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Early Efforts in Experimental Archaeology: Examples from Evans, Pitt-Rivers, and Abbott

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Experimental archaeology formally began more than 150 years ago with attempts in replicative flint knapping by well-known archaeologists such as Sir John Evans, Augustus (Lane Fox) Pitt-Rivers, John Lubbock, and Sven Nilsson (Coles, 1973). These individuals sought to discover how stone tools were made in order to better identify archaeological artifacts as the products of human manufacture and to understand the process by which they were made.

However, the history of experimental archaeology encompasses more than just attempts to replicate stone tools. It needs to be contextualized within debates about the antiquity of humankind and the development of archaeology as professional science.

> These early examples demonstrated a new scientific approach to the production of archaeological knowledge. By testing possible ways to manufacture replicas of artifacts or characteristics found on archaeological sites, Evans, Pitt-Rivers, and Abbott were able to interpret the archaeological record and the artifacts they found with increasing accuracy and nuance.

Archaeological Inquiry and Palaeolithic Archaeology

In the early years, those who participated in archaeology were frequently members of an aristocratic class and were concerned with merely collecting the relics of the past. These antiquarians often neglected archaeological provenience, explanation, and cultural context (Hudson, 1981, p.12; Trigger, 1989, p.14; Taylor, 1995). As the field grew in scientific rigor in the latter half of the 19th century, participants were more likely to have academic degrees or formal training. The discipline soon developed from mere acquisition of unique artifacts and fossils to a scientific understanding of the antiquity of humans, and specifically to scholarly arguments about Palaeolithic human occupation in Europe and America, which accelerated with the assistance of experimental archaeology (Coles, 1973).

In 1797, when John Frere found Acheulean hand axes in association with animal bones in the Hoxne lake deposits of Britain, at a depth of four meters, the report published by the Society of Antiquaries included the comment that they were from a remote, but undated, past (Heizer, 1962, p.71; Grayson, 1983; van Riper, 1993). A few decades later, in the 1830's through 1840's in the Somme Valley of France, Jacques Boucher de Perthes ignited debate when he found stone tools in association with Pleistocene fossils (1847; 1857). A decade later, in Britain, Charles Lyell and other well-respected geologists who had previously discounted evidence of humans during the Pleistocene, changed their beliefs largely due to participation in excavations of Brixham Cave in south-western England (Grayson, 1983; 1990; van Riper, 1993). A total of 36 possible stone tools were found during the excavation in 1858 and 1859, of which fifteen were believed to be indisputably of human manufacture, and all from secure stratigraphic contexts. Brixham Cave offered irrefutable evidence of human association with extinct Pleistocene mammals, and therefore a greater human antiquity than previously believed (Grayson, 1983; 1990; van Riper 1993).

Experimental Archaeology and Stone Tool Identification

Newly discovered Palaeolithic artifacts increased antiquarian interest in collecting stone tools of deep antiquity, and a market arose for Pleistocene fossils and associated lithics. The

Acheulean hand axe was emblematic of Palaeolithic occupation, but it also increased questions about the correct identification of lithic artifacts that were not so obviously human-made. A persistent criticism of alleged Palaeolithic finds was that the lithic artifacts were perhaps caused by natural weathering or rolling of flint nodules in glacial outwash. Were these rough flint chips and cores actually evidence of human behaviour? In order to address such questions, several 19th century archaeologists embarked on experimental efforts to understand flint knapping and the products of lithic reduction, leading to the earliest formal efforts in experimental archaeology.

Contemporaneous flintknapping practices provided a model. During the mid-19th century, a flintlock mechanism was still in use for pistols and rifles, meaning that there was an active gunflint industry that employed flintknappers who made them. Flintknappers in England and France produced relatively uniform flints for firearms often using metal hammers instead of hammer stones. However, even though the tools were not authentic to prehistoric times, the method of flaking stone was an obvious parallel to prehistoric technology. Observations of contemporaneous flintknappers in the mid-19th century provided ethnographic data for experimental flint knapping by archaeologists such as Sir John Evans, who became known as an expert at reproducing prehistoric lithics (Roberts and Barton, 2008; Lamdin-Whymark, 2009).

Because archaeology in the 19th century focused so heavily on collecting unique and interesting artifacts, rather than scientific excavation, it created a fertile market for forgeries. Most forgers remained anonymous, but one – Edward Simpson, known as “Flint Jack” - became infamous, in part because he was frequently caught. Once his reputation became well known, and he was no longer able to sell fraudulent Palaeolithic artifacts, he made a living conducting flint knapping demonstrations for the public and sold replica spear points made of bottle glass. However, he used a metal hammer and bar instead of a hammer stone and was not interested in replicating the method by which stone tools were made with any authenticity – he only sought a passable final product. Evans and Simpson met on at least one occasion, and though Evans dismissed Simpson’s work as coarse (Evans, 1893; Munro, 1905, p.117), Evans (1893) did acknowledge that there were other forgers who were able to create more convincing replicas, suggesting that a number of skilled flintknappers existed in the late 19th century.

Experimental Efforts by Evans, Pitt-Rivers, and Abbott

In 1859, Sir John Evans visited archaeological localities within the Somme Valley (Trigger, 1989, p.93) and grew interested in the question of human antiquity. However, he recognized the importance of understanding lithic technology in order to answer questions about Palaeolithic occupation in Europe and was familiar with the debate over natural versus human action in creating the alleged artifacts (Evans, 1872; Roberts and Barton, 2008). In 1872, he published *The Ancient Stone Implements, Weapons, and Ornaments, of Great*

Britain, which quickly became the standard reference for lithic artifacts of the European Palaeolithic. In this volume, Evans discussed the way in which stone tools were made and used his own observations of gunflint manufacture from the 1850s, as well as others' ethnographic observations of people who still used stone tools, as an initial point for gaining greater knowledge about flint knapping (Evans, 1872; Roberts and Barton, 2008; Lamdin-Whymark, 2009).

Evans (1872, p.13) wrote that in order to understand stone tool production "we cannot, in all probability, follow a better guide than that which is afforded us by the manner in which instruments of similar character are produced at the present day". He also outlined his own flint knapping attempts, and wrote that "I have found by experiment that taking a flake of flint (made, I may remark, with a stone hammer, consisting of a flint or quartzite pebble held in the hand), and placing it, with the flat face upwards, on a smooth block of stone, I can, by successive blows of the pebble, chip the end of the flake without any difficulty into the desired form" (1872, p.33). Evans also apparently performed flint knapping demonstrations at professional meetings, such as at the International Congress of Prehistoric Archaeology at Norwich in 1868, in which a note of the event recorded that "Mr. John Evans made flint scrapers and tools by pressure as well as by percussion, demonstrating the possibility of accomplishing the work by both methods." He also employed a piece of antler as a flaking tool (Stevens, 1870, p.84). Evans used his knowledge both in his descriptions of archaeological artifacts, as evidenced in his published works, and to authenticate prehistoric artifacts (Lamdin-Whymark, 2009).

Evans also taught others. Augustus Lane Fox Pitt-Rivers wrote that Sir John Evans was respected as an expert flintknapper and had taught him how to flint knap (Johnson, 1978; Roberts and Barton, 2008). Pitt-Rivers heralded the "application of the knowledge thus obtained by modern anthropologists, and by Mr. Evans in particular, to the determination, by means of experiment, of those forms and modes of fracture by which we are enabled to recognize at a glance and with certainty, the smallest chip of flint flaked by the hand of man, from those which, split by natural causes, cover the surface of the ground" (Lane Fox [Pitt-Rivers], 1875, p.358). Applying this to the search for Palaeolithic humans, Pitt-Rivers (1875, p.359) wrote that, because it was now possible to identify flakes rather than just looking for formal tools, "we know where to look for Palaeolithic man in the drift gravels, and to determine his place in sequence by the deposits which overlay them". Pitt-Rivers attempted to make stone tools of his own, three of which are in the collections of the Pitt Rivers Museum at Oxford (Catalogue #1884.140.1595.1 through 1884.140.1595.3), and also conducted experimental archaeology to understand the construction of ditches and banks at the Neolithic site of Cissbury Ring in England (Lane Fox [Pitt-Rivers], 1877; Bowden, 1991; Stevenson, 2012).

Cissbury Ring, in the South Downs region of England, is a hill fort that contains a Neolithic flint mine with deep shafts of up to 12 meters in depth. Pitt-Rivers wanted to determine how this structure was created and what tools were employed to excavate the flint mine shafts. He wrote that antler picks and wedges may have been used and tried to replicate them: “Cutting off the tines with a flint took me from five to ten minutes, and the best mode of making the wedges was found to be by grinding them on a wet sandstone. Commencing with a surface of hard, smooth chalk, and taking the work turnabout with one of the men, I found that we made an excavation 3 feet square and 3 feet deep in an hour and a half, consequently, by continuous labour, and sufficient reliefs, it would have taken us twelve hours to form the longest gallery found” (Lane Fox [Pitt-Rivers], 1877, p.382). These antler picks and wedges are also in the collections of the Pitt Rivers Museum at Oxford (Catalogue #1884.140.1593.1 through 1884.140.1593.7). In another instance of experimental archaeology, he revisited and re-examined the trenches that he had excavated to determine how they re-silted and refilled in order to better interpret stratigraphy at the site (Bowden, 1991; Stevenson, 2012).

In an American example, Charles Conrad Abbott, famous not for his efforts in experimental archaeology, but instead for his erroneous claims that there existed an American Palaeolithic identical to that in Europe, tested the ways in which stone drills were used and described his experiments in an 1881 publication (1881, pp.109-110). He attempted to replicate the bi-conical hole drilled in a prehistoric stone gorget that he found in New Jersey, USA, by drilling nine additional holes in the same artifact using a prehistoric jasper drill. He noted “a glance will show that the one perforation, made by the Indian, was in all probability made with a similar tool” (1881, p.109). In his experiments, however, he observed that the drill dulled quickly, after merely one perforation. He altered his methods by placing the gorget in water for subsequent holes, and concluded that prehistoric people may have also used water when drilling stone, leaving a polished tip to the artifact. When water is not used, “the friction of dry, rapid rotation causes a steady splintering and keeps the drill in a newly chipped condition” (1881, p.109). Abbott’s replicative experiments helped him explain the polish, or lack of polish, on some prehistoric jasper drills. Unfortunately, his experiments were conducted on actual artifacts - specifically the gorget, which is still housed in Harvard’s Peabody Museum (Catalog #52-2-10/33498).

Experimental Archaeology as Scientific Method

These early examples demonstrated a new scientific approach to the production of archaeological knowledge. By testing possible ways to manufacture replicas of artifacts or characteristics found on archaeological sites, Evans, Pitt-Rivers, and Abbott were able to interpret the archaeological record and the artifacts they found with increasing accuracy and nuance. Instead of merely discarding flint flakes, or speculating on how many man-hours were needed to construct a mining shaft, or assuming the way in which a drill was used, these archaeologists used archaeological evidence and replicative experiments to demonstrate one

way in which they may have been created and used. By hypothesizing and testing these technologies, they approached archaeology with increasing scientific rigor, an important component of professional archaeology.

Such actions were part of a larger movement to professionalize the field. Joseph Henry, the first secretary of the Smithsonian Institution, founded in 1846, engineered institutional efforts to bring scientific methods to American archaeological practice. He reprinted reports on European archaeology in the Annual Report of the Smithsonian Institution, which included methodological advances such as controlled excavations, recording, and stratigraphy (Trigger 1989, pp.107-108). The Bureau of Ethnology (later renamed the Bureau of American Ethnology [BAE]), created in 1879 under the supervision of the Smithsonian Institution, initially had a mission to conduct ethnographic research, but became the driving force for a greater empirical approach to archaeological research (McKusick, 1970; 1988; Hinsley, 1976; Trigger, 1989).

Of the three men discussed here, Abbott is largely remembered for his stubborn adherence to theories of an American Palaeolithic that paralleled that of the old world. He refused to accept that he was wrong, and his reputation today is coloured by this debate (Meltzer, 2015). But for Evans and Pitt-Rivers, archaeologists remember them as members of a vanguard in the discipline that helped lead the way for the scientific approaches we use today (Coles, 1973; Bowden, 1991; Roberts and Barton, 2008; Lamden-Whymark, 2009; Stevenson, 2012).

Conclusion

As the discipline of archaeology evolved into the 20th and 21st centuries, experimental archaeology gained an important place as a component of modern scientific approaches. Today, replicative experiments and laboratory analyses are essential steps in our understanding of the past (Ascher, 1961; Coles, 1973; Ingersall, Yellen and MacDonald, 1977; Carrell, 1992; Mathieu, 2002; Busuttil, 2013). In lithic analysis, the flint knapping experiments conducted by Evans and Pitt-Rivers, and even replicative use-wear such as that analysed by Abbott, have assisted archaeologists in interpreting prehistoric artifacts. More recent flint knapping experiments by skilled knappers such as François Bordes and Don Crabtree have created a foundation for modern study, and experimental archaeology is recognized as a legitimate means of generating and testing hypotheses (Ascher, 1961; Coles, 1973; Ingersall, Yellen and MacDonald, 1977; Carrell, 1992; Mathieu, 2002; Busuttil, 2013). As archaeology moves forward as a professional, scientific discipline, experimental approaches remain an essential part of archaeological inquiry.

Keywords experimental archaeology
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Gallery Image

FIG 1. FLAKES PRODUCED BY AUGUSTUS LANE FOX PITT-RIVERS IN THE COLLECTIONS OF THE PITT-RIVERS MUSEUM (CATALOG #1884.140.1595 (1-3). PHOTO CREDIT: PITT-RIVERS MUSEUM, UNIVERSITY OF OXFORD.

FIG 2. ANTLER PICK AND WEDGE PRODUCED BY AUGUSTUS LANE FOX PITT-RIVERS IN THE COLLECTIONS OF THE PITT-RIVERS MUSEUM (CATALOG #1884.140.1593 (2, 7). PHOTO CREDIT: PITT-RIVERS MUSEUM, UNIVERSITY OF OXFORD.

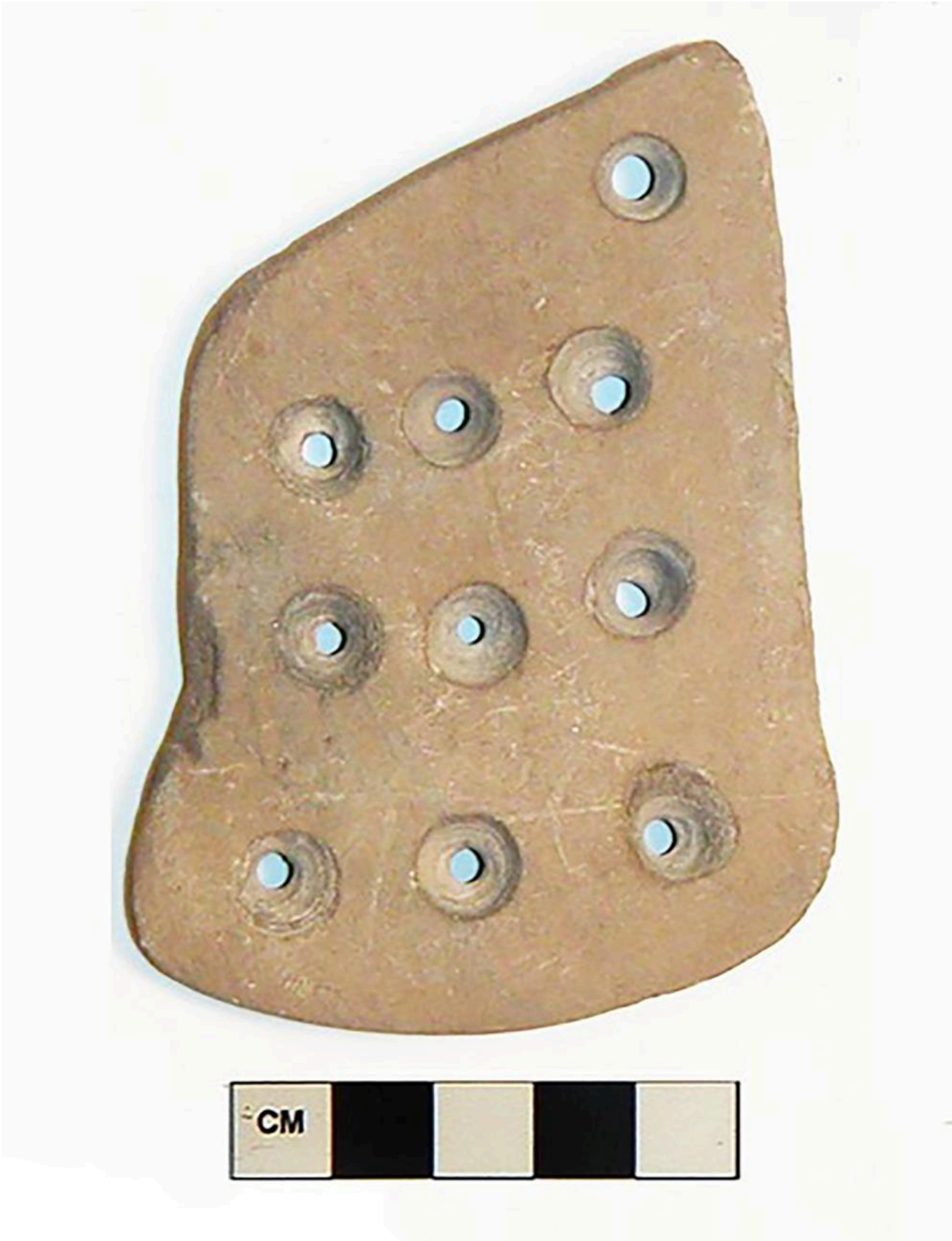

FIG 3. GORGET DRILLED BY CHARLES CONRAD ABBOTT IN THE COLLECTIONS OF THE PEABODY MUSEUM, HARVARD UNIVERSITY (CATALOG #52-2-10/33498). PHOTO BY THE AUTHOR.