

Supplementary material

List of Tables

1	Data Dictionary with variables considered in the attributes analysis, including measurement units, allowed values, definitions and/or references.	3
2	Vale Boi. Terrace identified layers with sediment description.	7
3	Summary of radiocarbon dates from Portuguese Proto-Solutrean. Adapted from Zilhão (1997), Cascalheira and Bicho (2013), Belmiro (2018) and Benedetti et al. (2019). Calibration curves are IntCal13 and Marine13, using OxCal 4.1.7 (online).	9
4	Vale Boi - Lower 5. Technological class by raw material.	10
5	Vale Boi - Upper 5/4E. Technological class by raw material.	11
6	Vale Boi - Lower 5 - core attributes frequencies.	12
7	Vale Boi - Upper 5/4E - core attributes frequencies.	13
8	Vale Boi - Lower 5 - mean and standard deviation of core measurements (in mm).	15
9	Vale Boi - Upper 5/4E - mean and standard deviation of core measurements (in mm).	15
10	Vale Boi - Lower 5 - flake attributes frequencies.	15
11	Vale Boi - Upper 5/4E - flake attributes frequencies.	18
12	Vale Boi - Lower 5 - mean and standard deviation of flake measurements (in mm).	21
13	Vale Boi - Upper 5/4E - mean and standard deviation of flake measurements (in mm).	21
14	Vale Boi - Lower 5 - elongated products attributes frequencies.	22
15	Vale Boi - Upper 5/4E - elongated products attributes frequencies.	24
16	Vale Boi - Lower 5 - mean and standard deviation of elongated products measurements (in mm).	27
17	Vale Boi - Upper 5/4E - mean and standard deviation of elongated products measurements (in mm).	27
18	Vale Boi - Lower 5. Retouched piece typology by raw material.	28
19	Vale Boi - Upper 5/4E. Retouched piece typology by raw material.	29
20	Lapa do Picareiro identified layers with sediment description and associated cultural horizons, whenever existent. After Benedetti et al. (2019).	31
21	Lapa do Picareiro - U/Lower T. Technological class by raw material.	35
22	Lapa do Picareiro - Middle T. Technological class by raw material.	35
23	Lapa do Picareiro - U/Lower T - core attributes frequencies.	36
24	Lapa do Picareiro - Middle T - core attributes frequencies.	36
25	Lapa do Picareiro - U/Lower T - mean and standard deviation of core measurements (in mm).	37

26	Lapa do Picareiro - Middle T - mean and standard deviation of core measurements (in mm).	37
27	Lapa do Picareiro - U/Lower T - flake attributes frequencies.	39
28	Lapa do Picareiro - Middle T - flake attributes frequencies.	40
29	Lapa do Picareiro - U/Lower T - mean and standard deviation of flake measurements (in mm).	41
30	Lapa do Picareiro - Middle T - mean and standard deviation of flake measurements (in mm).	41
31	Lapa do Picareiro - U/Lower T - elongated blanks attributes frequencies.	42
32	Lapa do Picareiro - Middle T - elongated blanks attributes frequencies.	44
33	Lapa do Picareiro - U/Lower T - mean and standard deviation of elongated blanks measurements (in mm).	45
34	Lapa do Picareiro - Middle T - mean and standard deviation of elongated blanks measurements (in mm).	45
35	Lapa do Picareiro - U/Lower T. Retouched piece typology by raw material.	45
36	Lapa do Picareiro - Middle T. Retouched piece typology by raw material.	45

List of Figures

1	Registered measurements scheme for debitage products and cores. Legend: 1- Maximum length; 2- Distal width; 3- Mesial width; 4- Maximum width; 5- Proximal width; 6- Mesial thickness; 7- Platform thickness; 8- Platform width.	6
2	Vale Boi. Location.	6
3	Vale Boi. Topographic plan, schematic profile and general view, with location of the excavation loci. After Cascalheira et al. (2017).	7
4	East profile stratigraphy in the Terrace area (above) and distribution of all tridimensionally cooredinated lithics in the new excavation area until 2017 (under). Lithis from layers 4E and 5 are coloured in black. Blue crosses represent dolerite artefacts and stars mark the provenance of each radiocarbon date: A - WK-42830; B - WK-42831; C - WK-44416.	8
5	Dolerite flake removed from a debitage waste piece.	12
6	Vale Boi. Interaction of core type with type of extracted products by raw material and phase.	14
7	Vale Boi. Boxplots of core elongation and flattening by raw material and phase.	14
8	Vale Boi. Boxplots of flake elongation and flattening by raw material and phase.	21
9	Lapa do Picareiro. Location.	30
10	Lapa do Picareiro. Generalized cross section showing surface topography, shape of the cave, and area excavated into sedimentary fill. After Benedetti et al. (2019).	30
11	Lapa do Picareiro. Spatial distribution of all plotted artefacts from levels T-U (in grey), lithic artefacts in colours and shapes refering to raw material and class. After Haws et al. (2019).	34
12	Lapa do Picareiro. Interaction of core type with type of extracted products by raw material and phase.	37
13	Lapa do Picareiro. Boxplots of core elongation and flattening by raw material and phase.	38
14	Lapa do Picareiro. Flake elongation and flattening by phase and raw material.	42

Supplementary Table 1. Data Dictionary with variables considered in the attributes analysis, including measurement units, allowed values, definitions and/or references.

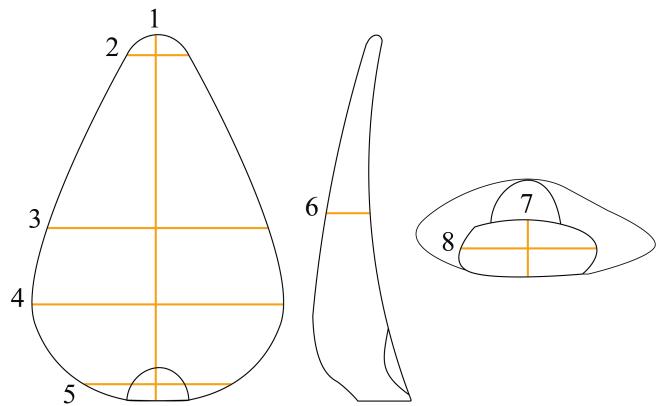
Variable	Measurement units	Allowed values	Description
ID	Numeric	-	ID number assigned to the piece.
Raw material	-	Chert, Quartz, Greywacke, Chalcedony, Schist, Silcrete, Dolerite, Other.	Type of raw material of the piece.
Quartz quality	-	Coarse, Medium, Fine, Rock crystal.	Type of grain and quality of quartz. Coarse quality: large and visible grains (>0.5 mm). Medium quality: small visible grains. Fine quality: absence of visible grains. Rock crystal: absence of visible grains and transparent coloration.
Class	-	Blank, Blank fragment, Retouched piece, Retouched piece fragment, Core, Core fragment, Core preparation product, Core preparation product fragment, Burin spall, Thinn flake, Thinn flake fragment, Anvil, Hammer, Manuport, Shatter, Chip, Crested piece, Core trim, Core tablet, Core front.	Technological class of the piece. According to Andrefsky (1998), Bicho (2011), Debenath and Dibble (1994), Inizan et al. (1999).
Core preparation product	-		Type of core preparation product. According to Inizan et al. (1999).
Retouched piece blank	-	Flake, Elonged blank, Shatter, Other, Indeterminate.	Type of retouched piece blank. According to Inizan et al (1999).
Piece completeness	-	Proximal, Distal, Other.	Part of the piece that is present. Proximal refers to the part which has a bulb and a striking platform; distal is the end of the piece; other refers to mesial.
Cortex	-	0%, 1-30%, 31-60%, 61-99%, 100%.	Percentage of cortex presence in the dorsal face of the piece. According to Andrefsky (2005, pp. 104-105) and Bicho (2011).
Cortex location	-	Proximal, Distal, Mesial, Left lateral, Right lateral, Proximal left lateral, Proximal right lateral, Distal left lateral, Distal right lateral, Mesial left lateral, Mesial right lateral.	Location of cortex in the dorsal surface of the piece.
Cortex type	-	Cobble, Outcrop, Indeterminate.	Type of cortex present on the piece. Cobble refers to rounded clasts of rock; Outcrop is an exposed bedrock or superficial deposits.
Platform type	-	Plain, Dihedral, Faceted, Punctiform, Linear, Winged, Removed, Crushed, Other.	Type of platform. According to Inizan et al (1999, pp. 136).
Platform cortex	-	No, Yes complete, Yes partial.	Presence of cortex on the platform.

Supplementary Table 1. Data Dictionary with variables considered in the attributes analysis, including measurement units, allowed values, definitions and/or references. (*continued*)

Variable	Measurement units	Allowed values	Description
Lipping	-	No, Yes.	Presence of a lip on the piece. According to Inizan et al (1999, pp. 144).
Blank shape	-	Parallel, Convergent, Divergent, Biconvex, Irregular, Circular, Dejete, Other.	Type of blank shape. According to Almeida (2000, pp. 107).
Cross section	-	Triangular, Trapezoidal, Quadrangular, Irregular, Lenticular, Other.	Type of cross section of the piece. According to Scerri et al (2015, pp. 19).
Blank tip	-	Feather, Hinge, Step, Overshoot, Pointed.	Type of blank tip. According to Almeida (2000, pp. 106).
Profile	-	Straight, Curved, Twisted, Irregular.	Type of blank profile. According to Almeida (2000, pp. 106).
Scar count	Numeric	NA	Count of dorsal flake scars over 5 mm. According to Andrefsky (2005, pp. 106).
Scar pattern	-	Unidirectional, Bidirectional, Crossed, Sub-centripedal, Centripedal, Other.	Type of scar pattern on the dorsal surface of the piece. According to Scerri et al (2015, pp. 19).
Thickness	In mm	-	Measurement of piece maximum thickness.
Max width	In mm	-	Measurement of piece maximum width.
Proximal width	In mm	-	Measurement of piece proximal width.
Mesial width	In mm	-	Measurement of piece mesial width.
Distal width	In mm	-	Measurement of piece distal width.
Length	In mm	-	Measurement of piece central length according to the technological axis.
Platform thickness	In mm	-	Measurement of platform central thickness.
Platform width	In mm	-	Measurement of platform central width.
Weight	In grams	-	Weight measurement of piece.
Exterior platform angle	In degrees	-	Measurement of the angle between the platform and the dorsal surface of the piece. According to Dibble (1997).
Core type	-	Single platform, Single prismatic, Single pyramidal, Two single platforms, Opposed, Opposed twisted, Other opposed, Orthogonal, Inform, Bipolar, Globular, Centripedal, Discoidal, Levallois, Chopper, Tested, Other.	Type of core. According to Zilhao (1997, pp. 17).

Supplementary Table 1. Data Dictionary with variables considered in the attributes analysis, including measurement units, allowed values, definitions and/or references. (*continued*)

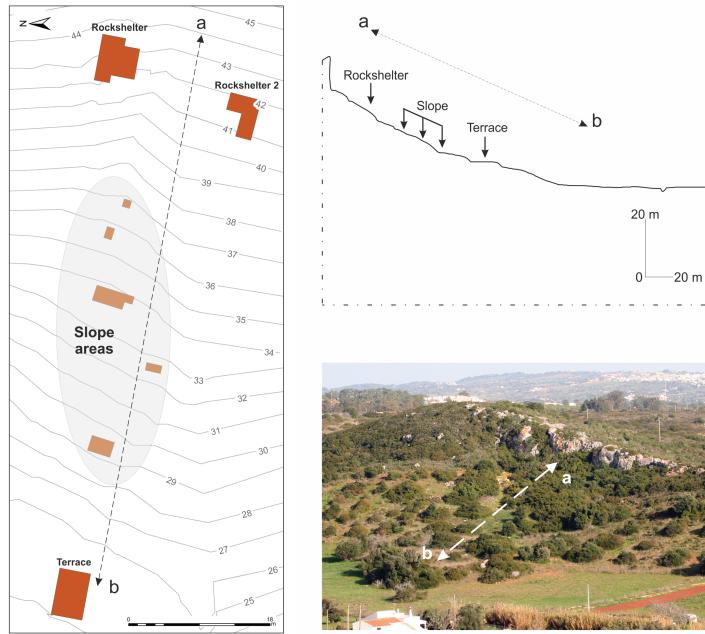
Variable	Measurement units	Allowed values	Description
Core Cross Section	-	Circular, Triangular, Quadrangular, Irregular.	Type of core cross section.
Number of core faces	-	One, Two, Three, Four, More than four.	Count of core debitage surfaces.
Core platform	-	Plain, Dihedral, Faceted, Cortical, Crushed, Other.	Type of core platform. According to Inizan et al (1999, pp. 136).
Main face cortex	-	0%, 1-30%, 31-60%, 61-99%.	Percentage of cortex of the main face. Main face refers to the debitage surface with most scars.
Main face scar count	Numeric	-	Count of scars over 5 mm in the main face of the core.
Main face scar direction	-	Unidirectional, Bidirectional opposed, Bidirectional alternate, Crossed, Sub-centripetal, Centripetal, Other.	Direction of scars in the main face of the core. According to Scerri et al (2015, pp. 19).
Main face aris orientation	-	Parallel, Convergent, Indeterminate.	Orientation of main face aris.
Main face scar length	In mm	-	Central length measurement of the last scar, over 5 mm, in the main face of the core.
Main face scar width	In mm	-	Maximum width measurement of the last scar, over 5 mm, in the main face of the core.
Main face platform angle	In degrees	-	Measurement of the angle between the platform and the main face of the core.
Main face core use	-	Flakes, Blades, Bladelets, Points, Mixed.	Type of products extracted from the main face of the core. Distinction of blade and bladelet according to Tixier (1963).
Alteration	-	None, Patinated, Concretion, Fire, Mix.	Type of alteration of the piece. Patina refers to a layer covering the surface of a piece; concretion is a mass of mineral formed around a nucleus.
Fire	-	Burned, Rubefact, Heat treatment.	Type of fire alteration to the piece. According to Inizan et al (1999, pp. 24).
Retouched piece typology	-	-	Retouched piece typology as defined by Sonnevile-Bordes and Perrot (1956), adapted by Zilhao (1997) for the Portuguese Estremadura.
Chip quantity	Numeric	-	Count of chips. According to Andrefsky (2005, pp. 12).
Other notes	-	-	NA



Supplementary Figure 1. Registered measurements scheme fordebitage products and cores. Legend: 1- Maximum length; 2- Distal width; 3- Mesial width; 4- Maximum width; 5- Proximal width; 6- Mesial thickness; 7- Platform thickness; 8- Platform width.



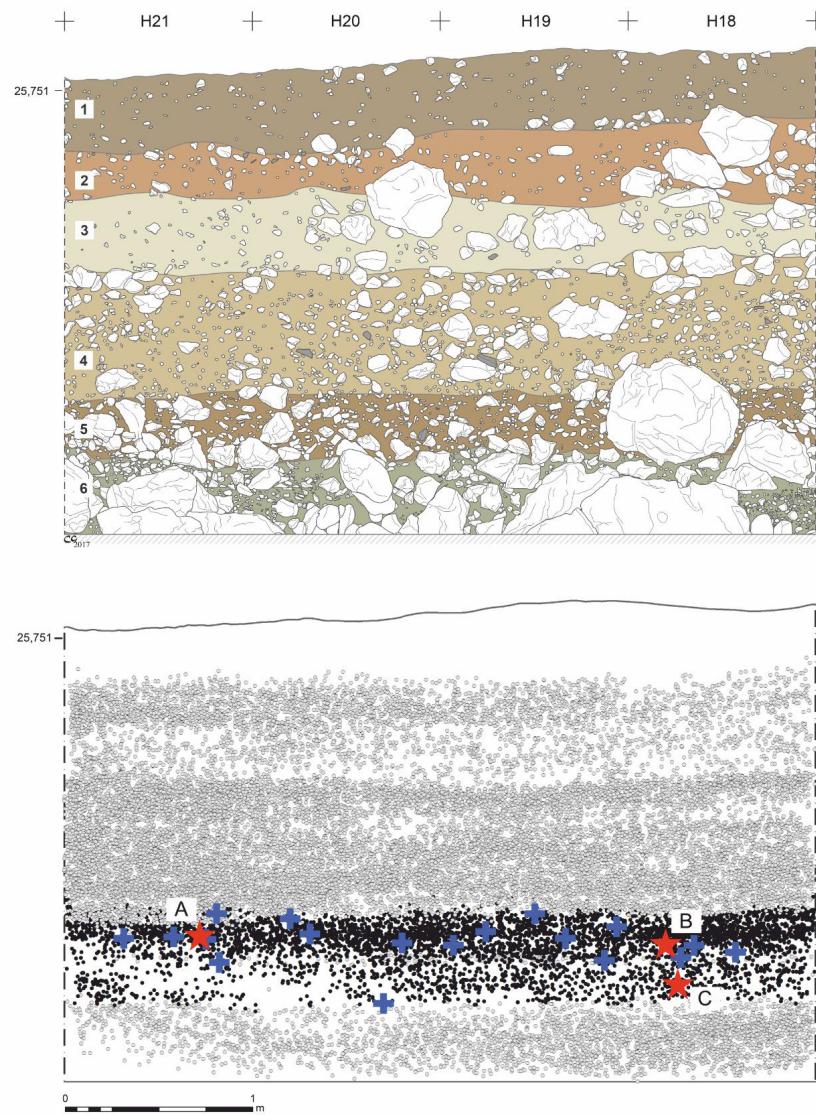
Supplementary Figure 2. Vale Boi. Location.



Supplementary Figure 3. Vale Boi. Topographic plan, schematic profile and general view, with location of the excavation loci. After Cascalheira et al. (2017).

Supplementary Table 2. Vale Boi. Terrace identified layers with sediment description.

Layer	Description
Layer 1	Reddish dark brown silt/clay matrix sediment, with a granulous texture, possibly disturbed by agricultural processes; ceramics until 30 cm depth, immediately above the transition between layer 1 and 2.
Layer 2	Dark sediment, more compact and with a heavier clay-like component; has a thickness of 25-30 cm and is well preserved; bones and ceramics are often in connection, with restricted spatial distributions; the limestone blocks correlate with the antropical structures dug in 2004; where the level with a Neolithic occupation has been identified.
Layer 3	Silt and clay matrix sediment, with some inclusions, mostly small limestone clasts; this layer is often interrupted by the deposition of levels of clasts with different sizes; presence of lithic artefacts and fauna is constant in all of the deposit, though it is possible to identify two different cultural horizons: Epipaleolithic (3A) and Solutrean (3B).
Layer 4	Identical to layer 3 but separated by the presence of a gravel level; contains sedimentary lateral variations, marked by different intensity of sediment compactation and/or concentration of organic materials (4B, 4C, 4D, 4E); identified two different cultural horizons of Solutrean and Proto-Solutrean chronology.
Layer 5	Silt and clay matrix sediment with a heavy presence of organic elements, such as small, medium and large faunal remains (frequently calcinated), which gives this layer a dark color.
Layer 6	Silt and clay matrix sediment with a heavy presence of organic elements, such as small, medium and large faunal remains (frequently calcinated), which gives this layer a dark color; presence of bigger quantity of small and medium sized limestone clasts.



Supplementary Figure 4. East profile stratigraphy in the Terrace area (above) and distribution of all tridimensionally coordinated lithics in the new excavation area until 2017 (under). Lithis from layers 4E and 5 are coloured in black. Blue crosses represent dolerite artefacts and stars mark the provenance of each radiocarbon date: A - WK-42830; B - WK-42831; C - WK-44416.

Supplementary Table 3. Summary of radiocarbon dates from Portuguese Proto-Solutrean. Adapted from Zilhão (1997), Cascalheira and Bicho (2013), Belmiro (2018) and Benedetti et al. (2019). Calibration curves are IntCal13 and Marine13, using OxCal 4.1.7 (online).

Site	Level	Lab. Ref	Age (BP)	SD	Sample type	Calibrated lower 95%	Calibrated upper 95%
LP	T	Wk-37655c	18960	80	Bone	22614	22989
LP	T	UGAMS-23727	19530	50	Charcoal	23436	23640
LP	T	UGAMS-23718	20240	50	Charcoal	24199	24417
LP	T	Beta-208221e	20240	110	Charcoal	24086	24539
LP	T	UGAMS-23725	20320	50	Charcoal	24298	24496
Vale Boi	5	Wk-42831	20329	90	Shell	23758	24165
Alecrim	6	Beta-203513	20510	150	Bone	24325	25119
LP	T	UGAMS-23726	20530	50	Charcoal	24528	24903
LP	T	UGAMS-23722	20630	60	Charcoal	24597	25067
LP	T	Beta-229781e	20700	100	Bone	24587	25211
LP	T	UGAMS-23721	20710	60	Charcoal	24702	25162
Vale Boi	5	Wk-42830	20818	107	Charcoal	24716	25377
CPM III Inferior	NA	ICEN-541	21080	850	Charcoal	23345	27023
Lagar Velho	6	OxA-8420	21180	240	Charcoal	24911	25887
Lagar Velho	6	Sac-1561	21380	810	Bone	23825	27127
Anecrial	2b	ICEN-964	21560	680	Charcoal	24332	27176
Anecrial	2b	OxA-5526	21560	220	Charcoal	25445	26175
Terra do Manuel	2s	EHT-6038	21770	210	Charcoal	25683	26428
Alecrim	6	Wk-25514	21794	170	Bone	25765	26349
Buraca Escura	2e	OxA-5524	21820	200	Bone	25770	26448
Lagar Velho	6	OxA-8418	22180	180	Charcoal	26065	26944
Vale Boi	5	Wk-44416	22358	80	Shell	26012	26309
LP	U	Beta-234373e	22560	110	Charcoal	26592	27146
LP	U	Beta-234374e	22590	110	Charcoal	26601	27175
LP	U	Beta-208222e	22660	240	Charcoal	26382	27407
LP	T	Wk-37656	23100	130	Charcoal	27225	27581

Supplementary Table 4. Vale Boi - Lower 5. Technological class by raw material.

Class	Quartz (n)	Quartz (%)	Chert (n)	Chert (%)	Greywacke (n)	Greywacke (%)	Dolerite (n)	Dolerite (%)	Chalcedony (n)	Chalcedony (%)	Other (n)	Other (%)	Total (n)	Total (%)
Anvil	0	0%	0	0%	2	0.09%	0	0%	0	0%	0	0%	2	0.02%
Blank	281	3.58%	171	15.86%	44	2.08%	3	50%	6	37.5%	4	11.76%	509	4.59%
BlankFrag	132	1.68%	90	8.35%	23	1.09%	1	16.67%	1	6.25%	1	2.94%	248	2.24%
Core	18	0.23%	23	2.13%	3	0.14%	0	0%	1	6.25%	1	2.94%	46	0.41%
CoreFrag	2	0.03%	8	0.74%	0	0%	1	16.67%	0	0%	0	0%	11	0.1%
CorePreparProd	1	0.01%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0.01%
Manuport	0	0%	0	0%	2	0.09%	0	0%	0	0%	1	2.94%	3	0.03%
RetouchedPiece	15	0.19%	38	3.53%	1	0.05%	0	0%	1	6.25%	0	0%	55	0.5%
RetouchedPieceFrag	3	0.04%	4	0.37%	0	0%	0	0%	0	0%	0	0%	7	0.06%
Shatter	1754	22.36%	95	8.81%	507	23.96%	0	0%	5	31.25%	16	47.06%	2377	21.43%
Chip	5638	71.88%	649	60.2%	1534	72.5%	1	16.67%	2	12.5%	11	32.35%	7835	70.62%
Total	7844	-	1078	-	2116	-	6	-	16	-	34	-	11094	-

Supplementary Table 5. Vale Boi - Upper 5/4E. Technological class by raw material.

Class	Quartz (n)	Quartz (%)	Chert (n)	Chert (%)	Greywacke (n)	Greywacke (%)	Dolerite (n)	Dolerite (%)	Chalcedony (n)	Chalcedony (%)	Other (n)	Other (%)	Total (%)	Total (%)
Blank	438	3.91%	407	19.53%	80	3.62%	14	60.87%	18	32.14%	8	34.78%	965	6.18%
BlankFrag	151	1.35%	155	7.44%	20	0.9%	3	13.04%	7	12.5%	0	0%	336	2.15%
Burin spall	0	0%	1	0.05%	0	0%	0	0%	0	0%	0	0%	1	0.01%
Core	32	0.29%	42	2.02%	1	0.05%	0	0%	0	0%	2	8.7%	77	0.49%
CoreFrag	4	0.04%	10	0.48%	0	0%	0	0%	0	0%	0	0%	14	0.09%
CorePreparProd	1	0.01%	5	0.24%	0	0%	0	0%	0	0%	0	0%	6	0.04%
Manuport	0	0%	0	0%	5	0.23%	0	0%	0	0%	1	4.35%	6	0.04%
RetouchedPiece	34	0.3%	70	3.36%	2	0.09%	5	21.74%	1	1.79%	0	0%	112	0.72%
RetouchedPieceFrag	6	0.05%	9	0.43%	1	0.05%	0	0%	0	0%	0	0%	16	0.1%
Shatter	3006	26.81%	227	10.89%	563	25.46%	1	4.35%	15	26.79%	12	52.17%	3824	24.5%
Chip	7540	67.25%	1158	55.57%	1539	69.61%	0	0%	15	26.79%	0	0%	10252	65.68%
Total	11212	-	2084	-	2211	-	23	-	56	-	23	-	15609	-



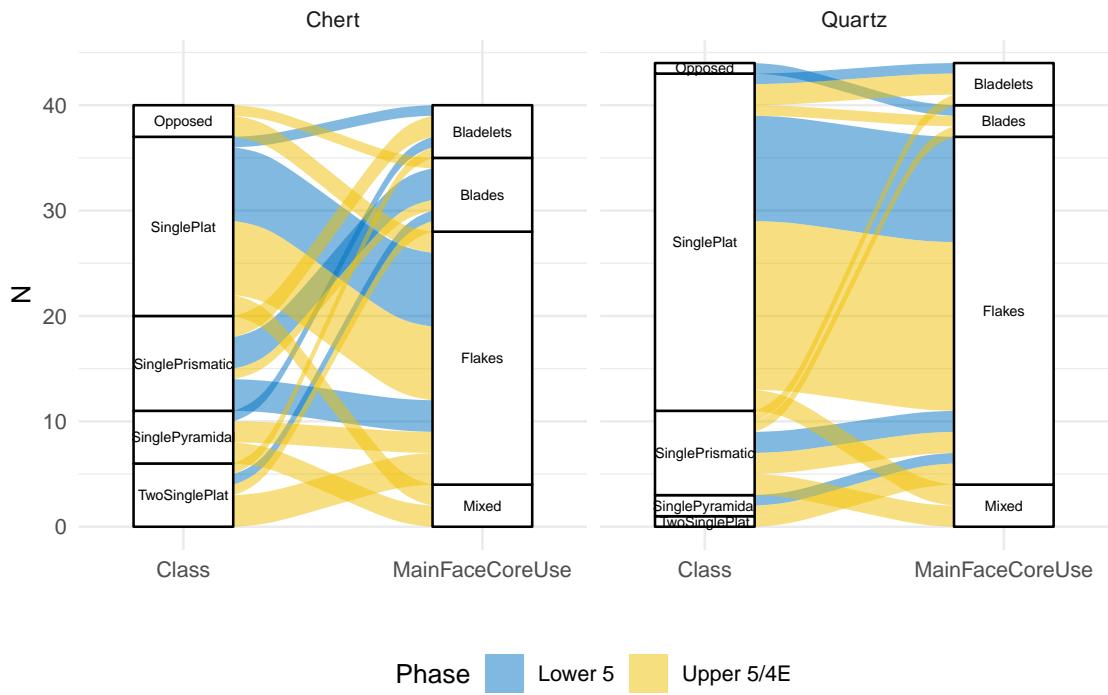
Supplementary Figure 5. Dolerite flake removed from a debitage waste piece. Left: ventral side with interior colour and texture of the raw material; Right: dorsal side with patina.

Supplementary Table 6. Vale Boi - Lower 5 - core attributes frequencies.

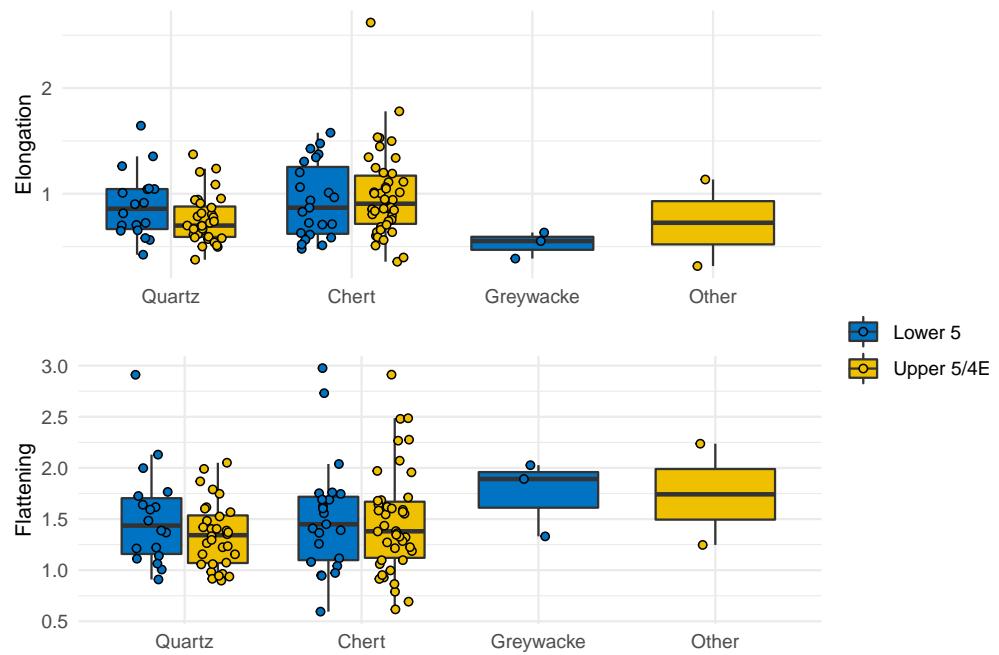
Tecnological attributes	Quartz	Chert	Greywacke	Other
CoreType, n (%)				
Opposed	1 (6.7)	0 (0.0)	0 (0.0)	0 (0.0)
SinglePlat	11 (73.3)	8 (50.0)	2 (100.0)	0 (0.0)
SinglePrismatic	2 (13.3)	6 (37.5)	0 (0.0)	0 (0.0)
SinglePyramidal	1 (6.7)	1 (6.2)	0 (0.0)	1 (100.0)
TwoSinglePlat	0 (0.0)	1 (6.2)	0 (0.0)	0 (0.0)
NumberCoreFaces, n (%)				
Four	3 (20.0)	0 (0.0)	0 (0.0)	0 (0.0)
MoreThanFour	0 (0.0)	2 (12.5)	0 (0.0)	0 (0.0)
One	4 (26.7)	7 (43.8)	2 (100.0)	1 (100.0)
Three	3 (20.0)	3 (18.8)	0 (0.0)	0 (0.0)
Two	5 (33.3)	4 (25.0)	0 (0.0)	0 (0.0)
CorePlatform, n (%)				
Cortical	3 (20.0)	1 (6.2)	2 (100.0)	0 (0.0)
Faceted	1 (6.7)	1 (6.2)	0 (0.0)	0 (0.0)
Plain	11 (73.3)	14 (87.5)	0 (0.0)	1 (100.0)
MainFaceCoreUse, n (%)				
Bladelets	1 (6.7)	2 (12.5)	0 (0.0)	0 (0.0)
Blades	1 (6.7)	4 (25.0)	0 (0.0)	0 (0.0)
Flakes	13 (86.7)	10 (62.5)	2 (100.0)	0 (0.0)
Mixed	0 (0.0)	0 (0.0)	0 (0.0)	1 (100.0)

Supplementary Table 7. Vale Boi - Upper 5/4E - core attributes frequencies.

Tecnological attributes	Quartz	Chert	Other	Total
CoreType, n (%)				
Opposed	0 (0.0)	3 (11.1)	0 (0.0)	3 (5.1)
Other	0 (0.0)	3 (11.1)	0 (0.0)	3 (5.1)
SinglePlat	21 (72.4)	9 (33.3)	2 (100.0)	32 (54.2)
SinglePrismatic	6 (20.7)	3 (11.1)	0 (0.0)	10 (16.9)
SinglePyramidal	1 (3.4)	4 (14.8)	0 (0.0)	5 (8.5)
TwoSinglePlat	1 (3.4)	5 (18.5)	0 (0.0)	6 (10.2)
NumberCoreFaces, n (%)				
Four	1 (3.4)	2 (7.4)	0 (0.0)	3 (5.1)
MoreThanFour	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.7)
One	14 (48.3)	12 (44.4)	2 (100.0)	28 (47.5)
Three	2 (6.9)	4 (14.8)	0 (0.0)	6 (10.2)
Two	12 (41.4)	9 (33.3)	0 (0.0)	21 (35.6)
CorePlatform, n (%)				
Cortical	9 (31.0)	1 (3.7)	1 (50.0)	11 (18.6)
Crushed	1 (3.4)	2 (7.4)	0 (0.0)	3 (5.1)
Dihedral	0 (0.0)	2 (7.4)	0 (0.0)	2 (3.4)
Faceted	1 (3.4)	5 (18.5)	0 (0.0)	6 (10.2)
Other	0 (0.0)	2 (7.4)	0 (0.0)	2 (3.4)
Plain	18 (62.1)	15 (55.6)	1 (50.0)	35 (59.3)
MainFaceCoreUse, n (%)				
Bladelets	3 (10.3)	3 (11.1)	0 (0.0)	6 (10.2)
Blades	2 (6.9)	4 (14.8)	0 (0.0)	6 (10.2)
Flakes	20 (69.0)	16 (59.3)	2 (100.0)	39 (66.1)
Mixed	4 (13.8)	4 (14.8)	0 (0.0)	8 (13.6)



Supplementary Figure 6. Vale Boi. Interaction of core type with type of extracted products by raw material and phase.



Supplementary Figure 7. Vale Boi. Boxplots of core elongation and flattening by raw material and phase.

Supplementary Table 8. Vale Boi - Lower 5 - mean and standard deviation of core measurements (in mm).

Core metrics	Quartz	Chert	Greywacke	Other	Total
MedWidth, M (SD)	31.6 (14.0)	30.3 (15.2)	59.7 (28.1)	41.0 (NA)	32.8 (16.7)
Length, M (SD)	26.6 (7.2)	29.1 (12.9)	32.4 (10.5)	36.3 (NA)	28.7 (10.5)
Thickness, M (SD)	23.4 (11.8)	22.8 (6.6)	36.1 (8.0)	32.6 (NA)	24.1 (9.5)
PlatformWidth, M (SD)	32.1 (13.2)	29.2 (11.6)	64.6 (26.3)	35.6 (NA)	32.6 (15.5)
PlatformThickness, M (SD)	22.1 (11.3)	21.4 (7.0)	40.3 (9.4)	23.9 (NA)	22.9 (9.9)
MainFacePlatformAngle, M (SD)	68.1 (32.8)	56.2 (40.2)	56.5 (52.2)	83.1 (NA)	60.2 (38.0)
Weight, M (SD)	35.0 (44.7)	35.0 (64.4)	107.5 (80.0)	84.8 (NA)	40.7 (58.6)

Supplementary Table 9. Vale Boi - Upper 5/4E - mean and standard deviation of core measurements (in mm).

Core metrics	Quartz	Chert	Greywacke	Other	Total
MedWidth, M (SD)	33.4 (13.0)	26.5 (8.7)	18.5 (NA)	51.4 (6.8)	29.9 (11.7)
Length, M (SD)	25.8 (10.2)	26.5 (8.9)	33.9 (NA)	36.9 (26.3)	26.6 (9.9)
Thickness, M (SD)	27.0 (9.9)	21.6 (10.0)	18.1 (NA)	32.6 (9.4)	24.1 (10.3)
PlatformWidth, M (SD)	34.4 (13.1)	25.9 (9.0)	17.5 (NA)	43.1 (16.7)	29.8 (11.9)
PlatformThickness, M (SD)	26.8 (10.3)	20.1 (9.5)	16.1 (NA)	19.5 (2.5)	22.8 (10.2)
MainFacePlatformAngle, M (SD)	70.4 (26.0)	52.2 (42.5)	86.7 (NA)	89.8 (18.3)	61.2 (37.0)
Weight, M (SD)	41.2 (50.9)	20.8 (15.1)	14.7 (NA)	99.8 (79.2)	31.2 (38.6)

Supplementary Table 10. Vale Boi - Lower 5 - flake attributes frequencies.

Attributes	Quartz	Chert	Greywacke	Dolerite	Chalcedony	Other	Total
CrossSection, n (%)							
Irregular	118 (49.8)	50 (35.7)	12 (31.6)	1 (33.3)	2 (40.0)	2 (50.0)	185 (43.3)
Lenticular	24 (10.1)	32 (22.9)	7 (18.4)	0 (0.0)	0 (0.0)	1 (25.0)	64 (15.0)
Other	5 (2.1)	3 (2.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	8 (1.9)
Quadrangular	13 (5.5)	3 (2.1)	3 (7.9)	0 (0.0)	0 (0.0)	1 (25.0)	20 (4.7)
Trapezoidal	11 (4.6)	5 (3.6)	4 (10.5)	0 (0.0)	0 (0.0)	0 (0.0)	20 (4.7)
Triangular	66 (27.8)	47 (33.6)	12 (31.6)	2 (66.7)	3 (60.0)	0 (0.0)	130 (30.4)
BlankShape, n (%)							
Circular	9 (3.8)	4 (2.9)	1 (2.6)	0 (0.0)	0 (0.0)	1 (25.0)	15 (3.5)
Convergent	60 (25.3)	20 (14.3)	8 (21.1)	1 (33.3)	1 (20.0)	0 (0.0)	90 (21.1)
Dejete	4 (1.7)	5 (3.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	9 (2.1)
Divergent	9 (3.8)	19 (13.6)	2 (5.3)	0 (0.0)	1 (20.0)	1 (25.0)	32 (7.5)
Irregular	108 (45.6)	68 (48.6)	20 (52.6)	0 (0.0)	3 (60.0)	0 (0.0)	199 (46.6)
Parallel	47 (19.8)	24 (17.1)	7 (18.4)	2 (66.7)	0 (0.0)	2 (50.0)	82 (19.2)

Supplementary Table 10. Vale Boi - Lower 5 - flake attributes frequencies. (*continued*)

Attributes	Quartz	Chert	Greywacke	Dolerite	Chalcedony	Other	Total
Profile, n (%)							
Curved	32 (13.5)	62 (44.3)	7 (18.4)	1 (33.3)	0 (0.0)	3 (75.0)	105 (24.6)
Irregular	47 (19.8)	14 (10.0)	9 (23.7)	0 (0.0)	2 (40.0)	0 (0.0)	72 (16.9)
Straight	154 (65.0)	60 (42.9)	21 (55.3)	2 (66.7)	2 (40.0)	1 (25.0)	240 (56.2)
Twisted	4 (1.7)	4 (2.9)	1 (2.6)	0 (0.0)	1 (20.0)	0 (0.0)	10 (2.3)
BlankTip, n (%)							
Feather	65 (27.4)	68 (48.6)	15 (39.5)	0 (0.0)	2 (40.0)	1 (25.0)	151 (35.4)
Hinge	107 (45.1)	28 (20.0)	10 (26.3)	2 (66.7)	1 (20.0)	1 (25.0)	149 (34.9)
Overshoot	1 (0.4)	4 (2.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	5 (1.2)
Pointed	31 (13.1)	9 (6.4)	2 (5.3)	0 (0.0)	0 (0.0)	0 (0.0)	42 (9.8)
Step	33 (13.9)	31 (22.1)	11 (28.9)	1 (33.3)	2 (40.0)	2 (50.0)	80 (18.7)
PlatformType, n (%)							
Crushed	79 (33.3)	21 (15.0)	2 (5.3)	1 (33.3)	2 (40.0)	0 (0.0)	105 (24.6)
Dihedral	2 (0.8)	6 (4.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	8 (1.9)
Faceted	0 (0.0)	2 (1.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.5)
Linear	0 (0.0)	5 (3.6)	1 (2.6)	0 (0.0)	0 (0.0)	0 (0.0)	6 (1.4)
Other	2 (0.8)	0 (0.0)	1 (2.6)	0 (0.0)	0 (0.0)	0 (0.0)	3 (0.7)
Plain	154 (65.0)	97 (69.3)	34 (89.5)	2 (66.7)	3 (60.0)	3 (75.0)	293 (68.6)
Winged	0 (0.0)	9 (6.4)	0 (0.0)	0 (0.0)	0 (0.0)	1 (25.0)	10 (2.3)
PlatformCortex, n (%)							
No	233 (98.3)	121 (86.4)	34 (89.5)	3 (100.0)	5 (100.0)	4 (100.0)	400 (93.7)
YesComplete	3 (1.3)	15 (10.7)	4 (10.5)	0 (0.0)	0 (0.0)	0 (0.0)	22 (5.2)
YesPartial	1 (0.4)	4 (2.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	5 (1.2)
ScarCount, n (%)							
0	2 (0.8)	2 (1.4)	2 (5.3)	0 (0.0)	0 (0.0)	0 (0.0)	6 (1.4)
1	89 (37.6)	39 (27.9)	17 (44.7)	1 (33.3)	1 (20.0)	3 (75.0)	150 (35.1)
2	100 (42.2)	49 (35.0)	11 (28.9)	1 (33.3)	3 (60.0)	1 (25.0)	165 (38.6)
3	38 (16.0)	32 (22.9)	4 (10.5)	1 (33.3)	0 (0.0)	0 (0.0)	75 (17.6)
4	7 (3.0)	12 (8.6)	3 (7.9)	0 (0.0)	1 (20.0)	0 (0.0)	23 (5.4)
5	0 (0.0)	5 (3.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	5 (1.2)

Supplementary Table 10. Vale Boi - Lower 5 - flake attributes frequencies. (*continued*)

Attributes	Quartz	Chert	Greywacke	Dolerite	Chalcedony	Other	Total
6	1 (0.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.2)
7	0 (0.0)	1 (0.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.2)
8	0 (0.0)	0 (0.0)	1 (2.6)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.2)
ScarPattern, n (%)							
Bidirectional	3 (1.3)	13 (9.3)	2 (5.3)	0 (0.0)	0 (0.0)	0 (0.0)	18 (4.2)
Centripetal	0 (0.0)	0 (0.0)	1 (2.6)	0 (0.0)	1 (20.0)	0 (0.0)	2 (0.5)
Crossed	1 (0.4)	1 (0.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.5)
None	2 (0.8)	2 (1.4)	2 (5.3)	0 (0.0)	0 (0.0)	0 (0.0)	6 (1.4)
Other	0 (0.0)	2 (1.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.5)
Unidirectional	231	122	33	3	4	4	397
	(97.5)	(87.1)	(86.8)	(100.0)	(80.0)	(100.0)	(93.0)
Cortex, n (%)							
0%	227 (95.8)	115 (82.1)	31 (81.6)	3 (100.0)	5 (100.0)	4 (100.0)	385 (90.2)
1-30%	4 (1.7)	13 (9.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	17 (4.0)
100%	2 (0.8)	2 (1.4)	2 (5.3)	0 (0.0)	0 (0.0)	0 (0.0)	6 (1.4)
31- 60%	3 (1.3)	6 (4.3)	3 (7.9)	0 (0.0)	0 (0.0)	0 (0.0)	12 (2.8)
61- 99%	1 (0.4)	4 (2.9)	2 (5.3)	0 (0.0)	0 (0.0)	0 (0.0)	7 (1.6)

Supplementary Table 11. Vale Boi - Upper 5/4E - flake attributes frequencies.

Attributes	Quartz	Chert	Greywacke	Dolerite	Chalcedony	Other	Total
CrossSection, n (%)							
Irregular							
	191 (49.4)	121 (36.4)	30 (39.5)	5 (38.5)	6 (42.9)	1 (16.7)	354 (42.8)
Lenticular	44 (11.4)	45 (13.6)	19 (25.0)	1 (7.7)	2 (14.3)	1 (16.7)	112 (13.5)
Other	6 (1.6)	7 (2.1)	2 (2.6)	0 (0.0)	0 (0.0)	0 (0.0)	15 (1.8)
Quadrangular	14 (3.6)	4 (1.2)	1 (1.3)	0 (0.0)	0 (0.0)	0 (0.0)	19 (2.3)
Trapezoidal	12 (3.1)	24 (7.2)	2 (2.6)	3 (23.1)	2 (14.3)	0 (0.0)	43 (5.2)
Triangular	120 (31.0)	131 (39.5)	22 (28.9)	4 (30.8)	4 (28.6)	4 (66.7)	285 (34.4)
BlankShape, n (%)							
Circular							
	16 (4.1)	7 (2.1)	2 (2.6)	1 (7.7)	1 (7.1)	0 (0.0)	27 (3.3)
Convergent	113 (29.2)	67 (20.2)	13 (17.1)	1 (7.7)	3 (21.4)	0 (0.0)	197 (23.8)
Dejete	6 (1.6)	15 (4.5)	8 (10.5)	0 (0.0)	0 (0.0)	0 (0.0)	29 (3.5)
Divergent	32 (8.3)	55 (16.6)	6 (7.9)	2 (15.4)	2 (14.3)	0 (0.0)	97 (11.7)
Irregular	111 (28.7)	118 (35.5)	41 (53.9)	9 (69.2)	4 (28.6)	5 (83.3)	288 (34.8)
Other	1 (0.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.1)
Parallel	108 (27.9)	70 (21.1)	6 (7.9)	0 (0.0)	4 (28.6)	1 (16.7)	189 (22.8)
Profile, n (%)							
Curved							
	75 (19.4)	146 (44.0)	24 (31.6)	6 (46.2)	6 (42.9)	4 (66.7)	261 (31.5)
Irregular	60 (15.5)	24 (7.2)	10 (13.2)	1 (7.7)	2 (14.3)	0 (0.0)	97 (11.7)
Straight	246 (63.6)	157 (47.3)	42 (55.3)	5 (38.5)	6 (42.9)	2 (33.3)	458 (55.3)
Twisted	6 (1.6)	5 (1.5)	0 (0.0)	1 (7.7)	0 (0.0)	0 (0.0)	12 (1.4)
BlankTip, n (%)							
Feather							
	76 (19.6)	139 (41.9)	34 (44.7)	6 (46.2)	9 (64.3)	3 (50.0)	267 (32.2)
Hinge	220 (56.8)	64 (19.3)	22 (28.9)	2 (15.4)	1 (7.1) (33.3)	2 (37.6)	311
Overshoot	3 (0.8)	8 (2.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	11 (1.3)
Pointed	49 (12.7)	29 (8.7)	8 (10.5)	0 (0.0)	2 (14.3)	0 (0.0)	88 (10.6)
Step	39 (10.1)	92 (27.7)	12 (15.8)	5 (38.5)	2 (14.3)	1 (16.7)	151 (18.2)

Supplementary Table 11. Vale Boi - Upper 5/4E - flake attributes frequencies. (*continued*)

Attributes	Quartz	Chert	Greywacke	Dolerite	Chalcedony	Other	Total
PlatformType, n (%)							
Crushed	139 (35.9)	53 (16.0)	5 (6.6)	2 (15.4)	2 (14.3)	0 (0.0)	201 (24.3)
Dihedral	2 (0.5)	23 (6.9)	1 (1.3)	1 (7.7)	3 (21.4)	0 (0.0)	30 (3.6)
Faceted	0 (0.0)	8 (2.4)	1 (1.3)	0 (0.0)	0 (0.0)	0 (0.0)	9 (1.1)
Linear	2 (0.5)	10 (3.0)	3 (3.9)	1 (7.7)	0 (0.0)	0 (0.0)	16 (1.9)
Other	0 (0.0)	1 (0.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.1)
Plain	243 (62.8)	217 (65.4)	66 (86.8)	9 (69.2)	7 (50.0)	6 (100.0)	548 (66.2)
Winged	1 (0.3)	20 (6.0)	0 (0.0)	0 (0.0)	2 (14.3)	0 (0.0)	23 (2.8)
PlatformCortex, n (%)							
No	377 (97.4)	270 (81.3)	65 (85.5)	12 (92.3)	14 (100.0)	5 (83.3)	743 (89.7)
YesComplete	6 (1.6)	35 (10.5)	11 (14.5)	1 (7.7)	0 (0.0)	1 (16.7)	54 (6.5)
YesPartial	4 (1.0)	27 (8.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	31 (3.7)
ScarCount, n (%)							
0	5 (1.3)	16 (4.8)	2 (2.6)	0 (0.0)	0 (0.0)	1 (16.7)	24 (2.9)
1	156 (40.3)	78 (23.5)	25 (32.9)	3 (23.1)	5 (35.7)	0 (0.0)	267 (32.2)
2	160 (41.3)	125 (37.7)	30 (39.5)	6 (46.2)	4 (28.6)	3 (50.0)	328 (39.6)
3	60 (15.5)	79 (23.8)	14 (18.4)	4 (30.8)	2 (14.3)	2 (33.3)	161 (19.4)
4	5 (1.3)	26 (7.8)	2 (2.6)	0 (0.0)	1 (7.1)	0 (0.0)	34 (4.1)
5	1 (0.3)	5 (1.5)	2 (2.6)	0 (0.0)	0 (0.0)	0 (0.0)	8 (1.0)
6	0 (0.0)	3 (0.9)	1 (1.3)	0 (0.0)	1 (7.1)	0 (0.0)	5 (0.6)
8	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (7.1)	0 (0.0)	1 (0.1)
ScarPattern, n (%)							
Bidirectional	11 (2.8)	26 (7.8)	2 (2.6)	2 (15.4)	2 (14.3)	0 (0.0)	43 (5.2)
Centripetal	1 (0.3)	5 (1.5)	3 (3.9)	1 (7.7)	0 (0.0)	0 (0.0)	10 (1.2)
None	5 (1.3)	16 (4.8)	2 (2.6)	0 (0.0)	0 (0.0)	1 (16.7)	24 (2.9)
Other	2 (0.5)	1 (0.3)	2 (2.6)	0 (0.0)	0 (0.0)	0 (0.0)	5 (0.6)
Unidirectional	368 (95.1)	284 (85.5)	67 (88.2)	10 (76.9)	12 (85.7)	5 (83.3)	746 (90.1)
Cortex, n (%)							
0%	369 (95.3)	231 (69.6)	66 (86.8)	11 (84.6)	14 (100.0)	4 (66.7)	695 (83.9)

Supplementary Table 11. Vale Boi - Upper 5/4E - flake attributes frequencies. (*continued*)

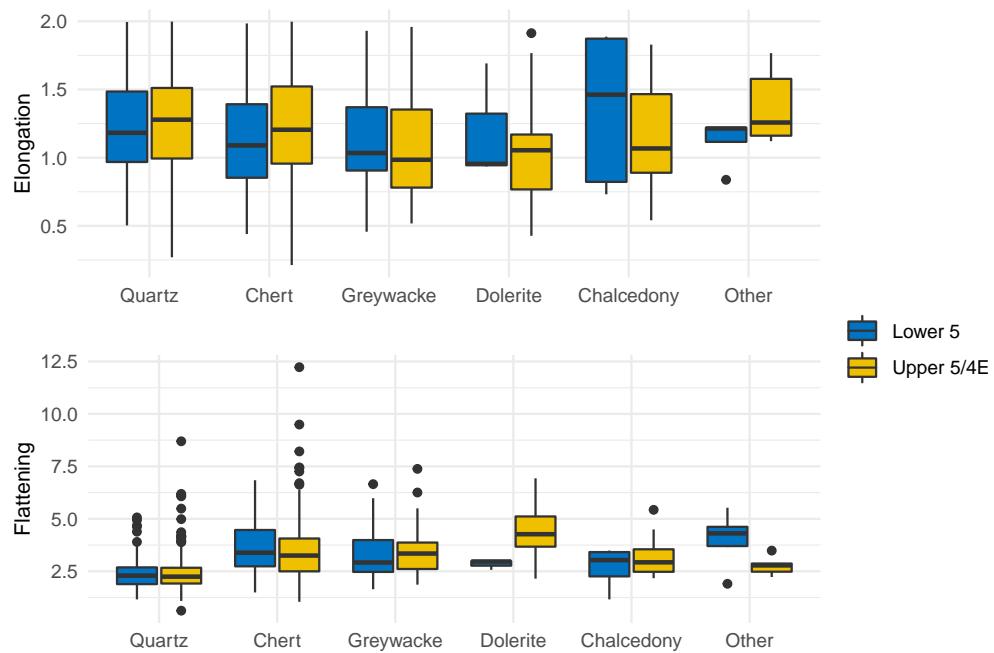
Attributes	Quartz	Chert	Greywacke	Dolerite	Chalcedony	Other	Total
1-30%	5 (1.3)	55 (16.6)	5 (6.6)	1 (7.7)	0 (0.0)	1 (16.7)	67 (8.1)
100%	5 (1.3)	16 (4.8)	2 (2.6)	0 (0.0)	0 (0.0)	1 (16.7)	24 (2.9)
31- 60%	7 (1.8)	11 (3.3)	1 (1.3)	1 (7.7)	0 (0.0)	0 (0.0)	20 (2.4)
61- 99%	1 (0.3)	19 (5.7)	2 (2.6)	0 (0.0)	0 (0.0)	0 (0.0)	22 (2.7)

Supplementary Table 12. Vale Boi - Lower 5 - mean and standard deviation of flake measurements (in mm).

Measurements	Quartz	Chert	Greywacke	Dolerite	Chalcedony	Other	Total
MedWidth, M (SD)	18.4 (6.8)	16.6 (6.3)	28.8 (13.5)	14.7 (3.9)	15.0 (5.7)	23.0 (3.5)	18.7 (8.1)
Length, M (SD)	23.0 (7.6)	19.4 (7.3)	32.9 (13.5)	18.0 (5.0)	20.6 (10.2)	26.3 (7.4)	22.7 (8.9)
Thickness, M (SD)	8.9 (3.8)	5.5 (2.6)	10.9 (6.0)	5.5 (1.3)	6.6 (3.5)	6.6 (3.0)	7.9 (4.1)
PlatformWidth, M (SD)	15.2 (7.4)	10.9 (5.6)	21.9 (12.1)	11.1 (3.4)	8.8 (4.7)	12.6 (5.1)	14.3 (7.9)
PlatformThickness, M (SD)	7.84 (4.20)	4.58 (2.44)	9.84 (5.07)	4.86 (1.17)	4.45 (2.87)	5.27 (3.46)	6.86 (4.16)
ExteriorPlatformAngle, M (SD)	78.1 (34.2)	73.0 (32.0)	80.0 (32.1)	76.9 (8.6)	101.6 (27.6)	84.5 (7.4)	76.9 (33.0)

Supplementary Table 13. Vale Boi - Upper 5/4E - mean and standard deviation of flake measurements (in mm).

Measurements	Quartz	Chert	Greywacke	Dolerite	Chalcedony	Other	Total
MedWidth, M (SD)	18.1 (7.2)	16.7 (6.2)	25.9 (10.8)	21.1 (7.1)	17.7 (5.1)	25.6 (11.0)	18.3 (7.7)
Length, M (SD)	23.2 (8.0)	21.0 (7.3)	28.6 (11.1)	23.1 (8.0)	21.1 (8.4)	39.3 (13.7)	22.9 (8.5)
Thickness, M (SD)	8.7 (3.5)	5.9 (3.0)	9.2 (4.5)	6.1 (2.9)	6.3 (2.1)	10.6 (2.8)	7.6 (3.7)
PlatformWidth, M (SD)	15.3 (7.7)	11.4 (5.1)	20.3 (9.3)	17.7 (10.5)	13.3 (4.7)	16.4 (5.5)	14.2 (7.4)
PlatformThickness, M (SD)	7.56 (3.71)	4.93 (2.74)	7.83 (4.24)	5.45 (3.09)	5.43 (2.11)	8.23 (3.10)	6.47 (3.62)
ExteriorPlatformAngle, M (SD)	84.3 (30.4)	70.6 (33.6)	77.1 (31.0)	86.7 (17.4)	77.4 (26.3)	80.1 (18.1)	78.0 (32.1)



Supplementary Figure 8. Vale Boi. Boxplots of flake elongation and flattening by raw material and phase.

Supplementary Table 14. Vale Boi - Lower 5 - elongated products attributes frequencies.

Attributes	Quartz	Chert	Greywacke	Chalcedony	Total
CrossSection,					
n (%)					
Irregular	12 (27.3)	2 (6.5)	2 (33.3)	1 (100.0)	17 (20.7)
Lenticular	2 (4.5)	2 (6.5)	0 (0.0)	0 (0.0)	4 (4.9)
Quadrangular	3 (6.8)	1 (3.2)	1 (16.7)	0 (0.0)	5 (6.1)
Trapezoidal	1 (2.3)	2 (6.5)	1 (16.7)	0 (0.0)	4 (4.9)
Triangular	26 (59.1)	24 (77.4)	2 (33.3)	0 (0.0)	52 (63.4)
BlankShape,					
n (%)					
Convergent	11 (25.0)	16 (51.6)	3 (50.0)	0 (0.0)	30 (36.6)
Dejete	0 (0.0)	1 (3.2)	1 (16.7)	0 (0.0)	2 (2.4)
Divergent	1 (2.3)	1 (3.2)	0 (0.0)	0 (0.0)	2 (2.4)
Irregular	4 (9.1)	4 (12.9)	1 (16.7)	1 (100.0)	10 (12.2)
Parallel	28 (63.6)	9 (29.0)	1 (16.7)	0 (0.0)	38 (46.3)
Profile,					
n (%)					
Curved	10 (22.7)	12 (38.7)	1 (16.7)	0 (0.0)	23 (28.0)
Irregular	1 (2.3)	2 (6.5)	0 (0.0)	0 (0.0)	3 (3.7)
Straight	32 (72.7)	15 (48.4)	4 (66.7)	1 (100.0)	52 (63.4)
Twisted	1 (2.3)	2 (6.5)	1 (16.7)	0 (0.0)	4 (4.9)
BlankTip,					
n (%)					
Feather	16 (36.4)	5 (16.1)	2 (33.3)	0 (0.0)	23 (28.0)
Hinge	13 (29.5)	7 (22.6)	4 (66.7)	0 (0.0)	24 (29.3)
Pointed	11 (25.0)	11 (35.5)	0 (0.0)	0 (0.0)	22 (26.8)
Step	4 (9.1)	8 (25.8)	0 (0.0)	1 (100.0)	13 (15.9)
PlatformType,					
n (%)					

Supplementary Table 14. Vale Boi - Lower 5 - elongated products attributes frequencies. (*continued*)

Attributes	Quartz	Chert	Greywacke	Chalcedony	Total
Crushed	18 (40.9)	5 (16.1)	1 (16.7)	0 (0.0)	24 (29.3)
Dihedral	0 (0.0)	4 (12.9)	0 (0.0)	0 (0.0)	4 (4.9)
Linear	4 (9.1)	3 (9.7)	0 (0.0)	0 (0.0)	7 (8.5)
Plain	20 (45.5)	19 (61.3)	5 (83.3)	1 (100.0)	45 (54.9)
Punctiform	1 (2.3)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.2)
Winged	1 (2.3)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.2)
PlatformCortex, n (%)					
No	44 (100.0)	27 (87.1)	5 (83.3)	1 (100.0)	77 (93.9)
YesComplete	0 (0.0)	3 (9.7)	1 (16.7)	0 (0.0)	4 (4.9)
YesPartial	0 (0.0)	1 (3.2)	0 (0.0)	0 (0.0)	1 (1.2)
ScarCount, n (%)					
1	7 (15.9)	3 (9.7)	3 (50.0)	0 (0.0)	13 (15.9)
2	26 (59.1)	12 (38.7)	0 (0.0)	0 (0.0)	38 (46.3)
3	10 (22.7)	11 (35.5)	2 (33.3)	1 (100.0)	24 (29.3)
4	1 (2.3)	4 (12.9)	1 (16.7)	0 (0.0)	6 (7.3)
5	0 (0.0)	1 (3.2)	0 (0.0)	0 (0.0)	1 (1.2)
ScarPattern, n (%)					
Bidirectional	0 (0.0)	4 (12.9)	0 (0.0)	0 (0.0)	4 (4.9)
Unidirectional	44 (100.0)	27 (87.1)	6 (100.0)	1 (100.0)	78 (95.1)
Cortex, n (%)					
0%	42 (95.5)	23 (74.2)	6 (100.0)	1 (100.0)	72 (87.8)
1-	2	2	0	0	4
30%	(4.5)	(6.5)	(0.0)	(0.0)	(4.9)
61-	0	6	0	0	6
99%	(0.0)	(19.4)	(0.0)	(0.0)	(7.3)

Supplementary Table 15. Vale Boi - Upper 5/4E - elongated products attributes frequencies.

Attributes	Quartz	Chert	Greywacke	Dolerite	Other	Chalcedony	Total
CrossSection, n (%)							
Irregular	14 (27.5)	6 (8.0)	1 (25.0)	0 (0.0)	0 (0.0)	1 (25.0)	22 (16.1)
Lenticular	1 (2.0)	3 (4.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4 (2.9)
Other	1 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.7)
Quadrangular	3 (5.9)	2 (2.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	5 (3.6)
Trapezoidal	3 (5.9)	10 (13.3)	0 (0.0)	0 (0.0)	1 (50.0)	0 (0.0)	14 (10.2)
Triangular	29 (56.9)	54 (72.0)	3 (75.0)	1 (100.0)	1 (50.0)	3 (75.0)	91 (66.4)
BlankShape, n (%)							
Convergent	14 (27.5)	28 (37.3)	1 (25.0)	1 (100.0)	2 (100.0)	1 (25.0)	47 (34.3)
Dejete	1 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.7)
Divergent	4 (7.8)	6 (8.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	10 (7.3)
Irregular	2 (3.9)	10 (13.3)	0 (0.0)	0 (0.0)	0 (0.0)	3 (75.0)	15 (10.9)
Parallel	30 (58.8)	31 (41.3)	3 (75.0)	0 (0.0)	0 (0.0)	0 (0.0)	64 (46.7)
Profile, n (%)							
Curved	6 (11.8)	26 (34.7)	0 (0.0)	1 (100.0)	0 (0.0)	0 (0.0)	33 (24.1)
Irregular	3 (5.9)	5 (6.7)	0 (0.0)	0 (0.0)	1 (50.0)	2 (50.0)	11 (8.0)
Straight	39 (76.5)	35 (46.7)	4 (100.0)	0 (0.0)	1 (50.0)	2 (50.0)	81 (59.1)
Twisted	3 (5.9)	9 (12.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	12 (8.8)
BlankTip, n (%)							
Feather	11 (21.6)	27 (36.0)	1 (25.0)	0 (0.0)	0 (0.0)	2 (50.0)	41 (29.9)
Hinge	24 (47.1)	17 (22.7)	1 (25.0)	1 (100.0)	0 (0.0)	0 (0.0)	43 (31.4)
Overshoot	1 (2.0)	4 (5.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	5 (3.6)
Pointed	14 (27.5)	17 (22.7)	0 (0.0)	0 (0.0)	2 (100.0)	2 (50.0)	35 (25.5)
Step	1 (2.0)	10 (13.3)	2 (50.0)	0 (0.0)	0 (0.0)	0 (0.0)	13 (9.5)

Supplementary Table 15. Vale Boi - Upper 5/4E - elongated products attributes frequencies. (*continued*)

Attributes	Quartz	Chert	Greywacke	Dolerite	Other	Chalcedony	Total
PlatformType, n (%)							
Crushed	24 (47.1)	11 (14.7)	0 (0.0)	0 (0.0)	0 (0.0)	2 (50.0)	37 (27.0)
Dihedral	0 (0.0)	3 (4.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3 (2.2)
Faceted	0 (0.0)	1 (1.3)	0 (0.0)	1 (100.0)	0 (0.0)	0 (0.0)	2 (1.5)
Linear	3 (5.9)	7 (9.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	10 (7.3)
Plain	24 (47.1)	52 (69.3)	3 (75.0)	0 (0.0)	2 (100.0)	2 (50.0)	83 (60.6)
Winged	0 (0.0)	1 (1.3)	1 (25.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (1.5)
PlatformCortex, n (%)							
No	51 (100.0)	65 (86.7)	4 (100.0)	1 (100.0)	2 (100.0)	4 (100.0)	127 (92.7)
YesComplete	0 (0.0)	10 (13.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	10 (7.3)
ScarCount, n (%)							
0	0 (0.0)	1 (1.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.7)
1	6 (11.8)	5 (6.7)	1 (25.0)	0 (0.0)	0 (0.0)	0 (0.0)	12 (8.8)
2	35 (68.6)	34 (45.3)	2 (50.0)	0 (0.0)	0 (0.0)	2 (50.0)	73 (53.3)
3	8 (15.7)	32 (42.7)	0 (0.0)	1 (100.0)	2 (100.0)	2 (50.0)	45 (32.8)
4	0 (0.0)	2 (2.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (1.5)
5	1 (2.0)	1 (1.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (1.5)
6	1 (2.0)	0 (0.0)	1 (25.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (1.5)
ScarPattern, n (%)							
Bidirectional	1 (2.0)	3 (4.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (25.0)	5 (3.6)
None	0 (0.0)	1 (1.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.7)
Unidirectional	50 (98.0)	71 (94.7)	4 (100.0)	1 (100.0)	2 (100.0)	3 (75.0)	131 (95.6)
Cortex, n (%)							

Supplementary Table 15. Vale Boi - Upper 5/4E - elongated products attributes frequencies. (*continued*)

Attributes	Quartz	Chert	Greywacke	Dolerite	Other	Chalcedony	Total
0%	48 (94.1)	54 (72.0)	3 (75.0)	1 (100.0)	2 (100.0)	4 (100.0)	112 (81.8)
1-	2	10	0	0	0	0	12
30%	(3.9)	(13.3)	(0.0)	(0.0)	(0.0)	(0.0)	(8.8)
100%	0 (0.0)	1 (1.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.7)
31-	1	6	1	0	0	0	8
60%	(2.0)	(8.0)	(25.0)	(0.0)	(0.0)	(0.0)	(5.8)
61-	0	4	0	0	0	0	4
99%	(0.0)	(5.3)	(0.0)	(0.0)	(0.0)	(0.0)	(2.9)

Supplementary Table 16. Vale Boi - Lower 5 - mean and standard deviation of elongated products measurements (in mm).

Measurements	Quartz	Chert	Greywacke
MaxWidth, M (SD)	8.8 (4.2)	10.3 (4.4)	20.8 (8.0)
Length, M (SD)	21.6 (10.0)	26.1 (9.8)	50.2 (16.7)
Thickness, M (SD)	5.6 (3.4)	5.4 (2.8)	11.0 (7.5)
PlatformWidth, M (SD)	6.7 (3.8)	7.4 (3.4)	17.9 (8.4)
PlatformThickness, M (SD)	4.1 (2.4)	4.5 (2.6)	10.5 (6.5)
ExteriorPlatformAngle, M (SD)	64.4 (46.7)	75.3 (37.8)	39.6 (50.0)

Supplementary Table 17. Vale Boi - Upper 5/4E - mean and standard deviation of elongated products measurements (in mm).

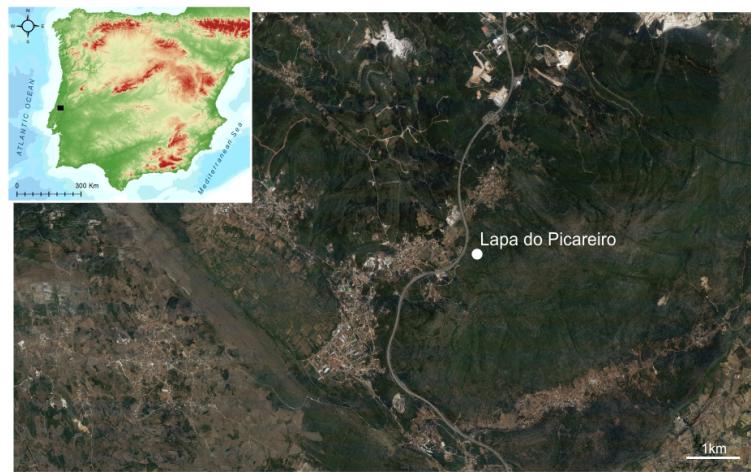
Measurements	Quartz	Chert	Greywacke	Dolerite	Chalcedony	Other
MaxWidth, M (SD)	9.3 (3.6)	10.4 (4.4)	11.7 (3.5)	16.0 (NA)	16.1 (9.2)	17.4 (1.4)
Length, M (SD)	21.1 (7.4)	26.1 (10.1)	36.2 (12.6)	36.6 (NA)	38.7 (16.1)	40.1 (7.6)
Thickness, M (SD)	5.47 (2.82)	4.26 (2.27)	8.55 (6.22)	7.15 (NA)	7.49 (5.33)	7.55 (2.38)
PlatformWidth, M (SD)	7.0 (3.1)	7.1 (3.3)	10.5 (3.1)	16.4 (NA)	11.7 (7.8)	7.0 (0.5)
PlatformThickness, M (SD)	4.79 (2.88)	3.29 (1.89)	6.04 (3.97)	5.40 (NA)	5.79 (4.24)	4.13 (1.12)
ExteriorPlatformAngle, M (SD)	57.3 (47.0)	66.1 (37.8)	79.8 (11.3)	78.3 (NA)	101.9 (18.1)	83.8 (6.9)

Supplementary Table 18. Vale Boi - Lower 5. Retouched piece typology by raw material.

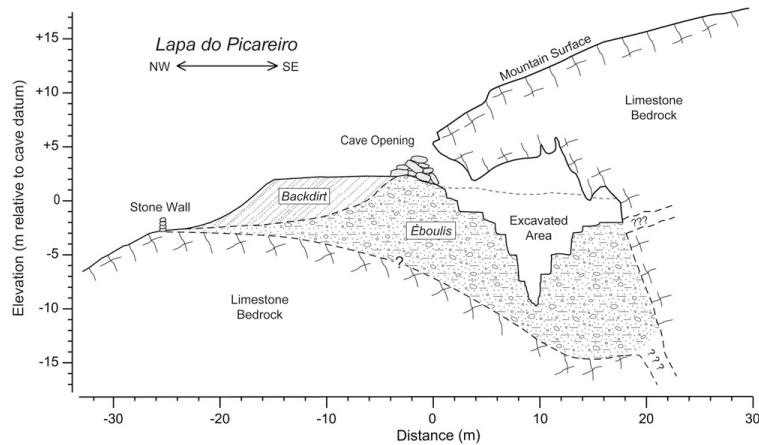
Typology	Quartz (n)	Quartz (%)	Chert (n)	Chert (%)	Greywacke (n)	Greywacke (%)	Chalcedony (n)	Chalcedony (%)	Total (n)	Total (%)
Endscraper	0	0%	4	10.53%	0	0%	1	100%	5	9.09%
Dihedral Burin	1	6.67%	3	7.89%	0	0%	0	0%	4	7.27%
Burin on truncation	0	0%	2	5.26%	0	0%	0	0%	2	3.64%
Truncation	0	0%	1	2.63%	0	0%	0	0%	1	1.82%
Notch	3	20%	4	10.53%	0	0%	0	0%	7	12.73%
Denticulate	0	0%	2	5.26%	0	0%	0	0%	2	3.64%
Splintered piece	8	53.33%	6	15.79%	0	0%	0	0%	14	25.45%
Double backed bladelet	0	0%	2	5.26%	0	0%	0	0%	2	3.64%
Retouched blade	0	0%	1	2.63%	0	0%	0	0%	1	1.82%
Retouched bladelet	0	0%	2	5.26%	0	0%	0	0%	2	3.64%
Retouched flake	3	20%	11	28.95%	1	100%	0	0%	15	27.27%
Total	15	100%	38	100%	1	100%	1	100%	55	100%

Supplementary Table 19. Vale Boi - Upper 5/4E. Retouched piece typology by raw material.

Typology	Quartz (n)	Quartz (%)	Chert (n)	Chert (%)	Greywacke (n)	Greywacke (%)	Dolerite (n)	Dolerite (%)	Chalcedony (n)	Chalcedony (%)	Total (n)	Total (%)
Endscraper	2	5.88%	21	30%	0	0%	2	40%	0	0%	25	22.32%
Carinated endscraper	0	0%	2	2.86%	1	50%	0	0%	0	0%	3	2.68%
Perforator-endscraper	0	0%	1	1.43%	0	0%	0	0%	0	0%	1	0.89%
Perforator	0	0%	1	1.43%	0	0%	0	0%	0	0%	1	0.89%
Dihedral Burin	2	5.88%	4	5.71%	0	0%	0	0%	0	0%	6	5.36%
Burin on truncation	0	0%	4	5.71%	0	0%	0	0%	0	0%	4	3.57%
Truncation	0	0%	4	5.71%	0	0%	0	0%	0	0%	4	3.57%
Vale Comprido Point	0	0%	1	1.43%	1	50%	3	60%	1	100%	6	5.36%
Notch	10	29.41%	3	4.29%	0	0%	0	0%	0	0%	13	11.61%
Denticulate	1	2.94%	2	2.86%	0	0%	0	0%	0	0%	3	2.68%
Splintered piece	15	44.12%	12	17.14%	0	0%	0	0%	0	0%	27	24.11%
Backed bladelet	0	0%	1	1.43%	0	0%	0	0%	0	0%	1	0.89%
Backed bladelet parcial	0	0%	1	1.43%	0	0%	0	0%	0	0%	1	0.89%
Retouched blade	0	0%	2	2.86%	0	0%	0	0%	0	0%	2	1.79%
Retouched bladelet	0	0%	5	7.14%	0	0%	0	0%	0	0%	5	4.46%
Retouched flake	4	11.76%	6	8.57%	0	0%	0	0%	0	0%	10	8.93%
Total	34	100%	70	100%	2	100%	5	100%	1	100%	112	100%



Supplementary Figure 9. Lapa do Picareiro. Location.



Supplementary Figure 10. Lapa do Picareiro. Generalized cross section showing surface topography, shape of the cave, and area excavated into sedimentary fill. After Benedetti et al. (2019).

Supplementary Table 20. Lapa do Picareiro identified layers with sediment description and associated cultural horizons, whenever existent. After Benedetti et al. (2019).

Zone	Level	Depth interval (mbd)	Matrix color (Munsell)	Sediment description a, b, c	Lithic assemblage
1	D	0.87–1.12	Brown (10YR5/3)	Medium clasts in very muddy matrix, friable to slightly hard, common fine charcoal and bone fragments, chalky appearance	Epipaleolithic
	E	1.12–1.86	Grayish brown(10YR5/2)	Small to medium clasts in very muddy matrix, friable to slightly hard, abundant charcoal and bone fragments, chalky appearance	Late Magdalenian
	F	1.86–2.17	Dark grayish brown (10YR4/2)	Medium to large clasts with little fine sediment, loose, muddy dark brown lenses with abundant charcoal and bone fragments	Late Magdalenian
	I	2.17–2.37	Light yellowish brown (10YR6/4)	Large to very large clasts with very little fine sediment, loose to friable, few bones	Late Magdalenian
	J	2.37–2.55	Yellowish brown (10YR5/4)	Medium to large clasts with very little fine sediment, loose, few bones	Late Magdalenian
	K	2.55–2.75	Strong brown (7.5YR5/6)	Small clasts, friable, few bones	Early Magdalenian
2	L	2.75–3.13	Strong brown (7.5YR5/6)	Small to medium clasts in muddy matrix, friable to slightly hard, few bones and fragments, few boulders up to 100<U+2009>cm	Early Magdalenian
	M	3.13–3.19	Strong brown (7.5YR5/6)	Very small clasts in muddy matrix, friable	None
	N	3.19–3.53	Strong brown (7.5YR4/6)	Medium to large clasts, loose to friable, common medium-large bones and bone fragments	None
	O	3.53–3.81	Strong brown (7.5YR4/6)	Medium clasts, friable, common charcoal, and bones	Solutrean
	P	3.81–3.93	Brown (7.5YR4/4)	Medium to large clasts, loose to friable	None
	R	3.93–4.01	Brown (7.5YR5/4)	Small to medium clasts, friable, common charcoal, and small bones	Solutrean
	S	4.01–4.13	Light brown (7.5YR6/4)	Small clasts, friable, common charcoal, and bones	Solutrean
	T	4.13–4.86	Strong brown (7.5YR4/6)	Medium to large clasts, friable, common boulders up to 80<U+2009>cm, muddy in lower half with abundant charcoal and bones	Solutrean and Proto-Solutrean

Supplementary Table 20. Lapa do Picareiro identified layers with sediment description and associated cultural horizons, whenever existent. After Benedetti et al. (2019). (*continued*)

Zone	Level	Depth interval (mbd)	Matrix color (Munsell)	Sediment description a, b, c	Lithic assemblage
3	U	4.86–5.02	Strong brown (7.5YR5/6)	Small to medium clasts in muddy matrix, friable, includes lenses with abundant small animal bones and bone fragments	Terminal Gravettian
	V	5.02–5.12	Strong brown (7.5YR5/6)	Medium to large clasts, little fine sediment, loose to friable, abundant small animal bones	Gravettian
	W	5.12–5.25	Strong brown (7.5YR4/6)	Small to medium clasts in very muddy matrix, friable to slightly hard, abundant small animal bones and bone fragments	Gravettian
	X	5.25–5.32	Strong brown (7.5YR5/6)	Medium clasts, little fine sediment, friable, abundant small animal bones	Gravettian
	Y	5.32–5.53	Strong brown (7.5YR5/6)	Medium to large clasts, little fine sediment, common bones	None
	Z	5.53–5.71	Strong brown (7.5YR5/6)	Medium clasts in muddy matrix, friable, common bones	None
	BB	5.71–5.96	Strong brown (7.5YR5/6)	Large clasts, friable, common bones, few boulders up to 60<U+2009>cm	Early Upper Paleolithic
	CC	5.96–6.03	Strong brown (7.5YR5/6)	Very small clasts, friable	None
	DD	6.03–6.14	Strong brown (7.5YR4/6)	Medium clasts in very muddy matrix, slightly to moderately hard	Early Upper Paleolithic
	EE	6.14–6.27	Reddish brown (5YR4/4)	Small clasts in muddy matrix, friable to slightly hard, common bones	None
4	FF	6.27–6.45	Dark reddish brown (5YR3/4)	Medium clasts, slightly to moderately hard, abundant charcoal and bones	Early Upper and/or Middle Paleolithic
	GG	6.45–6.62	Strong brown (7.5YR5/6)	Large clasts, extremely hard, cemented by calcite crystals filling voids, common bones, and bone fragments	Aurignacian
	HH	6.62–6.76	Strong brown (7.5YR4/6)	Medium clasts in muddy matrix, slightly hard, common bones	Aurignacian
	II	6.76–6.87	Strong brown (7.5YR5/6)	Medium to large clasts in muddy matrix, very hard, calcite cement filling voids	Aurignacian

Supplementary Table 20. Lapa do Picareiro identified layers with sediment description and associated cultural horizons, whenever existent. After Benedetti et al. (2019). (*continued*)

Zone	Level	Depth interval (mbd)	Matrix color (Munsell)	Sediment description a, b, c	Lithic assemblage
5	JJ (upper)	6.87–7.73	Reddish brown (5YR4/4)	Medium to large clasts in muddy matrix, slightly hard, common bones; up to 20<U+2009>cm thick lenses of dark reddish brown fine sediment with dispersed charcoal	Mousterian
	JJ (lower)	7.73–8.35	Reddish brown (5YR4/4)	Medium clasts in very muddy matrix, slightly hard, lenses of dark reddish-brown fine sediment with dispersed charcoal and large animal bones	Mousterian
	KK	8.35–8.64	Yellowish red (5YR5/8)	Medium to large clasts, slightly to moderately hard, few bones	None
	LL	8.64–9.15	Reddish brown (5YR4/4)	Large clasts, slightly hard, concentration of angular boulders up to 60<U+2009>cm in lower part	None
	MM	9.15–9.98	Reddish brown (5YR5/4)	Medium to large clasts in muddy matrix, moderately hard, few small animal bones	None
	NN	9.98–10.62	Reddish brown (5YR5/4)	Very large clasts and boulders up to 70<U+2009>cm in muddy matrix, slightly hard, few bones	None

Lapa do Picareiro: Level T-U

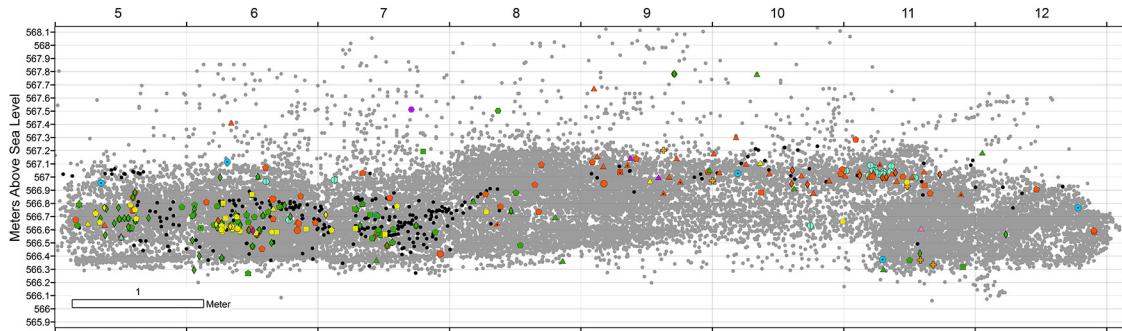


Figure 1. North profile of Level T to U.

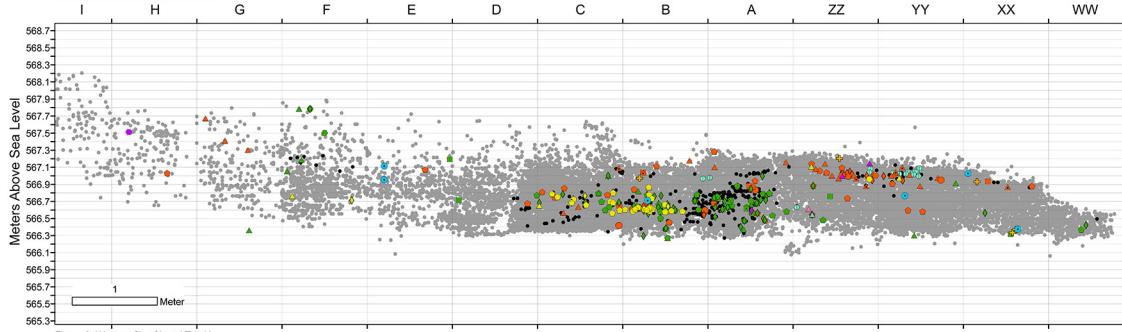


Figure 2. West profile of Level T to U.

○	Blade	○	Bladelet	◊	Chip	□	Core	△	Flake	○	Hammerstone	▲	Retouched Piece	○	Shatter
■	Chert	■	Quartzite	■	Quartz	■	Rock Crystal	■	Limestone	■	Other				
●	Shell	+	Bone Tool	●	Ochre	●	Charcoal	*	Piece Plot						

Supplementary Figure 11. Lapa do Picareiro. Spatial distribution of all plotted artefacts from levels T-U (in grey), lithic artefacts in colours and shapes referring to raw material and class. After Haws et al. (2019).

Supplementary Table 21. Lapa do Picareiro - U/Lower T. Technological class by raw material.

Class	Quartz (n)	Quartz (%)	Chert (n)	Chert (%)	Other (n)	Other (%)	Total	Total (%)
Blank	30	20.83%	24	53.33%	1	14.29%	55	28.06%
BlankFrag	22	15.28%	4	8.89%	1	14.29%	27	13.78%
Core	2	1.39%	0	0%	0	0%	2	1.02%
CorePreparProd	0	0%	1	2.22%	0	0%	1	0.51%
Manuport	0	0%	0	0%	1	14.29%	1	0.51%
RetouchedPiece	1	0.69%	5	11.11%	0	0%	6	3.06%
Shatter	4	2.78%	1	2.22%	2	28.57%	7	3.57%
Chip	85	59.03%	10	22.22%	2	28.57%	97	49.49%
Total (RM)	144	-	45	-	7	-	196	-

Supplementary Table 22. Lapa do Picareiro - Middle T. Technological class by raw material.

Class	Quartz (n)	Quartz (%)	Chert (n)	Chert (%)	Other (n)	Other (%)	Total	Total (%)
Blank	19	19%	46	63.01%	2	28.57%	67	37.22%
BlankFrag	19	19%	9	12.33%	0	0%	28	15.56%
Core	2	2%	2	2.74%	1	14.29%	5	2.78%
RetouchedPiece	0	0%	5	6.85%	0	0%	5	2.78%
Shatter	3	3%	2	2.74%	3	42.86%	8	4.44%
Chip	57	57%	9	12.33%	1	14.29%	67	37.22%
Total (RM)	100	-	73	-	7	-	180	-

Supplementary Table 23. Lapa do Picareiro - U/Lower T - core attributes frequencies.

Attributes	Quartz n(%)
CoreType	
Other	1 (50.0)
SinglePlat	1 (50.0)
NumberCoreFaces	
Three	1 (50.0)
Two	1 (50.0)
CorePlatform	
Crushed	1 (50.0)
Dihedral	1 (50.0)
MainFaceCoreUse	
Flakes	2 (100.0)

Supplementary Table 24. Lapa do Picareiro - Middle T - core attributes frequencies.

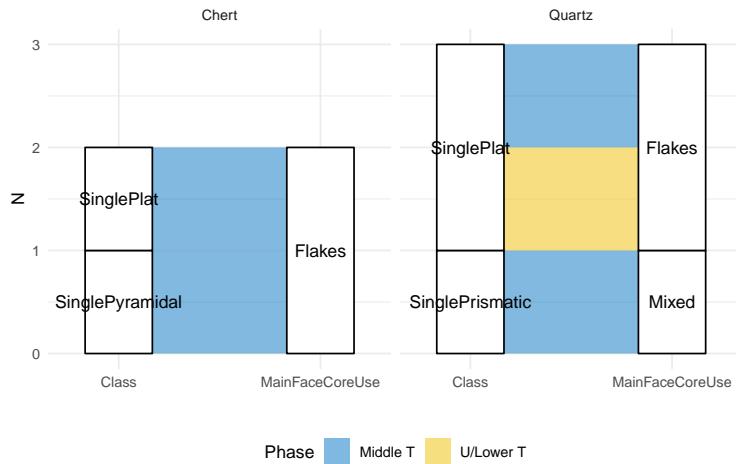
Attributes	Quartz	Chert	Other	Total
CoreType, n (%)				
SinglePlat	1 (50.0)	1 (50.0)	1 (100.0)	3 (60.0)
SinglePrismatic	1 (50.0)	0 (0.0)	0 (0.0)	1 (20.0)
SinglePyramidal	0 (0.0)	1 (50.0)	0 (0.0)	1 (20.0)
NumberCoreFaces, n (%)				
Four	0 (0.0)	2 (100.0)	0 (0.0)	2 (40.0)
One	1 (50.0)	0 (0.0)	0 (0.0)	1 (20.0)
Three	1 (50.0)	0 (0.0)	0 (0.0)	1 (20.0)
Two	0 (0.0)	0 (0.0)	1 (100.0)	1 (20.0)
CorePlatform, n (%)				
Dihedral	0 (0.0)	1 (50.0)	0 (0.0)	1 (20.0)
Plain	2 (100.0)	1 (50.0)	1 (100.0)	4 (80.0)
MainFaceCoreUse, n (%)				
Flakes	1 (50.0)	2 (100.0)	1 (100.0)	4 (80.0)
Mixed	1 (50.0)	0 (0.0)	0 (0.0)	1 (20.0)

Supplementary Table 25. Lapa do Picareiro - U/Lower T - mean and standard deviation of core measurements (in mm).

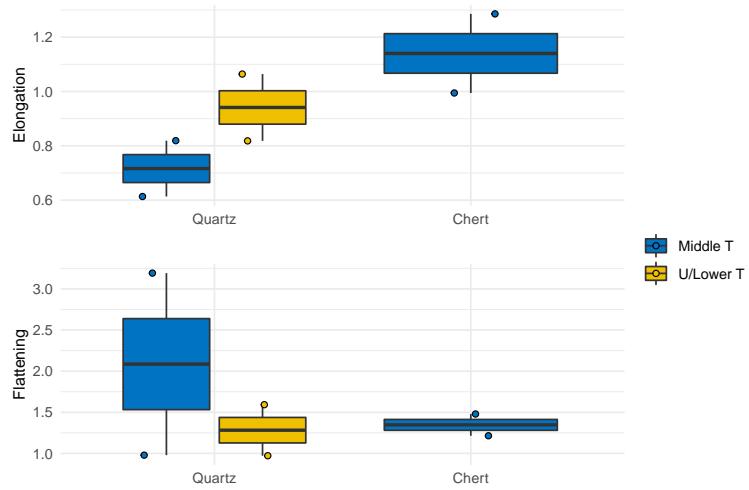
Core metrics	Quartz
MedWidth, M (SD)	29.0 (4.2)
Length, M (SD)	28.4 (9.1)
Thickness, M (SD)	25.2 (11.9)
PlatformWidth, M (SD)	24.6 (1.3)
PlatformThickness, M (SD)	24.9 (10.3)
MainFacePlatformAngle, M (SD)	82.7 (21.1)
Weight, M (SD)	40.2 (37.5)

Supplementary Table 26. Lapa do Picareiro - Middle T - mean and standard deviation of core measurements (in mm).

Core metrics	Quartz	Chert	Other	Total
MedWidth, M (SD)	42.2 (8.2)	22.0 (10.3)	71.8 (NA)	40.0 (21.5)
Length, M (SD)	30.1 (2.2)	27.9 (14.1)	29.9 (NA)	29.2 (7.2)
Thickness, M (SD)	25.9 (13.8)	17.4 (3.6)	48.9 (NA)	27.1 (14.8)
PlatformWidth, M (SD)	38.4 (3.9)	21.6 (9.3)	75.5 (NA)	39.1 (22.6)
PlatformThickness, M (SD)	28.3 (15.6)	16.7 (1.3)	50.6 (NA)	28.1 (15.9)
MainFacePlatformAngle, M (SD)	74.3 (14.9)	80.4 (1.3)	75.8 (NA)	77.1 (8.1)
Weight, M (SD)	46.5 (14.8)	28.0 (32.7)	154.3 (NA)	60.7 (56.1)



Supplementary Figure 12. Lapa do Picareiro. Interaction of core type with type of extracted products by raw material and phase.



Supplementary Figure 13. Lapa do Picareiro. Boxplots of core elongation and flattening by raw material and phase.

Supplementary Table 27. Lapa do Picareiro - U/Lower T - flake attributes frequencies.

Attributes	Quartz	Chert	Other	Total
CrossSection, n (%)				
Irregular	3 (15.0)	0 (0.0)	0 (0.0)	3 (10.7)
Lenticular	1 (5.0)	1 (14.3)	0 (0.0)	2 (7.1)
Other	2 (10.0)	0 (0.0)	0 (0.0)	2 (7.1)
Quadrangular	1 (5.0)	0 (0.0)	0 (0.0)	1 (3.6)
Trapezoidal	2 (10.0)	3 (42.9)	0 (0.0)	5 (17.9)
Triangular	11 (55.0)	3 (42.9)	1 (100.0)	15 (53.6)
BlankShape, n (%)				
Circular	2 (10.0)	0 (0.0)	0 (0.0)	2 (7.1)
Convergent	6 (30.0)	1 (14.3)	1 (100.0)	8 (28.6)
Déjeté	1 (5.0)	0 (0.0)	0 (0.0)	1 (3.6)
Divergent	1 (5.0)	3 (42.9)	0 (0.0)	4 (14.3)
Irregular	3 (15.0)	2 (28.6)	0 (0.0)	5 (17.9)
Parallel	7 (35.0)	1 (14.3)	0 (0.0)	8 (28.6)
Profile, n (%)				
Curved	4 (20.0)	1 (14.3)	0 (0.0)	5 (17.9)
Irregular	2 (10.0)	0 (0.0)	0 (0.0)	2 (7.1)
Straight	12 (60.0)	6 (85.7)	1 (100.0)	19 (67.9)
Twisted	2 (10.0)	0 (0.0)	0 (0.0)	2 (7.1)
BlankTip, n (%)				
Feather	7 (35.0)	1 (14.3)	0 (0.0)	8 (28.6)
Hinge	8 (40.0)	1 (14.3)	1 (100.0)	10 (35.7)
Pointed	1 (5.0)	3 (42.9)	0 (0.0)	4 (14.3)
Step	4 (20.0)	2 (28.6)	0 (0.0)	6 (21.4)
PlatformType, n (%)				
Crushed	6 (30.0)	2 (28.6)	1 (100.0)	9 (32.1)
Dihedral	0 (0.0)	2 (28.6)	0 (0.0)	2 (7.1)
Faceted	1 (5.0)	1 (14.3)	0 (0.0)	2 (7.1)
Plain	13 (65.0)	1 (14.3)	0 (0.0)	14 (50.0)
Winged	0 (0.0)	1 (14.3)	0 (0.0)	1 (3.6)
PlatformCortex, n (%)				
No	17 (85.0)	7 (100.0)	1 (100.0)	25 (89.3)
YesComplete	3 (15.0)	0 (0.0)	0 (0.0)	3 (10.7)
ScarCount, n (%)				
0	1 (5.0)	0 (0.0)	0 (0.0)	1 (3.6)
1	3 (15.0)	1 (14.3)	0 (0.0)	4 (14.3)
2	7 (35.0)	1 (14.3)	0 (0.0)	8 (28.6)
3	8 (40.0)	3 (42.9)	1 (100.0)	12 (42.9)
4	1 (5.0)	1 (14.3)	0 (0.0)	2 (7.1)
5	0 (0.0)	1 (14.3)	0 (0.0)	1 (3.6)
ScarPattern, n (%)				
Centripetal	0 (0.0)	1 (14.3)	0 (0.0)	1 (3.7)
Other	1 (5.3)	0 (0.0)	0 (0.0)	1 (3.7)
Unidirectional	18 (94.7)	6 (85.7)	1 (100.0)	25 (92.6)
Cortex, n (%)				
0%	18 (90.0)	5 (71.4)	1 (100.0)	24 (85.7)
1-30%	1 (5.0)	2 (28.6)	0 (0.0)	3 (10.7)
100%	1 (5.0)	0 (0.0)	0 (0.0)	1 (3.6)

Supplementary Table 28. Lapa do Picareiro - Middle T - flake attributes frequencies.

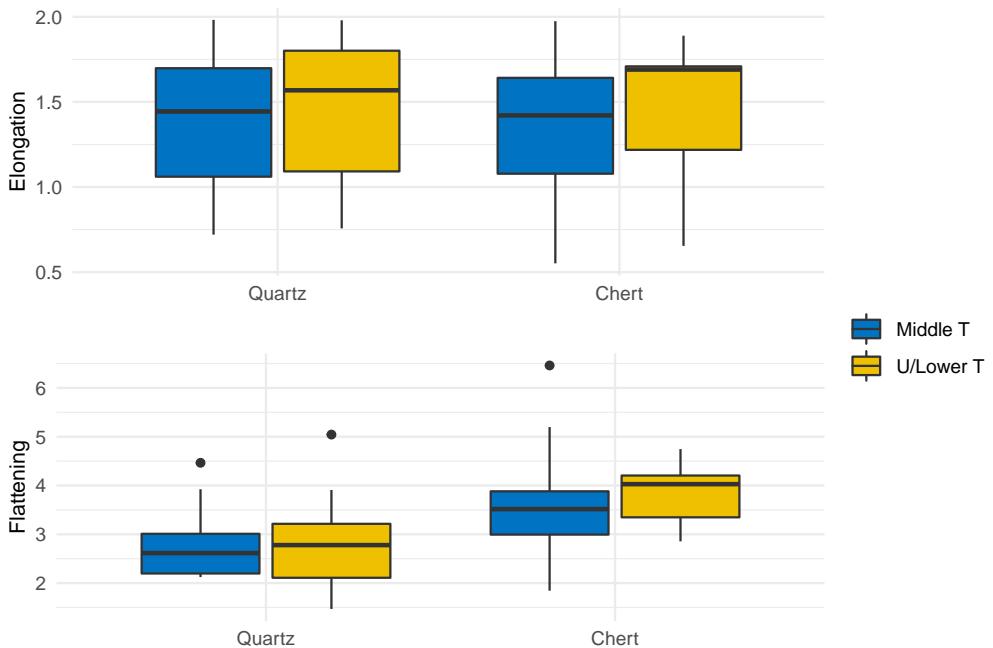
Attributes	Quartz	Chert	Other	Total
CrossSection, n (%)				
Irregular	3 (23.1)	5 (15.6)	0 (0.0)	8 (17.0)
Lenticular	2 (15.4)	4 (12.5)	0 (0.0)	6 (12.8)
Other	0 (0.0)	2 (6.2)	0 (0.0)	2 (4.3)
Trapezoidal	0 (0.0)	7 (21.9)	0 (0.0)	7 (14.9)
Triangular	8 (61.5)	14 (43.8)	2 (100.0)	24 (51.1)
BlankShape, n (%)				
Circular	0 (0.0)	2 (6.2)	0 (0.0)	2 (4.3)
Convergent	5 (38.5)	4 (12.5)	1 (50.0)	10 (21.3)
Déjeté	1 (7.7)	1 (3.1)	0 (0.0)	2 (4.3)
Divergent	0 (0.0)	3 (9.4)	0 (0.0)	3 (6.4)
Irregular	7 (53.8)	7 (21.9)	1 (50.0)	15 (31.9)
Other	0 (0.0)	2 (6.2)	0 (0.0)	2 (4.3)
Parallel	0 (0.0)	13 (40.6)	0 (0.0)	13 (27.7)
Profile, n (%)				
Curved	2 (15.4)	12 (37.5)	1 (50.0)	15 (31.9)
Irregular	1 (7.7)	1 (3.1)	0 (0.0)	2 (4.3)
Straight	10 (76.9)	19 (59.4)	1 (50.0)	30 (63.8)
BlankTip, n (%)				
Feather	5 (38.5)	13 (40.6)	0 (0.0)	18 (38.3)
Hinge	6 (46.2)	9 (28.1)	2 (100.0)	17 (36.2)
Overshoot	0 (0.0)	1 (3.1)	0 (0.0)	1 (2.1)
Pointed	1 (7.7)	1 (3.1)	0 (0.0)	2 (4.3)
Step	1 (7.7)	8 (25.0)	0 (0.0)	9 (19.1)
PlatformType, n (%)				
Crushed	6 (46.2)	5 (15.6)	0 (0.0)	11 (23.4)
Dihedral	0 (0.0)	6 (18.8)	0 (0.0)	6 (12.8)
Faceted	1 (7.7)	1 (3.1)	0 (0.0)	2 (4.3)
Plain	6 (46.2)	20 (62.5)	2 (100.0)	28 (59.6)
PlatformCortex, n (%)				
No	12 (92.3)	31 (96.9)	1 (50.0)	44 (93.6)
YesComplete	0 (0.0)	0 (0.0)	1 (50.0)	1 (2.1)
YesPartial	1 (7.7)	1 (3.1)	0 (0.0)	2 (4.3)
ScarCount, n (%)				
1	3 (23.1)	4 (12.5)	1 (50.0)	8 (17.0)
2	8 (61.5)	11 (34.4)	0 (0.0)	19 (40.4)
3	1 (7.7)	11 (34.4)	1 (50.0)	13 (27.7)
4	1 (7.7)	5 (15.6)	0 (0.0)	6 (12.8)
7	0 (0.0)	1 (3.1)	0 (0.0)	1 (2.1)
ScarPattern, n (%)				
Bidirectional	0 (0.0)	3 (9.4)	0 (0.0)	3 (6.4)
Other	1 (7.7)	0 (0.0)	0 (0.0)	1 (2.1)
Unidirectional	12 (92.3)	29 (90.6)	2 (100.0)	43 (91.5)
Cortex, n (%)				
0%	10 (76.9)	31 (96.9)	0 (0.0)	41 (87.2)
1-30%	0 (0.0)	1 (3.1)	1 (50.0)	2 (4.3)
31-60%	2 (15.4)	0 (0.0)	0 (0.0)	2 (4.3)
61-99%	1 (7.7)	0 (0.0)	1 (50.0)	2 (4.3)

Supplementary Table 29. Lapa do Picareiro - U/Lower T - mean and standard deviation of flake measurements (in mm).

Measurements	Quartz	Chert	Other	Total
MedWidth, M (SD)	15.3 (10.4)	17.0 (8.7)	38.8 (NA)	16.6 (10.6)
Length, M (SD)	21.8 (14.3)	27.3 (14.2)	76.0 (NA)	25.1 (17.1)
Thickness, M (SD)	7.4 (6.0)	5.3 (3.1)	11.8 (NA)	7.0 (5.4)
PlatformWidth, M (SD)	13.4 (9.0)	12.9 (9.5)	14.2 (NA)	13.3 (8.8)
PlatformThickness, M (SD)	7.15 (6.23)	4.51 (2.82)	4.70 (NA)	6.40 (5.53)
ExteriorPlatformAngle, M (SD)	83.7 (32.8)	59.6 (41.4)	101.4 (NA)	78.3 (35.7)

Supplementary Table 30. Lapa do Picarero - Middle T - mean and standard deviation of flake measurements (in mm).

Measurements	Quartz	Chert	Other	Total
MedWidth, M (SD)	12.2 (5.6)	16.3 (8.1)	31.2 (8.4)	15.8 (8.3)
Length, M (SD)	16.3 (4.1)	20.9 (8.5)	38.4 (11.9)	20.4 (8.7)
Thickness, M (SD)	5.0 (2.8)	5.0 (2.3)	10.3 (1.4)	5.3 (2.6)
PlatformWidth, M (SD)	10.0 (5.4)	10.5 (4.9)	27.4 (1.6)	11.1 (6.0)
PlatformThickness, M (SD)	4.7 (3.2)	4.2 (2.1)	12.9 (1.0)	4.7 (3.0)
ExteriorPlatformAngle, M (SD)	81.5 (39.3)	74.2 (31.9)	71.7 (24.3)	76.1 (33.4)



Supplementary Figure 14. Lapa do Picareiro. Flake elongation and flattening by phase and raw material.

Supplementary Table 31. Lapa do Picareiro - U/Lower T - elongated blanks attributes frequencies.

Attributes	Quartz	Chert	Total
CrossSection, n (%)			
Irregular	0 (0.0)	1 (5.9)	1 (3.7)
Lenticular	2 (20.0)	2 (11.8)	4 (14.8)
Trapezoidal	0 (0.0)	3 (17.6)	3 (11.1)
Triangular	8 (80.0)	11 (64.7)	19 (70.4)
BlankShape, n (%)			
Convergent	3 (30.0)	3 (17.6)	6 (22.2)
Déjeté	0 (0.0)	1 (5.9)	1 (3.7)
Irregular	0 (0.0)	1 (5.9)	1 (3.7)
Parallel	7 (70.0)	12 (70.6)	19 (70.4)
Profile, n (%)			
Curved	2 (20.0)	5 (29.4)	7 (25.9)
Straight	8 (80.0)	11 (64.7)	19 (70.4)
Twisted	0 (0.0)	1 (5.9)	1 (3.7)
BlankTip, n (%)			
Feather	5 (50.0)	11 (64.7)	16 (59.3)
Hinge	2 (20.0)	1 (5.9)	3 (11.1)
Overshoot	0 (0.0)	1 (5.9)	1 (3.7)
Pointed	1 (10.0)	1 (5.9)	2 (7.4)
Step	2 (20.0)	3 (17.6)	5 (18.5)
PlatformType, n (%)			
Crushed	4 (40.0)	3 (17.6)	7 (25.9)
Dihedral	0 (0.0)	2 (11.8)	2 (7.4)
Linear	1 (10.0)	0 (0.0)	1 (3.7)
Plain	5 (50.0)	12 (70.6)	17 (63.0)

Supplementary Table 31. Lapa do Picareiro - U/Lower T - elongated blanks attributes frequencies. (*continued*)

Attributes	Quartz	Chert	Total
PlatformCortex, n (%)			
No	9 (90.0)	17 (100.0)	26 (96.3)
YesComplete	1 (10.0)	0 (0.0)	1 (3.7)
ScarCount, n (%)			
1	1 (10.0)	0 (0.0)	1 (3.7)
2	7 (70.0)	6 (35.3)	13 (48.1)
3	2 (20.0)	5 (29.4)	7 (25.9)
4	0 (0.0)	4 (23.5)	4 (14.8)
5	0 (0.0)	2 (11.8)	2 (7.4)
ScarPattern, n (%)			
Unidirectional	10 (100.0)	17 (100.0)	27 (100.0)
Cortex, n (%)			
0%	9 (90.0)	15 (88.2)	24 (88.9)
1-30%	1 (10.0)	2 (11.8)	3 (11.1)

Supplementary Table 32. Lapa do Picareiro - Middle T - elongated blanks attributes frequencies.

Attributes	Quartz	Chert	Total
CrossSection, n (%)			
Irregular	0 (0.0)	2 (14.3)	2 (10.0)
Lenticular	2 (33.3)	1 (7.1)	3 (15.0)
Trapezoidal	1 (16.7)	2 (14.3)	3 (15.0)
Triangular	3 (50.0)	9 (64.3)	12 (60.0)
BlankShape, n (%)			
Convergent	1 (16.7)	5 (35.7)	6 (30.0)
Divergent	1 (16.7)	0 (0.0)	1 (5.0)
Irregular	1 (16.7)	0 (0.0)	1 (5.0)
Parallel	3 (50.0)	9 (64.3)	12 (60.0)
Profile, n (%)			
Curved	4 (66.7)	3 (21.4)	7 (35.0)
Irregular	0 (0.0)	2 (14.3)	2 (10.0)
Straight	2 (33.3)	7 (50.0)	9 (45.0)
Twisted	0 (0.0)	2 (14.3)	2 (10.0)
BlankTip, n (%)			
Feather	4 (66.7)	9 (64.3)	13 (65.0)
Hinge	2 (33.3)	1 (7.1)	3 (15.0)
Pointed	0 (0.0)	3 (21.4)	3 (15.0)
Step	0 (0.0)	1 (7.1)	1 (5.0)
PlatformType, n (%)			
Crushed	3 (50.0)	5 (35.7)	8 (40.0)
Plain	3 (50.0)	9 (64.3)	12 (60.0)
PlatformCortex, n (%)			
No	6 (100.0)	13 (92.9)	19 (95.0)
YesComplete	0 (0.0)	1 (7.1)	1 (5.0)
ScarCount, n (%)			
2	4 (66.7)	4 (28.6)	8 (40.0)
3	2 (33.3)	7 (50.0)	9 (45.0)
4	0 (0.0)	3 (21.4)	3 (15.0)
ScarPattern, n (%)			
Unidirectional	6 (100.0)	14 (100.0)	20 (100.0)
Cortex, n (%)			
0%	6 (100.0)	13 (92.9)	19 (95.0)
1-30%	0 (0.0)	1 (7.1)	1 (5.0)

Supplementary Table 33. Lapa do Picareiro - U/Lower T - mean and standard deviation of elongated blanks measurements (in mm).

Measurements	Quartz	Chert
MaxWidth, M (SD)	7.9 (4.7)	11.9 (7.6)
Length, M (SD)	17.5 (9.0)	32.3 (17.5)
Thickness, M (SD)	3.17 (3.58)	3.54 (2.81)
PlatformWidth, M (SD)	4.77 (1.43)	7.66 (5.57)
PlatformThickness, M (SD)	2.48 (2.94)	3.04 (2.52)
ExteriorPlatformAngle, M (SD)	68.3 (47.6)	74.1 (45.0)

Supplementary Table 34. Lapa do Picareiro - Middle T - mean and standard deviation of elongated blanks measurements (in mm).

Measurements	Quartz	Chert
MaxWidth, M (SD)	7.7 (1.5)	14.0 (7.8)
Length, M (SD)	17.0 (2.9)	37.5 (16.5)
Thickness, M (SD)	2.16 (0.69)	4.20 (2.36)
PlatformWidth, M (SD)	5.51 (1.67)	9.04 (4.26)
PlatformThickness, M (SD)	2.07 (0.58)	3.29 (2.39)
ExteriorPlatformAngle, M (SD)	92.8 (8.9)	64.0 (44.1)

Supplementary Table 35. Lapa do Picareiro - U/Lower T. Retouched piece typology by raw material.

Typology	Quartz (n)	Quartz (%)	Chert (n)	Chert (%)	Total	Total (%)
Dihedral angle burin	0	0%	1	20%	1	16.67%
Notch	0	0%	1	20%	1	16.67%
Splintered piece	1	100%	0	0%	1	16.67%
Retouched flake	0	0%	3	60%	3	50%

Supplementary Table 36. Lapa do Picareiro - Middle T. Retouched piece typology by raw material.

Typology	Chert (n)	Chert (%)	Total
Concave truncation	1	20%	1
Vale Comprido point (?)	1	20%	1
Notch	1	20%	1
Retouched flake	2	40%	2