The Châtelperronian Lithic Industries of Eastern France: Germolles and Châtelperron

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ABSTRACT

In this paper we discuss two Châtelperronian sites in eastern France: Grotte de la Verpillière I, the easternmost known Châtelperronian site as of today, and the eponymous site of Grotte des Fées in Châtelperron. While the Châtelperronian of the Grotte des Fées has been at the center of many discussions over the past decade, the Châtelperronian assemblage from Grotte de la Verpillière I has not received much attention; there is a prevailing opinion that the number of Châtelperronian artifacts and the stratigraphic integrity of the latter site are insufficient at best. We revised this view of Grotte de la Verpillière I in an earlier paper by presenting the results of our analyses of the Châtelperronian artifacts from past excavations and from our own recent work (Floss et al. 2016). Here, we will provide an overview of the Châtelperronian lithics of eastern France, with a special focus on the technological aspects of the assemblages by comparing them to our analyses of the lithic material from Grotte des Fées in Châtelperron.

RÉSUMÉ

Cet article présente deux sites du Châtelperronien dans l'est de la France : D'une part, la grotte de la Verpillière I, qui est le site Châtelperronien le plus à l'est connu à ce jour, et d'autre part, le site éponyme de la grotte des Fées à Châtelperron. Alors que le Châtelperronien de la Grotte des Fées a été au centre de nombreuses discussions au cours de la dernière décennie, l'inventaire de la Grotte de la Verpillière I n'a pas reçu beaucoup d'attention ; l'opinion qui a longtemps prévalu est que le nombre d'artefacts châtelperroniens et l'intégrité stratigraphique de ce dernier site sont aux mieux insuffisants. Nous avons révisé ce point de vue sur la grotte de la Verpillière I dans un article précédent, en présentant les résultats de nos analyses de l'inventaire châtelperronien issu de fouilles antérieures et de nos propres travaux récents (Floss et al. 2016). Nous donnerons ici un aperçu du lithique du Châtelperronien dans l'Est de la France, à travers l'exemple de ces deux sites. Une attention particulière sera portée aux aspects technologiques des inventaires lithiques.

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ZUSAMMENFASSUNG
In diesem Beitrag werden zwei Châtelperronien-Fundstellen in Ostfrankreich vorgestellt: Zum einen die Grotte de la Verpillière I, bei welcher es sich um die östlichste bislang bekannte Châtelperronien-Fundstelle handelt, und die eponyme Fundstelle Grotte des Fées in Châtelperron. Während das Châtelperronien der Grotte des Fées im letzten Jahrzehnt im Mittelpunkt zahlreicher Diskussionen stand, wurde dem Inventar der Grotte de la Verpillière I nicht viel Aufmerksamkeit geschenkt; lange Zeit herrschte die Meinung vor, dass die Anzahl der châtelperronienzeitlichen Artefakte und die stratigraphische Integrität der letztgenannten Fundstelle bestenfalls unzureichend sind. Wir haben diese Ansicht über die Grotte de la Verpillière I in einem früheren Beitrag revidiert, indem wir die Ergebnisse unserer Analysen des Châtelperronien-Inventars aus früheren Ausgrabungen und aus unseren eigenen jüngsten Arbeiten vorgestellt haben (Floss et al. 2016). Hier werden wir einen Überblick über die Lithik des Châtelperronien in Ostfrankreich geben, anhand des Beispiels dieser zwei Fundstellen. Besonderes Augenmerk wird dabei auf die technologischen Aspekte der lithischen Inventare gelegt.

INTRODUCTION

Grotte de la Verpillière I in Germolles (Saône-et-Loire, Burgundy) represents the easternmost extension of the Châtelperronian technocomplex. First discovered and excavated in 1868, its assemblage was used by Henri Breuil in the famous *bataille aurignacienne* to support his positioning of the Aurignacian at the very beginning of the upper Paleolithic (Breuil 1909: 14). Later, Henri Delporte compared the Châtelperronian of Germolles to that of the Grotte des Fées complex in the eponymous site of Châtelperron (Allier) (Delporte 1955b). Discovered in the middle of the 19th century, Châtelperron shares with Grotte de la Verpillière I a long research history, along with the stratigraphic difficulties linked to this; both sites also provide key evidence for the transition between the Middle and Upper Paleolithic.

In this paper, we provide an overview of the Châtelperronian of both sites, including their research history, the current debates and the new findings of our own analyses of the lithic raw material. In order to embed these two sites within a wider geographical context, and to give an overview of the Châtelperronian characteristics of eastern France, we compare them to each other and to other well-known Châtelperronian sites.

GERMOLLES

Grotte de la Verpillière I (Germolles, Burgundy) is situated on the right bank of the River Orbize, on a cliff-side called the Plateau de Montadiot or Plateau de Chauvirey, an Upper Jurassic limestone massif (Dutkiewicz and Floss 2015: 14). At the time of writing this paper, this site marks the easternmost verified extension of the Châtelperronian technocomplex, situated around 10 km north-west of Chalon-sur-Saône (Burgundy), in the municipality of Mellecey (Fig. 1). However, as has been mentioned else-

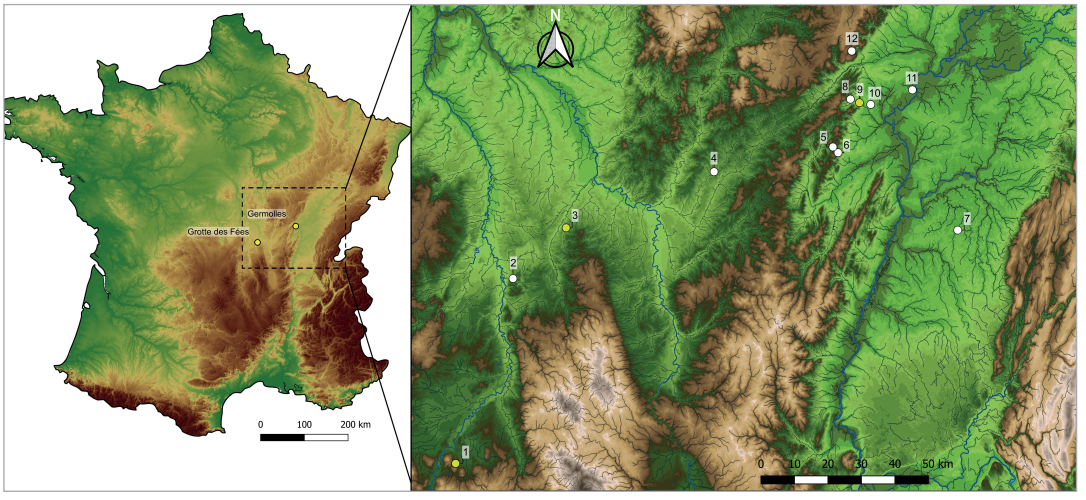

Fig. 1.
On the left: Location of the sites Grotte des Fées (Châtelperron) and Grotte de la Verpillière I (Germolles). On the right: Châtelperronian sites in the Côte Chalonnais; 1: La Tour Fondue, 2: Theillat, 3: Grotte des Fées, 4: Neuzy-Paray, 5: Saint-Vallerin, 6: Chenoves "Rue Cataux," 7: Sermoyer "Les Charmes," 8: Saint-Martin-sous-Montaigu "La Roche," 9: Grotte de la Verpillière I and II, 10: Dracy-le-Fort "La Fous-sotte," 11: Gergy "Bougerot," 12: Abri Virely (base map: European Environmental Agency; image: H. Würschem).

where (Floss et al. 2016: 171; Würschem in prep.), there are indications for the existence of a Châtelperronian component at the site of Trou de la Mère Clochette in Rochefort-sur-Nenon, situated some 85 km north-east of Germolles (Desbrosse 1976: 1351; Desbrosse 1982: 1984).

Since its discovery by Charles Méray in 1868 during the construction of a road between Germolles and Mellecey, Grotte de la Verpillière I has yielded an abundance of archaeological finds, spanning from the Middle Paleolithic right up to the Medieval period. In particular, the existence of stratified layers documenting the transition between Middle and Upper Paleolithic marks this site as one of the key sites for understanding this period in eastern France. In 2006, during investigations carried out by a team from the University of Tübingen, a second cave was discovered some 50 m from Grotte de la Verpillière I; this recently discovered site has been termed Grotte de la Verpillière II. Today these two caves open to the north, but since they are in fact two collapsed rockshelters, their original orientation was probably towards the north-east.

After its discovery and subsequent excavation by Méray, Grotte de la Verpillière I has been the subject of many other investigations, including test trenches, surface collections and further excavations, both legal and illegal. Its research history spans over 150 years and has been the subject of several detailed studies (see Dutkiewicz 2011; Dutkiewicz and Floss 2015).

At the beginning of the 20th century, the site played an important role in the research history of the Châtelperronian technocomplex; Henri Breuil published his analysis of the Châtelperronian assemblage of the Grotte des Fées (Châtelperron) and highlighted the striking similarities between the artifacts from this site and some of the artifacts from Germolles (Breuil 1911: 39–40; Floss et al. 2016). From then on, the Grotte de la Verpillière I became one of the reference sites for the Châtelperronian,

largely due to the work carried out by Henri Delporte who, after completing his first excavation season in Châtelperron, started to work simultaneously at Germolles (his excavations in Châtelperron ended in 1954 and were resumed in 1962). Although he had not been able to identify intact Châtelperronian layers at Germolles, he compared the two sites in 1953 (published in Delporte 1955b).

In 1959, Jean Combier carried out an excavation of VP I, but today little information is available about his work at the site, apart from a plan of the cave and a sketch of the stratigraphy he found (Dutkiewicz and Floss 2015: 27; Floss et al. 2016). It includes a layer described as "*Niveau Moustérien à éclats ou Châtelperronien*" (Floss et al. 2013: Fig. 4), but during our own work it was not possible to confirm his observations. Thus, for a long time, there was no tangible evidence for an intact Châtelperronian layer at the site.

The Tübingen team carried out their investigations of the site between 2006 and 2016. Amongst others, the objective of these investigations was to find out if there were any intact layers documenting the transition between Lower and Upper Paleolithic still in place inside or outside the cave. The team unearthed Châtelperronian points over the course of almost every excavation season, but always from disturbed contexts. In 2014, we were finally able to identify a small section of a Châtelperronian layer within a stratigraphical section which had remained from the old excavation carried out by Mazenot (1919-1925) (Hoyer et al. 2016). It yielded one Châtelperronian point and only a small amount of other lithics, including a large blade and some small pieces of debris and chips. Recently, the finds, together with Châtelperronian points from disturbed contexts and those from the old excavations of Germolles, were the subject of a Bachelor's thesis on the Châtelperronian of Germolles (Würschem 2015; see also Floss 2003, Floss 2005; Floss et al. 2016).

CHÂTELPERRON

Grotte des Fées in Châtelperron (also known as Boîte aux Fées or Cave aux Fées) is the eponymous site of the Châtelperronian technocomplex, a so-called transitional industry between the Mousterian and the Aurignacian technocomplexes (Pelegrin and Soressi 2007: 283). Situated between the communities of Vaumas in the north and Châtelperron in the south, and about 30 km south-east of the city of Moulins, the cave lies on the left-hand bank of the small River Graveron—also known as the Châtel (Bailleau 1870; Lacaille 1947)—at around 250 m asl (Fig. 1) (Delporte n.d.; Depraetere 2000: 22). The Graveron is a tributary of the Besbre, which itself flows into the Loire further north.

"Grotte des Fées" is the name given to a group of three caves, two of which are still visible today and all of which are oriented towards the east (Delporte n.d.; Lacaille 1947; Zilhão et al. 2008). Delporte named the two southern caves after the first two excavators of the sites: the southernmost cave is thus called the Grotte Poirrier, the one in the middle Grotte Bail-

leau. The northernmost cave had already collapsed at the time of the first excavations, which is why Delporte named it Grotte Effondrée ("collapsed cave"; Delporte n.d.). He also hypothesizes that the stone slabs of the former cave ceiling were used during the construction of the furnaces of Dompierre-sur-Besbre, which is the reason for the late discovery of the cave.

The site was first discovered by railway engineer A. B. Poirrier between 1840 and 1850 (the exact date varies in different publications; cf. Bailleau 1869; Lacaille 1947; Breuil 1911) during the construction of a railway between Dompierre and Bert. Poirrier was a geologist and paleontologist, and fortunately was able to identify some of the unearthed bones as belonging to Pleistocene fauna. During the years following the discovery, he compiled a large collection of bones from Châtelperron, both in the context of the railway construction as well as from his own excavations in Grotte Poirrier and Grotte Bailleau. Unfortunately, only a small portion of his collection has survived. This remaining collection, which includes an engraved bone awl made from a horse metatarsus (Debénath et al. 2002), is today housed in the Museum of the University of Pennsylvania, but it consists solely of faunal remains since Poirrier did not recognize any stone tools. Those were only discovered between 1864 and 1867 in the debris of his excavation by Dr. Bailleau, a physician from Pierrefitte-sur-Loire (Breuil 1911; Roux and Péro 1911: 141; Zilhão et al. 2008). Bailleau was an amateur archaeologist, but he was in close contact with well-known experts of his time, for example Édouard Lartet and Émile Cartailhac (Delporte n.d.). He started his own excavation in the autumn of 1867 inside the two visible caves, with barely any resources at hand and almost no knowledge of the excavation methods of his time. Nevertheless, Delporte describes him as a careful scientist whose published work was very detailed compared to the standards of the 19th century. Around the year 1870, Bailleau discovered the Grotte Effondrée, which, at first, he thought to be a "*salle à manger*" (dining area) for the inhabitants of the two other caves. He excavated an area measuring around 6 m in length and 4 m in width where he found the highest density of worked materials and also the first lithic artifacts, which he describes as "*quantités considérables de silex, éclats, nuclëi et instruments entiers, ainsi que plusieurs objets en os ou en ivoire travaillé*" (Bailleau 1870: 94). From then on, he concentrated his work in Châtelperron on Grotte Effondrée, where he excavated the central area to a depth of around 3 m up until 1872. He was not able to identify different layers during this work, explaining why Henri Breuil assumed that all of the lithic tools were part of one single technocomplex. In his 1911 publication, Breuil thus described the Châtelperronian as an assemblage consisting of scrapers, endscrapers, unilaterally retouched points (Châtelperronian points), handaxes, burins and retouched blades (Breuil 1911: 31). This erroneous assumption that the Châtelperronian technocomplex was a mixture of Mousterian handaxes and "Upper Paleolithic" artifact types was only amended following the excavations carried out by Henri Delporte in the

1950s and 1960s; until recently, these were the most important excavations carried out in Châtelperron.

Delporte began his excavations in 1951 by digging a test trench in the entrance, or former entrance, of each cave. In doing so he learned that only Grotte Effondrée still contained archaeological remains; this is why he concentrated his efforts on this site, even though it had been greatly disturbed by Bailleau's previous excavations (Delporte 1955a). He worked in different areas between 1952 and 1954 and again in 1962, trying to avoid any overlap with the debris from the old excavation. During this work, he managed to identify three different layers (Fig. 2, on the left): Layer 1 or A is a disturbed layer consisting of humus and excavation debris; Layer 2 or B is the Châtelperronian layer; and Layer 3 or C, is a Mousterian layer containing handaxes (Delporte 1955c). The Châtelperronian layer he observed was finely stratified with five sub-layers which he initially called Layers 2a to 2e, later B1 to B5. These sub-layers where defined by their red color. According to Delporte, the red sub-layers yielded the largest numbers of lithic artifacts (Delporte 1999: 12).

Henri Delporte subsequently compared the stratigraphies of Châtelperron and Germolles (Fig. 2) and commented on the strong similarities between the two sites (Delporte 1955b). It has to be pointed out, however, that we were unable to verify the accuracy of his stratigraphy for Germolles over the course of our own work.

During the last decade, the integrity of the Châtelperron stratigraphy as documented by Delporte has been the subject of heated discussion marked by strong ideological viewpoints (see Gravina et al. 2005; Zilhão et al. 2006; Mellars et al. 2007; Zilhão et al. 2008; Mellars et al. 2008). In the course of an excavation carried out in the context of a joint research project of the Tübingen University and the SRA-DRAC Auvergne-Rhône-Alpes in 2021 (Angevin et al. 2022) and the study of letters sent from Bailleau to Lartet during his own excavations in the 19th century (Angevin and Lacoste 2019), we were, however, able to comprehensibly prove Delporte's stratigraphy to be a product of secondarily displaced sediments from the older excavations and the railroad construction. For that reason, we decided to ignore the layers and sub-layers identified by Delporte during our own work; instead we considered the artifacts from a strictly neutral point of view.

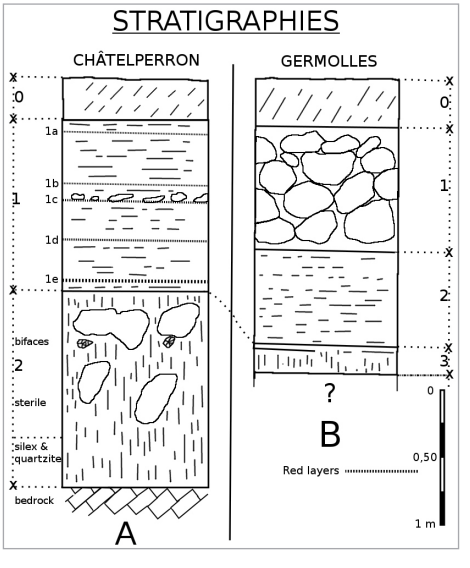

Fig. 2.
Idealized stratigraphy of Châtelperron and Germolles, as described by H. Delporte. Layers 0: topsoil; 1: a Châtelperronian layer in Châtelperron and a disturbed layer with Châtelperronian artifacts in Germolles; 2: Mousterian layer (after Delporte 1955b: Fig. 1).

References exist to further excavations at Grotte des Fées, but these are scarce and no primary documentation of any kind is known. In the Musée d'Archéologie Nationale in Saint-Germain-en-Laye we found a collection marked "*Don Girod*" ("Girod donation"; also described by Delporte in his undated manuscript). Girod and Gautier worked in the area of Châtelperron at the end of the 19th century. Delporte himself dismissed the idea that Girod excavated in Grotte des Fées. However, during our own research we came across the following reference to such an excavation in the Bulletin de la Société d'Emulaiton du Bourbonnais from 1921: "*Le colonel de Châtelperron a donné à M. Gauthier [sic], directeur du Muséum de Clermont-Ferrand, l'autorisation de faire des fouilles à la Grotte des Fées*" (Dumont 1921: 286).

During February and March 2017, two of the authors (HW, HF) visited the three institutions in which the lithic artifacts from Châtelperron are housed today: The British Museum in London, the Musée Anne de Beaujeu in Moulins and the Musée d'Archéologie Nationale in Saint-Germain-en-Laye. The lithic assemblages in all three institutions were recorded in databases and important tools were drawn and photographed. These data constitute the basis for the following analysis.

CHÂTELPERRONIAN TECHNOLOGY

The Châtelperronian industry is commonly seen as being "Upper Paleolithic" in nature (Bordes et al. 2011: 12–14; Lucas et al. 2003: 289; Soressi and Roussel 2014: 2680). This view stems from several observations: a) Châtelperronian core reduction centers on the serial production of blades; b) these blades are often produced using *pierre tendre* ("soft-stone" percussion) or soft hammer percussion; c) there exists little or no regular flake production; d) apart from Châtelperronian points, the most common Châtelperronian tool types are usually associated with the Upper Paleolithic (i.e., endscrapers, burins, laterally retouched blades, etc.); and e) in some sites, there exist organic tools and symbolic artifacts, commonly associated with industries created by anatomically modern humans (AMH) (Bordes et al. 2011: ibid.). For these reasons, the Châtelperronian could easily be classified as the work of AMH, were it not for the discovery of Neanderthal remains associated with the Châtelperronian of Saint-Césaire (Vandermeersch 1984; Mercier et al. 1991) and Grotte du Renne in Arcy-sur-Cure (Hublin et al. 1996; Welker et al. 2017). Much debate surrounds the issue of whether or not these skeletal remains and the organic artifacts are really correlated with the Châtelperronian, or whether these findings are just the result of stratigraphic disturbance (see Soressi and Roussel 2014: 2682; Higham et al. 2010; Mellars 2010; Caron et al. 2011; Higham et al. 2011; Zilhão et al. 2011; but also, Welker et al. 2017); in the case of the skeleton of Saint-Césaire, the attribution to the Châtelperronian has been refuted by a recent study. The authors conclude "the Neanderthal-Châtelperronian association at Saint Césaire should be considerable [sic] unreliable at best" (Gravina et al. 2018: 10).

Blade technology

Châtelperronian blade cores have been intensively studied, e.g., at Grotte du Renne in Arcy-sur-Cure (Connet 2002), Roc-de-Combe (Pelegrin 1995) and Quinçay (Roussel 2011). Although the various authors employ different methods and terminologies in their work, the overall concept of the core reduction is strikingly similar for all of the analyzed sites. Roussel and Pelegrin concur that the Châtelperronian core technology focuses on the reduction of at least two perpendicular surfaces, usually one broad and one narrow, but three or sometimes even four surfaces also occur. These surfaces are exploited one after another, starting from the natural or modified crest between them, in a reduction scheme that differs from the later Aurignacian or Proto-Aurignacian *semi-tournant* concept in that it consists of two (or more, depending on the number of surfaces exploited) independent reduction steps. If there is a modified crest, it is usually one-sided, creating an acute angle on the intersection of the surfaces (see Roussel 2011 for more detail). During the core reduction, the angle between the surfaces tends to become more obtuse. To restore this angle, the reduction of so-called "*éclats envahissants laminaires*" (or "laminar rejuvenation flakes"; Roussel 2011: 108; Roussel et al. 2016: 17; see also Rios-Garaizar et al. 2012; Baillet et al. 2014) is necessary. These were sometimes used as blanks for Châtelperronian endscrapers (see below).

In his dissertation, Roussel (2011) was able to show that the Châtelperronian method of blade production led to greater quantities of asymmetrically shaped blades. These blades have a natural back, which consists either of cortex, remains of a primary or secondary crest, or of a blade scar which is oriented perpendicular or almost perpendicular to the ventral side of the blade. At Quinçay, around one out of four blades displayed such asymmetry. For Roc-de-Combe, Pelegrin (1995: 252) states that core preparation was usually executed by hard hammer percussion; while soft or soft stone hammer percussion was used for the blade production itself. Soft stone percussion is identified by him as the predominant method of blade reduction (Pelegrin 1995; Pelegrin and Soressi 2007).

Flake technology

There are various accounts of the existence of formal flake production in the Châtelperronian. In the case of Roc-de-Combe, Pelegrin (1995) has argued that all existing flakes are simply by-products of blade production, since he did not identify any flake cores in the assemblage. At Quinçay, there exist nine cores (of a total of 452 cores) which show only unorganized or centripetally produced flake scars (Roussel et al. 2016: 16–17). In comparison, there are 363 blade cores and 51 bladelet cores from the site. In contrast to those two sites, Connet (2002) identified centripetal, polyhedral and discoidal core concepts for the Châtelperronian at Arcy-sur-Cure, which she described as follows: "*Dans le Châtelperronien d'Arcy, la produc-*

tion d'éclats par gestion centripète du débitage nous apparaît plutôt résulter de l'exploitation opportuniste d'une surface non préparée, en liaison avec une économie de la matière première qui entraîne une surexploitation du silex" (Connet 2002: 399). She continues: "*Les nucleus polyédriques sont le résultat d'une surexploitation conduisant à la déstructuration de l'architecture d'un volume initial qui a pu être construit au départ comme laminaire*" (Connet 2002: 400). Flake cores make up almost one third of all cores in Grotte du Renne (264 out of 988, 26.7%; after Connet 2002: Table 69). For the moment, therefore, it seems that there is no clear consensus as to what part flake production played in the overall lithic technology of the Châtelperronian.

Bladelet technology

Châtelperronian bladelet production was first described for the Châtelperronian layers of Roc-de-Combe and La Côte (Pelegrin 1995), but as Roussel (2014: 496) puts it: "*cette production reste anecdotique, identifiée sur la base de quelques nucleus de petites dimensions qui peuvent être le résultat d'un processus de reduction des nucleus à lames.*" If the cores from these two sites are discounted, then the only remaining evidence of bladelet production in the Châtelperronian comes from Quinçay, where 51 bladelet cores and 40 retouched bladelets where identified in the three Châtelperronian layers. Roussel (ibid.) describes them as independent from the blade production, meaning there is no reduction from blades to bladelets on one core. From a technological point of view, however, the reduction concept for bladelets is analogous to the one for blades. Bladelet cores are generally of prismatic shape and produced on blocks or flakes. As with blade cores, most of the bladelet cores are reduced on at least two adjacent surfaces, usually one broad and one narrow. Of the 40 retouched bladelets from Quinçay, 30 display inverse marginal retouch, consistent with the definition of Dufour bladelets belonging to the Dufour sub-type (Roussel 2014).

Châtelperronian points

Châtelperronian points or knives are defined by Sonneville-Bordes and Perrot (1956: 547, artifact #46) as tools made on blades that are either short and thick, or long and thin, with a steeply retouched, curved back and an asymmetrically retouched offset tip. The same authors differentiate between these kinds of points, which they call typical Châtelperronian points, and atypical Châtelperronian points (artifact #47). To be classified as atypical, a Châtelperronian point needs to be a) non-continuously backed, b) thinly backed, or c) lacking an offset tip.

However, we have decided not to apply this distinction between typical and atypical Châtelperronian points in our research, as the continuity of the retouch does not change the overall usability or form of the tool. Applying this distinction seems simply to create arbitrary boundaries

between one and the same tool type, with the only difference being the amount of time spent on retouching the back. Roussel et al. (2016: 20) argued that the "backing on Châtelperronian points is thus not only the result of retouch, but is also conceptually embedded in the blade production process." Châtelperronian points are often among the most numerous tool types in Châtelperronian assemblages (Baffier 1999: 62; Soressi and Roussel 2014: 2685), and the core reduction seems to be aimed at producing a high number of asymmetrical blades. The idea that these asymmetrical blades were specifically produced to simplify the manufacturing of Châtelperronian points seems, therefore, not to be far-fetched. If this is the case, the so-called typical and atypical Châtelperronian points are both part of the same *chaîne opératoire*, and making a distinction between them is thus unnecessary.

Châtelperronian endscrapers

Châtelperronian endscrapers were first described by Demars and Laurent as endscrapers retouched "*sur large éclat épais présentant un front de grattoir plutôt étendu*" (Demars and Laurent 1989: 154). The retouch is less pronounced than in later Aurignacian assemblages, and they are often created on laminar rejuvenation flakes, which show "*soit des négatifs laminaires parallèles ou subparallèles* (…), *soit des négatifs d'éclats envahissants antérieurs* " on their dorsal surface (Roussel 2011: 108).

THE CHÂTELPERRONIAN OF GERMOLLES

The first mention of an intact Châtelperronian layer in Germolles was made by Jean Combier in 1959 (see above; Floss et al. 2016). A large part of our own work has focused on verifying this observation; however, during the excavations carried out from 2006 to 2013, no intact Châtelperronian layers could be found. This was mainly due to the long research history and subsequent destruction of a large part of the stratigraphy. Despite these problems, in 2014 we were finally able to find a layer of red sediment in which a Châtelperronian point was embedded (Fig. 3) (Würschem and Floss 2022).

This intact Châtelperronian layer at Germolles, Layer (GH) 40, was dated on a horse molar to around 49,600 ± 3900 uncal BP (AMS-14C), a date which is considered to be quite early. Since only a small part of the layer was preserved for excavation, no further datable material could be unearthed. The lithic assemblage from GH 40 consists of 48 pieces (40 of them < 1 cm), of which the most important artifacts are the previously mentioned Châtelperronian point and one large crested blade. Most Châtelperronian tools from Germolles originate from disturbed contexts or from old excavations. Since its discovery in 1868, the site has yielded a total of 48 Châtelperronian points, 27 of which were uncovered by old excavations: 17 pieces originate from Méray's excavation (1868), 7 from Gros's excavation (1951-1952), one from Delporte's excavation (1953-

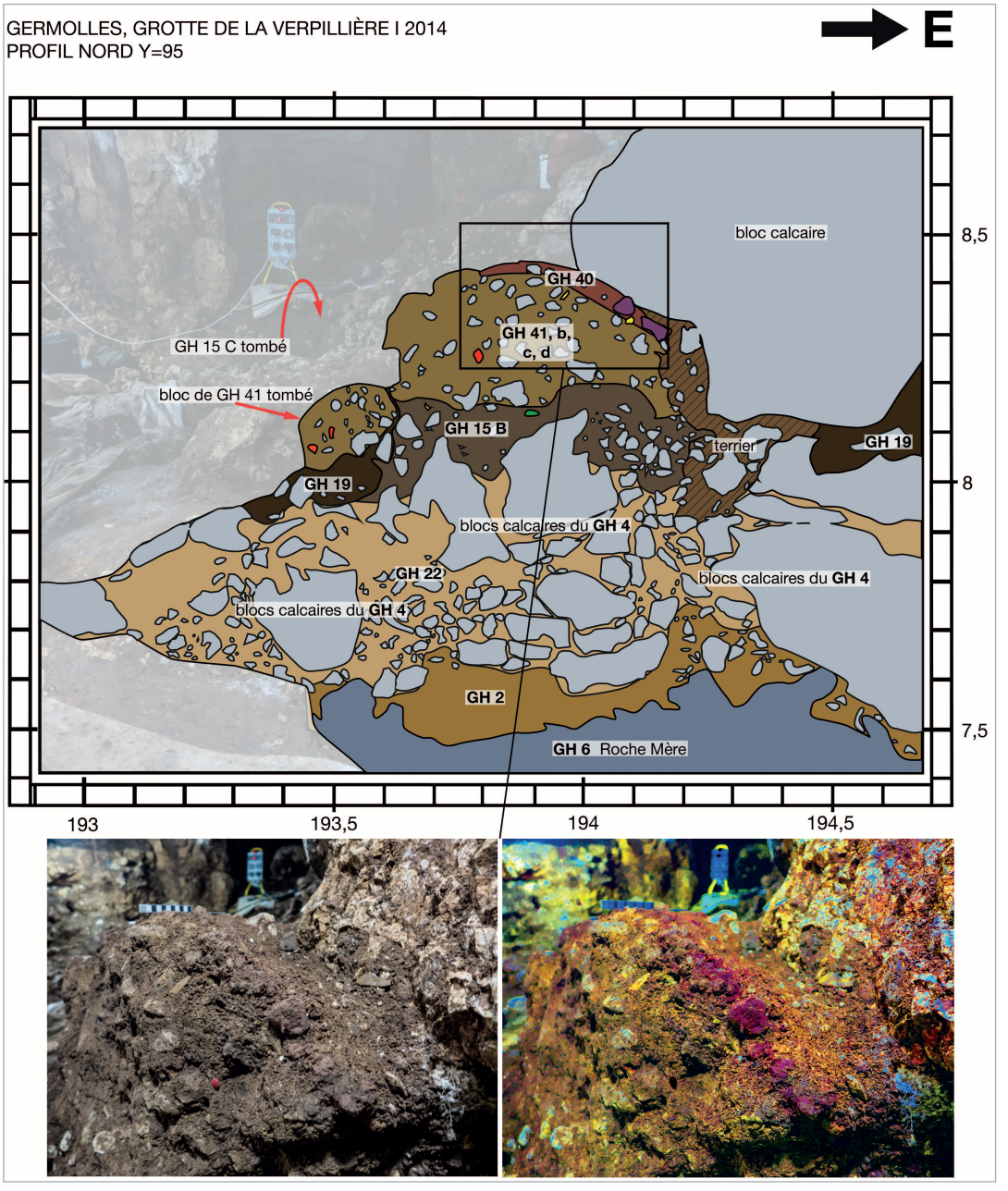

Fig. 3.
Grotte de la Verpillière I, the Châtelperronian layer GH 40 in its stratigraphical context. Above: profile image based on photogrammetry. Bottom left: Photograph of layer GH 40. Bottom right: Photograph of Layer GH 40, modified by DStretch software. The red coloration of the Châtelperronian layer is highlighted by color-shift (Floss et al. 2016: Fig. 3).

1955), and one from the surface collection carried out by Thevenot (1956-1957). A further 21 were discovered during our own excavations (Floss et al. 2016). Through analysis of the lithic inventory from Germolles, we have identified at least 11 cores which fit into a Châtelperronian context, as well as knives of Abri Audi type and asymmetrically produced blanks (Fig. 4), which are considered to be a desired form of blank in the Châtelperronian (Fig. 5) (Floss et al. 2016; Roussel 2011). The intact layer may be limited in extent, but it is nevertheless clearly situated between Mousterian layers (GHs 15 B, 41 B, 41 C and 41 D) and an Aurignacian layer (GH 15c).

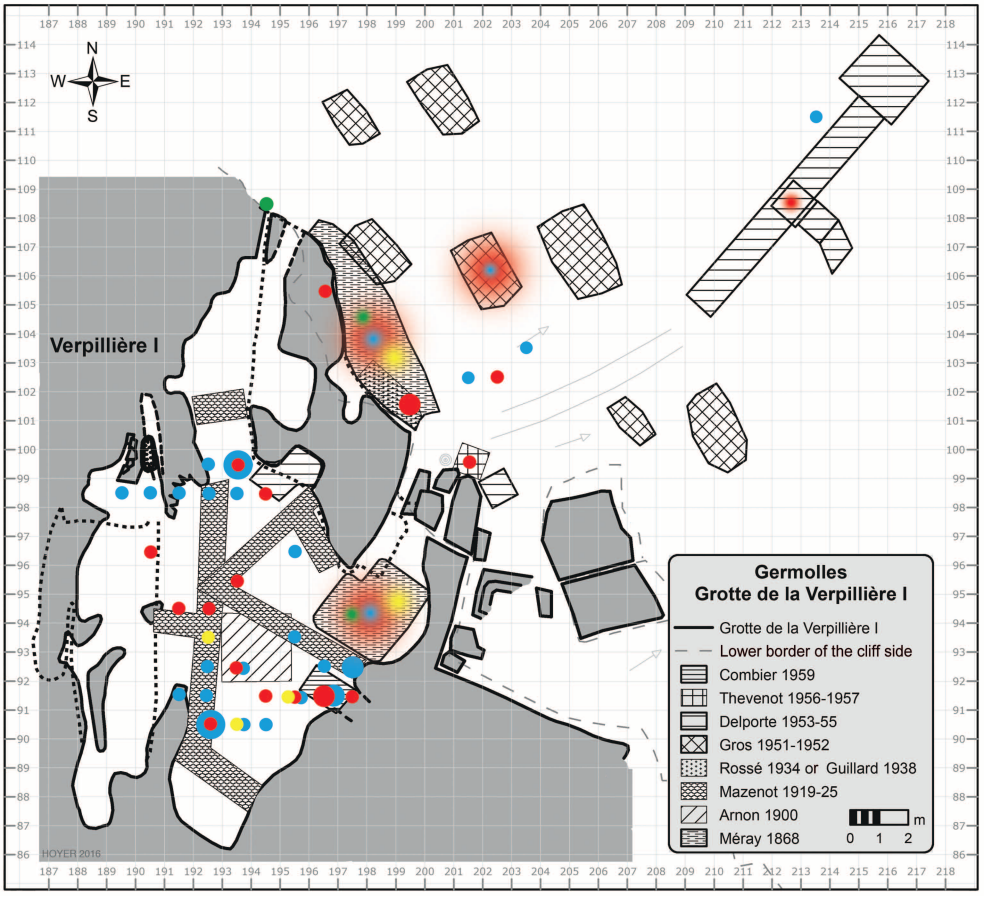

Fig. 4. above
Site plan of the Grotte de la Verpillière I. Squares recently excavated by the Tübingen University team and the areas of old excavations are marked. Distribution of the Châtelperronian artifacts: red: châtelperronian points, blue: blanks (blades), yellow: cores, green: knives. The diameter of the symbols reflects the number of pieces, ranging from 1 to 8 (image: C. Hoyer).

Fig. 5. right
Grotte de la Verpillière I, selection of asymmetrical (naturally backed) blades. Depicted are blades with backs formed by cortex, a primary or secondary crest and a negative. 1,5,7: Méray excavation; 2-3,6, 8-9: Tübingen excavations; 4: Gros excavation (image: H. Würschem).


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Fig. 6. right
Grotte de la Verpillière I, Châtelperronian points. 1: Tübingen excavations; 2,4, 6-9: Méray excavation; 3,5: Gros excavation (image: H. Würschem).

Châtelperronian points

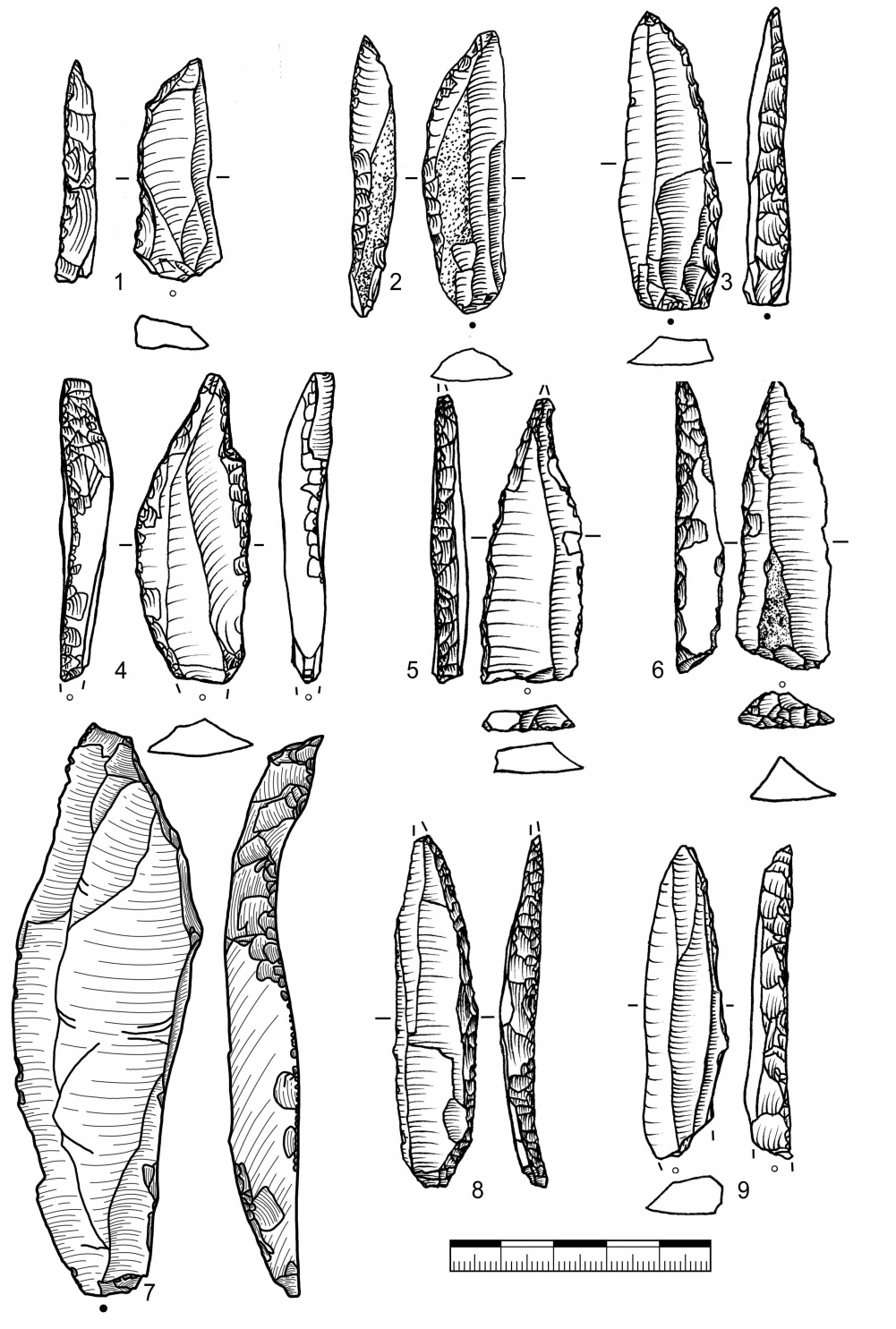
Of the 48 Châtelperronian points from Grotte de la Verpillière I (Fig. 6), 41 pieces (85.4%) were made from local raw material, i.e., flint from *argiles à silex* (flint bearing clays). This material is very common in the Côte Chalonnaise, and it is the predominant raw material (with an abundancy of over 95%) used throughout the Paleolithic in Germolles, (Hoyer et al. 2016: 158). Relatively speaking, the quantity of exotic raw material belonging to the Châtelperronian seems somewhat elevated. This exotic material consists of two pieces made from *chaille rose*, four pieces made from non-identified flint and three more from tertiary flint presumably from the Mont-lès-Étrelles region of the Haute-Saône, situated some 120 km north-east of Germolles. These last points were very likely brought to the site as finished tools, since no cores and hardly any debitage debris of this raw material occur in the lithic assemblage from the site. This would suggest that the Châtelperronian people ventured approximately 100 km further east of Germolles, which at the moment is the eastern-most confirmed site.

Thirty-eight Châtelperronian points (79.2%) display unidirectionally removed blade scars on their dorsal side; the other 9 (18.8%) were produced in the context of bidirectional blade production. Of the 20 pieces where the blank is intact, 12 (60%) were struck using soft hammer percussion, 1 (5%) using *pierre tendre*, and 7 (35%) using hard hammer percussion. Regarding the backing of the Châtelperronian points, no clearly preferred side could be identified. The ratio between points that are backed on the left side and those backed on the right side is 60.4% to 39.6% (29 on the left to 19 on the right), showing only a minor tendency towards points backed on the left. This makes sense, since the cross section of most Châtelperronian points shows transversal symmetry, meaning that the longitudinal orientation of the tool does not make a difference to its usability.

Eleven (23.4%) pieces bear impact fractures or possible impact fractures, such as crushing, cone fracturing and pseudo-burin fracturing, and on 5 pieces (10.6%) the point was retouched on the basal part of the blank.

A surprisingly high number of Châtelperronian points feature only a partially retouched back, with 22 pieces produced on asymmetrical blades. This amounts to more than three quarters of all unearthed Châtelperronian points (45.8%) even though these types of blanks usually only constitute around a fifth of all blades produced (Roussel et al. 2016: 18). In the case of 15 (68.2%) of these artifacts, the back is partially formed by a negative, in three (13.6%) by remains of a primary or secondary crest, and in 4 (18.2%) by cortex.

The mean length of all intact Châtelperronian points (n=21) is 5.61 cm ± 1.44, with an elongation index (length to width) of 2.99 ± 0.50; the mean width of all points is 1.73 cm ± 0.36 and the thickness is 0.66 cm ± 0.19, with a robustness index (width to thickness) of 2.82 ± 0.846.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At the time of writing, no Châtelperronian endscrapers could be identified in the Germolles assemblage, and there are only three knives of the Abri Audi type, which could be associated with the Châtelperronian.

Cores

Although no cores were found in the stratified Châtelperronian layer, it was possible to retrieve several cores from the disturbed material; these fit into the typical reduction schemes described above (Fig. 7) (see Floss et al. 2016).

Five of the exhausted cores have one remaining surface, five more show one broad and an adjacent narrow reduction surface and only one core was reduced on three surfaces, two broad and one narrow. Unidirectional reduction was used on all eleven cores, although sometimes a second striking platform is present. It was, however, only used for the restoration of the core volume, not to produce blanks. Three cores also display a negative of what we believe to be a laminar rejuvenation flake, among them two two-sided cores and the three-sided core.

Furthermore, four cores are very small in size, with very narrow blade scars. Since our distinction between blades and bladelets is set at a width of 1 cm, and since they also show clear blade scars which suggest that their small size is a result of extensive core reduction, we decided not to define them as bladelet cores. However, without a fully reconstructable *chaîne opératoire*, this deduction is open to debate.

THE CHÂTELPERRONIAN OF CHÂTELPERRON

The corpus of lithic artifacts from the Grotte des Fées consists of 3643 pieces of silex, which originate from three excavations and which are distributed in three main institutions. The Bailleau collection is split into two parts, one of which is housed in the British Museum in London, the other in the Musée Anne de Beaujeu in Moulins. This latter part of the collection has recently been augmented by a donation of artifacts from the diocese. More lithics belonging to the Bailleau collection can be found in the Musée d'Archéologie Nationale (MAN) in Saint-Germain-en-Laye, where the most important collection from Grotte des Fées is also housed, namely the corpus from Delporte's excavation. It consists of around 3000 lithic artifacts. In the year 2000, these lithics were the subject of a Master's thesis produced by Blandine Depraetere; this thesis is unpublished but can be consulted in the MAN (Depraetere 2000).

The Poirrier collection consists, to our knowledge, only of faunal remains and some organic artifacts, and has therefore not been included in our analysis. It is currently housed in the Museum of the University of Pennsylvania and in the Academy of Natural Sciences in Philadelphia.

As part of a recent Master's thesis (Würschem 2017), the Châtelperronian artifacts from Châtelperron have been re-evaluated. A total of 72 Châtelperronian points have been identified: 26 in the British Museum,

Fig. 7.
Grotte de la Verpillière I, cores. 1, 3, 5, 7, 9-11: Méray excavations,
2: Pelatin collection; 4, 6, 8: Tübingen excavations (Floss et al. 2016; Fig. 13).

Type	n	%
Châtelperronian point	70	13.3
Retouched blade	60	11.4
Laterally retouched piece	56	10.6
Retouched flake	53	10
Burin	50	9.5
Endscraper	47	8.9
Backed piece	39	7.4
Sidescraper	21	4
Truncated piece	17	3.2
Châtelperronian endscraper	15	2.8
Truncated piece, oblique	14	2.7
Retouched bladelet	15	2.8
Notched piece	11	2.1
Splintered piece	11	2.1
Denticulated piece	9	1.7
Dufour bladelet	8	1.5
Biface	8	1.5
Retouched point	7	1.3
Borer	7	1.3
Carinated piece	4	0.8
Aurignacian endscraper	3	0.6
Aurignacian blade	3	0.6
Total	528	100

Table 1.
Châtelperronian tool-types from Châtelperron.

11 in the Musée de Moulins and 35 in the MAN. Other tool types include predominantly laterally retouched or backed blades, endscrapers, burins and truncations (see Table 1).

Châtelperronian Points

Of the 72 Châtelperronian points which have been identified in the assemblage from Grotte des Fées (Fig. 8), 58 (80.6%) are made using the local raw material from Tilly flint, which was first identified by Bailleau in the 19th century in the course of his work on the site of Saligny (Saligny-sur-Roudon). Delporte later analyzed Bailleau's collection and described the raw material from Tilly as having "*un aspect jaspé très esthétique, avec des nuances de rouge, de blanc, de vert, qui tiennent à la presence d'oxydes minéraux*" (Delporte 1999: 21). Tilly is located less than 5 km from Châtelperron.

Other types of raw material also occur in the assemblage, such as a grey or white flint which, according to Delporte (ibid.), originates from Berry. A number of quartz and quartzite pebbles originating from Graveron river gravels were also used, as well as a type of amethyst with very poor knapping qualities.

Dorsal blade scars indicate a unidirectional method of extraction for around three quarters of the Châtelperronian points. Soft hammer percussion was the predominant method of blank production, with around 70% of blanks produced by this method. Some 15% show signs of soft stone percussion, and only one Châtelperronian point was produced using hard hammer percussion. In 30 pieces (42.9%) the back is situated on the left side and in 40 (57.1 %) on the right, relative to the orientation of the Châtelperronian point and not the blade it was produced on. This is important, since on 15 Châtelperronian points (21.4 %) the tip was retouched on the basal part of the blank.

There are impact scars, or possible impacts scars, visible on 10 (14.3%) Châtelperronian points. However, since the assemblage consists of artifacts from older excavations, there is quite a high degree of modern abrasion and breakage. This complicates the identification of impact features.

Thirty of the Châtelperronian points display non-continuous backing, with part of the back constituted by either a negative (20 pieces, 66.7%), a primary or secondary crest (4 pieces, 13.3%) or by cortex (6 pieces, 20%). They are retouched on asymmetrical blanks (Fig. 9).

Fig. 8. right
Châtelperron. Grotte des Fées, 1 to 11: Châtelperronian points (image: H. Würschem).

The intact Châtelperronian points (36 pieces, 51.4%) have a mean length of 5.4 cm ± 1.1. The mean width of all pieces is 1.78 cm ± 0.38 and the thickness is 0.63 cm ± 0.24, with an elongation (ratio of length to width) of 3.03 ± 0.36 (n=36) and a robustness (ratio of width to thickness) of 2.8 ± 0.79.

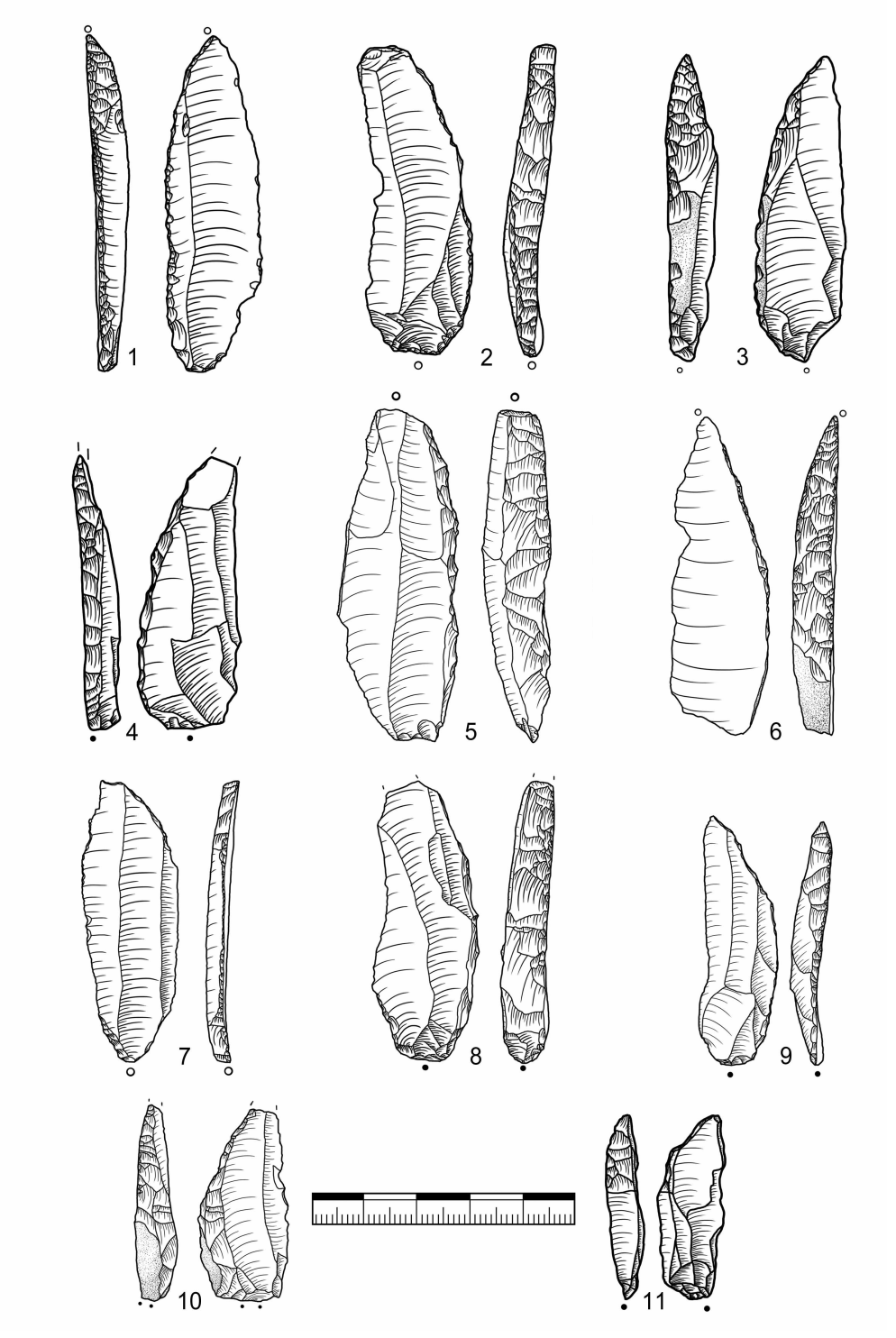
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Fig. 9. right
Grotte des Fées, selection of asymmetrical (naturally backed) blades. Depicted are blades with backs formed by cortex (7 to 8, 10), a primary or secondary crest (1, 5-6), and a negative (2-4, 9 and 11) (image: H. Würschem).

Châtelperronian endscrapers

Fifteen of 65 endscrapers from Châtelperron can be classified as Châtelperronian endscrapers after Demars and Laurent (Fig. 10) (1989: 154). They are all made on relatively narrow flakes, which usually display dorsal blade scars. The raw material used is Tilly flint. Some of these endscrapers are retouched on laminar rejuvenation flakes as defined by Roussel (2011: 108; see above).

Furthermore, there are 13 endscrapers with a broad, semi-circular front as described for some Châtelperronian endscrapers from Quinçay (Roussel et al. 2016: 17). This working edge is sometimes retouched laterally or on several edges, but always forms a very distinct semi-circular endscraper front, which cannot be mistaken for a sidescraper edge. They too are made using the local raw material from Tilly.

Dufour bladelets

Eight bladelets from Châtelperron show marginal inverse retouch, which is consistent with the definition of Dufour bladelets of the Dufour subtype (Fig. 11). Since their find-context is ambiguous, their attribution to the Châtelperronian is provisional. In earlier analyses of the inventory, these bladelets where usually seen as distinct markers for the presence of an Aurignacian intermixture in the Châtelperronian. In light of the finds from Quinçay (see above), this view must be revised, which is why they are mentioned here as potential Châtelperronian artifacts.

Half of the Dufour bladelets feature retouch on their left side, the other half on the right. The raw material used to produce the bladelets differs from the one usually used to produce blades. This has previously been viewed as an indication that these artifacts do not belong to a Châtelperronian but rather an Aurignacian context. It is, however, also possible that the brown, homogeneous raw material which was used for two bladelets was chosen for bladelet production due to its superior knapping properties. There exist bladelet cores of the same raw material, but their attribution to the Châtelperronian is ambiguous.

Cores

Blade cores

Of a total of 101 cores existing in the assemblage from Grotte des Fées (including Mousterian artifacts and those of younger technocomplexes), at least 46 blade cores fit into a Châtelperronian core reduction concept


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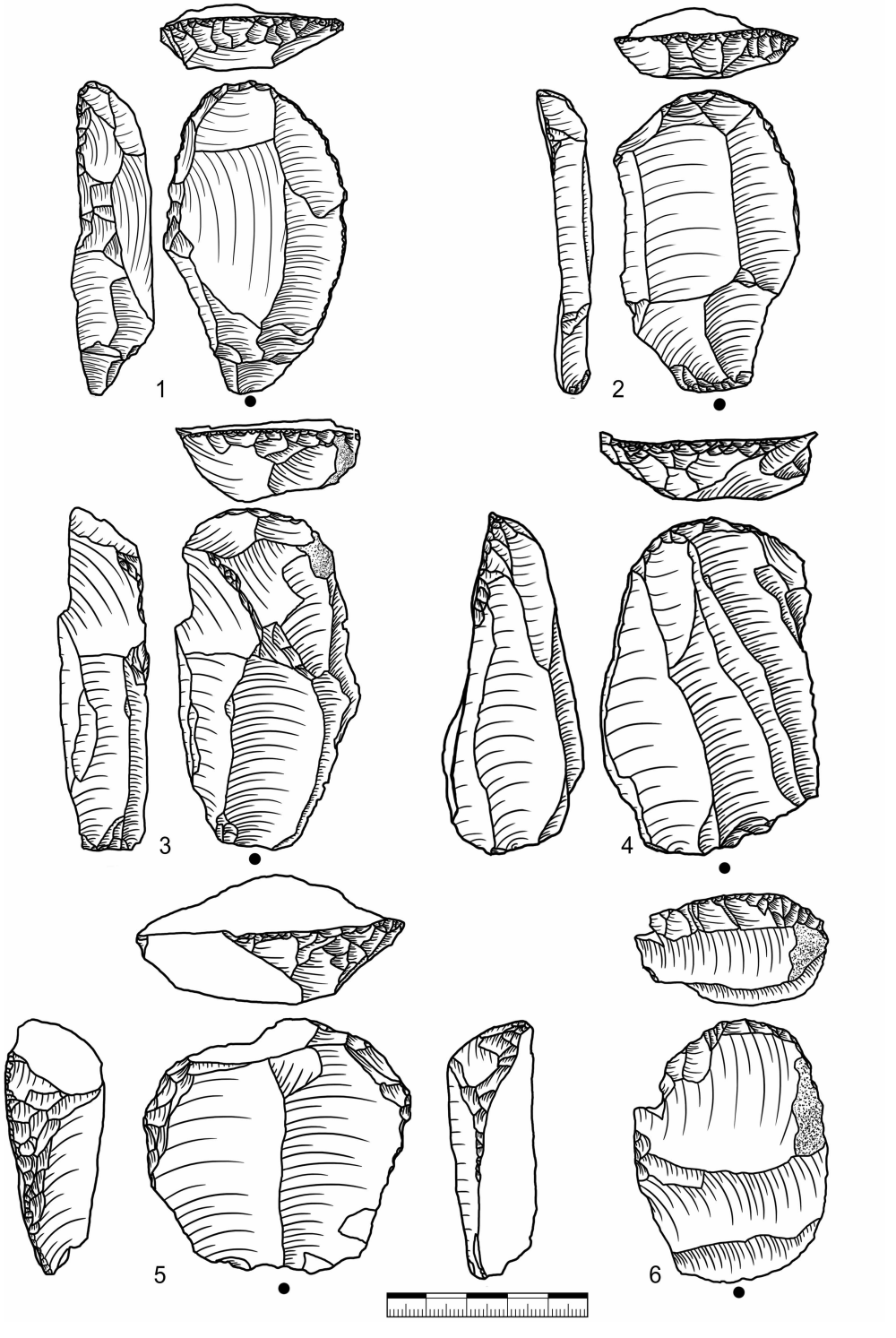
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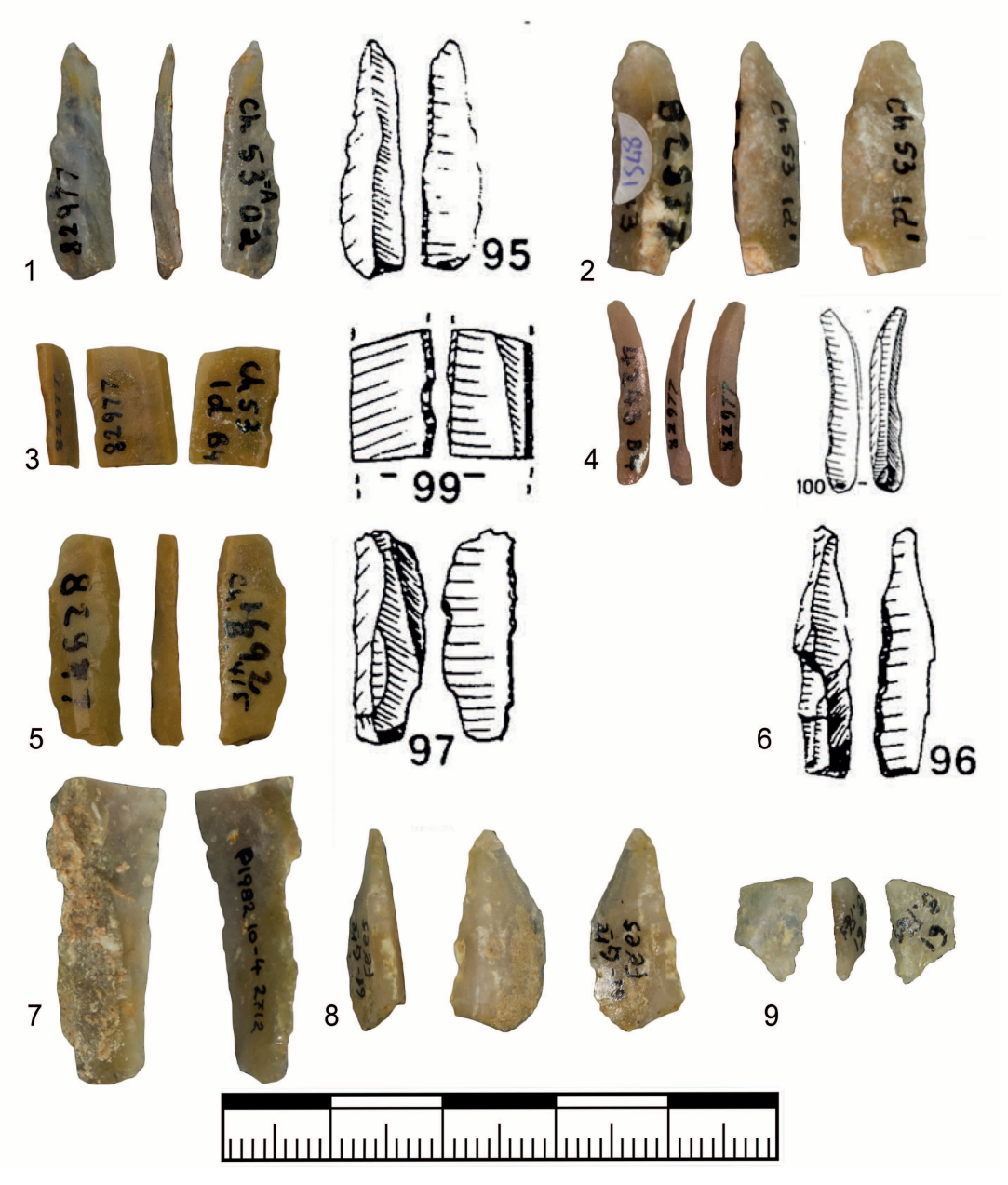
Fig. 10. left
Châtelperron. Grotte des Fées, 1 to 6: Châtelperronian endscrapers (drawings: H. Würschem).

Fig. 11. below
Châtelperron. Grotte des Fées, 1-9: Dufour-bladelets. Nr. 6 only after depiction by Delporte (drawings with the numbers 95-97 and 99-100: Delporte n.d.; photos and drawings: H. Würschem).



(Fig. 12). All of these are of prismatic shape. Thirty-six (78.3 %) are made of the raw material from Tilly, nine (19.6 %) of different types of grey flint, and a single core (2.2 %) was made from brown jasper.

Cores reduced on two surfaces, as described by Roussel (2011), are the most numerous core type, constituting around three quarters of the blade cores present (n=21, 45.7%). They are followed by cores reduced on three surfaces (n=13, 28.3%) and exhausted blade cores with only one remaining surface (n=11, 23.9%). Only one core (2.2%) is reduced on four surfaces. The two-sided cores are usually reduced on one narrow and an adjacent broad surface.

The one-sided cores all show a natural or prepared back. Two of them are bidirectionally reduced, the remaining nine unidirectionally. The two-sided cores show more variation, with 12 of 21 being reduced unidirectionally and 7 bidirectionally. The remaining two pieces exhibit two platforms and bidirectional reduction, but the reduction of each surface remained unidirectional.

Different types of three-sided cores were observed. Four of them were reduced on two broad surfaces and a narrow one, six on two narrow surfaces and a broad one. For the three remaining cores the original surface size could not be deduced. The four-sided core was initially reduced on three sides, but was later turned and the knapping platform was used as a fourth reduction surface.

Unidirectional and bidirectional core reduction are represented in similar proportions, with 27 (58.7%) unidirectionally and 19 (41.3%) bidirectionally reduced cores. However, eight of the latter display a method of bidirectional core reduction in which each individual surface is reduced unidirectionally. This has been described at Quinçay as an often-used method in the case of three-sided cores (Roussel et al. 2016: 20); it results in blanks featuring only dorsal scars indicative of unidirectional blade production. In Châtelperron too, out of the eight cores (17.4%) where this reduction method is used, six are three-sided.

Bladelet cores

Besides these blade cores, there also exist eight bladelet cores, six of which have been attributed to the Châtelperronian (Fig. 13, 1-6). Of these six, five were produced on flakes, with two showing bladelet reduction on the flank and the ventral surface of the flake, the other three only on the flank. This translates to a reduction on two surfaces (one narrow, one broad) for the former group and on one surface (one narrow) for the latter. Reduction on three surfaces is absent in the bladelet cores from Châtelperron. Three show two surfaces, a narrow one and an adjacent broad one, and the remaining three exhibit only one narrow surface. One of the bladelet cores is pyramidal. All were reduced unidirectionally.

Fig. 12.
Châtelperron. Grotte des Fées, 1-8: blade cores
(photos: H. Würschem).


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Fig. 13. left
Châtelperron. Grotte des Fées, bladelet cores 1-5: bladelet cores on flakes; 1-2 and 6: bladelet production on narrow and broad surface; 3-5: bladelet production primarily on narrow surface; 7: probably Aurignacian bladelet core (photos and image: H. Würschem).

COMPARISON

The sites of Germolles and Châtelperron share topological aspects as well as resemblances in their lithics, especially in terms of the Châtelperronian points, and they also share a long research history. First discovered and excavated in the 19th century, they played an important part in the early process of establishing a chronology for the Paleolithic period, and they were compared to each other early on by Henri Delporte (1955b). Geographically, both sites are located on a north-south extending cliffside, opening towards a small tributary river: the Orbize and Graveron, respectively. The Graveron flows into the Besbre, which itself is a tributary of the Loire, while the Orbize flows into the Saône. In Germolles there are two collapsed rockshelters, at a height of 215 m asl; at Châtelperron the site consists of three collapsed caves at a height of 250 m asl (Fig. 14). At both sites, the transition between the Middle and Upper Paleolithic is documented, with a Mousterian layer underlying the Châtelperronian. The Aurignacian as well as younger technocomplexes are well represented in Germolles, while in Châtelperron we find mostly isolated occurrences. The linear distance between the two sites is about 100 km.

Fig.14.
Situation of the Grottes de la Verpillière ensemble (above) and the Grotte des Fées ensemble (below). Upper photo by Jean Combier; lower photo after Zilhão et al. 2008: Fig. 2.

At both Germolles and Châtelperron, the most frequently used raw material was sourced locally. For Germolles, the preferred raw material is flint from the *argiles-à-silex*, several outcrops of which exist within 5 km of the site. For Châtelperron, it is Tilly flint, which also occurs less than 5 km away. Both raw materials constitute around 80% of the Châtelperronian lithic assemblage. It must be stated, however, that in Germolles anything less than 90% of flint from the *argiles-à-silex* should be seen as a comparatively small quantity.

Concerning the lithics, Châtelperronian points are an obvious point of comparison between the various Châtelperronian sites, as they are usually among the most numerous and best studied tool types. We will start with a comparison between the points from Châtelperron and Germolles, for which we have been able to record our own attributes. These are summarized in Table 2. It must be stressed that the total number of Châtelperronian points from both sites is below the statistically significant quantity. However, strong similarities are still visible, which we do not believe to be

Table 2.
Comparison between the attributes of Châtelperronian points from Germolles and Châtelperron.

Attributes		Germolles (n=48)		Châtelperron (n=70)	
		n	%	n	%
Raw material	Local	41	85.4	56	80
	Exotic	7	14.6	14	20
Core reduction	unidirectional	38	79.2	52	74.3
	bidirectional	9	18.8	16	22.8
	unknown	1	2.1	2	2.9
Percussion method	Soft hammer	12	60	18	69.2
	Hard hammer	7	35	1	3.9
	Soft-stone hammer	1	5	4	15.4
	Unknown	0	0	3	11.5
	Total	19	40.4	26	37.1
Atypical Châtelperronian points	Cortex	4	18.2	6	20
	Negative	15	68.2	20	66.7
	Crest	3	13.6	4	13.3
	Total	22	45.8	30	42.9
Point retouched on basal part of the blank		7	14.6	15	21.4
Side retouched	Right	19	39.6	40	57.1
	Left	29	60.4	30	42.9
Impact scar or possible impact scar		11	22.9	10	14.3

the result of chance. Where it is possible, we will also use comparisons with the very rich Châtelperronian site of Grotte du Renne of Arcy-sur-Cure, which lies about 130 km north of Châtelperron and about 120 km north-west of Germolles, as well as the well-studied and published site of Grande Roche de la Plématrie in Quinçay, which lies further west, about 350 km to the west of Germolles and around 260 km west of Châtelperron.

The most striking similarity between Châtelperron and Germolles is the large quantity of so-called atypical Châtelperronian points present on both sites. In Germolles and Châtelperron around three-quarters of all Châtelperronian points are visibly created on asymmetrical blanks. Assuming that the core reduction scheme at the two sites is comparable to that at Quinçay— which our analyses of the cores imply—this number exceeds the estimated number of asymmetrical blanks created during the core reduction (around 20% asymmetrical blanks; Roussel et al. 2016: 18) and thus is not a result of chance, but indicates a preference on the part of

Châtelperronian flint knappers for these naturally backed blanks. In Quinçay, this preference is not as clearly evident. Instead, the amount of points produced on asymmetrical blanks varies between c. 18% and 25% in the three layers (Roussel 2011: 138).

Unidirectional core technology is the preferred method of reduction on both sites; at Châtelperron there was a preference for the use of soft hammer percussion, while at Germolles there seems to have been no clear preference. A small quantity of Châtelperronian points from both sites have their points retouched on the basal part of the blank; in the case of the artifacts from Grotte du Renne, Connet offers the following explanation: "*Cette inversion est observée lorsque la morphologie de la partie distale du support ne permet pas l'aménagement de la pointe, lorsqu'elle est trop épaisse, outrepassée, ou présente un profil trop courbe ou encore lorsqu'elle est trop fine, ne permettant pas la mise en place de la courbure de la pointe recherchée*" (Connet 2002: 370). She observed between 5 and 15% of such inversely struck points in the different layers. In Quinçay, the quantity varied between 10 and 15% in the three layers (Roussel 2011), which is also consistent with the findings from Germolles and Châtelperron.

No distinct preference can be seen in the backing of the Châtelperronian points at any of the mentioned sites. In Germolles, the ratio of points backed on the left side to those backed on the right is around 42.6% to 57.4%, while in Châtelperron 62.5% are backed on the right and 37.5% on the left. In Quinçay, the ratio is only known for the 107 complete Châtelperronian points and varies slightly from layer to layer, with 52% backed on the right to 48% backed on the left in Layer En, and 45% on the right to 55% on the left in Layer Em. Only Layer Ej shows a clear tendency for points backed on the left side (75% to 25%), but this layer contains a total of only eight complete Châtelperronian points (Roussel 2011: 154). In Grotte du Renne, where 380 Châtelperronian points have been found, "*(…) le dos se situe indifféremment à gauche ou à droite des supports*" (Connet 2002: 370).

In Table 3, the dimensions of Châtelperronian points from Germolles, Châtelperron and two layers from Quinçay are compared to each other. The mean length values lie between 5 and 6 cm, the widths between 1.5 and 1.9 cm and the thickness never exceeds 0.7 cm. These similarities clearly suggest strict standardization in the case of the Châtelperronian points; however, there still exist a few outliers (see especially Fig. 6, Nr. 7).

The remaining tools in the Châtelperronian inventories from Germolles and Châtelperron are harder to compare, since in the case of Châtelperron a strong pre-selection of tools and a loss of part of the inventory must be assumed, and in the case of Germolles there are no stratified tools from the intact layers. Nevertheless, some general conclusions can be drawn despite these problems. Laterally retouched blades, endscrapers and backed blades (including Châtelperronian points) constitute around 72% of all tool types in Châtelperron, which is relatively high compared to Quinçay, where they represent around 57% (after

	Châtelperron (n=70)	Germolles (n=47)	Quinçay Layer En (n=77)	Quinçay Layer Em (n=22)
Length (cm)	5,40 ± 1.10 (n=36)	5.61 ± 1.44 (n=21)	5.18 ± 1.39	5.42 ± 1.31
Width (cm)	1.78 ± 0.38	1.73 ± 0.36	1.56 ± 0.38	1,69 ± 0,39
Thickness (cm)	0.63 ± 0.24	0.66 ± 0.19	0.56 ± 0.19	0.53 ± 0.18
Elongation (length/width)	3.03 ± 0.36 (n=36)	2.99 ± 0.50 (n=21)	3.40 ± 0.8	3.30 ± 0.6
Robustness (width/thickness)	2.80 ± 0.79	2.82 ± 0.86	3.10 ± 0.9	3.40 ± 0.9

Table 3.
Dimensions of Châtelperronian points from Châtelperron, Germolles and Quinçay (metrics from Quinçay according to Roussel et al. 2016: Tab. 3).

Roussel et al. 2016: Table 2). The remaining tool types identified at Quinçay, such as truncations, burins, endscrapers, splintered pieces and sidescrapers are all represented in Châtelperron in comparable quantities; however, borers are almost entirely absent in Châtelperron, as are notches and denticulates.

CONCLUSION

Two of the sites representing the eastern-most extension of the Châtelperronian technocomplex have been discussed: The Grotte des Fées in Châtelperron and the Grotte de la Verpillière I in Germolles. They share a long and complicated research history, starting in the 19th century, and both played an important role in the genesis of our profession (Table 4). Despite the problems that arise from old excavated material, we were able to highlight indications for a strong standardization of the production of Châtelperronian points at both sites, from the general dimensions of the points to a similar strategy of raw material use and a strikingly similar approach to blank selection. In both Châtelperron and Germolles, asymmetrical, i.e., naturally backed blades, were preferably used to retouch Châtelperronian points, constituting around three quarters of all Châtelperronian points within the assemblage. Seeing as the Châtelperronian cores from both sites fit into the reduction scheme defined by Roussel (2011), the amount of such asymmetrical blades created during the core reduction should be approximately the same as that identified for Quinçay, around one in five blades. While in Quinçay the number of Châtelperronian points retouched on such blades is proportional to that number, it is far exceeded in Châtelperron and Germolles. The reason for this is unclear, but although the number of tools is lower than in Quinçay, we do not believe this to be the result of chance. The fact that in the Châtelperronian a method of core reduction was used that seemed to be specifically aimed at producing such asymmetrical blades—which, at times, already have the general shape and size of the finished tool—seems

	Germolles	**Châtelperron**
19th century	Discovery of the cave during road construction	Discovery of two caves during railway construction
	First excavation by C. Méray	First excavations by A. Poirrier and J.-G. Bailleau
1950s and 60s	Excavations by H. Delporte, Gros and Combier	Excavations by H. Delporte
Today	Excavations by the Tübingen University, discovery of intact Châtelperronian layers	Excavations by joint team SRA-DRAC Auvergne-Rhône-Alpes and Tübingen University

Table 4.
Comparison between the research history of Grotte de la Verpillière I and Châtelperron (after Dutkiewicz and Floss 2015; Delporte 1999; Depraetere 2000).

to us to be another indication for this standardization and a technology that is specifically aimed at producing Châtelperronian points.

Further research into the Châtelperronian of Eastern France has also been done during a recently finished dissertation (Würschem in prep.), which revisited the sites of Trou de la Mère Clochette, Frettes (Lamotte et al. 2014) and Grotte du Renne in Arcy-sur-Cure, among others.

Concerning the site of Châtelperron, there is considerable potential for future work. This includes an analysis of the faunal remains, which are principally housed in the Museum of the University of Pennsylvania and the Academy of Natural Sciences in Philadelphia, but also a continuation of our field work which was started in 2021. Delporte himself wrote: "*L'expérience montre qu'il est exceptionnel qu'un gisement préhistorique ait été totalement 'vidé' par les anciens fouilleurs*" (Delporte 1999: 10). While the existence of remaining intact sediments seems to be rather unlikely at the current time, it could be shown that the excavation of Delporte took place in sediments disturbed by earlier excavations and the building of the railway (Würschem et al. 2022).

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