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Engaged Palaeoethnobotany on the Northern Plains: A Compelling Future for Medicinal Plant Research

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Article abstract

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Abstract The University of Saskatchewan Department of Archaeology & Anthropology became the first academic department in Canada to publicly offer a Statement on Reconciliation. Most archaeologists recognize our colonial past and agree we need to expand our focus to incorporate better the thoughts, actions, and desires of the descendant communities of those who produced the material and nonmaterial remains we study. As a subdiscipline of archaeology, palaeoethnobotany with its emphasis on traditional plant use is well-positioned to engage fully with descendant communities. The Northern Plains would seem an ideal candidate for such research, given the rarity of existing palaeoethnobotanical research and the apparent absence of engaged research on medicinal plants. Current literature on the Northern Plains does include various ethnobotanical accounts, including discussion of plants with medicinal purposes. Though rare, there are also a few palaeoethnobotanical studies, which typically incorporate ethnobotanical data to aid interpretations. But what is lacking are clear attempts to bridge these sources of information; to conduct studies specifically designed through the coordinated efforts of Indigenous Knowledge Keepers and Healers with palaeoethnobotanists. We discuss how community-engaged scholarship of medicinal plants research on the Northern Plains may benefit both palaeoethnobotany and descendant communities.

KeyWords Palaeoethnobotany; ethnobotany; archaeology; medicinal plants; Northern Great Plains

Plants have always been a crucial component of First Nations and Native American cultures, and not just for groups for whom cultivating plants was *a*, or in many cases *the*, key component of their subsistence. Nomadic groups, such as those living on the Northern Great Plains of Alberta, Saskatchewan, Montana, and the Dakotas, are typically referred to as hunter-gatherer groups, and the gathered items were primarily plants. The study of the interaction and interrelationships between past peoples and these plants falls within the realm of palaeoethnobotany. Specifically, palaeoethnobotany is the study of behavioral and ecological interactions between past peoples and plants, documented through the analysis of plant remains recovered from archaeological sites (Stuart, 2018, p. 1). It derives from ethnobotany, which refers to the scientific study and recording of the interrelationships between plants and people, especially from the perspective of traditional knowledge of Indigenous communities (Stuart, 2018, p. 3). It also is directly related to archaeobotany, which simply refers to the

study of botanical remains from archaeological sites regardless of the purpose for which they are studied, though palaeoethnobotany and palaeoenvironmental reconstruction are the most common.

As palaeoethnobotanical research has continued, it has become apparent that hunter-gatherer groups from many locations around the world practiced at least limited forms of plant manipulation, if not horticulture (Lightfoot, Cuthrell, Striplen, & Hylkema, 2013; Oetelaar & Oetelaar, 2007; Smith, 2011; Turner, 2014a, 2014b). Though there is no doubt that while ancestral First Nations and Native Americans of the Northern Plains placed great emphasis on bison hunting, the use of plants was also of crucial importance (Kornfeld, Frison, & Larson, 2010). The written accounts of early explorers and ethnographers, however, put their emphasis on the male-dominated activity of bison (buffalo) hunting, with rather less said about the female-dominated collection and use of plants (e.g. Fidler, Haig, & Centre, 1991; Grinnell, 1892 [1972]). Similarly, archaeological research on the Northern Plains has tended to emphasize the use of animal resources, whose remains are often abundant in archaeological sites, rather than plant resources, whose remains are often small and difficult to see; a circumstance compounded by the fact that research methods have not systematically sought plant remains. Consequently, our knowledge of plant use in the archaeological record is limited.

This would seem especially true when it comes to medicinal plants, which are likely to be used in smaller quantities than those plants used for subsistence. Thermal features used in the preparation of subsistence items may lead to relatively large quantities of seeds being recovered (e.g., Ramsay, 1993; see also Turner, 2014a). Such does not appear to be the case for those plants employed for medicinal use which are typically used in quantities suitable to produce decoctions, infusions, juice, powders, mixtures, or poultices for individual patients, though healers would also store some plants (Hart, 1981; Turner, Thompson, Thompson, & York, 1990; Uprety, Asselin, Dhakal, & Julien, 2012). Further, it is worth noting that the same plant could be used for medicinal and subsistence purposes, though these applications often involved different plant parts, different preparation techniques, and use of the plant at different lifecycle stages (Moerman, 1996). Additionally, ethnographic data from the Plains and elsewhere typically indicates a greater range of plants is used for medicinal purposes than for subsistence, construction, or other activities (Clavelle, 1997; Kerk & Fisher, 1982; Turner et al., 1990). Hence, developing a coherent understanding of past medicinal plant use is inherently difficult. Here we argue that a crucial way to improve our understanding of such plant use is through community-engaged scholarship with the descendants of these ancestral groups. Our emphasis on medicinal plants would seem particularly apropos for a discussion of community-engaged scholarship, given the cross-disciplinary interest in medicinal plants as well as the exploitive history of at least some past research into Indigenous medicinal plant use (C. G. Armstrong & McAlvay, 2019; de Rus Jacquet et al., 2017; Hitziger et al., 2016; Weckerle et al., 2018).

It seems clear, however, that a better understanding of all aspects of past plant use and human-plant interaction would be gained through a community-engaged scholarship model.

Although her research areas are different biologically, climatically, physiographically, and culturally than those of the Northern Plains, Nancy Turner's decades-long collaborative research in the interior and on the coast of British Columbia (e.g. Turner, 2007, 2014a, 2014b; Turner et al., 1990) provides an excellent example of the high quality of ethnobotanical research achievable through engaged scholarship and serves as an inspirational model for the community-engaged palaeoethnobotanical scholarship we envision.

Community-engaged scholarship in which community-campus partnerships are developed and sustained through trust, reciprocity, and mutual benefit is a rapidly growing aspect of today's academic research (Zimmerman, 2020). Within archaeology, community-engaged scholarship goes by various names, including applied archaeology, Indigenous archaeology, community-oriented archaeology, collaborative Indigenous archaeology or, what seems to be the most commonly employed, community-based archaeology (Angelbeck & Grier, 2014; Atalay, 2006, 2012; McNiven, 2016; Nicholas, 2008; Nicholas et al., 2011); central to all is collaboration. Community-based archaeology — archaeology that is done by, with and for a local, typically Indigenous, community — has its origins in the 1990s, arising from issues involving repatriation and cultural patrimony (Silliman, 2008). Many, if not most, archaeologists recognize the validity of claims that for much of its history archaeology "continued to colonize, appropriate, and take away" (Silliman, 2008, p. 6). Yet, as Silliman (2008) points out, this realization also was instrumental in the development of new modes of archaeology, in which archaeologists sought to collaborate with Indigenous groups "to explore how to make archaeology … a cultural practice that gives back in responsible and needed ways" (p. 8).

Community-engaged archaeological scholarship is now well established, if still practiced only by a minority of archaeologists. There are both practical and philosophical reasons for this. It can typically take several years of hard work to develop a collaborative research program (Atalay, 2012; Nicholas et al., 2011; Nicholas, Welch, & Yellowhorn, 2007), a period not readily compatible with that of granting agencies or student thesis cycles. Another highly significant practical issue concerns intellectual property rights (Nicholas, 2012; Nicholas et al., 2010), which we return to below. Also of concern is "Elder Fatigue" as the demands on the time of Elders, Knowledge Keepers, and Traditional Healers expand beyond conventional roles within Indigenous communities (Latimar, 2019). The reluctance of some archaeologists to become involved in community-based research may also arise, at least in part, from the perception that community-based research is directed by the community, and consequently that archaeologists doing such work lose the ability to conduct value-free research, thereby jeopardizing scientific inquiry (Silliman, 2008; Wylie, 2015). While various authors have questioned the validity of such arguments (McNiven & Russell, 2005; Silliman, 2008; Wylie, 2015), it may not be so much whether such a position is valid, but that such perceptions are still held, despite arguments and evidence to the contrary. Much of the literature on community-engaged scholarship and collaborative research does give primacy to the community — a position with which we do not disagree — but this does not mean that the value to archaeology is necessarily diminished. In this paper, we investigate how research into palaeoethnobotany, centred on medicinal plant use on the Northern Great Plains, is greatly enhanced through collaborative research with

Indigenous Knowledge Keepers and Healers. Further, we indicate how that same research may promote capacity building in Indigenous communities and empower these communities in the restoration and revitalization of their cultural environment (see Ferguson, 2014, pp. 241-2; Morgan & Weedon, 1990). It is crucial to acknowledge, however, that not all communities may be interested in pursuing collaborative work. If members of a community are not interested in collaborating, then the research cannot proceed.

It is important to point out that neither of the current authors is Indigenous, although we are actively engaged in establishing collaborative archaeobotanical and palaeoethnobotanical research partnerships on the Canadian Plains and elsewhere in Western Canada. We could attempt to assume an Indigenous point of view to describe how we see our research benefiting Indigenous communities. However, such a position would perpetuate the colonial attitude that educated non-Indigenous people understand what is better for Indigenous groups than do the groups themselves. This is a fundamentally flawed approach. The best we can do is offer ideas about how we think such an approach might benefit Indigenous communities.

Relatedly, we cannot know the entirety of what it is that we as archaeologists and palaeoethnobotanists would gain from collaborative research. Almost certainly greater insight into past plant use, but following Zimmerman (1989), we, as scientists, must be prepared "to constantly learn (Johnson 1996)" (cited in Wylie, 2015, p. 204) and anticipate that, through collaborative research, we will learn new ways to learn.

It is important to emphasize that collaborative research is not the same as consultation, the latter involving "legal mandates, procedural steps, and compliance whereas collaboration emphasizes social relationships, joint decision-making, equitable communication, mutual respect, and ethics" (Silliman, 2008, p.7). As such, research goals and methods cannot be dictated solely by one party – that is not collaboration. To be truly collaborative, the research must have utility to all members of the collaboration.

Our approach to community-engaged scholarship draws directly from that of Silliman (2008) who stated,

> Unlike traditional ethnographers who once tried to capture aspects of people's lives without too much of their own interference, archaeologists and Native people working on collaborative Indigenous projects actually embark on a joint project. In many cases, archaeologists seek Indigenous participants as co-producers of their own history rather than as informants on a closed repository of such knowledge. … the parties join together in the present to pursue the past with respect to research projects, heritage concerns, and cultural activities for both separate and mutual benefit. (pp. 10-11)

In such an approach, methodological rigour is maintained; the whole idea is to learn more, with projects designed and practiced so that generated knowledge benefits all partners. The main point is that a collaborative project has a recognized value to the community. Benefiting the participants, both Indigenous and non-Indigenous, is a good start, but ideally the larger

community would also benefit thereby building a long-term productive relationship, again revealing and emphasizing the long-term commitment of community engagement.

Palaeoethnobotany and Ethnobotany

Before discussing how collaborative research can add to our understanding of past plant use and potentially benefit Indigenous groups, a brief review of the current state of palaeoethnobotanical and ethnobotanical knowledge on the Northern Plains is required. Our emphasis here is to discuss what is missing and therefore is rather critical of existing research. However, we do not mean to minimize the important contributions prior research has made, but rather to indicate what is lacking and how a collaborative research program could help fill these gaps.

Analysis of plant remains can add a great amount of information to the archaeological record, facilitating interpretations relating to environmental reconstruction, identification of specific cultural activities, use of plants in medicine, food preferences, seasonal movement patterns and the nature and form of the interaction between Precontact peoples and the landscapes within which they lived (Stuart, 2018). Most palaeoethnobotanical research conducted on the Great Plains, however, has centred on groups that derive much of their food from plant cultivation (Cutler & Agogino, 1960; Drass, 1993, 2008; Schneider, 2002). Relatively little research has been centred on predominately nomadic groups, though the need for such work has long been known (Keyser, 1986).

Northern Plains archaeobotanical and palaeoethnobotanical research conducted at Wanuskewin Heritage Park in Saskatoon, Saskatchewan has resulted in the recovery of charred seeds from various taxa, including goosefoot, cherry, rose, honeysuckle and poplar from hearth features at the Redtail site (Ramsay, 1993). Unfortunately, no detailed examination of the importance or specific use of these plants was conducted. Analysis of charcoal from various thermal and other features at the Wolf Willow site revealed variations in fuel use through time and by activity type (Stuart & Walker, 2018), though charred seeds, the mainstay of palaeoethnobotanical research, were not analyzed. Current research at Wanuskewin by one of us (EC) is addressing both these concerns.

Further south, palaeoethnobotanical research incorporated as part of a multidisciplinary research project at the Cree Crossing site in Montana involved analysis of ten sediment samples, though only two contained charred seeds. Goosefoot and prickly pear were the only materials discussed, though it was unclear if their presence reflected resource use or was a natural occurrence (Aaberg, Eckerle, & Cannon, 2003).

Falzarano (2014) presents seed counts and identifications as part of her larger analysis involving the spatial distribution of archeological features and their contents within a series of palaeosols reflecting 8000 years of occupation at the Stampede Site in the Cypress Hills of southeastern Alberta. Given species identification, she turns to the ethnobotanical record (e.g., Johnston, 1987; Murphey, 1959) to suggest possible uses of these plants. She (Falzarano, 2014) also uses general plant processing activities within her overall analysis of change and continuity in the patterning of activities at the Stampede site through time.

Elsewhere in Alberta, analysis of starches from several grinding stones and mauls indicated the use of maize (corn) and various local grasses and fruits (Fedyniak & Giering, 2016; Zarrillo & Kooyman, 2006), while analysis of organic residues from a hearth in a stone circle (tipi ring) site revealed a range of local and exotic taxa, including maize, beans, and squash (Leyden, 2011).

While the identification of ancient maize based on the presence of starch grains alone may be questioned as a result of the potential for laboratory contamination (Clarke, 2015; Crowther, Haslam, Oakden, Walde, & Mercader, 2014), stable isotope, trace element, starch, and phytolith evidence for the use of maize has been found on the prairies of Manitoba (Boyd, Surette, & Nicholson, 2006; Boyd, Varney, Surette, & Surette, 2008), while starch and phytolith evidence of both maize and beans was found on the prairies of Saskatchewan (Lints, 2012). We are unaware of any macrobotanical evidence for the use of maize, beans, or squash on the Northern Plains. Though not directly relevant to the current work, research into the potential distribution of maize and other domesticates on the Northern Plains is a vital area of palaeoethnobotanical research, given the importance of maize as a dietary staple in much of North America combined with its previously perceived lack of use amongst nomadic hunter-gatherer populations on the Northern Plains.

Archaeobotanical research focused on Northern Plains palaeoenvironmental reconstruction and how these changing environments might have affected past peoples has also occurred (Cummings, 1995, 1996; Cyr, McNamee, Amundson, & Freeman, 2011; Klassen, 2004; Siegfried, 2002), as have some interesting experiments in palaeoethnobotany (S. W. Armstrong, 1993).

Combined, these archaeobotanical and palaeoethnobotanical studies evidence the scope of research conducted, the wide range of materials studied, and have provided significant contributions. But while medicinal plants are noted in some of these studies, as far as we are aware there are no detailed investigations into the Pre-contact use of medicinal plants on the Northern Plains. For example, Yost and Logan (in Leyden, 2011), Aaberg et al. (2003), and Stuart and Walker (2018) refer to ethnographic and ethnobotanical accounts to document whether or not any of the plant taxa identified through their analyses may have had medicinal uses. Similarly, Zarrillo and Kooyman (2006) refer to the ethnobotanical work of Peacock (1992) to document some of the medicinal plants that were processed by grinding. Such results, however, only indicate that the plants *could* have been used for medicinal purposes not that they *were* used for such a purpose. Granted, analysis of a single hearth or grinding stone is very unlikely to provide any clear indication of medicinal plant use, but then neither do those studies that have multiple samples from multiple features. The tendency toward using relatively small amounts of medicinal plants as noted above is part of the problem, but so too is the nature of the ethnographic record to which paleoethnobotanists derive information on medicinal use.

Ethnographic and ethnobotanical literature on Northern Plains plant use in general and medicinal plant use in particular is limited and occasionally ill-informed. For the Blackfoot Confederacy (Niitsitapi), one of the most extensively ethnographically documented groups on

the Northern Plains, B. R. Johnson's (1988) annotated bibliography of 1186 entries lists only seven which deal specifically with plants, and five of those are by the same author (Peacock, 1992). One of the first to pay much attention to plants was Grinnell (1892 [1972]), though he paid considerably more attention to hunting. Only one early ethnographer, Walter McClintock (1910, 1923), extensively documented plant use. Both of these individuals worked and lived with Indigenous groups with their information derived directly from personal connections. Their works also seem to have formed the foundation for much of the subsequent ethnobotanical literature on the Northwestern Plains.

A perusal of ethnobotanical literature of interest to the Northern Plains suggests that such publications tend to build upon previous publications, offering new syntheses and summations, but rarely new information derived from Indigenous Knowledge Keepers. This arises not from some oversight of the researchers, but rather from the purpose of their investigations, which was to try to compile as much ethnobotanical information as possible in one place. Moerman (2009) provides an excellent example:

> *Native American Medicinal Plants* is based on the research of hundreds of scholars. I accumulated the material over a period of more than 25 years. In that period, any time I saw an item containing useful information, I made note of it. In addition, in 1993 I did an intensive search of the literature using traditional techniques such as reading bibliographies and using computerized search techniques. (p. 17)

Thus, though highly useful sources of information, one can wonder if they are truly ethnobotanical publications, given they seldom document first-hand experience derived from Indigenous specialist or non-specialist Healers.

There are, of course, exceptions and some publications specifically state that they received information from Indigenous "informants" or "consultants" (e.g. Hart, 1981; Hart, 1992; Scott-Brown, 1977). However, seldom is context provided as to whether or not the consultant is someone who routinely engaged in healing (a Healing specialist) or is a non-specialist. There is also seldomly a clear indication as to the individuals' affiliation within a specific community. It is a standard ethical requirement that the names of consultants not be provided, though some may choose to be identified. There are, nevertheless, means by which the identity of a particular Knowledge Keeper may be protected while still providing the reader with their background. For example, rather than using names each knowledge provider could be numbered or referred to by a pseudonym with pertinent information, such as the individuals' gender, age, society association, and an indication as to whether the individual is a specialist or non-specialist, provided. This information preserves the anonymity of the consultant while providing the reader with well-sourced information. Further, anonymity can protect the privacy of the Knowledge Keepers and therefore help build trust and rapport between the researcher and the Knowledge Keepers, in turn facilitating a free flow of information. While collaborative community-engaged scholarship may result in those who might otherwise fulfill

the role of consultant taking an active role in the research, including as an author on a report or publication, even in such circumstances anonymity may be preserved if so desired.

These synthetic works also typically lack detailed information on how the plants are collected, prepared, or administered. Further, they tend to lack information on specific personal medicinal practices or information on group medicinal practices. Instead, they tend to list plants, using standard Western scientific nomenclature, and describe the ailment for which each plant is used. We do recognize, however, that many are likely to see the lack of information as a plus, as Indigenous groups may not want such details widely available for fear of it being misrepresented, misused, or otherwise appropriated by non-Indigenous people, and justifiably so (see Whitt, 1998).

At least as significant is that much of this literature tends to ignore the spiritual context in which many medicinal plants are collected, processed, and used. Across North America, there is a strong spiritual connection to Indigenous medicinal plant use as it is commonly understood that physical health is intertwined with spiritual well-being (e.g. Morse, McConnell, & Young, 1988; Uprety et al., 2012; Young, Ingram, & Swartz, 1989; Young, Rogers, & Willier, 2015). This is also true for the Northern Plains. Amongst the Piikani (Peigan) (Grinnell, 1892 [1972]) and Nehiyawak (Plains Cree) (Mohling, 1992), for example, evil spirits typically cause illness. On the other hand, spirits also visit people and tell them which plants to use, how to prepare them, and what songs and rituals are necessary to produce a cure (Mohling, 1992; Peacock, 1992). Thus, for Indigenous groups, spirituality is a fundamental part of medicinal plant use, and trying to divorce the medicine from the spirit divorces plant use from cultural tradition (see also Wylie, 2015). Not surprisingly, this would be seen as a fundamentally flawed approach representing another example of appropriation, dispossession, and colonial practice (for a broader perspective see Echo-Hawk, 1997).

Other gaps within the ethnobotanical literature concern differentiation between specialist and non-specialist Healers. Peacock (1992, p. 68) is an exception, noting that some plants were widely used by various members of the Piikani, such as old man's whiskers, which was brewed into a medicinal tea for colds, sore throats, fever, stomach-aches, and kidney troubles. For serious illnesses, however, reliance was placed on specific individuals considered to have spiritual powers for curing (Mohling, 1992; Peacock, 1992). Similarly, the literature is unclear as to where healing occurred, and about whether patients would go to the specialist or if the specialists would go to the patients (or both). From a palaeoethnobotanical and archaeological perspective, the spatial distribution of activities is of fundamental concern (cf. Falzarano, 2014).

However, a few researchers do properly contextualize medicinal plant use, but these same researchers are also the ones who are better immersed in the healing milieu and therefore defer from inappropriately publishing details. For example, Peacock (1992) notes, "due to the sacred nature of spiritual curing it would be inappropriate to discuss personal medicines and curing methods" (p. 69). Though some may see this as a fundamental flaw of more collaborative approaches to research, for the reasons provided below, we do not.

In summary, little palaeoethnobotanical research has been done on the Northern Plains, and even less specifically addresses medicinal plant use. Ethnobotanical information is much more prevalent, and while providing useful information to aid in palaeoethnobotanical interpretation, most of this literature lacks the necessary context to produce archaeologically meaningful interpretations of palaeoethnobotanical remains. There is also a clear conundrum concerning ethnobotanical literature. On the one hand, it is insufficient for facilitating meaningful elucidation of palaeoethnobotanical information as it typically lacks the context of plant use, but on the other hand, these very data that are the most inappropriate to publish. A collaborative approach, however, would help with both of these concerns.

Benefits of Collaborative Research

It is a standard practice in palaeoethnobotany, and archaeology more generally, to employ ethnographic data to ascertain what purposes a given taxon may have had; the theoretical perspective known as ethnographic analogy (Binford, 1972; Currie, 2016). Juniper, for example, was widely used to treat a variety of ailments not only on the Plains but in the Boreal Forest. The Dënesųłinné (Chipewyan) ate cones as a general remedy, smoked them to relieve asthma, or boiled green cones to make a tea for treating back pain associated with kidney problems (Johnson, Kershaw, MacKinnon, & Pojar, 1995). Among the Nihīthawak (Woods Cree), juniper had a variety of medicinal uses, ranging from an antiseptic on wounds to treating coughs, fevers, kidney troubles, teething, lung infections, and diarrhea (Leighton, 1985). The Pikanii used juniper for treating digestive issues, muscle pains, and as a general panacea (Peacock, 1992). Similarly, the Dakota used juniper to treat colds and coughs, as well as cholera (M. R. Gilmore, 1919). While a useful synopsis, such a discussion lacks detail. As palaeoethnobotanists, we are interested in more than just what ailment a plant may have helped cure; we seek information on harvesting loci and timing, whether plant collection locales were maintained and how, processing techniques, who used which plants and under what conditions, and knowledge regarding artifacts or other material remains that were used in association with any of these aspects. In short, we seek a far more holistic account of how a particular plant fits within the general cultural milieu.

Current ethnobotanical works are useful but, as indicated above, they have a strong tendency toward being utilitarian works providing inventories of plants and their uses. There are few attempts to provide information on plant utilization patterns or data on gathering and processing (but see Peacock, 1992). Further, existing ethnographic works emphasize western scientific classifications, with little if any discussion of Indigenous classification systems. From a linguistic perspective, Taylor (1989) highlights that accurately recording Indigenous plant names adds indispensable knowledge to a publication. He also cautions, however, that many if not most of these Indigenous names within the ethnographic record are mistranslated. This results in improper representation of medicinal plant utilization and is something rectifiable through collaborative research. From a palaeoethnobotanical perspective, even if temporally removed from archaeological contexts, incorporating such classification systems provides additional insight into how people assessed similarities, differences, and ascribed relative

importance to various plants and plant uses; all of which would have utility in interpreting palaeoethnobotanical materials (see also Turner, 2014a, pp. 117-190). Consequently, it seems prudent that if we want to understand how plants may have structured, and been structured by, the activities of past peoples, we should work with the descendants of those people.

Ideally, such collaborations would involve multiple communities. As the example above illustrates, different groups used the same plant for different ailments. The literature abounds with such examples. The Niitsitapi employed chokecherry as a throat aid and antidiarrheal, whereas other groups such as the Só'taeo'o and Tsétsêhéstâhese (Cheyenne) used chokecherry as a dietary aid to increase the appetite of a sick person, as well as an antidiarrheal (Moerman, 2009). Another example is Canadian mint, employed by the Niitsitapi for chest pains whereas the Só'taeo'o and Tsétsêhéstâhese used it to relieve nausea and prevent vomiting (Moerman, 2009). Several other examples exist; mutual collaboration among various Indigenous researchers could lead to very profitable discussions of variations in plant use.

It was also indicated above that one of the problems with identifying medicinal use of plants in the archaeological record is that the plants are typically used in much smaller amounts than plants used for food as medicines are typically produced for one and food for multiple people. One means by which this problem might be ameliorated is by having access to information that provides greater knowledge as to how medicinal plants might have been distributed across a site, based on their context of use. This sort of information is rarely if ever mentioned in ethnobotanical works, but would seem to be the sort of information that relatively easily might be obtained through collaborative research, and therefore inform an archaeological research design regarding how preparation and use of medicinal plants might be revealed through palaeoethnobotanical evidence (pollen, phytoliths, starch grains, ancient DNA, charred remains) collected from artifacts (grinding stones) or sediment samples.

We also foresee areas of potential benefit to Indigenous groups. First, as with any collaborative or community-based archaeological project, such research would help build a bridge, allowing modern descendants to reconnect with their past. Collaborative palaeoethnobotanical research is also likely to play a role in social and environmental justice by re-affirming the importance of Indigenous ways of knowing. Collaboration does not negate science, but rather offers an opportunity to combine science and Indigenous ways of knowing together to provide a holistic perspective on medicinal plant use. Collaboration with multiple groups would further enhance such a perspective, and re-affirm that knowledge transcends single epistemologies and builds equity (see Atalay, Clauss, McGuire, & Welch, 2014).

Indigenous North American groups have long struggled to protect sacred sites, with only limited success. Depending on location, various municipal, state, provincial, or federal laws are relevant. In Saskatchewan, for example, provincial law (Saskatchewan Heritage Property Act, section 64) designates pictograph, petroglyph, human skeletal material, burial object, burial place or mound, boulder effigy or medicine wheel as Sites of Special Nature, and therefore deserving of additional protection. While no means inclusive — omitting, for example, such well-known and widely recognized sacred sites on the Northern Plains like vision quest sites (Friesen, 2013) — this list nevertheless clearly references sites typically, if not universally, held

as sacred by First Nations.

Given that spirituality and sacredness play a huge role in traditional medicine, it is not surprising that collecting medicinal plants is a spiritual activity with offerings and prayers of thanks provided to the plant, accompanied by various rules regarding the amount to be collected and from where plants could be harvested (Karst, 2010; Turner, 2014b, pp. 297-350; Turner et al., 1990). It is not, or at least not necessarily, the presence of the plants themselves that makes them sacred – what makes them sacred is the human component, the act of harvesting and employment of the plant (Brown, 1953; Kovach, 2006; Turner et al., 1990). While some medicinal plants are widely distributed and others ecologically restricted (e.g. Uprety et al., 2012), favoured locations for plant collection exist (Johnston, 1987; Peacock, 1992; Young et al., 2015). By extension, it seems reasonable to posit that the locations that people visit to obtain medicinal plants can themselves be seen as sacred; minimally they would seem significant.

Such areas would seem prime candidates for protection and preservation (Hamilton, 2004; Karst, 2010). This would seem especially pertinent on the Northern Plains, where the scale and scope of agricultural, industrial, and urban development has destroyed about 80 percent of the grassland ecoregion (Acton, Padbury, & Stushnoff, 1998). Yet, this same sacred or significant association may also prevent groups from seeking protection for these areas as doing so draws unwanted attention to the area. Protection might also limit the very activity — the collection of plants — that was central to an area being protect (see also Hamilton, 2004). Might collaborative research facilitate the protection of such locations (and other types of sites) by offering additional means and avenues to protection? If so, such collaboration could potentially have significant ramifications. Collaboration between not only participants of a given project, but rather between the community of archaeologists and Indigenous communities in general might substantially facilitate amending existing Acts and Regulations. Particularly if such amendments are consistent with articles of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) which both Canada and the United States have now adopted. Of particular interest in this regard is Article 24, which states, "Indigenous peoples have the right to their traditional medicines and to maintain their health practices, including the conservation of their vital medicinal plants, animals and minerals."

A significant concern about conducting collaborative research and publishing the results that would need to be addressed at the outset is the sharing of knowledge (Atalay, 2012; McNiven, 2016). How can knowledge about medicinal plants be shared in culturally appropriate ways? Who should know about the results of any particular research project, either in whole or in part? Should some knowledge not be shared at all? The sacred nature of much of the knowledge concerning the use of medicinal plants on the Northern Plains is certainly a factor here. For example, Raczka and Bastien (1986, p. 10) indicate that "some very specific and detailed information was obtained concerning … medicine bundles among the Piikáni Tribe..." (cited in Peacock, 1992, p. 26). As medicine bundles typically contain medicinal plants, this information would likely be of considerable interest to many paleoethnobotanists. However, none of this information was included in their manuscript because such items are highly sacred.

Therefore, it would seem prudent to establish as early as possible what information may or may not be shared publicly and to ascertain whether certain aspects of the research should be avoided entirely. Such potential problems are curtailed by developing research projects in collaboration, where community members are engaged in the entire research process from developing the research design, grant application generation, development and implementation of field methods to interpretation and generation of results (Atalay, 2006, 2012).

Further, even if publication is eschewed and data embargoed, research is still very much worth doing if the community decides it would benefit the community itself. At least since the 1980s, ethnobotanical publications have been warning that knowledge of traditional medicine is rapidly declining. It is not simply the fact that Elders with such knowledge are dying, though that is a factor, but also that such knowledge, for various reasons, has not been passed down to younger generations (Morgan & Weedon, 1990). By creating meaningful long-term relationships with Indigenous groups as academics, we can provide the communities with written records that are held within the community; with the community having control as to what can and cannot be published. Toward this end, we support The First Nations Principles of OCAP®, that First Nations communities have the right to own, control, access, and possess information about their peoples as this is "fundamentally tied to self-determination and to the preservation and development of their culture" (FNIGC, 2020). Thus, even if research never leads to a publication or conference presentation, this would still be incredibly important research to undertake, not because it would add to the World's knowledge but rather because it may offer the possibility of helping to restore and revitalize the Community's cultural knowledge (e.g., Ferguson, 2014).

A related important concern is that of Intellectual Property rights (Nicholas, 2012). How might the concept of Intellectual Property apply to investigations of medicinal plants? How does one ensure that publication involving collaborative research into the use of medicinal plants does not negatively affect Intellectual Property rights? The willingness of individual Healers in particular and the community in general to share their knowledge would seem to be a guiding principle. But the colonial and exploitive past is a difficult precedence to overcome, with many Native American and First Nations groups reluctant to share their knowledge of the various benefits and uses of medicinal plants because of past exploitation (see Crane, 2012; M. P. Gilmore & Hardy Eshbaugh, 2011; Nolan & Turner, 2011; Trotti, 2001). Particularly given that such appropriation of pharmaceutical knowledge is only one example; Whitt (1998) provides a long list of items from which Indigenous peoples have been dispossessed. Combine this with the sacred knowledge associated with medicinal plants, plus the fact that some plants used for medicinal purposes are toxic, even lethal if administered inappropriately, and it becomes rather clear why Indigenous groups may be reluctant to become involved in collaborative research regarding medicinal plants.

The most honest and open way of ensuring Intellectual Property rights and dealing with related issues would be for the research to be designed, directed, and implemented through collaborative efforts of Indigenous Healers, other community members, and academic collaborators. This would help ensure that methods and products avoid the extractive and

invasive past of investigations of medicinal plant use while contributing to the empowerment of the community itself. As Atalay (2012) notes,

> In developing a partnership with a community, the specifics of the research topic, the field methods, and projected outcomes or products actually play a minimal role. What matters most is a shared ideology of mutual respect and a commitment to partnering in equitable, authentic ways. (pp. 128-129)

Summary and Conclusions

In this article, we have briefly discussed what community-engaged scholarship/collaborative archaeology is, outlined that Northern Plains palaeoethnobotanical research is limited, with little to no research done on the use of medicinal plants, other than the practice of consulting ethnographic and ethnobotanical sources to identify which plants were used by which groups of people to treat which ailments. Contextualization of activities involved in acquiring, processing, and using these plants is lacking, as is a discussion of the spiritual component to healing. This same information is also lacking from most ethnobotanical accounts of medicinal plant use on the Northern Plains, though there are notable exceptions (Mohling, 1992; Peacock, 1992; Scott-Brown, 1977). We also briefly reviewed other gaps in the ethnobotanical literature that limit their uses as references to aid in the interpretation of palaeoethnobotanical materials, though it needs to be noted that such use, was rarely the intention of the authors of these works. Though there are shortcomings, the fact remains that they are still highly useful works for palaeoethnobotanical investigations. We also argued that many of these shortcomings could be addressed through community-engaged collaborative scholarship with First Nation and Native American Elders, Knowledge Keepers, and Healers. Though we also point out that there are concerns involved in such projects that would need to be mutually addressed and that the development of such collaborations requires a long-term commitment.

Though it is not our place to specify how such collaborative research would benefit Indigenous groups, we strongly believe that such a benefit would accrue. For too long archaeologists, and numerous others, have held the position that the cultural histories salvaged by archaeology were not significant to a living community (Wylie, 2015). We have now become much more aware of the basic fact that the materials comprising the archaeological record can readily be argued to be part of a living cultural tradition, in particular the living cultural tradition of modern First Nations and Native Americans. Collaborative research into medicinal plants would seem an excellent means by which the bridge between past and present practices could be at least partially strengthened.

Collaborative research done elsewhere in North America has revealed that such research has the potential to be a capacity-building tool toward enhancing sovereignty and cultural revitalization (Atalay et al., 2014). Collaborative research on medicinal plants would also seem to have similar potential by helping to preserve traditional knowledge and aid in the protection of plant-collecting areas. Thus, we think such research would directly contribute to the wellbeing of the community.

It would also seem likely to contribute to the wellbeing of palaeoethnobotany in particular, and archaeology more generally. It is not incidental that such research would help to heal further the rift between archaeologists and the descendant groups of the people who produced the materials we study. It would also seem likely to contribute directly to the discipline of palaeoethnobotany itself, given Wylie's (2015) contention "that some of the most creative archaeological learning now taking place is in the context of collaborations…; they can and do significantly improve archaeological practice empirically, conceptually, and methodologically" (p. 192). Taylor (1989) emphasized that, "in order to do good ethnobotany, the investigator must have considerable familiarity with the methods and theories of anthropology and linguistics, in addition to botany, natural history, and possibly herbal medicine" (p. 360). These same attributes would seem appropriate to do good palaeoethnobotany, but with the addition that one should also have similar knowledge about the traditional and spiritual component of "herbal medicine". This knowledge, we contend, is best obtained through engaged scholarship with Knowledge Keepers. The implication being that if paleoethnobotanists do not establish the sort of horizontal connections necessary to undertake collaborative research we would seem doomed forever to have a less complete picture of the past. If we want to advance knowledge about medicinal plants in particular and human-plant interaction more generally, then collaborative research is perhaps the only means whereby this can be achieved.

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