Report of the Beutell Expedition to Hole-in-the-Wall, Churchill County, North Central Nevada

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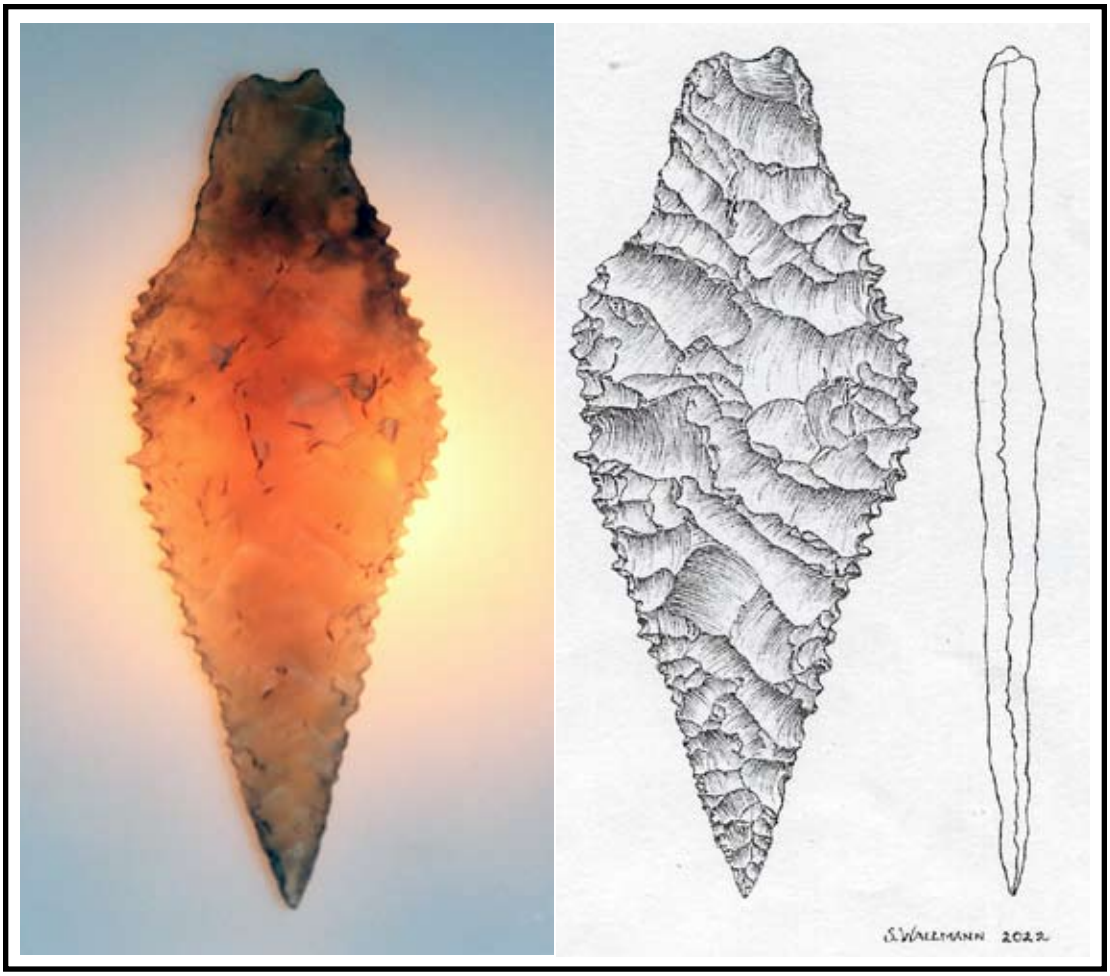


Readers of the *CSAJ* may be familiar with our 2021 essay about the search for the source of Hole-in-the-Wall lemon-yellow agate, its eventual discovery, and preliminary ideas about the age and cultural affiliations of ancient quarrymen who made use of it (Gramly, Newton, Wallmann and Waldorf 2021: 38-54).

Suffice it to say, Hole-in-the-Wall agate was important to Clovis groups and their descendants who carried it to sites distant from its source (Fig. 1) and was employed by later cultures of the Great Basin for their projectile points, scrapers, and other implements. Remarkably, the Hopewell archaeological culture east of the Mississippi River, also had learned about this special raw material and found a place for it among their ritual paraphernalia.

This document presents evidence, which came to light during the expedition, for quarrying and lithic reduction during the Palaeo-American Clovis era when presumably, the region was better watered and populated by game and hunters who preyed upon them. Conversely, we will argue that afterwards visitation was desultory and perhaps incidental. Actual quarrying during later prehistory may not have been performed; rather, cast-off lithic debris and failed specimens of Palaeo-American age were retrieved from the surface and transformed into flaked stone implements. In sum, we hypothesize primary use of the Hole-in-the-Wall quarry occurred during the pre-Hypsithermal, Palaeo-American era; while, secondary use may have been characteristic from 7000 B.C., when climate had warmed significantly, continuing until nearly the present day. The only exception appears to be during Hopewell times (1700-2000 years ago) when rare, large masses of agate (Fig. 2) were sought to supply a specialized market for exotic raw materials (Gramly 2022). Some small-scale quarrying on the fringe of the Palaeo-American workings may have taken place then.

At top: Pinto point of Hole-in-the-Wall lemon-yellow agate. Found 2022 within the Humboldt Sinks, Pershing County, Nevada. Length = 4 ½ inches (113 mm). One of the longest points in this raw material on record.Drawing by S. Wallmann.

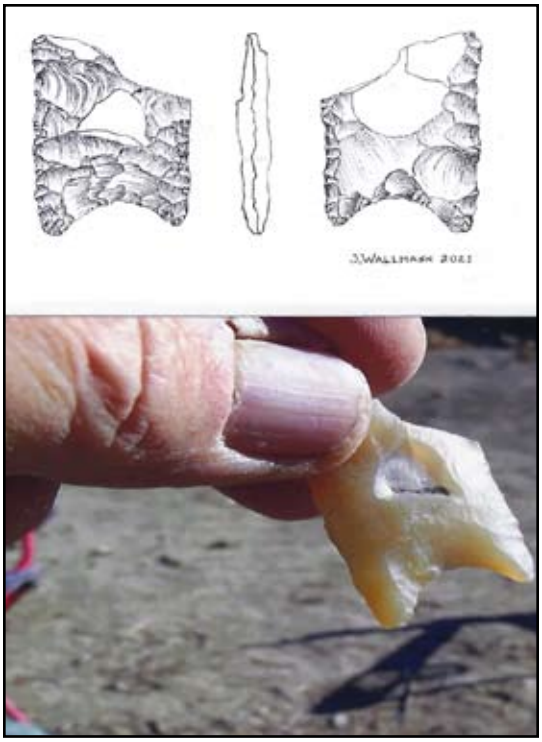


Figure 1. Palaeo lanceolate point of Hole-in-the-Wall agate, width = 21 mm, found during 2021 at Modoc County, south of Alturas, California. Drawing by S. Wallmann.

Figure 2. Isaac Newton holds a massive, very large agate (weight = 16 pounds), which was unearthed at the upslope end of Trench B, on October 5, 2021. Using such a nodule a skilled flintknapper might produce a biface 10 inches (25 cm) or more in length.

A. Location of the Fieldwork

Hole-in-the-Wall is a prominent geographic feature, which is shown upon standard maps of Nevada (DeLorme 2018; USGS 7.5' quadrangle - Hole in the Wall, Nevada). It lies along the eastern edge of the Dixie Valley in northern Churchill County. Today the Dixie Valley is thinly populated, with only scattered ranches and farms where husbandry is enabled by borehole irrigation. A prominent valley landmark lying 15 km due west of the entrance to Hole-in-the-Wall canyon is a geothermal spring used to generate electricity; a small community of workers is served by an unpaved road and an airstrip. The principal human activity in this part of Nevada, however, is linked with the United States Navy, whose pilots incessantly conduct practice exercises in jet aircraft flying at low altitude and sometimes at supersonic speed.

The nearest centers of population, which lie 3-5 hours steady driving to the west, are Fallon, Churchill County (9,471 residents) and Lovelock (1,787 residents); while, to the southeast on US Route 50 is the picturesque community of Austin, Nevada, with a seasonal population of nearly 200 (Fig. 3). All supplies, fuel, and dependable water sources must be accessed in Fallon and Lovelock via routes 50 and I-80. The backhoe that we employed to trench the flank of the agate-bearing ridge was brought out from Fallon – as was the diesel fuel it consumed.

The principal ancient workings of the Hole-in-the-Wall lithic source occupy the eastern flank of a low ridge, 350 m long (Fig. 4) and lying approximately 4,050 feet above sea level. This ridge helps demarcate a shallow draw ("Hole-in-the-Wall Draw"), along which a minor watercourse has cut its way, debouching into the broad valley of an unnamed stream (tributary of Spring Creek in Dixie Valley?). These days the unnamed stream is usually dry, but formerly it must have gathered waters off the southern flank of the Augusta Mountains (peak 8,409 feet) and northern section of the Clan Alpine Mountains (peak 8,647 feet) – see Figure 5. It seems likely that this unnamed stream once carried a goodly flow, and its alluvial valley may have supported thick vegetation. Today, however, no surface water is seen except during late winter or early spring within Hole-in-the-Wall canyon itself, and the predominant vegetation is bushy and thin. Bare ground is everywhere exposed, providing good visibility when searching for ancient artifacts.

Although we experienced no seismic disturbances during our many visits to Hole-in-the-Wall since 2018, strong earthquakes are on record for the 20th century. Fresh-appearing, elevated ridges and other landforms with prominent aprons of debris lie in every direction and are reminders of continuing tectonism. Bedded sediments upon the flank of the agate-bearing ridge, which constitutes the west boundary of Hole-in-the-Wall draw, lie at 15 degrees to the horizontal. Presumably they were tipped to this position by tectonism. Likewise, a small outcrop of lemon-yellow and strawberry-colored agate lying 1.5 kilometers south of the principal workings and elevated approximately 100 m above it,

which we have designated "Hole-in-the-Wall South" (Fig. 6), must have been displaced by faulting and folding. Despite its small size and location well away from Hole-in-the-Wall valley, this minor occurrence was not overlooked by ancient prospectors and exploited by them from an early time.

One wonders if other agate outcrops remain to be discovered in the neighborhood of Hole-in-the-Wall? Finding them across trackless barrens will not be a simple matter.

B. Plant and animal communities in the present day

Hole-in-the-Wall belongs to the Great Basin shrub steppe, which is dominated by sagebrush. There are no trees of any consequence within its immediate vicinity, and fires for cooking and warmth must be stoked by spiny, dry growth – some of which emits a noxious smoke (greasewood). During the Beutell expedition we found it necessary to bring firewood and wood scrap from afar, and these materials were husbanded carefully.

The fauna we observed was impoverished. At camp it was dominated by friendly Paiute ground squirrels and small lizards of unknown species. Dun-colored starlings and ravens appeared occasionally, and we saw several red-and-gray banded snakes of short length (Sonoran kingsnakes?). A burrowing animal had been at work within the soft, dug-over soil of the lithic quarry, and

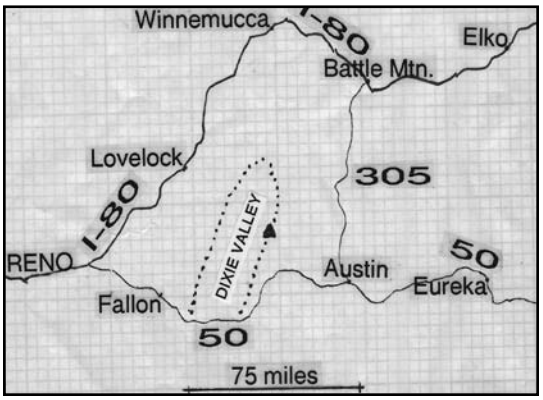


Figure 3. Location of Hole-in-the-Wall, Dixie Valley, and population centers of north-central Nevada.

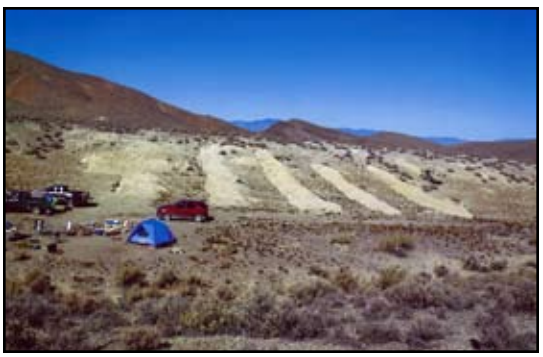


Figure 4. Trenches A-F (F is being dug by backhoe) on the eastern flank of the low ridge that helps form a shallow draw. This draw opens northward into the valley of an unnamed stream that flows west through Hole-in-the-Wall canyon. October, 2021.

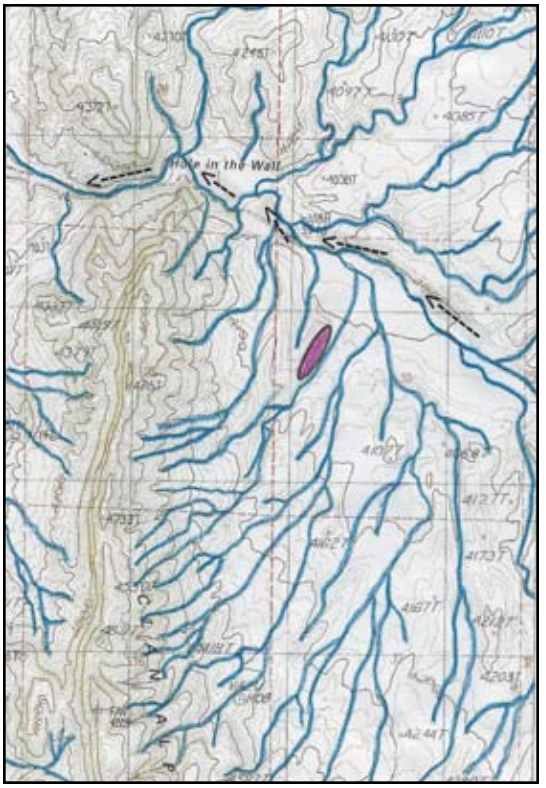


Figure 5. Map showing the Hole-in-the-Wall lithic source in relation to seasonal watercourses draining highlands of the Augusta and Clan Alpine Mountains and the principal watercourse (unnamed) flowing west through Hole-in-the-Wall canyon.

we presumed it was a badger – although we never did observe one in the flesh.

Of special interest to us were wild horses. Likely, without borehole water, horses could not eke out a living in such a stark, waterless landscape. The "sign" and trackways of a small herd were often met by us, and on several occasions we observed a black stallion, two mares, and colts crossing the mouth of the draw where our tents stood. The stallion was shy but inquisitive, and two mornings he entered camp very softly at first light to take our measure.

Even insect life and denizens of the earth were deficient at Hole-in-the-Wall. There were no biting flies, scorpions, or spiders, or at least I saw none. After a while, we stopped looking for them, but nonetheless took the precaution of keeping the doors to our tents zippered shut.

C. Rationale of our work at the lithic quarry

Work in Trench A (Figs. 7, 8) prior to the Beutell Expedition during Fall, 2021, had revealed dug-over soil with quarry debris to a depth of 1-1.5 meters. This debris overlay sloping bedrock – a water-laid tuff – having agates still embedded within its upper surface (Fig. 9). Agates took the form of rounded masses and thin sheets; however, prehistoric quarrying had extracted most larger masses. Because prehistoric trenching was likely irregular and took place sporadically, not

Figure 6. Views of Hole-in-the-Wall South emphasizing its isolated location. *Top,* view to the southeast across a waterless, trackless landscape. Note scattered agate debitage in foreground. *Bottom,* test-pit being excavated, October, 2022. The main workings of the Hole-in-the-Wall lithic source lie to the north and on the other side of the distant ridge colored white by diatomite.

At left: Figure 7. Mark Newton, owner of the Red Eagle Mine claim at Hole-in-the-Wall, stands within a short section of Trench A, May, 2021.

At right: Figure 8. Derek Risley measures the depth of a mid-sized agate nodule (weight four pounds) resting upon diatomite bedrock at the base of Trench A, May, 2021. This specimen clearly had been overlooked by ancient quarrymen.

surprisingly a few good agates per square meter of bedrock had been missed; however, in relation to the amount of work necessary to retrieve them today, this residue of usable agate that escaped the attention of prehistoric quarrymen is uneconomic.

Extensive hand-digging and sieving of ancient quarry debris within Trench A yielded a small number of culturally diagnostic specimens. Extrapolating our return of data from so small a section of the prehistoric quarry to the entire ancient working, however, struck me as logically unsound. Therefore, our 2021 fieldwork was designed to sample a large section of the quarry within a limited time-frame. A backhoe was indispensable. In practice, we found that artifacts separated themselves from dry soil-matrix as fast as they came to light upon the spoil piles. Two attendants with hoes stood by freshly-generated spoil and retrieved specimens – bucket after bucket – throughout the day. Also, watch was kept for any usable nodules that had been overlooked by ancient quarrymen.

As a check upon the thoroughness of our rough-and-ready recovery method, we tested several cubic meters of spoil from Trenches A and B by sieving upon a 6 mm mesh and collecting all flaked stone artifacts, as well as any hammerstones and anvils. We were surprised to observe no appreciable difference in the variety of culturally diagnostic specimens yielded by either method. In short, diligent inspection (with the aid of a hoe) of a large volume of spoil generated by the backhoe was as revealing archaeologically as slower sieving of small volumes of trench fill.

At the end of two full weeks, we had used a backhoe to explore eight (8) trenches – each 70 cm wide (approximately two feet) and as deep as two meters. We labeled the trenches consecutively and alphabetically as they were dug – A through H (Fig. 10). The cuts ran parallel to one another, at intervals of approximately 10 m, with the exception of Trench H, which was sited 25 m to the south of Trench A. Roughly, a span of 85 meters of sloped, agate-bearing deposit was examined, or perhaps 25-30 per cent of the entire potential outcrop zone. Two hundred forty-four (244) linear meters or just short of 800 feet of trench were dug either to bedrock, or at most, two meters below surface.

The agate-bearing zone at the eastern extremities of Trenches E, F, and G was deeply buried by alluvium. Prehistoric quarrymen appear to have been unwilling to penetrate more than two meters below surface; therefore, another meter of rich "ore" remained for us to explore, as we might with machinery. Scores of kilograms of raw agate came to light within Trenches E-G at the base of the slope bordering the main axis of Hole-in-the-Wall draw (Fig. 11). A minimum estimate of this proven reserve of sizeable, raw agates for just this sector is 50-100 tons.

Apart from the abundance of raw, unflaked agate within deep tests at the eastern extremities of Trenches E-G, there were few surprises, and the yield of artifacts and intact agates was surprisingly uniform everywhere. It was mute conformation, it seemed to me,

of the cultural homogeneity of the portion we had explored.

The sole novel discovery during our two weeks of trenching was an archaeological feature at point West 38 meters of Trench F and continuing eastward (downslope) to West 36 meters. It was a scrambled heap of sheet agate slabs. Obviously, they had been gathered and stacked together – perhaps as a depot of potentially useful raw material. None of the slabs had been reduced anciently on the spot, nor were there any hammerstones and anvil-stones among the slabs to indicate that such reduction had been intended. The quality of the slab agate appeared good. Most were 5 cm or more in thickness and exhibited attractive banding parallel with the upper and lower flat surfaces. Merely as mineral specimens, the agate slabs had value.

Figure 9. Small agate embedded with tuff bedrock, Trench C, 2021 fieldwork.

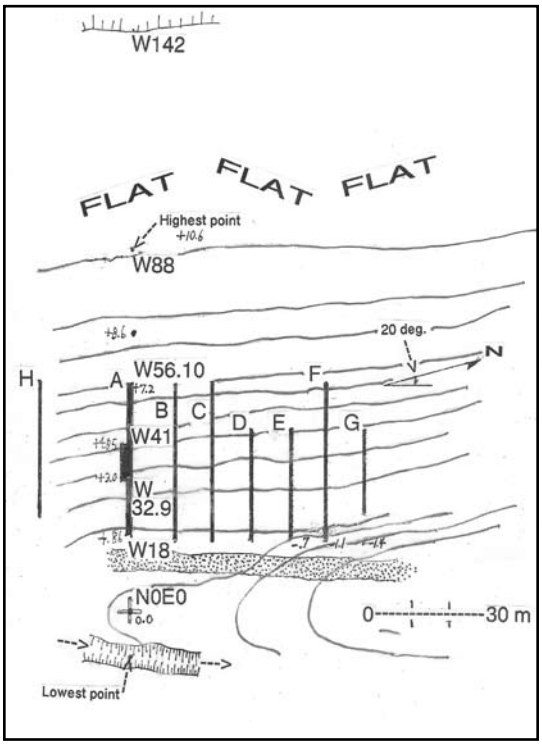


Figure 10. Map of Trench locations along the flank of the ridge at Hole-in-the-Wall Draw, October, 2021. Contour interval = 1 meter

D. The nature of the agates exposed by trenching

Origin and diagenesis

There is evidence to suggest that Hole-in-the-Wall agate grew upon volcanic tuff across the bottom of a shallow sea that may have existed during the Palaeozoic era. The sea appears to have harbored ichthyosaurs, to judge by discoveries on the lower flank of nearby Cain Mountain in the Augusta Range and farther afield within Ione Valley, southwest of Route 50 and Austin, Nevada. Ichthyosaurs were a long-lived lineage, and survived into the Cretaceous Period, when they became extinct.

Figure 11. Large quantity of raw agate (12 five-gal. pails) that was revealed within the eastern extremity of Trench E, October, 2021. Note the large size of some specimens, which are classifiable as "agglutinated agates." Near the crest of the ridge, the backhoe is being positioned in order to excavate Trench F.

Figure 12. Chunks of fossil wood pervaded by agate/silica. The upper specimen was collected at Hole-in-the-Wall by Mark Newton in 2018; while, the lower specimens came to light near Trench H during 2021.

The shallowness of this vanished sea is suggested by chunks of fossil wood that we collected among the quarry debris along Hole-in-the-Wall Draw. These chunks are pervaded with lemon-colored agate suggesting that they were mineralized at the same time agate nodules formed (Fig. 12). Likewise, the presence of discoidal concretions of diatomite (?) that came to light within Trenches E, F, and H (Fig. 13) are indicators of shallow (less than 30 feet deep) bodies of water where the Hole-in-the-Wall agate must have formed.

The shallow sea that covered the tuff substrate having agates and diatomite within and above it eventually drained away and generally arid conditions prevailed for untold millions of years. Bladed gypsum crystals that developed upon many agates, especially sheet agate, are indicators of a seasonally arid environment, which must have existed during this long timespan when agates lay near surface (Fig. 14).

Some time after the agates had hardened, they were subjected to enormous forces causing cracking. Some of these cracks (joints) were permeated with iron-rich (manganese-rich?) solutions resulting in brownish-black (Rock-Color Chart, 5 YR 2/1) patches and a distinctive reticulated pattern. I have not observed any agate from other regions of western North America with such a striking appearance (Figure 15). Despite jointing and mineral invasion, reticulated Hole-in the-Wall agate is a superior raw material for knapping, and it is attractive to the collector's eye. An often-illustrated Clovis point found in Brewster, west Texas, appears to be made of this raw material (Harper and Rogers 2021: 34) and constitutes a record for the movement of reticulated Hole-in-the-Wall agate during Clovis times.

At Hole-in-the-Wall South, as is the case for the main quarry itself, the vast majority of agate is lemon-yellow in color. There is, however, a minority color variant, which is an attractive moderate red (Rock-Color Chart, 5 R 5/4). We likened this hue to the interior of a ripe strawberry. What element imparts this color is a mystery, but it does not appear to be iron. Possibly it is colloidal gold.

The lemon-yellow color itself, which varies in intensity or saturation, is typical of at least 99% of the agate flakes, chunks, and nodules to be seen at Hole-in-the-Wall today. Less than a per cent of the agate is white in color or variegated white and yellow (Figure 16). Although experiments have shown that severe heating can cause lemon-yellow agate to change to white, the variegated variety is a primary growth taking the form of banded concretions. This color variation does not seem to have lessened the suitability of the mineral for toolmaking.

The lemon-yellow color, we have argued (Gramly et al. 2021), was imparted by rare trace elements iridium and osmium. The color is identical to that of Libyan Desert Glass, which formed as a result of a direct meteor impact 29 million years ago (*COSMOS*, 23 May 2019). Geo-archaeologist C. Vance Haynes, who is familiar with rocks and minerals worldwide, observed that the closest thing he has seen to Hole-in-the-Wall agate is Libyan Desert Glass (Personal communication, 2020). And, indeed, the outward resemblance of Libyan Desert Glass and Hole-in-the-Wall is striking (Fig. 17).

Characteristically, the fall-out particles of meteor impact contain iridium, which is rare on our planet except at great depths below crustal rock. Air-borne sediments associated with the "Chicalxub Meteorite," which impacted the Yucatan during the Cretaceous period and ended most of animal life, are rich in the element iridium. It follows that we may hypothesize agates forming in shallow seas of Nevada at the end of the Palaeozoic Era, incorporated iridium-rich meteoric dust resulting from the life-ending, cataclysmic Chicalxub impact.

While it may seem fantastic that Hole-in-the-Wall agate was colored by such a calamitous geological event, such speculation is reasonable given the possibilities, as we understand them now.

Figure 13. Three discoidal concretions of diatomite from Trenches E. F. and H. The greatest diameter of the middle specimen is 74 mm.

Figure 14. Cluster of bladed gypsum crystals developed upon a small chunk of sheet agate, Trench F.

Variations in agate's habit of concern to knappers

We observed three habits of agate at Hole-in-the-Wall. The first, and least common, is the single nodule. Most isolated nodules are small in size, weighing a half-pound to a pound, with a maximum width of 10-13 cm (Fig. 18); however, our work proved they can attain a weight of 16 pounds with a diameter of 25 cm or 10 inches (!) -- as typified by the amazing specimen shown in Figure 2. Such an impressive agate, solid throughout, would have been exceedingly rare during prehistory and as valuable then as it is today.

The second form of agate, and by far the most common, is the "agglutinated nodule," which is composed of multiple smaller nodules joined together. Fusion must have occurred when individual nodules were still in a gelatinous state, and perhaps the process was

Figure 15. Snyders point made by D. C. Waldorf from a mass of reticulated agate within Trench A, Hole-in-the-Wall and a massive flake-blade (inset photo) of the same rare variant collected within Trench C during 2021.

accelerated by heat. We are reminded of how genesis may have occurred by a model composed of fused gelatine capsules, which were subjected to gentle heat (Fig. 19). A good example of an agglutinated nodule is given by Figure 20, which weighs 4 kg and was discovered within Trench E. Even heavier agglutinated nodules were found by us with the backhoe; however, it seems unlikely that very large bifaces could be derived from them, as the constituent smaller nodules are sometimes imperfectly joined. Large, crystal-lined vugs sometimes separate nodules and these gaps are not easily bridged except by talented knappers. Making a large biface from an agglutinated nodule involves a great deal of skill – and luck.

Agate in sheets is the third form at Hole-in-the-Wall. Pieces that are well suited to manufacturing bifaces and other thin, "two-dimensional" artifacts should be 3-6 cm thick. None of this dimension, however, were observed in situ during our backhoe operation; therefore, the maximum length and width of naturally occurring sheet agate with this critical thickness are unknown. However, some sheet agate slabs that had been heaped anciently into a pile within Trench F measured as much as 40 cm in length and 7 cm in thickness. Two smaller slabs from the pile are pictured in Figure 21. Note the banding evident upon their edges.

The suitability of sheet agate for knapping is set forth in Figure 22, which shows a slab weighing 1.3 kg from the heap within Trench F that was transformed into a Stage 4 fluted point preform weighing 300 grams and measuring 15.5 cm in length (about six inches) by expert flintknapper D. C. Waldorf. It is necessary to note that this was D. C.'s first attempt at flaking sheet agate and that this raw material was not heat-treated or enhanced in any manner! His remarkable creation underscores the value of sheet agate from the Hole-in-the-Wall source, and it alerts us to the possibility that this raw material may have been important in prehistory.

Likewise, some agglutinated agates are capable of yielding large bifaces although working this variety of raw material is technically more challenging than reducing sheet agate. Figure 23 shows an agglutinated agate nodule weighing 1.75 kg that yielded a fluted point preform approximately 160 mm long. It, too, was the handiwork of master knapper D. C. Waldorf. The parent nodule was introduced to his workshop straight from the quarry and had not been heat-treated. Novice knappers are advised to first heat-treat agate nodules (to 400 degrees F) before attempting to emulate Dave's craftsmanship!

Of course, it is not only bifaces for making points, knives, and adzes that were intended products of the quarrymen-knappers at Hole-in-the-Wall. Cores for producing prismatic blades were also a desired end-product. Cores of this sort could be made upon single nodules or nodules broken away from agglutinated masses, as for example Figure 24. Prismatic blades and bladelets constituted important elements of the Clovis tool-kit. Their exceedingly sharp edges could be used without modification for cutting or dulled ("backed") in order to make points, borers and sidescrapers. The distal ends of prismatic blades could be shaped as endscrapers or backed – thereby creating platforms for removing burin-spalls.

The superior nature of Hole-in-the-Wall agate for making prismatic blades has been addressed in our 2021 essay for *CSAJ*. Suffice it to say, it is a "free-running stone," and rarely do prismatic blades made from it turn inward at their distal end. In other words, prismatic blades of Hole-in-the-Wall agate are flat along their entire length. Further, very thin prismatic blades and bladelets of Hole-in-the-Wall agate are strong and resist breakage. This attribute is important when crafting very thin projectile points with keen working edges – such as Folsom points. An extraordinary specimen, modernly made by master knapper Dan Theus, is shown in Figure 25 along with a cast of the famous Folsom point from the Cooper site, Oklahoma, for comparison. The Folsom point crafted by Theus is all the more remarkable as it was fully fluted on both faces across a healed crack in the agate!

E. Collection localities at Hole-in-the Wall

During 2018-2021 artifacts were collected repeatedly from four areas, namely, 1) The Main Quarry along the flank of the ridge forming Hole-in-the-Wall Draw; 2) North End of Ridge; 3) Hole-in-the-Wall South; and 4) The East Workshop (see Figure 26 for locations). Intensive industrial activity occurred at the Main Quarry and Hole-in-the-Wall South; the other two localities appear to have been residences where some

agate reduction took place. At residences, tools were used, maintained and ultimately discarded. While, the majority of flaked artifacts we encountered at the east Workshop and North End of Ridge had been fashioned of lemon-yellow agate, there was an appreciable number of specimens made of raw materials introduced from afar. These artifacts were likely culls from the tool-kits of Palaeo-Americans who had come to Hole-in-the-Wall in order to quarry fresh tool-stone. At the same time, hunting and gathering must have been occurred, for then the region likely was better watered than today and suited to seasonal, but perhaps longer term, habitation.

For each area at Hole-in-the-Wall I shall review and illustrate some salient, as well as typical, stone artifact finds. Alas, neither organic materials (such as wedges, hoes, and the like) nor dietary remains were encountered by us.

Main Quarry

The rough-stone, industrial sub-assemblage that came to light during initial surface-collecting and test-pitting as well as 2021 backhoe trenching consists of 1) hammerstones, 2) massive anvils, and 3) heads of digging-picks.

Beginning with hammerstones, here we report 26 which were measured and weighed, as given in Table 1. Two categories by weight are evident – "light" and "heavy."

Light hammerstone are more numerous (N = 22), and their weights range from 109 to 583 grams with a median value of 259 grams. Hammerstones of such mass are ideal for reducing agate spalls to biface preforms and for shaping cores and driving flakes off them. A few light hammerstones have irregular shapes, but they are made of select, hard raw materials such as felsite, indurated limestone, and quartzite. Some of these specimens might even be described as sub-spheroidal in shape (Fig. 27, upper and lower). Two-thirds of light hammerstones, however, have neat spheroidal and sub-spheroidal shapes and in most cases are fashioned of tough, dark-colored basalt of non-local origin (Figs. 28 and 29, upper and lower).

The essential homogeneity of light hammerstone shapes and the limited range of raw materials that were employed in their manufacture are evidence of only one archaeological culture or industrial tradition being responsible for workings at the Main Quarry at Hole-in-the-Wall.

Only four (4) heavy hammerstones were recovered during all fieldwork (Figure 30, upper and lower). These hammerstones weighed 850 grams, 1,025 grams, 1,362 grams, and an impressive 4,086 grams. The one weighing 850 grams was unearthed within Trench B, and it lay near an anvil-stone of fossil wood having a weight of approximately 12 kg. The pair is shown in Figure 30, lower.

Heavy hammerstones, used in conjunction with stable, blocky anvil-stones would have been ideal for reducing ("cobbing") massive agates that were too heavy and awkward to be grasped. Pitting upon anvil-

Figure 16. Small and large, rejected bifaces of variegated white and lemon-yellow agate from the ancient quarry along Hole-in-the-Wall Draw. Length of the longer, massive biface (Trench F) is 13.5 cm.

Figure 17. *Top row,* specimens of Libyan Desert Glass – two are ancient artifacts; *lower row,* Hole-in-the-Wall artifacts. The color resemblance is striking although mineralogically the substances stand far apart.

stones (Fig. 31) is testimony of their hard service by ancient flintknappers.

Large de-cortication flakes resulting from dressing agates upon massive anvil-stones are abundant at the Main Quarry (Fig. 32). One of the largest specimens of this type of flake is shown in the same figure. It measures 90 mm wide and weighs 120 grams. The force of a well-placed hammerstone blow that was required to generate it must have been considerable!

Upslope from the tuff with embedded agates at the Main Quarry and thus stratigraphically overlying it, is another massive tuff, lighter in color. This tuff is well suited for knapping. Crude, thick bifaces with lozenge shapes and roughly pointed at both ends were made of this tuff. They might have been affixed to short handles and used as picks? Two examples of these heads of digging-picks came to light in our excavations, and there were many spalls that might have been derived from others. A complete specimen was discovered within Trench E. It measures 18.5 cm in length, by 11.5 in width, and 8.0 cm in thickness. This ungainly implement is matched by a reworked fragment nearly as wide and thick -- although now only 12.5 cm long (Fig. 33).

Although we excavators regularly unearthed elements belonging to the rough-stone industrial sub-assemblage (hammerstones, anvil-stones, and picks) at the Main Quarry, more often we encountered the primary products of the ancient quarrying operation, that as to

Table 1. Hammerstones from Hole-in-the-Wall (mostly Main Quarry)

UNIT	CONFIGURATION	RAW MATERIAL	WEIGHT
1) Surface, coll. 2018	Irregular	Black chert	264.7 gr.
2) Surface, coll. 2019	Irregular	Brown chert/agate	247.6 gr.
3) Surface, N. End Ridge, 2021	Irregular	Conglomerate	163.3 gr.
4) Locus, N. End Ridge, 2021	Irregular	Basalt	184.5 gr.
5) Trench A (Unit B), 2020*	Sub-spheroidal	Brown quartzite	289.3 gr.
6) Trench A (Unit B), 2020*	Sub-spheroidal	Porphyritic felsite	264.8 gr.
7) Trench A (Unit B), 2021	Irregular	Welded tuff (?)	4,086 gr.
8) Trench A (Unit B), 2021	Sub-spheroidal	Welded tuff (?)	1,362 gr.
9) Trench A (Unit B), 2021	Sub-spheroidal	Agate (?)	109.3 gr.
10) Trench A (Unit B), 2021	Irregular	Welded tuff (?)	172.8 gr.
11) Trench A (Unit B), 2021	Sub-spheroidal	Welded tuff	237.8 gr.
12) Trench A (Unit B), 2021	Sub-spheroidal	Welded tuff	157.7 gr.
13) Trench A, coll. 10/2021	Sub-spheroidal	Basalt	210.0 gr.
14) Trench B, coll. 10/2021	Cylindrical	Fine crystalline	471.1 gr.
15) Trench B, coll. 10/2021	Irregular	Vesicular lava	850.0 gr.
16) Trench C, coll. 10/2021	Sub-spheroidal	Limestone (?)	367.3 gr.
17) Trench C, coll. 10/2021	Flat, flaked mass	Fine crystalline	202.3 gr.
18) Trench D, coll. 10/2021	Sub-spheroidal	Basalt	383.gr.
19) Trench D, coll. 10/2021	Sub-spheroidal	Basalt	184.3 gr.
20) Trench F, coll. 10/2021	Sub-spheroidal	Limestone (?)	583.3 gr.
21) Trench F, coll. 10/2021	Spheroidal	Basalt	200.9 gr.
22) Trench F, coll. 10/2021*	Sub-spheroidal	Basalt	441.8 gr.
23) Trench G, coll. 10/2021	Spheroidal	Agate	171.6 gr.
24) Trench G, coll. 10/2021	Irregular	Basalt	1,025 gr.
25) Trench H, coll. 10/2021*	Sub-spheroidal	Basalt	264.8 gr.
26) Trench H, coll. 10/2021*	Spheroidal	Basalt	131.5 gr.

Illustrated by Steve Wallmann.

say, 1) bifaces, 2) cores for producing prismatic blades and bladelets, and 3) prismatic blades and bladelets themselves. Needless to say, most of the bifaces were rejects, which had been discarded because of flaws in the agate and perverse fractures. Cores, on the other hand, were thrown away because they were exhausted or unpromising. Prismatic blades and bladelets were deselected because they were thick and misshapen or had broken in half when they were struck off the core.

Bifaces (rejected) belonged to two basic types, namely, preforms for fluted points and preforms for adzes. A typical example of a discarded preform for a Palaeo-American point – likely a fluted point – of Hole-in-the-Wall lemon-yellow agate is illustrated in Figure 34. It is short (L = 80 mm) and has a well-developed striking platform for fluting. No channel flake was ever struck on either face. Since the thickness of this preform could not be made uniform, it was abandoned.

The second type of biface that was produced standardly at Hole-in-the-Wall was a preform for an adze. Adzes made of flaked stone and ivory are common elements of Clovis tool-kits (Gramly 1993; 2021). A good example of such an implement is given by Figure 35. It approaches four inches (10.2 cm) in length, which is likely a minimum length for hafting such an adze without an extension sleeve of antler (or some other shock-absorbing substance).

Cores were an important part of the output of the quarrymen at Hole-in-the-Wall. The predominant form is a simple prismatic core with one, sometimes two, striking platforms. A good example of the single-platform variety from Trench A has already been presented as Figure 24. Another excellent specimen, which was collected near our tent-camp below the Main Quarry during 2019, is shown as Figure 36 (upper). This small core is based upon a biface fragment – the lateral break serving as a striking platform for blade removal. The agate

Figure 18. Isolated, single nodules of agate – each capable of yielding a flawless implement. Maximum length of longer nodule is 125 mm.

Figure 19. Model of an agglutinated nodule of agate made by fusing isolated gelatine capsules with gentle heat.

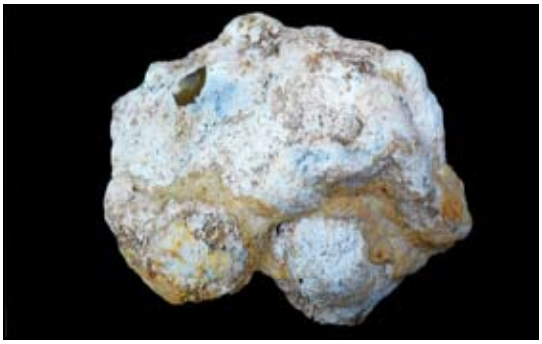


Figure 20. Large agglutinated nodule of lemon-yellow agate from Trench E. Weight = 4 kg.

from which it was made is high-grade and free from flaw.

Disc-shaped, "Levallois-type" cores intended for flake and flake-blade removal as well as (ultimately) production of bifaces are also on record for Clovis assemblages (Bradley, Collins, and Hemmings 2010: 58). Discoidal cores, in the writer's experience, are less frequently encountered among Clovis assemblages than prismatic blade cores are. A good example from Hole-in-the-Wall, which appears to have been abandoned due to difficulties during de-cortication is illustrated in Figure 36, lower. It came to light within Trench F during the Beutell Expedition.

Although prismatic blades and bladelets were generated at the Main Quarry, perhaps the bulk of these cutting instruments were produced elsewhere from cores that had been shaped preliminarily at the quarry and then carried away. Figure 37 is a selection of prismatic blades that were left at the quarry due to flaws and fragmentation. All are made of a good grade of lemon-yellow agate, except for the specimen in the lower row (right), which is the proximal end of prismatic blade of volcanic rock (dacite?) – an import to this site from afar.

A preference for prismatic blades and bladelets is characteristic of Clovis and Cumberland Palaeo-American cultures, although they were also desired by some later cultures (e.g., Hopewell). The intimate association of these special artifacts with fluted point and adze preforms indicates that their cultural connections lie with earliest cultures rather later manifestations.

Finally, the archaeological deposits at the Main Quarry yielded a few finished flaked stone artifacts suggesting that activities besides quarrying and primary reduction of agate may have taken place there. Three examples of this small group of uncommon artifacts – all fashioned of lemon-yellow agate – are presented in Figure 38. The first item (A) is a bifacial chopper that is conveniently sized for grasping. Remnant cortex of the agate nodule provides a sure grip. B is an endscraper with a talon that has been flaked bifacially for inserting within a haft. The item labelled C is a diminutive sidescraper with two, sub-parallel, unifacially-flaked working edges. All three implements, of course, may have been used to fashion pick-handles and equipment needed for quarrying, or they may have had other purposes altogether.

North End of Ridge (Locus)

The low ridge forming the western flank of Hole-in-the-Wall Draw extends N-S for a distance of approximately 1,100 feet. It is possible, but not yet proved, that agate is embedded within the slanted tuff layer (resting at 15 degrees from the horizontal) for the full length of the ridge. Our backhoe testing at the Main Quarry (Fig. 39) covered only 275-300 feet of the ridge's flank -- near its mid-point.

The crest of the ridge for almost its entire length was a focus of ancient habitation, and anyone walking upon its deflated soils and among its sparse vegetation will expect to observe scatters of agate debitage and flaked tools. The density of these vestiges increases as one

Figure 21. Two small slabs of sheet agate, 3.5-4.0 cm thick, that lay among the heap within Trench F. Length of longer piece = 20 cm.

Figure 22. Stage 4 fluted point preform (bottom photo) made from an untreated, sheet agate (upper photo) weighing 1.3 kg by master knapper D. C. Waldorf.

Figure 23. Stage 4 fluted point preform made from an untreated, agglutinated agate nodule (upper photo) weighing 1.75 kg by master knapper D. C. Waldorf.

Figure 24. Prismatic blade core made on nodule fragment recovered from Trench A, Hole-in-the-Wall. Inked illustration by Steve Wallmann. Height of core = 70 mm.

approaches the ridge's north end where the frequency of exotic lithics also is greater. A fine view overlooking the broad valley with its unnamed streambed coursing towards Hole-in-the-Wall canyon proper may be had from this vantage point. A comparable view can also be had from the mouth of Hole-in-the-Wall Draw 100 m to the east (Figure 40).

A concentration of artifacts was observed upon the surface of the ridge at the extreme north end, and on October 4, 2021, I scraped up surficial soil and sieved it through a 6 mm mesh. All artifacts were collected for study and illustration; afterwards, they were returned to the find-spot. The concentration covered a circular area approximately two meters in diameter. The impetus for this work was the discovery of a projectile point tip of lemon-yellow agate, which may be a Clovis point fragment (Figure 41, upper). The yield of this operation is given by Table 2.

In close proximity to the sieved concentration

Figure 25. Exquisite Folsom point, a few mm thick, of Hole-in the-Wall lemon-yellow agate made by master knapper Dan Theus with the famous Cooper site Folsom (cast) beside it for comparison.

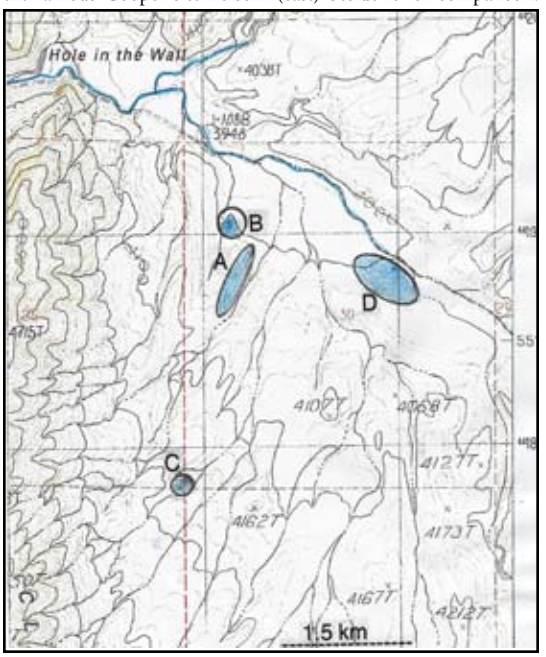


Figure 26. Map of Hole-in-the-Wall and the four principal collecting localities (components), namely: A, Main Quarry along flank of ridge; B, North End of Ridge; C, Hole in the-Wall South; D, East Workshop.

were scattered artifacts suggesting a Palaeo-American (Clovis?) former presence. Chief among them were fragmentary and intact utilized prismatic blades (Figure 41, lower). Although lemon-yellow agate predominates, there are specimens of colorful, banded cherts and agates that may have been introduced from afar within Clovis tool-kits. Later after fresh replacements were manufactured from the local agate, these well-used tools were purged from tool-kits and discarded on the spot.

Hole-in-the-Wall South

This lithic quarry-workshop, which lies 1.5 kilometers to the south of the Main Quarry and at an altitude nearly one hundred meters above it, was discovered during 2018 by Mark Newton. At the time of the Beutell Expedition it was not part of the Red Eagle Mine claim, and, therefore, our explorations were necessarily cursory and restricted in scope.

During 2021 our goals were merely to sample ancient materials lying upon the surface, thereby establishing the site's extent, and to ascertain by means of a single, shallow test-pit (one-meter square) if archaeological deposits lay below the surface.

Our observations suggest that a mineral claim at Hole-in-the-Wall South is warranted, but we can only guess what the tonnage of agate awaiting harvesting might be. Archaeologically, this quarry-workshop appears to offer little new information. We predict that it will mirror what has already been learned by excavations at the Main Quarry – except for the fact that a small percentage of the lemon-yellow agate there is imbued with a red or pink color. The element that is responsible for this attractive "strawberry" hue has not been established, but it might be gold.

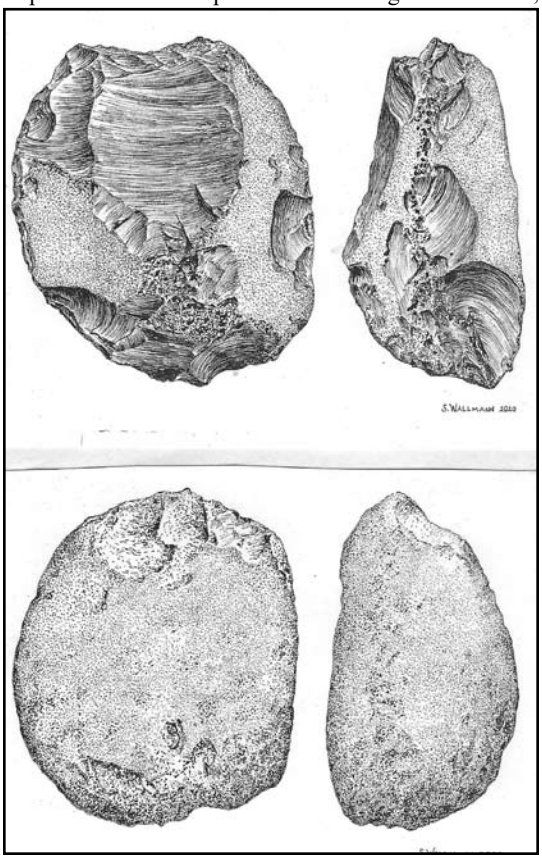


Figure 27. Irregularly-shaped, light hammerstones, approaching a sub-spheroidal shape. From the Main Quarry. *Upper,* brown quartzite, 289.3 grams, Trench A. *Lower*, porphyritic felsite, 264.8 grams, Trench A. Illustrations by Steve Wallmann..

Figure 28. *Upper,* seven light hammerstones of spheroidal and sub-spheroidal shape, made of basalt. *Lower,* small spheroidal hammerstone made of basalt, weight = 131.5 grams. Steve Wallmann illustration.

Table 2. Artifacts Discovered at Locus at the Northern End of Ridge

1.	237 debitage items of lemon-yellow agate.	Weight = 1.7 kg
2.	Cobble hammerstone of vesicular lava	Weight = 184/1 gr
3.	Core for making flake-blades of yellow agate	Not weighed
4.	Tip of projectile point of lemon-yellow agate	Weight = 8.0 gr
5.	Two biface fragments of lemon-yellow agate	Not weighed
6.	Seven utilized prismatic blades of lemon-yellow agate	Not weighed

Hole-in-the-Wall South extends across the southern face of a spur ridge (Fig. 42) for approximately 100 meters. It is likely that a bed of tuff with embedded agate was quarried here, and just like the Main Quarry, nodules were reduced upon the spot. Without extensive excavation, the attitude of the agate-bearing tuff cannot be established.

Immediately across the draw running along the quarry face are sloped deposits covered with agate debitage and other artifacts. These materials undoubtedly were derived from the quarry only a short distance away.

Our 1-m square unit that was excavated and sieved to a depth of 10 cm at the quarry-workshop (see Fig. 6) yielded an impressive 745 debitage items weighing 7.3 kg. These materials were left within the unit. To what depth the archaeological deposit extends is unknown, but judging by our work within test trenches at the Main Quarry, it may be a meter or more.

Among the 16+ objects lying upon the surface at Hole-in-the-Wall South that we examined were: 1) nine fragmentary and intact bifaces – one of them had been intended to be large; 2) rejected and exhausted prismatic blade cores; and 3) five prismatic blades (Figure 43). Judging by its homogeneous character, it seems likely that the entire assemblage was generated during the Palaeo-American (Clovis) era; however, we observed no artifacts fashioned of raw materials from distant lithic sources.

The East Workshop

This extensive, flat-lying archaeological site, which has eroded to a slight degree because of livestock grazing upon it, was discovered by crew member, Derek Risley (Fig. 44) when reconnoitering on October 4, 2020. Two of the three artifacts (a Clovis-age biface with outrepasse flaking and a prismatic blade fragment) that he collected that day from the surface are shown in Figures 45 and 46.

The prehistoric habitation loci that together constitute the "East Workshop" are widely scattered across a terrace, which is elevated 10-15 meters above the broad valley with an unnamed stream. This stream once drained through Hole-in-the-Wall canyon but does not flow in the modern day. The terrace is situated due east of the prehistoric quarry along Hole-in-the-Wall Draw, as seen in an aerial view (Fig. 47). Farther to the west of Hole-in-the-Wall Draw, but well seen from the East Workshop, rises a range of hills (the Clan Alpines) – a geographic landmark, which we have dubbed the "Mastodon Range" because of its likeness to a procession of mastodons (Fig. 48).

Repeated visits were made to the East Workshop during the clement months of 2021 searching for diagnostic artifacts. Also, we hoped to document the limits of the ancient occupation and understand its

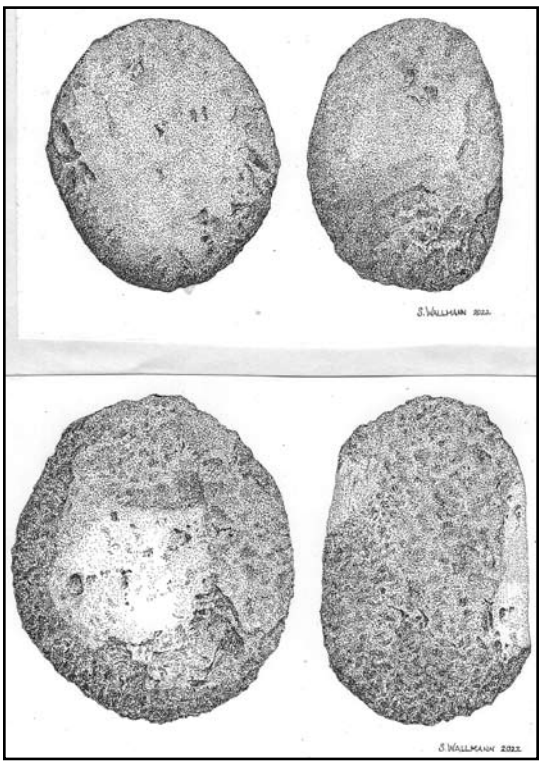


Figure 29. Small sub-spheroidal hammerstones made of basalt. Upper, weight = 264.8 grams. Lower, weight = 441.8 grams. Steve Wallmann illustrations.

Figure 30. *Upper,* heavy hammerstones from Main Quarry excavations. From left: Tr. A (Unit B), 1,362 grams; Tr. B. 850.0 grams; Tr. G, 1,025 grams. *Lower,* heavy hammerstone from Trench B weighing 850.0 grams atop anvil-stone of fossil wood weighing 12 kg that was found near it.

Figure 31. Large anvil-stone with heavy pitting resulting from prolonged usage, Trench B at Main Quarry.

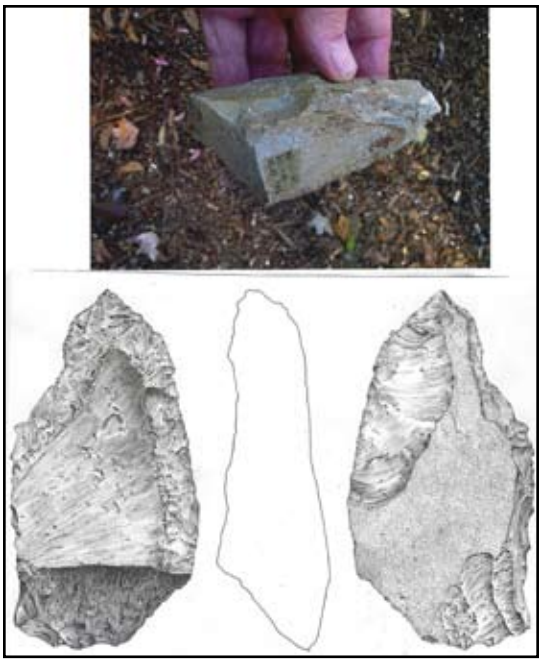


Figure 33. Illustrations of a reworked fragment of the head of a digging-stick. It was discovered within Trench A. It has been flaked from massive tuff, light gray in color. Surviving length = 12.5 cm.

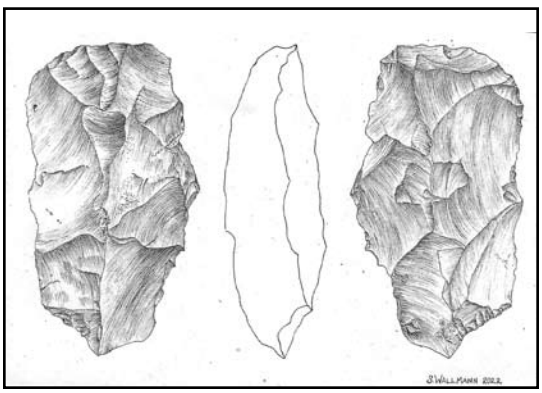


Figure 34. Rejected preform for a fluted point (Clovis point) from Trench B (eastern end, area of sampling), The striking platform was set up, but no channel flake was ever removed. Length = 80 mm. Steve Wallmann illustration..

Figure 32. *Upper,* three large de-cortication flakes that likely were removed from an agate nodule with the aid of a heavy hammer-stone and anvil-stone. *Lower,* ventral face of a massive de-cortication flake, Unit B, Trench A excavation (10/2020). Maximum width = 90 mm.

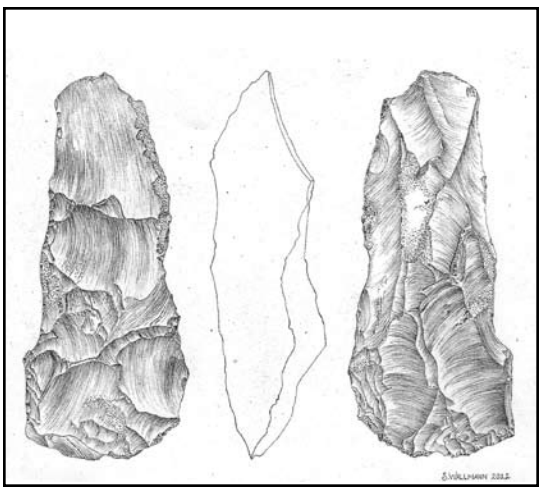


Figure 35. Preform for an adze, Trench F (2021). Length = 10.2 cm. The preform was rejected when the dorsal face could not be flattened sufficiently by means of outrepasse flaking. Clovis adzes may have been used often, although when exhausted, they were re-purposed and seldom survive intact for the archaeologist to discover.

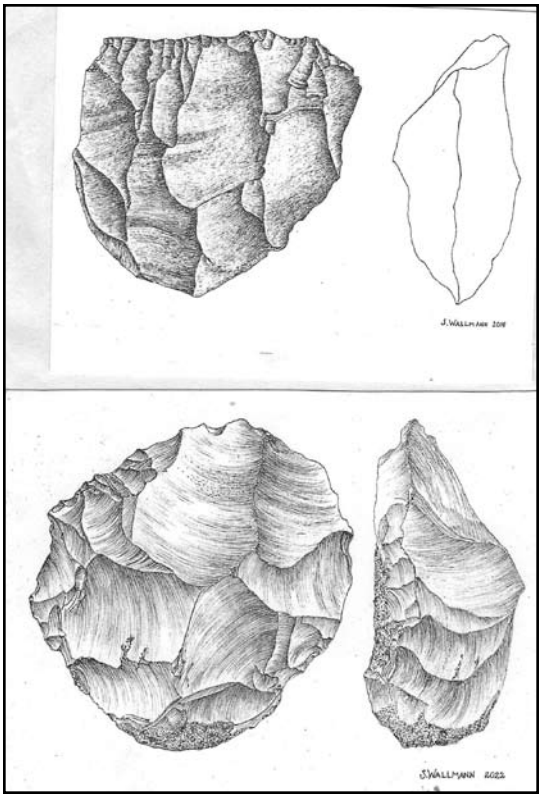


Figure 36. *Upper,* small prismatic blade core made on a biface fragment – the snap serving as the striking platform, Main Quarry, 2019 find; *lower,* discoidal core from Trench F. The maximum width of this specimen is 7.2 cm. Steve Wallmann illustrations.

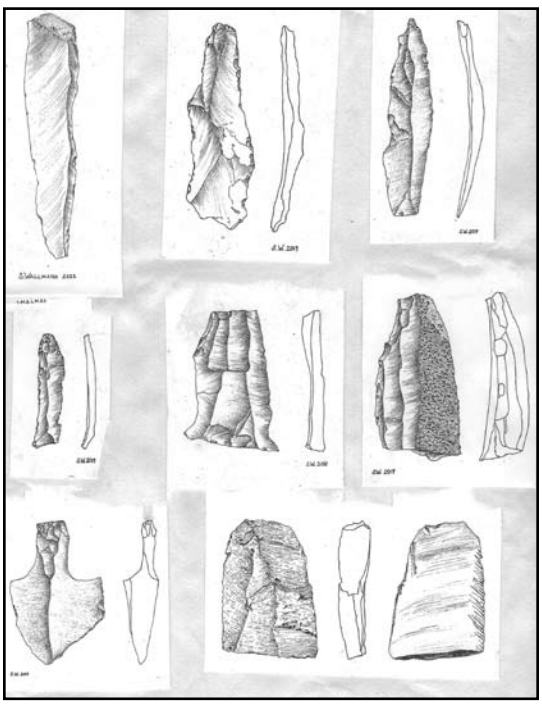


Figure 37. Prismatic blades recovered from the Main Quarry during 2019-2020 and the 2021 Beutell Expedition (top row, extreme left --specimen from Trench H = 79 mm).

nature. Three, discrete loci or artifact concentrations (designated A. B. and C) were observed in the northwest sector of the terrace; elsewhere at the East Workshop artifacts were more dispersed. Exposure of the ancient occupation surface, however, was poor, and organic artifacts were not preserved. We came away with the realization that our understanding was limited and inconclusive except for one fact: All the flaked stone within an area of 75 X 300 meters could be relegated to occupations by Palaeo-Americans (likely, Clovis people). We identified no vestiges of a later time period, that is to say, no Neo-Indian habitations.

Underscoring our belief that artifacts upon the East Workshop had been left by Palaeo-American (Clovis) visitors, is the presence of utilized tools and tool preforms made of exotic raw materials (Figure 49). At least 25 specimens were noted across the terrace wherever erosion had done its work. This number, however, is hardly 15-20% of the sub-assemblage of tools, tool fragments, cores made of lemon-yellow agate that was observed there. If we had not been selective and instead included in our tally every piece of lemon-yellow agate debitage lying exposed upon the East Workshop, the representation of exotic raw materials would be much less – likely less than one per cent of the total.

Another remarkable observation of the field-crew who scoured the terrace, day after day, is that few large biface fragments and flakes of any raw material remained at the East Workshop. Medial or basal sections of bifaces and rejected preforms, which one might expect to recover from a "pristine" ancient workshop, were mysteriously absent. Yet, shapely prismatic blades and nicely-formed, exhausted cores – precisely the sorts of items attracting today's collectors – remained. We concluded that the East Workshop had been scavenged by prehistoric (Neo-Indian) tool-makers for any large piece of raw material worthy of being recycled or repurposed. Four of the largest biface fragments that had escaped the attention of prehistoric scavengers or deliberately had been passed over by them are illustrated in Figure 50.

As one might expect for a Clovis site, prismatic blades and the cores used to generate them were common finds by us. Most of the blades bore edge damage from prolonged usage. The longest specimens did not exceed 6-7 cm; average-sized prismatic blades (Fig. 51) measured only 4-5 cm in length. The longest scar created by removing prismatic blades from cores discovered upon the East Workshop is only 7.5 cm (Fig. 52).

Our repeated searching among the ancient flaked stone debris upon the terrace did yield a few key indicators of Palaeo-American presence (see Gramly 2000), some of which are illustrated by Figure 53. Noteworthy is a coronet graver with nine prominent spurs and a common form of trianguloid endscraper. Both of these implements had been fashioned of good grades of lemon-yellow agate.

By way of summary, Table 3 presents the sequential tallies of all artifacts observed by us at the

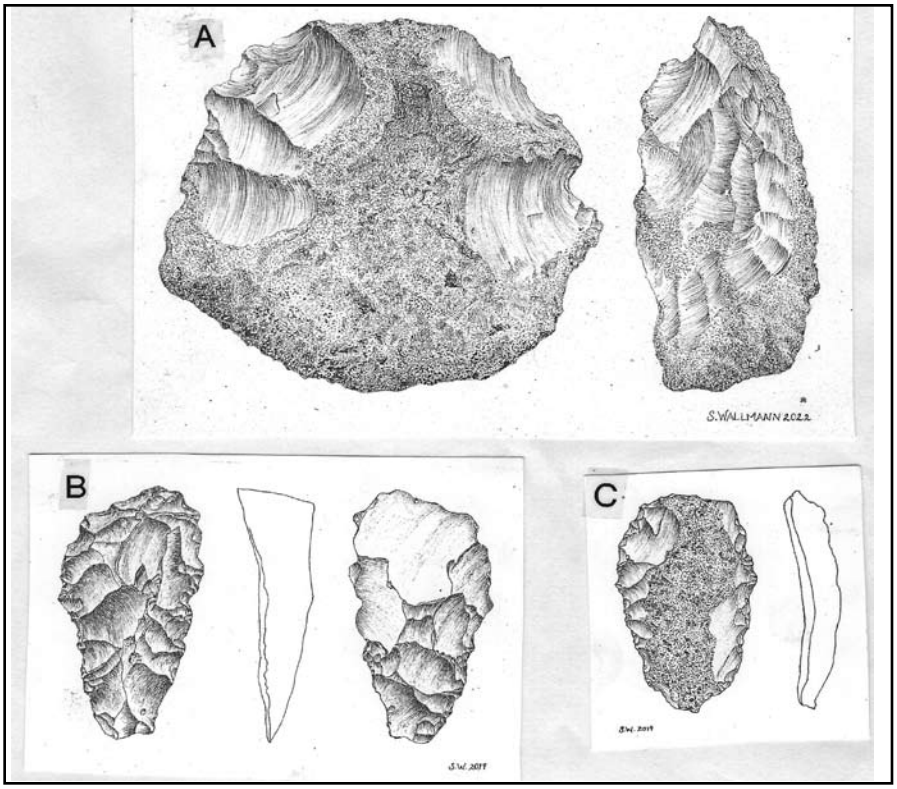


Figure 38. Examples of uncommon or one-of-a-kind flaked stone artifacts from excavations at the Main Quarry. A, chopper made from a small, single nodule, greatest width = 9 cm, Trench A; B, endscraper of unidentified chert with a bifacially -worked talon; C, small sidescraper. Steve Wallmann illustrations.

East Workshop for the period 10/2020 – 10/2021. These objects and all debitage of Hole-in-the-Wall agate not mentioned in the table were left where they were found for future investigators. Only a small fraction of this Clovis site is exposed upon the surface. What remains hidden, buried under drifted sediment and desert vegetation, undoubtedly will prove more than ample for archaeological studies, which this potentially important Palaeo-American station deserves.

Figure 39. Trench A in the Main Quarry under excavation, October, 2021. Isaac Newton is the backhoe operator.

F. Overview

The work accomplished during the Beutell Expedition supports our belief that the Hole-in-the-Wall lithic source was intensively quarried during Palaeo-American (Clovis) times only. Workshops and residences of Clovis quarrymen were established at overlooks and were short distances from the Main Quarry and Hole-in-the-Wall South.

Later visitors to Hole-in-the-Wall scavenged quarry debris that must have lain about abundantly, and they even gleaned workshops and habitations for

Figure 40. View looking north across unnamed stream valley (arrow indicates direction of rare water flows) from the entrance to Hole-in-the-Wall Draw. In the far distance to the right lies Cain Mountain (elevation 8,409 feet). 2018 photograph by Steve Wallmann.

Table 3. Sequential Tallies of Artifacts Observed at the East Workshop, 10/2020-10/2021.

October, 2020

1. 2 prismatic blades (one is exotic stone)
2. 1 biface fragment

TOTAL = 3

*May, 2021 (A)**

1. 2 biface fragments
2. 2 prismatic blade cores (one is fashioned from a biface fragment)
3. 8 utilized flakes (five are exotic stones)
4. 9 prismatic blades (all utilized)
5. 1 utilized flake-blade (possibly a channel flake)
6. 1 core rejuvenation flake
7. 1 unidentified flake made of variegated white and lemon-yellow agate

TOTAL = 24

*The above were 100 m to the west from the find-spots of the three artifacts discovered on 10/2021.

May, 2021 (B)

LOCUS A

1. 45 angular waste flakes and other debitage
2. 25 cortex removal flakes
3. 43 utilized flakes
4. 13 utilized prismatic blades/flake-blades
5. 2 beaks
6. 1 prismatic blade core
7. 1 coronet graver

TOTAL = 130, weight – 720.1 grams

LOCUS B

1. 36 angular waste flakes
2. 32 cortex removal flakes
3. 25 utilized flakes (one specimen is exotic raw material)
4. 12 utilized prismatic blades
5. 3 biface fragments
6. 1 fragmentary graver

TOTAL = 109, weight = 468.5 grams

LOCUS C

1. 32 angular waste flakes
2. 46 cortex removal flakes
3. 13 utilized flakes
4. 6 utilized prismatic blades/flake-blades
5. 7 biface fragments (all derived from preforms)
6. 2 beaks
7. 1 sidescraper
8. 2 unassigned flakes

TOTAL = 109, weight = 1,637.7 grams

October 11 & 14, 2021

1. 16 bifaces or biface fragments (including broken fluted point preform of exotic agate)
2. 15 utilized flakes and prismatic blades (several of exotic raw materials)
3. 5 prismatic blade cores
4. 1 oval scraper
5. 1 hammerstone on a chert cobble
6. 1 large flake of basalt

TOTAL = 39

GRAND TOTAL = 414

At right: Figure 41. *Upper,* possible Clovis point tip fashioned of lemon-yellow agate, length = 37 mm; *Lower,* five utilized prismatic blades of lemon-yellow agate and variegated chert or agate from unknown lithic sources – perhaps lying distant from Hole-in-the-Wall. Length of longest prismatic blade = 62 mm. All specimens lay upon the surface of the Ridge at its extreme northern end.

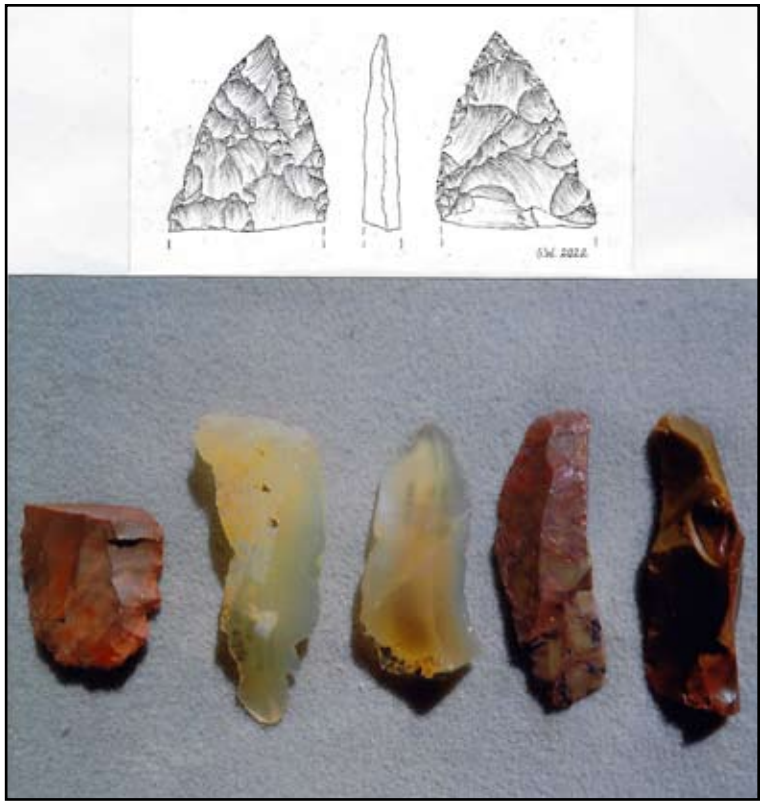


Figure 42. View of Hole-in-the-Wall South (arrow) from the south on a clear day in October. To the northeast is Cain Mountain. Among the sparse vegetation in the foreground are agate debitage and rejected flaked tools.

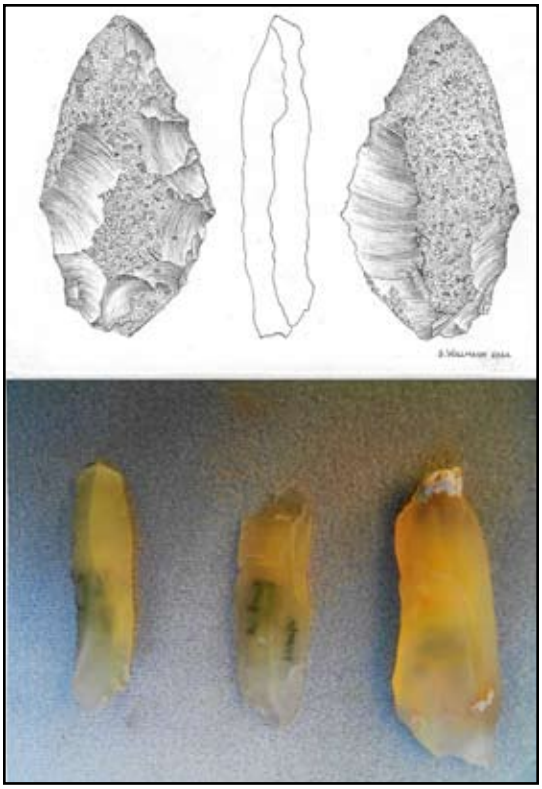
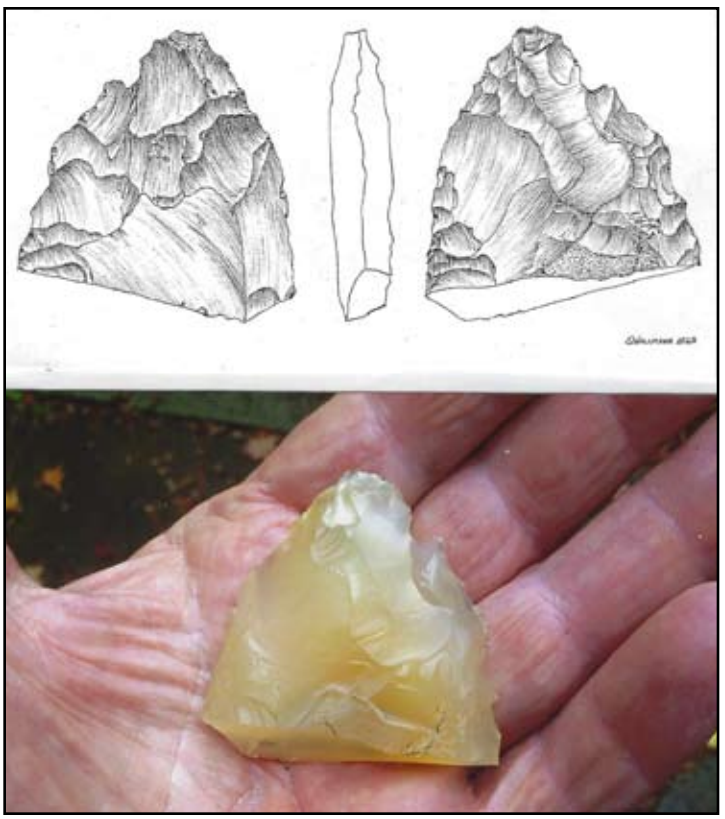


Figure 43. Artifacts found lying upon the surface of Hole-in-the-Wall South during 2021. *Upper,* abandoned biface made from a small, discrete nodule of lemon-yellow agate having a length of 75 mm; *lower,* three average-sized prismatic blades of agate, length of longest = 56 mm. Steve Wallmann drawing.

Figure 44. Derek Risley (left) and Dean Ferguson dunring a May, 2021, re-visit of the East Workshop. The top of the terrace where prehistoric activity occurred is remarkably flat.

At right: Figure 45. Tip of a Clovis-era biface with an *outrepasse* flake emanating from one end; made of lemon-yellow Hole-in-the-Wall agate. Found upon the surface of the East Workshop during October, 2020, by Derek Risley. Width = 54 mm

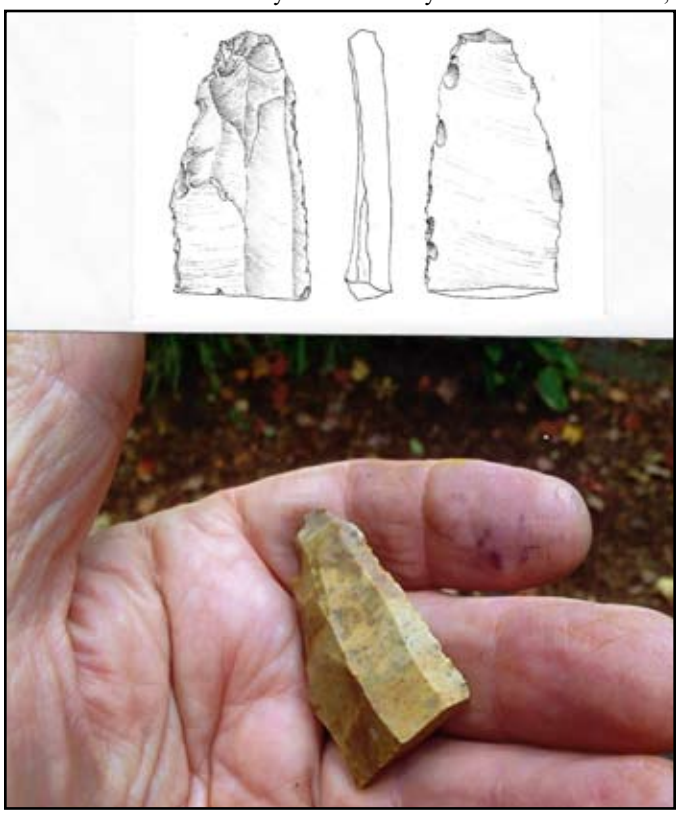


discarded pieces. If actual quarrying was carried out by Neo-Indian groups, we observed no evidence of it.

Clovis tool-makers employing lemon-yellow agate contented themselves with small-to-medium-sized raw material, which yielded bifaces and prismatic blades having a maximum dimension of 10-15 cm (4-6 inches). Clovis fluted points of this size are on record for the Great Basin, Texas, and western Nebraska. Of course, from time to time larger masses of agate capable of yielding larger tools must have come to light, but such vestiges are rare.

Hole-in-the-Wall agate is a superior material for sharp cutting instruments. Prismatic blades and bifacial implements made of this tough stone may have given prolonged service and, thus, ended up at archaeological sites far and wide. Findspots of Palaeo-American domestic implements made of this agate, however, all are located west of the Mississippi; most finds are on record for the Great Basin (states of Nevada, Oregon, California, and Washington).

In Hopewell times when raw materials were appreciated not only for their utility but also for their color,



At right: Figure 46. Proximal end of a prismatic blade with double arises. Made of a banded chert (or agate) foreign to the immediate region. East Workshop, discovered October, 2020. Length of fragment = 47 mm.

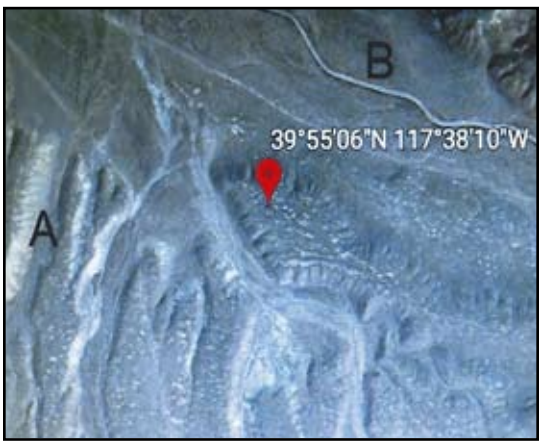
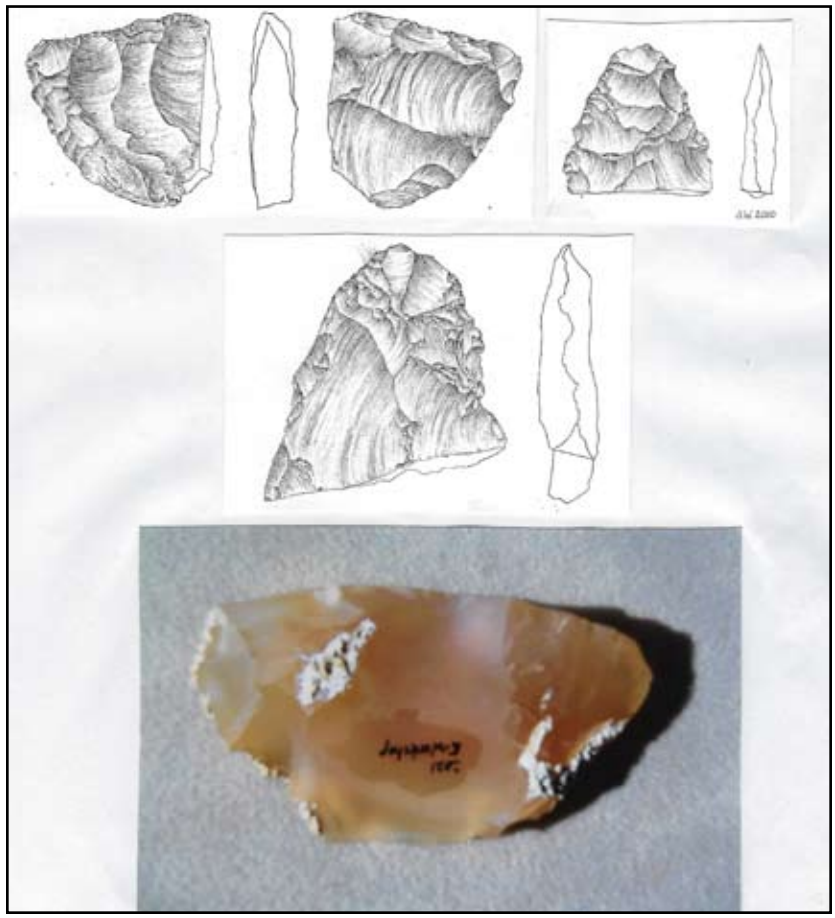


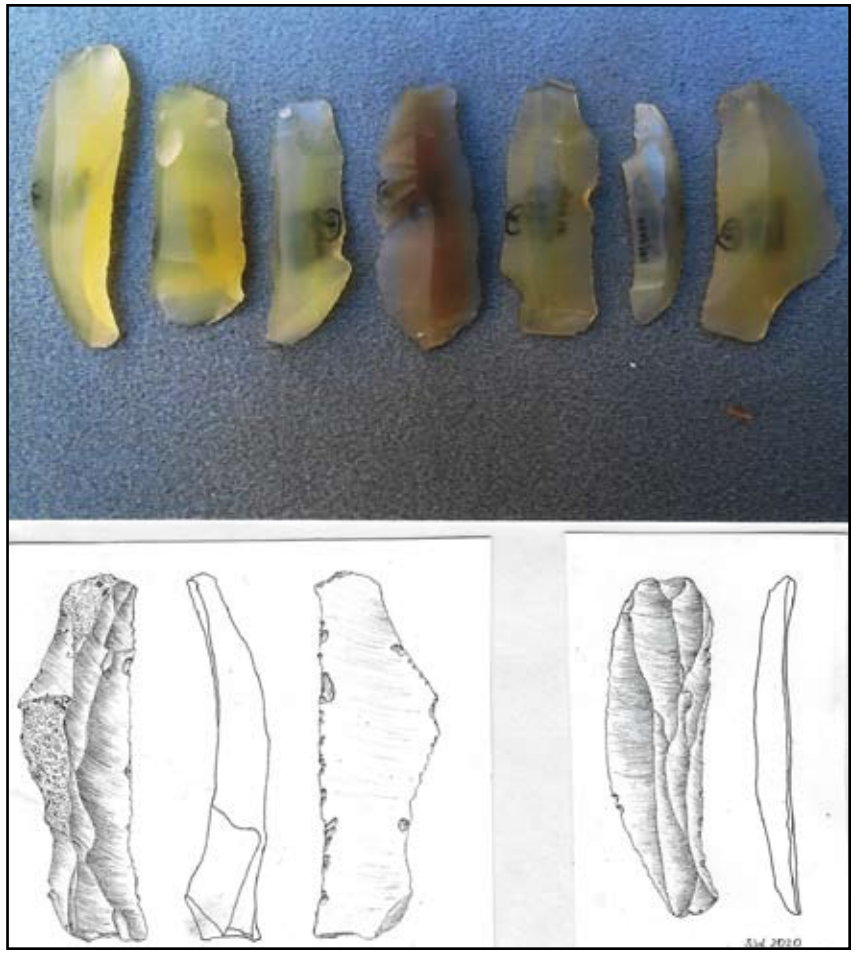
Figure 47. Satellite view of landforms east of Hole-in-the-Wall Canyon. A designates Hole-in-the-Wall Draw and the Main Quarry; B, indicates the unnamed steam-bed, which flows west; the red marker with its latitude and longitude pinpoints the location of October, 2020, discoveries of Clovis artifacts.

Figure 48. The "Mastodon Range" of hills is well seen from the East Workshop, looking southwest. R. M. Gramly photograph, 2021.

At right: Figure 49. Artifacts selected from the sub-assemblage of exotic raw materials (agates, basalt, porphyritic felsite, etc.), East Workshop. The fluted point preform made of reddish agate (L = 11cm) in the lower row has been restored from two fragments. The large basalt flake next to it has no utilization and may have been derived from a hammerstone.

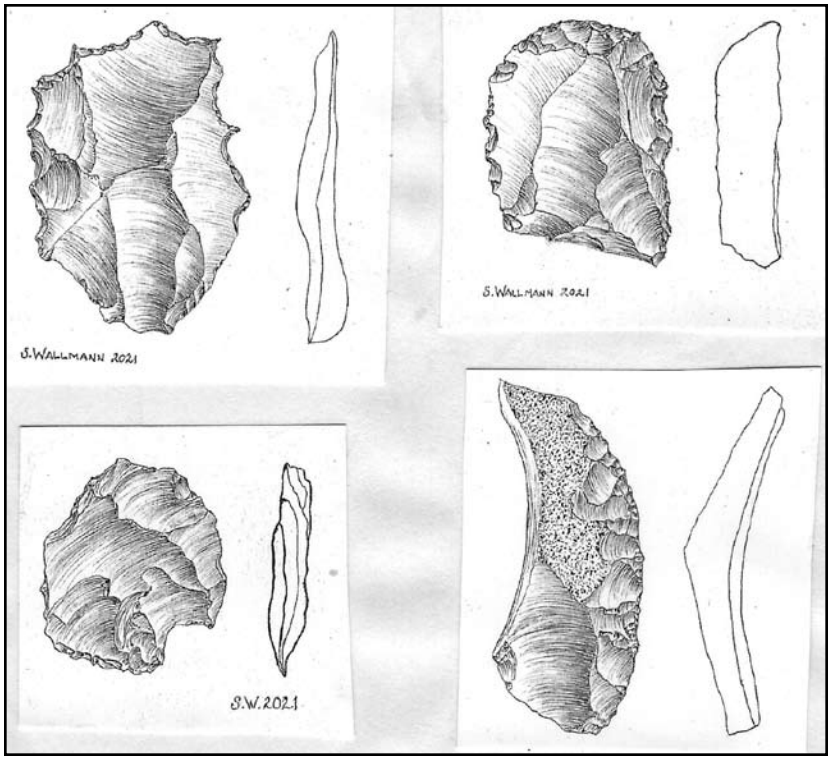


At right: Figure 50. Drawings, biface tip fragments of lemon-yellow agate from the East Workshop (one has been modified into a core); photo, basal fragment of a large biface of strawberry-colored agate (from Hole-in-the-Wall South), modified into a core. Width of this fragment is 9 cm. Neo-Indian scavengers may have rejected these pieces of raw material.



At right: Figure 51. Series of prismatic blades from the surface of the East Workshop. *Upper*, average-sized specimens measuring 4-5 cm in length. *Lower,* longer specimens measuring 6-7 cm and made of Hole-in-the-Wall agate.

At right: Figure 52. Prismatic blade cores made of Hole-in-the-Wall agate, East Workshop. The longest scar resulting from removal of a blade is 7.5 cm and was struck from the core in the center (arrow).



At right: Figure 53. Formal types of flaked stone tools from the surface of the East Workshop. *Top row*, from left, coronet graver, end-scraper; *bottom row,* from left, combination beak/denticulate, small sidescraper. All are lemon-colored agate. Length of sidescraper = 5.3 cm. Steve Wallmann illustrations.

texture, and inherent beauty, lemon-colored Hole-in-the-Wall agate must have been prized. Being a true rarity to prehistoric Native Americans residing in the East, it was imported with considerable difficulty via trading networks stretching across North America. Whether it moved as rare, large nodules or as finished artworks has not been established; however, evidence suggests it was reduced and recycled within Indiana (D. Greives, personal communication).

When in the course of backhoe trenching during the Beutell Expedition we confirmed the presence of extra-large agate nodules (Fig. 2), a "veil" separating Hopewell art-fanciers living 2,000 years ago and us archaeologists/mineralogists was lifted. It was easy to believe that members of two separate cultures could venerate the same wonderful creation of Nature – a stone yellow as lemons and full of light as the Sun.

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