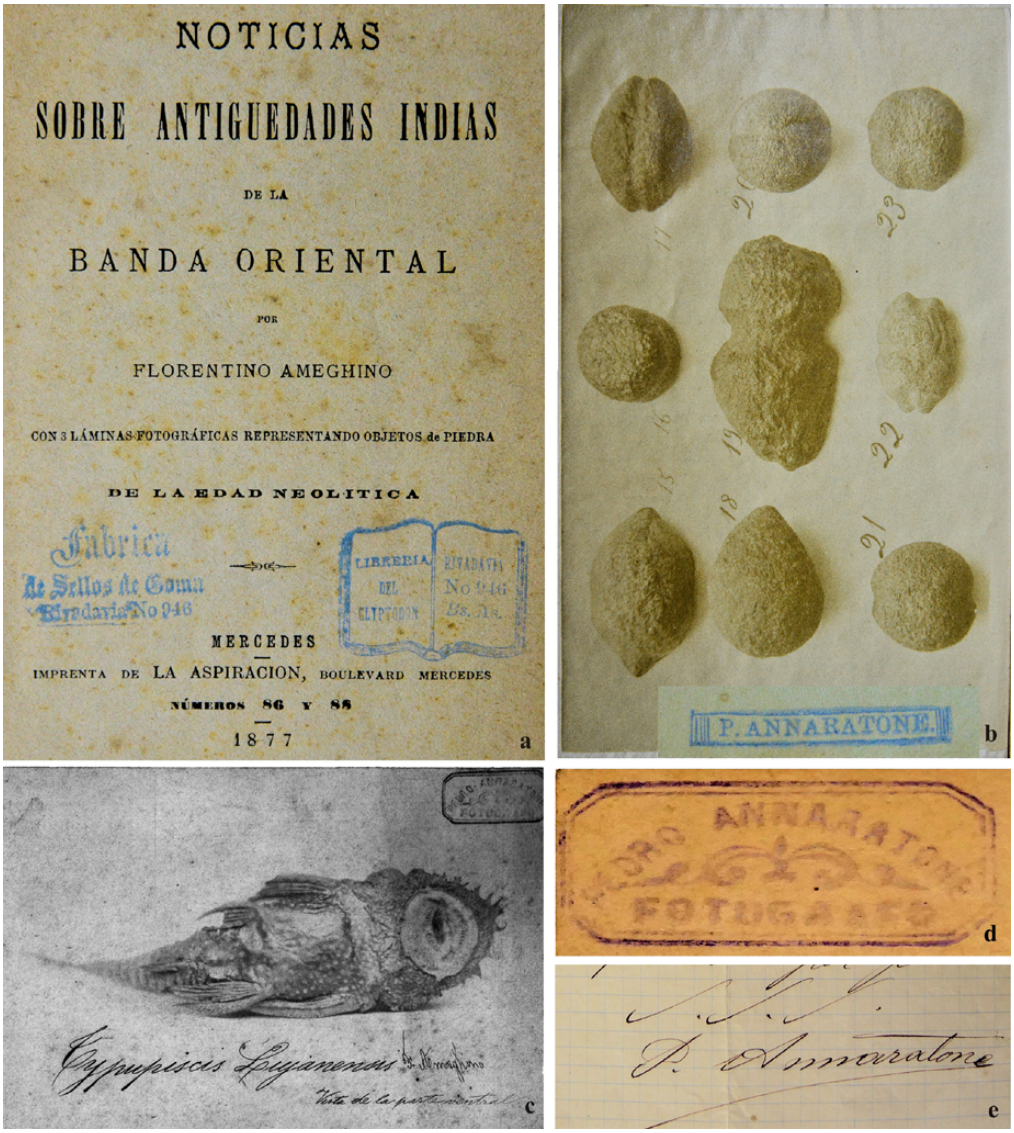


Figura 9. a: Cover of the *'Noticias'* booklet printed in the facilities of *La Aspiración* in 1877, note the rubber stamps of *Glyptodon* stationary that Ameghino opened in Buenos Aires after returning from Paris. b: Photograph by Pedro Annaratone of the *bolas* from the *Banda Oriental* (Ameghino 1877). c: *Chaetostoma* sp., caught in 1874 from the Luján river and photographed by P. Annaratone in Mercedes. d-e: stamp and signature of P. Annaratone.

the Zoo. In of 1888 updates Ameghino about Jose Larroque new paleontological collection (Torcelli 1935, letter n° 527). Ameghino honoured Annaratone with the species *Platyodon Annaratonei*.

6. The local newspapers promoting Ameghino activities

Initially, when formal publications were inaccessible, Ameghino used the local newspapers and its printing facilities. Newspapers like 'El Pueblo', 'La Unión' and 'La Libertad' reflected the discoveries, and scientific disputes of Ameghino between 1875 and 1877 (Figure 10). Ameghino compilate himsef his newspaper articles (Ameghino 1874-1897), clipping was a common practice at the time as well as keeping a personal diary. Ameghino will initiate one with scientific data titled '*Diario de un Naturalista*' (Torcelli 1914). This process of vulgarization of the 'diluvian wars' is partly similar to that which had taken place in the Times, and in the French newspapers of Abbeville, Dieppe and Rouen during the second half of 1859 installing the paleolithic debate within reach of all social classes (Groenen 1994). In particular Ameghino has a privileged access to the newspaper *La Aspiración*,

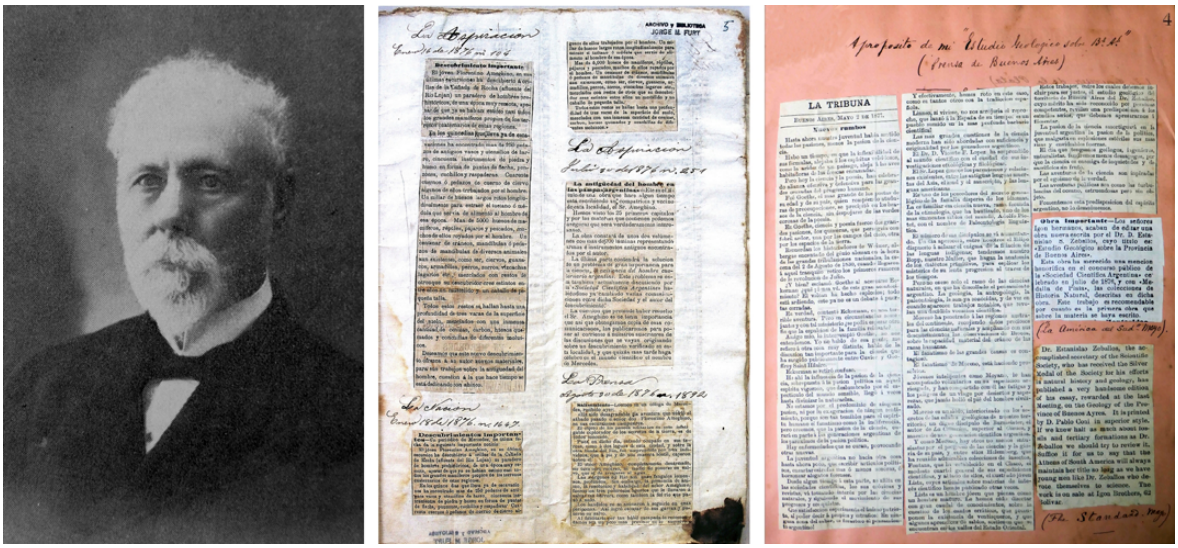


Figure 10. Alberto Mohr *circa* 1900. Ameghino's newspaper clippings from *La Aspiración, La Nación and La Prensa* of 1876, announcing the Rocha site discovery and the progress of *La Antiguedad* manuscripts. Zeballos clippings from *La Tribuna, La America del Sud* and *The Standard* of may 1877. The first article describes the nascent movement of young scientists, while López, Fontana, Holmberg, Moreno, Lista and Zeballos are mentioned, Ameghino is completely ignored.

which had been founded by Luis Alberto Mohr in 1875. As did the Abbeville newspapers, Mohr promises to publish all the news about Ameghino discoveries. The 'eolithic' affair will continue to be settled in the press. Ameghino will unsuccessfully request a field inspection through *La Libertad* and *La Nación* newspapers challenging Lista and Aguirre. Recently Podgorny (2017) suggests that Ameghino intentionally uses the press to increase his prestige and keeping a clipping collection for future biographers. There is no indication of this, since as Zeballos's *revue de presse* (Zeballos 1877) also displays a combination of personal articles with others of general interest, being simple personal archives (Toledo 2016: 163) (Figure 10).

7. The academic networks and central institutions: the Museum, University and the Argentinean Scientific Society

In the 1870's three institutions monopolized natural sciences studies: the Public Museum, the University and the Argentine Scientific Society (SCA). The museum was under the tutelage of the omnipresent Germán Burmeister who assumed the direction in 1862 until his death in 1892. In close relationship was the SCA founded in 1872 where excelled the young Francisco Moreno and Estanislao Zeballos (about the institutional history see Camacho 1971; Fernández 1982; Fernández 1982; Podgorny 2000, 2009). Natural history courses began to be dictated in 1865 with the arrival of the Italian professor Pellegrino Strobel in 1865, later replaced by Giovanni Ramorino (Camacho 1971). Strobel, progressive and unconventional, was one of the fathers of Italian paleoethnology (Mutti 2014). Ameghino will maintain a tense relation with the SCA (Figure 11) and a frank opposition with the Museum director. Personal, unsolicited visits of a young, selfconfident Ameghino to Burmeister annoncing his discoveries, strongly irritated the director, initiating a life-time tumultuous relation of mutual criticisms. Burmeister, undisputed *maitre* of the 'central' science, considered peripheral collectors 'incompetent' and 'greedy' for profit, while Ameghino accuses him of being 'selfish', 'authoritarian' and 'despotic' (Ameghino 1881). Although his disciple Moreno had not taken formal university courses, he quickly became an essential opinion-former. Moreno also has his allies in Paris, Broca and Topinard encouraged him. He atributed the fossil man discoveries to 'modern alluvium', believing that recent human remains and tools had been naturally mixed with fossils (Moreno

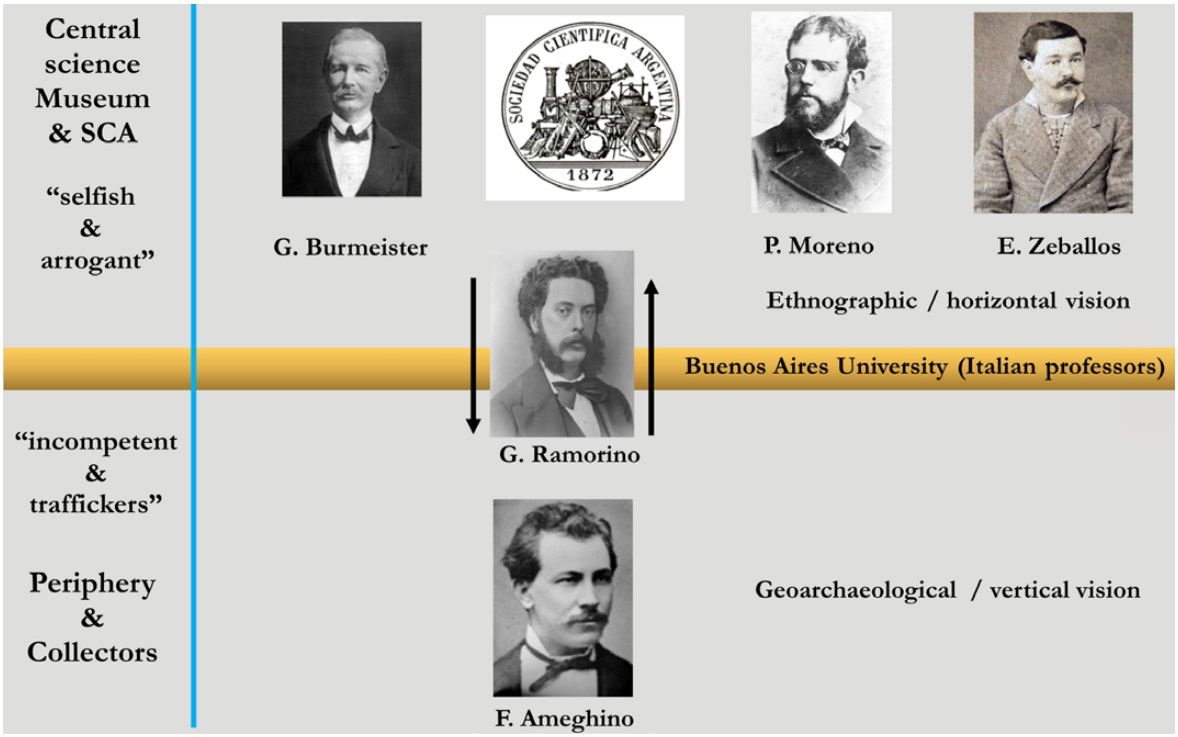


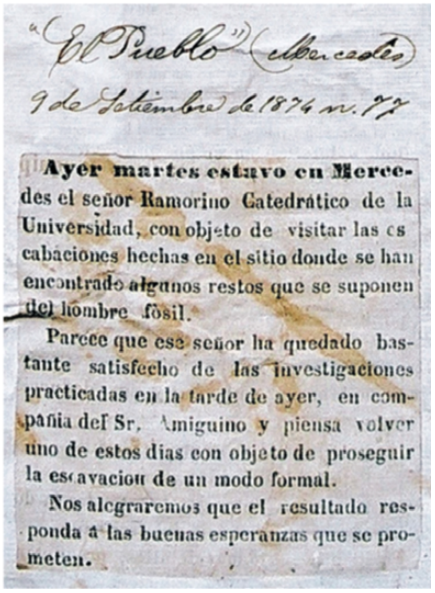
Figure 11. Central science institutions versus peripheral collectors. Role of G. Ramorino as an intermediate man between both camps. His premature death in 1876 precluded the understanding and acceptance of Ameghino's ideas.

1874). As in Europe, when any ossiferous breccia was considered a torrential mixture, Moreno and Burmeister considered the Pampean discoveries as not 'diluvial', and in consequence, without interest.

8. Professor Giovanni Ramorino: the bridge with the European tertiary man

The librarian of the Paris Museum, Jules Pierre Denoyers (1800-1887) discovered in his paleontological excursions near Chartres, bones of *Elephas* and *Rhinoceros*, clearly tertiary according to the consensus of the time, with cutting marks, that supposes anthropic. He presented his discovery to the *Academie* in June 1863 installing passionate exchanges about the 'tertiary man' and the taphonomic debate (Toledo 2017: 49-52). Shortly after, in 1867, controversies were reinforced with the finding of a 'tertiary flint tools' by Louis Bourgeois (1819-1878) near Tours. Thus, the discoveries of Saint Prest and Thenay became famous and were discussed at the Prehistoric Archaeology Congress of 1867 in Paris, at the Bologna Anthropological congress, in 1872, where a majority accepts these evidences (Haddon 1910; Groenen 1994; Richard 2008). Towards 1875 the miocene man partisans impose their ideas with a triumphalism that made Meunier (1875) to declaim '*Vous autres, du diluvium, vous n'êtes pas des enfants!*'.

In 1865 Giovanni Ramorino (1841-1876) (Figure 12), former disciple of Filippo de Filippi (Gestro 1921-26, 1929) who already during the 1850's considered prehistoric man antiquity (Canadelli 2014), explored the Italian cave of Varezzi finding under a limestone layer, reddish mud with abundant fauna. He deduced the human presence after coal and calcined bones as in the Finale site (Issel 1864). Following Desnoyers discoveries, he reviewed the Arno collections of the Genoa museum and thinks to recognize cut marks on tertiary Rhinoceros bones (Ramorino 1866; Issel 1875). Later, in September 1865, Ramorino presented his conclusions at the historic La Spezia meeting, being hereafter, his investigations integrated into treatises as those of Hamy (1870), Lubbock (1876: 382) and Issel (1875: 738).



"El Pueblo" (Mercedes)
9 de Setiembre de 1874 n. 77

Ayer martes estuvo en Mercedes el señor Ramorino Catedrático de la Universidad, con objeto de visitar las escabaciones hechas en el sitio donde se han encontrado algunos restos que se suponen del hombre fósil.

Parece que ese señor ha quedado bastante satisfecho de las investigaciones practicadas en la tarde de ayer, en compañia del Sr. Amiguino y piensa volver uno de estos dias con objeto de proseguir la escavacion de un modo formal.

Nos alegraremos que el resultado responda á las buenas esperanzas que se prometen.

Figure 12. Prof. Giovanni Ramorino in 1876 (Coll. Universidad de Buenos Aires). Article of the *El Pueblo* announcing his visit to the Frías excavation in september 1874.

Ramorino left Europe in full discussion of the 'tertiary man', moving to Buenos Aires in 1866 taking a position of professor at Buenos Aires University. In 1876 he died in Genoa. The role of Ramorino was decisive in promoting the first prospections in prehistoric sites of Luján. It should be noted that the concepts that Ameghino will use were very familiar to Ramorino: cut and impact marks on extinct fauna bones associated with lithics. In April 1875 Ameghino sent him material from *Paraderos* I and II and a classification of anthropic modified bones. It is evident that Ramorino European experience and the readings of the Gervais book, deeply influenced Ameghino's research, notably his taphonomic interpretations (Toledo 2016: 65, 154). Torcelli in *Cumbres Platenses* (La Nación 1932, Coll. Salas) described clearly these circunstancies: *'it was a fortunate fact that the anthropologist Ramorino encouraged the teenager to continue his explorations and studies, because if this had not happened, Ameghino probably would not have continued trying to find more evidences about the existence of fossil man in Argentina.'*

9. The 'fossil man' of Frias (1870-1874) and the journal of Paul Gervais

Ameghino found human fossil remains being very young, only 16 years old, in 1870, in the Frias stream near Mercedes (Ameghino 1889) and sold them to Pozzi. In November 1880, Ameghino contacted Emilio Cornaglia, director of the Civic Museum of Milan, to relocate the remains allegedly deposited there by Pozzi (Torcelli 1935, letters n° 125 and 126). Between December of 1872 and the summer of 1873, he re-excavated the same point founding more human remains mixed with coal, artefacts and fauna (Figure 13). In January of 1874 he presented this material to Burmeister (Ameghino 1881: 378) who completely disregarded these findings. Ramorino assisted to the excavations in September 1874 (Ameghino 1881). In Paris these remains were examined by Broca who prepeared a note that Ameghino attached to his '*Armes et instruments*' (Ameghino 1880a). Cope requested a summary of the Frias find for the *American Naturalist* magazine, which constitutes the first publication of a stratigraphic section of Lujan.

On October 31, 1875, he wrote to Paul Gervais, in charge of the Chair of Comparative Anatomy of the Museum. Gervais had already published the finding of human fossils by Seguin in 1872, and in his *Recherches* (Gervais 1867) he studied and illustrated in detail bones with cuts marks and intentional fracturing for marrow extraction. The list of 'proofs' of the existence of the 'quaternary' European man of Gervais recalls the list that Ameghino will make of them in his 1876 memoir. Ameghino also cites the works of Figuier, Lartet and Dupont regarding the archaeological and ethnological evidences of modified bones.

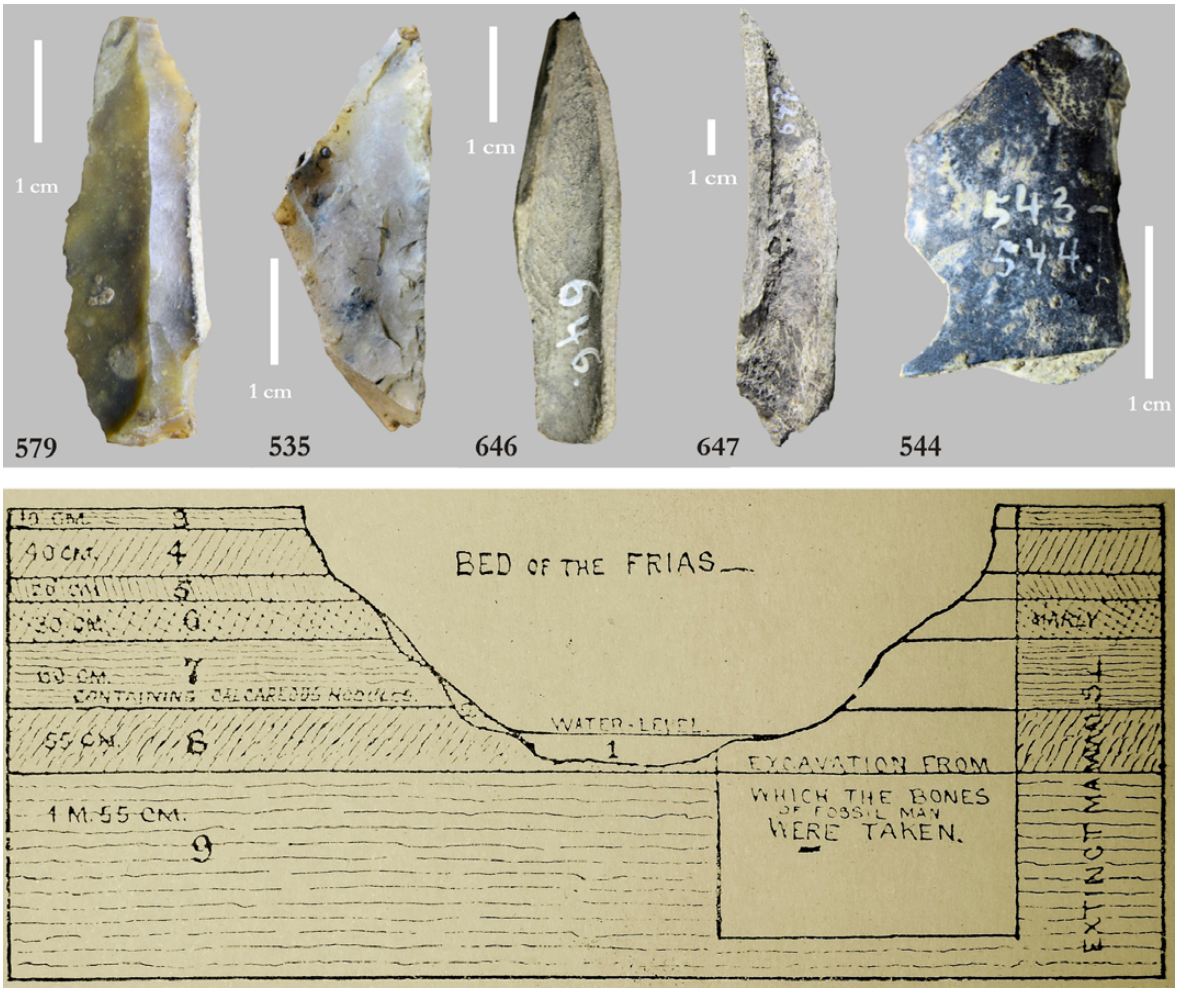


Figure 13. Modified bones and tooh, and lithics from the 'eolithic' site of Frías and stratigraphic section published in the *American Naturalist* in 1878.

Thus, unexpectedly Ameghino succeed to publish in a prestigious European journal while Ramorino prepared a report to the SCA about the findings of Frias. This relationship recalls the initial collaboration between Tournal and de Serres in France. In spite of the auspicious beginnings for the local prehistory, shortly after, an unexpected event will have decisive historical and epistemological repercussions: the field trip of the SCA commissioners.

10. The SCA field certifying commission

In 1876 the Breton brothers and his partner Bonemment requested financial support from the SCA to continue their excavations (Bonnement *et al.* 1872). This support was denied but the Society decides to verify their sites and those of Ameghino. Two SCA members, Zeballos and Reid, explored the Marcos Díaz creek, near Luján (Figure 14). They erroneously assumed that they were exploring the 'Pliocene' sites of Ameghino and confused the Arroyo de Frías with the arroyo Marcos Díaz (Figure 1, 14), more than 30 kilometres away (Toledo 2016: 159). They publish the results of this failed certification in June 1876, stating that Ameghino had confused historical deposits with tertiary layers.

This erroneous statement constitutes a pivotal point in the history of Argentine archaeology since it will soon condemn all evidence profusely documented by Ameghino along the Luján valley. Ameghino had presented two memoirs (Ameghino 1876a, 1876b) to the SCA in April and May 1876, documenting his findings with great vehemence and self-confidence. Both were rejected

Figure 14. Map of the SCA commissioners field trip north of Luján.
Note that the Frias creek site is located 30 km westward.

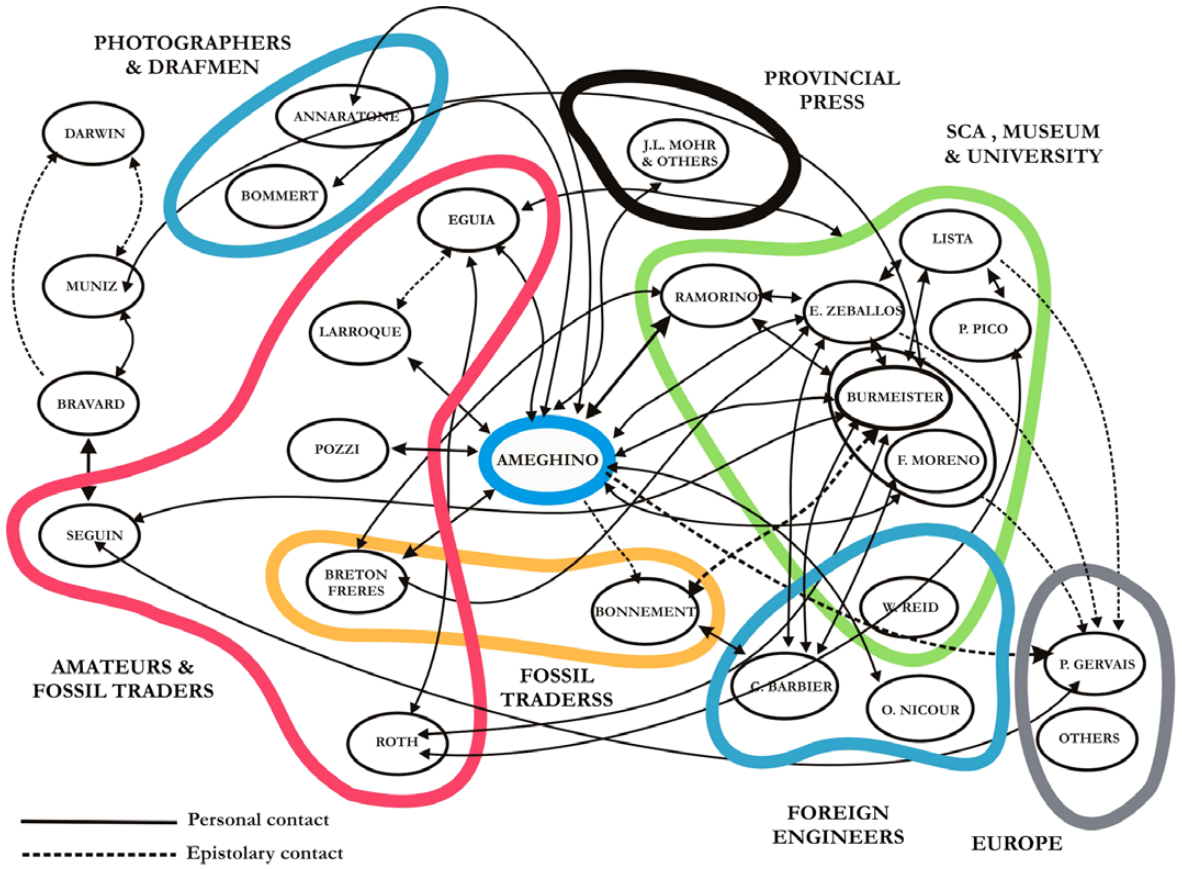


Figure 15. Social and science subgroups network related
with Ameghino activities in the 1870's.

after the field trip of Zeballos and Reid. In the internal reports of the SCA we observe that the rejection is not based on technical arguments but on an *ad hominem* argument, considering Ameghino as incompetent. In search of legitimacy, recognition and external validation (Stagnaro 1993) Ameghino decided to present his collection of 'weapons and instruments' at the 1878 Paris Universal Exposition (Figure 17).

11. Journey of a passion: Luján-Paris-Luján (1869-1884)

Ameghino arrived to Paris beginning of 1878 and will return to Buenos Aires married to Leontine Poirier in september 1881. With only 24 years old, he lived in Paris perhaps the freest and most

exciting years of his life. It has some economic solvency thanks to the financial help of merchant friends from Mercedes. Larroque, rented for a year the room at Av. Millaud; Frenchman Nogaró and the Italians Salomone and Annaratone contributed with letters of credit (Torcelli 1935, letters n° 40 and 42). In December of 1878 he receives the first share of 2000 Fr for the sale of his collection to Cope for a total of 45000 Fr. Until the close of the Exhibition he is absorbed by the conditioning and sale of collections, acting as a commercial representative, an usual practice in the 19th century (Richard 2008: 129). Its collection is visited by the renowned personalities while he managed to impose the debate on the Americas Palaeolithic. De Quatrefagues, de Mortillet, Gervais, Cope, Cartailhac, Capellini, Ribero and Villanova among others (Ameghino 1881: 466), agreed that the incisions on a Mylodon tibia (Figure 17) were anthropic. After this event Ameghino is incorporated, not only into the discussion about the evidences of fossil man, but also into the social media of European prehistory and paleontology. He published papers in magazines such as the *Revue d'Antropologie* and the *Bulletin of the Societe Geologique de France* and worked with personalities such as H. Gervais, P. Brocca, P. Topinard, E. Hamy and D'Acy, among others. After reading one of his articles he manages to pluck Topinard the following thought *'Je me demande si l'homme de Neardenthal n'etait plus americain qu'Europeen*' (Torcelli 1935; letter n° 55), indirectly supporting Ameghino's still unconfessed ideas about a men migration from Americas to the old world.

In the meantime he negotiated the sale of paleontological pieces. Once the exhibition finished, he accelerates the dispatch of the unsold collections. He dedicated full time to study other pampean collections available in Paris, such as the Barbier (Ecole Normale); Muñiz, Bonemment, Bravard and Seguin (MNHN) collections, included the Carcarañá man and worked indefatigably to leave ready for printing the manuscripts of *La Formación Pampeana* and *La Antigüedad*. Upon his return from Brussels in September 1879, he published *Los mamíferos fósiles de América Meridional* in collaboration with Henry Gervais. The publishing house Masson accepts in July the printing order of *La Antiguedad* for 5500 francs, a title that mirrored the titles of Lyell and Gervais books. Its two volumes will be printed in Spanish between 1880 and 1881. Here, Ameghino summarizes all the results of the explorations in the Luján Valley. Although he finished writing in Paris, the manuscript was already ready around 1876 (Torcelli 1935, letter n° 531). In the preface he explains that his objetive was to gather all the evidences about 'the great antiquity of man in pampas'. The *Antiguedad* becomes the witness, without continuation, of a surprisingly advanced beginning of the South-American archaeology. In Chelles he refined his stratigraphical observations and related successions of fauna and cultural material.

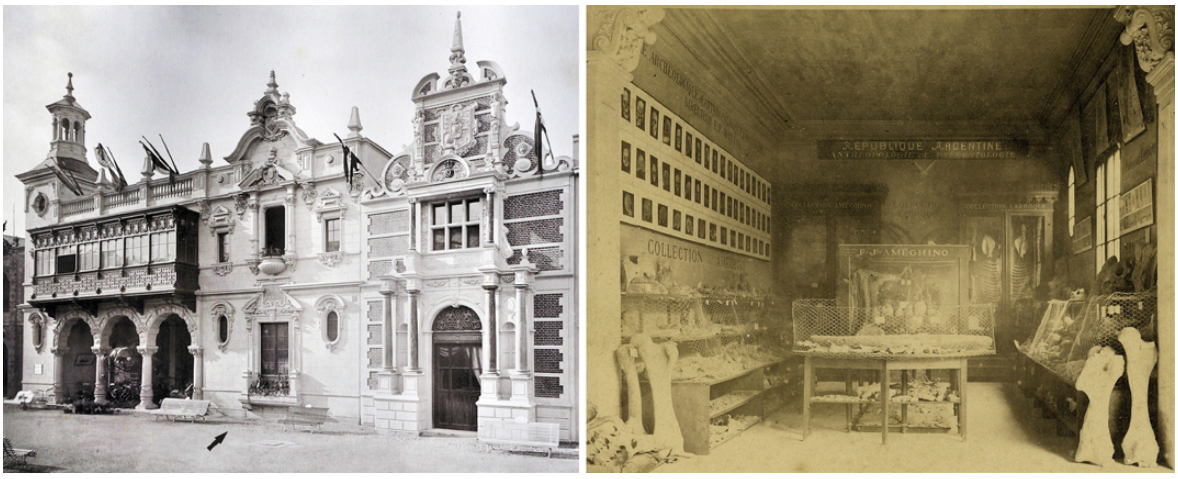


Figura 16. Pavillon of 'États de l'*Amérique Centrale et Méridionale*', *rue des Nations, Champs de Mars* at the *Exposition Universelle de Paris* of 1878. The Argentine anthropological collections occupied the room behind the ground floor window (arrow), Photo Noiret (*Archives Nationales de France, Pierrefitte-sur-Seine*). Interior of the room that was aconditionated by Ameghino probably with the help of Larroque and Bommert (Archive ANF Caran/F12 and coll. MNLP).

The supportive exchanges with the French anthropologists secretly feed the hypothesis, germ of his future anthropogenic theories, that the ancestors of his 'Pliocene man' could have been native. But he's not alone to envisage that, one of *Materiaux*'s editors said: 'On cherche le secret des origines de notre côté. Qui sait si la lumière pour nous ne viendra pas de l'autre côté, au contraire [de l'Amérique]' (*Revue d'Anthropologie* 1879: 181).

12. The Luján valley anthropological collection

Ameghino returns to Buenos Aires with this collection enriched with a collection of European artefacts that he acquires with his own means. In July 1886 (Torcelli 1935: 414-418) he sells this collection to the La Plata Museum (Farro 2009: 104; Toledo 2016: 174) where it was exhibited and later internally dispersed and lost. In 1907 Lehmann-Nitsche (1907: 145) was the last scholar to studied and photographed it. Most of the pieces can be identified by the engravings, drawn at natural size, of *La Antiguedad* plates. Most of them are fragments of percussion by dynamic loading on fresh bone for marrow extraction from its lujanian sites (Toledo 2009: 177). The study of the original collection in march 2016, rediscovered accidentally after works in the Museum during 2015, confirms that Ameghino's taphonomic interpretations were generally correct, although he mistakenly attributed percussion shards naturally sharpened with 'arrowheads' and certain fragments with a very regular helical fracture planes with 'tools' (Toledo 2009). Diagnostic attributes of dynamic load on bone are observed as helical fractures, hackle marks, percussion waves, plumose structure, notches and notches with attached flakes (Figure 17). Most of the Ameghino's 'striae' and 'incisions' correspond to slice marks and chop marks (Toledo 2009: 135-218, 2017: 115-156, 2016: 176). Lithic artefacts are ftanite and quartzite fragments and flakes without or very low formatization.

After stratigraphical analysis and AMS, OSL and ESR results, we date 'eolithic' sites fluvial facies between 13 and 45 ky BP (Toledo 2009, 2011, 2017).

13. Discussion and Conclusions

A few years after the debate on the European quaternary man was closed during the 1860s, the debate about the existence of an American 'Paleolithic' stage was set up. Thus, in the 1870s, Ameghino antagonize with the Argentine Scientific Society while Abbott opposed to the Smithsonian Institute, exchanges that Meltzer (2009) named, the 'Paleolithic wars'. The discoveries of the 'fossil man' in the pampas have been discredited due to the participation of collectors motivated by a commercial interest, as Seguin, who concealed information, or like the Bretón brothers that provided unreliable data. Thus this jeopardized access to contextual information while objects were sold to the highest bidder in Europe.

In contrast to these practices, provincial or peripheral scholars, peripheral either by distance, by their youth, by lack of formal scientific education or by not belonging to central institutions, demanded a moral product: the certification, acceptance and legitimization of their ideas and original field observations. Similar processes had already taken place in from late eighteenth century among collectors, antiquarian and *amateurs éclairés de province* and the central academic institutions of London and Paris.

We find a parallel with Tournal, who in 1827 with only 22 years old, discovered the coexistence of man with extinct fauna in the Bize breccia, in relation to the resistance of central institutions to accept their discoveries and particularly to conduct *in situ* field certifications (Hurel 2009; Rudwick 2008). He tried unsuccessfully to convince Cuvier as Ameghino did with Burmeister. The relationship between Ameghino and the SCA mirrowed that of Tournal and the provincial circles with the Parisian hegemony of the *Institut* between 1827 and 1833 (Guilaine and Alibert 2016) (Figure 18). Both promptly recognized the importance of geology to understand the 'antediluvian'

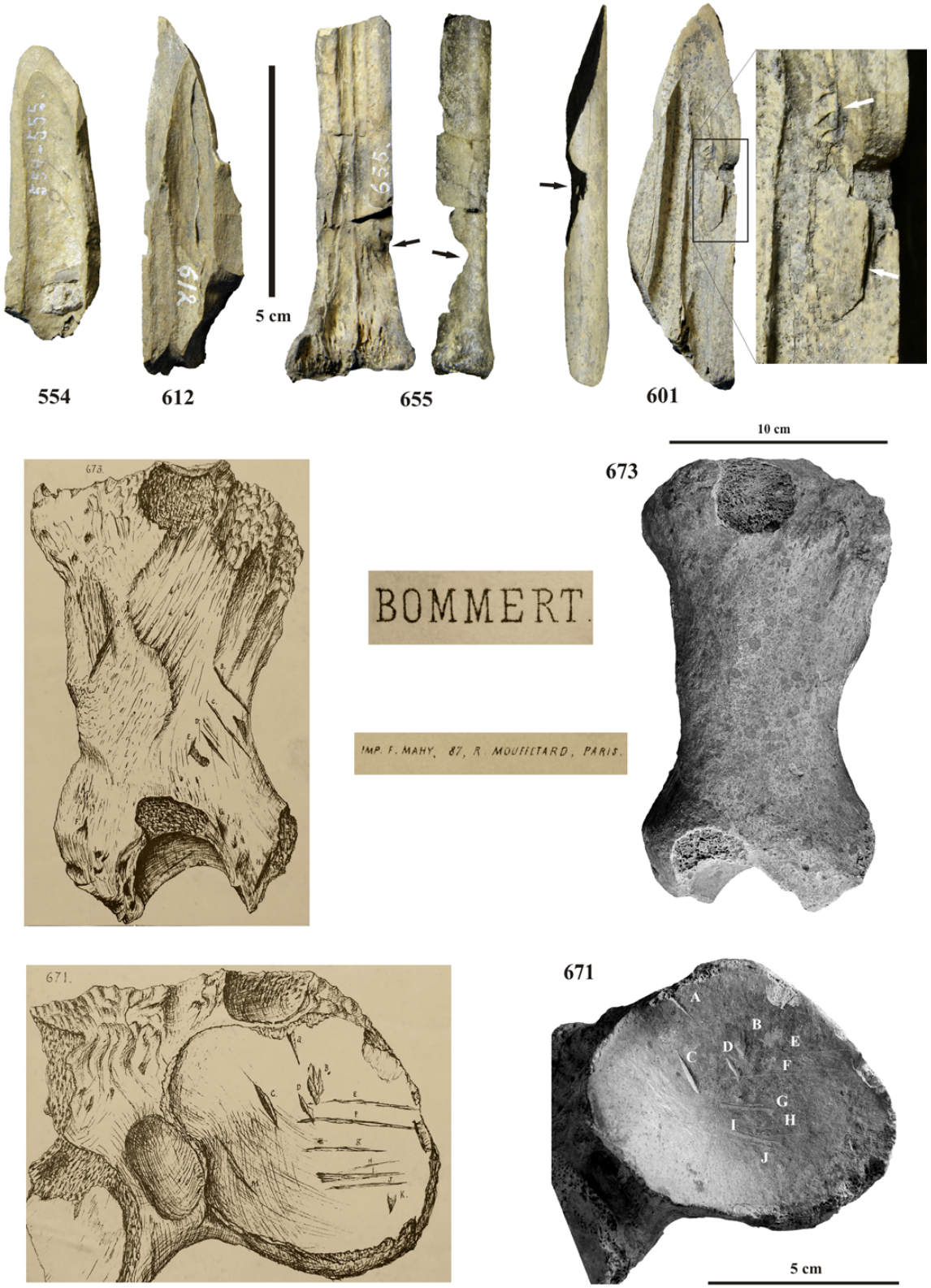


Figure 17. Dynamic load (percussion) bone fragments from *'Paradero 2'* (pieces n ° 554, 655 and 673); *'Paradero 5'* (piece n° 601) and *'Paradero 6'* (piece n° 612). Note percussion notches (black arrows), helical fractures and attached flake. Detail of the attached flake and hackle marks of piece n° 601, associated to a notch (white arrows). Drowings by Zacharias Bommert of piece n° 671-673 from *'La Antiguedad'* plate XXV, compared with the original (Coll. Ameghino, MNLP), presenting cut and chop marks in the mid shaft and articular facets. Numbers in white were written down by Leheman-Nitsche in 1907, who was the last scholar to examine this collection (Lehmann-Nitsche 1907).

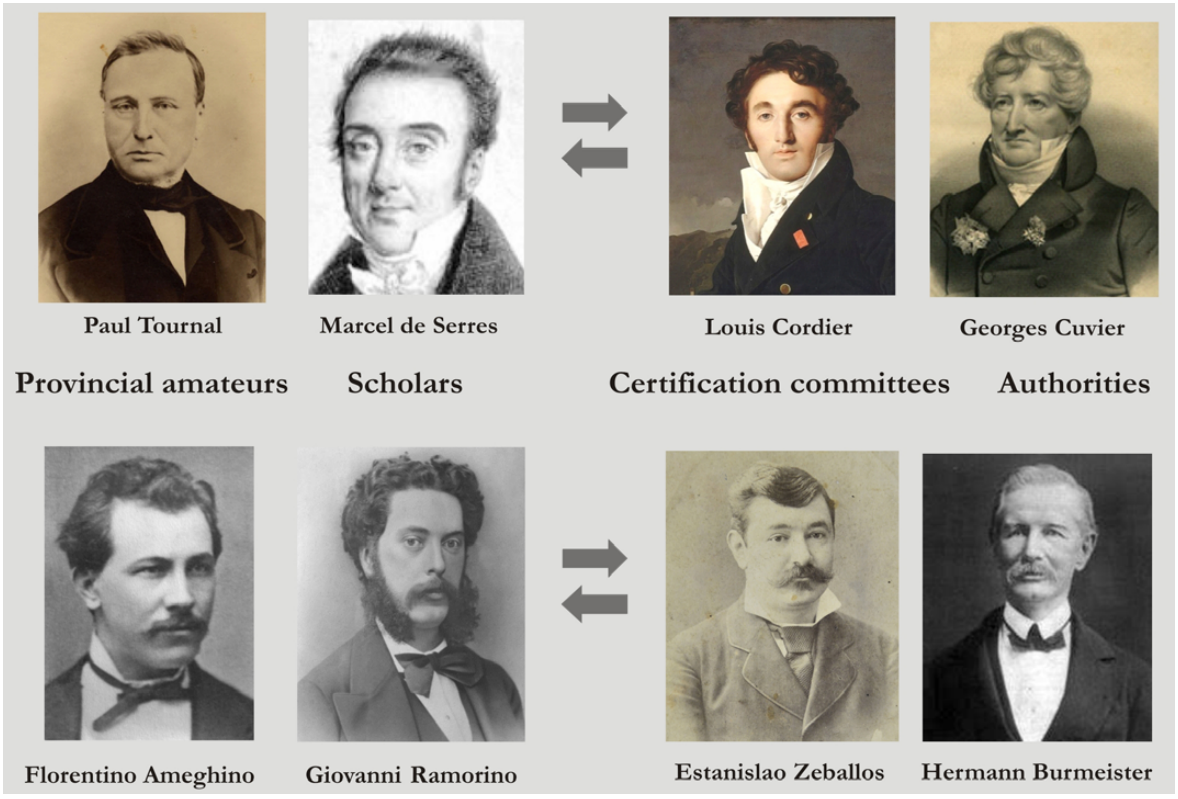


Figure 18. Peripheral, scholars and museum directors network groups. A parallelism is made between similar processes dealing with man and fossil fauna coexistence occurred in France (1827-1840) and later, in Argentina (1870-1877).

terrains. The exchange of letters, the sending of material evidence and even the publication of scientific notes, all of them seemingly collective practices, did not guarantee that they would become part of the circles that delayed the certification and acceptance of their investigations. Both interacted with the decision and legitimating nodes of the science social networks, but did not succeed to be part of them.

Regarding the coexistence of the 'eolithic' man and extinct fauna, Ameghino attempted unsuccessfully to convince his 'morenist' opponents, whom had Burmeister as *alma mater*, a catastrophist that was unfavourable to Darwinian ideas. This circle, reluctant to a verticalist vision of the archaeological record and to the geological antiquity of man, leads the nascent Argentinean archaeology towards a horizontalization where the near surface objects had more significance than stratigraphical surveys. For this group, the concepts of Lyell and transformist theories were useless and unnecessary. Contrasting with this ethnographic and dogmatic approach, Ameghino's holistic method was based on the amalgamation of geology, palaeontology, archaeology and anthropology. After analyzing the published descriptions and the original collection, we deduce that most of Ameghino's taphonomic observations were correct, being the first author to scientifically document the intentional processing of extinct pampean fauna carcasses.

The abandonment and discrediting of all Ameghinian anthropogenetic theories after Hrdlicka's publications in 1912, plus the indifference and misunderstanding of the rich content of *La Antiguedad*, contributed to deepen the 'ethnographization' of Argentinean archaeology, which later, during the rest of XX century, would feel more comfortable harvesting objects in the northeast of Argentina than in the prospection of pleistocene river terraces and loessoide sedimentary successions. Luján would never become the Pampean Abbeville.

Acknowledgments

For diverse contributions I would like to thank: Dr. M.A. Peltrin, Lic. Mariana Luchetti (Archive and Library E. Zeballos, Luján), Mrs. E. Furt (†) (Library and Archive Furt), Mr. Jorge Petrocelli and to Dr. Ruth Gruhn. For their comments and suggestions, prof. Alessandro Guidi and Massimo Tarantini, and for English proof and useful suggestions, Dr. Steve Holen (CAPR).

I also thank the intervention of 'visible' and 'invisible colleagues' in particular Dr. G. Politis for the fervent interest in sharing and discussing ideas about Ameghino and its context at the Museum of La Plata in September 2016. Dr. I. Podgorny for its timely reception. This work is based on a section of the author's doctoral thesis (Toledo 2009, 2017).

References

AGN	Archivo General de la Nación Argentina
AHGCPBA	Archivo Histórico de Geodesia y catastro de la Provincia de Buenos Aires
ANF	Archives Nationaux de France
AyBEZ	Archivo y Biblioteca Estanislao Zeballos
FCEN-UBA	Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires
MACN	Museo Argentino de Ciencias Naturales Bernardino Rivadavia
MCA	Museo Casa Ameghino
MNHN	Musée Nationale d'Histoire Naturelle de Paris
MNLP	Museo Nacional de la Plata
SCA	Sociedad Científica Argentina

Ameghino, F. ([1876a] 1914). El hombre cuaternario en la Pampa. In Torcelli A., ed. *Obras Completas y Correspondencia Científica,* Primeros trabajos científicos, Vol. 2, pp. 21-40. La Plata: Taller de impresiones oficiales.

Ameghino, F. ([1876b] 1914). Concurso de 1876. Ensayos de un estudio de los terrenos de transporte cuaternarios de la Provincia de Buenos Aires, presentados al concurso de la Sociedad Científica Argentina, correspondiente al año 1876. In Torcelli A., ed., *Obras Completas y Correspondencia Científica,* Primeros trabajos científicos, Vol. 2, p. 53-137.

Ameghino, F. (1874-1897). Colección de recortes periodísticos sobre el sabio y su obra en la prensa de Bs As-La Plata e interior. [newspaper clippings] Archive J.M. Furt, Estancia Los Talas, Lujan.

Ameghino, F. (1875). Nouveaux débris de l'homme et de son industrie, mêlés à des ossements d'animaux quaternaires, Recueillis auprès de Mercedes (République Argentine). *Journal de Zoologie*, IV, pp. 527-528.

Ameghino, F. (1876-1886). Recortes de diarios del autor. Coll. Ameghino. Biblioteca Furt, Los Talas. Luján.

Ameghino, F. (1877). *Noticias Sobre Antigüedades Indias en la Banda Oriental, con Tres Láminas Representado Objetos de Piedra de la Edad Neolítica*. Mercedes: Imprenta de La Aspiración, p. 80.

Ameghino, F. (1878). L'Homme préhistorique dans le bassin de la Plata. In *Comptes rendus sténographiques du Congrès lnternational des Sciences Anthropologiques*, tenu à Paris du 16 au 21 Août 1878, pp. 341-350.

Ameghino, F. (1879a). L'homme préhistorique dans la Plata. *Revue d'Anthropologie* 2(2), pp. 237-249.

Ameghino, F. (1879b). La plus haute Antiquité de l'homme dans le nouveau-monde. *Congrès international d'américanistes. Compte rendu de la troisième session* (2), pp. 198-239.

Ameghino, F. (1880b). *La Antigüedad del Hombre en el Plata* (I). Paris-Buenos Aires: G. Masson e Igon.

Ameghino, F. (1881). *La Antigüedad del Hombre en el Plata (*II). Paris-Buenos Aires: G. Masson e Igon.

Ameghino, F. (1889). Contribución al conocimiento de los mamíferos fósiles de la República Argentina. *Actas de la Academia Nacional de Ciencias,* pp. 1-1028 y Atlas: 98 láminas.

Ameghino, F. (1880a). Armes et instruments de l'homme préhistorique des Pampas. *Revue d'anthropologie,* II(3), pp. 1-12.

Angelis de, P. (1842a). Letter to Carlo Zucchi, april 1842. [letter], Archive Reggio Emilia. Coll. Bongiovanni. Reggio Emilia.

Angelis de, P. (1842b). Letter to Carlo Zucchi, 3 june 1842. [letter], Archive Reggio Emilia. Coll. Bongiovanni. Reggio Emilia.
Annaratonne, P. (1887-1888). Letters to Ameghino. [letter] Archive Casa Ameghino. Coll. Ameghino-Salas, FAS.FLO2.EPIVAR1 19, 20, 21 y 22. Lujan.
Argot, C. (2008). Changing views in paleontology: the story of a giant (Megatherium, Xenarthra). In Sargis E.J. & Dagosto M., eds., *Mammalian Evolutionary Morphology: a tribute to Frederick S. Szalay*, Dordrecht: Kluwer Academic Publishers, pp. 37-50.
Badini, G. (1999). *Lettere dai due mondi. Pietro de Angelis e altri corrispondenti di Carlo Zucchi,* Reggio Emilia: Archivio di Stato di Reggio Emilia.
Balbin, (1876). Letter to Lujan court, August 1. [letter] *Juzgado de Paz de Luján* (AyBEZ), Archivo y Biblioteca Estanislao Zeballos (AyBEZ). Luján.
Barbier, Ch. (1877). *Le Cheval de la Plata comme cheval de guerre, son importation pour la remonte de l'armée, état de la question.* Paris.
Barbier, Ch. (1878). *Le Maté : historique, données statistiques, données scientifiques, caractères chimiques, effets physiologiques, emploi thérapeutique, son introduction en France*. Saint-Dizier: Carnandet.
Bommert, Z. (1881). Letter to Ameghino, July 21, 1881. [letter] Archive Casa Ameghino. Coll. Ameghino-Salas, FAS.FLO2.EPIVAR1.16. Lujan.
Bonnement, B., Breton, P. and Breton, J. (1872). Letter to Burmeister, July 13, 1872. [letter] Archive Museo Argentino de Ciencias Naturales. Buenso Aires.
Boyd, J. (1958). The Megalonix, the Meghaterium and Thomas Jefferson's lapse of memory. *Proceedings of the American Philosophical Society*, 102(5), pp. 420-435.
Bravard, A. (1847). Letter to Laurillad, November 8. [letter] Bibliothèque Centrale et Archive du Muséum National de Historie Naturelle., MS 638, fol. 51. Paris.
Bravard, A. (1856). Résumé du catalogue des collections paléontologiques d'Auguste Bravard. Amérique du Sud, 1852-1856, Buenos Ayres. [Ms] Bibliothèque de Paléontologie. Muséum National de Historie Naturelle: Paris.
Bravard, A. (1857). *Observaciones geológicas sobre diferentes terrenos de transporte en la hoya del Plata*. Buenos Aires.
Bravard, A. (1858). *Geología de las pampas.* In *Registro estadístico del estado de Buenos Aires*. Buenos Aires: Imprenta de la Tribuna.
Buckland, W. (1824). *Reliquiae diluvianae*. 2nd edition, London.
Burmeister, H. (1864-1869). El hombre fósil Argentino. *Anales del museo público de Buenos Aires*, vol. I.
Burmeister, H. (1870-1874). El hombre fósil Argentino. *Anales del museo público de Buenos Aires*, vol. II.
Camacho, H.H. (1971). *Las ciencias naturales en la Universidad de Buenos Aires. Estudio histórico*. Buenos Aires: Editorial Universitaria de Buenos Aires,.
Canadelli, E. (2014). *Filippo De Filippi e l'antichità dell'uomo.Il contributo di un naturalista alla nascita della Paletnologia in Italia.* In A. Guidi, ed., *150 anni di Preistoria e Protostoria in Italia*, Firenze: Istituto Italiano di Preistoria e Protostoria, pp. 129-133.
Ebelot, A. ([1880] 1995). *La guerre dans la pampa: Souvenirs et récits de la frontière argentine, 1876-1879*. Paris: L'Harmattan.
Farro, M. (2009). *La formación del Museo de La Plata*. Rosario: Prehistoria Ediciones.
Ferrari, R.A. (1993). *Bibliografía de publicaciones argentinas con fotografías montadas (incunables fotográficos): 1864-1900*. Buenos Aires: Biblioteca Histórico-Científica.
Ferrari, R.A. (1995). Los inicios de la fotografía científica y técnica en la Argentina, 1864-1900. In *2° Congreso de Historia de la Fotografía*. Buenos Aires: CEP, pp. 159-163.
Fernández, J. (1982). *Historia de la arqueología argentina*. Asociación Cuyana de Antropología: Mendoza.
Figuier, L. (1873). *L'Homme Primitif.* Paris: Hachette.
Gabriel, J. (1940). *El loco de los huesos. Vida, obra y drama del continente americano y de Florentino Ameghino*. Imán: Buenos Aires.
Gervais, P. (1867). *Recherches sur l'ancienneté de l'homme et la période quaternaire*. Paris: A. Bertrand.
Gervais, P. (1872). Débris humains recueillis dans la Confédération Argentine avec des ossements d'animaux appartenant a des espèces perdues. *Journal de Zoologie*, II, pp. 231-234.
Gestro, R. (1921-26). Ricordo biografico di Giacomo Doria. *Annali del museo civico di storia naturale Giacomo Doria*. Serie 3, X, p. 50.

Gestro, R. (1929). Giovanni Ramorino e la Societa di Letture Scientifiche. *A Compagna*, 12, pp. 30-31.
Gonzales Arrili, B. (1980). El 80-Ameghino. *Diario La Prensa*, 1 de noviembre de 1980, Buenos Aires.
González Arrili, B. (1954). *Vida de Ameghino*. Santa Fe: Ed. Castellví.
Groenen, M. (1994). *Pour une histoire de la préhistoire. Le paléolithique*. Grenoble: Jérôme Millon.
Guilaine, J. and Alibert, A. (2016). *Paul Tournal, fondateur de la Préhistoire*. Paris: Odile Jacob.
Haddon, A.C. (1910). *History of Anthropology.* London: Knickerbocker Press.
Hamy, M. (1870). *Précis de paléontologie humaine*. Paris: J.B. Bailliere et fils, pp. 372.
Hoffstetter, R. (1959). Les rôles respectifs de Bru, Cuvier et Garriga dans les premières études concernant *Megatherium*. *Bulletin du Museum National d'Histoire Naturelle*, 31, pp. 536-545.
Hrdlicka, A. (1912). *Early men in South America*. Washington: Smithonian Institution. Bureau of American Ethnology. Bulletin 52.
Hurel, A. (2011). Paul Tournal, les grottes de Bize et la question de la haute antiquité de l'homme. In Hurel, A. & Coye, N., eds., *Dans l'épaisseur du temps. Archéologues et géologues inventent la Préhistoire*. Paris, Publications scientifiques du Muséum, 2011, pp. 109-154.
Ingenieros, J. (1951). *Las doctrinas de Ameghino*. Buenos Aires: Ramón J. Roggero y Compañía Eds.
Issel, A. (1864). Di una caverna ossifera di Finale. *Atti della Societa italiana di scienze naturali*, Vol. III.
Issel, A. (1867). Resume des recherches concernant l'anciennete de l'homme en Ligurie. In *Compte resndu du Congres d'atropologie et d'archeologie prehistoriques*. Paris, pp. 75-89.
Issel, A. (1875). L'Uomo preistorico in Italia. In J. Lubbock, *I tempi preistorici e l'origine dell'incivilimento*. Torino: Unione Tipografico-Editrice, pp. 735-916.
Laming-Emperaire, A. (1964). *Origines de l'archéologie prehistorique en France*. Paris: Picard.
Langguth de Bonino, V. (1957). Sobre antigüedades indias de la Banda Oriental. *Revista de la sociedad de amigos de la arqueología*, 15, pp. 433-444.
Larroque, A.J. (1873). Letter to Manuel Eguia, 9 september 1873. [letter] 82-6. Archive Museo Etnográfico Ambrosetti. Buenos Aires.
Lehmann-Nitsche, R. (1907). Nouvelles recherches sur la formation Pampéenne et l'homme fossile de la République Argentine. *Revista del Museo de la Plata,* XIV, p. 490.
Lista, R. (1998). *Obras*. Buenos Aires: Confluencia.
López Piñero, J.M., (1988). Juan Bautista Bru (1740-1799) and the description of the genus *Meghaterium*. *Journal of the history of biology*, 21(1), pp. 147-163.
López Piñero, J.M., Glick, T.F. (1993). *El esqueleto de megaterio de Bru y el presidente Jefferson. Una relación insospechada en los albores de la paleontología*. Valencia: Instituto de Estudios Documentales e Históricos sobre la Ciencia, Universitat de Valencia.
Lubbock, J. (1875). *I tempi preistorici e l'origine dell'incivilimento.* Torino: Unione Tipografico-Editrice.
Lubbock, J. (1876). *L'homme préhistorique. Etudié d'après les monuments retrouvés dans les différentes parties du monde*. Paris: Germer Baillière.
Lugones, L. (1915). *Elogio de Ameghino*. Buenos Aires: Otero & Company.
Márquez Miranda, F. (1951). *Ameghino. Una vida heroica*. Buenos Aires: Nova.
Martínez, G. (2001). 'Fishtail' projectile points and megamammals: new evidence from Paso Otero 5 (Argentina). *Antiquity* 75(289): 523-528.
Mege, F. (1886). *Un naturaliste issoirien, Auguste Bravard*. Clermont Ferrand: Editions Mont-Louis.
Meltzer, D.J. (2009). *Fist peoples in a New World. Colonizing Ice Age America*. Berkeley: University of California Press.
Mercante, V. (1911). *Florentino Ameghino. Su vida y su obra*. Buenos Aires: Casa Jacobo Peuser.
Meunier, V. (1875). *Les Ancêtres d'Adam, histoire de l'homme fossile*. Paris: Rothschild.
MNHN (1843). Catalogue of. Dupotet [Muniz] collection, March 23. [catalog] Bibliothèque de Paléontologie. Muséum National de Historie Naturelle. Paris.
MNHN (1856). Session of October 9, 1856. [Ms] Chaire d'Anatomie comparée. Bibliothèque et archive du Muséum National de Historie Naturelle. Paris.
Moreno, F.P. (1874a). Description des cimentières et paraderos préhistoriques de Patagonie. *Revue d'Anthropologie,* 3, pp. 72-90.
Moreno, F.P. (1874b). Noticias sobre antigüedades de indios, del tiempo anterior a la conquista, descubiertas en la provincia de Buenos Aires. *Boletín de la Academia de Ciencias de Córdoba*, I, pp. 130-132.

Moreno, F.P. (1876). Sur des restes d'industrie humaine préhistorique dans la République Argentine. *Compte rendu du Congres International d'anthropologie et d'archéologie préhistoriques*, Stockholm, 1874. Norstedt et Soner, Stockholm.
Moreno, F.P. (1878). *El estudio del hombre sud-americano*. Buenos Aires.
Moreno, F.P. (1879). *Viaje a la Patagonia austral emprendido bajo los auspicios del gobierno nacional, 1976-1877.* Buenos Aires: Imprenta de La Nación.
Moreno, F.P. (1882). *El origen del hombre sud-americano, Razas y civilizaciones de este continente, contribuciones al estudio de las colecciones del Museo Antropológico y Arqueológico*. Buenos Aires: Coni.
Mortillet de, G. (1873). Classification des diverses périodes de l'âge de la pierre. In *Congrès international d'anthropologie et d'archéologie préhistoriques, Comptes rendus de la 6e session, Bruxelles, 1872*. Bruxelles: C. Muquardt, pp. 432-459.
Mortillet de, G. (1865). *Matériaux pour l'histoire positive et philosophique de l'homme*. Premiere année.
Mortillet de, G. (1867). *Matériaux pour l'histoire positive et philosophique de l'homme.* Troisieme année.
Mortillet de, G. (1869). Essai d'une classification des cavernes et stations sous abri fondée sur les produits de l'industrie humaine. *Matériaux pour l'histoire positive et philosophique de l'homme,* V, pp. 172-179.
Mutti, A. (2014). Pellegrino Strobel nel dibattito scientifico del suo tempo. In A. Guidi, ed., *150 anni di Preistoria e Protostoria in Italia.* Firenze: Istituto Italiano di Preistoria e Protostoria,, pp. 247-252.
Orione, J. (1991). El hallazgo del megaterio en el virreinato del Rio de la Plata. *Cuadernos Hispanoamericanos*, 489, pp. 80-89.
Orquera, L.A. (1970). A cien años del descubrimiento de Ameghino. *Diario La Prensa*, 6 de Septiembre de 1970. Buenos Aires.
Orquera, L.A. (1971). *Paleoantropología de la Pampa Húmeda.* Buenos Aires: Biblioteca del Museo Etnológico de Buenos Aires (Inédito).
Outes, F. (1897). *Los Querandíes*. Buenos Aires: Imprenta de M. Biedma.
Palcos, S. (1943). *Nuestra Ciencia y Francisco Javier Muñiz. El Sabio – El héroe*. La Plata: Universidad Nacional de la Plata.
Palcos, S. (1944). El extraordinario hallazgo paleontológico de 1787. *La Prensa*, 11 de Junio de 1944. Buenos Aires.
Pelayo, F. (1996). Del diluvio al megaterio. Los orígenes de la paleontología en España. *Cuadernos galileo de historia de la ciencia,* 16, Departamento de Historia de la Ciencia, CSIC, Madrid.
Podgorny, I. (2000). *El argentino despertar de las faunas y de las gentes prehistóricas. Coleccionistas estudiosos, museos y universidades en la creación del patrimonio paleontológico y arqueológico nacional (1875-1913)*. Buenos Aires: Libros del Rojas.
Podgorny, I. (2009). *El sendero del tiempo y de las causas accidentales. Los espacios de la prehistoria en la Argentina, 1850-1910*. Rosario: Prohistoria ediciones.
Podgorny, I. (2017). The Daily Press Fashions a Heroic Intellectual: The Making of Florentino Ameghino in Late Nineteenth-Century Argentina. *Centaurus*, 58, pp. 166-184.
Ramorino, G. (1866). Ossements pliocenes avec diverses impressions. *Matériaux pour l'histoire positive et philosophique de l'homme,* II.
Ramorino, G. (1868). Sopra le caverne di Luguria e specialmente sopra una recentemente scorpeta a Verezzi presso Finale. *Memorie della Reale Accademia delle Scienze di Torino*, XXIV, pp. 277-304.
Richard, N. (2008). *Inventer la préhistoire. Les débuts de l'archéologie préhistorique en France*. Paris, Vuibert, Adapt-Snes, Paris.
Rudwick, M.J.S. (1997). *Georges Cuvier, fossil bones, and geological catastrophes. New translations and interpretations of the primary texts*. Chicago: University of Chicago Press.
Rudwick, M.J.S. (2008). *Worlds before Adam. The reconstruction of geohistory in the age of reform*. Chicago: University of Chicago Press.
Sabor, J.E. (1995). *Pedro de Angelis y los orígenes de la bibliografía argentina. Ensayo bio-bibliográfico*. Buenos Aires: Solar.
Salvatore, D.R. (2007). *Los Lugares del Saber. Contextos locales y redes transnacionales en la formación del conocimiento moderno (compilador)*. Rosario: Beatriz Viterbo editora.
Seguin, Q. [Ms] Archive of Clermont Ferrand Library, MS 1089, fol 349-335. Clermont Ferrand.
Seijo, C. (1999 [1945]). *Maldonado y su region*. Montevideo.

Stagnaro, A.A. (1993). La antropología en la comunidad científica: entre el origen el hombre y la caza de cráneos-trofeo (1870-1910). *Alteridades*, 3(6), pp. 53-65.
Stoppani, C. (2014). Antonio Stoppani (1824-1891): L'impegno scientifico, sociale, civile e religioso di uno scienziato patriota. In A. Guidi, ed., *150 anni di Preistoria e Protostoria in Italia.* Firenze: Istituto Italiano di Preistoria e Protostoria, pp. 135-139.
Strobel, P. (1867). Paraderos preistorici in Patagonia. *Atti de la Societa Italiana de Scienze Naturali*, X, pp. 167:172.
Strobel, P. (1868a). Pointes de flèche en pierre du sud de l'Amérique. *Materiaux pour l'histoire primitive et philosophique de l'homme*, IV, p. 123.
Strobel, P. (1868b). Paraderos de la Patagonie. *Materiaux pour l'histoire primitive et philosophique de l´homme*, IV, p. 124.
Strobel, P. (1872). Le valve degli Unio nelle mariere dell'emiliae nei Paraderos della Patagonia. *Archivo per l'Antropologia et la Etnologia,* 16.
Strobel, P. and Pigorini, L. (1865). Le terremare e le palafitte del Parmense, seconda relazione. *Materiaux pour l'histoire primitive et philosophique de l'homme*, I, pp. 74-80.
Toledo, M.J. (2005). Secuencias Pleistocenas 'Lujánenses' en su sección tipo: Primeras dataciones C14 e implicancias estratigráficas, arqueológicas e históricas, Luján-Jáuregui, provincia de Buenos Aires. *Revista de la Asociación Geológica Argentina,* 60(2), pp. 417-424.
Toledo, M.J. (2009). *Géoarchéologie de la transition Pléistocène-Holocène dans le nord-est pampéen (Buenos Aires, Argentine). Révision historique, stratigraphique et taphonomique. Perspectives pour le premier peuplement*. Tesis doctoral, Muséum National d'Histoire Naturelle (inédita), París.
Toledo, M.J. (2011). El legado Lujanense de Ameghino: revisión estratigráfica de los depósitos pleistocenos-holocenos del valle del río Luján en su sección tipo. Registro paleoclimático en pampa de los estadios OIS 4 al OIS 1. *Revista de la Asociación Geológica Argentina*, 68 (1), pp. 121-167.
Toledo, M.J. (2016). Ameghino en contexto. Nuevos datos históricos y revisión geoarqueológica del sitio Arroyo Frías (1870-1874). *Revista del Museo Argentino de Ciencias Naturales,* n.s. 18(2): pp. 147-183.
Toledo, M.J. (2017). *Géoarchéologie de la Transition Pléistocene-Holocéne dans le Nord-est Pampéen (Buenos Aires, Argentine),* 2 vols. Oxford: BAR International Series 2880.
Torcelli, A. (1914). *Obras Completas y Correspondencia Científicade Florentino Ameghino. Primeros trabajos científicos*, vol. 2. La Plata: Taller de impresiones oficiales.
Torcelli, A. (1935). *Obras completas y correspondencia científica de Florentino Ameghino. Correspondecia Cientifica,* vol. 20. La Plata: Taller de impresiones oficiales.
Zeballos, E. (1877). *Noticias y Juicios sobre los estudios y publicaciones de Estanislao S. Zeballos.* [newspaper clippings], Archivo y Biblioteca Estanislao Zeballos (AyBEZ), Coll. Zeballos. Luján.
Zeballos, E. (1879). Noticas preliminares sobre el hombre primitivo de la Provincia de Buenos Aires. *Revista de Ciencias, Artes y Letras*, 1(1), pp. 39-51.
Zeballos, E. (1910). [MS typed text]. Archivo y Biblioteca Estanislao Zeballos, Coll. Zeballos, p. 53. Luján.
Zeballos, E. and Reid, W. (1876). Notas geológicas sobre una excursión a las cercanías de Luján. *Anales de la Sociedad Científica Argentina*, 1, pp. 313-319.

From mining to archaeology. An Austrian experiment in Transylvania at the beginning of the 19th century

Aurora Peţan
Study Centre of Dacica Foundation, Alun – Romania
aurora.petan@dacica.ro

Abstract

At the beginning of the 19th century the ruins of the ancient site of Sarmizegetusa Regia, the capital of pre-Roman Dacia (nowadays Romania) came into attention of the Austrian administration of Transylvania, who organized two large excavation campaigns. The lack of experience and knowledge in digging an ancient site has determined the managers to borrow methods from other disciplines and to innovate. Mining excavation techniques have been applied and adapted. Very well-trained specialists in geology, mineralogy and metallurgy have done laboratory analysis and determination of the building materials used by Dacians. They also identified the traces of kilns, workshops, and other ancient metal and glass processing activities. The Austrian administration produced a huge quantity of documents related to these excavations, which remained unknown until recently. This paper explores the information in the Austrian tax reports and highlights the way in which this proto-archaeological experiment was carried out using methods of various sciences.

Keywords: Proto-archaeology, mining, Transylvania, 19th Century, Dacian Kingdom

Résumé

Au début du XIXe siècle, les ruines de l'ancien site de Sarmizegetusa Regia, capitale de la Dacie préromaine (la Roumanie d'aujourd'hui) attira l'attention de l'administration autrichienne de la Transylvanie, qui organisa deux grandes campagnes de fouilles. Le manque d'expérience et de connaissances nécessaires pour excaver un site ancien ont déterminé les responsables à emprunter des méthodes à d'autres disciplines et à innover. Ils ont appliqué et adapté des techniques d'excavation minière. Des spécialistes très bien formés en géologie, minéralogie et métallurgie ont procédé à des analyses en laboratoire et à la détermination des matériaux de construction utilisés par les Daces. Ils ont également identifié des traces de fours, d'ateliers et d'autres activités de traitement du métal et du verre. L'administration autrichienne a produit une grande quantité de documents liés à ces fouilles, qui sont restés inconnus jusqu'à récemment. Cet article explore les informations contenues dans les rapports de l'administration autrichienne et met en évidence la manière dont cette expérience proto-archéologique a été réalisée à l'aide de méthodes de différentes sciences.

Mots-clés : Proto-archéologie, exploitation minière, Transylvanie, 19ème siècle, le royaume dace

1. The earliest archaeological site in Transylvania

The site of Grădiștea de Munte (Hunedoara County, Romania), identified with the ancient Sarmizegetusa Regia, capital of the Dacian kingdom between the 1st century BC and the 1st century AD, lies in the South-East of Transylvania, in a mountainous area (Figure 1). It is now one of the most important archaeological sites in Romania and it is also a UNESCO World Heritage Site. The site covers an elongated hill (Grădiștea Hill) and the central area of the settlement, which gathers the main monuments, lies around the 1000 m elevation (Figure 2).

Grădiștea Hill is far from Transylvania's main communication roads, but it was connected to them by a complex network of ridge roads, well-kept and controlled during the Dacian times.

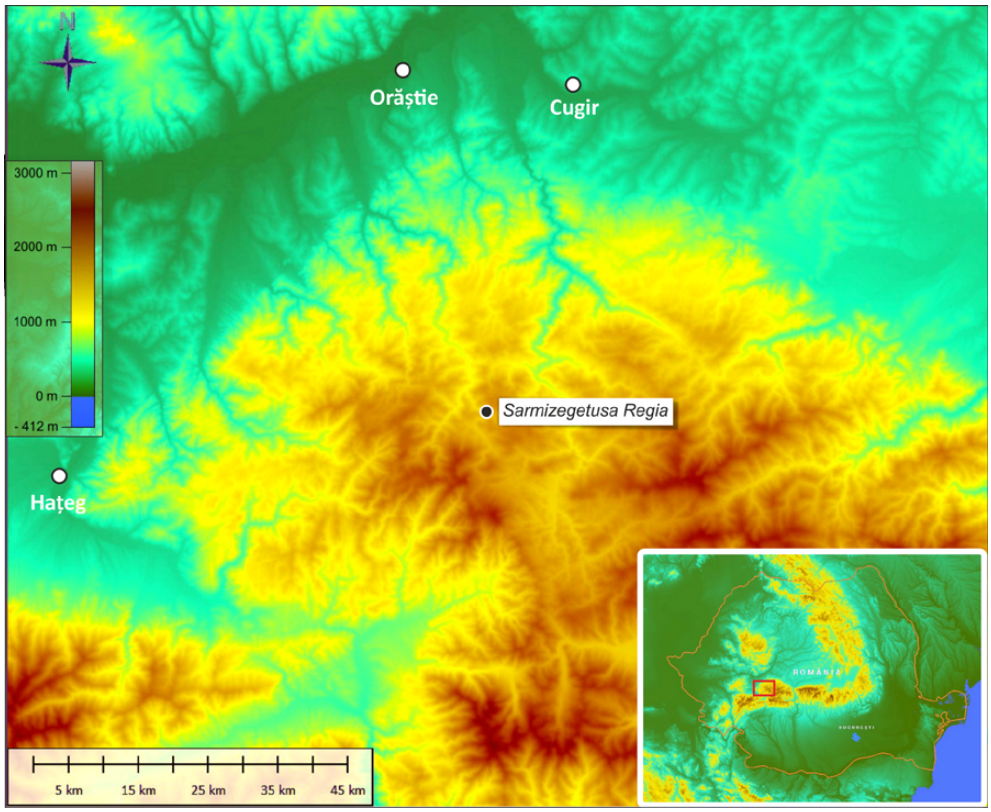


Figure 1. Location of the archaeological site of Sarmizegetusa Regia – Grădiștea de Munte. Background map: SRTM Worldwide Elevation Data.

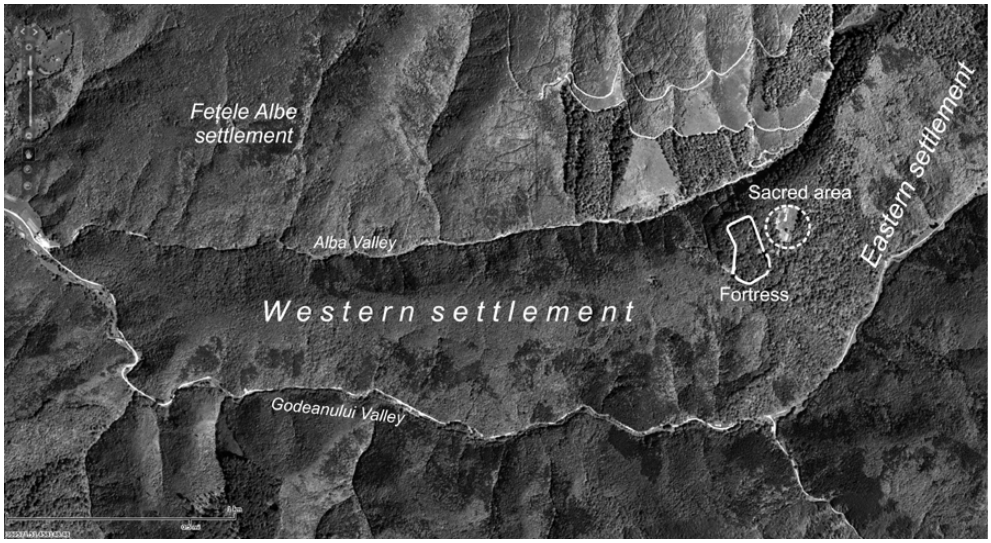


Figure 2. Grădiștea Hill and the main archaeological areas. Background map: National Agency for Cadastre and Land Registration (www.ancpi.ro).

After the Roman conquest of Sarmizegetusa, in 106 AD, this network of roads was abandoned and only seldom used by the shepherds. In the centuries that followed the conquest, the site was covered by a dense forest and it remained isolated up in the mountains. Therefore, when the ruins were discovered, at the beginning of the 19th century, the access to the site was most difficult.

The capital of the kingdom was raised around the middle of the 1st century BC and it developed particularly in the 1st century AD. Its main constituent parts are the fortification (the fortress), the

sacred area and the civil quarters, which spread over hundreds of artificial terraces, along an axis of over 4 km. The capital was surrounded by a series of fortresses and smaller fortifications, as well as by numberless civil settlements (Stefan 2005; Florea 2011).

At the end of the 18th century, the inhabitants of the area found a series of coin hoards in the vicinity of the fortress, which drew the attention of the authorities (Makkay 1995; Munteanu 2004; Munteanu 2005). The Austrian Tax Authority decided to organize ample excavations among the ruins, in hopes of finding treasures. The campaigns involved huge expenses and efforts and summed up 8 months of field work in 1803 and 1804 (Mateescu 2017; Peţan 2018).

2. The reports

The administration produced a huge quantity of documents related to these excavations, they recorded hundreds of items of information and details on the organization of the work, the techniques used, the artifacts dug out and inventoried, the descriptions of the structures that were uncovered, etc.

This set of documents remained unknown for over a century and a half. The authorities did not publish anything when the excavations were stopped, probably because they had considered their approach as a strictly economical one, its aim being to find treasures and it was therefore considered a failure.

The documentary collection written in German, Latin and Hungarian was identified 50 years ago in the archives of Vienna, Cluj and Budapest and was published. However, the turning into account of these documents would have to wait until now (Peţan 2018).

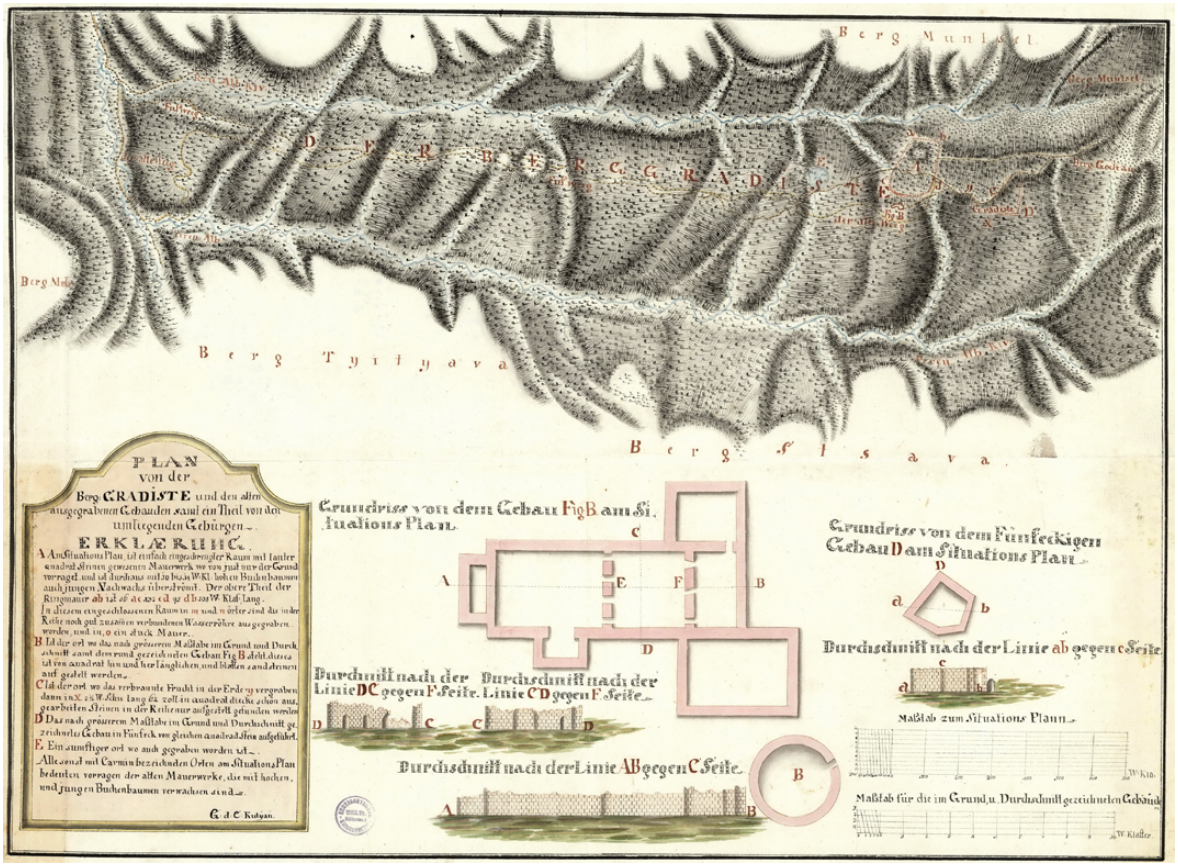


Figure 3. Austrian map of Grădiștea Hill (1804). Österreichisches Staatsarchiv, Kriegsarchiv, Kartenabteilung KVIIk 403 I/2 (Peţan 2018, Pl. VI).

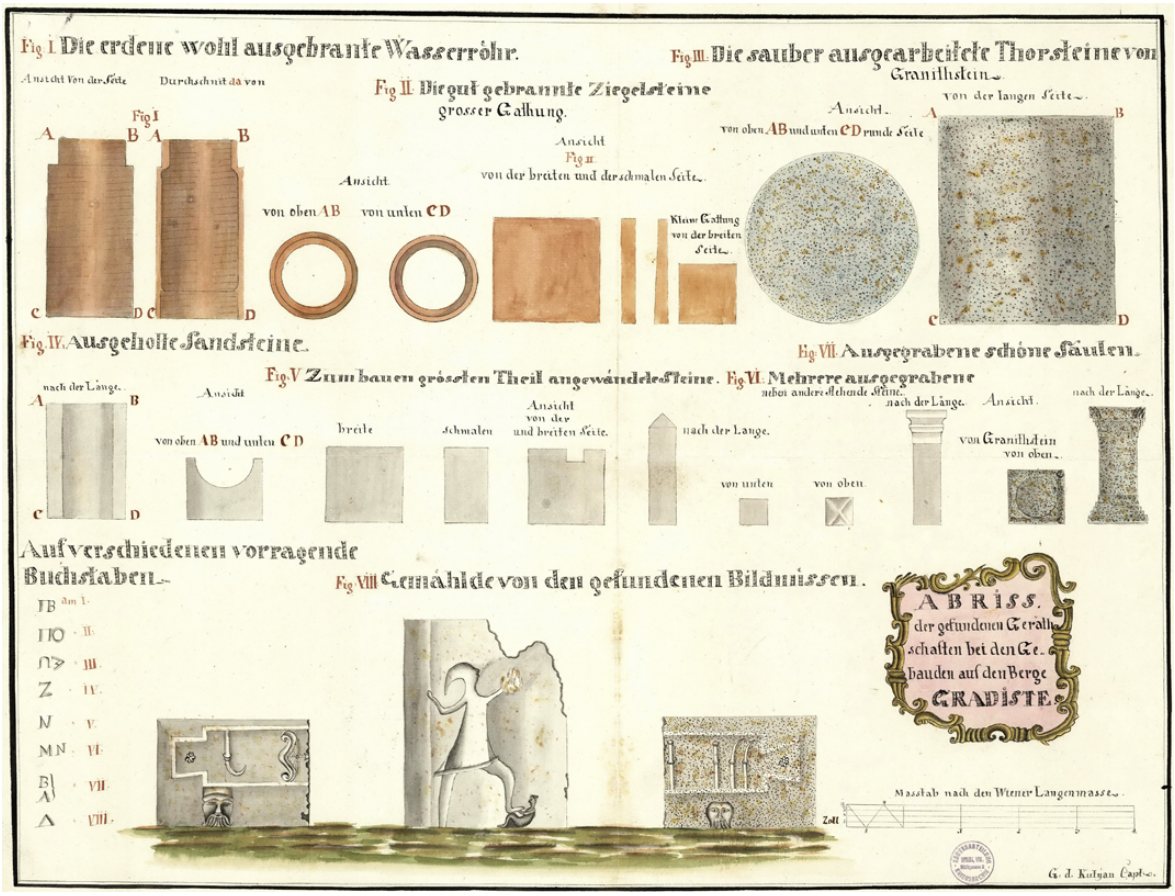


Figure 4. Austrian plate with drawing of artefacts discovered during the excavations in Grădiștea (1804). Österreichisches Staatsarchiv, Kriegsarchiv, Kartenabteilung KVIIk 403 I/2 (Pețan 2018, Pl. VII).

The first reports were chaotically drawn up, for the reporters did not know what and how to write down. Things would change in the beginning of the second campaign, when weekly reports were requested, which were supposed to mention, item by item, even the most minute discoveries. They were mentioning the place where they dug, the progress made, the objects found, sometimes even the depth where they were found and the way the pieces were grouped, eventually the operations that were necessary. Some reports contain up to eight such items of information, each having its own annex, which contained the list and the package with the objects found at that point. Primitive as it may be, this system anticipates the modern method of recording by archaeological complexes. Alongside with the simple written note, they also made some sketches that were attached as annexes to the reports.

The cartographic documentation was drawn up by an expert who got to the site at the end of the excavations. He drew two sketches, one of them representing the hill with the location of the fortress and the plans of some buildings and the other one including some artifacts discovered during the excavations (Figures 3 and 4).

The historical interpretations made in this period are awkward. At that time, the Dacian material civilization was completely unknown. No other Dacian site had been identified in the field. Still, from the first diggings, in 1803, there were voices that claimed that the ruins of Grădiște belong to a fortress that served as refuge for the Dacian king Decebalus. The idea had come up due to the interpretation of the ancient Greek and Roman literary sources and of the images from Trajan's Column, hence resulted that the last fights between the Dacians and the Romans had taken place

in the vicinity of a fortress located up in the mountains. But it took more than a century until the fortress from Grădiștea de Munte was claimed to be the very capital of the Dacian kingdom (Peţan 2016).

3. Digging techniques

The technical and industrial development of the previous century and the most remarkable advance of the mining science turned Hunedoara County, a rich region in metallic ore, into a powerful metallurgical zone. The Austrian authorities never missed any occasion of exploiting all resources from the imperial domain, on condition the profit should exceed the expenditures. Therefore, the diggings for the gold of Grădiște would be done with miners and mining technology. They brought specialists trained at the Mining Academy in Schemnitz, the first technical university in the world.

The two campaigns were carried out between 15 July and 30 September 1803 and 27 April and 27 October 1804 and they involved great logistic difficulties. The place was far from the transport routes, it had a harsh climate, with frequent rains from spring till autumn, with long, early winters (in 1803 the first snow was mentioned as early as 23 September), and the workers had to transport all the food and tools on horseback, from long distances.

Started as a mining approach meant to exploit the underground, with prospecting and galleries, the activity turned more and more scientific, due to the intervention of some intellectuals of the time, who claimed that the excavations should be regarded as a scientific approach and not as a treasure hunt. However, the rigid clerks of the imperial administration considered these diggings as an economical endeavour which proved fruitless and therefore, they stopped it after the second campaign.

They investigated all the objectives that were visible at that time, everything that involved walls and some areas considered interesting for their position or for other characteristics, all situated in the central area of the site (Figure 5).

Undoubtedly, the excavations were unscientific, and they have therefore done a lot of damage to the site. There was no expertise or model for this kind of excavations and the miners had to adjust to the situation and discover themselves which were the most efficient approaches. They had come with the specific mining techniques, namely prospecting, gallery (the horizontal digging) and the pit (the vertical digging). Naturally, most of the excavations were just simple trenches.

The excavation techniques used in the two campaigns were improved on the job. The first worksite foreman had to find appropriate techniques adapting what he knew from his trade of a miner to the novel situation of unveiling some ruins.

On such a wide site with multiple components, the delegates of the Tax Authority had to deal with several types of structures: complex buildings, surrounding walls, large areas of land.

The upper terrace was the easiest to approach as there were no traces of buildings on it, yet it raised the interest by its dominant position. They opted for a cross-shaped ditch that should have revealed the ruins of eventual constructions in case they existed. ‘The cross’ consisted of four ditches starting from the central point, about 2 meters wide and deepened to the rock.

For the larger flat areas, they needed a more complex technique. As random probes gave no results, they suggested the technique of parallel and crossed ditches. The principle is somewhat similar to the modern chessboard scheme excavation, but surely, 200 years ago stratigraphy was beside the point.

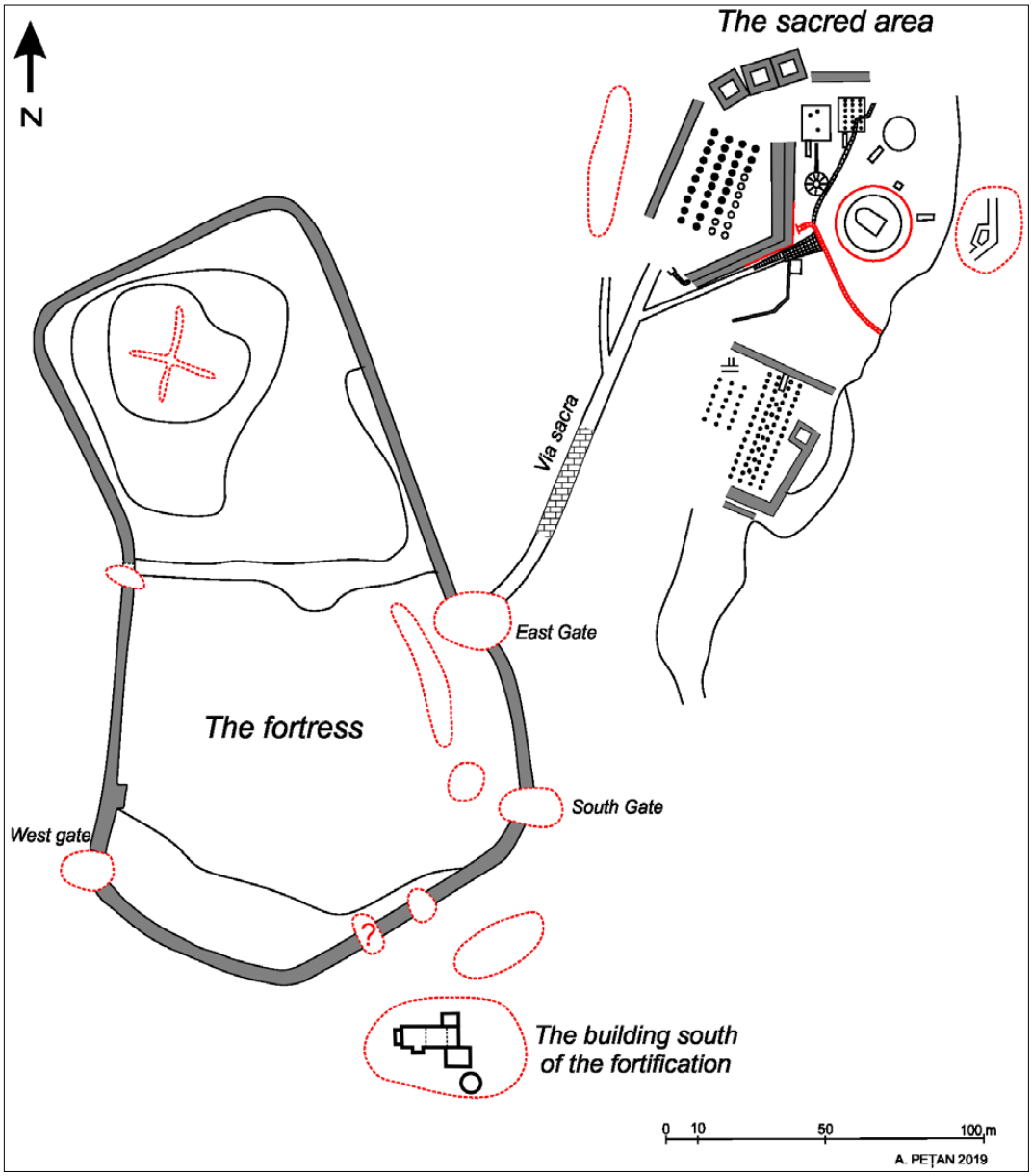


Figure 5. Sarmizegetusa Regia's plan. In red, the main known areas investigated by Austrians in 1803-1804.

The fortification involved some approach problems, as it had a quite large perimeter. They opted for excavation in several places, both inside the wall and outside it, parallel to the wall and perpendicular to it, and then the wall was completely dismantled in certain places.

The large building south of the fortification must have been the biggest challenge in both campaigns. Their approach was to probe several spots near the building, not far from one another, on the identified sides of the building, down to the level of the rock. Later on, they dug galleries up to the walls and then they emptied the rooms, obtaining in this way the planimetry of the building.

The technique of vertical diggings was used at least at the 'large stone circle', in the middle of which they dug such a well until they reached the rock, and on the upper terrace where they dug a similar well, down to the shale, in the middle of the 'cross'.

An important operation was the washing of the earth resulting from the excavations (*Waschwerk*), as a result of which a few gold coins were found (Pețan 2012).

A particular interest is also raised by some stratigraphic observations. The campaign coordinators noticed from the very beginning that the antique level was lower than the modern one and they tried to identify it every time. Moreover, they also tried to identify the level of the sterile, in order to make sure their diggings went down to the base rock.

4. Identification and analyses of raw materials

The antique raw materials and matters drew the special attention of the miners sent to excavate at Grădiștea Muncelului: building stone, slag and ores, traces of metallurgical craft activities or glass processing, and others. It was a lucky chance that, due to their instruction and experience, this category of discoveries benefited from a fairly accurate identification and registration.

They noticed that the stone that was used was not local but brought from a long distance. In the area, there is nothing but mica-schist, which is inappropriate for constructions of such grandeur, so that huge efforts were needed in order to transport the stone from great distances. It was noticed that there are two types of rocks used in the constructions from Grădiștea Muncelului: limestone and andesite. In both cases the sources of exploitation were correctly identified: the antique limestone quarry from Măgura Călanului and the andesite quarry near Deva.

There is a lot of evidence related to iron processing, mentioned in those times. The representatives of the Austrian Tax Authority noticed as early as the first campaign traces of iron processing in the ancient times, both due to their expertise and because they were quite abundant. Some of them collected ores from the neighbouring areas. Pieces of ore, particularly iron garnet and hematite were identified on the very site. Iron slag was reported frequently in quite large quantities, in several points of the fortress. We can add to these the discovery of some metallurgical hearths.

Pieces of copper slag and ore are also mentioned, but the most important piece of information is related to a large deposit of argentiferous galena. We are talking about over a ton and a half ore, deposited near the ruins of a building. The metallographic analyses done in 1804 by the experts of the time showed that the ore had a concentration of 62% lead and 0.2% silver. The source of this quantity of ore is still undetermined. This item of information has not been turned into account so far. This is particularly important, and it could help in shaping up the real dimensions of the manufacturing activities at Sarmizegetusa Regia.

5. Short conclusions

All the aspects above shape up the first great archeological site on the territory of today's Romania. The excavations did not lead to the identification of the sought-after treasures and were stopped for lack of profit. Fortunately, whilst it was set to find gold, this approach turned into a proto-scientific one, a proto-archaeological experiment carried out using methods of various sciences as mining and geology.

Yet, because of the lack of interest manifested by the authorities, almost nothing was made public at that time, therefore, all the experience acquired along the months of diggings remained unknown till today. The results have never been published and the reports have remained in the archives and have not been exploited until now. For this reason, the gained experience has not been passed on, and this enterprise has remained an experiment. Moreover, not only did a fundamental episode of the history of this site remain unknown, but also one of the most important episodes of European archaeology from the beginning of the 19th century.

In the following decades, there were fewer operations on the site, but measurements were done by some scholars, sketches were drawn, and a series of plans were published, alongside with descriptions and interpretations. The turning point would come in 1921, when the first

Figure 6. The fortress today. Photo: A. Pețan 2019.

Figure 7. The sacred area today. Photo: A. Pețan 2019.

systematic scientific research was initiated, and this continued until nowadays (Florea 2017) (Figures 6 and 7).

Nevertheless, the Austrian excavations had an indirect influence upon the research from the 19th century and even upon the next: all those who made it to the site after 1804 saw the diggings and took advantage of them in their endeavor to decipher the monuments they found there.

References

Florea, G. (2011). *Dava et oppidum. Débuts de la genèse urbaine en Europe au deuxième âge du Fer*. Cluj-Napoca: Centre d'Études Transylvaines.

Florea, G. (2017). Excavations in Sarmizegetusa Regia: Recent Results and Perspectives. In F. Mitthof, G. Schörner, eds., *Columna Traiani – Traianssäule. Siegesmonument und Kriegsbericht in Bildern. Beiträge der Tagung in Wien anlässlich des 1900. Jahrestages der Einweihung, 9.-12. Mai 2013*. Wien: Holzhausen Verlag, pp. 363-367.

Makkay, J. (1995). The treasures of Decebalus, *Oxford Journal of Archaeology*, 14(3), 1995, pp. 333-343.

Mateescu, R. (2017). Digging and Excavating at Sarmizegetusa Regia in the 19th and 20th Century. In F. Mitthof, G. Schörner, eds., *Columna Traiani – Trajanssäule. Siegesmonument und Kriegsbericht in Bildern. Beiträge der Tagung in Wien anlässlich des 1900. Jahrestages der Einweihung, 9.-12. Mai 2013*. Wien: Holzhausen Verlag, pp. 357-362.

Munteanu, L. (2004). Sur les découvertes monétaires de type koson. *Arheologia Moldovei*, XXV, 2002 (2004), pp. 253-270.

Munteanu, L. (2005). Quelques considérations concernant les découvertes des monnaies d'or de type Lysimaque dans la Dacie intracarpatique. In V. Cojocaru, ed., *Ethnic Contacts and Cultural Exchanges North and West of the Black Sea (from the Greek Colonization to the Ottoman Conquest)*. Iaşi: Trinitas, pp. 237-254.

Peţan, A. (2012). Coin finds at Grădiştea Muncelului during the excavation campaigns of 1803-1804. *Acta Musei Napocensis* 47-48/I, 2010-2011 (2012), pp. 81-90.

Peţan, A. (2016). The Dacian Fortress of Grădiştea Muncelului: from the Legend of the White King to its Identification with Sarmizegetusa Regia. *ReDIVA*, IV, 2016, pp. 65-98.

Peţan, A. (2018). *Sarmizegetusa Regia. 1. Redescoperirea cetăţii.* Alun: Dacica.

Stefan, A.S. (2005). *Les guerres daciques de Domitien et de Trajan: architecture militaire, topographie, images et histoire.* Rome: Ecole française de Rome, Rome.

Interdisciplinary research of the caves conducted by the Academy of Arts and Sciences in Cracow at the turn of 19th and 20th centuries[1]

Marzena Woźny
Archaeological Museum in Cracow – Poland
marzenawoz@wp.pl

Abstract

Established in 1872, the Academy of Learning in Cracow played an important role in the Polish science and culture at the turn of 19th and 20th centuries. This place provided patronage for diverse areas of scientific research, including archaeology. In this field, the Academy funded and promoted research in the caves of Galicia (one of the three annexed territories created at the end of the 18th century after the partitions of the Polish Kingdom by Russia, Prussia and Austria. Until 1918, Galicia constituted a part of, first the Austrian, and then the Austro-Hungarian monarchy). Three archaeologists from Warsaw and Cracow became particularly interested in the caves from Galicia: Count Jan Zawisza (1822-1887), Gotfryd Ossowski (1835-1897) and Włodzimierz Demetrykiewicz (1859-1937). This paper seeks to present the circumstances of the project of interdisciplinary research of the Galicians caves. In that project the archaeologists, geologists, anthropologists, botanists and historians were engaged.

Keywords: caves, the Academy of Arts and Sciences in Cracow, interdisciplinary research, 19th century, Poland

Résumé

L'Académie des Arts et des Sciences à Cracovie, fondée en 1872, a joué un rôle important dans la science et la culture polonaise au tournant du XIXe et du XXe siècle. Elle a parrainé diverses études scientifiques, y compris des recherches archéologiques. L'académie a financé des recherches dans les grottes de Galicie (anciens territoires du Royaume de Pologne, gouvernés par la monarchie autrichienne de la fin du XVIIIe siècle à 1918). Trois chercheurs de Varsovie et de Cracovie ont, en particulier, mené des recherches dans les grottes de Galicie et du Jura polonais : le comte Jan Zawisza (1822-1887), Gotfryd Ossowski (1835-1897) et Włodzimierz Demetrykiewicz (1859-1937). Cet article présente les circonstances de la création et les résultats d'un projet d'étude interdisciplinaire des grottes galiciennes, auquel, des archéologues, géologues, anthropologues, botanistes et historiens ont participé.

Mots-clés : grottes, Académie des Arts et des Sciences de Cracovie, recherche interdisciplinaire, XIX siècle, Pologne

The turn of the 20th century was the period of formation of modern archeology in Poland. At that time, the discipline was slowly gaining its place in the university system even if archaeology did not have a consolidated place among the branches of science. The creation and development of prehistoric archeology was connected with the progress of natural sciences since the very beginning. This progress later influenced the way the discipline was perceived and systematized among the branches of science. In 1865, John Lubbock (1834-1913), an English ethnologist and archeologist, in his famous work *Pre-historic Times: As Illustrated by Ancient Remains, and the Manners and Customs of Modern Savages* (1865), in which he divided the Stone Age into Paleolithic and Neolithic, noted that: 'Archeology forms, in fact, the link between geology and history' (as cited in Lech 1992: 275).

[1] This work has been prepared with the financial support of the Minister of Science and Higher Education in Poland – by the National Program for the Development of Humanities in 2017-2022 project number 11 H 16008784.

At this time, there was a debate about whether archaeology should be included in the natural sciences or humanities. In Poland, the study of prehistoric caves played a significant role in this discussion. When the Academy of Learning (hereafter AL) was established in 1872, two commissions dealing with archeology were established, including the Archeological Commission, dealing with archeology understood in an old, romantic way, and the Anthropological Commission, in which prehistoric archeology was practiced, with a natural-evolutionary approach. Leading representatives of Polish archeology of those times – Jan Nepomucen Sadowski (1814-1897), Izydor Kopernicki (1825-1891), Godfryd Ossowski (1835-1897), Adam Honory Kirkor (1818-1886) and Józef Łepkowski (1826-1894) – were associated with the activities of these commissions. The work of the Archeological Commission (in conjunction with the Faculty of History and Philosophy of the Academy) was, to a large extent, connected with issues related to art history and auxiliary history sciences. The Anthropological Commission, however, was subject to The Faculty of Mathematics and Natural Sciences. Its chairman was the president of the Academy, Professor Józef Majer (1808-1899), doctor and anthropologist, while its secretary as well as a founder and long-term editor of *Zbiór Wiadomości do Antropologii Krajowej (Collection of News for National Anthropology)* was Izydor Kopernicki, who also worked as an anthropologist and professor at the Jagiellonian University (UJ) (Talko-Hryncewicz 1923: 179-180; Nosek 1967: 40-44, 57-59; Antoniewicz 1974: 192; Abramowicz 1991: 64-67; Jednorowska 1996: 63; Woźny 2016: 226-227).

When setting up the Anthropological Commission it was assumed that the works undertaken by it would not duplicate the works of the Archeological Commission. In order to set the line between the scope of activities of both bodies, it was assumed that the Anthropological Commission would deal mainly with the examination of prehistoric cave sites from the Stone Age, while the excavation section of the Archeological Commission would deal with the remaining sites. However, it is worth mentioning that, in practice, it was impossible to maintain this distinction – although the Anthropological Commission put an emphasis on researching caves, excavations were also carried out on settlements and cemeteries from later periods on its behalf (Jednorowska 1996: 69).

Research on cave sediments has a 150-year tradition in Poland. The first excavations in the second half of the 19th century were carried out in the caves of the Polish Jura. The beginnings of Polish archeological research in caves are linked to Count Jan Zawisza (Figure 1). In 1871, he began his research in the Ojców caves and presented the results at the Congress of Anthropology and Prehistoric Archeology in Bologna (Zawisza and Przezdziecki 1873: 121-122; see Lech 2001: 129-133; 2006: 21). Zawisza and later Gotfryd Ossowski (then archaeologist working in Academy of Learning in Cracow) interpreted the cave stratifications in an attempt to find references to stratigraphic patterns created in Western Europe in them (Zawisza 1871: 54-58; 1873; 1874a; 1874b; 1876; 1882a; 1882b; Ossowski 1881; 1882; 1883; 1884; 1885; 1886; 1887).

The first serious examination for the stratigraphic sequence of cave sediments – based on the studies carried out on various sites – was presented by Édouard Lartet (1801-1871), a French archaeologist and geologist who conducted research mainly in the region of Dordogne in south-west France. Lartet sought to create a stratigraphic pattern for the Quaternary Period for archaeological purposes – the dating and sequencing sedimentation phases of the Stone Age (Lartet 1862). Lartet's pattern was later criticized by Gabriel de Mortillet (1821-1898), who proposed his own pattern for the Palaeolithic periodization based on the typology of archeological monuments (Mortillet 1869, 1873).

As I mentioned before, from the very beginning, the archeological studies of the caves were one of the key tasks in the scientific program of the AL Anthropological Commission. In the first period of its activity, it was carried out mainly by Godfryd Ossowski. He was a geologist, and a citizen of the Russian Empire. In the so-called Cracow period, he was delegated by the excavation section of the Archeological Commission of the AL to conduct excavations in Podolia and Pokuttya, studying,

among others, the Grand Barrow of Ryżanówka and the sites of Tripolye culture in Wasylkowce and Bilcze Złote (Figure 2; Ossowski 1888, 1891, 1892, 1895; see Nosek 1967: 45-51; Abramowicz 1991: 68, 72; Jednorowska 1996: 70-72; Lech 2002: 19-26; 2006: 24; Blombergowa 2005: 219-221, Kadrow and Trela-Kieferlig 2013).

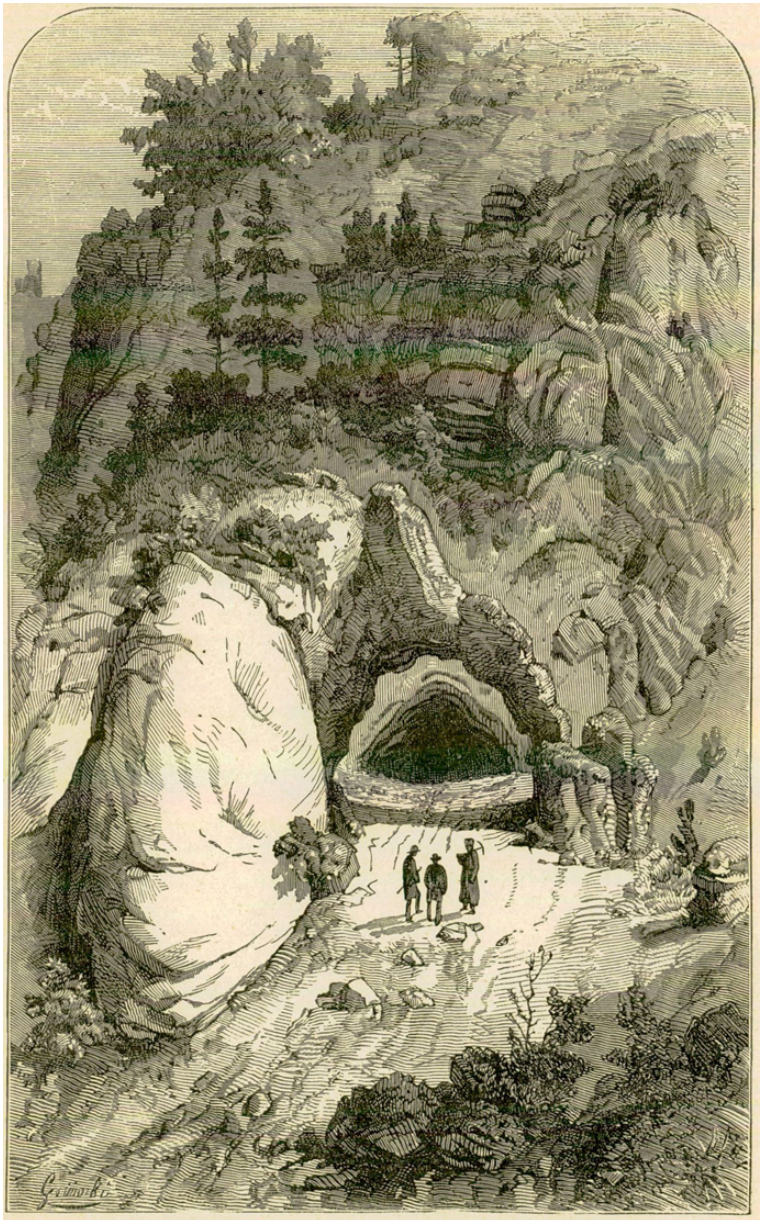


Figure 1. The Mammoth Cave in Ojców Jura. Drawning from the 'Wiadomości Archeologiczne' published by Count Jan Zawisza in 1874.

On the other hand, on behalf of the AL Anthropological Commission, Ossowski conducted extensive research on caves near Cracow, Ojców and in the Tatra Mountains. In 1879-1883, he conducted preliminary research in the Cave under the Mount Kopa Magury in the Tatra Mountains, as well as near Cracow (Ossowski 1882: 49-51; 1883: 80-87). His research in Mników, however, brought him the greatest publicity. He investigated several caves in this area. Ossowski excavated these caves in three different seasons, during which many monuments from various eras were acquired – from the Palaeolithic to modern times. A significant part of them were bone artifacts. The authenticity of these works, however, aroused doubts among scientists from Cracow and Europe (they were discussed by Gabriel de Mortillet, Josef Szombathy [1853-1943] and Matthäus Much [1832-1909], both from Vienna, among others). After several decades, it turned out that some of these objects were fake, and Ossowski was cheated by workers who threw their works onto the site he explored. However, before this high-profile case was clarified, a special committee was set up at AL in the 1890s to address the authenticity of the alleged monuments. Its members used, among others, an opinion of a Czech scientist Jan Nepomuk Woldřich (1834-1906), a professor of geology and paleontology in Prague. At his request, Ossowski sent several of these questionable artifacts to Vienna. Members of the Vienna Anthropological Society – Shombathy and Much – considered them to be fake. Woldřich himself, however, was convinced that they had been created in prehistoric times (*Sprawa wykopalisk mnikowskich...* 1885: 2; Demetrykiewicz 1929, 1930; see Woźny 2014: 95, 99).

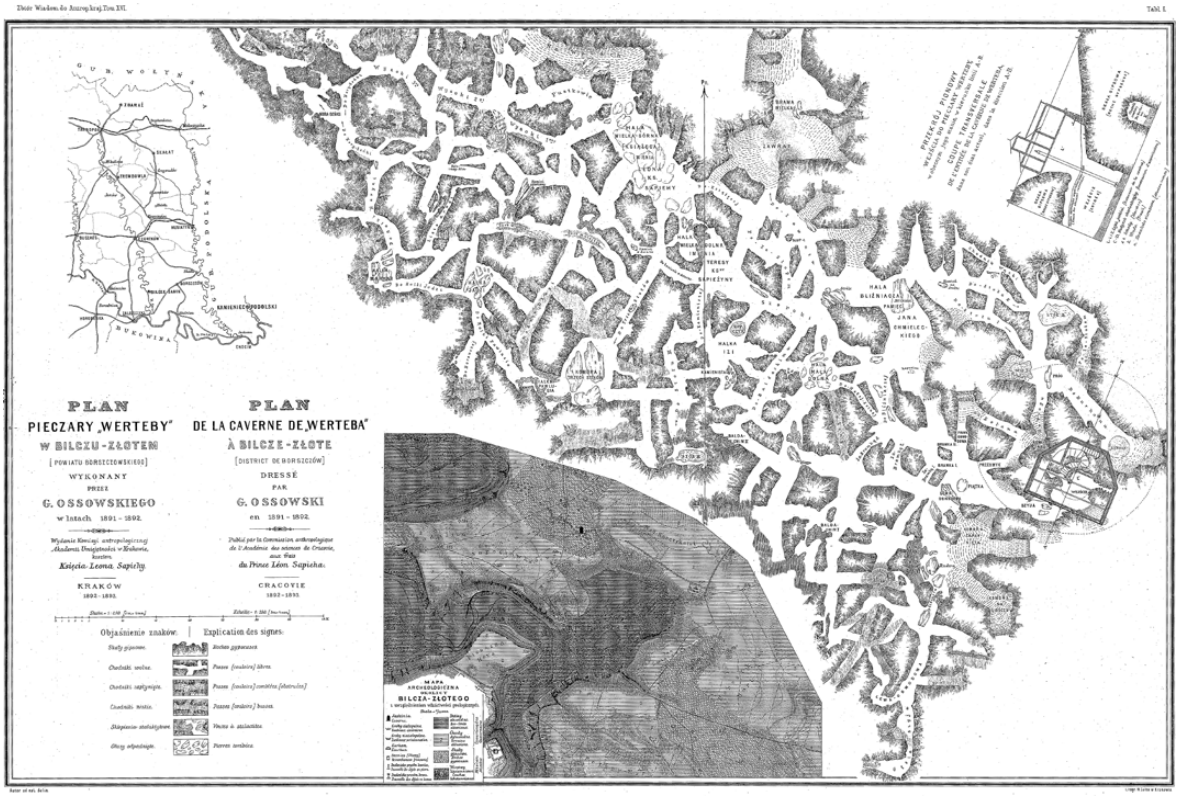


Figure 2. The map of the Werteba Cave in Podolia region, drawn by Gotfryd Ossowski in 1891-1892. From the collection of the Archaeological Museum in Cracow.

In the years 1879-1883, Ossowski undertook research in caves in the region of Cracow (Ossowski 1880; 1881; 1882; 1883) and in 1883-1886 in the region of Ojców (Ossowski 1884, 1885, 1886, 1887). He dug one of the caves in Wierzchów, 'Wierzchowska Górna', and 'Maszycka Cave' in Maszyce. The uniqueness of the discovery he made in 1883 in Maszycka Cave is based on the fact that it revealed material testimonies of a tragedy that took place in the cave 15-14 thousand years ago. Ossowski extracted fragments of skeletons (mainly skull bones) of at least 16 people, including 5 women, 3 men and several children. The damage visible on the bones indicates that the inhabitants of the cave fell victim to cannibals. Almost all the equipment of a Paleolithic hunter was preserved in the cave (Figure 3; Ossowski 1884: 70-85; see Kozłowski, Połtowicz-Bobak, Bobak and Terberger 2012).

Another scholar who was involved in cave research on behalf of the Academy of Learning, was Adam Honory Kirkor, who had previously worked in Vilnius. Unlike Ossowski, his studies of caves were rather random works. However, it should be emphasized that Kirkor was the first researcher to make studies of the Werteba Cave in Bilcze Złote (where he conducted small surveys in 1876-1878). He also tried to solve the issue of the authenticity of rock caves in Eastern Galicia, which bothered archeologists at that time (Kirkor 1876; 1879a; 1879b: 34-37; 1879c; see Nosek 1967: 52-57; Fajnhauz and Nosek 1966-1967; Abramowicz 1991: 66-67; Jednorowska 1996: 70-71; Blombergowa 2005: 218-219; Lech 2006: 19-20).

Research in the caves, carried out on behalf of AL, was continued by Demetrykiewicz at the turn of the 20th century. His work in this area was of a threefold nature. Firstly, he was delegated by the Academy to carry out excavation work. However, he also initiated the processing of materials stored in the AL Archaeological Museum (mainly Paleolithic and Neolithic) coming from research on cave sites. In addition, he also made effective efforts to acquire such monuments for the Museum's collection. It was also significant that Demetrykiewicz participated in activities aimed

Figure 3. Bone and antler artefacts from Maszycka Cave from the G. Ossowski's excavations in 1883. Collection of the Archaeological Museum in Cracow.

at protecting caves, as well as in the development of a program of interdisciplinary research on these objects, which was created in AL just before the outbreak of World War I (Woźny 2018: 290-294).

Demetrykiewicz conducted an important part of his work in Western Ukraine. On behalf of the AL Anthropological Commission, in 1898, 1904 and 1906 he investigated the interior of the Werteba Cave and the remains of the Tripolye cultural settlement located in the area of the palace park in Bilcze Złote, Borshchiv district. There he discovered traces of bonfires, human skeletons and animal bones, as well as ceramics, clay figures depicting human and animal figures, and flint and bone instruments (Kadrow ed. 2013; Woźny 2018: 165-169, 256-259). Demetrykiewicz also conducted works seeking to identify caves located in several towns in the Podolia region. He also studied artificial rock caves described in archeological literature (Demetrykiewicz 1903). Contrary to the opinions of earlier researchers, he stated that the traces of human activity that had been preserved to that day came from historical times.

At the turn of the 20th century, research was also carried out in Tatra Mountains caves. In 1881-82 they were visited by Ossowski (Ossowski 1882: 49-51; 1883: 80-87). The research carried out in the 1980s by Jan Gwalbert Pawlikowski (1860-1939), an economist, publicist, politician, and a mountaineer, was also of great importance for their recognition. In an article published in 1887 in *Pamiętnik Towarzystwa Tatrzańskiego* (*the Diary of the Tatra Society),* he described as many as 30 Tatra Mountains caves (Pawlikowski 1887).

AL became interested in the Tatra Mountains caves thanks to an invitation from the Tatra Mountains Museum. In 1908, they planned to start excavations in the cave under the Mount Kopa Magury. The idea of carrying out the research, which according to the first projects was to be conducted by Mariusz Zaruski (1867-1941), an amateur researcher, painter and mountaineer as well as a member of the Tatra Society, was presented to the AL by the Board of the Tatra Mountains Museum in Zakopane. Zaruski had worked on the cave before, but the Academy did not want to finance his research because he was not an archeologist. However, Demetrykiewicz went to the Tatra Mountains at the recommendation of the AL Anthropological Commission. The aim of his expedition was to find prehistoric traces in the cave. After arriving at Zakopane, Demetrykiewicz started studying the materials stored in the Tatra Mountains Museum, coming from earlier research. He believed that these materials had a scientific value for paleozoologists and geologists, but they did not have any archeological value. He carried out excavations in

Figure 4. Włodzimierz Demetrykiewicz in Kościeliska Valley in Tatra Mountains. 1909. From the collection of the Archaeological Museum in Cracow.

the cave in the summer of 1909 (Figure 4). He was accompanied by Wiktor Kuźniar (1879–1935), a geologist, and Eugeniusz Kiernik (1877–1921), a paleozoologist. During the research, Demetrykiewicz stated that the silt and the animal remains found in it originated from the 'Ice Age'. In the cave he found no traces of prehistoric man. However, he was convinced that the cave under the Mount Kopa Magury should become a subject of scientific interest for geologists and palaeontologists. At the meeting of the AL Anthropological Commission, he proposed to encourage the members of the Physiographic Commission to conduct research in it. His proposal was unanimously accepted by the Commission (*Sprawozdania...* 1910: IX-X, XII; see Jura 1955, Nosek 1967: 100-101; Woźny 2018: 267-269).

On behalf of the AL Anthropological Commission, interdisciplinary excavations were carried out in the Okiennik Cave in Skarżyce, Polish Jura in 1912. This research was carried out by a geologist, Kuźniar, together with Demetrykiewicz. In this cave the Paleolithic stratum and the early medieval strata were found. The results of this research were published in 1914 (*Sprawozdania...* 1914: IX; Demetrykiewicz and Kuźniar 1914).

Subsequent studies of caves, conducted on behalf of AL, were related to Leon Kozłowski (1892-1944), later professor of archeology in Lviv, and Prime Minister of Poland. Before World War I, he began his studies in Cracow and soon became one of the closest students of Professor Demetrykiewicz, and finally his informal assistant at the Archeological Museum of the AL (see Kozłowski and Sytnyk 2010). In 1913, he was given an opportunity to excavate on behalf of the AL at the Ojców Jura, in the Mammoth Cave, popularized by its earlier research by Count Jan Zawisza (Kozłowski 1922: 24-29; Nosek 1967: 61-62; Lech 2001: 129-134; Lech and Piotrowska 2006: 171-172). Kozłowski conducted research on a terrace situated in front of the cave. He found fragments of vessels and Neolithic tools in a layer of humus as well as animal bone remains and artifacts that he associated with the Magdalenian period while in a layer he described as 'diluvial'. He identified the layers he ascribed to the Magdalenian, Solutrean and Mousterian 'eras' on the terrace. He took samples from each of them in order to reconstruct the entire profile of the cave in the Museum of the Academy (Kozłowski 1922: 24-25, 28-29).

AL, as the most important Polish scientific institution of the turn of the 20th century, also attracted amateur researchers, who, as collaborators of the Academy, published their works in its publications, and who handed over excavation materials from their research to its collections. At that time, one of such researchers was Stanisław Jan Czarnowski (1847-1929), who donated a large amount of artifacts from Ojców caves to the Academy (Zaitz 1981: 18; Chochorowska 2001: 14). The Museum also received Zawisza's collection of archeological finds. First (in 1914), the collection was rented to the Academy thanks to the efforts of Leon Kozłowski. A few years later, in 1922, the finds were purchased by the Academy (see Dagnan-Ginter 1990: 2019; Woźny 2018: 233).

In the last years before the outbreak of World War I, AL was involved in the protection of Galician caves. At that time, this issue became a matter of concern and interest for the Austro-Hungarian Empire. The initiative to grant conservation protection to the caves came from the Ministry of Public Works in Vienna. This central, governmental project was adopted with great interest by the authorities and scientific and conservation institutions in Galicia. In November 1913, the Governorate in Lviv turned to AL for protection of the caves. The Board of the Academy entrusted Demetrykiewicz with the issue of cave protection. Demetrykiewicz prepared an extensive list of Galician caves. He identified three groups of them: the first one included 56 caves located near Cracow (they were best studied), the second one – 22 in the Tatra Mountains (Demetrykiewicz believed that they contained almost no traces of prehistoric man), and the third one, which included 14 caves from the south-eastern part of Galicia (the areas of present western Ukraine). Demetrykiewicz also wrote a memorial in which he expressed his conviction that it was in the interest of archeology, anthropology and natural sciences to ensure that the interiors of the caves are not violated in any way before their scientific recognition. He strongly condemned the exploitation of silt for industry or agriculture, as well as its destruction by irresponsible tourists and amateur archeologists. He demanded a ban on any digging of silts, and only specialists would be allowed to carry out the excavations. The AL authorities, after becoming acquainted with this memorial, decided to start efforts to undertake research in Galician caves. They wanted to carry it out in several of them, selected from among three groups (near-Cracow, Tatra Mountains, and Podolia group). AL prepared an interdisciplinary research project entitled *The Program of the Most Urgent Research in Galician Caves Intended by the Academy of Learning, Prepared by Natural Scientists and Archeologists*. According to his assumptions, research in caves was to be primarily of a natural character – 'speleobotanical, speleozoological and paleozoological'. In the group of Tatra Mountains caves it was proposed to continue the research carried out there by the AL Physiographic Commission in the past – the study was supposed to be of paleozoological and botanical nature. Geological, paleontological, 'speleobotanical' and 'speleozoological' studies were planned in the group of Podolia caves. The Werteba Cave was the only one of the caves listed in the program to be subject to archeological research. However, due to the outbreak of World War I, this research was not carried out at that time (see Woźny 2018: 290-294).

In the upper Vistula basin, within the Polish Jura and Tatra Mountains, there is a number of caves, which had been of interest to archeologists, geologists and paleozoologists since the 1870s and 1880s. AL operating in these areas organized and financed a number of studies in these caves, as well as in the caves located in the Podolia region (in the middle Dniester basin), in the present western Ukraine. Not only prehistorians but also representatives of other scientific disciplines took part in this research. The Academy was also involved in the protection of cave sites and prepared a project of a large-scale research of interdisciplinary character. This project, outlined at the turn of the 19th and 20th centuries, was partially implemented only one hundred years later.

References

Abramowicz, A. (1991). *Historia archeologii polskiej XIX i XX wiek*, Warszawa – Łódź.

Antoniewicz, W. (1974). Archeologia, in *Polska Akademia Umiejętności 1872-1952. Nauki humanistyczne i społeczne. Materiały sesji jubileuszowej. Kraków 3-4 V 1973*, Wrocław, pp. 189-204.

Blombergowa, M.M. (2005). Badania archeologiczne Polaków na Podolu prowadzone w XIX i na początku XX wieku. *Analecta*, 14/1-2, pp. 217-226.
Chochorowska, E. (2001). Zbiory krakowskiego Muzeum Archeologicznego dawniej i dziś. *Materiały Archeologiczne*, 32, pp. 13-18.
Dagnan-Ginter, A. (1990). Działalność Włodzimierza Demetrykiewicza w zakresie gromadzenia zbiorów archeologicznych. *Materiały Archeologiczne*, 25, pp. 218-220.
Demetrykiewicz, W. 1903. Groty wykute w skałach Galicji wschodniej, pod względem archeologicznym (z 6 tablicami). *Materiały Antropologiczno-Archeologiczne i Etnograficzne*, 6, pp. 51-91.
Demetrykiewicz, W. (1929). Nowe oświetlenie autentyczności wykopalisk mnikowskich. *Sprawozdania z czynności i posiedzeń Polskiej Akademii Umiejętności*, 34/6, p. 19.
Demetrykiewicz, W. (1930). Nowe oświetlenie autentyczności wykopalisk mnikowskich II. *Sprawozdania z czynności i posiedzeń Polskiej Akademii Umiejętności*, 35/5, pp. 21-22.
Demetrykiewicz, W. and Kuźniar, W. (1914). Najstarszy paleolit na ziemiach polskich oraz inne wykopaliska odkryte w jaskini Okiennik koło wsi Skarzyce w pow. będzińskim, gub. Piotrkowskiej. *Materiały Antropologiczno-Archeologiczne i Etnograficzne*, 13, pp. 10-43.
Fajnhauz, D. and Nosek, S. (1966-1967). Kirkor Adam Honory, in *Polski Słownik Biograficzny*, 13, pp. 475-479.
Jednorowska, Z. (1996). Dwadzieścia lat działalności Sekcji Wykopalisk Komisji Archeologicznej Akademii Umiejętności (1873-1892). *Rocznik Biblioteki PAN w Krakowie* 41, pp. 63-74.
Jura, A. (1955). Grota Magury w Tatrach (1460 m), najwyżej w Polsce położona siedziba człowieka epoki lodowej. *Światowit*, 21, pp. 81-124.
Kadrow, S. (ed.), (2013). *Bilcze Złote. Materials of the Tripolye culture from the Werteba and the Ogród sites*. Kraków.
Kadrow, S. and Trela-Kieferlig, E. (2013). History and the present state of research, in S. Kadrow (Ed.). *Bilcze Złote. Materials of the Tripolye culture from the Werteba and the Ogród sites*. Kraków, pp. 9-11.
Kirkor, A.H. (1876). O grobach kamiennych na Podolu galicyjskiem. *Zbiór Wiadomości do Antropologii Krajowej*, 1, pp. 17-35.
Kirkor, A.H. (1879a). Sprawozdanie z poszukiwań w grocie Lisionki pod Czerną. *Zbiór Wiadomości do Antropologii Krajowej*, 3, pp. 8-11.
Kirkor, A.H. (1879b). Sprawozdanie i wykaz zabytków złożonych w Akademii Umiejętności z wycieczki archeologiczno-antropologicznej w roku 1878. *Zbiór Wiadomości do Antropologii Krajowej*, 3, pp. 12-45.
Kirkor, A.H. (1879b). Bołdy w Stryjskiem. *Zbiór Wiadomości do Antropologii Krajowej*, 3, pp. 46-61.
Kozłowski, L. (1922). *Starsza epoka kamienna w Polsce (Paleolit)*. Poznań.
Kozłowski, S.K. and Sytnyk, O., (Eds). (2010). *Profesor Leon Kozłowski*. Lwów-Warszawa.
Kozłowski, S.K., Połtowicz-Bobak, M., Bobak, D. and Terberger, T. (2012). New information from Maszycka Cave and the Late Glacial recolonization of Central Europe. *Quaternary International*, 272-273, pp. 288-296.
Lech, J. (1992). Prehistoria i przemiany światopoglądowe w Europie. *Archeologia Polski*, 37/1-2, pp. 265-285.
Lech, J. (2001). Archeologia Jury Ojcowskiej w zarysie, in J. Lech and J. Partyka (Eds). Z archeologii Ukrainy i Jury Ojcowskiej. Ojców, pp. 127-182.
Lech, J. (2002). Początek archeologii w kręgu polskiego Towarzystwa Naukowego w Toruniu: 1875-1881, in B. Wawrzykowska (Ed.). Archeologia toruńska. Historia i teraźniejszość. Toruń, pp. 17-30.
Lech, J. (2006). Z badań polsko-ukraińskich związków w archeologii do II wojny światowej. *Przegląd Archeologiczny*, 54, pp. 5-59.
Lech, J. and Piotrowska, D. (2006). Leon Kozłowski i jego związki z Jurą Ojcowską, in J. Lech and J. Partyka (Eds). Jura Ojcowska w pradziejach i w początkach państwa polskiego. Ojców, pp. 159-192.
Lartet, É. (1862). New Researches respecting the Co-existence of Man with the Great Fossil Mammals, regarded as Characteristic of the latest Geological Period. *Natural History Review*, 2/5, pp. 53-71.
Lubbock, J. (1865). Pre-historic Times: As Illustrated by Ancient Remains, and the Manners and Customs of Modern Savages. Edinburgh.

Mortillet, G. de (1869). Essai d'une classification des cavernes et des stations sous abri, fondée sur les produits de l'industrie humaine. *Matériaux pour l'histoire primitive et naturelle de l'homme*, 5, pp. 172-179.

Mortillet, G. de (1873). Classification de l'Âge de la pierre, *Congrès International d'Anthropologie et d'Archéologie Préhistoriques. Compte rendu de la 6e Session à Bruxelles, 1872,* Bruxelles, pp. 432-444.

Nosek, S. (1967). Zarys historii badań archeologicznych w Małopolsce. Wrocław.

Ossowski, G. (1880). Sprawozdanie z badań geologiczno-antropologicznych dokonanych w r. 1879 w jaskiniach okolic Krakowa. *Zbiór Wiadomości do Antropologii Krajowej*, 4, pp. 35-56.

Ossowski, G. (1881). Drugie sprawozdanie z badań geologiczno-antropologicznych w jaskiniach okolic Krakowa dokonanych w r. 1880. *Zbiór Wiadomości do Antropologii Krajowej*, 5, pp. 18-44.

Ossowski, G. (1882). Trzecie sprawozdanie z badań antropologiczno-archeologicznych w jaskiniach okolic Krakowa dokonanych w r. 1881. *Zbiór Wiadomości do Antropologii* Krajowej, 6, pp. 28-51.

Ossowski, G. (1883). Czwarte sprawozdanie z badań antropologiczno-archeologicznych w jaskiniach okolic Krakowa dokonanych w r. 1882 oraz rozpoznanie przygotowawcze do badań jaskiń tatrzańskich, z dwiema tablicami. *Zbiór Wiadomości do Antropologii Krajowej*, 7, pp. 66-88.

Ossowski, G. (1884). Sprawozdanie z badań paleo-etnologicznych w jaskiniach okolic Ojcowa dokonanych w r. 1883. *Zbiór Wiadomości do Antropologii Krajowej*, 7, pp. 61-85.

Ossowski, G. (1885). Sprawozdanie z badań paleo-etnologicznych w jaskiniach okolic Ojcowa dokonanych w roku 1884. *Zbiór Wiadomości do Antropologii Krajowej*, 9, pp. 3-13.

Ossowski, G. (1886). Sprawozdanie z badań paleo-etnologicznych w jaskiniach okolic Ojcowa dokonanych w roku 1885. *Zbiór Wiadomości do Antropologii Krajowej*, 10, pp. 3-14.

Ossowski, G. (1887). Sprawozdanie z badań paleoetnologicznych w jaskiniach okolic Ojcowa dokonanych w roku 1886. *Zbiór Wiadomości do Antropologii Krajowej*, 11, pp. 13-31.

Ossowski, G. (1888). Wielki Kurhan Ryżanowski według badań dokonanych w latach 1884 i 1887/ Grand Kourhan de Ryżanówka d'après les recherches faites en 1884 et 1887. Kraków.

Ossowski, G. (1891). Sprawozdanie drugie z wycieczki paleoetnologicznej po Galicji. *Zbiór Wiadomości do Antropologii Krajowej*, 15, pp. 2-21.

Ossowski, G. (1892). Sprawozdanie trzecie z wycieczki paleoetnologicznej po Galicji. *Zbiór Wiadomości do Antropologii Krajowej*, 16, pp. 63-95.

Ossowski, G. (1895). Sprawozdanie czwarte z wycieczki paleoetnologicznej po Galicji. *Zbiór Wiadomości do Antropologii Krajowej*, 18, pp. 1-28.

Pawlikowski, J.G. (1887). Podziemne kościeliska. *Pamiętnik Towarzystwa Tatrzańskiego*, 11, pp. 33-48.

Sprawa wykopalisk mnikowskich... (1885). Sprawa wykopalisk mnikowskich: dodatek do tomu IXgo Zbioru wiadomości do Antropologii krajowej wydawanego staraniem Komisyi Antropologicznej Akademii Umiejętności w Krakowie. Kraków.

Sprawozdania... (1910). Sprawozdania z posiedzeń Komisji odbytych w roku 1908 i 1909. *Materiały Antropologiczno-Archeologiczne i Etnograficzne*, 11, pp. VIII-XIII.

Sprawozdania... (1914). Sprawozdania z posiedzeń Komisji Antropologicznej odbytych w r. 1912 i 1913. *Materiały Antropologiczno-Archeologiczne i Etnograficzne*, 13, pp. VIII-XXI.

Talko-Hryncewicz, J. (1923). Z moich wspomnień o dawnych archeologach. *Wiadomości Archeologiczne*, 8, pp. 176-190.

Woźny, M. (2014). Kontakty archeologów krakowskich z nauką czeską na przełomie XIX i XX wieku. *Acta Musei Moraviae, Scientiae sociales*, 99/1, pp. 87-104.

Woźny, M. (2016). Archeologia w Towarzystwie Naukowym Krakowskim, in J. Wyrozumski (Ed.). Towarzystwo Naukowe Krakowskie w 200-lecie założenia (1815-2015). Materiały konferencji naukowej 9-10 grudnia 2015. Kraków, pp. 209-227 and illustrations.

Woźny, M. (2018). Włodzimierz Demetrykiewicz (1859-1937). Prehistoryk z przełomu epok. Kraków.

Zaitz, M. (1981). Zestawienie ważniejszych wydarzeń z historii Muzeum Archeologicznego w Krakowie. *Materiały Archeologiczne*, 21, pp. 16-23.

Zawisza, J. (1871). Poszukiwania archeologiczne Jana Zawiszy. *Biblioteka Warszawska*, 1871/4, pp. 40-58.

Zawisza, J. (1873). Niedźwiedź jaskiniowy (ursus spelaeus) z Jaskini Łokietkowskiej w Ojcowie. *Wiadomości Archeologiczne*, 1, pp. 1-7.

Zawisza, J. (1874a). Jaskinia Mamuta w dolinie Wierszchowskiej w okolicy Ojcowa i Krakowa położona. *Wiadomości Archeologiczne*, 2, pp. 5-16 and III-VII.
Zawisza, J. (1874b). Wierszchowska jaskinia zwiedzana w 1871, 72, 73 r. *Wiadomości Archeologiczne*, 2, pp. 17-23 and VIII-XI.
Zawisza, J. (1876). Dalsze poszukiwania w Jaskini Mamuta w czerwcu 1874. *Wiadomości Archeologiczne*, 3, pp. s. 125-146.
Zawisza, J. (1882a). Poszukiwania w Jaskini Mamuta 1877 i 1878. *Wiadomości Archeologiczne*, 4, pp. 1-30.
Zawisza, J. (1882b). Ostatnie poszukiwania w Jaskini Mamuta. *Wiadomości Archeologiczne*, 4, pp. 167-175.
Zawisza, J. and Przezdziecki, A. (1873). Sur les cavernes ossifères de la Pologne. *Congrès International d'Anthropologie et d'Archéologie Préhistoriques. Compte rendu de la Cinquième Session à Bologne 1871*. Bologne, pp. 121-123.

Interdisciplinarity and institutions. The case of Italian prehistoric archaeology (1875-1954)

Massimo Tarantini
Soprintendenza archeologia, belle arti e paesaggio, Firenze – Italy
massimo.tarantini@beniculturali.it

Abstract

This article deals with the crucial role of institutions in scientific dynamics. In particular, it addresses the relationships between institutionalisation processes and interdisciplinarity using a case study on a national scale. The discussion is based on the assumption that institutionalisation processes are crucial moments for the definition of disciplinary boundaries and the approval of certain interdisciplinary alliances and collaborations at the expense of others.

The case study involves Italian prehistoric archaeology in the period 1875-1954. The institutionalisation processes concern the principal Italian institutions of prehistoric archaeology: the national 'prehistoric-ethnographic' museum in Rome, the Committee for Research in Human Palaeontology, the Italian Institute of Human Palaeontology and the Italian Institute of Prehistory and Protohistory. The relationships among geology, palaeontology, and prehistoric archaeology will be reviewed, with also a brief reference to anthropology.

Keywords: Interdisciplinarity, Italy, prehistory, institutions, disciplinary boundaries

Résumé

Cet article porte sur le rôle clé joué par les institutions dans les dynamiques scientifiques. En particulier, les relations entre processus d'institutionnalisation et interdisciplinarité sont ici abordées à partir d'une étude de cas nationale. Le point de départ est l'hypothèse que les processus d'institutionnalisation sont décisifs dans la définition des frontières disciplinaires et pour déterminer le succès de certaines alliances interdisciplinaires.

L'étude de cas présentée ici est celle de l'archéologie préhistorique italienne de 1875 à 1954. Les processus d'institutionnalisation abordés sont ceux relatifs aux principales institutions nationales dans le domaine de l'archéologie préhistorique: le Musée national préhistorique-ethnographique de Rome, le Comité pour les recherches de paléontologie humaine, l'Institut italien de paléontologie humaine et l'Institut italien de Préhistoire et Protohistoire. Les relations entre géologie, paléontologie et archéologie préhistorique sont envisagées, avec une brève mention également à l'anthropologie.

Mots-clés : Interdisciplinarité, Italie, préhistoire, institutions, frontières disciplinaires

1. Looking at institutions

In order to explore the process of incorporating (or not) other disciplines into archaeology, we address here the role of institutional dynamics. The history of science has emphasized the importance of the places of knowledge, demonstrating that scientific ideas are 'embedded into the fleshly forms of human culture and attached to particular times and places' (Ophir and Shapin 1991, p. 3). As to concern scientific institutions, they are the principal loci for the production, reproduction, and diffusion of scientific knowledge. Furthermore, they are crucial instruments for stabilising research networks, acquiring economic resources, and creating tools for the diffusion of scientific knowledge (specialised journals) (Blanckaert 1995, pp. 39-42).

The creation of new institutional bases is also essential for the appearance of new objects of science, and therefore both for the affirmation of new disciplines and for the configuration of their specific scientific program. In this perspective, it is not surprising – to cite again Ophir and Shapin (1991, p. 15) – that 'struggle over divergent intellectual programs constantly involves negotiation and conflict over places of knowledge'.

Moving from these premises, this article considers the relationships between institutionalisation processes and interdisciplinarity via the case study of Italian prehistoric archaeology. The discussion is based on the assumption that institutionalisation processes are crucial moments for the definition of disciplinary boundaries and the approval of certain interdisciplinary alliances and collaborations at the expense of others.

The case study of Italy is particularly interesting because Italian prehistoric archaeology was for a long time subjected to a powerful tension between the humanistic and naturalistic approaches; this situation is clearly reflected in all of its institutional vicissitudes.

For the sake of clarity and brevity I will concentrate on several key moments in the period 1875-1954, and I will limit the discussion to the relationships among geology, palaeontology, and prehistoric archaeology, with only a brief reference to anthropology. With the word 'institution' I mean museums, chairs in universities and scientific societies.

2. The institutionalisation of prehistory

The institutionalisation of prehistory occurred very early in Italy (Tarantini 2012). In fact, a national 'prehistoric-ethnographic' museum was created in 1875, and the world's first permanent university chair in prehistory (under the title of 'Palethnology') was established in Rome in 1877. Both institutions were entrusted to Luigi Pigorini (1842-1925) (Figure 1).

Figure 1. Luigi Pigorini, director of the National Prehistoric-ethnographic Museum created in Rome in 1875 and professor of Palethnology from 1877 onwards (Archive of the Museo Archeologico Nazionale di Parma).

The foundation of these institutions was made possible by a series of fortuitous historical factors (the administrative centralisation of the newly unified Italy, political interest in enhancing the pre-Roman Italic identity, the dismemberment of the large museum created in Rome by the Jesuit Athanasius Kircher, etc.), but what is most pertinent to this discussion are the arguments employed to justify the foundation of the prehistoric-ethnographic museum.

In order to fully understand these arguments, it is necessary to know that:

a) geologists played a decisive role in the birth of prehistoric studies in Italy. It is worth recalling that geology was the 'big science' of the time, and

several geologists engaged in prehistoric studies were also prominent scientists in Italy in this period. Consequently, their activity played a crucial role in bringing prehistory quickly to the centre of the scientific debate. For example, the first conference session dedicated to prehistoric archaeology took place in 1865 during a meeting of the Italian Society of Natural Sciences, under the direction of geologists such as Antonio Stoppani (1824-1891) and Giovanni Capellini (1833-1922). It was on that occasion, as is known, that the *Congrès international d'archéologie et d'anthropologie préhistoriques* (CIAAP) was founded. It was also Giovanni Capellini, a professor at the University of Bologna, who organized the fifth CIAAP in 1871, in Italy. This congress was a real event, attended by the crown prince and the Minister of Education, and as happened in other countries (Babes and Kaeser 2009) it proved decisive for the promotion of human prehistory to the subject of a nationally recognized scientific discourse;

b) the need for an interdisciplinary approach was clearly perceived. To cite only one example, upon starting his research on the Bronze Age *terremare* in 1861 Pellegrino Strobel (1821-1895), a professor of natural sciences in Parma and a protagonist in the birth of prehistoric archaeology in Italy, felt the explicit need to collaborate with an archaeologist in the person of the young Luigi Pigorini. Nevertheless, some geologists viewed prehistoric studies as two sub-fields distinguished by methods and disciplinary competencies: a more recent period which could be investigated with the tools of history and archaeology, and an older period which could be interpreted only in the light of geo-paleontological studies. In short, there was no space for a discipline dedicated specifically to human prehistory.

In 1875 Pigorini, writing to the Minister of Education Ruggiero Bonghi, proposed the foundation of a new museum: 'Leaving the prehistoric collections in the hands of the geologists, on one side, and the archaeologists, on the other, has in my opinion inhibited the realisation of their full value. The geologists and archaeologists considered those collections from opposite points of view [...] and rarely did they take the trouble to apply them towards the advancement of comparative ethnography.' (cit. in Bassani 1977). The same concept was later repeated by Bonghi in the introduction to the decree that established the new museum: 'it is necessary that palethnological and ethnographical research be not wholly entrusted to geologists on the one hand, and to archaeologists on the other' (Bonghi 1875).

Pigorini referred to the Swiss and Danish comparative models and was certainly not alone in criticizing the weight of geology in prehistoric studies. Alexandre Bertrand (1820-1902), for example, expressed similar opinions in the 1874 CIAAP in Stockholm: 'the preponderant influence of geologists in the movement of prehistoric sciences has had the unfortunate result of introducing into the facts of human development a method and habits that are not applicable' (cit. in Lehoerff 2009 p. 1117; our translation). However, in the context in which they were formulated, Pigorini's statements seem essentially aimed at justifying the birth of a new academic discipline. As a matter of fact, he proposed a definition for 'palethnology' which explicitly distanced the field from two disciplines already structured at the academic level: geology and archaeology. The specious nature of this position is clear if we consider that: a) Pigorini actually used comparative ethnography almost exclusively in his university courses and in outreach works, and not in the practice of research; b) alongside geology, Pigorini cited archaeology as a discipline from which prehistory had to separate itself, but in his research Pigorini supported the legitimacy of palethnology as an autonomous science only by using archaeological data (Cupitò and Paltineri 2014) – after all, he was an archaeologist and numismatist by training; c) in his subsequent historiographical works Pigorini decisively downplayed the role of geologists in order to further legitimate a genealogy of palethnology without direct links to geology (Tarantini 2013).

The consequences of this division between prehistory and geology were soon felt. In 1877 Pellegrino Strobel was compelled to protest in public about an article to be published in the recently (1875) founded *Bullettino di paletnologia italiana,* the first journal devoted to the prehistory

of one nation: 'Whoever wishes to reproach me for having written more about geology and palaeontology than about palethnology in a journal of prehistory, I ask him to define for me clearly the boundary between the two sciences' (Strobel 1877). Such a protest, tacitly addressed to Pigorini (one of the directors of the *Bullettino*), was unthinkable just a few years earlier and demonstrates that prehistory had gained its autonomy by drawing a precise disciplinary boundary with geology and palaeontology. The creation of the new academic field thus acted as a brake on several interdisciplinary collaborations and certainly contributed, along with other more general factors (Kaeser 2006), to a certain estrangement from prehistoric research by Italian geologists.

The creation of the prehistoric-ethnographic museum in Rome on the basis of palethnology as comparative ethnography also marked the 'liberation' of palethnology from anthropology, when it seemed that prehistory could enter into its own. In 1870 the *Società Italiana di Antropologia e Etnologia* and its journal (the *Archivio per l'Antropologia e l'Etnologia*) were founded in Florence by Paolo Mantegazza (1831-1910). Taking as a model the *Anthropologie generale* of Paul Broca, Mantegazza set out with the aim of making anthropology 'the natural history of man', giving unity to all of those disciplines which studied 'some parts of man' but not 'the whole man' (Landucci 1987). Thus both the physical and cultural characteristics of peoples, in their history and prehistory, were included in the domain of anthropology. No wonder, then, that prehistoric scholars, especially geologists and naturalists, played a prominent role in the Society; the *Archivio* immediately became an essential tool for the dissemination of prehistoric research. Pigorini himself noted that it filled a void (Tarantini 2012).

This situation changed after the foundation of the museum in Rome. In 1877 a public dispute exploded between Mantegazza and Pigorini over the place of ethnographic collections: the former claimed the ethnological collections for the Florentine museum ('anthropology without ethnology is a word without meaning' he wrote, recalling the model of the French and English museums), while the latter responded by recalling the principles of comparative ethnography and the example of the museums of Copenhagen, Stockholm and Berlin (Bassani 1977). In the end, the clash reflected tensions associated with the definition of disciplinary boundaries.

3. The controversy on the Upper Paleolithic and the foundation of Human Palaeontology

The question of the definition of 'palethnology' in opposition to the geo-palaeontological sciences remained a constant in Pigorini's work, as fully demonstrated by his historiographical works (already mentioned above) and by the controversy on the existence of the Upper Paleolithic in Italy at the beginning of the 20th century. I will now discuss this controversy in some detail.

A premise is needed. Thanks to his institutional position, Pigorini played a dominant role in Italian prehistory. Although his research interest was the Bronze Age, he nonetheless waded into debates about earlier periods: in particular, between 1886 and 1888 he denied the existence of the Upper Paleolithic in Italy, openly contradicting the unilinear and universal sequence established by Gabriel De Mortillet (Tarantini 2000). This interpretation was repeated several times, particularly in several synthetic papers published at the beginning of the twentieth century (Pigorini 1902, 1903), but it was heavily criticized by European colleagues. Salomon Reinach (1903) caustically asked in *L'Anthropologie*, 'Would you like a prehistoric novel? Here you are'.

In Italy, however, Pigorini's institutional weight made it more difficult to formulate open criticisms. In 1904, for example, the excavations at Grotta Romanelli were published, with lithic industries attributed to the Upper Paleolithic and dated to the last interglaciation thanks to the faunal study performed by the palaeontologist Ettore Regalia (1842-1913). Regalia's study was particularly sound and connected directly to the broad renewal of ideas introduced by the works of the German

geologist Albrecht Penck, known to Regalia through the synthesis of Hugo Obermaier (1904). The German geologist had in fact highlighted a tundra – forest – steppe – tundra climatic oscillation starting from the top of the glaciation then called Riss. The palaeontological remains thus became a tool of chronology insofar as they allowed paleoclimatic reconstruction. Consequently Regalia attributed some levels of Grotta Romanelli to an interglacial phase thanks to the identification of a steppe-fauna association. But Pigorini's response was categorical: in a harshly-worded review (Pigorini 1904), he declared that he would not even 'entertain' the data derived from the faunal study to date an archaeological layer.

The debate was revived in 1911 by Aldobrandino Mochi (1875-1931) (Figure 2), a recently nominated professor of anthropology in Florence. Mochi approached the question of the Upper Paleolithic using the same palaeontological premises as Regalia, but once again Pigorini mounted a public challenge. During a meeting of the Italian Society for the Advacement of Sciences in the same year, Mochi showed 'how the various Italian Palaeolithic horizons can be dated with the criteria of the Quaternary climatic variations caused by glaciation, and therefore with the criteria of the faunal sequence'. Pigorini, on the contrary, intervened to repeat his belief in 'the advisability of applying archaeological criteria, rather than palaeontological criteria, to palethnology' (Atti SIPS 1912). This statement represented a complete closure to the natural sciences.

Pigorini's resistance to accepting an interdisciplinary approach is connected to his rejection of non-archaeological data in the dating of archaeological layers. It resembles the mechanism recently pointed out by Geraldine Delley (2016) to explain the slow acceptance of radiocarbon dates by archaeologists.

Pigorini's reaction made it clear that a different research project on the Palaeolithic, founded on collaboration with the natural sciences, needed to have an institutional basis. With this precise purpose in 1913 the *Comitato per le ricerche di Paleontologia Umana* (Committee for Research in Human Paleontology, CRHP) was founded by Mochi himself along with the physicist Gian Alberto Blanc (1879-1966). The CRHP looked to the *Institut de Paléontologie Humaine* in Paris in every way, starting from its name, but there was an important difference: while the Parisian institute was programmatically configured from the start as an autonomous entity (Hurel 2007, pp. 205-221),

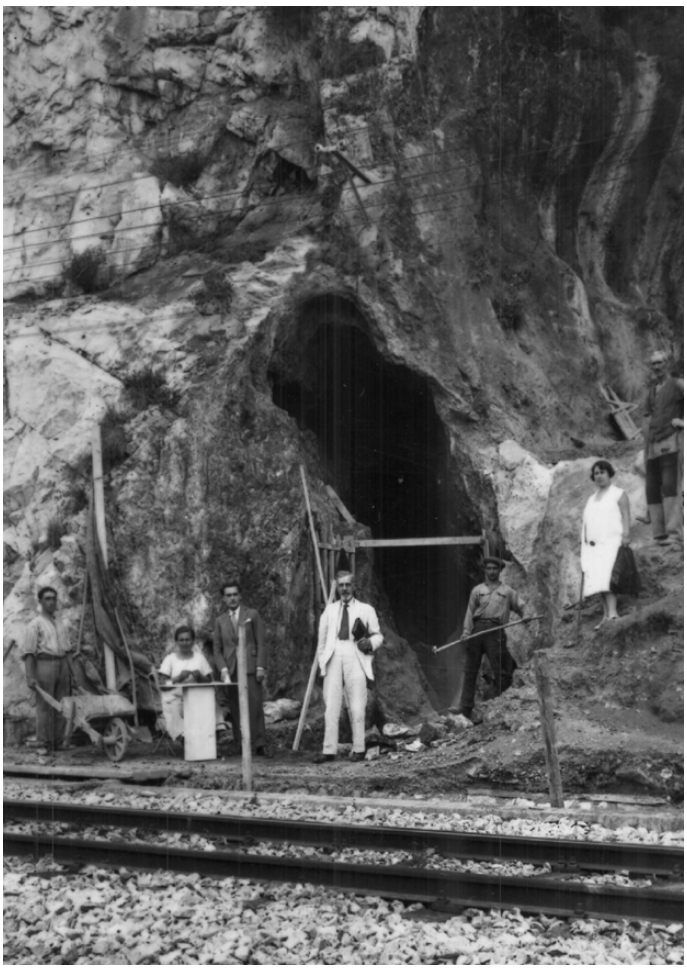


Figure 2. Aldobrandino Mochi (dressed in white) during the 1928 excavation at Balzi Rossi caves, led by the Italian Institute of Human Palaeontology, founded in Florence in 1927 (Archive of the Istituto Italiano di Preistoria e Protostoria, Florence).

the CRHP relied on the structures of the *Società Italiana di Antropologia ed Etnologia* and its journal, the *Archivio per l'Antropologia e l'Etnologia,* where all of the results of its research were published (Tarantini and Parenti 2009). The primary objective of the CRHP was to focalise on the same problem the attention of institutions and scholars from various branches of the natural sciences which 'until then had been extraneous to everything pertinent to the study of Quaternary man' (Blanc 1931, p. 19). From the start the CRHP also sought to equip itself with the economic means to carry out a programme of field research designed to resolve the problems associated with knowledge of the Palaeolithic in Italy.

According to the Committee's program, the problems pertaining to the Italian Paleolithic were conceived as 'problems of great importance for archaeologists in general, and especially for palethnologists, [but they require] the data provided by Palaeontology, Physical Geography, and Geology for their solution. Therefore [...] Italian naturalists should be given the means to address these problems directly and actively' (CRHP Program, in: Modigliani 1914). Thus the main reason for the foundation of the CRHP was to create the conditions that would allow these sciences to be incorporated into prehistoric archaeology, including the economic resources needed for field research.

The CRHP's interdisciplinary perspective can also be explained in the light of the wider Italian scientific context. The same years saw a need to precisely delineate the spheres of competency of several fields, a sign of increasing specialisation. A few years earlier Mochi had formalized his own taxonomic conception of the ethno-anthropological sciences, in which each of the individual fields (geography, physical anthropology, ethnography, prehistory, linguistics, etc.) had its own identity and autonomy (De Risi 1995). The trend towards specialisation, however, in turn seemed to fuel the demand for interdisciplinary coordination, as attested especially by the birth of the Italian Society for the Advancement of Science (ISAS), founded in 1906 to 'correct the tendency towards excessive specialisation by bringing together experts in different sciences' as part of a 'battle against the artificial divisions of science' that were making it ever more difficult to create holistic views (Casella 2000).

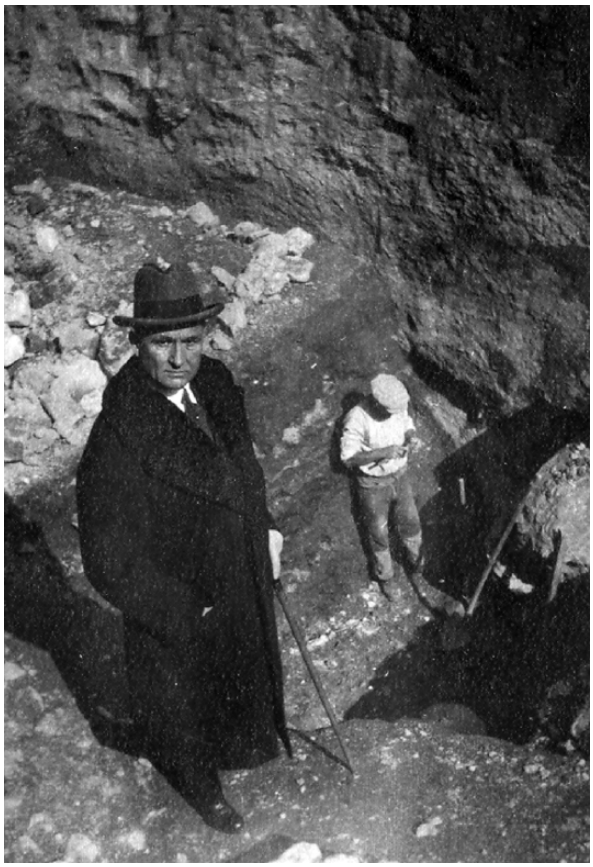


Figure 3. David A. Costantini, patron of the Italian Institute of Human Palaeontology, at Balzi Rossi in 1927 (Archive of the Istituto Italiano di Preistoria e Protostoria, Florence).

In 1927 the CRHP became the Italian Institute of Human Palaeontology (IIHP) thanks to the economic and organizational support of Count David A. Costantini (1875-1936) (Figure 3). The new Institute succeeded in developing and consolidating an interdisciplinary approach that yielded notable results throughout the first half of the twentieth century.

The IIHP conducted an intense series of field activities, with important discoveries such as the Neanderthal skulls at Saccopastore (discovered in 1935 by Alberto Carlo Blanc and Henri Breuil: Figure 4) and Circeo (which opened the debate

about Neandertal spirituality: Trinkaus and Shipman 1994). Furthermore, it expanded its interdisciplinary collaboration to other areas such as botany (palynology and carpology) and geomorphology with the aim of increasing paleo-environmental reconstruction. The principal aim of increasing interdisciplinary collaborations continued to be the dating of the strata and the related lithic industries, but this was increasingly carried out through a paleo-environmental reconstruction to be correlated with climatic oscillations caused by glaciations.

Figure 4. Italian Institute of Human Palaeontology made important discoveries throughout the first half of the twentieth century (here Alberto Carlo Blanc and Henri Breuil at Saccopastore, where a famous Neanderthal skulls was discovered in 1935) (Archive of the Istituto Italiano di Paleontologia Umana, Rome).

In this context there were also important epistemological formulations, which clearly delineated the need to transport 'the study of human origins from the pure and simple field of prehistoric archaeology to a much broader field, that of ecology' (Blanc 1931).

In part thanks to the political and academic influence of some of its members, the IIHP's activities led to the foundation of a new academic discipline. In 1939 the first chair of Human Palaeontology was created, at Pisa University; the chair was entrusted to Paolo Graziosi (1906-1988). Starting in 1930 Human Palaeontology had its own place in the ISAS, in a section shared with physical anthropology, zoology and botany but not palethnology and archaeology. To better understand the reasons for the rapid institutional success of Human Palaeontology, it is useful to remember that Gian Alberto Blanc – one of the two founders of the CRHP – had become a leading exponent of the Fascist regime, as well as president of the same ISAS beginning in 1930.

In any event, the IIHP's activities resulted in the creation of an opposition between this new discipline, directed towards the natural sciences and the study of the Palaeolithic, and a prehistoric archaeology conceived as 'pure' archaeology (in other words, essentially based on the study of materials) and dealing with subsequent periods. A *de facto* distinction arose even at the methodological level between an older prehistory and a more recent one – in other words, a distinction between prehistory and protohistory. A new disciplinary boundary had been created, and thus two different disciplinary histories could be written in a single book dedicated to the progresses of Italian science (Barocelli 1939; Blanc, A.C. 1939).

4. Reconciling Prehistory and Protohistory as an interdisciplinary perspective

After World War II the critical nature of this opposition was highlighted by several scholars. The questions associated with this opposition were formulated especially by the linguist Giacomo Devoto in two programmatic articles, which were significant also for their placement. The first was published in 1946 as the opening article of the first issue of *Rivista di scienze preistoriche,* a journal founded by Paolo Graziosi with a markedly interdisciplinary editorial board consisting of zoologists, geographers, archaeologists, anthropologists, geologists, botanists and Etruscologists and which deliberately accepted as many contributions dedicated to the Palaeolithic as to the Iron Age (Devoto 1946). Devoto's second article was the inaugural address of the International Congress on Mediterranean Prehistory and Protohistory (Figure 5) organized in 1950 by Paolo Graziosi and Massimo Pallottino (1909-1995), an archaeologist specializing in Etruscan civilization and the Iron

Figure 5. The International Congress on Mediterranean Prehistory and Protohistory held in Rome and Florence in 1950. It is possible to recognize D. Adamesteanu (1), L. Laurenzi (2), P. Bosch Gimpera (3), Dom Lehembre (4), L. Pericot (5), R. Laborie (6), A. Vigliardi (7), M. Reygasse (8), P. Graziosi (9), R. Bloch (10) and M. Louis (11) (Archive of the Museo Fiorentino di Preistoria, Florence).

Age (Figure 6). This conference was the first international event for Italian prehistoric archaeology after a long period of isolation determined initially by Fascism and later WWII. In his address Devoto (1952, pp. 15-16) recalled the existence of a 'naturalistic' method and an 'historical' method, as well as a problem – 'actually, a drama' – which lurked behind 'the double formulation of "prehistory and protohistory"': 'we must acknowledge the severity of the problem by recognizing that this double denomination conceals two separate methods, or in other words two visions of life, which have nothing to do with chronological partitions [...] The central meaning of this conference ... is recognizing the equality of rights in the two methods, their interdependence and, at the same time, their mutual independence from chronology'.

Figure 6. Massimo Pallottino and Paolo Graziosi, founders of the Italian Institute of Prehistory and Protohistory (Archive of the Museo Fiorentino di Preistoria, Florence).

The boundary between prehistoric and protohistoric studies seemed to preclude a unitary discourse on human prehistory (Graziosi 1946). Overcoming this opposition became the main objective of a research programme which, once again, led to a new scientific institution.

In 1954, following a schism within the IIHP driven by institutional, political, and personal reasons, the Italian Institute of Prehistory and Protohistory (IIPP) was founded under the initiative of Paolo Graziosi, Massimo Pallottino and Giacomo Devoto (Tarantini 2004).

In defining its own character the IIPP also gave a crucial place to interdisciplinary research, although now directed towards different goals. As a matter of fact, the necessity of a close collaboration with both the natural sciences and the human sciences was now taken for granted. As clearly indicated in the IIPP's programme, the principal objective (evident even in the IIPP's name) became favouring integration among the different methods employed in research on Palaeolithic or protohistoric civilisations, which were sometimes 'either exclusively archaeological and historical, or essentially naturalistic', creating the conditions for a 'contact or collaboration' among those who 'are dedicated to research on ancient man in the Palaeolithic and experts in protohistoric civilisations.' Considering – we read in the IIPP program – that 'the field of action' of any scholar 'is generally limited to determined periods and phases,' the lack of communication among scholars seemed to deepen, 'on the level of both methodology and concrete results, the pre-existing rift between aspects of disciplines that nevertheless constitute a single and indivisible whole in the common interest for the human phenomenon of the origins of history' (Costituzione IIPP, 1956, p. 231).

In the intentions of its founders, therefore, the creation of the IIPP was supposed to help overcome the impasse which had until then allowed prehistoric and protohistoric research to advance at different paces and with only rare opportunities for communication. Thus the IIPP's founders perceived the confrontation and collaboration between prehistory and protohistory as the most important form of interdisciplinarity to be promoted at the time.

5. Final remarks

In conclusion, at least in Italy, the processes of institutionalisation appear as decisive moments of both construction and rupture for interdisciplinary collaborations. Surely the relationships between the institutional and epistemological levels should also be considered, but we would like to emphasize the decisive role of strictly institutional dynamics in defining disciplinary boundaries and orienting interdisciplinary collaboration in one direction rather than another. We have seen how even a research project based on interdisciplinarity, such as the case of the IIHP, can contribute to the creation of a new disciplinary boundary, this time within prehistoric archaeology itself.

Acknowledgements

This paper has been realized in the framework and with the support of the Inter-Arq project (ref. HAR2016-80271-P), funded by the Spanish Agencia Estatal de Investigación (AEI) and the Fondo Europeo de Desarrollo Regional (FEDER).

References

Atti SIPS (1912). *Atti della Società Italiana per il Progresso delle Scienze. Sezione XI. Storia e archeologia*. Roma: Tipografia Nazionale.

Babes, M. and Kaeser, M.A. (2009). *Archaeologists without bounderies: toward a history of International archaeological congresses (1866-2006)*, ed. by M. Babes and M.A. Kaeser. Oxford: BAR International series.

Barocelli, P. (1939). Paletnologia. In *Un secolo di progresso scientifico italiano*. Roma: Società Italiana per il Progresso delle Scienze, V, pp. 157-203.

Bassani, E. (1977). Origini del Museo Preistorico Etnografico « Luigi Pigorini » di Roma. *Belfagor*, 32 (4), pp. 445-458.
Blanc, A.C. (1939). *Paleontologia Umana*. In *Un secolo di progresso scientifico italiano*. Roma: Società Italiana per il Progresso delle Scienze, V, pp. 205-223.
Blanckaert, C. (1995). Fondements disciplinaires de l'anthropologie française au XIXe siècle. Perspectives historiographiques. *Politix*, 8 (29), pp. 31-54.
Bonghi, R. (1875). Istituzione di un Museo preistorico, di un Museo italico, di un Museo lapidario in Roma. Relazione a sua Maestà. *Ministero della Pubblica Istruzione, Bollettino Ufficiale,* X (1), pp. 854-858.
Costituzione IIPP (1956). La costituzione dell'Istituto Italiano di Preistoria e Protostoria. *Rivista di Scienze Preistoriche*, 11, pp. 231-234.
Casella, A. (2000). Di un acerbo progresso: la SIPS da Volterra a Bottai. In A. Casella *et al.* ed., *Una difficile modernità. Tradizioni di ricerca e comunità scientifica in Italia, 1890-1940*. Pavia: La Goliardica Pavese, pp. 37-90.
Cupitò, M. and Paltineri, S. (2014). La teoria pigoriniana. Una riconsiderazione critica del problema. In A. Guidi, ed., *150 anni di preistoria e protostoria in Italia*, Firenze: Istituto Italiano di Preistoria e Prostoria, pp. 269-276.
De Risi, L. (1995). Il carteggio Mochi-Loria. Primo bilancio del contributo di Aldobrandino Mochi all'etnografia italiana. *La Ricerca Folklorica*, 32, pp. 105-109.
Delley, G. (2016). Entre laboratoire et terrain: physiciens, chimistes et archéologues face au radiocarbone. *Organon*, 48, pp. 113-141.
Devoto, G. (1946). Preistoria e storia. *Rivista di Scienze Preistoriche*, 1, pp. 7-18.
Devoto, G. (1952). Discorso inaugurale. In *Atti del I Congresso internazionale di Preistoria e Protostoria mediterranea*. Firenze: Leo S. Olschki, pp. 13-20.
Graziosi, P. (1946). Presentazione. *Rivista di Scienze Preistoriche*, 1, pp. 3-5.
Hurel, A. (2007). *La France préhistorienne*. Paris, CNRS Éditions.
Kaeser, M.A. (2006). The first establishment of prehistoric science: the shortcomings of autonomy. In J. Callmer *et al.* eds., *Die Anfänge der ur- und frühgeschichtlichen Archäologie*. Berlin: Berliner Archäologische Forschungen, 2, pp. 149-160.
Kaeser, M.A. (2011). Préhistoire et sciences naturelles: complexe d'Œdipe, tabou de l'inceste? A propos du «Grand Partage» nature/culture dans l'histoire et l'épistémologie de l'archéologie préhistorique. In : J. Studer, M. David-Elbiali and M. Besse, eds., *Paysage...Landschaft...Paesaggio... L'impact des activités humaines sur l'environnement du Paléolithique à la période romaine*. Lausanne : Cahiers d'archéologie romande, 120, pp. 251-261.
Landucci, G. (1987). *L'occhio e la mente. Scienze e filosofia nell'Italia del secondo Ottocento*. Firenze: Olschki.
Lehoerff, A. (2009). Les paradoxes de la Protohistoire française. *Annales*, 64 (5), pp. 1107-1133.
Modigliani, E. (1914). L'opera del Comitato nel 1913. *Archivio di Antropologia ed Etnologia*, 44, pp. 14-21.
Obermaier, H. (1904). Le Quaternaire des Alpes et la nouvelle classification du Professeur Albrecht Penck. *L'Anthropologie*, 15, pp. 25-36.
Ophir, A. and Shapin, S. (1991). The place of knowledge. A methodological survey. *Science in context*, 4 (1), pp. 3-21.
Pigorini, L. (1902). Continuazione della civiltà paleolitica nell'età neolitica. *Bullettino di Paletnologia Italiana*, 28, pp. 158-183.
Pigorini, L. (1903). Le più antiche civiltà dell'Italia. *Bullettino di Paletnologia Italiana*, 29, pp. 189-211.
Pigorini, L. (1904). La grotta Romanelli presso Castro in Terra d'Otranto. *Bullettino di Paletnologia Italiana*, 30, pp. 145-155.
Reinach, S. (1903). Comptes-rendu de Pigorini 1902. *L'Anthropologie*, 14, pp. 66-69.
Strobel, P. (1877). Alcune osservazioni intorno all'uomo fossile. *Bullettino di Paletnologia Italiana,* 3, pp. 145-166.
Tarantini, M. (2000). Tradizioni e tensioni disciplinari nell'archeologia preistorica italiana tra Ottocento e Novecento. *Origini*, XXII, pp. 7-43.
Tarantini, M. (2004). Dal fascismo alla repubblica. La fondazione dell'Istituto Italiano di Preistoria e Protostoria nel quadro delle vicende istituzionali delle ricerche (1927-1960). *Rivista di Scienze Preistoriche*, 54, pp. 5-82.

Tarantini, M. (2012). *La nascita della paletnologia in Italia.* Firenze: All'Insegna del Giglio.
Tarantini, M. (2013). La «naissance» de la préhistoire en Italie, entre antagonismes des disciplines et influences politiques. *Bulletin du Musée d'Anthropologie préhistorique de Monaco*, 53, pp. 5-16.
Tarantini, M. and Parenti, F. (2011). L'origine de l'Institut Italien de Paléontologie Humaine: science, institutions et relations internationales (1911-1936). In H. De Lumley and A. Hurel, eds., *Cent ans de préhistoire. L'Institut de Paléontologie Humaine*. Paris: CNRS, pp. 120-132.
Trinkaus, E. and Shipman, P. (1994). *The Neandertals. Changing the image of Mankind*. London: Pimilico.

List of authors

Cultraro, Massimo
2Consiglio Nazionale delle Ricerche (CNR), Catania
massimo.cultraro@cnr.it

de Beaune, Sophie
Jean Moulin University – Lyon 3, Lyon & UMR 7041 ArScAn, Nanterre – France
sophie.de-beaune@univ-lyon3.fr

Guidi, Alessandro
1Dipartimento di Studi Umanistici, Università Roma Tre
alessandro.guidi@uniroma3.it
Alessandro Guidi1,

Hussain, Shumon
Department of Archaeology and Heritage Studies, School of Culture and Society,
Aarhus University, Moesgård Allé 20, 8270 Højbjerg, Denmark
CRC 806 'Our Way to Europe', University of Cologne, Bernhard-Feilchenfeld-Str. 11,
50969 Cologne, Germany
Palaeolithic Research Unit (FAST), Institute for Prehistoric Archaeology,
University of Cologne, Weyertal 125, 50931 Cologne, Germany
s.t.hussain@cas.au.dk

Javier Toledo, Marcelo
Instituto de Geociencias de Buenos Aires (IGEBA). Universidad de Buenos Aires – Argentine
loessoide@gmail.com

Kourtessi-Philippakis, Georgia
National and Kapodistrian University of Athens – Greece
gkphil@arch.uoa.gr

Labrusse, Rémi
Université Paris Nanterre – France

McLaughlin, T. Rowan
School of Natural and Built Environment, Queen's University Belfast
r.mclaughlin@qub.ac.uk

Malone, Caroline
School of Natural and Built Environment, Queen's University Belfast

Moro Abadía, Oscar
Memorial University of Newfoundland – Canada
omoro@mun.ca

Nomi, Federico
Dipartimento di Studi Umanistici, Università degli studi Roma Tre
federico.nomi@uniroma3.it – alessandro.guidi@uniroma3.it

Notter, Olivier
Musée d'Anthropologie préhistorique de Monaco – Monaco
erossoni-notter@gouv.mc
onotter@gouv.mc

Parkinson, Eóin
Department of Archaeology, University of Cambridge
Catriona Brogan
Department of Classics and Archaeology, University of Malta

Peţan, Aurora
Study Centre of Dacica Foundation, Alun – Romania
aurora.petan@dacica.ro

Plutniak, Sébastien
École française de Rome and Lisst-Cers (Toulouse, France)
sebastien.plutniak@posteo.net

Rossoni-Notter, Elena
Musée d'Anthropologie préhistorique de Monaco – Monaco

Simon, Patrick
Musée d'Anthropologie préhistorique de Monaco – Monaco
psimon@gouv.mc

Simone, Suzanne
Musée d'Anthropologie préhistorique de Monaco – Monaco
suzanne_simone@libello.com

Stoddart, Simon
Department of Archaeology, University of Cambridge

Tarantini, Massimo
MiBACT – Soprintendenza Archeologia Belle Arti e Paesaggio Firenze
massimo.tarantini@beniculturali.it

Vavouranakis, Giorgos
National and Kapodistrian University of Athens – Greece
gvavour@arch.uoa.gr

Woźny, Marzena
Archaeological Museum in Cracow – Poland
marzenawoz@wp.pl