

Aspects of Prehistoric Wiyot Exchange and Social Ranking

RICHARD E. HUGHES

ANTHROPOLOGISTS have long been aware of the distinctive appearance of the culture of the Yurok, Karok, Hupa, Wiyot, and Tolowa Indians of northwestern California (Kroeber 1904, 1920, 1922, 1953:30). Although the ethnographic record attests to the elaborate ceremonial system operative throughout most of this area, we have as yet no firm grasp on how far back in time this system may have been in operation, nor any reasonably well-documented information about the time depth for the social ranking and exchange relations which existed among these groups.

In order to bring new data to bear on some aspects of these anthropological concerns, obsidian artifacts associated with graves at the prehistoric Wiyot site of *Dulawo't* (CA-Hum-67 on Gunther Island) were subjected to non-destructive X-ray fluorescence analysis to determine the geographical source of the raw material used in their manufacture. These prehistoric data, combined with brief sketches of the ceremonial system and obsidian sources, are consonant in part with observations derived from the ethnographic record although some new insights into the dimensions of social ranking are offered. It is suggested that the social, exchange, and ceremonial systems evident during the ethnographic period were in operation at *Dulawo't* by at least 600 years ago.

Obsidian was widely used by the inhabit-

ants of California during the prehistoric and ethnographic periods. In many areas of the state, natural deposits of this volcanic glass were close at hand and were readily exploited by local groups for use in fashioning a wide variety of chipped stone implements. In other areas, northwestern California in particular, no natural deposits of obsidian existed and the historic peoples here were obliged to engage in reciprocal exchange relations with neighboring groups to obtain it. Obsidian was the raw material favored by the Yurok, Karok, Hupa, Wiyot, and Tolowa for large "blades" (technically bifaces) displayed during dances. These bifaces varied markedly in length and shape, but were usually either bipoined or straight based, and valued according to length, color, and fineness of flaking. The preference for exotic obsidians over locally available cherts probably related to the occurrence of blocks of obsidian of sufficient size at the quarry sources that large, ostentatious finished pieces could be obtained. Although local cherts were utilized in the manufacture of projectile points and bifaces, obsidian is more easily flaked; it could be obtained in a variety of black, red, gray, banded, and mottled hues; and it could be manipulated by skilled craftsmen into aesthetically pleasing forms. The distance involved in securing large obsidian pieces (some up to 30" long) added to their value and scarcity. These obsidian implements, along with *Dentalium*

shells, red woodpecker scalps, and albino deerskins, formed an integral part of the wealth emphasis and ceremonial complex so apparent among groups of northwestern California Indians.

THE ETHNOGRAPHIC MOVEMENT OF OBSIDIAN IN NORTHWESTERN CALIFORNIA

The remarkable ethnographic record available for much of northern California provides an important benchmark from which studies of prehistoric exchange can proceed. Of northwestern California, Kroeber observed that

All of the obsidian used by the tribes of this region comes from up the Klamath River and no doubt had its origin in the deposits in the headwaters of this stream [Kroeber 1905:691].

The Yurok told me of nodules of obsidian occurring in the Siskiyou Mountains, especially in the Karok region. But the Karok said that these sufficed only for short points, and that no Indian they knew of could in their time manufacture the large, symmetrical, evenly flaked blades, but that they had originated somewhere upstream. This agrees with all signs and clues known to me [Kroeber 1960:214].

Kroeber's remarks were echoed by later ethnographers in the region; Goldschmidt and Driver (1940:120) reported that among the Hupa

. . . flints are of two kinds: a red obsidian that presumably comes from the south, and a black obsidian that comes from the Shasta region in northeast California.

Among the Western Shasta and Western Achumawi large ceremonial bifaces were manufactured but not used:

[The] black and cloudy red variety [was] carried occasionally in War dance, but not kept for long; chiefly sent down-river to Karuk. SE [Eastern Shasta] near Glass

Mountain made those large blades used down-river [Voegelin 1942:201].

Although northeast California was acknowledged as the principal source of obsidian used by the ethnographic Tolowa, south-central Oregon was also mentioned:

Mr. Sam Lopez, aged seventy-nine, recalled how his father had been engaged in a regular overland trade for obsidian from the vicinity of Bend, Oregon. Much of this material was brought down the Klamath River, too, mainly by Hupa, Karok, and Yurok traders [Gould 1966a:79; 1966b:61].

The Glass Buttes area of central Oregon was reported to have been visited for obsidian, in all likelihood during the historic period, by the Karok (Forbes *in* Mack 1975:48).

In summary, there is abundant documentation for the Glass Mountain area (Medicine Lake Highlands) of northeast California as the chief contributor of obsidian to groups of northwest California (cf. Davis 1961). The principal route seems to have been down the Klamath River, with the Shasta and Achumawi often mentioned as middlemen or direct suppliers; the Shasta appeared to have been pivotal to the northwest groups (Hupa, Karok, Yurok, Wiyot), while the Achumawi were central to the obsidian acquisitions of the Wintu, Maidu, Yana, and Atsugewi.

OBSIDIAN AND CEREMONY IN NORTHWESTERN CALIFORNIA

Kroeber (1905, 1925, 1960, 1976:45-47), Goddard (1903), Drucker (1937), and Goldschmidt and Driver (1940), among others, all noted the importance of obsidian in social and religious aspects of the lives of northwestern California groups.

A myth recounts that *wo'ge* (an immortal being) tried to turn this promontory (Flint Rock head, *okne'get*) into obsidian so the

Indians could make arrow-points there. Although he did not succeed, his efforts left the rock marked with stripes of red [Waterman 1920:233].

Throughout this entire area, obsidian bifaces ("blades") were often considered sacred, and were important markers of wealth and social rank (cf. Thompson 1916:101-110). During ethnographic times, these ceremonial bifaces were owned by individuals or individual families, passed from father to son, and retained as heirlooms; they were seldom destroyed upon the death of the owner, nor were they buried with him (Rust 1905:688; Kroeber 1905:691; 1925:39). They were occasionally used as currency: "A *Ho'pew* village Yurok paid for his Wiyot wife nine strings of dentalia, an obsidian blade, a woodpecker headband" (Kroeber 1960:214; see also Powers 1976:79). They were sometimes used in payment for an insult or crime (Goldschmidt and Driver 1940:106, endnote 8; Spott and Kroeber 1942:211-212), but were most frequently concealed by their owners and reserved for ostentatious display at public dances. Rust (1905:688) reported that

In almost every instance the owners were reluctant to show these blades. All were carefully wrapped in redwood bark and carefully hidden away, sometimes under the floor of the lodge, oftener outside beyond the knowledge of any one except the owner. In one instance the owner could not be induced to get his blade until night-fall, in order that no one should learn of its hiding place.

Since broken bifaces were virtually without value, the Yurok

. . . carefully handled and stowed [them]: obsidians in sand-filled stone cysts in the ground indoors, with transport in fitted cases of redwood bark carried inside hollow-cylinder trunks or in close-woven conical seed-gathering baskets [Kroeber 1960:215].

The ceremonial system within which these bifaces functioned was shared in essentially the same form by the Yurok, Karok, and Hupa; the Wiyot and Tolowa possessed related but somewhat aberrant versions. The White Deer-skin Dance was by far the most prestigious, wherein the largest and most valuable obsidian bifaces were displayed; obsidian bifaces were not documented for the Jumping, or Woodpecker, Dance; and only the smaller, less valuable obsidians were presented at the Brush Dance.

During the White Deerskin Dance matched pairs of obsidian bifaces of the same color were alternately exhibited. At the Yurok Brush Dance small obsidian bifaces mounted on sticks were carried (see Goddard 1903:Plate 4 for a Hupa example), while a Wiyot version of the White Deerskin Dance (*wišiō'lawak* ?) included a line of dancers "some of whom wore obsidian blades hanging from the neck, rather than carrying them as among other north-western tribes" (Kroeber 1925:62, 118-119).

Wealthy individuals exercised ceremonial control through alliances with their counterparts in adjacent villages:

[Important dances were] held only at certain villages, but are always participated in by the people of other villages. The dances are performed by two or more parties, which aim to outdo one another in the display of wealth. At a dance held at a certain village a certain man is usually recognized as the principal person or organizer of a party; but generally only a small part of the valuables displayed by his party are actually his property, the remainder being contributed by his wealthy friends living in other villages. In this way families living many miles apart, and perhaps entirely unrelated even by intermarriage, are often connected from generation to generation by close ties of friendship and mutual help, and the obligation of one to the other is clearly recognized [Kroeber 1905:691].

This inter-village ceremonial linkage af-

forded the wealthy access to information and resources which transcended any one village boundary, thus setting rich and influential persons apart from the bulk of the village population (cf. Cohen 1973; Bean 1974; Kroeber 1925:39-40).

THE PROBLEM

With a model for the ethnographic movement of obsidian and a brief description of the ceremonial system in hand, two further tasks remain: the documentation of the distribution of obsidian in northwestern California during some point in prehistoric time, and finally a comparison of these prehistoric data with the model derived from the ethnographic record.

In order to document changes or regularities in exchange through time, one must first secure adequate temporal control over the assemblage being compared to the ethnographic model. This time control is best obtained through examination of single component sites, culturally stratified sites, or through analysis of grave lots in which the age of the associated artifacts is known. In this particular case, the Gunther Island site was selected for analysis because obsidian artifacts were found associated with burials and "cremations," the graves were stratified by depth, the site could be linked to the ethnographic Wiyot, and a radiocarbon date was available which facilitated placement in time.

THE GUNTHER ISLAND SITE (CA-Hum-67), *DULAWO'T*

During the ethnographic period, the Humboldt Bay region of northwestern California was inhabited by the Wiyot. One of the principal Wiyot occupation sites during this time was *Dulawo't* on Gunther, or Indian, Island opposite the present city of Eureka (Fig. 1). *Dulawo't* was occupied as late as 1860 and was

. . . 1 of the 2 largest Wiyot towns. The

wiṣiō'lawak dance was made here, indoors. They wore jumping-dance regalia but it was a different dance [Nomland and Kroeber 1936:42].

For about two months during 1913, L.L. Loud (1918:350-356, 399) conducted archaeological excavations at *Dulawo't* and recorded 22 graves; 6 burials and 16 "cremations" (actually grave-pit burning). The material excavated by Loud 65 years ago constitutes the data base for the present study.

Subsequent to Loud's archaeological investigations, a radiocarbon date of 1050 ±200 B.P. was secured from the basal peat layer underlying the cultural deposit (Heizer and Elsasser 1964:35; Elsasser and Heizer 1966:2), suggesting that the use of *Dulawo't* did not predate 900 years ago. Assuming a relatively constant rate of midden accumulation for the past 900 years, we arrive at a figure of 30 cm. (about 1 ft.) of midden build-up per 104 years. Since the site was abandoned around 1860 and the deepest burials encountered by Loud were located at a depth of 1.46 meters (see Table 1), an age estimate of 606, or about 600 years, is indicated for these interments. This figure is in accord with an earlier estimate (Elsasser and Heizer 1966:57) and would allow ample time for occupation of the site before it began to be used for burial purposes.

All typable obsidian projectile points analyzed from Loud's excavation of *Dulawo't* graves were quite similar to an ethnographic example recorded among the Klamath River Yurok (Schumacher 1951:305e) although with slightly less pronounced barbs (see Fig. 2).

Therefore, based in part on the formal correspondence of prehistoric artifact assemblages (primarily bifaces and projectile points) with their ethnographic counterparts, it is suggested that sometime beginning around A.D. 1350 *Dulawo't* served as a burial site used by the ancestors of the ethnographic Wiyot (cf. Heizer 1964:133).

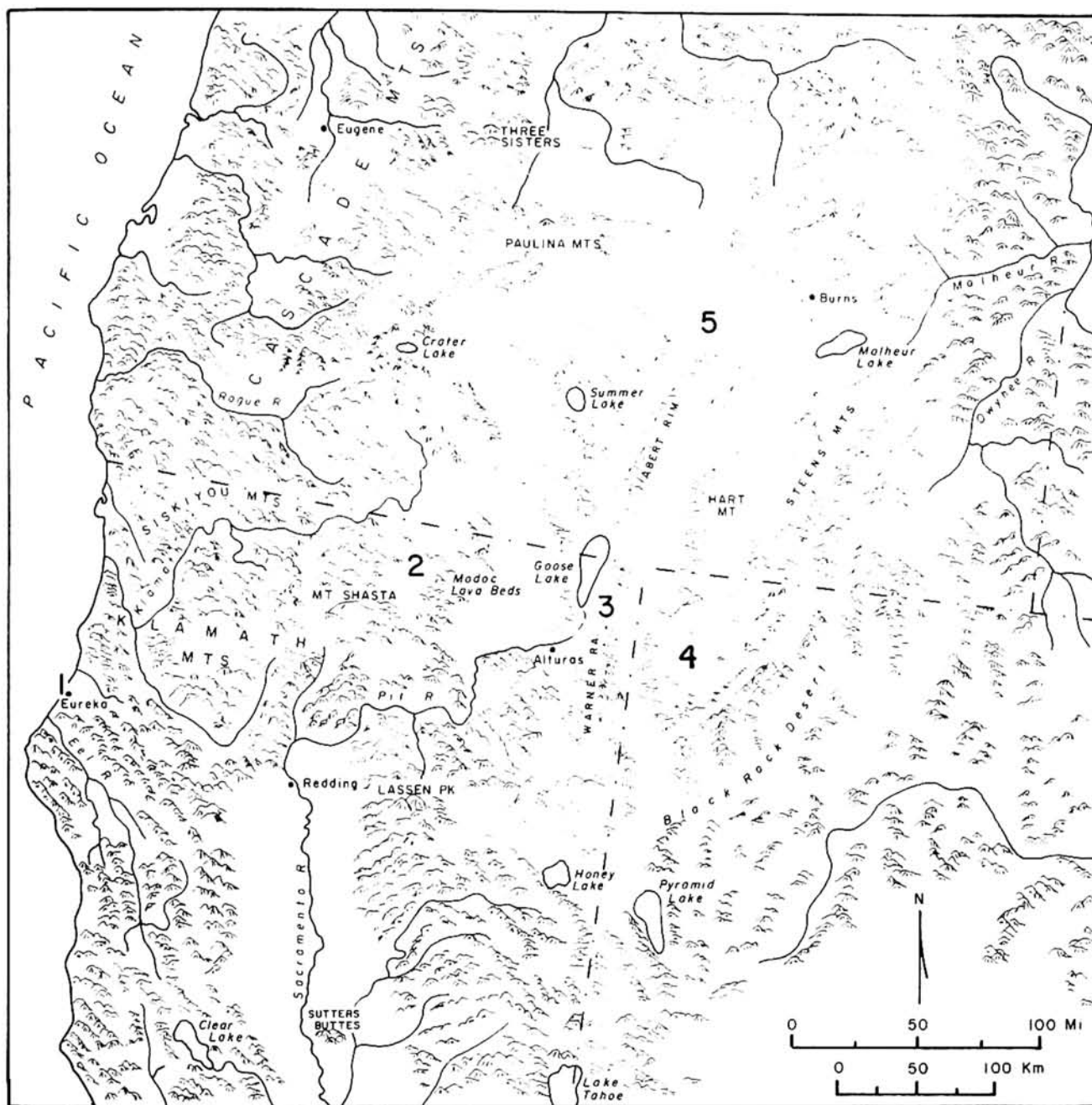


Fig. 1. Map of northern California, southern Oregon, and northwestern Nevada showing location of archaeological sites and obsidian sources referred to in text. 1, *Dulawo't* (CA-Hum-67); 2, Medicine Lake Highlands; 3, Warner Mountains; 4, Vya; 5, Glass Buttes.

RESULTS AND DISCUSSION

In order to determine if the ethnographic model was an adequate predictor of the prehistoric pattern, obsidian artifacts associated

with graves from Loud's (1918) excavation at *Dulawo't* were subjected to rapid scan semi-quantitative X-ray fluorescence analysis.¹ Six graves contained a total of 43 obsidian artifacts, of which 41 were available for analysis (Table 1).

Table 1
DISTRIBUTION OF OBSIDIAN ARTIFACTS ASSOCIATED WITH BURIALS
AT *DULAWOT* (CA-Hum-67)

Catalogue numbers are those of the Lowie Museum of Anthropology,
 University of California, Berkeley

RHLMA cat. no.	Description	Burial no.	Depth (cm.)	Obsidian Source	Illustration
1-18213	Biface	9	40	Glass Buttes	Loud 1918:Plate 13, no. 1
1-18214	Biface	9	40	Warner Mountains	Loud 1918:Plate 13, no. 2
1-18215	Biface	9	40	Warner Mountains	not illustrated
1-18218	Projectile point	9	40	Medicine Lake	not illustrated
1-18233	Biface fragment	19	52	Warner Mountains	Fig. 3c
1-18234	Biface fragment	19	52	Medicine Lake	Fig. 3b
1-18235	Biface fragment	19	52	Medicine Lake	Fig. 3a
1-18236	Biface fragment	19	52	Warner Mountains	not illustrated
1-18237	Biface fragment	19	52	Warner Mountains	not illustrated
1-18035	Projectile point	2	61	Medicine Lake	not illustrated
1-18040	Projectile point	2	61	Medicine Lake	Fig. 2a
1-18041	Projectile point	2	61	Medicine Lake	Fig. 2b
1-18042	Projectile point	2	61	Medicine Lake	Fig. 2c
1-18043	Projectile point	2	61	Medicine Lake	Fig. 2d
1-18044	Projectile point	2	61	Medicine Lake	Fig. 2e
1-18045	Projectile point	2	61	Medicine Lake	Fig. 2f
1-18046	Projectile point frag.	2	61	Medicine Lake	not illustrated
1-18047	Projectile point frag.	2	61	Medicine Lake	not illustrated
1-18048	Projectile point	2	61	Medicine Lake	Fig. 2g
1-18049	Projectile point	2	61	Medicine Lake	Fig. 2h
1-18050	Projectile point	2	61	Medicine Lake	Fig. 2i
1-18051	Projectile point tip	2	61	Medicine Lake	not illustrated
1-18003	Projectile point	4	61	Medicine Lake	Fig. 2j
1-18004	Projectile point	4	61	Medicine Lake	Fig. 2k
1-18005	Projectile point	4	61	Medicine Lake	Fig. 2l
1-18006	Projectile point	4	61	Medicine Lake	Fig. 2m
1-18007	Projectile point frag.	4	61	Medicine Lake	not illustrated
1-18008	Projectile point	4	61	Medicine Lake	Fig. 2n
1-18009	Projectile point frag.	4	61	Medicine Lake	not illustrated
1-18010	Biface fragment	4	61	Glass Buttes or Warner Mountains	not illustrated
1-18011	Biface fragment	4	61	Warner Mountains	not illustrated
1-18012	Biface	18	107	Vya	Fig. 3d
1-18094	Biface	14	146	Warner Mountains ?	not illustrated
1-18095	Biface	14	146	Vya	not illustrated
1-18099	Projectile point	14	146	Medicine Lake	Fig. 2o
1-18100	Projectile point	14	146	Medicine Lake	Fig. 2p
1-18101	Projectile point frag.	14	146	Medicine Lake	not illustrated
1-18102	Projectile point	14	146	Medicine Lake	Fig. 2q
1-18103	Projectile point	14	146	Medicine Lake	Fig. 2r
1-18104	Drill or Proj. point	14	146	Medicine Lake	Fig. 2s
1-18106	Drill	14	146	Medicine Lake	Loud 1918:Plate 14, no. 15

As is apparent from this table, the majority of obsidian artifacts recovered as grave associations at *Dulawo't* were made of material

derived from the Medicine Lake Highlands (Glass Mountain) area of Siskiyou County, northeast California, thus providing independ-

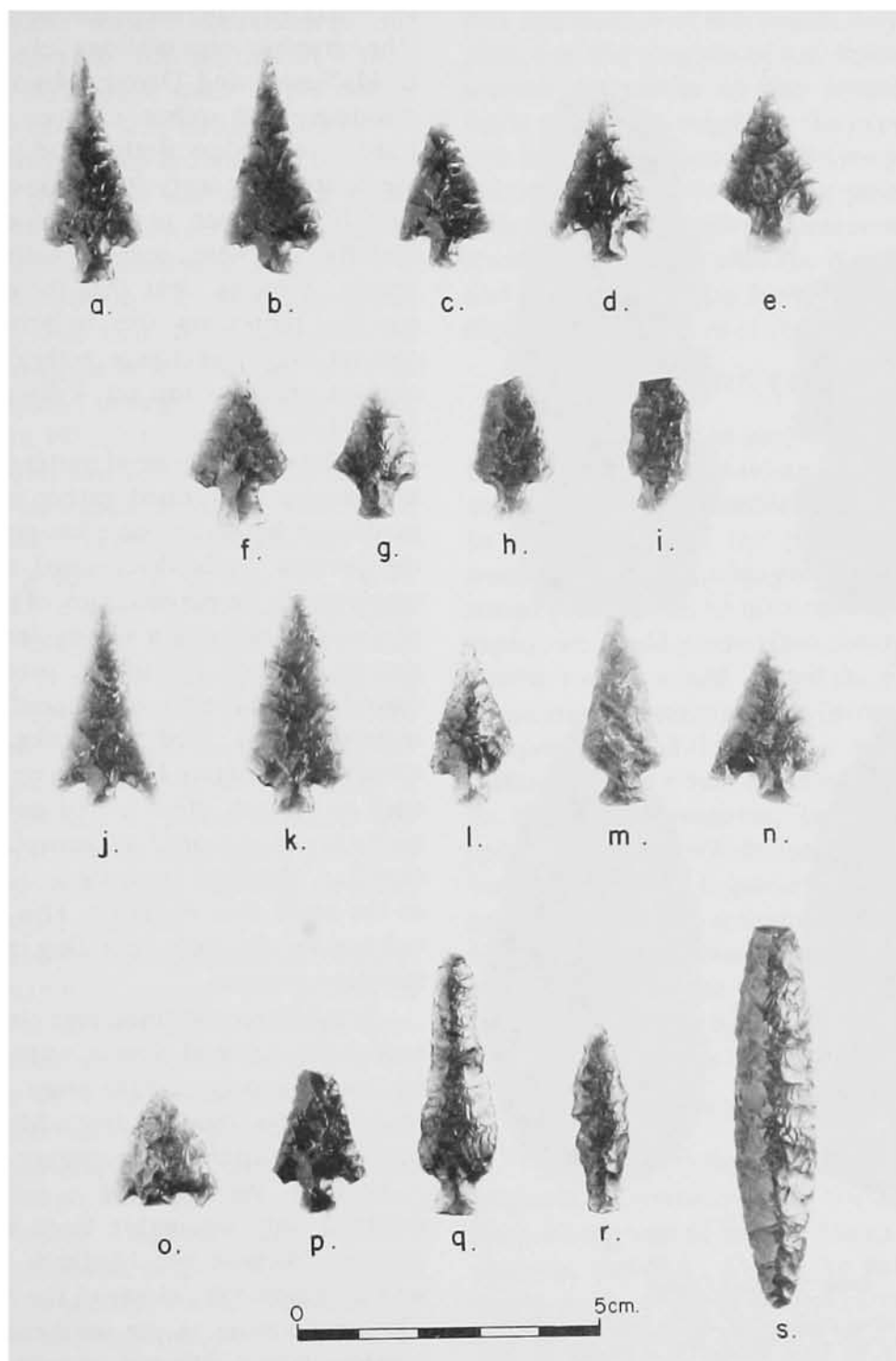


Fig. 2. Projectile points from *Dulawo't* (CA-Hum-67). *a-i*, Burial 2; *j-n*, Burial 4; *o-s*, Burial 14. See Table 1 for catalogue numbers and obsidian source assignment. Courtesy of the Lowie Museum of Anthropology, University of California, Berkeley.

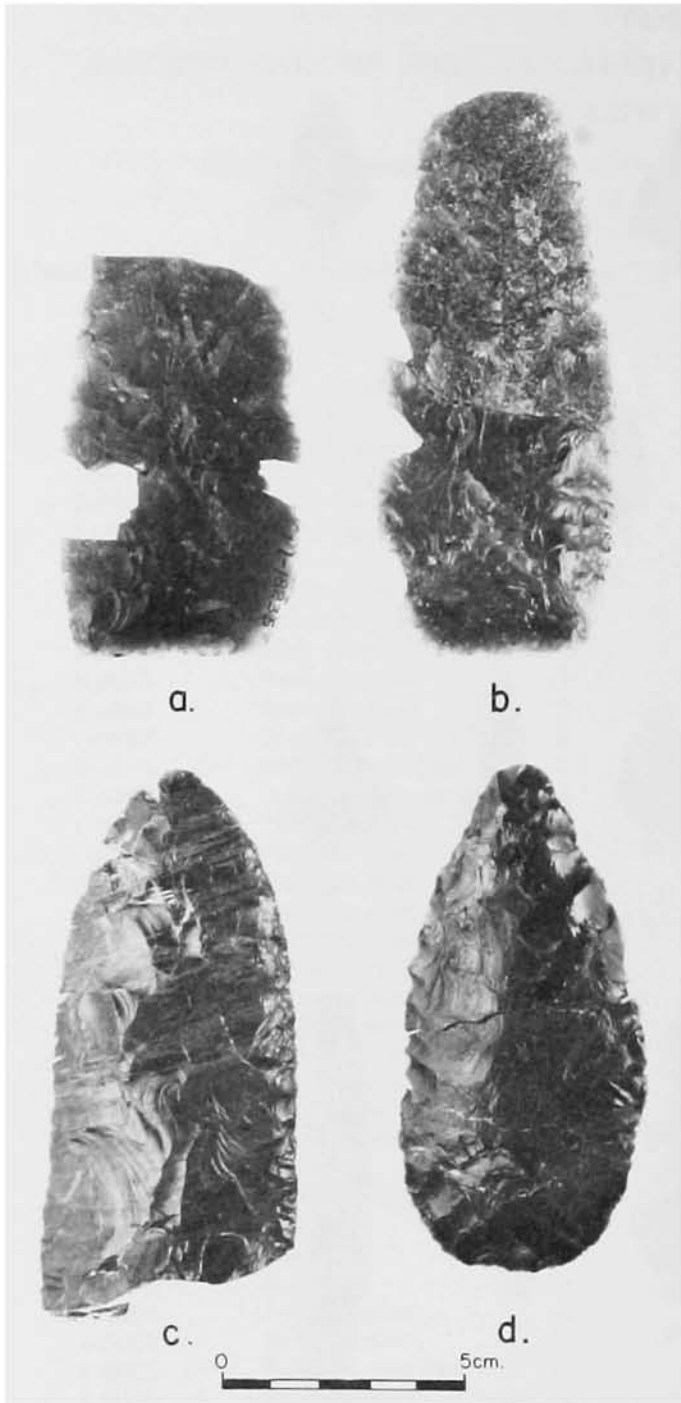


Fig. 3. Bifaces from *Dulawo't* (CA-Hum-67). *a-b*, Burial 19 (see note 5); *c*, Burial 19; *d*, Burial 18. See Table 1 for catalogue numbers and obsidian source assignment. Courtesy of the Lowie Museum of Anthropology, University of California, Berkeley.

ent verification for the prehistoric period of the ethnographic observations of Kroeber and Goldschmidt and Driver. Minor amounts of obsidian from other sources (the Warner Mountains,² Glass Buttes, and Vya) complete the source inventory (cf. Jackson 1972; Jack 1976:207). Since no objects of Caucasian manufacture were recorded with any of these graves, it seems clear that the obsidian they contain represents the by-product of pre-contact Wiyot exchange rather than a post-contact phenomenon (cf. Pilling and Pilling 1970:112).

Although the general pattern for obsidian acquisition conformed rather neatly to the prediction based on the ethnographic record, the present study determined that obsidian employed in the manufacture of certain classes of artifacts showed a strong tendency to be source-specific.³ All of the projectile points recorded with graves were manufactured from material from Medicine Lake, the closest obsidian source (see Fig. 1); larger implements such as bifaces, often of red obsidian,⁴ were, with two exceptions,⁵ all manufactured from obsidian obtained from more distant sources to the north and northeast. This suggests that cultural factors were operating in the material selection process.

It will be recalled that large obsidian bifaces used in ceremonial dances were often paired by color. I suggest that since red obsidian could not be obtained from Medicine Lake, but since custom and ceremony dictated that it be used, there existed a need for exotic material only attainable from more distant sources. Because the Medicine Lake source was geographically closer to the Wiyot (about 175 airline miles to the northeast) and other northwestern California groups, it may not have been as highly valued, hence its overwhelming popularity in the more common utilitarian items (such as projectile points). The distance involved in securing large red, or mottled red-and-black, obsidian bifaces from

as far away as the Warner Mountains (about 220 airline miles to the northeast), Glass Buttes (about 300 airline miles to the northeast) and Vya (about 250 airline miles to the east) undoubtedly added immeasurably to the value of these pieces, as well as to the social rank and wealth of their owners. If it is granted that "an individual's treatment at death is a reflection of the position occupied in a status system in life, and that differences between individual interments reflect the type of status system participated in (e.g., egalitarian versus ranked)" (Saxe 1971:39), persons buried with red or black obsidian bifaces must have been individuals of high social rank and remarkable social influence. There is ethnographic support for this proposition among the Yurok (Kroeber 1960:214; 1976:45-47, note 14), Hupa (Goddard 1903:84), and Tolowa (Gould 1966a:62; 1966b:73), as well as among northwestern California groups in general (Kroeber 1905:690, 695). If this is correct, the time depth for social ranking as inferred from ownership of obsidian bifaces can be placed at about 600 years among the Wiyot; although it probably extends farther back in time, we have as yet no convincing earlier evidence.

Unfortunately, there appeared no trends in this small sample to support the notion of increasing social differentiation through time. Heizer and Elsasser (1964:13-14) found no evidence from the Stuart excavations to support Loud's observation that primary inhumations were stratigraphically superior to "cremations" (grave-pit burning). The impression is that the wealth emphasis and material correlates of social rank in the form of obsidian bifaces appeared at the same time at *Dulawo't*, and were from the beginning oriented to the pattern evident in the latest interments.⁶ This impression is further supported by the presence of projectile points manufactured from Medicine Lake obsidian in both the deepest and shallowest graves. The observed continuity in the *Dulawo't* artifact assemblage, the sud-

den appearance of the wealth emphasis complex, and the absence of any known developmental precursors in the immediate area, lends additional weight to the hypothesis of a late incursion of ancestral Wiyot peoples into northwestern California.⁷ As pointed out by other researchers, this cultural complex shows strongest similarity with the Northwest Coast and it was presumably from this northern area that the predecessors of the Wiyot originated.

CONCLUDING COMMENTS

If the association suggested here between artifact class and obsidian source is a valid one, it should be possible to apply this model to the analysis of the prehistory of other northwestern California groups. If evidence of social ranking can be discerned in the ethnography, we would predict that obsidian from the closest source would contribute most heavily to utilitarian manufactures (projectile points, scrapers, utilized flakes, etc.), while the more distant sources would contribute more heavily to the socio-ceremonial (or its equivalent) sphere (cf. Irwin-Williams 1977:147). Conversely, we would hypothesize that egalitarian social organization would not be characterized by significant differences between artifact class and obsidian source (cf. Fried 1967; Ericson 1977). These distinctions are offered as working hypotheses to be tested by future research.⁸

ACKNOWLEDGEMENTS

I would like to thank Frank Norick, Lowie Museum of Anthropology, for arranging for the loan of most of the specimens used in this analysis, and R.F. Heizer for valuable comments on the original version of this paper, as well as for making available additional specimens from Hum-67 previously analyzed by R.N. Jack (1976). L.R. Kittleman, University of Oregon Museum of Natural History, generously donated samples from obsidian sources in Oregon and northeast California, and T.N. Layton supplied specimens from northwest-

ern Nevada. I thank Jennie Goodrich for Figure 1, and Gene Prince for Figures 2 and 3. Thanks also go to Tom Jackson and Jon Ericson for help and encouragement and, especially, to Joachim Hampel for technical assistance and advice. D.A. Fredrickson, S. Silver, and N.L. French provided constructive comments on an earlier version of the manuscript. While all of these individuals were of help in many ways, I am responsible for the opinions, speculation, and shortcomings contained herein.

University of California, Davis

NOTES

1. During the past several years, significant advances have been made in the characterization of the chemical composition of volcanic glasses (Weaver and Stross 1965; Stross et al. 1968; Jack and Heizer 1968; Jack and Carmichael 1969; Ericson et al. 1975; Taylor 1976). One of the most important findings in connection with early studies was that the chemical composition of major trace elements of individual obsidian flows, or parent magma pools, were virtually homogeneous, and further that the differences between obsidian flows could often be expressed through determination of the relative peak amplitudes of only three minor trace elements; rubidium ($Rb K\alpha$), strontium ($Sr K\alpha$), and zirconium ($Zr K\alpha$). While the relative peak amplitudes of these three elements will not distinguish between geographical sources of obsidian in every case (Jackson 1974:13-14; Jack 1976:188), the results obtained to date have been sufficiently encouraging to warrant continued use of the technique.

Rapid scan semi-quantitative X-ray fluorescence has been described in detail in recent publications (Jack and Carmichael 1969; Jack 1976), so only a cursory outline will be offered here. Briefly, this nondestructive technique consists of detection and graphic display of the relative peak amplitudes of the trace elements rubidium ($Rb K\alpha$), strontium ($Sr K\alpha$), yttrium ($Y K\alpha$), zirconium ($Zr K\alpha$) and niobium ($Nb K\alpha$). To "sense" the relative intensities of these elements, an X-ray target tube is used to excite the atoms present in

the obsidian sample. When the atoms are sufficiently excited, their characteristic emission lines are detected and sorted according to wavelength, and graphically displayed on a strip chart recorder. The relative peak intensities for each element are then read from the chart recorder, corrected for interference, and converted to percentages. These percentages are plotted on a ternary graph, where each dot represents the relative Rb/Sr/Zr concentration for one artifact or geological sample. Because of the chemical homogeneity characteristic of obsidian flows, the ternary diagram plots for one geographical obsidian source are usually quite similar. Consequently, once the range of chemical variation (or "fingerprint") is determined for a given obsidian flow or source area, artifacts can be quite accurately assigned to one or another of the geological sources on the basis of best overall "fit."

The analysis reported herein was undertaken at the Department of Geology and Geophysics, University of California, Berkeley, on a Norelco (Philips) Universal Vacuum Spectrograph using a tungsten (W) target tube, LiF-220 analyzing crystal, scintillation detector with pulse height discrimination, in an air path. A counting rate of 1000 counts/second was employed, and all scans were made at 2 degrees (2θ) per minute.

2. I have chosen to use the term "Warner Mountains," rather than "Buck Mountain/Sugar Hill" (Jack 1976:196), as a general source designation since recent archaeological surveys have revealed that *at least* eight obsidian sources are present here, not merely two. Preliminary results of scans on material from these sources overlapped with those obtained by Jack from "Buck Mountain/Sugar Hill" so I have, for the time being, lumped them all together. Therefore in the present paper, the "Warner Mountains" source designation subsumes Jack's "Buck Mountain/Sugar Hill" as well as Ericson, Hagan, and Chesterman's (1976:227-228) "Fandango Valley."

3. Artifact classes used in the present study were: *utilitarian* (projectile points and fragments, drills) and *socio-ceremonial* (bifaces and fragments). The utilitarian category used herein corresponds with Binford's (1962:219) "technomic," while the socio-ceremonial class corresponds with Binford's "socio-technic" and "ideo-technic." I

have chosen to use different terms since there appears to be good evidence that bifaces functioned in both the social and ideological spheres in northwestern California society.

The distribution of artifacts by obsidian source and class was:

Obsidian Source	Artifact Class	
	utilitarian	socio-ceremonial
Medicine Lake	28	2*
non-Medicine Lake	0	11

*see note 5.

Chi-square significant at .01.

4. Although varieties of red obsidian are known from southern obsidian sources, notably at Napa Glass Mountain (Jackson 1974:7) and from the Clear Lake vicinity, no fingerprints characteristic of obsidian from these sources were obtained from the *Dulawo't* sample.

5. These specimens, 1-18234 (Fig. 3b) and 1-18235 (Fig. 3a) are both made from Medicine Lake obsidian. On the basis of form, we would predict that they both would have been fashioned from more distant material. However, their shape and size suggest that they may have functioned in the Brush Dance (cf. Goddard 1903:Plate 4) where "small obsidian blades mounted on sticks are carried, [but] all ornaments of considerable intrinsic value are reserved for the two great dances" (Kroeber 1925:62).

6. The pattern of disposal of bifaces with the dead runs counter to ethnographic data already presented. The reason for this discrepancy is not entirely clear; Cressman (1933b:18-19) was of the opinion that the property-emphasis complex of British Columbia had gradually moved south so that "property, instead of being something that might readily be buried with its owner, came to be a means of establishing status . . . and knives (sic) were then retained as objects of family wealth rather than buried with their owners." It is also conceivable that social boundaries were beginning to consolidate in northern California and southwestern Oregon, resulting in restriction or attenuation of the flow of material through existing exchange networks. If this had been so, the cost of these items would have encouraged hoarding.

7. The observed patterning of obsidian also suggests that the ancestors of the Wiyot must have known of, and received bifaces from, "exotic" sources before they arrived at *Dulawo't*. To test this hypothesis, an earlier site containing similar cultural material should be analyzed. The best candidate at the moment appears to be the Gold Hill site on the Rogue River in southwestern Oregon (Cressman 1933a, 1933b).

8. An earlier version of this paper was delivered at the 31st Annual Northwest Anthropological Conference, held at Pullman, Washington, April 7, 1978.

REFERENCES

- Bean, Lowell J.
1974 Social Organization in Native California. In *Antap: California Indian Political and Economic Organization*, Lowell John Bean and Thomas F. King, eds., pp. 11-34. Ballena Press Anthropological Papers No. 2.
- Binford, Lewis R.
1962 Archaeology as Anthropology. *American Antiquity* 28:217-225.
- Cohen, Y.A.
1973 To Be or Not to Be: An Anthropological Study of Identity. Work in progress.
- Cressman, Luther S.
1933a Aboriginal Burials in Southwestern Oregon. *American Anthropologist* 35:116-130.
1933b Contributions to the Archaeology of Oregon: Final Report on the Gold Hill Burial Site. University of Oregon Publication, Studies in Anthropology Vol. 1, Bulletin 1.
- Davis, James T.
1961 Trade Routes and Economic Exchange Among the Indians of California. Berkeley: University of California Archaeological Survey Reports No. 54.
- Drucker, Philip
1937 The Tolowa and Their Southwest Oregon Kin. University of California Publications in American Archaeology and Ethnology 36:221-300.

- Elsasser, Albert B., and Robert F. Heizer
 1966 Excavation of Two Northwestern California Coastal Sites. Berkeley: University of California Archaeological Survey Reports No. 67:1-149.
- Ericson, Jonathon E.
 1977 Egalitarian Exchange Systems in California: A Preliminary View. *In Exchange Systems in Prehistory*, T.K. Earle and J.E. Ericson, eds., pp. 109-126. New York: Academic Press.
- Ericson, Jonathon E., Timothy A. Hagan, and Charles W. Chesterman
 1976 Prehistoric Obsidian in California II: Geologic and Geographic Aspects. *In Advances in Obsidian Glass Studies: Archaeological and Geochemical Perspectives*, R.E. Taylor, ed., pp. 218-239. Park Ridge, New Jersey: Noyes Press.
- Ericson, J.E., A. Makishima, J. Mackenzie, and R. Berger
 1975 Chemical and Physical Properties of Obsidian: A Naturally Occurring Glass. *Journal of Non-Crystalline Solids* 17: 129-142.
- Fried, Morton H.
 1967 *The Evolution of Political Society*. New York: Random House.
- Goddard, Pliny Earle
 1903 *Life and Culture of the Hupa*. University of California Publications in American Archaeology and Ethnology 1:1-88.
- Goldschmidt, Walter R., and Harold E. Driver
 1940 *The Hupa White Deerskin Dance*. University of California Publications in American Archaeology and Ethnology 35:103-142.
- Gould, Richard A.
 1966a *The Wealth Quest Among the Tolowa Indians of Northwestern California*. *Proceedings of the American Philosophical Society* 110:67-89.
 1966b *Archaeology of the Point St. George Site, and Tolowa Prehistory*. University of California Publications in Anthropology No. 4.
- Heizer, Robert F.
 1964 *The Western Coast of North America*. *In Prehistoric Man in the New World*, J.D. Jennings and E. Norbeck, eds., pp. 117-148. Chicago: University of Chicago Press.
- Heizer, Robert F., and A.B. Elsasser
 1964 *Archaeology of Hum-67, the Gunther Island Site in Humboldt Bay, California*. Berkeley: University of California Archaeological Survey Reports No. 62:5-122.
- Irwin-Williams, Cynthia
 1977 *A Network Model for the Analysis of Prehistoric Trade*. *In Exchange Systems in Prehistory*, T.K. Earle and J.E. Ericson, eds., pp. 141-151. New York: Academic Press.
- Jack, Robert N.
 1976 *Prehistoric Obsidian in California I: Geochemical Aspects*. *In Advances in Obsidian Glass Studies*, R.E. Taylor, ed., pp. 183-217. Park Ridge, New Jersey: Noyes Press.
- Jack, R.N., and I.S.E. Carmichael
 1969 *The Chemical 'Fingerprinting' of Acid Volcanic Rocks*. *In Short Contributions to California Geology, Special Report 100:17-32*. California Division of Mines and Geology, San Francisco.
- Jack, Robert N., and Robert F. Heizer
 1968 *"Fingerprinting" of Some Mesoamerican Obsidian Artifacts*. Berkeley: Contributions of the University of California Archaeological Research Facility No. 5:81-100.
- Jackson, Thomas L.
 1972 *X-ray Fluorescence Analysis of Obsidian from 4-DNo-14*. *In Archaeological Investigations in the Redwood National Park Region, California*, by M.J. Moratto. Manuscript on file at the U.S. National Park Service, Tucson.
 1974 *The Economics of Obsidian in Central California Prehistory: Applications of X-ray Fluorescence Spectrography in Ar-*

chaeology. M.A. Thesis, San Francisco State University.

Kroeber, A.L.

- 1904 Types of Indian Culture in California. University of California Publications in American Archaeology and Ethnology 2:81-103.
- 1905 Notes. *American Anthropologist* 7:690-695.
- 1920 California Culture Provinces. University of California Publications in American Archaeology and Ethnology 17:151-169.
- 1922 Elements of Culture in Native California. University of California Publications in American Archaeology and Ethnology 13:259-328.
- 1925 Handbook of the Indians of California. Bureau of American Ethnology Bulletin 78.
- 1953 Cultural and Natural Areas of Native North America. University of California Press.
- 1960 Comparative Notes on the Structure of Yurok Culture. *In* The Structure of Twana Culture, by W.W. Elmendorf. Pullman: Washington State University Research Studies, Monographic Supplement 2.
- 1976 Yurok Myths. University of California Press.

Loud, Llewellyn L.

- 1918 Ethnogeography and Archaeology of the Wiyot Territory. University of California Publications in American Archaeology and Ethnology 14:221-436.

Mack, Joanne M.

- 1975 Cultural Resources Inventory of the Potential Glass Buttes Geothermal Lease Area, Lake, Harney and Deschutes Counties, Oregon. Manuscript on file with the Bureau of Land Management, Burns, Oregon.

Nomland, Gladys Ayer, and A.L. Kroeber

- 1936 Wiyot Towns. University of California

Publications in American Archaeology and Ethnology 35:39-48.

Pilling, Arnold R., and Patricia L. Pilling

- 1970 Cloth, Clothes, Hose, and Bows: Non-sedentary Merchants Among the Indians of Northwestern California. *In* Migration in Anthropology, pp. 97-119. Proceedings of the Spring Meeting of the American Ethnological Society, Seattle.

Powers, Stephen

- 1976 Tribes of California. University of California Press.

Rust, Horatio N.

- 1905 The Obsidian Blades of California. *American Anthropologist* 7:688-695.

Saxe, Arthur A.

- 1971 Social Dimensions of Mortuary Practices in a Mesolithic Population from Wadi Halfa, Sudan. *In* Approaches to the Social Dimensions of Mortuary Practices, J.A. Brown, ed., pp. 39-57. Society for American Archaeology Memoir 25.

Schumacher, Paul

- 1951 Stone-Flaking of the Klamath River Yurok. *In* The California Indians: A Source Book, R.F. Heizer and M.A. Whipple, eds., pp. 304-307. Berkeley: University of California Press.

Spott, Robert, and A.L. Kroeber

- 1942 Yurok Narratives. University of California Publications in American Archaeology and Ethnology 35:143-256.

Stross, F.H., J.R. Weaver, G.E.A. Wyld, R.F. Heizer, and J.A. Graham

- 1968 Analysis of American Obsidians by X-ray Fluorescence and Neutron Activation Analysis. Berkeley: Contributions of the University of California Archaeological Research Facility No. 5:59-79.

Taylor, R.E., ed.

- 1976 Advances in Obsidian Glass Studies: Archaeological and Geochemical Perspectives. Park Ridge, New Jersey: Noyes Press.

Thompson, Lucy

1916 To the American Indian. Eureka: Cummins Print Shop.

Voegelin, Erminie W.

1942 Culture Element Distributions: XX, Northeast California. University of California Anthropological Records 7:47-251.

Waterman, T.T.

1920 Yurok Geography. University of Califor-

nia Publications in American Archaeology and Ethnology 16:177-314.

Weaver, J.R., and F.H. Stross

1965 Analysis by X-ray Fluorescence of Some American Obsidians. Berkeley: Contributions of the University of California Archaeological Research Facility No. 1: 89-93.

