Prehistory of the Lower Columbia and Willamette Valley

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The drainage area of the Lower Columbia River contains two regions that were culturally distinct at the time of Euro-American contact in the eighteenth century—the Lower Columbia valley with its primarily Chinookan population, and the Willamette Basin, the home of the Kalapuya and the Molala. The two areas were neatly divided at Willamette Falls, with the Willamette below the falls and its tributary the Clackamas River belonging in the Lower Columbia region.

It appears that only one major category of the effective environment, aquatic wildlife, sets the two valleys apart in any way similar to the cultural separation. The Columbia River has a much broader variety of fishes, and a larger fish population. At least 13 species of fishes found in the Columbia River did not inhabit the Willamette River system to a significant extent. Among these are sturgeon, salmon, and eulachon (Loy et al. 1976:160-161). Also worthy of mention in this context is the harbor seal, a sea mammal at home in freshwater in the Columbia River but not the Willamette below the falls. This brief comparison of the two valleys strongly suggests that the relative abundance of aquatic food resources in the Lower Columbia Valley and their corresponding lack in the Willamette Basin was the major factor influencing the divergence of the two cultures.

Early sites appear to reflect the hunting emphasis that presumably characterized the ancestral culture that first populated the southern Northwest Coast. Some suggestions of an early distinctiveness for Lower Columbia culture are found in the stylized ground stone tools (stone weights called bola stones, cobble celts, loaf stones) found regularly in undated early sites there but not in the Willamette area. Diverging developmental trends were probably well under way by 6000 B.C., if not earlier, and much of the divergence appears to have taken place by the time represented by dated bottomland sites in both valleys.

Lower Columbia Valley

For the Lower Columbia area chronologies have been devised for the Portland Basin (Pettigrew 1977, 1981) and for the Columbia Estuary (fig. 1) (Minor 1983). The Portland Basin chronology is a culture sequence originally defined to apply to the area between the Sandy River on the east and Rainier, Oregon, on the west, though it has been extended to include the area around Bonneville Dam (Pettigrew 1981:iii). The Portland Basin sequence covers only the time since about 600 B.C., because of the rarity of firmly dated assemblages older than that time.

The Portland Basin sequence includes two cultural phases, Merrybell and Multnomah, with the latter divided into three subphases. Various temporal markers are used to distinguish these phases and subphases. Most useful, because they are most common, are the projectile points, which shift from high proportions of large, broad-necked, stemmed points in the Merrybell phase to the predominance of smaller, narrow-necked, corner-notched, and then small side-notched points as the Multnomah phase unfolds (fig. 2). Other Merrybell diagnostics include flaked cylindrical bipoints and crescents, graphite, perforated ground stone pendants, peripherally flaked pebbles, and atlatl weights. Multnomah yields notched or perforated netsinkers, mule-ear knives, clay figurines, and incised clay tablets. After 1750, in Multnomah 3, historic trade goods and copper tubes are found.

The culture sequence for the Columbia Estuary (Minor 1983) covers the period of time from 6000 B.C. to A.D. 1851, though it is documented by radiocarbon dates only from about 1200 B.C. Human occupation at the mouth of the Columbia River is grouped into four temporally separate units: the Youngs River complex (6000-4000 B.C.), the Seal Island phase (4000 B.C.-A.D. 1), the Ilwaco phase (A.D. 1-1775), and the Historic phase (A.D. 1775-1851). The Ilwaco phase is divided into Ilwaco 1 (A.D. 1-1050) and Ilwaco 2 (A.D. 1050-1775). Projectile points, grouped by means of the Portland Basin typology (Pettigrew 1981), are very important diagnostic elements, but other artifact classes such as stone weights, atlatl weights, composite toggling harpoons, and dentalium shell beads are essential discriminating elements in the scheme as well (fig. 3). Sites from each of the phases have been excavated, but the Youngs River complex is represented only by surface collections from some of the sites

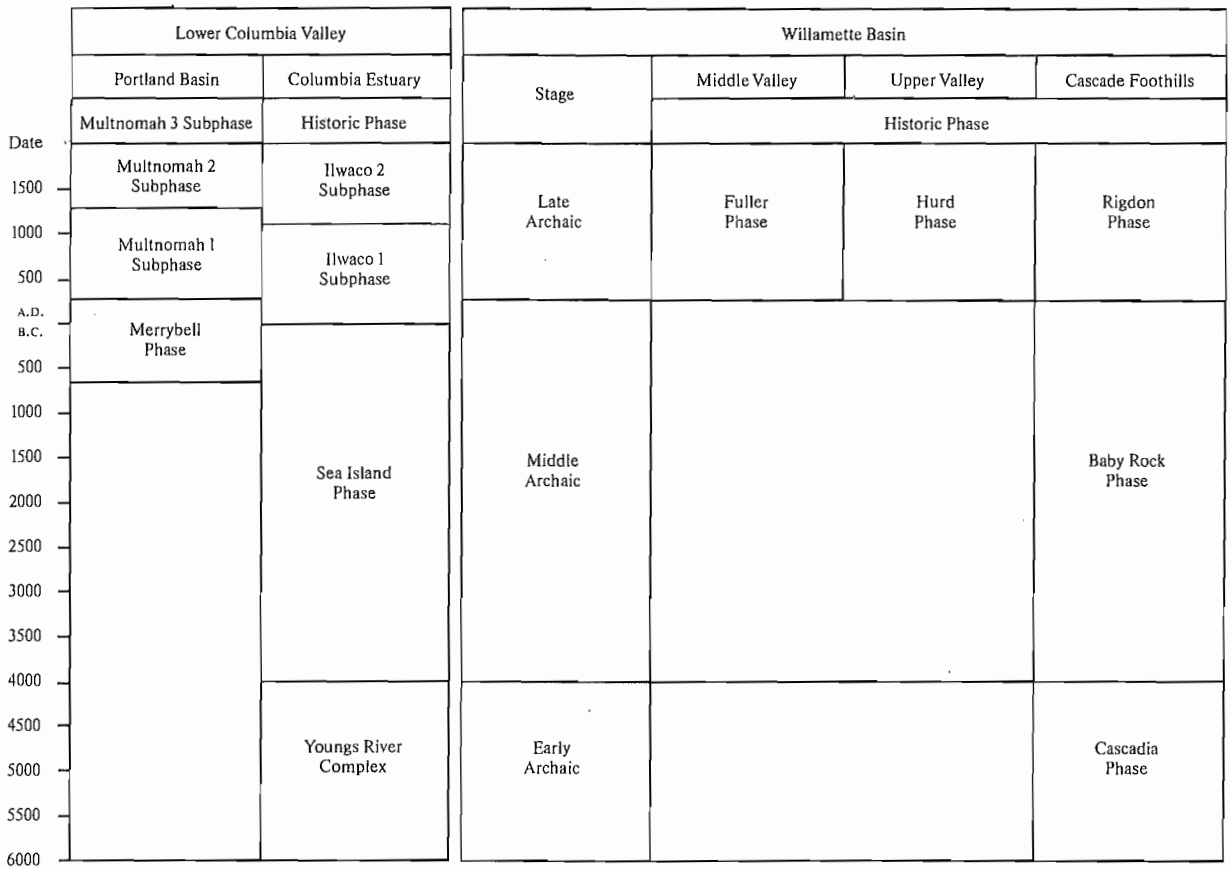

Fig. 1. Chronologies for the Lower Columbia Valley and the Willamette Basin.

presumed to be the oldest yet discovered in the area. A curious exception to the Columbia Estuary sequence is the Martin site (45PC7) (Kidd 1967; Shaw 1975) on North Beach Peninsula, where nearly all points are stemless, though the radiocarbon dates (A.D. 90 and 510) fit within the Ilwaco 1 subphase, in which small stemmed points predominate.

Youngs River complex diagnostics are shouldered lanceolate and willow-leaf-shaped points, stemmed scrapers, and stone weights. In Seal Island phase, broad-necked, stemmed points predominate. In Ilwaco 1, there are occasional atlatl weights and a low proportion of broad-necked points. By Ilwaco 2, broad-necked points are absent, and small side-notched points are evident.

Although earlier sites on the floodplain may exist, the earliest firmly dated cultural deposit in the Lower Columbia area is site 45CL31, on the southeastern shore of Vancouver Lake. A hearth feature there produced dates of 1560 and 1410 B.C. (Wessen and Daugherty 1983: B–110). Unfortunately, no tools were directly associated with the hearth. The next earliest firm date on the Lower Columbia area is at the Eddy Point site near the mouth of the Columbia River (Minor 1983:112–129). The lowermost stratum there produced a date of 1180 B.C., making it the earliest known component of the Seal Island phase (Minor 1983:184–188). Nearly as old is the lowest stratum of the Merrybell site (Pettigrew 1981:67–79) in the Portland Basin with one date of 930 B.C. and two of 900 B.C. These three sites mark the beginning of the period for which there is well dated evidence for human exploitation of the area.

Types of Sites

Signs of prehistoric human occupation on the Lower Columbia are found mostly in the narrow lowland belt (fig. 4). The Columbia River is at sea level (and has been so for much if not all of the past 10,000 years) for nearly all the distance up to the Cascades. Sea level began to rise shortly before 8000 B.C. and did not stabilize at its present elevation until perhaps 3000 B.C. (Fladmark 1975). Consequently, all sites located on the floodplain prior to about 3000 B.C. have probably been drowned and covered with alluvium.

It is not surprising, then, that the earliest known sites in the Lower Columbia region downstream from The Dalles

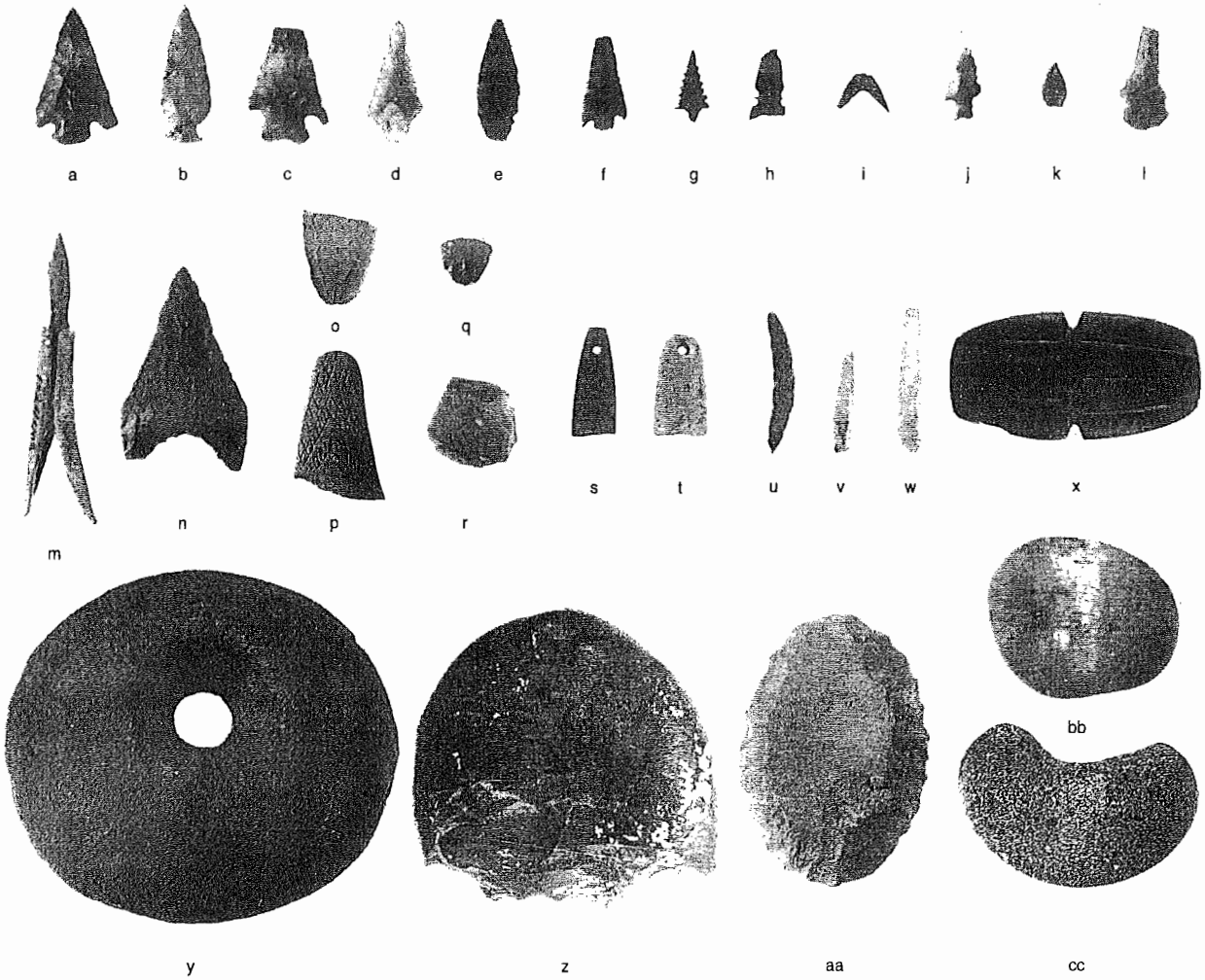

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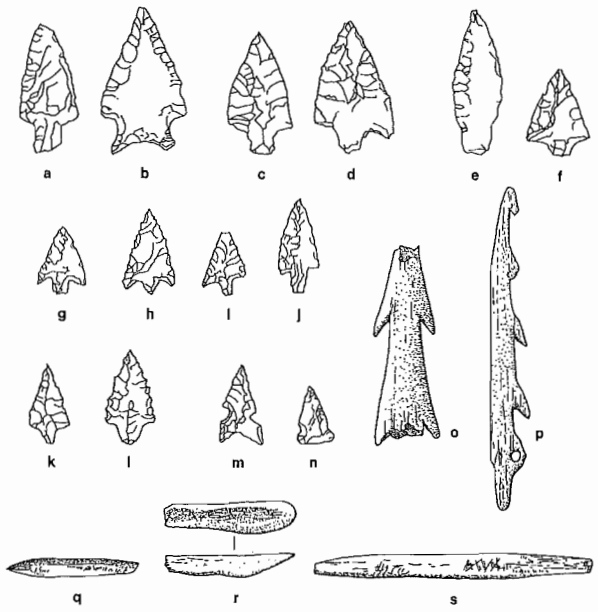
Fig. 2. Artifacts from the Merrybell and Multnomah phases, Portland Basin: a, Type 1 projectile point, Merrybell; b, Type 2 projectile point, Merrybell; c, Type 3 projectile point, Merrybell; d, Type 5 projectile point, Merrybell; e, Type 6a projectile point, Merrybell; f, Type 7 projectile point, Multnomah; g, Type 9 projectile point, Multnomah; h, Type 12 projectile point, Multnomah subphases 2–3; i, Type 13 projectile point, Multnomah subphases 2–3; j, Type 15 projectile point, Multnomah subphases 2–3; k, Type 16 projectile point, Multnomah subphase 1; l, stemmed drill, Merrybell; m, composite toggling harpoon head, Multnomah; n, mule-ear knife, Multnomah; o, clay figurine, Multnomah; p, clay tablet, Multnomah; q, small end scraper, Multnomah; r, large end scraper, Merrybell; s-t, perforated pendants, Merrybell; u, flaked crescent, Merrybell; v-w, flaked bipoints, Merrybell; x, atlatl weight, Merrybell; y, perforated sinker, Multnomah subphases 2–3; z, unifacially flaked cobble, Merrybell; aa, peripherally flaked cobble, Merrybell; bb, "wrap-marked" sinker, Multnomah subphase 1; cc, notched sinker, Multnomah subphase 1. Length of x 7.5 cm; rest to same scale.

are above the floodplain on surfaces that have been free of the depositional and erosive effects of the river since the end of the Pleistocene. These sites in the Portland Basin and Cascades zones can be divided into two categories: the upland sites, which are more than one kilometer from the river, and the peripheral sites, which are within one kilometer. Representative artifacts from these sites are shown in figure 5.

The best known of the upland sites is the Geertz site (Woodward 1972), just west of the Cascade Mountains. This site appears to be a seasonal hunting camp. The projectile points were all large willow-leaf-shaped forms, known to have been most common in adjacent regions from 6000 to 4000 B.C. The Geertz site may have been used by hunting parties whose homes were located on the Clackamas or Columbia rivers.

Another upland site (45CL54) (Tuohy and Bryan 1958–1959:29–32) appears to belong roughly to the same period as the Geertz site but has a much more heterogeneous assemblage, including all the artifact classes that the Geertz site produced, but also manos and metates, mortars and pestles, a sculpted cobble, a perforated cobble



after Minor 1983:105, 122, 124, 137, 140, 156, 167, 177.

Fig. 3. Projectile points from the Columbia Estuary: a, Type 2, Seal Island phase; b, Type 3, Seal Island phase; c–d, Type 4, Seal Island phase; e–f, Type 5, Seal Island phase; g–j, Type 9, Ilwaco phase; k–l, Type 10, Ilwaco phase; m–n, Type 12, Ilwaco subphase 2; o–p, single-piece harpoon heads, Seal Island phase, absent in Ilwaco subphase 2; q–s, composite toggling harpoon, with point (q), barbs (r), and foreshaft (s), Ilwaco phase. Length of s, 8 cm; rest to same scale.

with an edge-ground facet, a ground stone pipe, pitted cobbles, and hearths. Furthermore, the site produced a large sample of stone weights ("bola stones") known from components of the Windust phase on the Lower Snake River, dated 8500 to 6000 B.C. (Rice 1972), and from the Roadcut site at The Dalles, dated about 9000 to 6000 B.C. (Cressman et al. 1960). The projectile points are nearly all willow-leaf-shaped, and these and the ovate bifaces found at both sites are similar to those belonging to the Cascade phase on the Lower Snake River, dated 6000 to 2500 B.C. (Leonhardy and Rice 1970; Brauner 1976), and found in deposits of similar antiquity at the Roadcut site. Certainly hunting was a major activity at 45CL54, but the milling stones and the mortars and pestles represent the processing of vegetable foods as well. The ground stone pipe and the sculpted cobble suggest that this site was more than simply utilitarian.

The peripheral sites are all on forested or formerly forested surfaces that have not been subject to flooding by the river since about 9000 B.C., so that human use of these areas at any time since then could have left exposed traces. Because the cultural deposits at these sites are purely surficial, and there is no charcoal preserved for radiocarbon dating, the only possible means to date them is to compare their assemblages with other nearby and objectively dated assemblages.

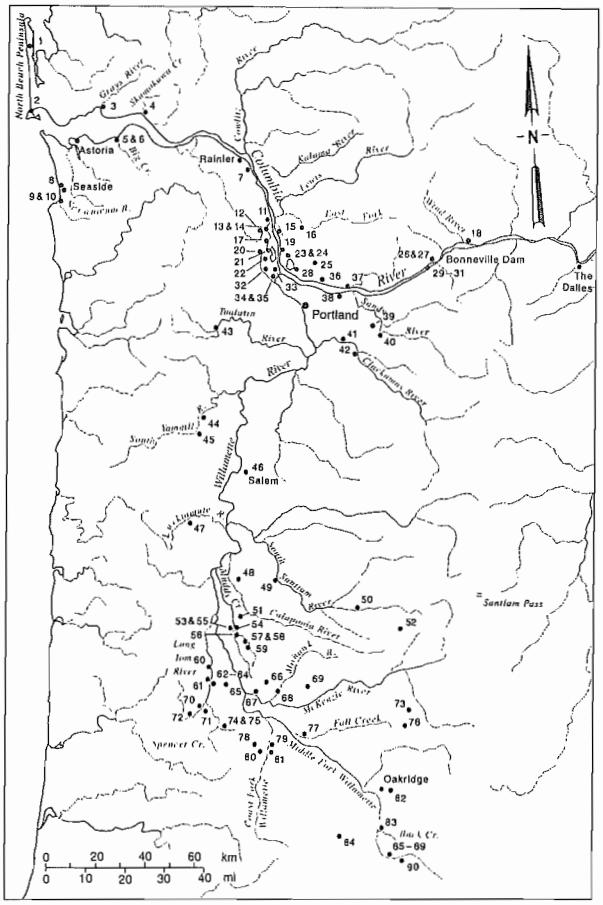


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Fig. 4. Archeological sites in the Lower Columbia and Willamette valleys: 1, Martin; 2, Fishing Rocks; 3, Burkhalter; 4, Skamokawa; 5, Ivy Station; 6, Eddy Point; 7, Trojan; 8, Ave. Q; 9, Par-Tee; 10, Palmrose; 11, Powell; 12, Decker; 13, Malarkey; 14, 35C03; 15, Bachelor Island; 16, 45CL54; 17, Meier; 18, Home Valley Park; 19, Herzog; 20, McClarin; 21, Pump House; 22, Cholick; 23, Kersting; 24, Duck Lake; 25, Schultz Marsh; 26, Caples; 27, 45SA11; 28, 45CL31; 29, 45SA12; 30, 45SA19; 31, 45SA13; 32, Coplin; 33, Lyons; 34, Merrybell; 35, Douglas; 36, Bishopbrick; 37, Lady Island; 38, Blue Lake; 39, Geertz; 40, Sandy; 41, Mostul Village; 42, Feldheimer; 43, Scoggins Creek; 44, Fuller Mound; 45, Fanning Mound; 46, Hager's Grove; 47, Luckiamute Hearth; 48, Templeton (Tangent); 49, Lebanon; 50, Cascadia Cave; 51, Halsey Mound; 52, Tidbits; 53, Kropf; 54, Miller Farm; 55, Simrock; 56, Barnes; 57, Davidson; 58, Lynch; 59, Spurland Mound; 60, Lingo; 61, Virgin Ranch Mound; 62, Benjamin; 63, Smithfield Mound; 64, Kirk Park; 65, Flanagan; 66, Beebe; 67, Hurd; 68, Mohawk River Clovis find; 69, Halverson; 70, Hannavan Creek; 71, Perkins Peninsula; 72, Long Tom; 73, Indian Ridge; 74, Bradley-Moen; 75, Ralston; 76, Sardine Confluence; 77, Fall Creek; 78, 35LA70; 79, Simons; 80, 35LA92; 81, 35LA118; 82, Baby Rock Shelter; 83, Buck Creek; 84, Bohemia Mining District Clovis find; 85, 35LA528; 86, 35LA529; 87, 35LA573; 88, 35LA574; 89, 35LA599; 90, Rigdon's Horse Pasture Cave.

Types of Artifacts

The most common artifacts found at the peripheral sites are unifacially flaked cobbles and projectile points. Other kinds of tools found include cobble celts, loaf stones, stone

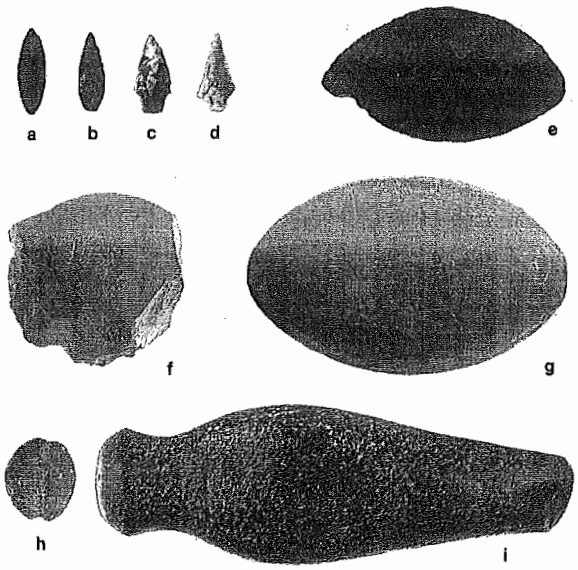

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Fig. 5. Artifacts from upland and peripheral sites, Portland Basin: a-b, Type 6a projectile points; c-d, Type 5 projectile points; e, ovate biface; f, unifacially flaked cobble; g, loaf-shaped stone; h, bola stone; i, cobble celt. Length of i, 21.6 cm; rest to scale.

weights, and foliate bifaces. Most of these tool classes are useful in estimating the temporal depth of the sites (Pettigrew 1981). Unifacially flaked cobbles at excavated sites on the floodplain are infrequent after 100 B.C. and practically absent after A.D. 200, and these generalizations should probably be applied also to the peripheral sites. The projectile points found are nearly all of early styles (large corner-notched, willow-leaf-shaped, broad-stemmed lanceolate) that suggest an antiquity of perhaps 8000 B.C. to as recent as 500 B.C. Cobble celts have a geographic distribution that centers in the Portland Basin, with specimens reported from as far away as Astoria to the west, the mouth of the Snake River to the east, and the Eugene area to the south. The only specimen found in a buried context is from the Flanagan site in the southern Willamette Valley, recovered below a level dated to 1350 B.C. (Toepel and Minor 1980). Bola stones suggest a date from 8500 to 6000 B.C., and foliate bifaces such as have been found in the peripheral sites are similar to others dated 6000 to 2600 B.C. Overall, then, it would appear that the peripheral sites were used mostly within the period 8000 to 1000 B.C.

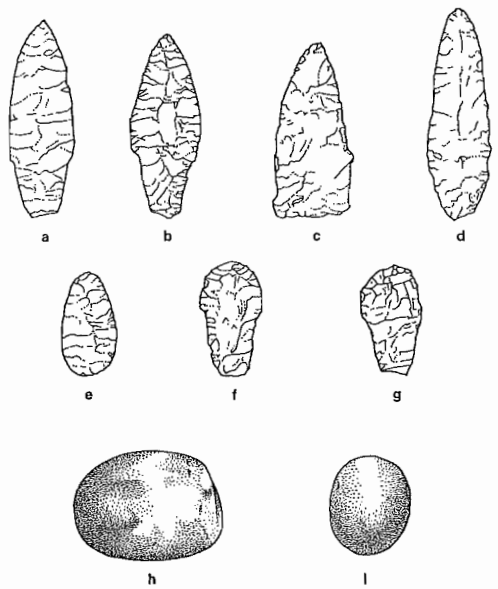
The uses to which these sites were put are unclear. The frequency of flaked cobbles and the forested vegetation suggest that wood products were being collected and processed. The presence of projectile points may indicate that hunting was a major activity. The cobble celts, loaf stones, stone weights, and foliate bifaces might have been originally deposited there as mortuary furniture; these areas may have been used for platform or tree interment, a practice known for the region in the historic period. Supporting this conjecture is the fact that nearly all the cobble celts and loaf stones reported from these sites are broken in half, a possible result of the ritual "killing" of the possessions of the deceased.

The only peripheral site that has been intensively studied is the Home Valley Park site (45SA17) (Dunnell and Lewarch 1974). Located in the Columbia Gorge on the northern margin of Lake Bonneville about 50 feet above the original floodplain of the Columbia River, the site contains a basically surficial cultural deposit. The horizontal patterning of the site showed many discrete clusters of debris, suggesting repeated use by small groups. The only chronologically diagnostic tool found was a fragmentary willow-leaf-shaped point. Small unifacially flaked tools were numerous. Also relatively numerous was the flaked cobble, which has become a hallmark of this type of site. Fire-cracked rock was also common, indicating frequent cooking activities; this kind of artifact is not usually reported in peripheral sites. The prehistoric function of this site seems to have been as a temporary seasonal camp used by small groups for hunting and gathering activities, a function that appears to distinguish it from the other known peripheral sites.

Apparently early but undated sites have also been noted at the mouth of the Columbia River by Minor (1983, 1984), who refers to this group of sites as the Youngs River complex. These sites, on terraces above Youngs River and Lewis and Clark River, have produced shouldered lanceolate and willow-leaf-shaped projectile points as well as stone weights and a kind of stemmed scraper (fig. 6).

A most unusual find that may also represent a period earlier than the earliest dated floodplain sites is the Kadow Collection, which was dredged from the bottom of Vancouver Lake (Wessen and Daugherty 1983:79–96). A majority of the projectile points were willow-leaf-shaped or broad-necked shouldered points. Among the other tools found were edge-ground cobbles, unifacially flaked cobbles, and a cobble celt.

Although the cultural chronologies for the Lower Columbia area clearly show stylistic change in artifact styles, as well as some probably functional additions or replacements of artifact classes, no fundamental change in the lifeway seems indicated for the last 3,000 years (a list of reported sites from this best documented period is given in table 1). For this reason, Minor (1983) was able to use sites from this entire period to illustrate the settlement and subsistence system used by the fully developed culture at the mouth of the Columbia River. The Eddy Point site contains a wide variety of faunal remains, including salmon, as well as many kinds of bone and antler tools, including specialized fishing tools such as barbed bone points and composite toggling harpoon valves. During the Merrybell phase rectangular house structures were built



after Minor 1984:6, 9, 14.

Fig. 6. Artifacts from the Youngs River complex, Columbia Estuary: a-b, shouldered lanceolate projectile points; c, straight-based lanceolate projectile point; d-e, foliate projectile points; f-g, stemmed scrapers; h-i, bola stones. Length of a, 6.5 cm; rest to same scale.

(Jermann, Lewarch, and Campbell 1975; Pettigrew 1981: 115). Large riverside settlements appear already to have been established by Seal Island phase and Merrybell phase times. A strong riverine orientation throughout this period seems indicated.

Development of the Historic Pattern

Woodworking seems to be a very ancient attribute of Lower Columbia culture, if the interpretation of flaked cobbles and cobble celts in the peripheral sites as woodworking tools is correct. Small ground-stone adz blades are present in the Merrybell phase, so they may have been introduced prior to that time. Woodworking as a major industry on the Lower Columbia was very likely already developed shortly after the end of the Pleistocene, when the coniferous forests of the Coast Range and the Cascade Mountains evolved to their present form. Cedar was already a major forest component in the Lower Columbia area by 7000 B.C., considerably earlier than in areas to the north (Hebda and Mathewes 1984a).

When the culture became heavily dependent on the salmon runs is difficult to determine. Notched netsinkers are very commonly found in sites affiliated with the Multnomah 1 subphase but are rare in sites of the Merrybell phase. Perhaps this indicates that seine nets were not used in the Merrybell phase. Surely salmon was an important resource in the Early period at The Dalles, where hundred of thousands of salmon vertebrae at the Roadcut site were found. It may be that the "bola stones" at the Roadcut site, as well as those in peripheral sites in the Portland Basin and in the Columbia Estuary, are netsinkers. Salmon have probably been taken on the Lower Columbia, at least at rapids and falls, since shortly after the end of the Pleistocene.

One of the most elusive aspects of prehistoric Lower Columbia culture is the development of the rich artistic tradition. The archeological problem apparently is that most artistic representations on the Lower Columbia were rendered on woods. The remaining examples of aboriginal art are petroglyphs and portable sculptures of stone, bone, and clay (Peterson 1978; Wingert 1952). Artistic representations occur in the Multnomah 1 subphase (A.D. 200–1250), but examples of art earlier than that are very rare.

Just when Lower Columbia culture evolved to a pattern similar to that recorded at contact is not possible to say. Surely the woodworking technology was a very early development; beyond this all that can be said with confidence is that the other hallmarks of the protohistoric culture were present at least as early as the beginning of the Multnomah phase. It seems that the most basic nonstylistic patterns were already in place by 1000 B.C., if not earlier.

Change did take place, as the Columbia Estuary and Portland Basin culture sequences show. Documented change was mostly stylistic, though many traits probably have functional and technological correlates. A major innovation between about 500 and 100 B.C. was the bow and arrow, which eventually replaced the atlatl. The introduction of the bow is evidenced by the appearance of small, narrow-necked projectile points thought to have tipped arrows and distinct from the more massive, broad-necked points that armed the atlatl dart. The degree of advantage offered by the bow is uncertain, but the two weapons systems were used side by side on the Lower Columbia for at least several hundred years, as indicated by the persistence of broad-necked points and atlatl weights in the Multnomah 1 and Ilwaco 1 subphases and by the discovery of whalebone atlatls at two sites (Phebus and Drucker 1975). These sites, on the coast near Seaside, probably affiliate with the Ilwaco 1 subphase. The atlatl disappears from the record by about A.D. 700 throughout the Lower Columbia area.

The Cascade Landslide

The changes wrought by a catastrophic event, the Cascade Landslide, may have been much more profound. At approximately A.D. 1250 a mountainside collapsed into the Columbia River near the present site of Bonneville Dam (Lawrence and Lawrence 1958), apparently creating a temporary earthen dam that impounded the waters of the river, which eventually broke through the dam and spilled out destructively into the valley downstream. The

Table 1. Documented Prehistoric Sites of the Lower Columbia Dated After 1000 B.C.

Phase	*Site*	*Source*
Merrybell	Merrybell (35MU9)	Pettigrew 1981
	Lady Island (45CL48)	Woodward 1977
	Kersting (45CL21)	Jermann, Lewarch and Campbell 1975
	Schultz Marsh (45CL29)	Chatters 1974
	Bachelor Island (45CL43)	Pettigrew 1981; Steele 1980
Seal Island	Eddy Point I (35CLT33)	Minor 1983
	Burkhalter (45WK51)	Minor 1983
	Skamokawa (45WK5)	Minor 1978, 1980, 1983
	Palmrose (35 CLT47)	Phebus and Drucker 1975
Multnomah 1	Cholick (35MU1)	Pettigrew 1981
	35CO3	Pettigrew 1981
	Malarkey (35CO4)	Pettigrew 1981
	Trojan (35CO1)	Warner and Warner 1975
	Sandy	Woodward 1974
Ilwaco 1	Ivy Station I (35CLT34)	Minor 1983
	Fishing Rocks I (45PC35)	Minor 1983
	Eddy Point II (35CLT33)	Minor 1983
	Skamokawa (45WK5)	Minor 1978, 1980, 1983
	Ave. Q (35CLT13)	Phebus and Drucker 1975
	Par-Tee (35CLT20)	Phebus and Drucker 1975
Multnomah 2	Meier (35CO5)	Pettigrew 1981
	Lyons (35MU6)	Pettigrew 1981
	Pump House (35CO7)	Pettigrew 1981
	45CL31	Wessen and Daugherty 1983
	Blue Lake (35MU24)	Archibald 1984
	Duck Lake (45CL6a)	Slocum and Matsen 1968
	Sandy	Woodward 1974
	Feldheimer	Woodward 1974
	45SA11	Skinner 1981
	Caples (45SA5)	Dunnell and Beck 1979
	45SA12	Dunnell and Campbell 1977
	45SA13	Dunnell and Campbell 1977
	45SA19	Dunnell and Campbell 1977
Ilwaco 2	Fishing Rocks II (45PC35)	Minor 1983
	Ivy Station II (35CLT34)	Minor 1983
Multnomah 3	Meier (35CO5)	Pettigrew 1981
	Lyons (35MU6)	Pettigrew 1981
	Pump House (35CO7)	Pettigrew 1981
	Herzog (45CL4)	Slocum and Matsen 1968; R. Jones 1972; Foreman and Foreman 1977
	Decker (35CO2)	R. Jones 1972
	Powell	R. Jones 1972
	Mostul Village	Woodward 1974
	45SA11	Skinner 1981

flood appears to have changed the floodplain topography and may have destroyed many, if not most, settlements in the Portland Basin and downstream. None of the prehistoric sites dated in the vicinity of the Bonneville Dam–Cascades area of the Columbia Gorge predates the landslide, which created the Cascades of the Columbia River, the series of rapids that made navigation so hazardous and the fishing so good for the aboriginal people of that locality. Furthermore, in the Portland Basin, sites that were occupied both just before and after the landslide are extremely rare or nonexistent (Pettigrew 1981:36). It would appear that settlement destruction and landform changes were so severe that virtually all subsequent floodplain sites were relocated. Though Minor

(1983:192) sees no evidence that the flood had any effect in the Columbia Estuary, with the possible exception of the abandonment of the Skamokawa site (Minor 1980:37), the evidence from his excavated sites on the river fits well with the Portland Basin data. The only excavated site on the river in that area that has components assigned to both the Ilwaco 1 and Ilwaco 2 subphase is the Ivy Station site. This site was assigned in part to the Ilwaco 1 subphase on the basis of a single radiocarbon date (A.D. 580), yet the assemblage found there is typical of Ilwaco 2 and Historic phase components (including small, side-notched points and historic debris) and contains no objects uniquely diagnostic of Ilwaco 1 or earlier phases (such as broad-necked, stemmed points, single-piece nontoggling harpoon points, girdled netsinkers, or atlatl weights). On this basis, it seems probable that Ivy Station is an Ilwaco 2–Historic phase site and that the riverine area of the Columbia Estuary may have suffered also from the Cascade Landslide flood.

The population loss caused by the catastrophe may have presented an opportunity for neighboring peoples to encroach upon this territory. The Caples site, situated on Cascade Landslide debris (Dunnell and Beck 1979), contains 41 circular housepits occupied within two or three centuries after the landslide. These circular depressions are clearly anomalous in the Lower Columbia area and may represent a short-lived intrusion by a group from the Plateau area.

In the centuries following the Cascade Landslide, it is clear that the population of the Lower Columbia rebounded and settlements were reestablished throughout the valley. The economic basis of the society was probably quite similar to its status before the landslide, but some suggestion of change comes in the form of an apparent replacement of the notched netsinker by the larger perforated sinker in the Portland Basin (Pettigrew 1981: 121). Perforated sinkers may have weighted heavy lines used in sturgeon fishing (Dunnell and Campbell 1977).

Willamette Basin

The culture sequence for the Willamette Basin includes the Cascade upland as well as the bottomland zone (Beckham, Minor, and Toepel 1981:157–175). As shown in figure 1, this chronology characterizes each of three areas (Middle Willamette Valley, Upper Willamette Valley, Cascade Foothills) in terms of both evolutionary stages and cultural phases. The Archaic stage is divided into Early (6000–4000 B.C.), Middle (4000 B.C.–A.D. 200), and Late (A.D. 200–1750). Early Archaic is the Cascadia phase (6000–4000 B.C.) in the Cascade Foothills, characterized by willow-leaf-shaped projectile points. No contemporaneous phase is defined for the Willamette Valley for lack of evidence. For the Middle Archaic broad-necked stemmed point types are diagnostic, and there is abundant evidence of plant processing. In the Late Archaic, narrow-necked point types are evident. In the Fuller phase, antler and bone tools are diagnostic, and there is evidence of fishing. Grave goods, especially marine shells, are found with burials. A list of some reported Willamette Valley sites is given in table 2, and sites from the Cascades Foothills in table 3. Characteristic Willamette Basin artifacts are shown in figure 7.

Sites and Artifacts

Early sites in the Willamette area are even rarer than on the Lower Columbia. Besides the two fluted points discussed above, two sites suggest evidence associating artifacts with remains of mammoth, thought to have become extinct in the Willamette Valley by about 8000 B.C. At the Lebanon site (Cressman and Laughlin 1941) a possible (but disputed) cobble tool was found directly associated with mammoth bones.

The earliest dated site in either the Willamette or Lower Columbia areas is Cascadia Cave (Newman 1966), in the Cascades foothills alongside the South Santiam River. Charcoal from a hearth near the bottom of the cultural deposit in this rockshelter was radiocarbon-dated to 5960 B.C. Evidence found in the excavation indicates that the cave was used not only for hunting mammals and birds but also for collecting and processing hazelnuts. Hunting tools (projectile points, large ovate bifaces) were found, as well as tools possibly used for milling vegetable foods (manos and metates, edge-ground cobbles). It is also important to note that Cascadia Cave is located on the best trail route linking the Willamette Valley and central Oregon (via Santiam Pass), so the site may have been a way station for travelers. The lower portion of the deposit contained only willow-leaf-shaped projectile points (thus the earliest dated style for the region), to which in the upper levels are added large side-notched and corner-notched specimens. No clearly recent styles were found, though it must be kept in mind that in places more than half of the culture deposit had been sifted by artifact collectors before the reported excavation was carried out, leaving only the lower portions of the deposit intact. Consequently, a terminal date for the occupation of the site is not possible to fix, and the rockshelter may have been used by aboriginal groups up to the time of contact.

The only other reported site in the Cascades foothills area that is firmly dated to before 5000 B.C. is Baby Rock Shelter (Olsen 1975), just east of the city of Oakridge. Though no radiocarbon dates were obtained from the site, the lowermost of four culture-bearing strata lies just below a layer of volcanic ash identified with the eruption of Mount Mazama (Crater Lake), dated to approximately 4200 B.C. Excavation of the site was limited in scale, and only a very small sample of artifacts was recovered from beneath the ash, so that nothing can be said about it except

Table 2. Selected Prehistoric Sites of the Willamette Valley

Site	*Date or Stage*	*Sources*
Halverson (35LA261)	A.D. 1790	Minor and Toepel 1982; Minor and Pickett 1982; Toepel and Sappington 1982
35LA568 (Kirk Park 2)	A.D. 1555, 1800+	Cheatham 1984
Lynch (35LIN36)	A.D. 670, 1150, 1950	Sanford 1975
Halsey Mound	Late Archaic, Historic	Laughlin 1941
Fanning Mound	Late Archaic, Historic	Murdy and Wentz 1975
Fuller Mound	Late Archaic, Historic	Woodward, Murdy, and Young 1975
Hurd (35LA44)	850, 830 B.C., A.D. 830 900, 900, 970, 1010, 1100, 1280, 1440, 1490, 1620, 1800, 1850, 1950	White 1975
Davidson (35LIN34)	Middle, Late Archaic, Historic	Davis, Aikens, and Henrickson 1973
35LA565 (Kirk Park 1)	A.D. 430, 780, 1410	Cheatham 1984
35LA118	A.D. 970	White 1975a
Perkins Peninsula (35LA282)	A.D. 730, 865	Cheatham 1984; L.R. Collins 1951
Simons (35LA116)	Late Archaic	Pettigrew 1975
Spurland Mound	Late Archaic (?)	Laughlin 1941; L.R. Collins 1951
Beebe (35LA216)	Late Archaic	Follansbee 1975
Simrock (35LIN21)	Late Archaic	W.A. Davis 1970
Kropf (35LIN22)	Late Archaic	W.A. Davis 1970
Miller Farm I (35LIN23)	Late Archaic (?)	Oman and Reagan 1971
Miller Farm II (35LIN24)	Late Archaic	Oman and Reagan 1971
Barnes (35LIN25)	Late Archaic	Oman and Reagan 1971
35LA70	Late Archaic	White 1975a
35LA92	Late Archaic	White 1975a
Virgin Ranch Mound	Late Archaic	White 1975a; L.R. Collins 1951
Smithfield Mound	Late Archaic	White 1975a; L.R. Collins 1951
35 MA9 (Hager's Grove)	1790 B.C., A.D. 730, 810, 1550	Pettigrew 1980
35MA7 (Hager's Grove)	1850, 920, 900, 730 B.C. A.D. 760	Pettigrew 1980
35LA567 (Kirk Park 3)	960, 810 B.C., A.D. 770	Cheatham 1984
35LA566 (Kirk Park 4)	1360, 530 B.C., A.D. 110	Cheatham 1984
35LA41 (Benjamin)	370 B.C., A.D. 310	F.E. Miller 1975
35LA42 (Benjamin)	Middle, Late Archaic	F.E. Miller 1975
Flanagan (35LA218)	3800, 3620, 1350, 1280 B.C., A.D. 110, 150, 170, 190 230, 270, 990, 1110, 1490	Toepel and Minor 1980; Beckham, Minor, and Toepel 1981
Scoggins Creek (35WN4)	Middle, Late Archaic (?)	W.A. Davis 1970a
Lingo (35LA29)	2180, 95 B.C.	Cordell 1975; White 1975a
Long Tom (35LA439)	2160, 1930 B.C.	O'Neill 1987
Bradley-Moen (35LA624)	2340 B.C.	R.D. Cheatham, personal communication 1984
Luckiamute Hearth	3300 B.C.	Reckendorf and Parsons 1966
Ralston (35LA625)	4575 B.C.	R.D. Cheatham, personal communication 1984
Hannavan Creek (35LA647)	5800, 4880 B.C.	Cheatham 1984; R.D. Cheatham, personal communication, 1984
Lebanon	Paleo-Indian (?)	Cressman and Laughlin 1941
Templeton	Paleo-Indian (?)	Cressman 1947

that it indicates use of the site at that early time. The levels above the ash produced a larger, though still small, sample of cultural debris that included willow-leaf-shaped, large side-notched, large corner-notched, small corner-notched, and small side-notched projectile points. These styles seem to represent a continuous, though perhaps not intensive, use of the site from 5000 B.C. to the contact period. That the terminal occupation of the site is so

recent is indicated by art on the rockshelter wall that includes representation of a horse and rider. Other cultural debris produced by the site includes a variety of unifacially and bifacially flaked stone tools, manos, a pestle, a mortar, an olivella shell bead, and an assemblage of faunal remains dominated by the bones of deer. Artifacts from the site and its location indicate use as a hunting and gathering camp.

The dated cultural record from the Willamette River drainage area is considerably older than that of the Lower Columbia area, with some of the oldest documented sites in the Cascades foothills. The oldest bottomland site is the Hannavan Creek site west of Eugene with dates of 5800 and 4880 B.C. on charred camas bulbs from an oven feature. These early dates on a camas oven are a surprising development in the context of previous reconstructions of Willamette Valley prehistory. The next oldest site from a bottomland setting is the Ralston site, not from the Willamette Valley proper but from a tributary valley on Spencer Creek southwest of Eugene, with a radiocarbon date of 4575 B.C. from a fire hearth and rock cluster buried in the creek bank. No food remains were recovered (Richard D. Cheatham, personal communication 1984). The Flanagan site, with dates of 3800 and 3620 B.C. from the lowest levels (Beckham, Minor, and Toepel 1981:136), contained low densities of flaked stone tools, suggesting that the location was used as a task-specific hunting camp (Toepel and Minor 1980:40).

The next earliest dated site in the lowland portions of the Willamette Valley is the Luckiamute Hearth site (Reckendorf and Parsons 1966). The hearth, in a pit 80 centimeters wide and 41 centimeters deep, included five charred acorns and was radiocarbon-dated at 3300 B.C. It seems clear that by 3300 B.C. the collection and processing of acorns was a part of the aboriginal economy.

The Long Tom site has yielded radiocarbon dates of 1930 and 2160 B.C. from a thick oven feature buried in alluvium. Though the site was almost devoid of flaked stone tools, it produced a charred acorn and two unidentified fruits, suggesting that the site represents the procurement and processing of plant foods.

Nearly as old but apparently different in function are the cultural deposits investigated at Hager's Grove in the city of Salem (Pettigrew 1980), where the earliest dates from the two excavated sites are 1850 and 1790 B.C. The earliest deposits at Hager's Grove give no evidence of the use of camas, while oven features dated about 900 B.C. suggest that it was in use by that time. Projectile points of about 1800 B.C. appear to have been almost exclusively willow-leaf-shaped in the northern Willamette Valley. After that time, perhaps by 900 B.C., broad-necked corner-notched points became established, though leaf-shaped points continued in lesser proportions.

At the Flanagan site an earth oven with charred camas bulbs was radiocarbon-dated to 1280 B.C. Aside from the much earlier dates from the Hannavan Creek site, this is the earliest date for the use of camas in the Willamette Valley.

The Flanagan site is typical of those excavated in that it is a mounded bottomland site of limited areal extent, occupied mostly within the last 3,000 years. A bottomland site that differs, in its greater areal extent and lack of a mound, is the Hurd site (White 1975), which has produced the only possible house feature—a circular pit house—found in the Willamette Basin. The only reported professional excavations of substantial size on the bottomland of the northern Willamette Valley are those from Hager's Grove (Pettigrew 1980). Other Willamette Valley sites are listed by White (1975a), Minor et al. (1980), and Beckham, Minor, and Toepel (1981).

Development of the Historic Pattern

Archeological evidence from the Willamette Valley sug-

Table 3. Selected Sites in the Cascades Foothills

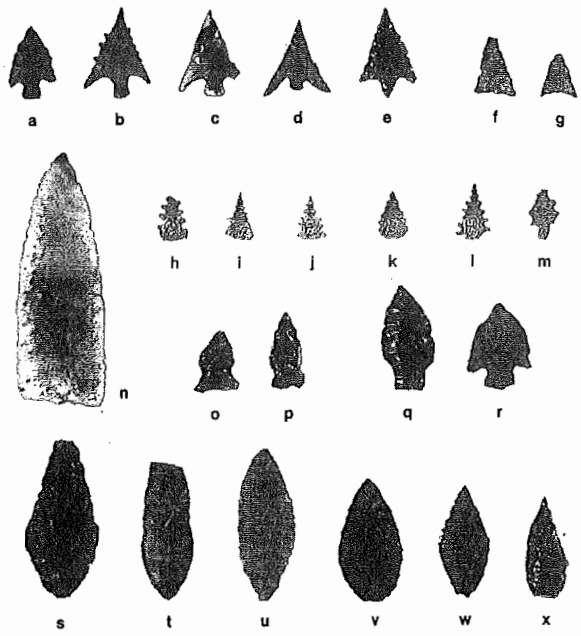
Site	*Date or Stage*	*Source*
Rigdon's Horse Pasture Cave (35LA39)	500 B.C., A.D. 1800	Baxter et al. 1983
Baby Rock Shelter (35LA53)	Early, Middle, Late Archaic, Historic	Olsen 1975
35LA574	Late Archaic	Baxter 1983
35LA573	Late Archaic (?)	Baxter 1983
Indian Ridge	Middle, Late Archaic (?)	Henn 1975
35LA33 (Fall Creek)	Middle, Late Archaic (?)	D.L. Cole 1968
Buck Creek (35LA297)	Middle, Late Archaic	Baxter 1984
35LA529	Middle, Late Archaic	Baxter 1983
35LA528	Middle, Late Archaic	Baxter 1983
Tidbits (35LIN100)	Middle Archaic	Minor and Toepel 1982a
35LA599	Middle Archaic	Baxter 1983
Sardine Confluence (35LA539)	Middle Archaic	Connolly and Baxter 1983
Cascadia Cave (35LIN11)	Early, Middle, Late (?) Archaic	Newman 1966

gests that the basic economic pattern of life documented for the historic Kalapuya, including the use of camas, was in place at least as early as 1280 B.C., though collection and cooking of camas is apparently documented 4,000 years before that. At least in the southern valley, sites dating since 1000 B.C. are frequent and scattered throughout the bottomland, evidencing a dispersed settlement pattern in which small family groups used one or more base camps throughout the growing season to take advantage of food resources that were available in particular zones at particular times of the year. The excavated bottomland sites of this period show a diversity of tools and features to indicate a great variety of economic activities, the most important of which were the collection and processing of vegetable foods, mostly camas (camas bulbs, earth ovens, mortars and pestles), and the hunting of birds and mammals (projectile points, faunal remains).

The cooking activities, and perhaps other kinds of activities as well, at these sites included the frequent digging of pits. This pit-digging, combined with the very diverse nature of the aboriginal activities, has made these sites difficult to interpret because of the churned nature of the cultural deposits and the consequent loss of the original context of the cultural items. Most valley bottom sites display a single dark culture-bearing stratum with no natural internal subdivisions, the only record of an average of about 2,000 years of intensive human activity. Therefore, the prehistory of the Willamette Valley over the past 3,000 years is very imperfectly understood, despite the significant number of sites excavated and reported for the period.

Changes in projectile point styles in the Willamette Valley followed the basic pattern described for the Lower Columbia Valley (Pettigrew 1981), with some differences. Broad-necked corner-notched points were common by 900 B.C., though willow-leaf-shaped points persisted. The bow and arrow apparently was introduced between about 500 and 100 B.C., signaled by the appearance of small, narrow-necked points. Small, side-notched points arrived some time after A.D. 1250, becoming more frequent shortly before contact. A form not known on the Lower Columbia, the "Christmas tree" style (small, triangular, unstemmed, with deep serrations), appears only in the southern Willamette Valley perhaps around 500 B.C., persisting about 1,000 years.

While the subsistence basis of Willamette Valley culture apparently remained fairly constant over the last 3,000 years, there is evidence that in protohistoric time some groups were heavily oriented to accumulation of wealth, a trait presumably derived from the cultures of the Lower Columbia and Lower Klamath rivers. Grave goods from burials found in the Fanning (Murdy and Wentz 1975) and Fuller (Woodward, Murdy, and Young 1975) mounds in the Yamhill River valley include: waisted



U. of Oreg., Oreg. State Mus. of Anthr., Eugene.

Fig. 7. Willamette Basin projectile points: a-e, narrow-necked, corner-notched projectile points (Late Archaic); f-g, triangular, concave-base projectile points (Late Archaic); h-m, "Christmas tree" projectile points (Middle and Late Archaic); n, lanceolate biface (possibly Early or Middle Archaic); o-p, small side-notched projectile points (Late Archaic); q-r, broad-necked projectile points (Middle Archaic); s-x, foliate projectile points (Early and Middle Archaic). Length of n, 7.2 cm; rest to same scale.

obsidian ceremonial knives, whalebone clubs, ear spools, olivella and glycymeris shell beads, and brass, copper, and glass trinkets. The extent of the accumulation of such wealth in the Willamette Valley is unknown; the only occurrences of something similar in the southern portion of the valley are a copper bead and dentalium shells from a burial at the Shedd Mounds on the Calapooia River (White 1975a:79–83).

The presence of early historic trade items in Willamette Valley sites is almost exclusively limited to the northern half of the area, suggesting that the southern half was somewhat insulated from Euro-American influences. The cultural distinction between the northern and southern halves of the valley is suggested by Beckham, Minor, and Toepel (1981:170) to have a time-depth of about 2,000 years.

Cascade Foothills

Cultural adaptation in the western Cascades Mountains seems not to have changed basically since about 8000 B.C. A primary dependence on hunting apparently persisted. The few sites there (table 3) have all yielded assemblages and have been located in places suggesting a hunting emphasis. Though no sites that may be winter encampments or villages in low-elevation valleys have been

investigated, the nature of the lithic debris at known sites is different enough from Willamette Valley bottomland sites to support the notion of a separate Cascades cultural province (D.L. Cole 1968; Grayson 1975; Baxter et al. 1983).

Cultural change in the Cascades Mountains area appears to have been only stylistic, with projectile point styles changing in much the same way as in adjacent areas. Early willow-leaf and large side-notched forms occur at Cascadia Cave in the period around and just after 6000 B.C. (Newman 1966), followed by broad-necked, corner-notched styles that were in vogue by 500 B.C. at Rigdon's Horse Pasture Cave (Baxter et al. 1983). As elsewhere in the region, the bow and arrow was introduced about 2,000 years ago, when corner-notched points became narrow-necked. The most popular style at contact appears to have been the small side-notched point (often called Desert Side-notched though it is found outside the Great Basin), as documented by its predominance at Rigdon's Horse Pasture Cave in the upper levels.

Conclusion

Cultural adaptation and development followed different courses in the Lower Columbia and Willamette regions. Presumably descended from a common cultural ancestor, cultures diverged most likely as a result of differing economic opportunities. Efficient utilization of the natural environment for human ends meant riverside nucleation and intensification of fishing activities to take advantage of the immense salmon runs in the Lower Columbia area, while the abundant but more dispersed resources of the Willamette Basin discouraged nucleation and encouraged a dispersed pattern of base camps or small villages and a more diverse array of primary economic activities. The cultural and economic distinctiveness of the two areas had already developed by the time periods represented by the earliest well-dated sites, possibly 5800 B.C. for the Willamette Valley and 1560 B.C. for the Lower Columbia Valley.