COBBLE CORE TYPES IN CALIFORNIA

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ABSTRACT

The strategy by which percussion was applied to cobbles varied across time and space in California. To what degree these variations in core reduction strategy mark temporal, cultural, or toolstone determined practices remain unknown. Literature comparisons of cobble core assemblages are often precluded by both insufficient illustration and inadequate descriptive terminology (Rondeau 1986a, n.d.a). The need for a reliable method of description for cobble cores in California is argued. A review of selected cobble core types is used to illustrate one method useful in their description. Preliminary findings, both limitations and discoveries using this method, are explored.

INTRODUCTION

The study of cores is important for what it can bring to the understanding of prehistoric California. Specific core types have been found to be temporally and perhaps culturally diagnostic in California (Arnold 1983), elsewhere in North America (Johnson and Morrow 1986), and the world (Bordes 1968). On another level, cores inform on certain techniques of stone tool manufacture. These manufacturing techniques are part of how prehistoric lithic industries were organized. The structure of that organization may inform on elements of task organization and adaptive postures. However, for the study of cores to contribute to the understanding of technological organization, there must be regional comparability in both basic morphological and technological descriptions that has not been obtained by the broad spectrum of current research.

METHODS AND ASSUMPTIONS

The method of core description explored in this paper is one of reading the flake scars. This reading involved determining the directionality and sequence of flake removals. Identification of striking platform types was also included. The cores could then be described in terms of flake removal directions, sequences, and striking platforms. Assignment of descriptive labels to the different core reduction strategies completed the designation of specific core types.

This descriptive method was based on the assumption that cores often retain evidence of the ways in which the flakes were removed (Rondeau 1979). Differences in flaking techniques and/or flake removal strategies might then be reflected in both morphological and technological core attributes (Rondeau 1987). In California, cobble cores were largely reduced by direct freehand percussion

Other core flaking techniques were used in prehistoric California (e.g., bipolar percussion, flake blade percussion). Likewise, cores were generated from stone forms other than cobbles (e.g., pebbles, flakes, formed tools). While the method presented here is thought to be applicable to those reduction techniques and core types as well, the demands of a focused exploration place

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them beyond the scope of this paper. Therefore, reading flake scars as a method for the identification of differences in flake removal strategies was limited to cobble cores.

Flake removal strategies are defined on individual cores and for collections of cores by directional patterns of flake scars, sequential patterns of flake scars, and patterns of striking platform use. The core illustrations presented herein are intended as schematic representations of the core types discussed below. They are intended to show a little variation from the ideal since normative stereotypes mask the variation that is critical to defining the general parameters of the flaking strategies that were used prehistorically.

THE UNIDIRECTIONAL-UNIFACIAL COBBLE CORE TYPE

The dominant cobble core type recovered from GLE-217, located on the eastern side of the North Coast Ranges (Figure 1), were greenstone rocks flaked by direct freehand percussion using a unidirectional-unifacial flaking strategy (Rondeau 1993). The cobbles tended to be somewhat flat and ovoid.

Attributes diagnostic of this unidirectional-unifacial cobble core type included: 1) only one face of the cobble was flaked, the other retaining cortex; 2) flakes were usually removed from only one end of the cobble; 3) the cortex surface was used almost exclusively as a striking platform; and 4) flakes were almost always removed in only one direction. A slight amount of variation from these elements of the general flaking strategy was noted in the collection. Figure 2a shows an early stage unidirectional-unifacial cobble core.

There is also the issue of the chopper-like appearance of a number of these specimens (Figure 2a). The misleading assignment of traditional functional type names without corroborating use wear evidence has often lead to the creation of spurious pseudo-tool designations in the archaeological literature. Further, such assignments can preclude clear descriptive presentation and adequate study of such artifacts (Rondeau 1992). Even so, 25% of these cores did show use wear. However, there were various kinds of wear, some of which did not support a chopping interpretation. Consideration of the use of unidirectional-unifacial cores as choppers is beyond the scope of this study (Rondeau n.d.b).

Figure 2b shows a cobble midway through the reduction sequence. Note the slant of the flaked edge from a side view. Some variation from the sloping angle when viewed from the side is illustrated. In this example the sloping edge is not totally flaked in the typical direction. A directionally divergent flake scar is also depicted, although it still uses the cortex as a striking platform.

Figure 2c depicts a late stage example of the same core type with the flakes still being driven off from one end of the cobble. The other face still exhibits only cortex and the side view still preserves the characteristic slant of the worked surface.

Figure 2d shows a typical reduction sequence for the unidirectional-unifacial cores from GLE-217. The excavated locus of the site producing these cores was dated between 2000 and 3000 B.P. using radiocarbon, obsidian hydration, and projectile point typology.

Figure 1 shows the general location of seven sites in Merced County in the lowest hills fronting the western side of the Sierra Nevada. The cobble cores from these sites also exhibited the unidirectional-unifacial flaking strategy (Rondeau and Rondeau 1993a, 1993b). Again the cobbles tended to be somewhat flat and ovoid. These quartzite cobble cores did not show use wear.

This series of sites was suggested to span the last 3000 years of prehistory (Ann S. Peak, personal communication, 1993). While a relatively late assignment for this kind of core and core tool may be suggested by these studies, the geographic distribution and temporal span of the unidirectional-unifacial core type remains unknown (Rondeau n.d.a). While the preliminary dates are

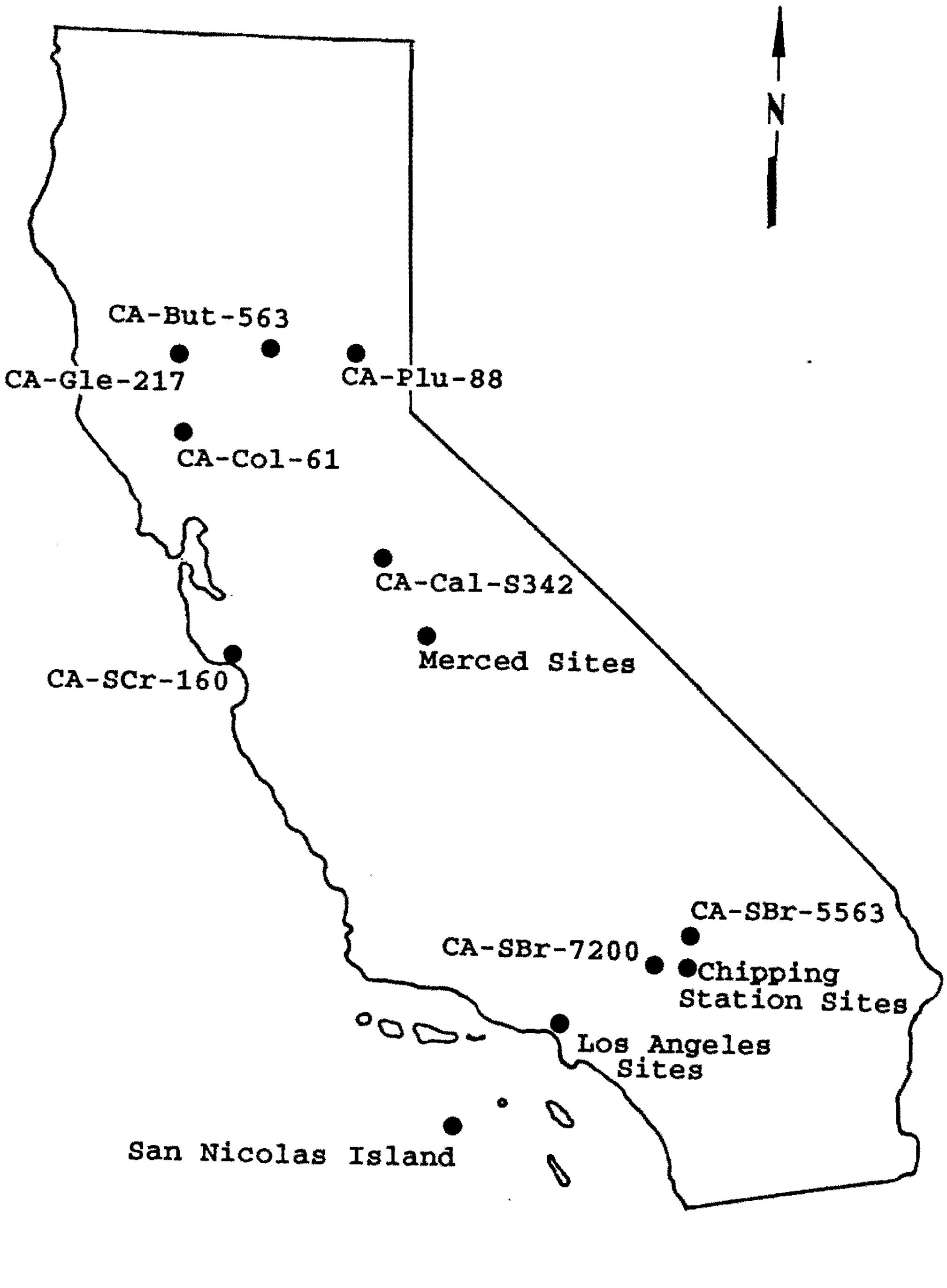

Figure 1. Cobble core site locations.

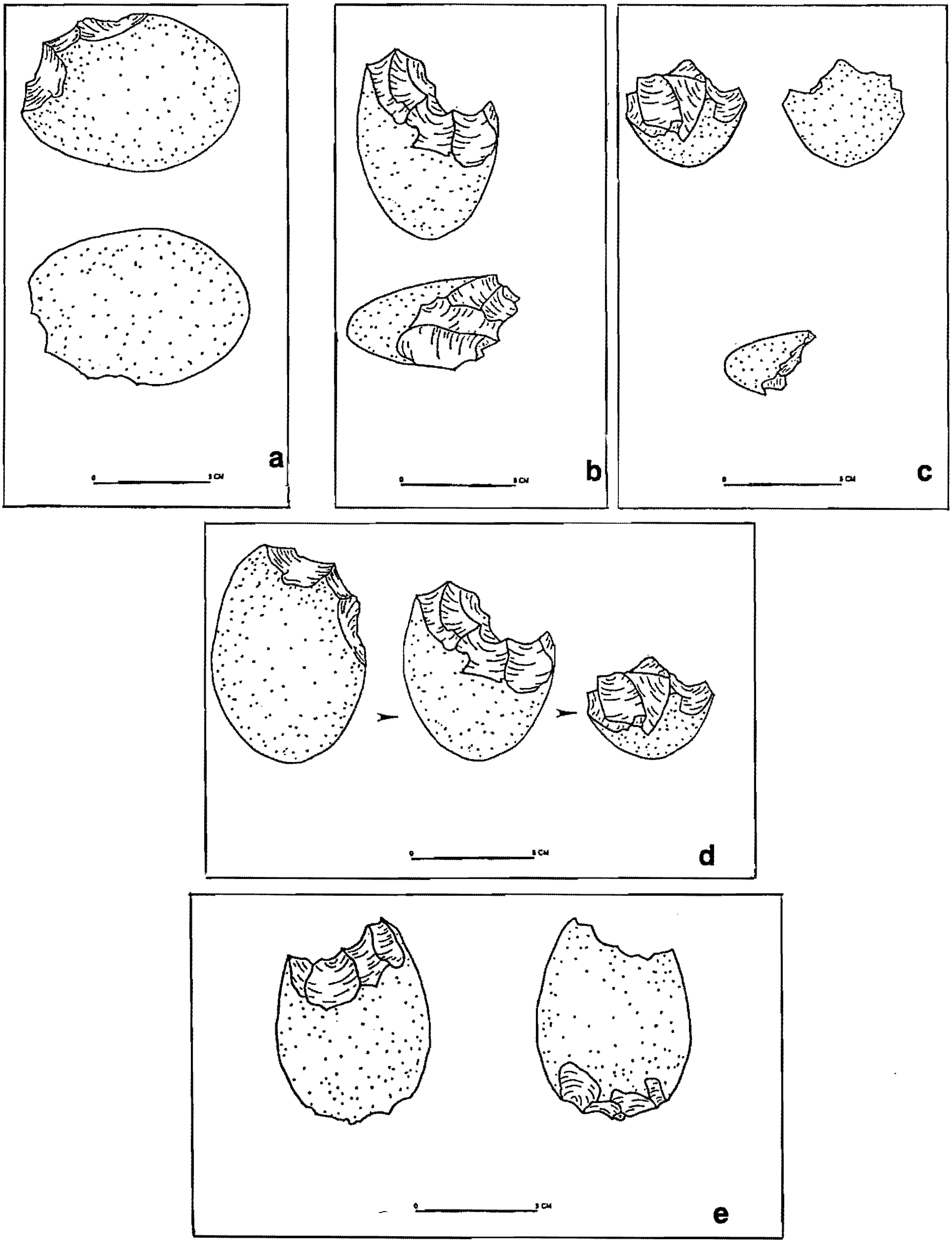

Figure 2

intriguing, caution and a great deal of further study are warranted.

TWO BIDIRECTIONAL COBBLE CORE TYPES

As noted above, other greenstone core types were recovered from GLE-217. For example, Figure 2e shows a bidirectional core that is only a variation of the unidirectional-unifacial core reduction strategy. While this example shows flaking on opposite faces at opposite ends, this unidirectional-unifacial flaking was also found to occur on the same face from opposite ends of other specimens. In both cases they represent only minor variations within the general unidirectional-unifacial strategy for flaking cobbles.

THE STEEP-ANGLED UNIDIRECTIONAL COBBLE CORE TYPE

Figure 3a shows a steep angled-unidirectional core from GLE-217. It is steep angled because the flake removals run at roughly 90 degrees to the striking platform. The flake removals, as represented by the flake scars, do not run back onto a face of the original cobble. Therefore, it is not as easily argued that this core is also unifacial. However, at GLE-217 there were a few of these cores. They clearly fall into a continuum with the unidirectional-unifacial cores, usually being late in the reduction sequence. This late stage placement suggests that they are only another numerically limited variant of the same flaking strategy. Recognizing such relationships among core types requires taking into account the assemblage-as-context. In other words, assemblage-as-context is the consideration of how any specific artifact or set of artifacts relates to the larger behavioral patterns indicated by the site's assemblage. This recognition is especially important when interpreting the overall behavioral trends for flaking strategies that were applied to cobble cores.

TWO UNIDIRECTIONAL-ROTATIONAL COBBLE CORE TYPES

Another example of this assemblage-as-context consideration is seen using the same core type, the steep angled-unidirectional core. This same type, in terms of both its morphology and technology, was also recovered from CAL-S342 (Figure 1). However, the cores from this site did not result from the same flaking strategy used to work the cobble cores at GLE-217.

Figure 3b shows a unidirectional rotational core from CAL-S342. While this was not a core type at GLE-217, it seems to be only a variation of that flaking approach. However, when the assemblage-as-context is considered, the overall strategy for flaking cobbles at CAL-S342 was one where a flat striking platform was consistently used and the flake removals rotated around the platform edge (Rondeau and Rondeau 1990). Two variations were identified. One platform type was a naturally flat cortex surface. The other platform type was a split cobble surface.

Figure 3c shows one core that is a unidirectional-rotational core using a cortex platform. The other is a unidirectional-rotational core with a split cobble platform. This strategy of flaking cobbles is quite divergent from the GLE-217 system. It might seem that regional differences, this site being in the lower, central Sierra Nevada (Fig-ure 1), or temporal differences, with CAL-S342 falling between 6000-9000 B.P., might hint at explaining the different cobble core flaking strategies.

However, less than 50 miles from GLE-217 lies COL-61 (Figure 1) in the North Coast Ranges. That site is later than GLE-217. COL-61 has the same cobble core reduction strategy, using both types of flat striking platforms and a unidirectional-rotational flake removal pattern (Rondeau n.d.a), as was found at CAL-S342.

Split cobble unidirectional-rotational cores have also been recovered from SBR-5563 (Figure

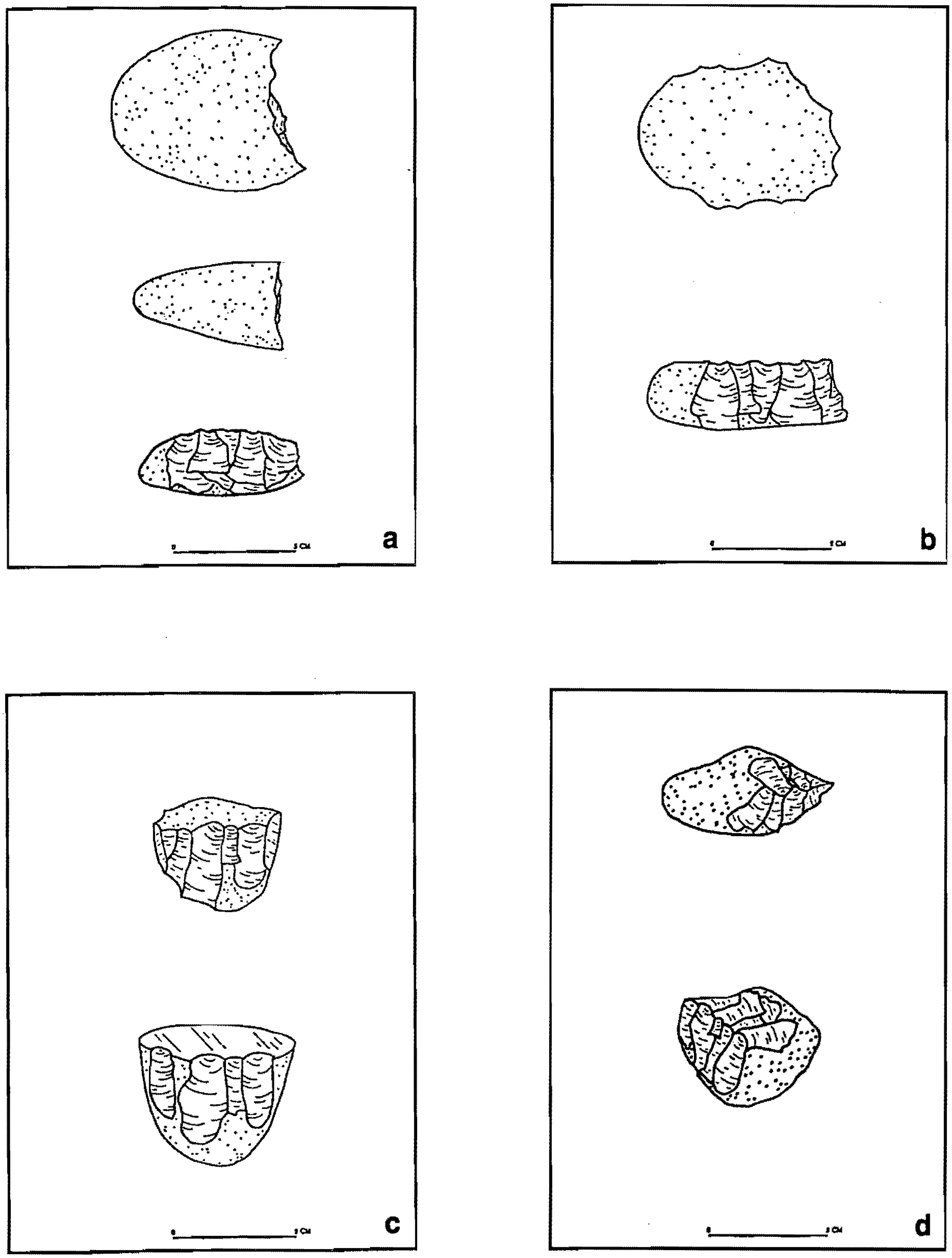

Figure 3

1) in southern California where single cores appeared to have been worked by that same flaking strategy during more than one time period (Rondeau 1986b). The spit cobble platform type of unidirectional-rotational cores will be considered further below, but first the review of the cobble cores from GLE-217 needs completion.

TWO BIFACIAL COBBLE CORE TYPES

That the unidirectional-unifacial cobble core flaking strategy was dominant for the greenstone cores from GLE-217 was noted above. It was also noted that there were a few cores resulting from this flaking strategy that could be assigned to other core types (those types defined partly in terms of the directionality of the flake scars). However, it was also recognized that the flaking strategy became much more flexible late in the reduction sequence (Rondeau 1993).

Figure 3d depicts both a traditional bifacial core (top of figure) and the sequential-bifacial core type (bottom of figure). The latter type was found at GLE-217. The sequential-bifacial core type was worked by the unidirectional-unifacial flaking strategy on both faces of one end of the core. The first series of flake removals used a cortex striking platform in the typical unidirectional-unifacial manner. The striking platform for the second series of flake removals was the proximal portions of the flake scars of the first face flaked.

This strategy is not typified by the alternating, back and forth removal of flakes from both faces as is common with the manufacture of bifaces and traditionally recognized bifacial cores (Figure 3a top). The sequential-bifacial core type has also been identified in southern California (Figure 1) at small primary reduction chipping stations in the desert of San Bernardino County (Hammond and Rondeau 1994).

TWO MULTIDIRECTIONAL COBBLE CORE TYPES

Figure 4a shows two kinds of multidirectional cores. On multidirectional cores both flake scars and cortex surfaces may have been used as striking platforms. Multidirectional cores are sometimes indicative of late stage core reduction (Figure 4a bottom). At both GLE-217 (Rondeau 1993) and COL-61 (Rondeau n.d.a) there was a late reduction stage shift in the cobble core reduction strategy. Even though the general flaking strategy was different at these two sites, some late stage multidirectional cores resulted at both. This appears to have been an attempt to remove the last few flakes by any approach that proved useful.

However, multidirectional cores do not always signal a late stage shift in core flaking strategy. Figure 4a (top) illustrates a specimen for which the initial flaking strategy was multidirectional. This flaking approach appears to have been a strategy to flake cobbles of irregular shape. Their irregular form often presented flat spots at various locations useful as striking platforms. Many such cobbles also had ridges running in different directions that were useful in channeling the removal of flakes. The cobble cores from both BUT-563 (Rondeau n.d.a) in northern California and SBR-7200 (Rondeau 1994) in southern California were worked by this initial multidirectional flaking strategy (Figure 1).

TWO SPLIT COBBLE CORE TYPES

Returning to the unidirectional-rotational cores depicted in Figure 3c please note that this flaking strategy is not the only split cobble core type from prehistoric California. Another type was worked by the split cobble rotational-cortex platform strategy (Figure 4b). After splitting the cobble, flakes were removed around the rim of the split surface using the cortex edge as the striking platform (Figure 4b bottom). The flakes were removed from the split surface. This flaking strategy has been identified for San Nicolas Island

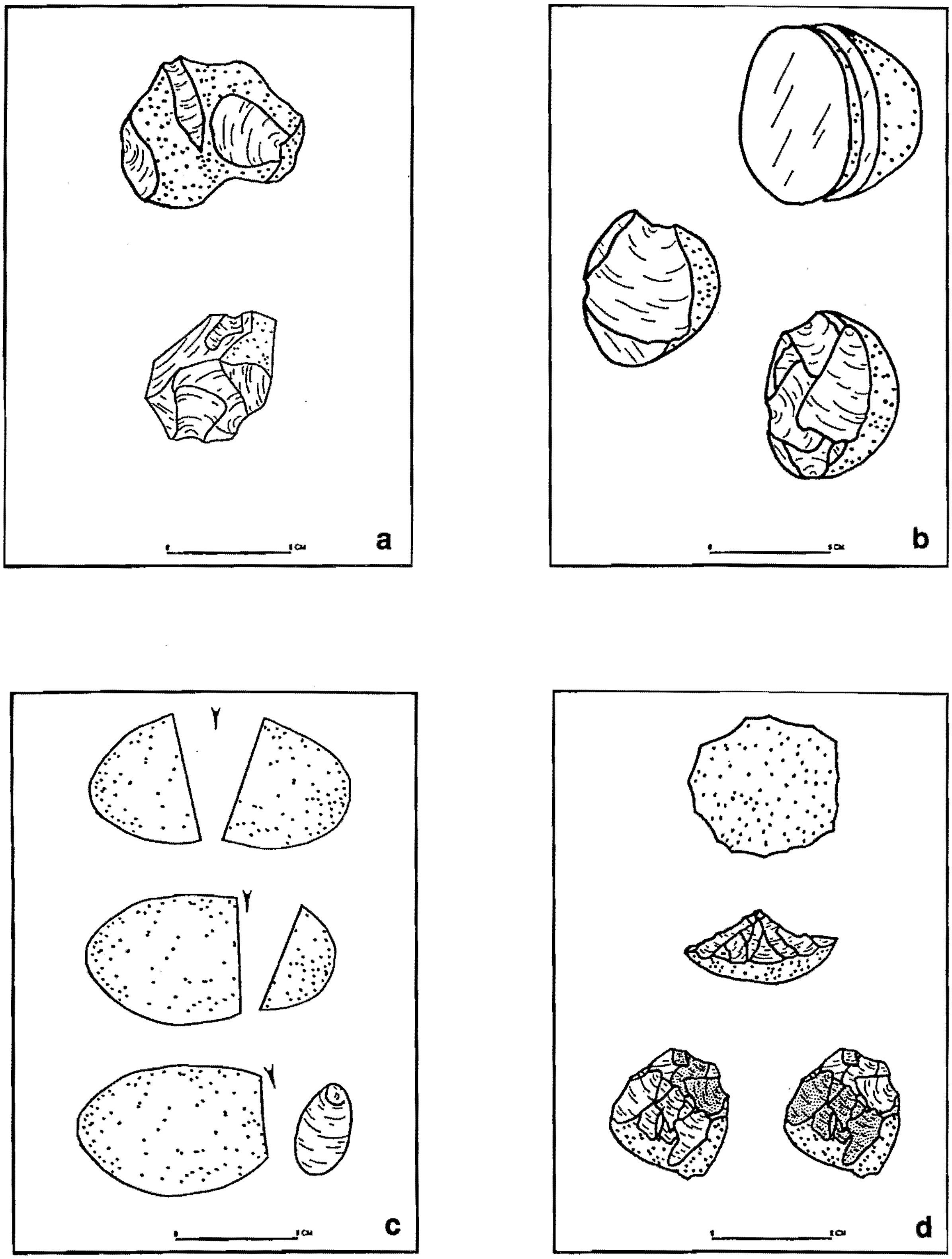

Figure 4

(Clevenger 1982) where it may be hypothesized as having persisted for as long as 8000 years. This strategy has also been identified for sites in the Los Angeles area (Van Horn 1987; Van Horn and Murray 1985).

VARIATIONS IN FLAKING THE SPLIT COBBLE CORTEX-PLATFORM CORE TYPE

In the northern Sierra Nevada of California several variations of the split cobble cortex platform strategy have been suggested as having been used to manufacture large flakes (Figure 4b middle) and plates (Figure 4b top). The use of the resulting cortex margin flakes of basalt as blanks for biface manufacture has been identified at PLU-88 (Rondeau and Rondeau 1993c, 1993d). While a rotational pattern of flake removals may be indicated for some sites in the region, there are also indications that single, large flakes were removed using a "largest flake possible" cortex platform variation of this strategy. The other variation, also using the cortex striking platform, may have sought to sheer off entire plates or pancakes of basalt, but this remains to be proven archaeologically.

AN INITIAL DIVERGENCE FROM THE SPLIT COBBLE CORTEX-PLATFORM COBBLE CORE TYPE

Figure 4c shows examples of initial core flaking from SCR-160 (Figure 1) in Santa Cruz County (Rondeau and Rondeau 1992). Some were split. Others are more properly described as having had an end knocked off. In other cases only a flake was removed from an end to begin the flaking. These variations in initial flaking were in part related to the size of the natural nodules of Monterey Chert, some of which fell below the cobble size range into that of larger pebbles (Wentworth 1922). Only some nodules were actually worked by the true split cobble approach although the rotational-cortex platform strategy for flake removals was maintained.

THE TORTOISE SHELL MORPHOLOGICAL CORE TYPE

Figure 4d shows several late reduction stage core types resulting from the San Nicolas Island split cobble rational-cortex platform strategy. One has been called the tortoise shell core (Figure 4d top) and is clearly a late stage version of the split cobble rotational-cortex platform type. It resulted when the knapper pursued extensive flake removal while maintaining the initial split cobble rotational-cortex platform flaking strategy until discard.

THE SAME DIRECTION-BIFACIAL COBBLE CORE TYPE

The same direction-bifacial core exhibits two flaked surfaces and in that sense is bifacially flaked (Figure 4d bottom). However, the origin of the flakes on the two faces are not the same. Further, the flakes on the two surfaces tend to run largely in the same direction. This core type is therefore different from both the sequential-bifacial core and the traditional bifacial core. The same direction-bifacial core results from a late reduction stage shift in flaking strategy.

The strategy shift was from the rotational-cortex platform strategy to a unidirectional-unifacial flaking strategy that used one edge of the previously flaked surface as the striking platform (Figure 4d bottom). This shift tended to remove older flake scars that ran away from the newly flaked surface. At the same time this shift retained those flake scars originating from the edge of the old split surface furthest from the newer flaking. These older flake scars generally appear to run in the same direction as the new flaking, but on the other, older flaked face.

THE ASSAY CORE LABEL

If it is accepted that the purpose of artifact types is to organize and generate data useful in addressing research questions, then the assay core is not a type. It is an interpretive label that assumes knowledge of the intent of the prehistoric flintknapper. Testing cobbles for their flaking qualities is often the assumed behavioral basis for assigning this label. However, cores in any sizable collection usually show that they were not all worked with the same intensity. Some were worked more, others less. How is cobble testing to be discerned from flake manufacture when only one or two flakes were needed? This label does not provide core descriptions or indicate the relationship to general flaking strategies.

THE RANDOM, AMORPHOUS, AND POLYHEDRAL CORE LABELS

These three terms are not core types since they fail to accurately describe the cores or provide useful data for research. While they have been used to label multidirectional cores in California, it has often been without describing them as such or providing any accompanying definitions. Even if these terms are accepted as equivalent in meaning to multidirectional cores, they still fail to indicate what kinds of multidirectional cores are being reported.

Does "random" describe the pattern of flake scars? As discussions above indicated, flake removals even on multidirectional cores were inten-tional and applied specific principals of flintknapping. Therefore, random, which is often taken to also describe the manner in which the core was flaked, is misleading and may more accurately describe the investigator's perception of these cores.

In terms of accurate core description, the use of "amorphous" is itself vague and seems to describe a blurry perception of morphology and technology. Even so, is not this label usually understood to mean multidirectional?

Amorphous cores have been defined as all core types that were not produced by prepared core techniques such as Levallois cores or Meso-American prismatic blade cores (Johnson 1986). This definition of "amorphous" subsumes all of the cobble core types discussed herein as well as bipolar cores and various other types. This definition is so general that it has little meaning and no descriptive value.

What does the term "polyhedral" tell us? Do not all cores have a number of surfaces? When is each flake scar to be described as a different surface and when not? In using any of the three terms discussed above, the basic description of morphology, technology, and general flaking strategy, has not been accomplished.

THE SPENT, EXPENDED, AND EXHAUSTED CORE LABELS

Some highly reduced cores, sometimes referred to as spent, expended, or exhausted, cannot be shown to have had a cobble as the original form. These labels describe a presumed condition. That condition is assumed, but not demonstrable. Thus, these labels usually pronounce an unwarranted interpretation. They also mask a range of core types and the behavioral information those types represent. Like the other labels discussed above, these are not acceptable core types due to their lack of data generating potential. Their use in reporting often appears to be only a pigeonhole of convenience.

DISCUSSION

Difficulties in assigning cobble core types have been discussed at length, especially in terms of their variability. Even when type assignments have been made, a number of situations can still make it difficult to interpret the meaning of individual core specimens.

One problem is that the initial flaking strategy of some cobble cores seem to have been erased by subsequent flake removals using a different strategy. It was found that the flaking strategy of any single core may or may not represent the dominant strategy for the core assemblage of which it is a part. Likewise, that core may or may not represent a minority strategy within that assemblage. This is complicated by the finding that the flaking strategy of any single core may represent an early or late variation of that general flaking strategy. It was also found that cores from different sites, regions, or time periods with similar morphology and technology did not always represent the same general core flaking strategy.

These preceding caveats mean that the interpretation of individual cores must take into account the assemblage-as-context. Lack of an assemblage-as-context limits the regional interpretative value of core isolates, single core chipping stations, as well as numerically small assemblages or core samples.

While this paper has focused on the utility of reading flake scars, the use of other core attributes in describing and assigning core types has been unavoidable to greater or lesser degrees. Given little consideration here has been the original form of the core, since this paper has been limited to cobbles. Other forms include pebbles, flakes, bifaces, unifaces, and cores previously flaked by different techniques and/or strategies.

Also, the use of flaking techniques in describing cores and making type assignments was not a focus of this paper. Even so, it is important to recognize that a range of techniques were used to reduce cores in California. Among these were a variety of direct freehand percussion strategies described herein, bipolar percussion (Rondeau 1987), flake blade percussion (Cassidy 1992), flake bladelet percussion (Arnold 1983), and apparently a flake blade pressure technique (Rondeau and Rondeau 1987).

The pattern of flake removals in terms of direction (e.g., unidirectional, bidirectional, multidirectional) and the sequence of removal (e.g., unifacial, bifacial, rotational, sequential) were explored for their utility in core description. Likewise, striking platform types (e.g., cortex, split surface, flaked surface) were also considered in core descriptions.

Evidence of use can be crucial to defining cores from tools and artifacts that served as both. Examples of use evidence include round edges, battered surfaces, and spalled ends. Where use wear is found (e.g., bifacial edge, unifacial edge, cortex surface) may also be significant. Determining when they were used as tools (e.g., before, during, and/or after use as a core) adds further information on which to make a type assignment. Other attributes that may also prove diagnostic of core types include the raw toolstone type, the final core morphology, the kinds of platform preparation, and evidence for heat treatment.

CONCLUSIONS

So what may be generalized from these studies of cobble cores? The identification of general flaking strategies has found that these systematic approaches to cobble flaking were often highly organized on an assemblage specific basis. This level of technological organization indicates that cobble core reduction was not an *ad hoc* behavior as is often assumed.

We also know that the strategy by which percussion was applied for the manufacture of flakes from cobbles varied across time and space in California. Toolstone characteristics sometimes influenced which flaking strategies were used although it is not always clear why certain flaking strategies were chosen when several different options could have served. Flaking strategies were found to be flexible during the core reduction sequence.

A great deal remains unknown about the working of cobble cores and cores in general. To what degree the differences in core reduction strategies represent temporal, cultural, or raw material influences remain largely undetermined. The work at GLE-217 and the regional comparisons that it has sparked, have suggested both research potential for the study of all cores in California and some ways in which those cores may be more profitably described and compared.

Diagnostic temporal and cultural differences in cobble core flaking strategies cannot be defined without regional and interregional comparability of core types. It is submitted that core types cannot be compared and contrasted unless they represent and therefore are based upon recognizable attributes such as those discussed above. These core attributes are useful for the construction of core type names that describe what they represent. Thereby, such type names facilitate communication and studies on the regional and extra-regional levels.

The intent of this paper has not been to review all of the known cobble core types in California. The purposes here have been to introduce some of the more common types, indicate how they may be identified, suggest some of their research potential, and argue for how core data need to be gathered so that those research potentials, especially at the regional level, may be explored.

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