
Preface

This is the final report of excavations carried out at the Middle Paleolithic site of Pech de l’Azé IV (Pech IV), located in the Department of the Dordogne in southwest France. This site was originally excavated by François Bordes from 1970–1977, and the excavations reported on here were carried out from 2000–2003. The more recent project was directed by Harold L. Dibble and Shannon J.P. McPherron.

Unfortunately, Bordes died not long after finishing his excavation, and most of his work at the site remained unpublished, except for a brief preliminary report (Bordes 1975). To a very large extent, the primary goal of the recent project was to complete his work there, which included analyzing the lithic and faunal material recovered by him, to develop a chronology of the site based on newer numerical dating techniques, and to undertake a comprehensive study of the formation processes that had affected the site during and subsequent to the deposition of the materials. To a very large degree, these goals were achieved and, as a result, the faunal and lithic collections from the two excavations can be combined, resulting in a large, well-provenienced, and well-dated series of assemblages spanning roughly 60,000 years of the early Late Pleistocene.

How We Came to Excavate Pech IV?

In the early 90s, Shannon went to the Musée National de Préhistoire (MNP) in Les Eyzies, France, to study handaxes from Mousterian or Acheulian Tradition (MTA) contexts as a follow-up to his dissertation on Acheulian handaxes (McPherron 1994; Iovita and McPherron 2011). One of the sites that interested him was Pech de l’Azé IV where in Layer F, at the top of the sequence, Bordes had identified a progression of MTA Type A to B. It turned out, however, that the collection was not at the museum. After a few phone calls, it was eventually determined that the Pech IV collections were housed at (what was then called) the Institut de Préhistoire et de Géologie du Quaternaire (IPGQ) at the University of Bordeaux I, where Bordes had been professor (subsequently they were transferred to the Musée National de Préhistoire). However, there was a certain degree of pessimism about the research value of the collections. Indeed, with the exception of a limited study of the faunal assemblage by Laquay (1981), not much had been done with this material since it was excavated.

A few weeks after Shannon’s visit to Les Eyzies, he and Harold were together on the island of Jersey to study collections from the site of La Cotte de St. Brelade. Over pints one night in a Jersey pub, we discussed the collection and the status of the site itself. Harold knew the site well—as a student he had excavated there with Bordes in 1976 and 1977, the last two years of the project (Fig. 1), and remembered it as having significant potential. Much of the evening was spent recounting those times—camping in the backyard of Bordes’ house in the village of Carsac, the primitive (and nearly full) outhouse, baths in the Dordogne, lunches delivered to the site by the Hotel Delpeyrat, and dinners in the hotel’s restaurant. We were, however, concerned about the fact that many people were dismissive of the site’s research value, but



Fig. 1 François Bordes at Pech IV, in 1976 (**A, B, and C**), and during his last day of excavation at the site in 1977 (**D**). Dibble is pictured in A

decided to look into the status of the collection with the idea that it might make a good future project.

A little while later we visited the IPGQ and took a quick inventory of the Pech IV collection. It was a large collection—around 90,000 stone tools and 30,000 pieces of bone, plus bags of bulk-provenienced material. As discussed in Chap. 1, the collection was not yet ready to be studied. Bordes had processed all the material from the first 4 years of excavations and sorted the lithics into boxes labeled with his type number and stored in trays with label indicating from which layer they had come. The rest of the collection, however, was unsorted, and a substantial portion was unwashed, unlabeled, and seriously at risk of becoming effectively lost to science. Thus, we requested permission from Jean-Philippe Rigaud, the then director of the institute, to begin organizing, processing, and analyzing the collection. We were aided considerably by Dominique Armand, with whom we had worked previously at La Quina, and who was at this time responsible for the curation of the various collections housed at the IPGQ. As part of this initial project, we digitally scanned all of the field notebooks, entered the coordinates of each object into a database, and washed and labeled the unprocessed objects.

The processing of this material, along with detailed analysis of the lithics, took place over the course of several years, between 1995 and 1999, during our work at Fontéchevade. This was possible simply because Fontéchevade yielded very few artifacts, and our focus there was primarily on site formation, which left time to do other research projects. Thus, with permission from the IPGQ, we took portions of the Pech IV material to our dighouse in Orge-deuil, near Fontéchevade, and as the excavations there proceeded, processed, and analyzed it.



Fig. 2 Analyzing the Pech IV lithics at the Fontéchevade dighthouse in Orgedeuil (1999)

This continued through 1999, and the work on both sites provided training opportunities for many graduate students (Fig. 2).

Early on in this process of working with the Pech IV collections we learned that the original notebooks—in fact, the only copies of the entire documentation of Bordes’ work there—were still with Denise de Sonnevile-Bordes, Bordes’ widow and herself the former head of the IPGQ. Harold had known de Sonnevile-Bordes since his graduate school days excavating at Pech IV, but also from the close relationship the Bordes had with his professor, Art Jelinek, at the University of Arizona. Subsequently, we both saw her regularly, since she often visited our previous excavations at Combe-Capelle Bas, Cagny, and Fontéchevade. Still, she had a reputation for fiercely guarding the legacy of her late husband and her relationship with the department that housed the collections was an uneasy one. At that time she was also dealing with requests from the MNP to move all of F. Bordes’ collections there. So, it was with some apprehension that we arranged to visit her and request a copy of the Pech IV notebooks. In fact, the visit went well and she graciously allowed us access to them. With help from our colleagues at Bordeaux, we immediately found a student (Abdeljalil Bouzzougar) who made three photocopies of all of the notebooks, giving the originals and one copy back to de Sonnevile-Bordes (Fig. 3).

Entering the data from the scanned notebooks resulted in an additional job in the Fontéchevade lab. Each day one student would sit at a computer running an older version of our data entry software and enter the square, id, type of object, X, Y, and Z coordinates (including the local Z used for that particular day of excavation), the layer (where available), the date when the objects were recovered, and the name of the excavator (Fig. 4). This was done for each of the roughly 120,000 provenienced artifacts. Because the XY coordinates were local to each



Fig. 3 Denise de Sonneville-Bordes during one of her annual visits to the site (2002) (also pictured are Shannon J.P. McPherron far left and Harold L. Dibble)

square (measured from the west and south square boundary, respectively), and because the Z measurements were relative to a temporary datum that changed periodically, we had to transform them to a grid system for the site as a whole. After some effort, we were able to convert the notebooks into the same database format we use for our own excavations, and with this notebook information we were able to assign levels to the rest of the collection.

Why Re-excavate Pech IV?

In 2000, the same year we started excavating Pech IV, we published our study of Bordes' Pech IV lithic collections (McPherron and Dibble 2000), and in that paper we outlined a number of reasons why we thought it was necessary to go back to the site. First, it was important to date the sequence. With his knowledge of the Pech I, II, and IV sequences, their respective lithic and faunal collections, and the sedimentological work of Laville (1973), Bordes put together a chronology for the three major Pech sites, I, II, and IV (Bordes 1978). Based on correlations with Pech II, which had already been dated using electron spin resonance (Grün et al. 1991, 1999), most of the Pech IV sequence would date to between 87 and 54 ka with the top part of the sequence, the MTA, dating to between then and the end of the Mousterian in southwest France. In re-excavating the site we hoped to test these conclusions and to bring some further precision to the dating of the various layers. In the end, we were able to apply electron spin resonance, radiocarbon, thermoluminescence, and optically-stimulated



Fig. 4 Flint Dibble at Fontéchevade entering from Bordes' excavation notebooks

luminescence dating techniques to the entire sequence. The results of this work are reviewed in Chap. 3.

A second reason to go back to Pech IV was the fact that the geology of the site, as done by Laville, remained unpublished. In fact, the only information available at the time came from Bordes' (1975) publication of the sequence based on the first 4 years of his excavation. But while Laville's work focused on establishing chronologies among sites in the Perigord, there had been virtually nothing done on the formation processes that may have affected the deposits. Of course, at the time of the site's initial excavation, studies of site formation processes were not yet part of most Paleolithic fieldwork. This did not mean that Bordes was unaware of issues surrounding the integrity of the deposits, but at the same time he did not systematically study this aspect on the site. However, since then site formation had become quite an issue in Paleolithic archaeology, and this topic had already developed into a major focus of our own work at Combe-Capelle Bas (Dibble and Lenoir 1995; McPherron et al. 2005), Cagny l'Épinette (Dibble et al. 1997), and Fontéchevade (Chase et al. 2007; Chase et al. 2009; Dibble et al. 2006; McPherron et al. 2012). Thus, we felt it important to make this one of the major foci of the new excavations as well.

There was another reason why a thorough study of site formation was important for Pech IV. We mentioned earlier that there was some pessimism expressed concerning the potential of Pech IV. Much of this was expressed as rumors circulating that Bordes had missed important lateral changes in the sequence that resulted in his mixing two different and independent depositional sequences. This meant that the site's formation may have been much more difficult than Bordes had realized, even though he had noted other problems, including differences in the horizontal extent of cryoturbation in some layers, lateral variation within some layers between deposits closer to the front of the site and those situated toward (what he

thought was) the back wall of the shelter, and the difficulty of making stratigraphic distinctions in the lowest layers. Although some information was available based on analysis of the objects and their positions within the three-dimensional grid system, a full site formation study, based in part on applying techniques we developed earlier, could only be undertaken with a new excavation.

We were fortunate in this regard to enlist the aid of Paul Goldberg (Fig. 5). Paul had also previously worked at Pech de l’Azé, but at Pech II, not IV, as part of his post-doctoral work on developing a methodology for doing micromorphology. This has become a particularly useful tool for studying site formation. He also had spent many years working at sites in Israel, especially at Kebara and Hayonim, which, like the lower deposits of Pech, had abundant evidence of the use of fire. Like Harold, the idea of essentially going back to where he had started his career was appealing to him, and his experience in studying fire use ultimately proved to be a major contribution at Pech IV and our later work at other sites. His study of the Pech IV sediments is presented in Chap. 2, along with the results of our work on site formation based on both geological and lithic evidence.

A fourth reason for re-opening Pech IV had to do with the issue of excavator bias. Based on his own work at the site in the 1970s, Harold knew that Bordes did not screen the sediment, and, furthermore, there were substantial inter-excavator differences in collection protocols—what kinds of objects were point-provenienced, what ones were just put into bags by square and level, and even which ones were discarded were, for the most part, left to the discretion of each excavator, who at the same time had varied amounts of experience in archaeological fieldwork. Of course, such variation can have a significant effect on the resulting collections, as we had already learned at Combe-Capelle (see Dibble and Lenoir 1995). So, by adhering to



Fig. 5 Paul Goldberg (left) and Dennis M. Sandgathe at Pech IV

strict excavation standards, as described in Chap. 1, and by digging some of Bordes' backdirt from Pech IV (as we had also done at Combe-Capelle), we could get an idea of the extent to which his collection had been affected (see Dibble et al. 2005).

Thus with these goals in mind, we received a 4-year, National Science Foundation grant, which when combined with funding from the Service Régional de l'Archéologie (Aquitaine) allowed us to excavate Pech IV from 2000 to 2003. Again, it proved helpful that Harold had worked at the site previously with Bordes during his final two seasons, since he was able to apply some of his initial understanding of the site, including some knowledge of the stratigraphic sequence as interpreted by Bordes. However, with Paul in the lead, we approached the site with fresh eyes and interpreted for ourselves the nature of the stratigraphic succession. We were also fortunate in locating Bordes' original site datum, allowing us to base the new excavation on the same coordinate system in all three dimensions and thus accurately integrate the new excavation with the former one.

Dennis M. Sandgathe joined our team in the first year of excavation at Pech IV. At that time, Dennis was a graduate student at Simon Fraser University, writing his dissertation on Levallois technology. Most of his previous archaeological fieldwork had been in the North American plains, at sites such as Head Smashed In Buffalo Jump, but he had also worked in Spain with Lawrence Straus at the Upper Paleolithic site of El Miron. Apart from his knowledge of lithics, we could see from the start that he had two qualities that made him stand out—he was an excellent excavator and he was able to work extremely well with the other student excavators. Thus, by the second season at Pech IV he became the site supervisor, a role that he continued to have at our later excavations at Roc de Marsal and La Ferrassie.

Most of the analysis was completed soon after the excavations stopped in 2003, but it took several more years to complete the final analysis. In 2005 and 2006 Daniel Richter placed additional dosimeters in the site for thermoluminescence dating, and in 2014 Zenobia Jacobs took samples for optically stimulated luminescence. In 2009, we worked at the site to clean some material that had fallen from the section, and in 2012 we went back to collect new samples for OSL dating (see Jacobs et al. (2016) and Chap. 3).

We have made a considerable effort to prepare the new collection for final curation. After having seen the excellent curation of the collections from La Cotte de St. Brelade in the Jersey Museum and Art Gallery at St. Helier, we decided to implement a similar system of individually bagging every provenienced artifact at Pech IV. In addition, we developed a barcode program for labeling these bags (see Dibble et al. 2007) and a computerized system for locating specific objects in storage. All of the excavated material is now housed in the MNP in Les Eyzies.

A Preview of This Monograph

In our view a site report, such as this one, is a presentation of the excavation and the resulting data. The emphasis is on providing context of the collections and on providing basic descriptions of the material. A site report is not a place for detailed analyses of the collections; such publications belong in peer-reviewed journals (see list below of our previous publications on Pech IV), for no other reason than that specific analyses will change in focus through time as research questions change. To a very large degree, then, this volume presents the basic metadata essential for future studies by others of the objects themselves or their analyses of the analytical data that we have made publicly available.

The flow of this presentation is as follows. It begins, in Chap. 1, with an overview of Bordes' excavation of Pech IV and our subsequent work on his collection. In this chapter, we also present our own excavations of the site with our methodology and a narrative of the work. Chapter 2 covers the geology with an emphasis on the context of the site, description of the layers, and the site formation processes. For the latter, we include observations made on the artifacts themselves as well as observations of the sediments. An effort is made to unite these

various lines of evidence, to see where the interpretations converge and where they may differ, something which potentially speaks to separate formation processes for the artifacts and the sediments. Chapter 3, by Nathan Jankowski, gives an overview of the dates for the sequence, all of which have been previously published elsewhere. The dating methods employed include radiocarbon dating of bone, thermoluminescence dating of heated flints, electron spin resonance dating of teeth, and optically stimulated luminescence dating of sediments. Chapters 4 and 5 present descriptions of the faunal assemblages: Chap. 4, by Jamie Hodgkins, presents a study of the fauna from two layers from Bordes' excavations from the perspective of zooarchaeology and taphonomy, and Chap. 5 is a report by Laura Niven (with contributions by H  l  ne Martin) of the fauna recovered during our own excavations. Chapter 6 describes the lithic assemblages. Bordes' collection (McPherron and Dibble 2000) and our collection (Turq et al. 2011) have already been published separately. Here we put the two collections together and examine changes through time. Chapter 7 provides a summary of all of these results.

Again, by no means do we consider this monograph to be the last word on Pech IV. First, this is a site that spans a long period of the late Upper Pleistocene, one that was excavated with modern techniques, and one that is well dated. There is undoubtedly much that can still be learned from its abundant collections about Neandertal behavior, and we encourage others to continue to make use of them in ways that go well beyond what we thought we might learn when this project started. In fact, the subject of Neandertal use of fire is a good example of how sites can continue to provide new evidence on questions that were not thought of when they were first excavated. Although we mentioned the presence of fire in the Pech IV sequence in our initial NSF proposal, we had no idea how interesting it would become. This was true in part because of the finds at Pech IV but also as a result of excavations we did subsequently, particularly at Roc de Marsal, France, where fire is also clearly evident at certain moments in the sequence. Explaining why fire comes and goes in late Mousterian sites in southwest France has become an important line of research for us (Dibble et al. 2009; Dibble et al. CA volume; Goldberg et al. 2012; Sandgathe et al. 2011), and given what we know now would have been one of the leading reasons for excavating the site. In fact, as of this writing we are planning a new project at the site, focusing on the lowermost layer, Layer 8, to further study how the numerous fires found in this level were used.

Final Words

The core members of this team have continued to work together at many sites—Roc de Marsal, Abri Peyrony and La Ferrassie in France, Contrebandiers in Morocco, and on a survey project in Egypt, and we hope to continue to work together for as long as we are able. We look forward to continuing our collaborations with many of the senior researchers who worked with us at Pech IV and also to developing new collaborations with others. And not the least, we will continue to invite students from all over the world to join us in order to get experience and training in field archaeology and analytical methods (Fig. 6).

We would like to thank the following individuals for their assistance. Our biggest thanks go to the late Mme. de Sonnevile-Bordes for having made this project possible. It has to be said that we were still apprehensive when she visited our excavations each year, but we will always be grateful for the kindness and trust she showed in us. We would also like to thank the Laplanche family for generously allowing us to work for years on their property, and the mayor of Carsac, who helped us find suitable housing in the village to serve as our dighouse and laboratory. A very special thanks goes to the entire Delpeyrat family for making us feel so at home in Carsac and who became a critical part of our Pech IV team over the years. Thanks also to Jean-Michel Geneste, Jean-Jacques Cleyet-Merle, and especially Alain Turq, who has been a close friend and colleague for over three decades. We thank Larry Bartram, Roland Nespoulet, Marie Soressi, and Laurent Chiotti for helping with our topographic surveys of the Pech de l'Azé sites.



Fig. 6 Crew photos from (clockwise from upper left) 2000, 2001, 2002, and 2003. Not all of the participants are included due to their schedules

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Harold L. Dibble
Shannon J.P. McPherron

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