



DNA Special Issue

An ethical crisis in ancient DNA research: Insights from the Chaco Canyon controversy as a case study

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Abstract

In recent years, the field of paleogenomics has grown into an exciting and rapidly advancing area of scientific inquiry. However, scientific work in this field has far outpaced the discipline's dialogue about research ethics. In particular, Indigenous peoples have argued that the paleogenomics revolution has produced a "vampire science" that perpetuates biocolonialist traditions of extracting Indigenous bodies and heritage without the consent of, or benefits to, the communities who are most affected by this research. In this article, we explore these ethical issues through the case study of a project that sequenced the ancient DNA (aDNA) of nine Ancestral Puebloan people from Chaco Canyon, New Mexico. By providing a "thick description" of this controversy, we are able to analyze its metanarratives, periodization, path dependency, and historical contingencies. We conclude that the paleogenomics revolution needs to include an ethical revolution that remakes the field's values, relationships, forms of accountability, and practices.

Keywords

Ancient DNA, NAGPRA, cultural affiliation, ethics, Ancestral Pueblo

Introduction

In the last decade, the study of ancient DNA (aDNA) has dramatically reshaped how scholars view the evolutionary and demographic histories of Indigenous populations (e.g., Bolnick et al., 2016; Flegontov et al., 2019; Stone and Ozga, 2019). While much scholarly and public attention has been given to the technological and scientific aspects of aDNA research, far less focus has been on the ethical implications of this genomic research for individuals and communities (Bardill, 2014; Bolnick et al., 2016; Wagner et al., 2020).¹ Indigenous peoples and their allies—in North America and beyond—continue to raise concerns about appropriation, the lack of consultation and community engagement in many studies of Indigenous ancestors, and the potential misuse and commodification of genetic material and data extracted (Gibbon, 2020; Malhi and Bader, 2019; Prendergast and Sawchuk, 2018). Genomes have become the new metaphor for Indigenous race, identity, and belonging, with urgent implications for Indigenous North Americans' sovereign rights to their lands and heritage (TallBear, 2007, 2013a, 2013b).

Concerns have also been voiced about permissions for research, control and dissemination of data, genetic determinism, and much more (Hollowell and Nicholas, 2009; Reardon and TallBear, 2012; Walker et al., 2016; Walter and Suina, 2019). The view that human remains are just another historical resource to be mined is seen by many as a form of colonialist violence against Indigenous peoples (Nicholas and Smith, 2020). A number of Indigenous communities see DNA research as a "vampire science" (Garrison, 2013), which has led some

communities to ban DNA research (Reardon, 2017) or seek control of it as an assertion of their sovereignty and tribal laws (Harry and Kanehe, 2006). Such antagonism often eclipses examples of Indigenous groups who participate in aDNA research (e.g., Mata-Míguez et al., 2012; Rasmussen et al., 2014; Scheib et al., 2018; Tackney et al., 2015). Indigenous peoples are themselves active in pushing for greater control of both the process and products emanating from such research (Handsley-Davis et al., 2020; Hudson et al., 2020; Matisoo-Smith, 2018).

In this article, we explore the convergence of many of these issues in a single case and discuss the lessons to be learned from a controversial study of aDNA from nine individuals whom archaeologists unearthed in Chaco Canyon. We examine the original scientific study by Douglas Kennett et al. (2017), along with 27 news reports, three academic publications, and eight interviews (all compiled or conducted by Cortez) with scientists involved with the study as well as Indigenous leaders and allies who were compelled to respond to the project's publication. We provide a "thick description" of the project—that is, a narrative that functions as "both a rhetorical form and a generic, logical form of explanation that merges theorized description of an event with its explanation" (Griffin, 1992: 419). Following this narrative, we conclude by briefly summarizing elements of its *metanarrative* (overall interpretations of events and circumstances that pattern or structure people's beliefs), *periodization* (whether discontinuous stages can be identified), *path dependency* (choices that trigger a deterministic sequence of events), and *historical contingency* (identifying which events/factors are singular or repeatable) (Neuman, 2011: 524).

Our examination of this case study reveals a range of underlying beliefs and attitudes around tribal consultation and highlights how many factors intersected to create a controversy, including the Native American Graves Protection and Repatriation Act (NAGPRA), the power of institutions over ancestral remains, multiple potential claims of affiliation by Indigenous peoples, and the research team's lack of clarity about consultation. We show that this context led to ambiguity regarding consultation within a framework of ill-defined authority and responsibility regarding obligations for working with tribes. This case study offers an important window into the ethical challenges that researchers and community members face when navigating the complex terrain of aDNA research today, and can help scholars understand how to conduct research that risks fewer harms to Indigenous communities.

The Chaco Canyon controversy

History of Chaco Canyon

Chaco Canyon, in present-day northwestern New Mexico, is a sacred place for Pueblo and Diné (Navajo) peoples and an important heritage site (Begay, 2004; Kuwanwisiwma, 2004). Native peoples inhabited the region for millennia, but today it is best known for the period from AD 850 to 1250, when it was a bustling

urban center that served as a focal point for ceremonial activities, trade, and political administration (Reed, 2004). By AD 1300, Chaco Canyon was no longer used as an urban center and Ancestral Puebloans migrated to different areas of the Southwest, where they became integrated into the Pueblo communities we now know as Hopi, Zuni, Laguna, Acoma, and those along the Rio Grande, and other Native nations.

In 1896, archaeologists from the American Museum of Natural History (AMNH) in New York City started excavations in Chaco Canyon and quickly turned to one of the most prominent fallen villages, called Pueblo Bonito. Within the expansive structural remains of Pueblo Bonito, archaeologists excavated what they termed “Room 33,” which included the ancestral remains of 14 people along with an array of 50,000 tools, ritual objects, and belongings (Pepper, 1909). Once uncovered, the individuals and associated objects were taken to the AMNH and have been housed there since.

In 1907, the US government created the Chaco Canyon National Monument, under the Antiquities Act of 1906. This act protected the archaeological landscape from development and fostered public access to it, but also removed Native Americans as stewards of their own heritage (Colwell-Chanthaphonh, 2005). In 1980, Chaco Canyon National Monument was re-designated as Chaco Canyon Historical Park, and it was designated a UNESCO World Heritage site in 1987.

Kennett et al. research study

In 2017, *Nature Communications* published an article titled “Archaeogenomic Evidence Reveals Prehistoric Matrilineal Dynasty” (Kennett et al., 2017), which examined the Ancestral Pueblo burials in Pueblo Bonito’s “Room 33.” Specifically, this research used aDNA to address the question of hereditary succession in ancient Chacoan society’s leadership (i.e., was leadership passed through family relationships?). Matrilineal descent in Puebloan societies is well-known ethnographically, and archaeologists have long postulated its deep roots based on artifact assemblages.

According to study author Douglas Kennett (professor of archaeology), he and study co-author George Perry (associate professor of anthropology and biology) teamed up with Steven LeBlanc (an archaeologist and former museum director) and Stephen Plog (professor emeritus of archaeology) to use paleogenomic methods to study the mitochondrial genomes of nine people disinterred from “Room 33.” The AMNH, which curated and legally controlled these individuals, gave permission for the study and its destructive analyses to proceed. The researchers also extracted bone collagen from the individuals’ crania and performed high-precision AMS ^{14}C dating. Combined with previous AMS ^{14}C measurements, they determined that these individuals lived between AD 800 and 1130. Their work revealed that these nine individuals had identical mitochondrial genomes, indicating a shared ancestor through the matrilineal line.

To confirm that this finding was not the result of contamination, the team reached out to David Reich, a geneticist at Harvard Medical School who already

had genomic data from some of the same individuals from “Room 33” as a result of samples provided by LeBlanc and Plog. Reich’s lab confirmed the mitochondrial findings and further targeted approximately 1.24 million genome-wide single nucleotide polymorphisms (SNPs) for sequencing to assess broader (biparental) patterns of biological relatedness. Six individuals had sufficient DNA preservation for SNP genotyping, and genetic comparisons suggested that two pairs of individuals were first- or second-degree relatives. Combined with the determined radiocarbon dates, the results, according to the research team, demonstrated “mother-daughter and grandmother-grandson relationships consistent with matrilineal descent” (Kennett et al., 2017: 2). Based on their labwork, the study authors concluded that the “individuals buried in room 33 were members of a single, elite matriline that played a central leadership role in the Chacoan polity for ~330 years” (Kennett et al., 2017: 3). The authors argued that these results not only help resolve a long-standing academic debate over whether Chaco society was egalitarian or hierarchically structured, but also provide an example of hereditary succession in an early complex society without a formal writing system.

Ethical concerns regarding the Kennett et al. research study

Ethical concerns about the Kennett et al. study arose before publication. After learning about the research from one of the study co-authors, Deborah Bolnick (a co-author here) reached out to a member of the research team to share concerns about conducting aDNA research on Indigenous ancestors without tribal consent or consultation. Science journalist Michael Balter encountered similar ethical concerns when developing a story on the scientific findings of the study before it was published (Balter, 2017a, 2017b).

Balter explained that ethical questions first came to his attention when an archaeologist whom he had asked to comment on the study for his reporting “sent a blistering email to me about all the unethical things [the study authors] had done” (interview with Cortez, 9/29/20). This exchange alerted Balter to another kind of story about the ancestral remains from Chaco, one that included the ethical dimension of Kennett et al.’s work, as well as the AMNH’s 1990s NAGPRA inventory and consultation process. After the study was published, he and other reporters (e.g. Curry, 2017) focused on concerns about whether the researchers and the AMNH needed to consult or in fact had consulted with tribal communities. Did this study of Ancestral Pueblo people—whom Pueblo tribes have claimed and are from an area where 20 Pueblo communities, as well as the Diné, still reside—adequately seek out tribal consultation? If so, how so? And if not, why not?

Tribal consultation for NAGPRA

Setting the stage for the ethical controversy surrounding Kennett et al.’s study was the NAGPRA-mandated review and inventory of ancestral remains and associated funerary objects housed at the AMNH. Passed in 1990, NAGPRA requires all

federal agencies and museums that have received federal funding (except the Smithsonian Institute, which is governed by different legislation that has a similar mandate to NAGPRA) to inventory Native American ancestral remains and associated funerary objects under their legal control. Along with this inventory, federal agencies and museums must identify the cultural affiliation of ancestral remains and objects, consult with tribal groups that might have connections to these individuals and objects, and repatriate ancestral remains and objects to Native American or Hawaiian organizations when a direct cultural relationship can be established (Fine-Dare, 2002).

Importantly, while NAGPRA mandates that these inventories “shall be . . . (A) completed in consultation with tribal government and Native Hawaiian organization officials and traditional religious leaders” (3003(b)(1)(A)), the law does not define “consultation.” It has therefore been left up to institutions to decide what the process of consultation entails, and when this requirement has been met (Peters, 2006). This lack of clarity in the law means that simply notifying tribal leaders of ancestral remains or funerary objects at an institution has sometimes been counted as fulfilling NAGPRA’s consultation mandate, even if no meaningful exchange ensued.² This vagueness in the law and the diversity of consultation practices that have resulted help explain how museums often designate ancestral remains as “culturally unaffiliated” even when there are present-day tribes who can claim a connection to them (Dumont, 2011).³ Additionally, museums with large collections, such as the AMNH, requested and received extensions to complete their inventories (Graham and Murphy, 2010: 108; McKeown, 2013: 188); however, some worried that deadlines and the threat to end extensions may have led to rushed decisions during the inventory process, potentially making it more difficult for tribal claims to be approved. As the Society for American Archaeology president Keith W. Kintigh wrote to US Secretary of Interior Bruce Babbitt, in 1999,

When inventories are done carefully and with thorough consultation, museums find it is possible to assign cultural affiliation to remains that, with a less intensive effort, would be deemed ‘culturally unidentifiable.’ If no culturally affiliated tribe is identified during the inventory process, repatriation on request cannot occur. Instead, a very much larger burden is placed on a tribe to challenge the museum’s finding and to show that a preponderance of the evidence supports its affiliation. (Kintigh, 1999)

Under NAGPRA, this designation can have important consequences because ancestral remains and cultural items that are found to be “culturally unaffiliated” can stay in the possession of federal agencies and museums, and are subject to another part of the law (43 CFR 10.11), titled “Disposition of culturally unidentifiable human remains,” that is even more nebulous (Colwell-Chanthaphonh et al., 2011). Furthermore, NAGPRA does not explicitly prohibit research on “culturally unaffiliated” ancestral remains and cultural items. The law only notes that the inventory requirement “shall not be construed to be an authorization for the initiation of new scientific studies of such remains and associated funerary objects or

other means of acquiring or preserving additional scientific information from such remains and objects" (Section 3003(b)(2)). While NAGPRA's wording suggests that institutions should not use the law to authorize new scientific research for the purpose of creating the required inventory or to extract extra scientific information prior to repatriation, it does not otherwise speak to what scientific research is permitted or prohibited, or whether consultation is necessary before future scientific work is conducted.

This context forms the backdrop for the AMNH's decision to designate the ancestral remains from Chaco Canyon as "culturally unaffiliated" and permit sampling for Kennett et al.'s research.⁴ After NAGPRA became law in 1990, the AMNH reviewed, consulted, and inventoried their collection, which was finalized in 2000 (Balter, 2017b), and determined that the ancestral remains from "Room 33" at Pueblo Bonito are "culturally unaffiliated." At least one tribe we spoke with, the Hopi Tribe, confirmed that in 1995 they started receiving inventories from museums that listed ancestral remains in their collections that museum staff had already decided were "culturally unaffiliated" without consultation—though we were not able to confirm if the Hopi Tribe, or others, received direct communication from the AMNH about the individuals from Chaco Canyon (Kuwanwisiwma interview with Cortez, 8/20/20). In any case, given their status as "culturally unaffiliated," the individuals from "Room 33" and their associated artifacts remained at the AMNH, and over a decade later, the museum approved sampling some of these same individuals for Kennett et al.'s aDNA analysis.

Public questions about the AMNH's review process—and the extent of tribal consultation when determining that the individuals from "Room 33" were "culturally unaffiliated" and could be sampled for research—quickly arose after the Kennett et al. study was published. In his reporting on this study in 2017 for the magazine *SAPIENS* (for which Colwell then served and currently serves as the editor-in-chief), science journalist Michael Balter (2017b) noted that there seemed to be little clarity around how the museum attempted to consult with tribal groups descended from Chaco Canyon or who was contacted, and he was unable to get much detail from the AMNH about their NAGPRA review process and inventory.

Interviews with museum personnel for this case study help shed more light on what happened and show the complexities of the consultation process and how ethically fraught the resulting decisions may be. In an interview with Cortez (10/1/20), David Hurst Thomas (acting curator of biological collections at the AMNH when Kennett et al.'s research request was submitted), speaking for himself and not for the AMNH, explained some of the challenges that the AMNH has faced when conducting consultation with a collection of some 12,000 sets of ancestral remains and 500,000 cultural objects (AMNH, 2020a, 2020b). At the root of this complicated context, as described by Thomas, is the framework of legal ownership of human remains. Specifically, Thomas noted that NAGPRA specifies that the responsibility of consultation and making cultural affiliation determinations lies with those considered to be legally in "ownership or control" (itself a problematic phrasing according to many Indigenous leaders) of the remains, not just on those

who hold or possess them (Section 3002(a); 43 CFR 10.1(3)). In the case of the Chaco Canyon individuals in the AMNH's collection, the museum is considered their legal owners, and was thus tasked with carrying out consultation and completing inventories.

In his interview, Thomas suggested that the AMNH's work to determine cultural affiliation under NAGPRA was made yet more difficult by the age of the Chaco Canyon ancestral remains and multiple, competing claims of cultural affiliation. Most similar institutions, Thomas pointed out, have also had difficulty affiliating Chaco ancestral remains, complicated in part by disagreements among potentially-affiliated groups. For example, according to Thomas, the Hopi tribe claimed affiliation with all ancestral remains in the Southwest dating back to Paleoindian times, while the Navajo Nation disputed that claim and stated that they should be consulted regarding ancestral remains from a number of sites in the Southwest, including Chaco Canyon. Given this context, Thomas struggled to decide to whom the ancestral remains should be affiliated and repatriated. Thomas did not want to create a dispute among tribes or insert the museum into a dispute over affiliation. He believed that insufficient information existed to culturally affiliate the remains from "Room 33" at Pueblo Bonito—and thus they were deemed "culturally unaffiliated." This decision created a path dependency, in which future conversations would necessarily be framed around the ambiguous legal status of the Ancestral Puebloans' remains.

Thomas' assessment was that the museum did everything required by NAGPRA to consult with possibly affiliated communities, but the NAGPRA-mandated process still raises ethical concerns because the power to determine what constitutes adequate consultation—and to decide the outcome of that consultation—lay solely with the museum, not descendant or other Indigenous communities. In an interview with Cortez (8/20/20), Leigh Kuwanwisiwma, Director of the Cultural Preservation Office for the Hopi Tribe in Arizona from 1989 to 2017, spoke to this problem and suggested that the AMNH did not do enough to consult tribes during their 1990s review.

Kurt Dongske, the Principal Investigator for the Zuni Cultural Resource Enterprise and the Zuni Tribal Historic Preservation Officer, also expressed concern (in an interview with Cortez, 8/29/20) about the 1990s NAGPRA review and the ability of museums to, under NAGPRA, make determinations of cultural affiliation themselves. Dongske noted:

Leaving the determination of cultural affiliation up to an institution that represents the settler state is problematic. Especially when a lot of the collection historically was done by museums, was done without the consent of affiliated tribes. And oftentimes ethnographic objects and material were collected in often dishonest and potentially not legitimate means. So, it's almost to the point of leaving [it up to] a thief to determine who he stole the property from. (Cortez interview, 8/25/20)

Kuwanwisima also pointed out that designating ancestral remains as “culturally unaffiliated” can provide a loophole that allows museums and researchers to avoid future consultation. Such comments point to a competing metanarrative, as tribal officials interpreted the museum’s decisions not as a way to comply with NAGPRA, but rather as a way to circumvent its obligations.

Although the AMNH determined that cultural affiliation could not be established for the purposes of NAGPRA, the cultural connections between Chaco Canyon contemporary Pueblo peoples were clear enough for Kennett et al. to cite that connection as evidence in support of their academic arguments. They noted the “uncertain” relationship between the ancient inhabitants of Chaco Canyon and “specific modern Native American groups,” but still suggested the findings of their study are consistent with

a widespread pattern reported for Pueblo social organization beginning with Spanish colonial records, and with Pueblo oral traditions recorded since the nineteenth century, especially among the Hopi and Zuni, that emphasize matrilineal clans as the founding social units and matrilineal leaders as key protagonists in social history. (Kennett et al., 2017: 5)

Thus the scientific evidence was interpreted in two different ways: in one context, it was used to deny a determination of cultural affiliation under NAGPRA; in the other, it was used to support a research question outside of NAGPRA.⁵ This dichotomy suggests a deep tension between how individuals and institutions elect to interpret the same data in different contexts.

Tribal consultation for research

Putting aside the *legal* requirements for consultation during NAGPRA’s inventory process, another question remains: Did the AMNH fulfill its *ethical* duties, or, as Balter (2017b) states it, “the law’s spirit of respect for tribal cultural traditions”? This question is important because designating the ancestral remains from Pueblo Bonito as “culturally unaffiliated” without consultation would make claims of cultural affiliation from Native nations more difficult. Under NAGPRA, this designation required the AMNH to retain the ancestral remains as part of the museum’s collections, which in turn made it possible for the ancient people to eventually be used in the Kennett et al. study.

The AMNH’s decision to approve the researchers’ request to sample the people from “Room 33” for destructive analysis without further tribal consultation or initiating a collaborative approach shaped the path dependency in the controversy’s next development. Claw et al. (2017) argue that although the ancestral remains were found to be “culturally unaffiliated,” there was enough evidence of possible cultural affiliation with tribes that they should have been consulted before the research was approved.

Given the determination of “culturally unaffiliated” made in the AMNH inventory in 2000, the museum was arguably not legally required to consult with any

tribes when they received a request to sample the people from “Room 33” for destructive analysis. The Anthropology Loan Committee, the entity that reviewed the request, concluded that the study had “considerable scientific merit with little impact on the artifacts and remains” (Balter, 2017b), centering potential risks of the study to the ancestral remains themselves rather than living descendant communities who could be negatively impacted by destructive DNA research. Furthermore, when defending their decision to allow the study to take place, the AMNH told Balter (2017b) that consultation was not required because no tribes “came forward to claim affiliation” during the 1990s review.⁶

Thomas felt that extensive consultation with multiple tribes regarding the research request would create too many problems. In his interview (10/1/20), Thomas walked through how he came to his decision: “Our focus [was]... to obey the law and not get involved in any kind of tribal disputes.” The question raised by the research request was how to consult with “two dozen tribes” about the research when the museum had already been unable, using NAGPRA, to make a clear determination of cultural affiliation for the remains in the 1990s. Furthermore, Thomas worried about how, as curator, he could balance what was in his view a “legitimate scientific study” and the potentially diverse wishes of those multiple tribal groups.

Thomas then consulted with a few non-tribal experts and decided that it would likely be impossible to reach an agreement amongst the groups about how to proceed with the research request. The feeling seemed to be that approaching multiple potential stakeholder groups about DNA and radiocarbon testing would likely generate confusion, disagreement, and animosity among the groups involved. Not only might such consultation be unable to collectively reach an agreement, but all parties could potentially be worse off than before they had started. Rather than accepting this potential lack of consensus on how to proceed with research as itself an answer to whether or not the museum should allow the research, Thomas decided to follow the minimal legal requirements of NAGPRA, which does not explicitly prohibit destructive analysis of ancestral remains. Thomas now admits that the decision to rely solely on NAGPRA was a mistake, and points to a metanarrative of this case that we have identified as the inadequacies of NAGPRA in the age of paleogenomics. He noted that, in hindsight, he realizes how little guidance NAGPRA provides for research and that it is up to research institutions to interpret laws. “Now we understand the law is not enough,” Thomas conceded in the interview. “These decisions need to go well beyond the law.”

From the view of tribal officials and Indigenous scholars, the AMNH’s decision was out of sync with the changing ethical landscape of consultation and collaboration that museums and other organizations have embarked on in the wake of NAGPRA. As critics such as Claw et al. (2017) and tribal officials such as Kuwanwisiwma and Dongoske have noted, the fields of museology and archaeology have shifted towards an ethos of meaningful collaboration with descendant tribal communities in the 20 years since the AMNH’s NAGPRA review was

completed (e.g., Colwell-Chanthaphonh and Ferguson, 2004; Kerber, 2006; Nicholas and Hollowell, 2007; Swidler et al., 1997). Claw et al. (2017) argued, for example, that although the ancestral remains were originally found to be “culturally unaffiliated,” the ethical landscape has changed so drastically since the AMNH’s 2000 inventory—and there was enough evidence of possible cultural affiliation—that Pueblo groups and the Navajo Nation should have been consulted.

Likewise, Dongske felt that it was unacceptable that the AMNH did not reach out to consult tribes on the research request. As he reported to Balter (2017b), “It has been 27 years since the passage of NAGPRA, and a lot of tension, disagreements, learning, and cultural and historical sensitivity training has been experienced by tribes, museums, and federal agencies.” Significantly, NAGPRA allows museums to revisit (and if necessary, revise) their determinations regarding cultural affiliation (Colwell-Chanthaphonh, 2010), so the AMNH could have chosen to reconsider their earlier determination and pursue consultation—that too would have been adhering to the letter of the law. Instead, the museum’s decision to not revisit their affiliation determination and move forward with research marked a new period in the budding controversy.

In a subsequent interview with Cortez, Dongske noted that he learned about the Kennett et al. study only after he was contacted by journalist Michael Balter. When asked about his reaction to finding out, he said:

Well I wasn’t pleased. I wasn’t pleased at all. First of all, the AMNH, to take a stance that these remains were culturally unidentifiable, was disingenuous—especially since the National Park Service had been carrying out consultation at least for 20 years under NAGPRA with multiple Pueblos and tribes regarding cultural affiliation, [and] how many tribes actually have vocalized their cultural affiliation to Chaco Canyon. To me, that was just a way the scientists could deflect responsibility for talking to Indians. (Cortez interview, 8/20/20)

The AMNH’s decision to adhere to their earlier NAGPRA determination and not engage in any tribal consultation stands in sharp contrast to the high-profile consultation and repatriation process that the National Park Service engaged in with Pueblo tribes and the Navajo Nation in the 2000s (Balter, 2017b; Claw et al., 2017). In 2006, the Chaco Canyon National Historical Park—governed by the National Park Service—culturally affiliated and repatriated the remains of 265 individuals and 722 funerary belongings to 19 Pueblo tribes and the Navajo Nation (McManamon, 1999). Claw et al. (2017) point out that these repatriations were based on evidence of cultural affiliation (Schillaci and Bustard, 2010) and, even though that determination was controversial (e.g., Cordell and Kintigh, 2010), it set a potential precedent for the AMNH to reconsider its nearly 20-year-old decision.

Additionally, the National Park Service was not the only organization to undertake consultation and make hard decisions about the cultural affiliation of

ancestral remains and objects from Chaco Canyon under NAGPRA. Other museums, such as the Museum of Natural History at the University of Colorado, Boulder, and the Robert S. Peabody Museum of Archaeology, culturally affiliated all the Pueblo tribes (but not the Navajo Nation) with Chaco individuals (Hutt, 2006, 2008). Although every museum makes its own cultural affiliation determinations under NAGPRA, these well-known precedents make it clear that the AMNH's approach to tribal consultation was incongruous with that employed by other institutions holding ancestral remains and objects from the same archaeological culture.

Upon reflection, Thomas acknowledges that his decision to not consult with tribes about the research was a mistake, and he would approach the process differently now if presented with the same situation (Cortez interview, 10/1/20). He explained that once he learned that the study had upset tribes, he began working with them to remedy the situation.⁷ The museum now has a moratorium on all destructive analysis on all ancestral remains, which is still in effect at the time of this writing, and the museum brought several tribal groups to New York to discuss past mistakes and address how the museum can avoid mistakes in the future. Moving forward, the museum now has guidelines from Pueblo communities about how to proceed with future research. From this situation, Thomas shared that he has learned that while there may never be unanimity among stakeholders, consultation is about laying out options, listening to tribes, and incorporating tribal input when difficult decisions have to be made.

Ethics beyond NAGPRA

Finally, it should be noted that the AMNH's decision to not consult with tribes about the Kennett et al. research proposal did not preclude Kennett and his team from working with tribes on their own. Yet the aDNA research team did not consult or collaborate with tribes before undertaking the research or during analysis. Based on interviews conducted by Cortez with the study authors, it seems that this lack of consultation and engagement was in part a case of deferring the responsibility of consultation to others within a framework of ill-defined authority regarding who should initiate consultation in the first place. From the perspective of Kennett (10/13/20), he left the issue of consultation to the museum because the museum, as he explained, is the entity that has legal control over the ancestral remains. As such, he assumed that museum administrators took all the necessary steps. Similarly, Reich understood that the ancestral remains were "culturally unaffiliated," meaning that their research did not legally *require* consultation, and was under the impression that the museum did not want the research team to consult tribes. Reich (interview with Cortez, 10/19/20) stated his understanding was that,

The AMNH made its determination about cultural affiliation and they requested that the outreach to Native American groups about these samples under the auspices of

NAGPRA be led by the AMNH and they requested that questions regarding decision-making on these points be directed to the AMNH. So they specifically asked us that they should take over that process. It was complicated because in the sampling request, the condition was, “We [the AMNH] have the relationship to the Native American groups and to the Indigenous peoples and we [the AMNH] want to handle that relationship and not have crosstalk about it with the researchers.”

Furthermore, in a statement to Balter (2017b), the research team explained that they had relied on the AMNH’s review and determination that the ancestral remains “could not be traced to specific tribes.” Kennett added that his team had “every reason to think that the AMNH were careful about this and they have great expertise in this area and we deferred to them here” (Balter, 2017b). While the study authors relied on and deferred to the AMNH’s authority, the AMNH relied on and deferred to NAGPRA, which, as we have already seen, is not designed to guide research involving ancestral remains. Such deferrals contributed to the controversy’s path dependency, allowing the research to proceed in a cloud of ambiguity.

While the study authors did not consult with tribes before beginning research, Kennett indicated that the study authors began consulting after Bolnick raised concerns. While Perry was initially under the impression that the AMNH did not want the research team to consult Native communities in the Southwest, he later worked to involve Native American groups in the project. After discussions with researchers and AMNH personnel, Perry began communicating with multiple Southwestern tribes in 2016. Though he sent letters to a number of tribal governors and cultural offices, he had more substantive communications with the Hopi Tribe and the Pueblo of Laguna, eventually visiting both to discuss the research results with tribal representatives. Given that this engagement was initiated after the research began, that it took time to establish communication, and because of unanticipated travel delays, Perry met with the two tribes after the paper was published.

A lack of consultation and community engagement associated with aDNA research is potentially detrimental to both the research itself and public perceptions of it. As Dongske and others noted to us, conducting research with Indigenous ancestral remains without tribal engagement perpetuates the long and problematic history of institutions and scientists having the final authority over decisions regarding Native American ancestors and their belongings (TallBear, 2013b). This lack of engagement means that the full costs and benefits of research may not be considered, and researchers may adopt research protocols that tribal communities object to, such as the destructive sampling techniques used in the Kennett et al. study to remove tissue for radiocarbon dating and genetic analysis (Claw et al., 2017). The absence of consultation and collaboration also affects the conclusions and presentation of research, with the questions asked, and the forms of knowledge produced, potentially narrowed and incomplete because the study

authors did not consider tribal ways of knowing or consult Indigenous knowledge keepers (Bolnick et al., 2019; Hudson et al., 2018; Matisoo-Smith, 2018).

If consultation had occurred in the Chaco Canyon study, for example, modern Pueblo groups could have provided more detailed knowledge of familial structures and matrilineal kinship systems to enhance the researchers' interpretation of their scientific findings, and they could have pushed the researchers to use more respectful and less dehumanizing language in the published paper (i.e., to refer to the individuals being studied as "ancestors" or "people," not simply "crania"). Such engagement would have been consistent with repeated and increasingly urgent calls for more collaborative methods in aDNA research in recent years (e.g., Bardill et al., 2018; Bolnick et al., 2016; Fox and Hawks, 2019; Gibbon, 2020; Kaestle and Horsburgh, 2002; Malhi and Bader, 2019; Prendergast and Sawchuk, 2018; Wagner et al., 2020), and in line with the practices implemented in a number of other archaeological projects in the American Southwest over the last three decades (e.g., Kuwanwisiwma et al., 2018).

However, because consultation and collaboration did not happen, the results of this study were instead framed in a deeply problematic way. In an AMNH (2017) press release, the study results were described as "confirming long-held contentions of modern Pueblo groups." While this statement was intended to highlight convergences between Indigenous perspectives and the scientific results, and to show the value of this research to Indigenous communities, it exposed an underlying assumption that is ethically troubling. Namely, this statement suggests a hierarchy between scientific and Indigenous knowledge, where scientific ways of knowing have authority over Pueblo claims. Rather than considering this genetic finding as an addition to long-standing and legitimate community knowledge, the science was framed as the ultimate arbiter of truth, with the scientific team self-empowered to determine the validity of ethnographic research that rested on Indigenous claims of their matrilineal system of kinship.

The future of ethical aDNA research begins with consultation that includes honesty and transparency and an acceptance that some research should not be undertaken. Critics of the study interviewed for this paper, including Katrina Claw (10/27/20), who co-authored a response to Kennett et al.'s study (Claw et al., 2017), Kuwanwisiwma (8/20/20), and Dongsoske (8/25/20), agree that the researchers and the AMNH should have meaningfully consulted tribes in the Southwest *before* the research began. For Kuwanwisiwma, this means apprising tribes of research goals and research questions, and even giving tribes a chance to shape the research questions. For Dongsoske, consulting before the research takes place is just the beginning. Researchers must be willing to accept tribal feedback, even if that means modifying the research agenda and goals and accepting that tribes might not want to move forward with a project. In a similar vein, Perry notes that perhaps not all aDNA research is worth pursuing. As he stated, "One of the lessons for me is that not all research needs to be done ... I don't care how important you think that it is, not all research needs to be done. And that's something that is a guiding principle for me going forward" (interview with Cortez, 10/

12/20). For Claw, it is not only important that researchers consult with tribal groups, but that museums update their consultation policies and facilitate the consultation process by being more forthcoming about how researchers can contact tribes.

Discussion

This case study provides an opportunity to consider the ethics of archaeological and museological practices as they intersect with aDNA research through four frames: *metanarratives*, *periodization*, *path dependency*, and *historical contingency*.

One central metanarrative is about the inadequacies of NAGPRA in the age of paleogenomics. When NAGPRA was signed into law in 1990, few anticipated the full possibilities of aDNA research. Because the law does not explicitly prohibit research on culturally unaffiliated ancestral remains, and because it empowers museums alone to make decisions about cultural affiliation, tribes and lineal descendants are put in the position of having to argue for their rights and values on an uneven playing field. To their credit, some of the museum administrators and scientists involved in this case have clearly rethought their decisions and have already made progress on avoiding such conflicts in the future. Yet such progress is necessarily ad hoc and localized when the overall structures of power remain slanted towards museums—their control and their decisions. Additionally, as researchers are increasingly able to extract DNA from individuals who lived deeper in the past and from ever more fragmentary ancestral remains, some may be tempted to continue applying this science without fully considering its impacts on descendant communities. The controversies that result may reinvigorate the tired trope of scientists versus Indigenous peoples and make it more difficult for other stories of collaboration, of Native peoples and scientists working together in mutual respect and benefit, to take hold and become the norm.

Our thick description of the Chaco controversy also suggests the importance of considering its periodization. Beginning with the AMNH's excavations of Chaco Canyon in the late 1800s without the consent of Pueblo communities, the stage was set for the repeated dismissal of Native viewpoints and values. A century later, the NAGPRA-mandated inventory process produced a complicated array of claims and conflicting assessments of the cultural affiliation of the ancient inhabitants of Chaco Canyon. The AMNH's decision to sidestep a final decision during the inventory phase, and instead deem the remains of these people to be "culturally unaffiliated," would leave open substantial questions that would still need to be addressed at some point—a point that came with Kennett et al.'s research request. Furthermore, the legal gray zone that resulted from that decision ensured future administrators would be traveling an uncertain road without guardrails.

These periods help us consider path dependency (choices that trigger a deterministic sequence of events). Museum administrators seem to have believed that their original NAGPRA requirements were satisfied and that the determination that the ancient people from Chaco Canyon were "culturally unaffiliated" did not

necessitate further consultation. The next step in logic seems to have been implied: the belief that fulfilling NAGPRA's *legal* obligations satisfied the museum's and researcher's *ethical* obligations—that is, their obligations to consider Indigenous human rights, the relationship between stakeholders, and the wellbeing of invested communities. As Thomas relayed, the proposed aDNA project was interpreted as a "legitimate scientific study" and the work of additional consultation was perceived as too complicated, and risky, to be practical—even endeavoring to consult with tribes could create more strife than not consulting at all. Rather than revisiting its earlier NAGPRA determination, museum administrators seemingly chose to move forward with the aDNA analysis behind the curtain of ambiguity that its own earlier decision had erected. The work then proceeded without including input from tribal leaders or representatives from the descendant communities of these ancestors, even as their scientific findings were discussed in relation to traditional knowledge. This series of decisions set the stage for a negative reaction from tribes, Indigenous scholars, and their allies once the study was published because the institution's failure to consult with Indigenous communities led to a study that ignored Indigenous values and knowledge.

Finally, this case study reveals important elements of historical contingency. From one viewpoint, this case is so complex precisely because there are so many intertwined factors that converged: problems with consultation and consent at multiple moments in time; challenges stemming from vagueness in NAGPRA; unclear paths forward for museums and researchers when tribes disagree, file competing claims, and dispute the claims of others; a lack of legal clarity about the requirements of consultation and established ethical obligations for collaboration; and shifting expectations over time about consultation and collaboration in these contexts. The interviews also show that museum staff and researchers have earnestly grappled with these issues, to varying degrees, and with varying degrees of success over time. And yet, while many singular factors led to this controversy, a factor that could be repeated across institutions is the widely held assumption that paleogenetic research involving Indigenous peoples can be ethically pursued without actively engaging Indigenous peoples' rights, perspectives, and beliefs.

Our stance is that "legitimate science" with Indigenous peoples and their heritage involves legitimate Indigenous participation. Most fundamentally, these controversies will continue without an ethical revolution in aDNA research. There is little reason to believe clear legal guidance or institutional review will soon be instituted to guide paleogenomics. As a result, it is up to the community of researchers and institutions and descendant groups to work together towards a new form of practice. What is needed is broad agreement on when consulting with potential descendants must take place and when collaboration simply becomes good science. This approach requires an inclusive conversation about the array of values that different groups have for ancestral remains, how equitable and sustained relationships can be formed between researchers and descendant communities, how researchers and museums can be held accountable, and what

protocols for labs, museums, and tribes can facilitate mutually beneficial research that is based on the dignity and rights of all people. NAGPRA is a legal floor, not an ethical ceiling⁸—leaving much work to be done by all involved to enhance the science but also the relationships that strengthen that research. The Chaco Canyon controversy, in other words, can help us learn from the past and understand the work ahead.

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Notes

1. We use “ethics” in relation to questions regarding the fundamental guiding moral principles, including right and wrong. It is important that discussions around ethics not be used to simply censure or approve particular behaviors, but rather to identify and navigate the complex moral questions people face. In the context of contemporary aDNA research, these questions may often be framed as questions of human rights, religious or academic freedoms, and tribal sovereignties—questions that address the well-being of individuals and communities and how to encourage human flourishing (Colwell-Chanthaphonh and Ferguson, 2006).
2. That law suggests that simply sending a letter is insufficient, but does not state precisely what is required: “Consultation may be initiated with a letter, but should be followed up by telephone or face-to-face dialogue” (43 CFR 10.9(b)(2)).
3. The phrase “culturally unaffiliated” is loaded because to many it hides the histories and actions that led to severing cultural ties, ranging from museums breaking up collections to federal Indian policies such as forced displacements. The terms “culturally unaffiliated” and “culturally unidentifiable” are interchangeable in NAGPRA discussions.
4. The AMNH’s (2020c) loan section of its website currently states: “NAGPRA does not address loans or destructive analysis nor are we aware of any established professional standards that might provide direction in this area. In the absence of such guidance, the Division of Anthropology will only rarely consider requests for sampling of human remains as it undertakes an internal policy review.”

5. Of note, under NAGPRA, the level of certainty for making a cultural affiliation determination is far less than scientific certainty. The standard of proof is a “preponderance of evidence,” which means about 51% certain (43 CFR 10.2(4)(e)(1)). The law explicitly states: “Claimants do not have to establish cultural affiliation with scientific certainty” (43 CFR 10.14(f)).
6. Under NAGPRA, a museum makes a cultural affiliation determination for Native American human remains and associated funerary objects independent of any claims (43 CFR 10.9). The AMNH here seems to be implying that no additional consultation was needed because no tribe had objected to their earlier determination and submitted a formal claim for cultural affiliation.
7. It is unclear from our interviews which tribes were involved in this process. According to Thomas, because the AMNH’s consultations are confidential, he was unable to be more specific about which tribal communities the museum consulted and if the Navajo Nation was involved.
8. Our thinking here was shaped by a conversation in April 2018 between Jacquetta Swift, Ripan Malhi, and Jessica Bardill (co-author here). One conclusion was that federal repatriation legislation should be seen as the starting point (a floor) not the accomplishment or limit (a ceiling) for the return of ancestral remains and their belongings.

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