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Jess Valley: An Archaeologically Significant Obsidian Source in the Southern Warner Mountains of Northeastern California

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This paper formally reports the Jess Valley obsidian source, presents its trace element composition, and sketches what we currently know about the time/space distribution of archaeological examples in northeastern California.

In the spring of 1982, the senior author was in the field collecting geological obsidian source samples to form the reference collection for a planned dissertation on prehistoric obsidian use in parts of northeastern California and southern Oregon. In the course of background literature research, he noted a mention of an obsidian source in, or near, Jess Valley, in the Warner Mountains of northeastern California in T39N, R14E, NW 1/4 of section 3 (Ericson et al. 1976: Table 12.1, p. 227). Legal location and quad maps in hand, he set out to locate this reported source, but ended up in entirely inappropriate geological terrain. After spending the next few hours dodging rattlesnakes in a fruitless attempt to locate the source, he gave up.

Back from the field, he contacted Charles Chesterman, who had made the actual discovery reported in Ericson et al. (1976) and learned—in a letter from Chesterman dated June 30, 1982—that there had been an unnoticed typographical error in the Ericson et al. (1976) paper and that the source actually was located in R15E—*not* R14E. Although feeling somewhat better that there had been a good reason for his in-field failure, the mounting pressure to begin dissertation writing derailed the senior author from making another collection attempt. Consequently, Jess Valley was not listed in the obsidian source compendium presented in Hughes (1986).

Nineteen years later, in August 2001, a large storm system precipitated a series of lightning strikes on the Modoc National Forest. One of the strikes started the Blue Lake fire, which burned over 35,000 acres on the southern and eastern ends of Jess Valley, from the valley floor up into the South Warner Wilderness and Modoc National Forest lands to the east and southeast. As part of post-fire assessment, Modoc National Forest Archaeologist Gerry Gates dispatched the junior author and archaeological technician Verity Winn to evaluate damage to archaeological sites affected by the fire, and to find the actual obsidian source reported near Jess Valley which had been known/suspected for some time (see above).

Winn and Howe found the obsidian outcrop, later designated archaeological site CA-Mod-6419, on a southern-facing ridge in the southeastern part of Jess Valley (Fig. 1), and collected samples for analysis. They documented obsidian nodules eroding downslope (to the west) at least a mile from the primary upslope exposure. The primary (upslope) area was quarried in the past, with broken nodules scattered around and down the hillside. Although smaller nodules were common, those of potential archaeological significance (ranging up to ca. 4–7 cm. in diameter), and the presence of a cobble 10 × 7 cm. in size, suggested that other equally large, or larger, cobbles awaited discovery elsewhere in the eruptive unit. The geological samples occurred in an aphanitic matrix and were highly angular, indicative of minimal post-eruption transport. No diagnostic artifacts were noted at the primary (upslope) locality, but obsidian projectile points (including Great Basin Stemmed, Northern Side-notched, Elko Series, Rosegate Series, and Desert Series points) representing the full range of time periods recognized in northeastern California were observed and recorded at activity loci associated with the western extension of the source and archaeological site.

GEOLOGICAL BACKGROUND, INSTRUMENTAL ANALYSIS, AND TRACE ELEMENT GEOCHEMISTRY

Although it was not mentioned in Russell's (1928:431–425, Map 1) pioneering study, nor in Laux's (1970) later regional geological inventory, Jess Valley obsidian was

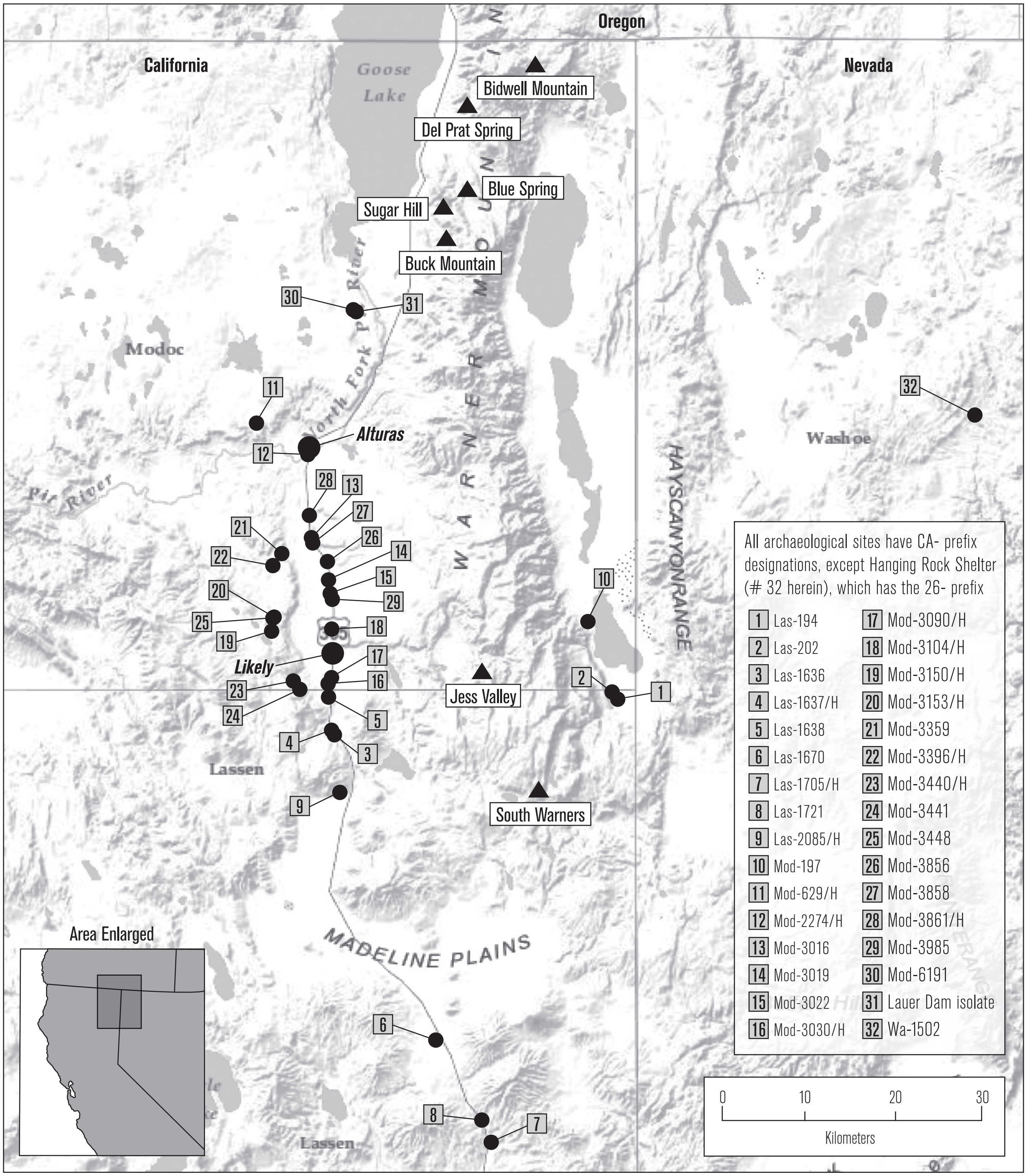


Figure 1. Portions of northeastern California and northwestern Nevada showing the locations of obsidian sources (filled triangles) and archaeological sites (small black dots) discussed in the text.

reported in the archaeological literature 40 years ago by Ericson et al. (1976). The location of the obsidian exposure we term Jess Valley[1] (Fig. 1) corresponds with the western edge of the Tvr rhyolite flow unit mapped at the southeastern end of Jess Valley by Duffield and Weldin (1976:Plate 1).

Table 1

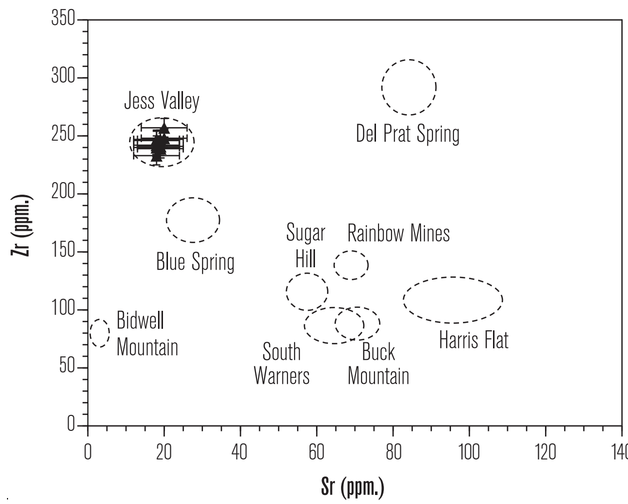
TRACE ELEMENT COMPOSITION OF OBSIDIAN FROM JESS VALLEY, WARNER MOUNTAINS, CALIFORNIA

		Trace and Selected Minor Element Composition Estimates								Ratio
		Rb	Sr	Y	Zr	Nb	Ba	$Fe_2O_3^T$	Mn	Fe/Mn
Jess Valley	X	119.3	18.7	41.3	244.0	14.1	411.5	1.53	715.6	19–21
	S.D.	4.6	0.8	1.3	6.5	1.0	28.4	0.1	50.4	
	CV%	4	4	3	3	7	7	6	7	
OS-13		167	54	48	560	42	1,286	nr	556	nr
		U.S. Geological Survey Reference Standard								
RGM-1 (measured)		151 ± 4	112 ± 4	25 ± 3	217 ± 4	11 ± 3	834 ± 21	1.86 ± .02	280 ± 34	68
RGM-1 (recommended)		149	108	25	219	9	807	1.86	300	nr

Notes: All values in parts per million (ppm.), except total iron (in weight %) and Fe/Mn ratios. X = sample mean, S.D. = sample standard deviation, CV = coefficient of variation (in %). Ten specimens analyzed. Data for sample OS-13 from Robert Jack, see note 1. ± values for RGM-1 (measured) are 2-sigma x-ray counting and regression fitting error estimates at 120 seconds live time. Recommended values for RGM-1 from Govindaraju (1994). nr= not reported.

Non-destructive trace and selected minor element analysis of geological samples was conducted by the senior author on a QuanX-EC™ (Thermo Electron Corporation) energy dispersive x-ray fluorescence (edxrf) spectrometer equipped with a silver (Ag) x-ray tube, a 50 kV x-ray generator, digital pulse processor with automated energy calibration, and a Peltier cooled solid state detector with 145 eV resolution (FWHM) at 5.9 keV. The x-ray tube was operated at differing voltage and current settings to optimize excitation of the elements selected for analysis. In this case, analyses were conducted for the elements rubidium (Rb Kα), strontium (Sr Kα), yttrium (Y Kα), zirconium (Zr Kα), niobium (Nb Kα), barium (Ba Kα), manganese (Mn Kα), as well as to generate iron vs. manganese (Fe Kα/Mn Kα) ratios. X-ray tube current was scaled automatically to the physical size of each specimen. Further details of calibration, artifact-to-source (geochemical type) attribution procedures, and element-specific measurement resolution appear in Hughes (1988, 1994, 2015a).

Table 1 presents edxrf data generated from the analysis of Jess Valley geological obsidian samples, Figure 2 plots their Zr vs. Sr compositions in relation to other artifact-quality obsidians known from the Warner Mountains, while Figure 3 plots Fe/Mn vs. Rb/Sr ratios for archaeologically significant Warner Mountains geological obsidians. These figures illustrate that the trace element composition of Jess Valley is distinct from all other known Warner Mountains obsidians, allowing



---- Range of variation measured in geological obsidian source samples from Warner Mountains obsidian sources (data from Hughes [1986]).

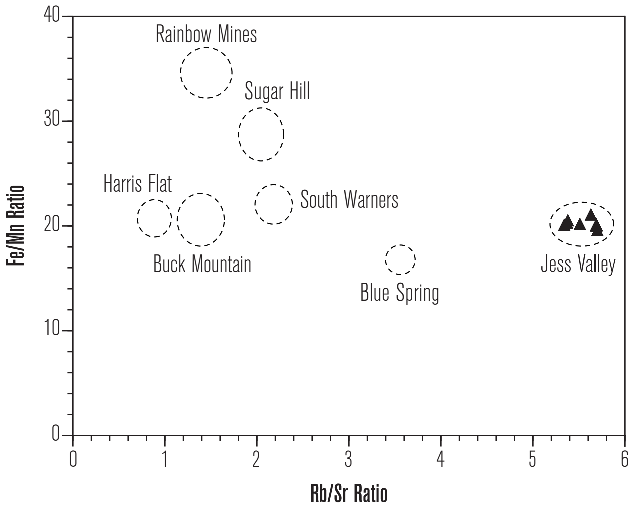
▲ Individual Jess Valley samples; summary statistics listed in Table 1.

├─┤ Error bars are two-sigma (95% confidence interval) composition estimates for each specimen.

Notes: Although South Warners and Buck Mountain obsidian overlap in Zr/Sr composition, they are distinguished on the basis of other elements (e.g., Ba; Hughes 1986:Table 7). Values for sample OS-13, listed in Table 1, plot off the chart at this scale.

Figure 2. Zr vs. Sr composition of obsidian from Jess Valley.

the senior author to recognize (at least as early as April, 1995 and prior to the actual discovery of the source) this distinctive trace element fingerprint in artifacts from proximate archaeological sites within the Tuscarora Pipeline Project. Lacking a secure geological/geographic referent at that time, he simply labeled these artifacts



---- Range of variation measured in geological obsidian source samples from Warner Mountains obsidian sources (data from Hughes [1986]).

▲ Individual Jess Valley samples.

Note: Values for Bidwell Mountain (a.k.a. Cowhead Lake) plot off the chart at this scale.

Figure 3. Fe/Mn vs. Rb/Sr composition of Jess Valley obsidian.

"Unknown A" (Hughes 1995a). Additional artifacts matching this trace element fingerprint were identified in the course of analysis of Tuscarora Pipeline Project site collections (see Delacorte [1997:Appendix A] and McGuire [1997:Appendix A] for summaries), and they continued to accrue—particularly in the vicinity of Likely—at sites investigated in the subsequent Alturas Intertie Project (see Nilsson et al. [2000] and Rosenthal [2000] for summaries).

TIME/SPACE DISTRIBUTION

Table 2 presents site-specific occurrences of Jess Valley obsidian, and Figure 1 shows the geographical distribution of these sites in relationship to the geological obsidian source.

At the time of contact with Euroamericans, the Jess Valley area was (and still is) occupied by Achumawi peoples who identify themselves as Hammawi (Kniffen 1928; Merriam 1926; Olmsted and Stewart 1978). Based on data from the Tuscarora and Alturas Intertie projects, we know that the prehistoric use of Jess Valley obsidian began at least 7,000–5,000 years ago (because the material was used to make Northern Side-notched points), and continued through late prehistoric times

Table 2

ARCHAEOLOGICAL OCCURRENCES OF JESS VALLEY OBSIDIAN

Figure #	Site	n occurrences	n sourced	% JV obsidian	Reference
1	Las-194	2	54	4%	Hughes 1986: Appendix 16
2	Las-202	1	82	1%	Hughes 1986: Appendix 14
3	Las-1636	1	3	33%	Hughes 1995a
4	Las-1637/H	2	9	22%	Hughes 1995a
5	Las-1638	1	64	2%	Hughes 1995a, b, c
6	Las-1670	2	137	2%	Hughes 1995a, b; 1996a, d
7	Las-1705/H	1	73	1%	Hughes 1995a, b; 1996b
8	Las-1721	1	9	11%	Hughes 1996d
9	Las-2085/H	2	18	11%	Hughes 1998a, b
10	Mod-197	1	70	1%	Hughes 1986: Appendix 18
11	Mod-629/H	3	78	4%	Hughes 1999c, f
12	Mod-2274/H	1	30	3%	Hughes 2015b
13	Mod-3016	1	12	8%	Hughes 2002b
14	Mod-3019	1	3	33%	Hughes 1996c
15	Mod-3022	2	3	67%	Hughes 1995a
16	Mod-3030/H	1	2	50%	Hughes 1995a
17	Mod-3090/H	1	19	5%	Hughes 1995a
18	Mod-3104/H	1	6	17%	Hughes 1995a
19	Mod-3150/H	3	33	9%	Hughes 1999e
20	Mod-3153/H	6	182	3%	Hughes 1999a, d, g
21	Mod-3359	1	12	8%	Hughes 1999b
22	Mod-3396/H	1	18	6%	Hughes 1998b
23	Mod-3440/H	2	7	29%	Hughes 1998b
24	Mod-3441	3	4	75%	Hughes 1998a
25	Mod-3448	14	110	13%	Hughes 1999a, e
26	Mod-3856	2	28	7%	Hughes 2002b
27	Mod-3858	1	22	5%	Hughes 2002b
28	Mod-3861/H	2	27	7%	Hughes 2002b
29	Mod-3985	6	30	20%	Hughes 2002a
30	Mod-6191	1	29	3%	Hughes 2008
31	Lauer Dam	1	127	< 1%	Hughes 2006
–	Sha-3643/H	1	49	2%	Hughes 2009
32	26-Wa-1502	1	147	< 1%	Hughes 2012

Reference column lists the report containing primary trace element composition data, available to qualified researchers on request. Note: Artifacts identified at Las-194, Las-202, and Mod-197 are all typologically distinct projectile points; other sites listed include artifacts from other form categories (e.g., debitage). JV = Jess Valley. Locations for all but one site (Sha-3543/H, located far to the southwest on the Pit River in the town of Fall River Mills) plotted in Figure 1.

(marked by Desert Series points; see Table 3). Although the sample size is extremely small, it appears from the time-sensitive point frequencies in Table 3 that the most intensive use of Jess Valley obsidian may have been during the Late Archaic (ca. 1,300–600 B.P.), based on Rosegate series point frequencies.

Table 3

FREQUENCIES OF TIME-SENSITIVE PROJECTILE POINTS MANUFACTURED FROM JESS VALLEY OBSIDIAN

	Projectile Point Type					
Site	Northern Side-notched	Gatecliff Series	Elko Series	Rosegate Series	Desert Series	Reference
Las-194	–	–	–	1	1	Hughes 1986: Appendix 16
Las-202	1	–	–	–	–	Hughes 1986: Appendix 14
Las-1636	–	–	1	1	–	Delacorte 1997: Appendix A
Las-1637/H	–	–	–	1	–	Delacorte 1997: Appendix A
Las-1638	–	–	–	1	–	Delacorte 1997: Appendix A
Las-1670	1	–	1	–	–	Delacorte 1997: Appendix A
Las-1705	–	–	–	–	1	McGuire 1997: Appendix A
Las-1721	–	–	–	1	–	McGuire 1997: Appendix A
Mod-197	1	–	–	–	–	Hughes 1986: Appendix 18
Mod-629/H	2	–	–	1	–	Nilsson et al. 2000:Table 16-13
Mod-2274/H	–	–	–	1	–	Hughes 2015b: Table 1
Mod-3019	–	–	–	1	–	Delacorte 1997: Appendix A
Mod-3022	–	–	1	1	–	Delacorte 1997: Appendix A
Mod-3030	–	–	–	1	–	Delacorte 1997: Appendix A
Mod-3090	–	–	–	–	1	Delacorte 1997: Appendix A
26-WA-1502	–	1	–	–	–	Hughes 2012: Table 1

SUMMARY AND CONCLUDING COMMENTS

Prior to the studies completed pursuant to the Tuscarora and Alturas Intertie projects, virtually nothing was known about obsidian use in the South Fork Valley along the Pit River in the vicinity of Likely. Based on current information, the record of archaeological use of Jess Valley obsidian to the north near Alturas and Canby was miniscule compared with the use of other high-quality obsidians erupted to the north in the Warner Mountains, and it occurs only infrequently at sites south of Madeline. Whether or not Jess Valley obsidian occurs as float on the Madeline Plains is an open question, but based on current evidence, Jess Valley glass seems quite restricted, and as Young (2002:76) notes, the float samples that have been analyzed from the Madeline Plains do not conform to the Jess Valley chemical type. North of Madeline frequencies increase into the South Fork Pit River Valley, but the data in Table 2 show that Jess Valley obsidian use falls off dramatically to the north and south. A small number of obsidian points made from Jess Valley obsidian have also been recorded at archaeological sites to the east of the Warner Mountains (Las-194, Las-202, and Mod-197; see Table 3) in southern Surprise Valley, a single Gatecliff Split Stem point (a.k.a. Silent Snake Bifurcate-stem [Layton 1970:Table 7]) made from Jess Valley glass was identified at Hanging Rock Shelter (26-Wa-1502) in northwestern Nevada (Hughes 2012), and a single artifact was recovered from Sha-3643/H on the Pit River far to the southwest in the town of Fall River Mills (Hughes 2009).

As archaeological research is undertaken elsewhere in the South Fork Valley and to the east of Likely, we suspect that archaeological frequencies of Jess Valley obsidian use will increase dramatically and we will be in a better position to assess its more general role in northeastern California prehistory.

More generally, the Jess Valley case underscores the archaeological importance of comparatively small, localized obsidian sources. Although these volcanic glass sources may not be major contributors to artifact assemblages at the *regional* level, they can be (like Jess Valley) quite significant *locally*. Tracking the time/space distribution and conveyance of material from small obsidian sources by artifact class can contribute information key to understanding local archaeological issues and provide archaeologists with additional perspectives on land use and the activities of peoples at different times in the past.

NOTES

[1]A few comments are in order about the source and its nomenclature. In 1982, when the senior author queried Charles Chesterman about the legal location discrepancy (mentioned above), Chesterman informed him that he had provided Robert Jack with a sample of obsidian for analysis. Jack analyzed the specimen (which he labeled OS-13) via x-ray fluorescence, but the results were never published. When Jack retired from U.C. Berkeley, he generously sent his unpublished data and notes to the senior author. Surprisingly, the trace element values (presented in Table 1) do not correspond with the primary obsidian we collected and analyzed from Jess Valley. Without additional field reconnaissance and analysis it is not possible to resolve this discrepancy, except to note that Chesterman's corrected location (T39N, R15E, NW 1/4 of section 3) is not close to the Tvr mapped obsidian we analyzed from T39N, R15E, SW 1/4 of the SE 1/4 of section 16. The disparity between the trace element values for OS-13 and those we have generated for Jess Valley glass suggests that the OS-13 specimen Chesterman provided to Jack was from some other eruptive unit—certainly not from the primary locality we term Jess Valley (see Table 1).

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