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Microcores and microliths in Northwestern Plains and Rocky Mountain front lithic assemblages

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Microcores and microliths have been identified in archaeological sites in Montana, Wyoming, and North Dakota. While clearly the product of patterned reduction yielding flakes with roughly parallel sides, the cores seldom produced regular flake removals, suggesting a high degree of variability in the resulting microliths. This irregular pattern of reduction contrasts with classic microblade cores from higher latitudes, where uniformity of microblades was desired. When noted by field archaeologists, microcores are variously described as conical or circular scrapers as well as microcores or microblade cores. They occur in low frequencies in several time periods and are seldom identified with associated production debitage let alone microliths. This article examines microlith manufacture and microcore discard in the Northwestern Plains and adjacent regions and proposes that the technology fulfilled

a specialized role in the organization of lithic technology linked to the infrequent manufacture of specialty items.

KEYWORDS microcore, microlith, microrblade, Northwestern Plains, Rocky Mountain Front, lithic

Artifacts resembling microblade cores are occasionally referenced in publications and gray literature of the Northwestern Plains and adjacent regions (e.g., [Cramer 1984](#); [Kornfeld et al. 1995](#); [Lahren 1976, 2006](#); [Roll and Neeley 2014](#)). Various referred to as microblade cores, microcores, and conical or circular scrapers, the documentation of this class of artifacts is frequently characterized by ambiguous terminology and limited description (e.g., [Greiser 1988](#); [Miller and Greer 1975](#)). As noted by [Sanger \(1970\)](#), uncertainty in the classification and function of similar artifacts is not confined to the Northwestern Plains. While not culturally related to the artifacts presented here, [Boldurian \(1985\)](#) describes potentially analogous occurrences of microlith manufacture in the upper Ohio River Valley and vicinity, as does [Connolly \(1991\)](#) in southwestern Oregon. This article compiles data on a sample of reported microcores and microliths from the Northwestern Plains and adjacent areas and complements Wilson et al.'s (2011) study of microblade technology from the High River area south of Calgary, Alberta (Figure 1; see also [Sanger 1968, 1970](#)). We examine several reported occurrences of microindustry and assess patterning in the assemblages in terms of chronology, core and bladelet morphology, and potential use. We hope to raise awareness among archaeologists working in the Northwestern Plains and Rocky Mountains of a technology that is seemingly uncommon and easily overlooked, but that may contribute to the

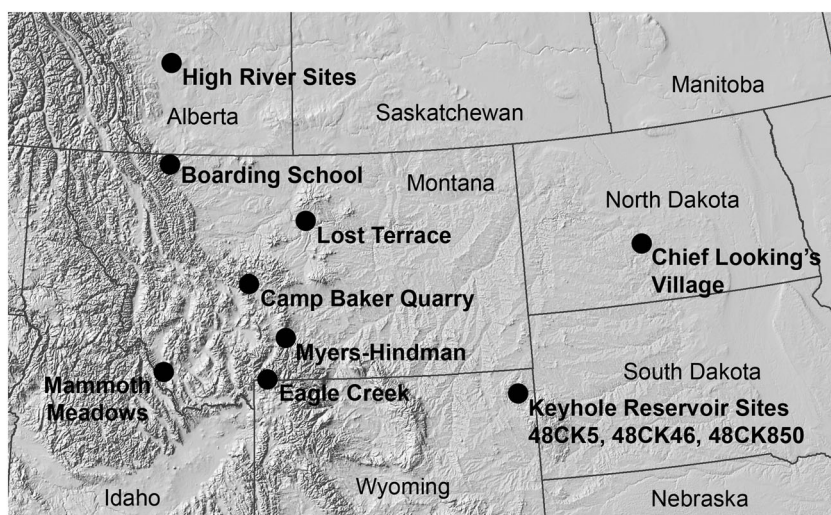


FIGURE 1 Archaeological sites where microcores or microliths have been recovered on the Northwestern Plains of the conterminous United States.

overall understanding of the technological systems in at least two time periods. During the late Paleoindian period, a true microblade technology, described in the next section, occurs in the Northwestern Plains, while during the Late Archaic and Late Prehistoric periods the technology is better characterized simply as microlithic.

The Alberta microblade assemblages described by [Wilson et al. \(2011\)](#) at High River and several other sites appear to be associated or coeval with the late Paleoindian Cody complex (see also [Sanger 1970](#); [Wormington and Forbis 1965:130](#)) and represent a true microblade technology, or at least a derivative of Arctic or Subarctic microblade traditions. The High River cores show broad similarities to Denali/Campus-type cores, but may represent a unique microblade technology that was further developed in the Northern Plains ([Wilson et al. 2011:33](#)). We present at least one site in Montana, Mammoth Meadows (24BE559), with evidence of microblade technology that appears to be coeval with the High River examples, however, our article's primary focus is on the occurrence of later microlithic technology, with distinct core morphology and preparation reflective of specific technological requirements.

Terminology

Because microindustries are unfamiliar to many working in the Northwestern Plains, we believe the productive exploration of this technology will benefit from the introduction of standardized terminology. This is also necessary because the Late Archaic to Late Prehistoric period microcores of the Northwestern Plains and adjacent regions are not identical to those recovered in the more northern regions of North America. We use the term microlith to refer to small, elongated blade-like flakes and the term microcore to reference the cores from which they were struck. Although they possess some microblade-like characteristics, microliths are more irregular in shape than microblades produced from formal cores (Figure 2). They can also be short because they fail to propagate all the way off the face of the core; sustained production of microblades (and blades) works best when the individual blades are driven off the full length of the face of the core to allow for clean subsequent removals. Microliths may include flakes with an irregular (sinuous or wavy) dorsal ridge, suggesting they were not removed in an ordered, sequential fashion. While individual microliths may coincidentally possess characteristics of a true microblade, from an assemblage-level perspective they do not. Microliths produced from less-patterned cores than those of microblades might be conceptualized as expedient microblades (sensu [Binford 1980](#)). In some contexts, microliths may possess similar functional traits to microblades. However, their irregular margins and wavy dorsal scars likely reflect functional expediency, with the resultant core morphology a byproduct of this less formalized manufacturing process. Microlith irregularity may reflect a difference in production relating to detachment technique, such as pressure flaking versus direct percussion.

In the most basic sense, all blades are flakes that are at least twice as long as they are wide ([Bar-Yosef and Kuhn 1999](#)). Many archaeologists ([Bar-Yosef and Kuhn 1999](#); [Owen 1988](#)) agree that a continuum exists between blades and microblades,

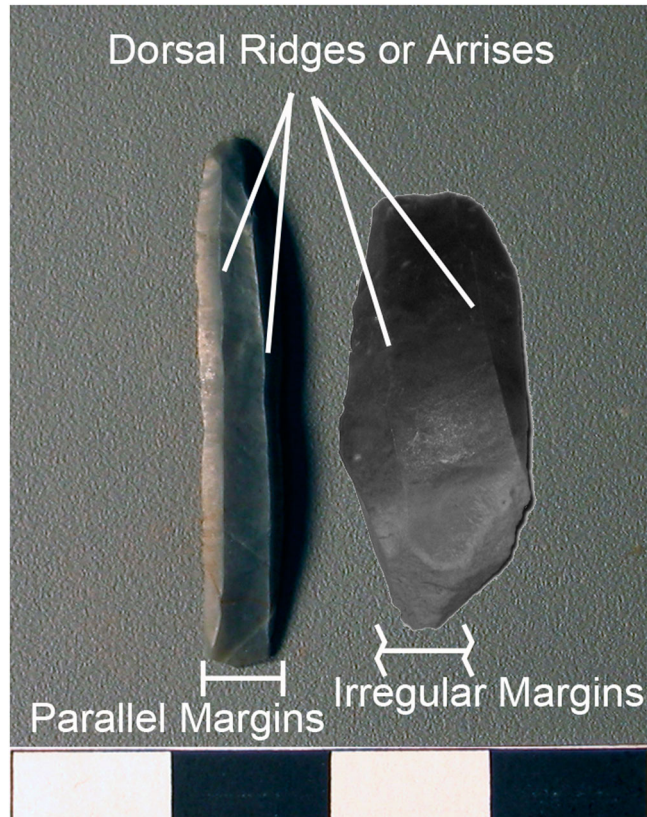


FIGURE 2 Comparative views of a uniform microblade produced from a formal core (left) and a more irregular microlith representative of Northwestern Plains and Rocky Mountain Front lithic assemblages (right).

with microblades sharing many of the characteristics of larger blades apart from their diminutive length and width, the latter of which generally clusters below a defined maximum of 15 mm (e.g., Owen 1988; Taylor 1962). True blades of any size exhibit one or more uniform dorsal ridges parallel to the long axis, which give them a triangular or trapezoidal cross-section (Bordes and Crabtree 1969). When produced from formally prepared cores such as those found in the American Paleoarctic tradition (APAt) and Denali complex, microblades tend to have parallel lateral margins as well. Characteristics of microblade cores in the APAt and Denali complex include: (1) bifacial preforms, the remnants of which can be seen on the sharp-edged keels or bases (Figure 3a); (2) blade removal across the width of the core, making them frontally faced (Figure 3b); and (3) a generalized wedge-shaped morphology when viewed from above and head-on toward the flutes (West 1967, 1996) (Figure 3b). The generally accepted model of microblade manufacture in the Denali and Paleoarctic traditions of Alaska is that tens or hundreds of microblades were manufactured and only the most uniform were selected for further use or modification (Clark 1992). This process yields assemblages in which

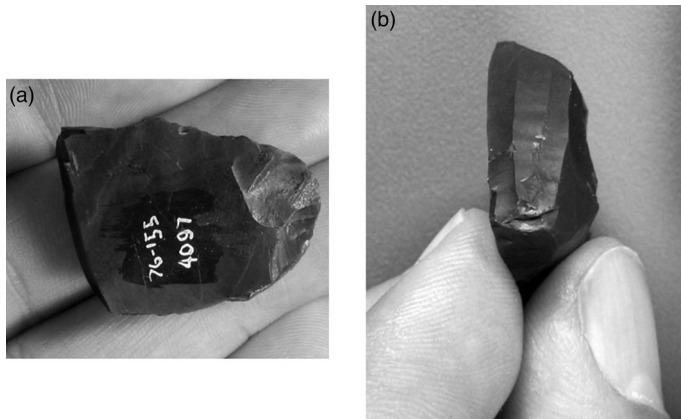


FIGURE 3 Two views of the same American Paleoarctic Tradition/Denali Complex wedged-shaped microblade core from the Dry Creek site in central Alaska. (a) Side view and (b) view toward face.

microblades substantially outnumber microblade cores. In contrast, the detachment of fewer and more variably shaped microliths does not suggest a similar, formal level of production and the resulting cores are generally conical rather than wedge-shaped in form.

Micro lithic traditions and technology

A historical relationship between many microlithic traditions is plausible, given the technology's origin in the general blade and bladelet industries of the early Upper Paleolithic of the Levant (Meignen and Bar-Yosef 2002), Western Europe (Straus 2002), and Sub-Saharan Africa (Ambrose 2001, 2002), and its eventual spread across the Arctic. By the end of the Last Glacial Maximum, microblades inset into organic hafts formed the hunting and cutting backbone of the Late Paleolithic for much of northern Eurasia and Beringia (northeast Siberia and unglaciated Alaska and Yukon Territory; Kuzmin et al. 2007; Lee 2001, 2007a, 2007b). Larsen (1968b:339) refers to North American examples as the “northeastern branch of a Circumpolar Microblade tradition, or, to be more specific, of a Circumpolar Side Blade tradition,” which spread roughly between 50 and 60° North latitude, encompassing archaeological cultures from the Maglemose in southern Scandinavia to various cultures in northern North America, including the APAt.

In general, microlithic technologies provide an efficient way to produce large quantities of usable cutting edge from a given piece of stone (Guthrie 1983; Sheets and Muto 1972). Researchers have noted an environmental influence on the organization of lithic technology (Andrefsky 1994; Kelly 1988), and the conservative nature of microlithic technology makes it particularly amenable to working within ecological constraints, such as the extreme seasonality of the Arctic and Subarctic (Dixon 1993, 2006, 2010). However, from a broad temporal and geographic perspective, the use of microlithic technology was certainly an adaptive behavior

that possessed wide economic utility. On a global scale, differences in the ecological environments in which microliths were used to demonstrate the technology was inherently flexible (Elston and Kuhn 2002) and part of the basic repertoire of many ancient peoples (Del Bene 1992; Dixon 2010; Larsen 1968a, 1968b; Meignen and Bar-Yosef 2002; Mitchell 1968).

While efficiency and raw material conservation may be important factors for understanding the appearance of microlithic industries, a number of other factors may explain why this technology was adopted (Neeley 2002). First, the production and use of microliths may enhance forager mobility as they are easily transported in large quantities and solve the problem of carrying heavy items (Shott 1986). Second, they constitute a versatile technology, because the generalized microlith form can be used in different ways. For example, microliths have been interpreted as cutting edges in organic hunting projectiles as well as plant processing tools and other cutting implements (Becker and Wendorf 1993; Clarke 1976; Odell 1994). Third, the relatively standardized form of microblades makes them interchangeable components that can be plugged into existing hafts as parts of composite tools, making maintenance more efficient (Bar-Yosef and Kuhn 1999). This ease of replacement constitutes what Clarke (1976:457) calls a “pull-out and plug-in” technology. Fourth, microliths can be viewed as a hedge against raw material scarcity or uncertainties in settings of high mobility. The ability to produce large quantities of microliths in one location and use them in other locations provides greater behavioral flexibility with regard to locations of tool use, resource procurement, and raw material access. This flexibility controls risk because it offsets gearing-up costs associated with food procurement and technological choices (Bamforth and Bleed 1997; Torrence 1989). And fifth, the adoption of microliths can signal changes in forager hunting strategies or changes in the availability of particular animal resources (Myers 1989). In sum, microliths might serve to increase the efficiency with which resources can be procured, especially relative to other technological options.

To facilitate repeated removals, microblade production requires that flakes be driven entirely off the face of the core to allow for subsequent blade removals (Lee 2001, 2007a, 2007b). Consequently, high quality materials without inclusions that could derail production were required. Although experimentation has shown that microblades can be produced in a variety of ways, their morphological regularity and the small size of the cores suggest both the use of a vise to support the core on an anvil and pressure flaking to detach the microblades (Flenniken 1987; Morlan 1970, 1976; Tabarev 1997). In the absence of formal core preparation, microliths could not be produced with the same consistency as microblades produced on more formal cores.

While any of these factors can be invoked as a potential explanation for the appearance of microliths, they are not mutually exclusive. The appearance of microlithic technology likely involves a complex interaction among these factors, as well as issues of reliability and maintainability (Bamforth and Bleed 1997; Bleed 1986). The production of true microblades involves complex concepts and technical skills suggestive of learned behaviors passed from one generation to the next as opposed to a recurring independent invention (Dixon 1999).

Unlike bifacial lithic tools that can exhibit life-cycles or stages of modification and reuse (Kelly 1988), both microliths and microblades are essentially finished when removed from the core, although their morphology can be adjusted through micro-flaking, or “backing” as well as adjustments to their length (Lee 2001, 2007a, 2007b). Most if not all of their utility derives from how they are hafted to organic materials such as wood, bone, or antler. In situations where microblades were used as insets to facilitate hafting, many microblades were intentionally broken into sections to offset the curvature of the core face. Because of the uniformity of microblades, archaeologists tend to focus their analyses on the cores from which they were struck, particularly those working in the region formerly comprising Beringia (northeast Asia and Alaska). For example, the spread of microblade technology has been traced through changes in core form, where different ethnic groups may have used different templates for core shape or reduction strategies (Andrefsky 1987; Magne 1996; Wilson et al. 2011). Although some analyses have been based on platform variation (Anderson 1970; Morlan 1970), many are based on the form or shape of the microblade core. Morlan (1970) describes four major core forms (conical, cylindrical, tabular and wedge-shaped) that may relate to distinct groups of people in northeast Asia and Alaska. A variety of techniques have been used to explore the relationships between temporally and spatially distinct microblade traditions for much of Beringia and adjacent regions such as the Northwest Coast (Magne 1996) and Japan (Bleed 2002). These studies reveal differences in the preparation and production of cores between the Alaska Gulf Coast regions (the Aleutians and the Northwest Coast), where platforms are frequently prepared first, and Interior traditions (the APAt), where the core face is prepared first (Hofecker et al. 1993; Steffian et al. 2002). The difference in core preparation, in concert with differences in subsistence activities, has been argued to represent the presence of distantly divergent groups in eastern Beringia during the late Pleistocene and Holocene (Larsen 1968b). Those observations are echoed by Wilson et al. (2011).

In addition to the regularity demanded of true microblades when used as insets in organic projectile points (Figure 4a; Vasil'ev 2001), microblades on the Northwest Coast of North America clearly met other functional needs. At a few sites with exceptional preservation along the Northwest Coast, such as the late Holocene Hoko River site (Croes 1995) and North Point site (Bowers et al. 2001), both microblades and microliths were used in end-hafted knives (Figure 4b and c). These tools would have been ideal for specialized processing tasks, such as cleaning fish, and the manufacture of clothing (Figure 5), cordage, and even minor surgery (Barclay et al. 2005; Bowers et al. 2001; Croes 1995). Jeffrey Flenniken conducted several replicative experiments with Hoko River-style microliths demonstrating their utility for processing fish (Croes 1995). Variation in the size of the end-hafts from the Hoko River and North Point sites (Figure 4b and c) suggests hafted microliths were used for different purposes. While smaller hafts might allow for more precision, larger ones would provide greater leverage and allow the application of greater force.

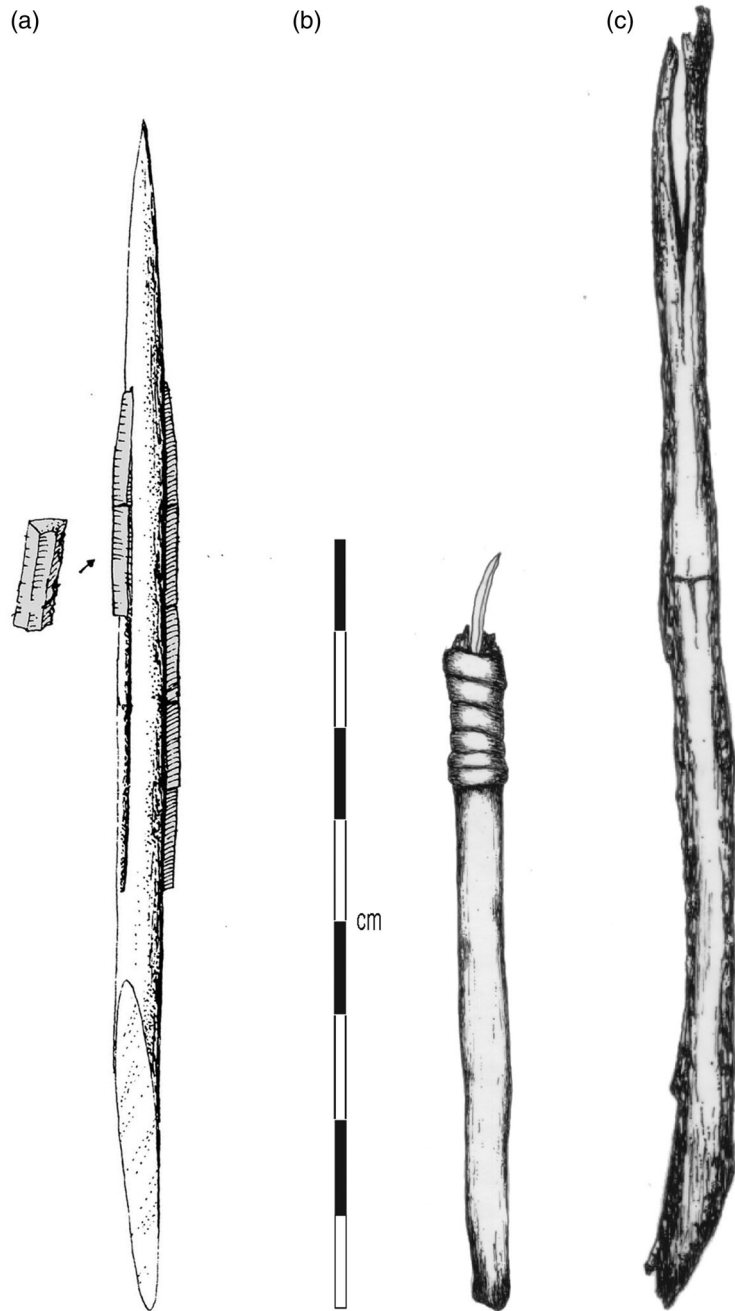


FIGURE 4 (a) Stylized organic projectile point with microblade insets (adapted from [Dixon 2010](#):Figure 2); (b) end-hafted microblade knife from the Hoko River site, Washington (adapted from [Croes 1995](#):Figure 4.116); and (c) a probable microblade end-haft from the North Point site, Alaska (redrawn by Jess Milhausen from [Bowers et al. \[2001](#): Appendix D: Plate 13a]).

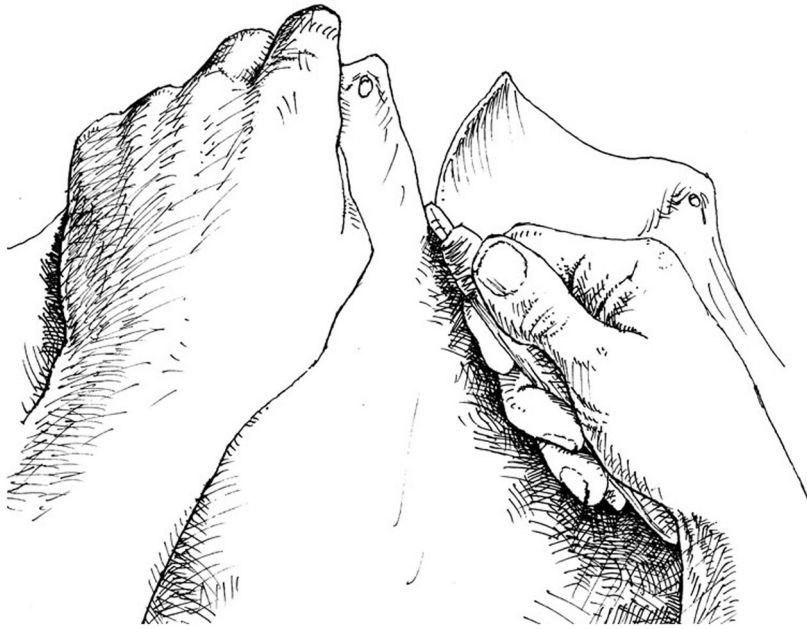


FIGURE 5 End-hafted knives may have been used for precision cutting tasks (from Dixon 2010:Figure 3) (figure courtesy of E. James Dixon).

Northwest plains microcore and microlith assemblages

Ethnographic research has long established that lithic technology was only a small part of hunter-gatherer technological repertoire (Oswalt 1973, 1976). To quote Stegner (2003:53), archaeology “make[s] us judge of a culture by the contents of a small boy’s overall pocket,” and with regard to the present study of microcores and microliths, we are attempting to tease out an aspect of ancient Native American activity based on an admittedly small sample. Our aim is to raise awareness of microcore technology in Northwestern Plains and Rocky Mountain lithic assemblages and not to review in totality its occurrences. Additional examples of microcore technology are reported from other locations, including Eagle Bay (48YE2190) in Yellowstone (Douglas MacDonald, personal communication, 2011) as well as in Wyoming’s Bighorn Basin and in Middle Park, Colorado (Frison and Kornfeld 1995).

Nine unambiguous examples of microcore technology are considered in our study (Table 1; Figures 6 and 7). In several instances, the artifacts were not collected or have subsequently been lost, thus preventing additional analysis. In most instances, the sites under consideration contain only one microcore and, not surprisingly, associated or reported microliths are rare. However, because microcores have never been systematically pursued, we do not know how rare they actually are. Thus, with a few exceptions, we focus on the cores in the absence of reported bladelets or microliths. Three of the authors have also observed microliths in the region. For example, Lee observed a trapezoidal microlith (two arrises) at an

TABLE 1
MICROCORES AND SITES CONSIDERED IN OUR STUDY

Site location	Site #, name and/ or catalog #	Age/technique	Morphology	Material	Platform length (mm) (measured away from dominant or illustrated face)	Chord length (mm) (dominant face)	Flute length (mm)	Number of remnant blade removals	Topographic context w/ distance to permanent water	Associated artifacts	Comments	References	Figure
North Central Montana	Lost Terrace; 24CH68	1,000 B.P. radiometric and typological (associated with Avonlea projectile points).	Tabular/Tongue	Unknown	Unknown	Unknown	Unknown	Unknown	Bank of Missouri River	Pronghorn antelope	Artifact was lost prior to completion of Greiser's analysis	Greiser (1988:126)	6f
Central Montana	Camp Baker Quarry; 24ME467	Unknown	Cylindrical	Chert (Smith River)	28	72	Unknown	12	Adjacent to Smith River	Debitage		Roll and Neeley (2014)	7
South Central Montana	Eagle Creek; 24PA301	Late Prehistoric (associated with side-notched projectile points)	Conical	Obsidian Cliff, Yellowstone	91	98	58	32	Hill ca. 100 m west of Eagle Creek (Tributary of Yellowstone R.)	Flat-bottomed Intermountain Tradition Pottery		Cramer (1984)	6g
South Central Montana	Myers-Hindman; 24PA504	ca. 9000 B.P. radiometric and typological (associated points)	Conical	Chert	37	41	37	7	Yellowstone River	Late Paleo Projectile Points		Lahren (1976:59, 2006:112)	6a
Central North Dakota	Chief Looking's Village; 32BL3	Late Prehistoric Radiometric	Conical	Chert (Knife River Flint)	23	36	27	10	Missouri River	Village Artifacts		Mitchell and Lee (2013)	9

Continued

TABLE 1
CONTINUED

Site location	Site #, name and/or catalog #	Age/technique	Morphology	Material	Platform length (mm) (measured away from dominant or illustrated face)	Chord length (mm) (dominant face)	Flute length (mm)	Number of remnant blade removals	Topographic context w/ distance to permanent water	Associated artifacts	Comments	References	Figure
Northeast Wyoming	48CK5.7	Middle to Late Plains Archaic (associated with 1 Hanna; three Besant projectile points)	Conical	Quartzite (Morrison)	279	32	176	10	Flood Plain, 10 m to Deer Creek (Tributary of Belle Fourche R.)		Single platform	Kornfeld notes; WYCRO site form	6c
Northeast Wyoming	48CK46.80	Late Plains Archaic (associated with Pelican Lake projectile point)	Conical	Chert	274	344	177	9	Top and slopes of low ridge 400 m overlooking North Deer Creek	30+ roasting features along ridge	Single platform w/ prep flake	Kornfeld notes; WYCRO site form	6e
Northeast Wyoming	Isolate	Unknown	Conical	Unknown	Unknown	Unknown	Unknown	Unknown	Knob, ca. 115 m overlooking intermittent tributary of Belle Fourche R.		Artifact was recorded as an isolated circular scraper	WYCRO site form	6b
Northeast Wyoming	48CK850.29	Unknown	Conical	Non-Volcanic Natural Glass	18	21	18	8	Terrace, ca. 700 m overlooking Mule Creek		Single platform w/ additional flake	Kornfeld et al. (1995), WYCRO site form	6d

Notes:

Platform vs. chord measurements are somewhat illogical on conical cores, but provided based on image or view of core in primary reference.

Core measurements are obviously on expended or potentially lost cores, and consequently are indicative of a core post utility.

WYCRO – Wyoming Cultural Records Office.

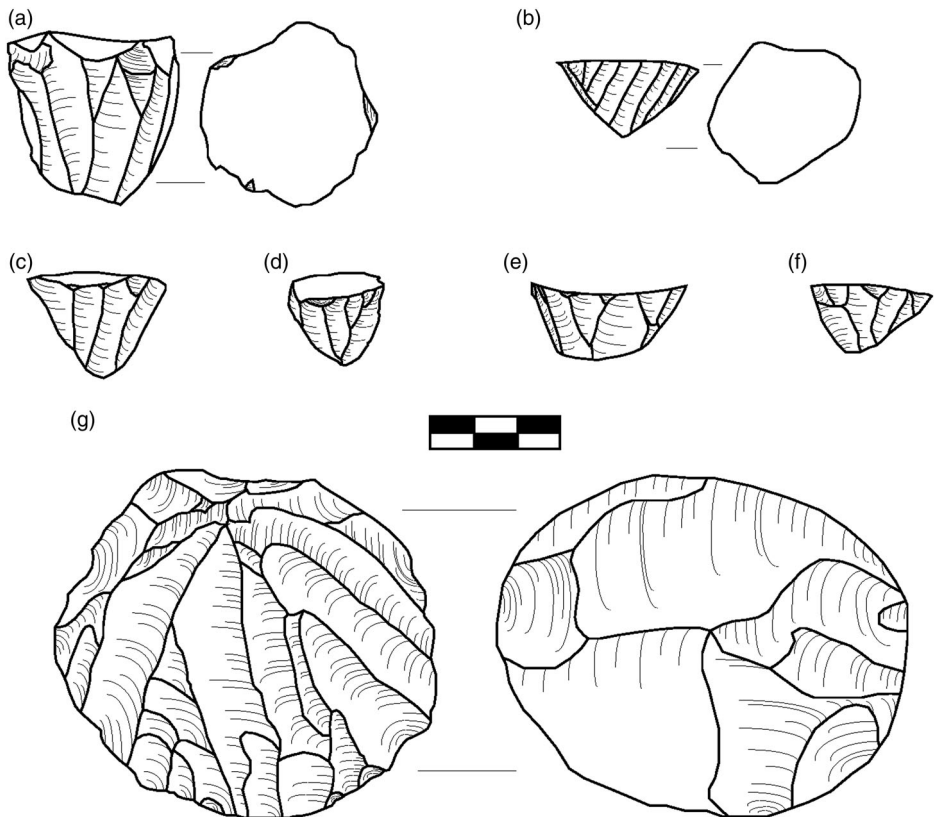


FIGURE 6 Scaled illustrations of northwestern Plains microcores from sites referenced in Figure 1 and Table 1: (a) Myers-Hindman (24PA504); (b) isolate from Campbell County, WY; (c) Keyhole Reservoir (48CK5.7); (d) Keyhole Reservoir (48CK850.29); (e) Keyhole Reservoir (48CK46.80); (f) Lost Terrace (24CH68); and (g) Eagle Creek (24PA301). With the exception of (g) the first view of each core depicts one of the core's fluted faces edge on with the platform at top and the keel at bottom. If provided, the second view is of the platform. Core (g) is redrawn from the only available image which is an oblique view. At left is a view of the keel and at right is a view of the platform.

ongoing excavation near the Boarding School bison drive in August 2013 (Figure 8); Neeley identified two in the Beaucoup site (24PH188/189); and Kornfeld has noted several from southern Montana to northern Colorado. Obsidian and chert microliths have also been cataloged at the Billings Curation Center (BCC) from additional sites in Montana, including 24BE1223 and 24CB875. These encounters further illustrate the presence of microlith technology in the study area.

Microliths can easily be overlooked as generic debitage during surface site recordings. Even when testing is conducted microlith representation in the assemblage can be biased by recovery techniques, such as large size screen mesh and wet versus dry screening (Clark and Gotthardt 1999). In contrast, the larger and morphologically distinct cores are more likely to be recognized and described in site documentation.



FIGURE 7 Camp Baker Quarry (24ME467) cylindrical microblade core showing numerous microblade removals (photo courtesy of Tom Roll). The platform is at the top and the keel is at the bottom.

In fact, several of the reported microcores were identified in surface contexts during surveys that did not involve testing or screening of sediments.

Our focus on cores that contain multiple microlith removals (rather than one or two flake scars) is not meant to be a comprehensive treatment of the suite of artifacts on the Northwestern Plains/Rocky Mountain Front that exhibit microcore-like characteristics. For example, in addition to the core reported from 48CK850, one of our study sites, four additional artifacts from the same site appear to have had a few microliths removed from them (Kornfeld et al. 1995). In compiling the data (Table 1), we selected cores exhibiting formal patterns of microlith removals, an activity that resulted in cores with a distinct morphology. Our criterion, arbitrarily defined as seven microlith flake scars, enabled us to distinguish the microcores from nodules that had fewer microlith removals resulting in cores with a microcore-like



FIGURE 8 Trapezoidal chert microlith recovered at the Boarding School Bison Drive (24GL302) in August 2013. (Used with permission of John Murray, Blackfeet THPO.)

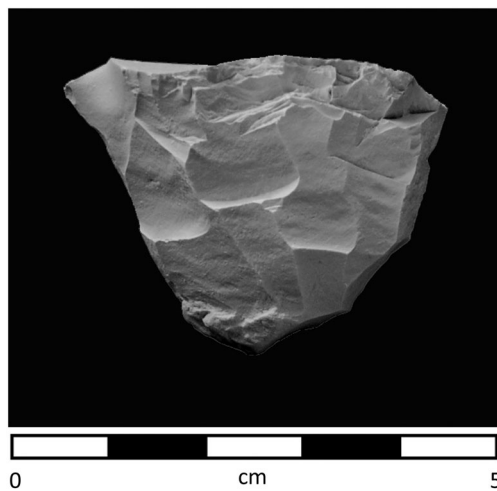


FIGURE 9 Microcore recovered at Chief Looking's Village (32BL3) in North Dakota. Knife River Flint. Platform is at the top and keel is at bottom.

appearance, but that might have been part of a different range of behavioral activities. Some microlith cores may exhibit fewer scars if the morphology of the core face is narrow. This pattern of repeated microlith removals from a given core bespeaks

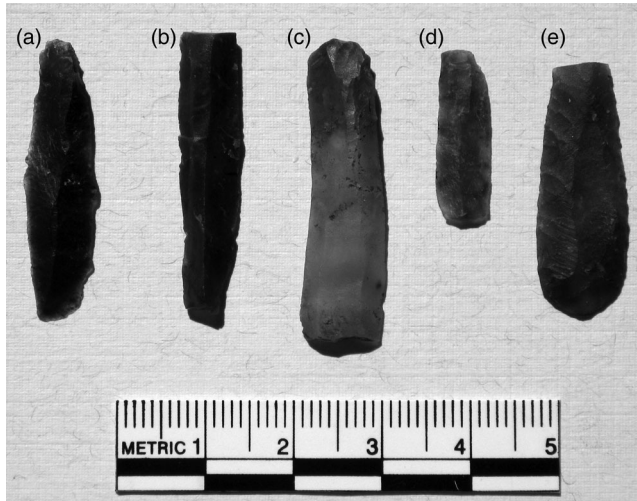


FIGURE 10 Representative microblades from Mammoth Meadows (24BE559). Catalog numbers assigned at Billings Curation Center (BCC) as follows: (a) .185, (b) .186, (c) .187, (d) .196, and (e) .220.

intentionality. Our use of the term intentionality invokes a knapping process in which the repetitive production of bladelets results in a true microcore distinct from cores with a microcore-like morphology resulting from the detachment of a few flakes. The larger issue of why microcores are manufactured instead of alongside flake cores is a separate issue that is not addressed in our use of the term.

Distribution

Our study area includes Montana, Wyoming, and western North Dakota. In our sample, the greatest concentration of microcores occurs in northeastern Wyoming and south central Montana (75 percent). Assigning any great significance to this pattern is premature due to the sample size and the likely under-reporting of microlithic technology; however, at minimum, this observation constitutes a pattern that can be tested as additional materials are identified and reported. Initially, we hypothesized that there may be an association between microcores and aquatic resources in some environmental settings; however, given our limited sample this is difficult to support, in part because there is little known about the fauna associated with many of the sites in our sample.

A number of raw materials are represented in our small sample, including obsidian, Knife River Flint, non-volcanic natural glass, unspecified cherts, and quartzite. These materials are available close to the sites where the cores were recovered and thus it is plausible that much of the raw material used was either directly procured or obtained through local exchange networks.

Manufacture and discard

Microcores with multiple removals appear to reflect the production of microliths for one or more specific purposes. The lack of associated debitage may simply reflect the

absence of a critical examination, but it might also suggest a limited range or duration of these manufacturing activities or that the microliths were transported off-site for subsequent use. Except for the core from 24PA301 (Eagle Creek), the core platforms consist of single flake scars. None of the cores appear to be extensively modified to create a specific, standardized morphology. Rather, their conical shape results from the loss of mass associated with the removal of blades from the face of the core. In this regard, none of the assemblages contain examples of traditional core preparation debitage associated with true microblade technologies such as core tablet or platform preparation flakes and platform or flute face rejuvenation flakes (Kobayashi 1970; Morlan 1967). Flute face rejuvenation occurs in some microblade tradition assemblages from British Columbia (Magne 2004:96).

While some flake removals appear to have produced relatively uniform microliths, many clearly did not (Figure 9). The core recovered at 32BL3 (Chief Looking's Village) in North Dakota exhibits multiple hinge or step fractures on the face suggesting the failure of blade removals (Mitchell and Lee 2013). Not surprisingly, these failures and the decrease in core size may have been important factors in the discard of this and other cores.

Excluding the specimens from Eagle Creek (24PA301; Figure 6g) and Camp Baker (24ME467; Figure 7) in Montana, the diminutive size of the cores suggests that flintknappers considered them exhausted when they could no longer produce blades longer than about 33 mm (Table 1). We could evaluate this proposition if we had a good sample of microliths and debitage. This size limitation may also indicate that efforts to stabilize the core cease to be effective when the cores become too small. The size of the discarded microcores hints at the minimally required cutting edge on the microliths produced.

The morphology of the negative flake scars left by the bladelet removals suggests that uniformity was not a requirement of the end product (Figure 9). This tolerance for variable size and shape precluded the need for formal core preparation and the production of a highly standardized core. The lack of standardization suggests there was no ideal microlith morphology.

Two types of microcore forms are present in the Northwestern Plains. The large approximately 75 mm long microblade core from the Camp Baker Quarry (Roll and Neeley 2014) and the trapezoidal microblades recovered at Mammoth Meadows (Figure 10; 24BE559, Bonnicksen et al. 1992) indicate the presence of more formal, tabular cores consistent with the Late Paleoindian period at the High River sites south of Calgary, Alberta. Roll and Neeley (2014:25) note the presence of 17 blades from the tested quarry pit where the core was recovered, however, no dates are available for the occupation. The only temporal marker, a single Late Prehistoric (A.D. 200 to 1600) projectile point, is not clearly associated with the core. Sanger (1968, 1970) describes some of the High River microblades as being up to 75 mm in length. The Mammoth Meadows microblades are shorter, varying in length from 18 to 30 mm, but are very flat in profile, suggesting the cores from which they were produced were not conical with incurving bases. Although the Mammoth Meadows site contains Paleoindian components, including the Cody complex, it is unlikely that all of the microblades at the site are associated with

the Cody deposits; several were found in test units with seemingly younger deposits or away from the main site area (Bonnichsen et al. 1992). Bonnichsen et al. (1992:312) note the Cody complex layer contains “microflake blade cores,” but none of these were located during our review of the collections at the Billings Curation Center. Of uncertain relevance, is the tabular core reported at the Late Prehistoric Lost Terrace site (24CH68) in Montana. Based on the picture in Greiser (1988), it is reminiscent of true microblade technology; however, the scant details regarding the piece cannot be verified, because it was lost prior to analysis. The artifact could represent a curated piece scavenged from an older site.

At this point, we do not have enough data to examine the ratio of microcores to microliths. The absence of reported microlith manufacturing debitage, such as core rejuvenation flakes, or core tablets, may indicate that microliths were not commonly manufactured at the sites under consideration. However, as noted, the potential exists for microcore debitage to simply be unnoticed at this point, particularly as microlith production may not involve the same degree of formal manufacture seen in the production of microblades.

Discussion

The rare occurrence of roughly conical cores on sites dating to the Late Archaic and Late Prehistoric periods in the Northwestern Plains and vicinity suggests that the flakes originating from these cores were occasionally a desired end product. Their relatively rare occurrence may indicate manufacture for specialized functions. The occurrence of patterned cores indicates intentionality or a desired morphological form. Patterned cores can be distinguished from microlith-like cores where the removal of a microlith or two might have been incidental. The paucity of microliths in the region suggests they were likely manufactured in relatively low numbers, which reinforces the notion that they (microliths) could have been manufactured for specialized or very limited functions. Given the morphological irregularity of microliths, if hafted, they would more easily work with the end-hafts depicted in Figure 4(b and c) than the slotted point (a).

While it is early to draw definitive conclusions regarding the role of microliths in the Northwestern Plains and Rocky Mountain Front, we offer some summary speculations. Based on the data presented and the environmental context (Table 1), microliths appear to have been used in some specialized capacity. Due to their diminutive size, Plains microliths were likely manufactured for use in composite tools and perhaps hafted in an implement of bone, antler, or wood that facilitated their use for repetitive tasks. Because direct evidence of organic hafts is extraordinarily rare, at present we must rely on other lines of inquiry to discern how they were used, including comparisons with other areas. Along the Northwest Coast the amenability of microblades for use in delicate butchery tasks suggests they were useful for working with aquatic resources (e.g., Croes 1995). In our study area, the remains of numerous fish species, as well as fresh water mussels, are abundant at Chief Looking’s Village in North Dakota (Mitchell et al. 2013). While it is difficult to definitively discern the use of aquatic resources archaeologically in the study area (e.g., Bogstie 2012; MacDonald et al. 2012, cf. Johnson and Reeves 2013), new

techniques, such as the extraction of ancient DNA from sediment (Haile et al. 2007, 2009; Hebsgaard et al. 2009) may prove useful in explicating its presence.

With a dedicated recovery effort at a site such as 48CK850, where additional pebbles with microflake removals were observed (Kornfeld et al. 1995), technological analysis could yield a microlith to microcore ratio. In North Dakota, village sites with excellent bone preservation and large and complex patterned bone tool industry, bone hafts, such as ungulate ribs or microliths with hafting residues (glues) may be identifiable.

Summary

Artifacts resembling microblade cores are occasionally referenced in regional publications and gray literature describing the archaeology of the Northwestern Plains and adjacent regions. However, in the absence of experience with microlith technologies, these objects may be unrecognized during compliance projects and thus their occurrence underestimated. In this article, we recommended terminological distinctions between microblades and microliths. In brief, microblades result from a formal production process using pressure flaking and are relatively uniform, whereas microliths result from a less formal process, perhaps involving percussion flaking, and are more variable in their morphology. We recognize two distinct periods of microindustry in the Northwestern Plains and adjacent regions: one corresponding to the Late Paleoindian period and one spanning the Late Archaic to Late Prehistoric periods. The latter, based on our limited sample, appears to be better represented in our study area. These microcores typically occur as isolated elements in assemblages rather than as the dominant mode of lithic technology.

We also emphasized the versatility of a microlithic technology for hunter-gatherers and note its presence in a variety of archaeological contexts. Lastly, we examined functions from other archaeological contexts to suggest possible roles for the microcores and microliths in our study area. Obviously, cutting and food processing tasks are strong possibilities, but the technology could perform other roles. While the specimens reported here are few in number and our conclusions regarding the utility of this technology are largely exploratory, we hope this paper highlights opportunities for exploration of this distinctive technology.

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