AN ABSTRACT OF THE THESIS OF

Judith A. Sanders Chapman for the degree of Master of Arts in Interdisciplinary Studies in Anthropology/History/History presented on April 6, 1984

Title: Willamette Mission Archeological Project: Phase III Assessment.

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David Brauner

The Willamette Mission archeological project consists of a broad program of cultural research in the fields of archeology, history, and architecture. The study focuses on the first Methodist mission in the Pacific Northwest. Archeological excavations were conducted in 1980 to locate the site of the mission, to assess the site's internal integrity, and to analyze the material content remaining from the 1830s occupation.

Historical documentation provided the archeologists with necessary information on the general location, spatial living pattern, time frame and material culture of the mission occupants. Archeological data provided additional information on the location and spatial

arrangement of the mission complex; the date range and the form and function of recovered artifacts; a behavioral concept of mission lifestyle; and the processes of abandonment of the mission complex in the historic period. The role of the mission enterprise within the general context of Oregon development is explored.

The founders of the mission colony were not intent on accomplishing their task of "civilizing" the local Native American population in a brief visit. The missionaries brought to the Oregon country their families, personal possessions, furnishings, goods, equipment, and construction materials. They built shelters, farmed, operated a mercantile business, taught school, held services, and performed essential mechanical duties.

The geographic isolation of the mission, and the missionaries response to the new environmént, are reflected in the archeological record. The architectural plan and featuring of the mission house points to a use of traditional log shelter construction techniques. These techniques involved the incorporation of native construction fabric with cottage made or imported joining materials. An inadequate response to the environment is evidenced by the erection of the mission house on a Willamette River floodplain. This error in reasoning as well as visions of expansion triggered a move from the complex to present Salem after a seven-year occupation.

The materials items recovered from the site reflect a material culture brought to the new country from the United States. An independency from the British Hudson Bay Company is inferred. A contradiction between the hardships of remote log cabin living and stringent missionary duties, and the retainment of New England social attitudes and customs is evident.

Important to areal archeological research and settlement studies are the implications behind the presence of the American missionaries and their goods in the Willamette Valley. Enlightened information on goods available during the Northwest frontier period can be useful in deciphering early trade networks, and avenues of cultural exchange and influence. The missionaries' inducement toward the promotion of American jurisdiction and settlement in the Oregon country was significant. The success of the missionaries as colonizers cannot be overstated considering the impact of the colony on the course of political, spiritual, social and economic development of the region.

Willamette Mission Archeological Project: Phase III Assessment

by

Judith A. Sanders Chapman

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PREFACE

The Willamette Mission archeological project was a cooperative effort between two graduate students within the Department of Anthropology at Oregon State University and their major professor, Dr. David Brauner. Judy Sanders Chapman, one of the graduate students, has sporadically worked on the project since its inception in 1979. Mary Weber joined the project in 1980.

After realizing they had devoted most of their time and energy to the mission project during their interdisciplinary studies, each graduate student felt it fitting to use the final archeological report as a thesis. Both students worked closely together during the research and analysis stages of the project. Though they wrote individual sections of the report, each feels comfortable offering a comprehensive explanation of the mission period in Oregon history.

Judy Sanders Chapman wrote the abstract, preface, acknowledgements, a portion of the physical setting, the historic overview, architectural features, material culture, buttons, glass beads, pipes, collectible rocks, pocketknife, watch fob, table utensils, cast iron vessels, brass container cap, strike-a-light, thimble, window glass, clay daub, wood, construction hardware, agriculture and husbandry items, hunting items, rivets, nuts, washer, bolt, screw, punch, slates, clay nodules, charcoal, shell, the initial draft of the discussion and conclusions, co-compilation of Appendix A, compilation of Appendix B.

Mary Weber wrote the signet ring seal section, mirror glass, "wash" bottle, alcohol bottle glass, tacks, ceramics, nails, brick, mortar, clinkers, faunal remains, final draft of discussion and conclusions, behavioral analysis, co-compilation of Appendix A. Both graduate students formulated the functional classification table of mission artifacts.

David Brauner offered overall advice and wrote the introduction, a portion of the physical setting, ethnographic setting, field methodology, brass crucifix, adze blade, and coal. All three authors contributed to the significance section of the report.

WILLAMETTE MISSION ARCHEOLOGICAL PROJECT:

PHASE III ASSESSMENT

INTRODUCTION

The Willamette Mission archeological project began in February 1979 with a request to Oregon State University from the Oregon State Historic Preservation Office for assistance in locating the 1834-1841 site of the Willamette Station of the Methodist Mission. The initial request was for an historical overview with an emphasis on pinpointing the exact location of the mission.

The specific location of the Willamette or "Jason Lee" Mission had been a recurring topic among Northwest historians since the latter part of the nineteenth century. Although agreement as to the general location of the mission was found in the literature, considerable debate surrounded the topic of the exact location. Acquisition of land for the Willamette Mission State Park, beginning in the early 1970s, rekindled the debate within the Oregon Parks and Recreation Division of the Department of Transportaton. Development of the 1682-acre park, which began in earnest in 1978, necessitated that the locational conflict finally be settled.

In response to this need, an extensive literature review was conducted by Judith Sanders, graduate research assistant with the Department of Anthropology, Oregon State University. Although a concise history of the mission was generated, too many contradictions and informational omissions were noted in the primary literature to allow definition of the precise location of the mission site (Sanders and Brauner 1979). The literature review did provide information on material culture which would aid in locating the mission site when combined with archeological field observations.

An archeological survey of the Mission Lake locality was authorized by the Oregon State Historic Preservation Office in April 1980. Fieldwork was conducted by archeologists from Oregon State University under the supervision of Dr. David Brauner. Archeological reconnaissance was confined to the east bank of the 1834 Willamette River channel, beginning several hundred meters north of the Wheatland ferry landing and extending to the southern end of Mission Lake (1834 river channel). Coverage extended from the river bank to approximately 200 meters to the east. The archeological reconnaissance team was operating on the assumption that the missionaries would have built their structures on high ground above the level of seasonal flooding. Several high areas were noted east of Mission Lake on aerial photographs of the 1964 flood. A low frequency scatter of historic debris on high ground adjacent to Mission Lake defined the only historic archeological site observed during the reconnaissance. Eight test units were excavated within the site area at localities promising, on the basis of surface indications, the most informational return. A total of 449 artifacts were recovered during reconnaissance and subsurface testing. This quickly verified the assumption that the missionaries had selected high ground for settlement. Analysis of the datable artifacts indicated an occupation predating 1850. The time frame, location, and functional sets of artifacts led the authors to conclude that the site of the mission, specifically the locations of the main house and blacksmith shop, had been found (Sanders and Weber 1980).

Because the east bank of Mission Lake was private property, a number of questions needed to be addressed before negotiations for acquisition of the land by the Parks and Recreation Division began. Paramount among the questions was the size of the mission complex. Also of importance were questions concerning the internal integrity and interpretive potential of the site. Answers to these questions were necessary to assess the site's potential for inclusion on the National Register of Historic Places. As a consequence, the Oregon State Historic Preservation Office requested an expanded program of archeological assessment of the site.

The expanded program of archeological assessment at the Willamette Station of the Methodist Mission represented the third and final phase of the Willamette Mission project. Fieldwork and laboratory analysis were accomplished by a team of archeologists from Oregon State University under the direction of Dr. David Brauner. Judith Sanders served as field foreman. Mary Weber and Alexy Simmons-Rogers operated the field laboratory. Dr. Leland Gilsen served as liaison archeologist for the State Historic Preservation Office. Fieldwork began with a crew of 15 field archeologists July 1, 1980, and terminated August 29, 1980. During testing and excavation, a total of 190 square meters of the site was excavated and 9541 artifacts recovered.

For this report, each artifact category was intensively researched within the framework of a functional classification. Combined with distributional data, the artifact analysis was directed toward the delineation of activity loci and architectural detail.

The appearance, material composition, and date range of each artifact is heavily emphasized not only to verify the mission occupation, but, more importantly, to establish a comparative tool for regional archeological research focusing on the early historic period in the Northwest.

PHYSICAL SETTING

The Willamette Mission site (35MA5001) is located in the central Willamette Valley, approximately 10 miles north of Salem, Oregon. The site is on the east side of Mission Lake in the W 1/2 of the NW 1/4 of Section 67, Township 6 South, Range 3 West, Marion County (Figure 1).

The Willamette Valley is approximately 125 miles long by 30 miles wide, and is bound by the Cascade Range to the east, the Calapooya Mountains to the south, the Coast Range to the west, and the Columbia River to the north. The valley is drained by the Willamette River system. The main stem of the Willamette River flows in a northerly direction to the Columbia River. The river grades from an elevation of 422 feet (MSL) near Eugene to 30 feet at its confluence with the Columbia River. The Willamette Mission site lies at an elevation of 110 feet above sea level. The valley has a modified marine climate with wet winters and warm, dry summers. Daily temperatures range from an average January minimum of about 55 degrees Fahrenheit on the valley floor to 20 degrees Fahrenheit at the crest of the Cascades, with an average July maximum of 80 to 83 degrees Fahrenheit on the valley floor and 75 degrees Fahrenheit on the

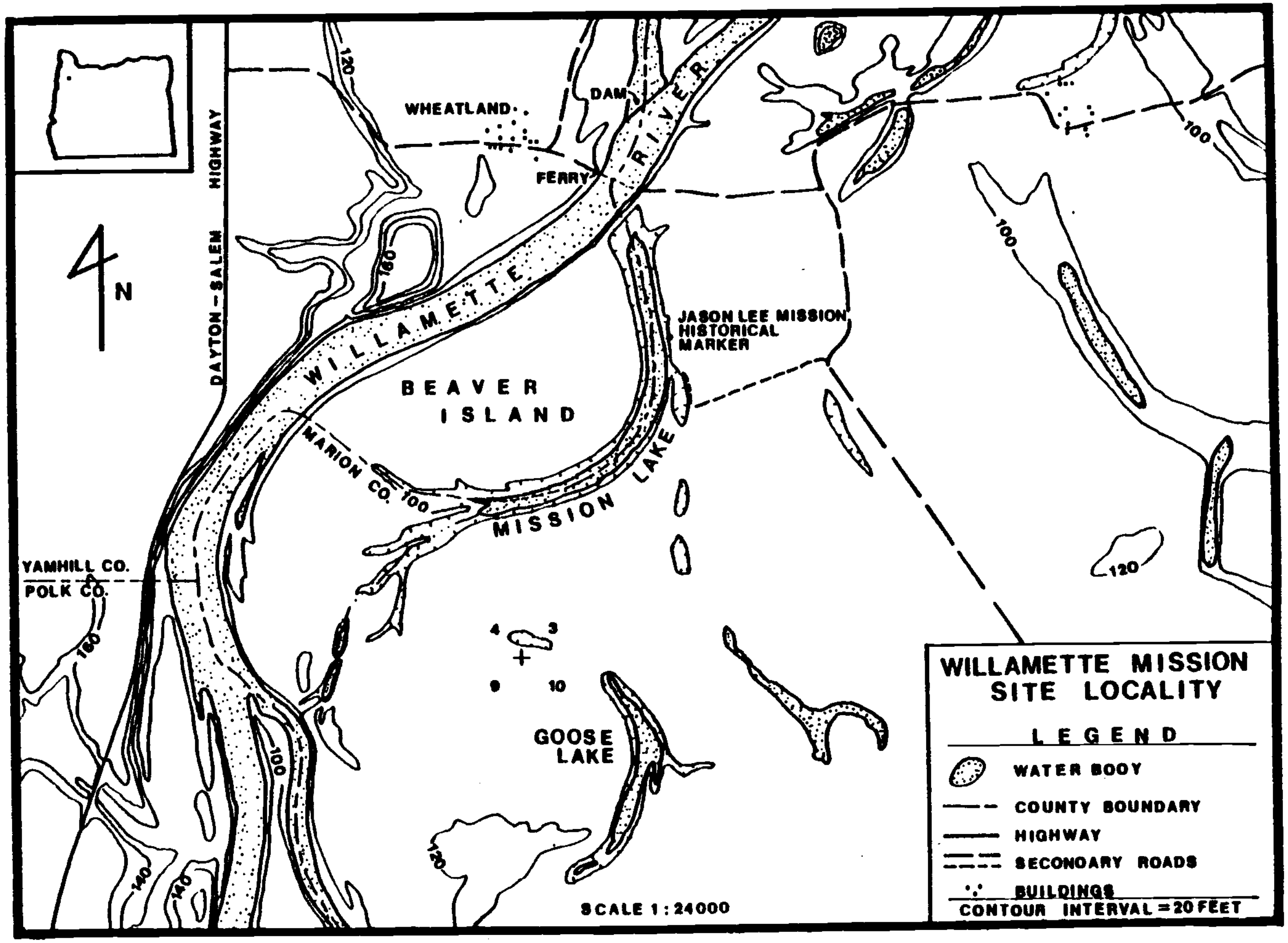


Figure 1. Map of site locality.

mountain crest (Willamette Basin Comprehensive Study 1969).

The basal geology of the Willamette Valley is Eocene to Miocene in age, covered by nonmarine sedimentary deposits of Quaternary age. The upper floor consists of silty and clayey lacustrine sediments deposited during Pleistocene inundation of the valley. Middle Pleistocene gravels are overlain by sandy silt, and modern floodplain deposits mantle parts of the valley floor (Balster and Parsons 1968:4; Franklin and Dyrness 1973:16; Oregon State Water Resources Board 1969:14).

The Willamette Mission site is situated on a broad alluvial flat known as Mission Bottom. Soils in this area are generally classified within Ingram unit soils, comprising the Chehalis, McBee, Wapato, and Coquato series. The soils encountered during archeological assessment of the Willamette Mission site closely approximate the Chehalis series: Chehalis soils are well-drained heploxerolls on 0 to 3 percent slopes. They have a dark brown (10 YR 3/3) silty clay loam A horizon over a dark brown (10 YR 3/3) silty clay loam B horizon (Balster and Parsons 1968:14; Brauner 1980).

A 20- to 30-meter-wide strip of riparian vegetation borders the east side of Mission Lake in the vicinity of the mission. The composition of the riparian community was defined by Shelley Smith, ethnobotanist, Oregon State University. Black cottonwood (Populus tricocarpa) and moss-covered bigleaf maple (Acer macrophyllum) comprise the main overstory species in this riparian habitat. Mesophytic licorice fern (Polypodium glycyrrhiza) is common in the trunks of maple. Other constituents of the mixed hardwood stand are willow (Salix sp.) and Oregon ash (Fraxinus latifolia), notably draped with lichen. A number of shrub species make up the understory of this bottomland forest. Himalayan blackberry (Rubus discolor) and wild trailing blackberry (Rubus ursinus) are growing in a dense thicket-like habitat. California hazel (Corylus cornuta californica) is a dominant species, while common snowberry (Symphoricarpos albus) and thimbleberry (Rubus parviflorus) occur less commonly.

The nonwoody flora of the riparian habitat is not represented by any one characteristic species. Competition for light is a contributing factor to the distribution of the herbaceous plants. Fringecup (Tellima grandiflora), sword fern (Polystichum munitum), and stinging nettle (Urtica dioica) occur in scattered patches. Native blue wild rye (Elymus glaucus) and sedge (Carex sp.) are conspicuous members of the diverse understory which also includes hedgenettle (Stachys sp.), horsetail (Equisetum sp.), fireweed (Epilobium sp.), climbing nightshade (*Solanum dulcamara*), elderberry (*Sambucus* sp.), and annual grasses. The riparian vegetation described here is characteristic of many riparian sites affected by floods and fire control throughout the interior Willamette Valley. The remaining site area is in agricultural production (wheat).

HISTORIC OVERVIEW

In 1834 a group of American Methodist missionaries set forth to educate, moralize, and provide religious and manual instruction to native populations of the Pacific Northwest region. While only marginally successful in this endeavor, the missionaries played a large role in the extension of American sovereignty to the area.

The remoteness of their chosen site from American sources of sustenance prompted the missionaries to develop a semipermanent settlement based upon families, farms, mercantile businesses, schools, churches, and the eventual organization of a government. The missionary effort in the Northwest served as a vehicle to successfully advertise the virtues of the Oregon Country to prospective settlers. Indeed, the missionaries achieved better success as colonizers than as missionaries.

The Methodists arrived in the Oregon Country at a time when both the British and Americans had an interest in national claims to the dominion west of the Rocky Mountains. Prior to 1834, the American contingent was represented by a handful of explorers, fur trappers, and traders. Canadian merchants from the Northwest Company and later the Hudson's Bay Company moved into the

Northwest to effectively adopt and exploit long-range policies for development and control of the region's trade and resources. Fundamental differences arose between British and American fur trade practices, which ultimately affected the issue of sovereignty. However, the Americans, with the eventual support of missionaries, settlers, and diplomats, effectively offset the British position and opened the way for American colonization and sovereignty in the Northwest.

The British trade system was based on a monopoly designed to discourage free colonization. The objective was to disuade agricultural and commercial enterprises which would debase the profit-making fur trappers' paradise. The policy thus inadvertently, as well as purposely, encouraged the protection of Native American populations and their lifeways. The Americans, however, freely utilized the environment and viewed the Indian trade as economic exploitation (Johansen 1976).

Jonathan S. Green, while on tour for the American Board of Foreign Missions in 1829, was one of the first missionaries to promote expansion into the Northwest (Green 1915). In 1832, Ross Cox, a voyager for the American Fur Company in Astoria, also identified a need for missionaries among the "aboriginal inhabitants" of the area (Cox 1832:148-149). Simultaneously, a notice appeared in the Christian Advocate and Journal and Zions Herald stating that several Indians belonging to the Flathead group west of the Rocky Mountains journeyed to St. Louis, Missouri, in 1831 "for the express purpose of inquiring after the white mans [sic] God and true manner of worshipping him" (Carey 1922:23).

The Methodist Episcopal Church in New York City laid groundwork in 1832 to authorize the establishment of Indian missions on the western and northwestern frontier (Barclay 1949:201). Within a year the Board of Managers of the Methodist Episcopal Church approved plans for a mission among the Flathead Indians (Gatke 1935:73). Wilbur Fisk, president of Wesleyan University, recommended Reverend Jason Lee to act in the capacity of superintendent (Gatke 1934:72).

Jason Lee accepted the superintendency, and his nephew, the Reverend Daniel Lee, agreed to accompany him as the second missionary in the field. Jason Lee engaged Cyrus Shepard as teacher and P.L. Edwards and C.M. Walker as carpenter and farmer. Preparations were made in the spring of 1834 to depart with Captain Nathaniel Wyeth across the continent to the Oregon Country. Provisions, tools, and supplies for the mission were shipped on the brig May Dacre, bound for the Columbia River (Decker 1961:40-45).

Wyeth's expedition arrived at Fort Vancouver in September 1834. Though the original intention was to establish a mission among the Flatheads in the interior, Dr. John McLoughlin, chief factor of the Hudson's Bay Company at Fort Vancouver, suggested that Lee and his party locate in the Willamette Valley (J. Lee 1916:262; McLoughlin 1880:50). McLoughlin hoped to keep the missionaries south of the Columbia River in anticipation of a boundary dispute between Great Britain and the United States (Hussey 1957).

The missionaries also desired to avoid the interior. The agricultural potential was suspect, and availability of resources would be insufficient in such a "remote" region. In addition, the missionaries were under the assumption that the interior Flathead Indian population was small, thus the interior was not as virtuous an area for "benevolent action" as a centralized Willamette Valley locality would be (D. Lee and Frost 1973:127).

On September 18, 1834, Jason Lee and Daniel Lee began an inspection tour of the lower Willamette Valley. The landscape at this time consisted of mixed stands of Douglas fir (Pseudotsuga menziesii), Oregon ash (Fraxinus oregana), cottonwood (Populus trichnocarpa), willow (Salix sp.), alder (Alnus rubra), and bigleaf maple (Acer *macrophyllum*), with a dense understory dominated by Oregon grape (*Berberis aquifolium* and *Berberis nervosa*), salmonberry (*Rubus spectabilis*), elderberry (*Sanbucus blanca*), rose (*Rosa* sp.), hard hack (*Spiraea douglassi*), nine bark (*Physocarpus capitatus*), and cascara (*Rhamnus furshiana*).

The higher terraces beyond the modern floodplain were covered with a vast savanna dotted with stands of oak (*Quercus garryanna*). Oak forests would have dominated the valley margins, grading into Douglas fir forests which blanketed the distant Coast and Cascade ranges to the west and east (Brackenridge 1931:55-58; Camp 1960:121; Douglas 1959:214; Palmer 1847:168-186; A. Ross 1849:229-230; Towle 1974:48).

The oak savanna was possibly a result of seasonal burning practiced by resident Kalapuya Indians. Though several firsthand accounts by early travelers noted this practice, each had differing opinions concerning why it was done. Generally, it is thought that annual burning of the prairies was a major factor in Kalapuya subsistence (Zenk 1976:23-24).

Jason Lee and Daniel Lee selected a site 60 miles south of the confluence of the Willamette and Columbia rivers (Figure 2). Despite a declining Indian population in the area, the site was attractive for a variety of

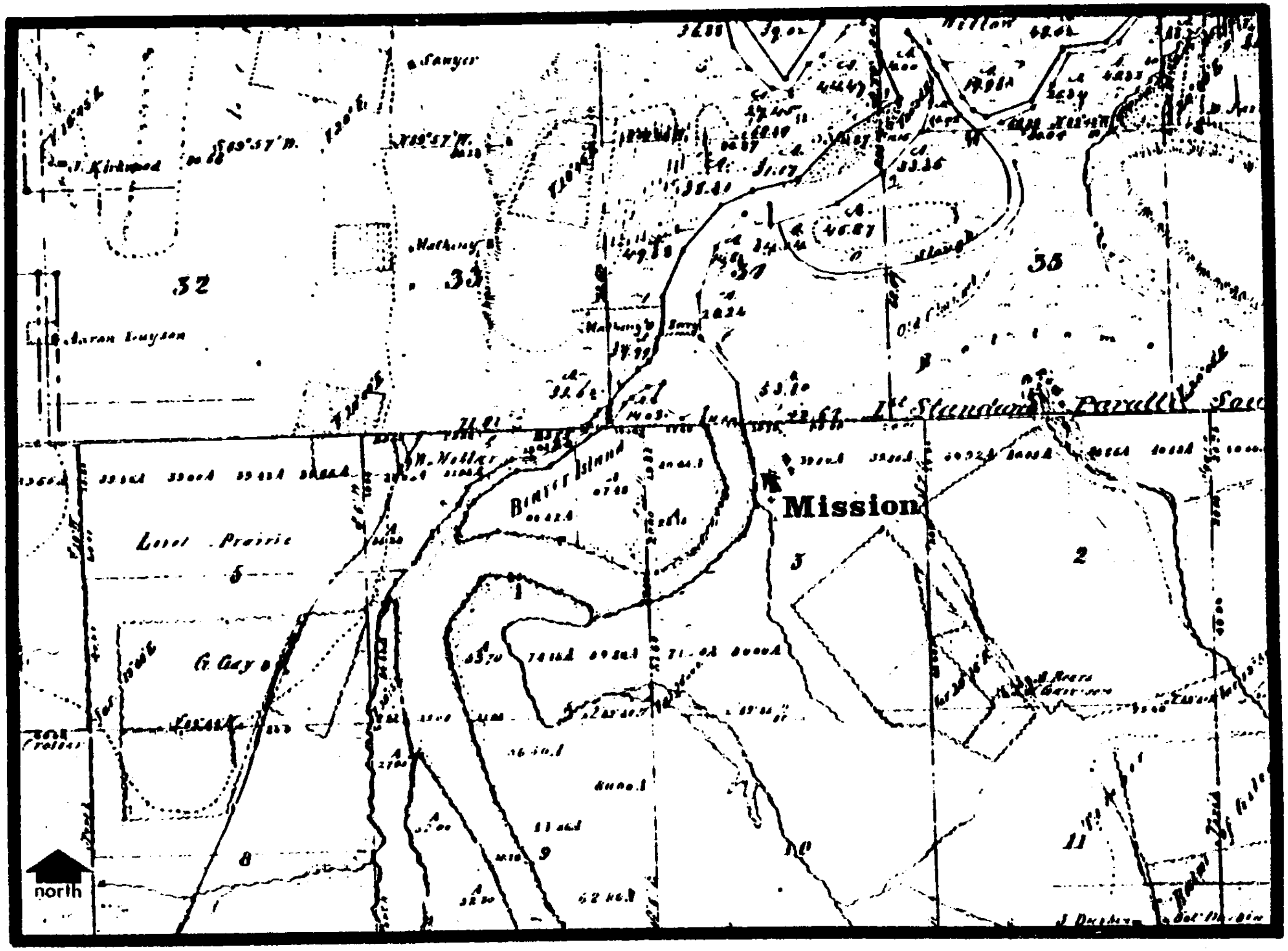


Figure 2. Map depicting 1841 Willamette River course and mission locality.

reasons. The Willamette River would be a favorable transportaton route for acquiring supplies from the Hudson's Bay Company and from ships entering the mouth of the Columbia River. Secondly, the site was centrally located for future settlement expansion among native populations and incoming settlers to the Willamette Valley.

The mission settlement was established on the southwestern fringe of an expansive area of open land known as French Prairie. This section of land is bounded by the Willamette River to the west and north, the Pudding River on the east, and the Salem hills to the south. Approximately 12 French Canadian families were farming the fertile prairie soils in 1834.

The mission compound was built close to the Willamette River on an alluvial floodplain. Jason Lee noted the environment as follows:

> [The house] stands a few rods from the river in a very beautiful situation, upon a prairie 2 miles in length and half a mile in breadth, covered with grass, and here and there is a white oak skirted with timber. In the rear is another prairie, elevated about 25 feet above this, say 50 miles in length and ten broad (J. Lee 1835).

Daniel Lee also noted the setting:

> Here was a broad, rich bottom, many miles in length, well watered, and supplied with timber, oak, fir, cottonwood, white maple, white ash, scattered along the borders of its grassy plains, where hundreds of acres were ready for the plough (D. Lee and Frost 1973:125).

The initial mission structures were located along the eastern bank of the Willamette River (Figure 3). The best known rendition of the mission house was drawn in 1841 by A.T. Agate, an artist with Wilkes' expedition. This rendition was later engraved by R.S. Gilbert (Figure 4). A midshipman on the expedition, Henry Eld, executed the same view (Figure 5). The following descriptions of the three mission buildings and their construction sequence were extracted from written records.

The first structure, pictured to the left in the drawings, was built a "few rods" from the river. The building was made of oak logs cut from nearby timber and hewn only on the interior surface (J. Lee 1835). The structure was topped with split shakes. The interior of the house was partitioned down the middle to form two apartments. Window sashes, partly handcarved by Jason Lee with his jack knife, defined four small windows. The chimney was built of sticks, clay, and sand on the interior north gable end (D. Lee and Frost 1973:128; J. Lee 1835). A puncheon floor was made from planks

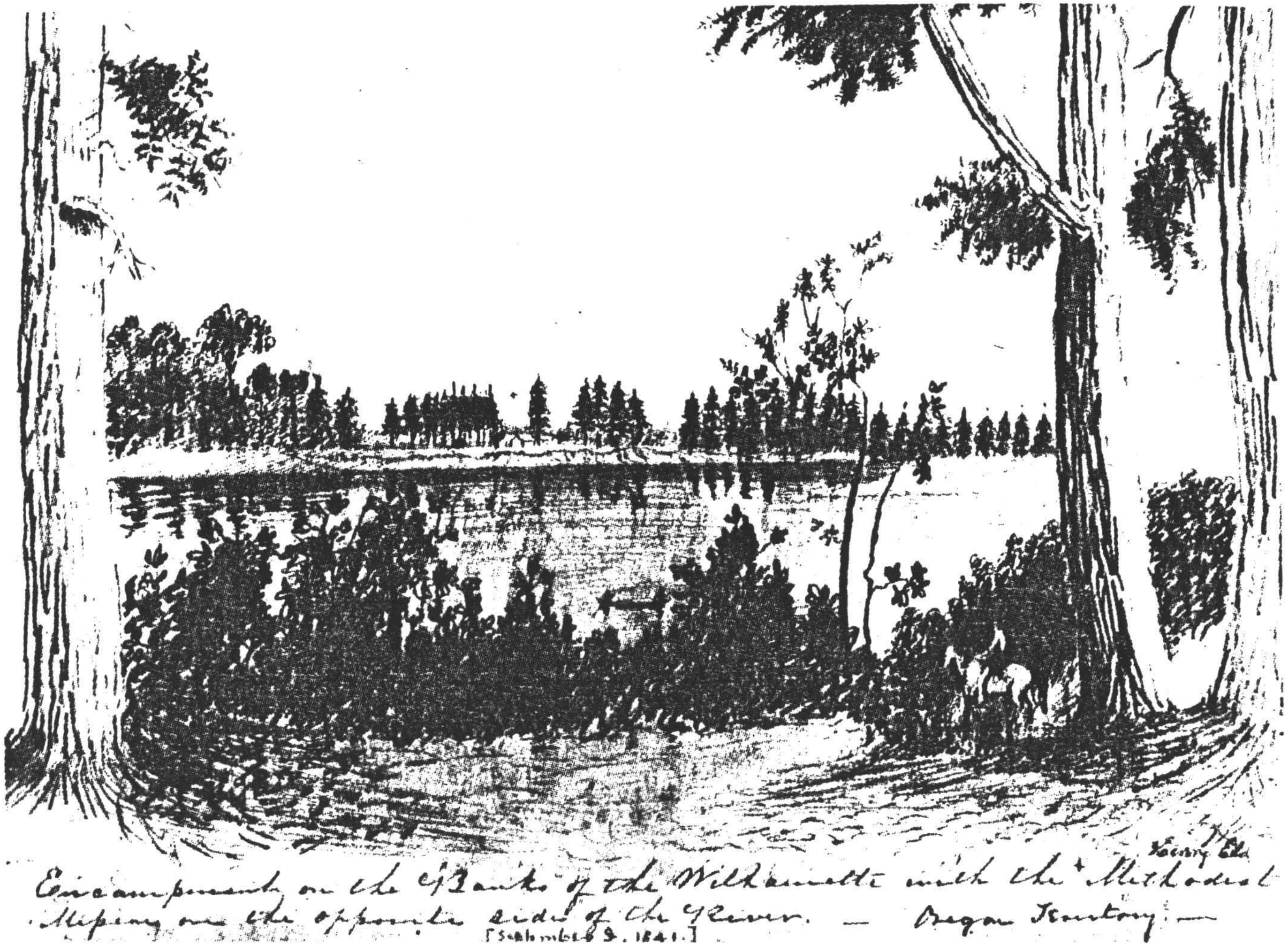


Figure 3. Rendition of the mission (1841) looking east across the Willamette River.

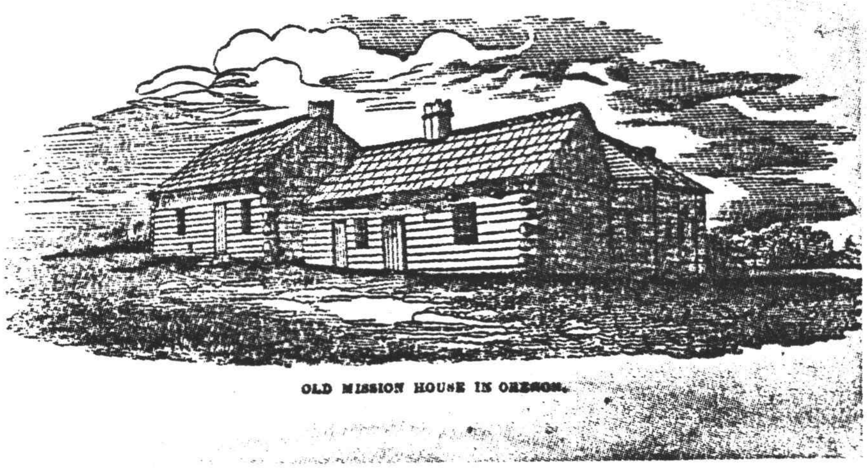


Figure 4. Agate's rendition (1841) of main mission house.

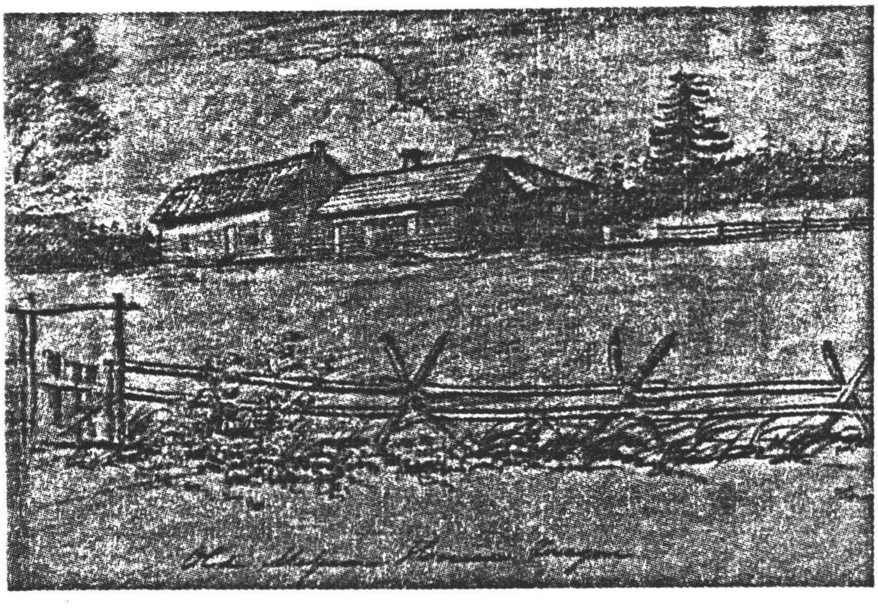


Figure 5. Eld's rendition (1841) of main mission house.

split from fir and hewn on the upper side. The doors were made in the same way and hung on wooden hinges. Puncheon tables, stools, and chairs completed the furnishings (D. Lee and Frost 1973:128). The structure measured approximately 18 feet by 32 feet, and was one-and-a-half stories high (J. Lee 1835). One source mentioned a cellar (F. Young 1912:194). The house was used initially for living quarters, as a school room, and as a chapel.

During the winter of 1834 the missionaries relied on previously purchased supplies for food. To supplement these provisions, staples were brought from Fort Vancouver, farm products were bartered from neighboring French Canadian settlers, and venison was acquired from the Indians (Bancroft 1886:79-80).

In the spring of 1835, the missionaries began subsistence farming activities. Thirty acres of prairie land were plowed, enclosed with a split rail fence, and planted with crops (D. Lee and Frost 1973:129). Seeds had been furnished by McLoughlin, who loaned the missionaries seven oxen, one bull, eight cows, and their calves. Jason Lee, recognizing the fertility of the soil, noted the land produced "good wheat, peas, barley, oats, beans and potatoes" (J. Lee 1835).

In the summer of 1835, a log barn measuring approximately 30 feet by 40 feet was completed to store harvested farm products. The gabled roof consisted of split shakes four feet in length. Heavy poles were laid across each shake course to secure them to the frame: no nails were used in this part of the construction. Planks and boards were hand sawn to provide flooring and doors (D. Lee and Frost 1973:129-130). The location of the barn relative to the mission house is unknown.

Once the necessary procedures of building and farming were initiated, the missionaries began their religious and educational activities. During the winter of 1835, they accepted Indian charges, mostly children, as members of the mission school (Shepard, September 28, 1835a). The students were provided with food, clothing, and manual training. A portion of the missionaries' time was spent instructing neighboring settlers' children. Religious sermons were conducted on Sundays at French Canadian homes in the vicinity, or at the mission house (Mudge 1848:155; Shepard, October 7, 1835b).

An increased number of students living at the mission prompted the missionaries to enlarge their house. An addition was completed in 1835 off the north gable face of the first structure. Both buildings reportedly fronted east (Gay 1936:156). The addition measured 16 feet by 32 feet, one-and-a-half stories high, and had a central fireplace and chimney (D. Lee and Frost 1973:139; Mudge 1848:158). The building was used for a kitchen (Gay 1936:156), and a combination school room and dining room.

A later addition to the house has been problematical because little is noted about this structure in the historical literature. Most likely the addition (Figures 4 and 5, extreme right) functioned as a school room and dining room added to the mission house prior to 1839 (Mudge 1848:186).

By 1836 it was apparent to Jason Lee that laymen were needed to attend to secular matters if the mission was to succeed. Of prime importance were a physician, blacksmith, and carpenter. Lee also wished to support an expanded Indian school, which would require more missionaries and teachers, as well as farmers to assist in enlarging the agricultural base for the community.

The missionaries and other settlers in the upper valley were relying primarily on Hudson's Bay Company livestock for their needs. To alleviate this reliance, a meeting was called at the mission house in early 1837 to organize a joint-stock company for the purpose of purchasing cattle in California. The expedition was conveyed through the cordiality of William A. Slacum, an

American conducting a political and physical investigation of the Oregon Country. Slacum highly approved of the Methodist settlement and the missionaries' American political aspirations. Slacum also lent assistance to the Oregon Temperance Society, organized by the missionaries to discourage the manufacture, sale, and use of alcoholic beverages in the Willamette Valley (F. Young 1912:195-196).

The first reinforcement of missionary personnel, requested by Lee, arrived at the mission in May 1837. Anna Maria Pittman, Jason Lee's future wife; Dr. Elijah White and family; Alanson Beers, blacksmith, and family; William H. Willson, carpenter and joiner; and three teachers were included. Another reinforcement arrived in September of 1837 with the Reverend David Leslie and family; Margaret Smith (Bailey), teacher; and the Reverend H.K.W. Perkins. Both groups arrived by ship at Fort Vancouver after a trip around the horn from the East Coast of the United States. Numerous personal possessions as well as provisions and supplies from East Coast markets and donations were on board. Additional items were acquired en route through transactions at the Sandwich Islands (Hawaii) and Fort Vancouver (Walton 1965).

To prepare for these arrivals, the missionaries built new houses and added to existing structures. A round-log house was constructed for Beers and his family a "few rods" from the mission house. A blacksmith shop was built for Beers near his home, and a wheelwright's house and shop were situated nearby (Wilkes 1845:351).

A one-story hewn log house was bought from a neighboring French Canadian settler for the Reverend David Leslie and his family upon their arrival in September 1837. The house, situated near the main mission house, was enlarged to three rooms (Bailey 1854:56). The house burned down on December 19, 1838 (Carey 1922:263; Hines 1973:35).

The mission cemetery, enclosed with a rail fence, was situated close to the main mission houses, near a grove of fir trees (Gay 1936:48; Mudge 1848:194). The cemetery was used for Indian charges as well as mission personnel.

The missionaries' garden was described as the most pleasant spot at the mission settlement (Mudge 1848:218). The enclosed garden was situated near the mission house and produced herbs, such as catnip, and vegetables, including turnips, radishes, tomatoes, and melons. Fruits included grapes and a row of peach trees (Mudge 1848:212, 218). Historically-noted flowering plant species in the general vicinity of the mission house include primrose (Oe nothera), California poppy (Eschoria), lily of the valley (Clintonia), and monkey flower (Mimulus) (Brackenridge 1831:58).

Soon after the reinforcements arrived at the settlement in 1837, the missionaries looked to higher ground one mile southeast of the mission house on which to construct new buildings. A dwelling was built for Dr. Elijah White and his family in late 1837. The house was described as

> a fine blockhouse situated upon a pleasant and extensive prairie, with a delightful evergreen grove of fir trees upon one side, and the agreeable variety of valley, hill, ponds of clean water, bushes, brakes, and groves of fir, oak, maple, and cottonwood, and deer, wolves, snakes, etc., upon the background (Bailey 1854:56).

When the Whites moved into their new home

> it was not in a fit condition for inhabitants. There was no chimney in it, and but roof enough to cover a bed; a few loose boards for a floor, one side entirely unenclosed. . . . However, the chimney was soon built, and as there was no suitable stone within several miles, the hearth was made of clay and ashes, which, after drying, became measurably, though not perfectly hardened. . . . In a few days, the roof was completed, the house sided, and their dwelling made very comfortable (Allen 1850:88).

Between the years 1838 and 1849 the missionaries constructed a hospital which was intended to serve settlers, Native American charges, and missionary personnel. The hospital was built in close proximity to Dr. White's house (Farnham 1977:89). Dr. White noted in early 1838:

> [Lee] wished me to begin an outfit for a hospital now about to be erected on the mission premises, for the benefits of the mission proper, the settlers of this country, and the perishing Indians of Oregon. Our hospital is to be 50 feet in length, and two stories high, to be put up by a good carpenter, and finished in a durable and workmanlike manner, and I wish it to be most distinctly understood that what is proper for a hospital in New York or Boston, is needed here (White 1838).

Lumber for the hospital may have been supplied through Ewing Young's sawmill, operating on Chehalem Creek by February 1838. Dr. White ordered a substantial amount of "planking, inch boards, and weatherboards" from Young on April 4, 1839 (E. Young 1839). Wilkes (1845:351) described the hospital as a "well built frame edifice, with a double piazza in front." The hospital was never used as such since its completion coincided with the arrival of additional personnel at the settlement and thus was needed for living quarters. In 1841 it was being used as a dwelling by George Abernethy, his wife, and three other families. Abernethy was the mission secular agent, and later, provisional governor of Oregon. Wilkes noted that two log houses were situated near the hospital. One of these structures was the home of Ira L. Babcock, a physician who arrived at the mission in June 1840 (Wilkes 1845:351).

A granary built by the missionaries in the vicinity of the hospital functioned as a multipurpose building--granary, school house, church, and briefly on May 15, 1843, it was used as a legislative hall to prepare laws for the newly organized provisional government in the Oregon Country.

> The building was a frame some sixteen by thirty feet, one and a half stories high, boards upright with one square room in front, and the balance used for a granary, from which it derived its name; the upper part was for storing and sleeping use. The square room was the meeting hall (Gray 1973:336).

Though it is not known when the granary was built, it was possibly constructed contemporaneously with the hospital.

In March 1838 Jason Lee departed for the East to conduct a two-year tour to promote the Willamette Mission and Euro-American colonization in the Northwest. His primary objective, however, was to request more money and missionary personnel from the Board of Managers of the Methodist Church, and to inquire about the possibility of establishing more mission stations in the Northwest. Before he departed, people at the mission formulated a petition to be read by Congress stressing the agricultural and commercial possibilities in the Oregon Country. They also wished to sever dependency ties with the Hudson's Bay Company and requested an extension of United States government to the Oregon Country (Atwood 1907:62). Clearly the missionaries had visions of Oregon becoming a United States territory and possibly a state.

Lee returned home in June 1840 on the ship Lausanne with "The Great Reinforcement" aboard. Fifty-two people with a large supply of equipment, clothing, and provisions were on board to endow the enlarged mission family, and to assist and equip future subsidiary stations. A stock of these goods was procured to supply the Willamette Station store. Although it is not known when the "Oregon Mission Store" was established, the account book, dating from 1838-1841, has survived. The document provides a glimpse of day-to-day commercial and economic activities at the Willamette Mission settlement (Mission Account Book 1838-1841).

The store served as a clearinghouse for an exchange of goods between the people of the mission, a means of trading with neighboring French Canadian settlers and Indians, and a storehouse for goods acquired from Ewing Young's store in the lower Willamette Valley and the Hudson's Bay Company at Fort Vancouver (Figure 6). The missionaries acquired local merchandise such as wheat, beaver skins, bear skins, butter, and potatoes. Some of these commodities, such as wheat and beaver skins, were

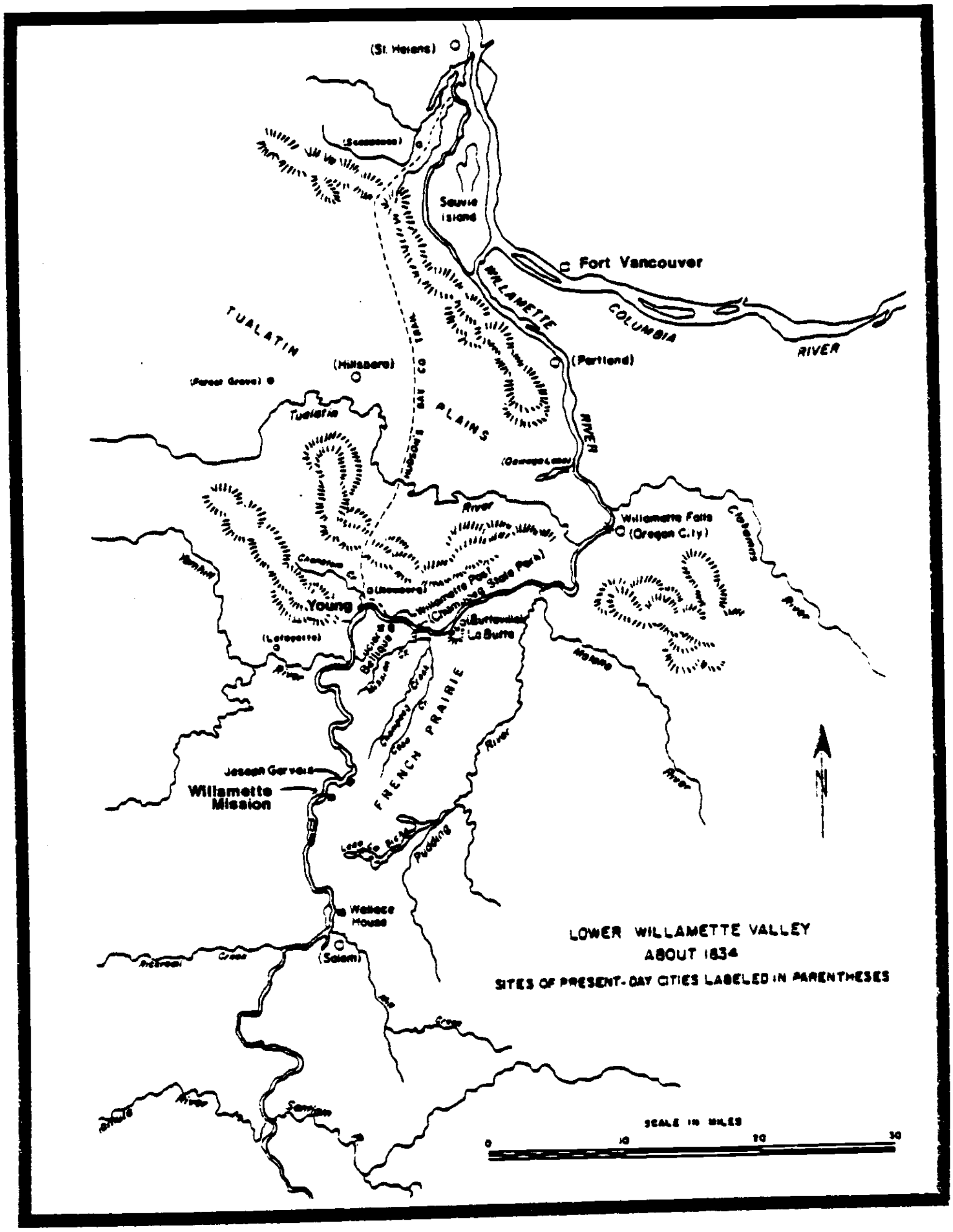


Figure 6. Map of lower Willamette Valley (Hussey 1967:42).

presumably resold to the Hudson's Bay Company. The store supplied to local residents a diverse line of standard consumption goods purveyed from American East Coast markets and donations (Burrell 1967:6-7). Many of these goods were stored temporarily at Fort Vancouver.

Although the Indian population in the Willamette Valley decreased during Jason Lee's 1838-1840 absence, he proceeded with plans for expansion. A program to establish subsidiary mission stations in the Oregon Country was put into effect. Foremost in Lee's plans was the construction of a new central station for mission activities. A combination sawmill and grist mill was to be erected on Mill Creek 10 miles up the Willamette River from the original mission site. The mill, situated on Chemeketa Plain, was the intended site of the Oregon Manual Labor Training School. Various explanations have been given for this shift in locations. A small creek, as opposed to the Willamette River, was essential to power the mill, and it was becoming increasingly difficult to live in the main mission house since it was infested with "vermin" and periodically threatened by floods (J. Lee 1841).

Willamette River floods were a problem the missionaries had to face at their chosen site. There is frequent mention of freshets and floods in historical references concerning the mission occupation period (Allen 1850:91; Gary 1923:182; Hines 1973:141; Mudge 1848:152). The mission was especially vulnerable to flood waters since the settlement was established on an eroding side of a bend in the river. According to Wilkes:

> The River here makes a considerable bend, and has undermined and carried away its bank to some extent; a short distance beyond, it is making rapid inroads into the rich soil of these bottom lands (Wilkes 1845:351-352).

By 1841, the "mission family" had moved to Mill Creek, which would in time become the town of Salem. A school, parsonage, and house were erected at the new mission site, known as Chemeketa, with lumber made from the completed sawmill. Some of the settlers associated with the mission remained at the original Willamette Station to continue work on the farms.

Jason Lee's ability as mission superintendent was questioned during the course of his work by fellow missionaries. A few had written unfavorable reports to the Mission Board in New York City expressing concern over his administration. Lee was prompted to personally reply to these accusations before the Board in 1843 (Brosnan 1932).

Before Lee arrived in New York, he learned his superintendency at the mission was superseded by the

Reverend George Gary. The reasons for Lee's discharge were as follows: (1) appropriation of mission funds for private speculation; (2) misuse of mission funds; and (3) failure to report matters concerning mission property (Brosnan 1932:246). Lee made a statement to the Board against these charges, and was exonerated. However, the Willamette Mission was dissolved in 1844 for various reasons including internal conflicts within the mission community, financial problems, a low Indian population, and increased Euro-American settlement in the Willamette Valley.

As new superintendent, the Reverend George Gary proceeded to dissolve mission activities and dispose of mission property. [By 1839 the missionaries had claimed approximately eight square miles of land at the old mission station (Brackenridge 1931:58; Gatke 1935:78).] Surveys of land to be sold were completed prior to October 1, 1844. The mission farm, one mile south of the mission compound, was surveyed by Jesse Applegate and sold to Alanson Beers on July 11, 1844 (Gary 1923:96; Secretary of State, Land Claim Records 1845). In August of 1844 the "old mission place" was sold to a Mr. Campbell for 700 bushels of wheat (Gary 1844).

Possibly the best known postabandonment description of the main mission house was written in 1844 by

H.K.W. Perkins, a missionary at the Chemeketa settlement (Mudge 1848:215; Perkins 1843-1844). Perkins noted that the main mission house was "very characteristically and firmly standing; but all the appurtenances, put up later, and by other hands are fast hastening to decay." The original furniture was gone from the house, replaced by rude benches. The library and cupboards were empty, the doors unhung, and the partitions broken down. The old kitchen fireplace was in fairly good condition, with the appearance of recent use. Possibly the fireplace was used by Lindsay Applegate and his party during their stay at "one" of the mission buildings in the winter of 1843-1844 (Applegate 1921:14). In the chamber Perkins found tracts (religious papers), and some specimens of quartz and carnelian from the Willamette River. The old chapel and school room, "a roofless tenement," was partially collapsed. Over the school room fireplace hung a letter and a still legible copy of the Declaration of Independence.

Gustavus Hines, writing in 1868, noted the house "and the ground upon which it was located, by the ceaseless actions of the river, have long since been swept away" (Hines 1868:140). (Archeological investigations verify, however, that only a portion of the mission house site was severely affected by river floods.)

The old mission house site became part of the Donation Land Claim of William Mathenay in 1851 (State of Oregon 1865, Donation Certificate 2448). Matheny sold the west half of his claim to Blake Greenville in 1869. The east half, which contained the mission site, was sold to Alexander M. LaFollette on October 10, 1872 (State of Oregon 1872, Marion County Deed Records 15:109).

In April 1930 the LaFollettes deeded 6.57 acres of land along with a 30-foot right-of-way to the people of the State of Oregon, with Willamette University as trustee. The deed stated:

> The parcel was to be held in trust for the people of Oregon as a perpetual shrine in memory of the Jason Lee Mission. The property should be fenced and never be used as a site upon which to conduct business for a profit (State of Oregon 1930, Marion County Deed Records 207:134).

A large rock with a bronze plate attached to it was placed at the mission site in 1930. The actual site of the mission was known at that time from the work of Willamette University historian Robert Moulton Gatke. Gatke, who wrote numerous articles about the mission, was well aware of the location of the mission site and even excavated a portion of the site in the 1920s. The inscription recorded the date Jason Lee arrived in the

Oregon Country, and the names of the LaFollettes and Aspinwalls who donated the plaque (Oregonian July 14, 1930). The plaque has since been stolen, but the rock remains in its original position (Figures 7 and 8).

Willamette University lacked adequate funding to maintain the property so the institution deeded the land back to the LaFollettes in November 1956 (State of Oregon 1956, Marion County Deed Records 495:193). The LaMars, heirs to the LaFollettes, requested in September 1961 that the road leading to the site be closed off as the public was not making proper use of the area (Regional Parks and Recreation Agency 1964). The Marion County Parks and Recreation Committee negotiated an agreement with the LaMars to establish the area as a Marion County Park.

Marion County would be trustee for the people of Oregon. The LaMars requested in 1962 that the county consider trading three acres of lake frontage (the assumed mission site) for three acres of good farm land. The trade was not negotiated. On September 5, 1963, the Marion County circuit court ruled that Marion County be declared trustee and owner of the park land and right-of-way.

On December 9, 1963, the Marion County Board of Commissioners dedicated the area for park and recreation

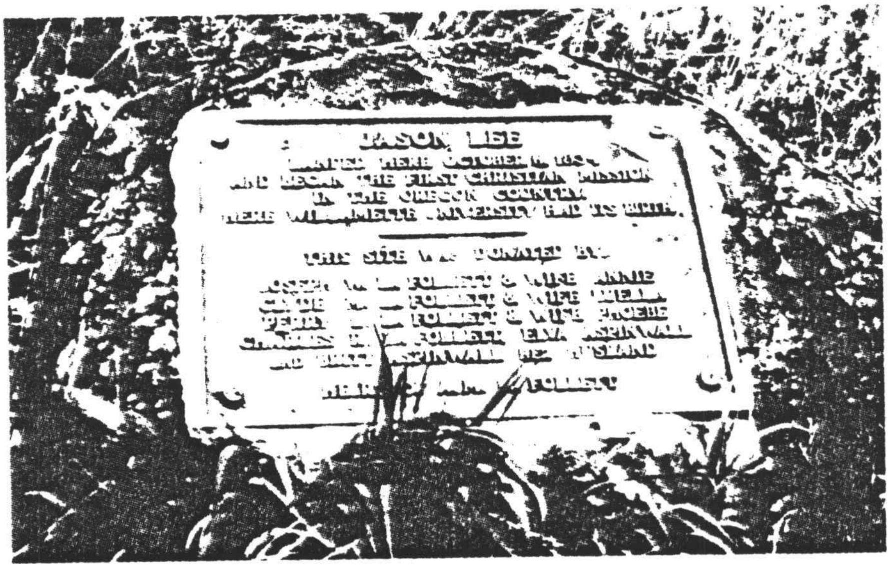


Figure 7. Bronze plate identifying the site of the mission, placed in 1930.

Figure 8. Rock marker in original placement, minus the plate.

purposes. Plans were under way to change the trusteeship of the mission site from Marion County to the State of Oregon in October 1974. This transaction remains unresolved because a transfer deed from the county to the state is required. This transfer deed is contingent on "permission" from the LaFollettes. A trade agreement is currently being negotiated with the LaFollettes concerning the mission site.

The Willamette Mission site functioned actively as a park between the 1930s and early 1960s. Throughout the 1930s and 1940s, the fields surrounding the park were in grain production. The fields were planted in orchards from the late 1940s until 1955. By 1956, although the park boundary was maintained, the surrounding fields had reverted again to grain crops. The park boundary was abandoned in 1957 and the land has since been used since for agricultural purposes. The mission site, within riparian vegetation and a portion of the park, have remained intact (Figure 9 a-d).

Figure 9. Sequential aerial photographs depicting changing agricultural landscape at the site of the mission.

a. 1936
b. 1939
c. 1950
d. 1978

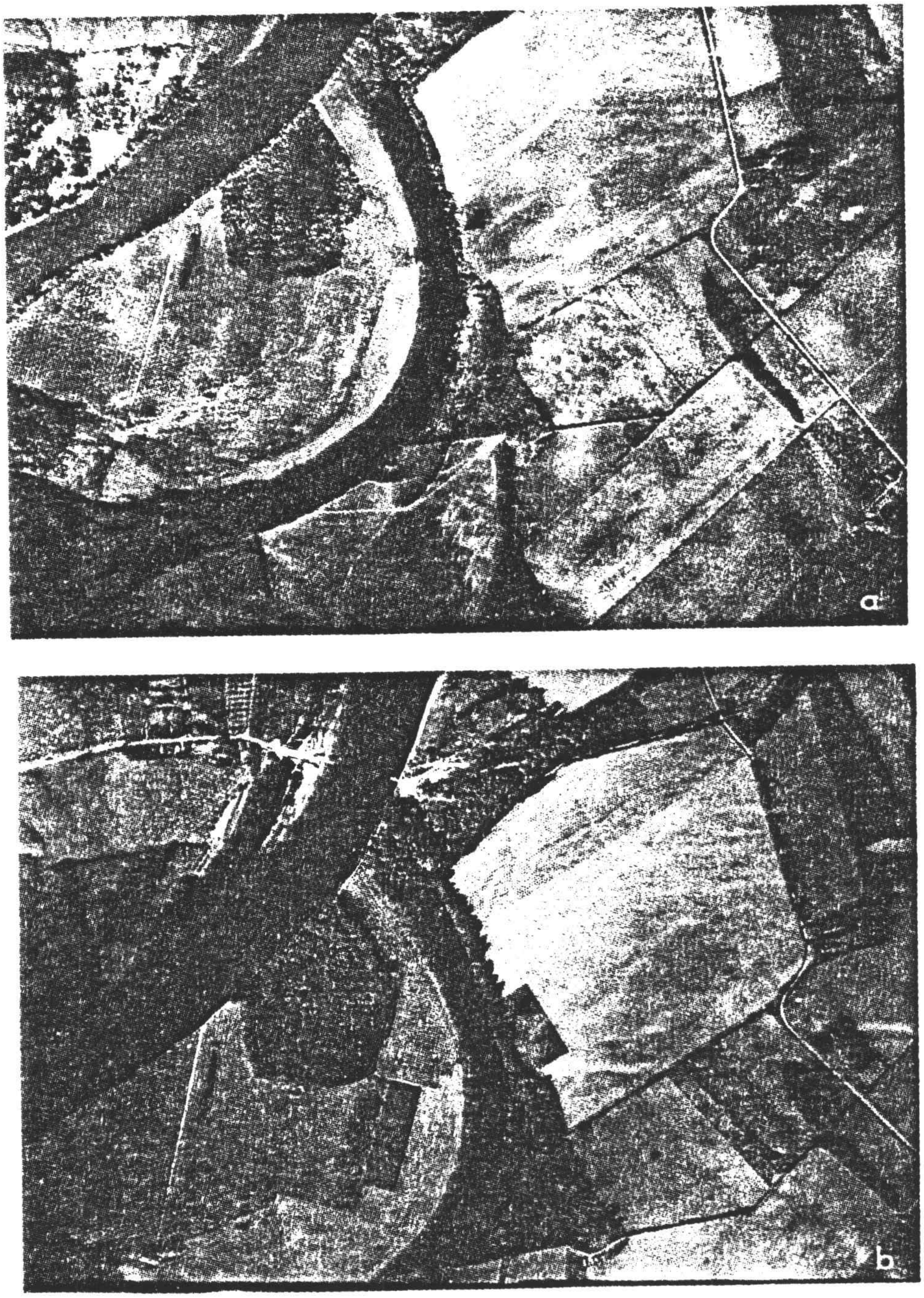
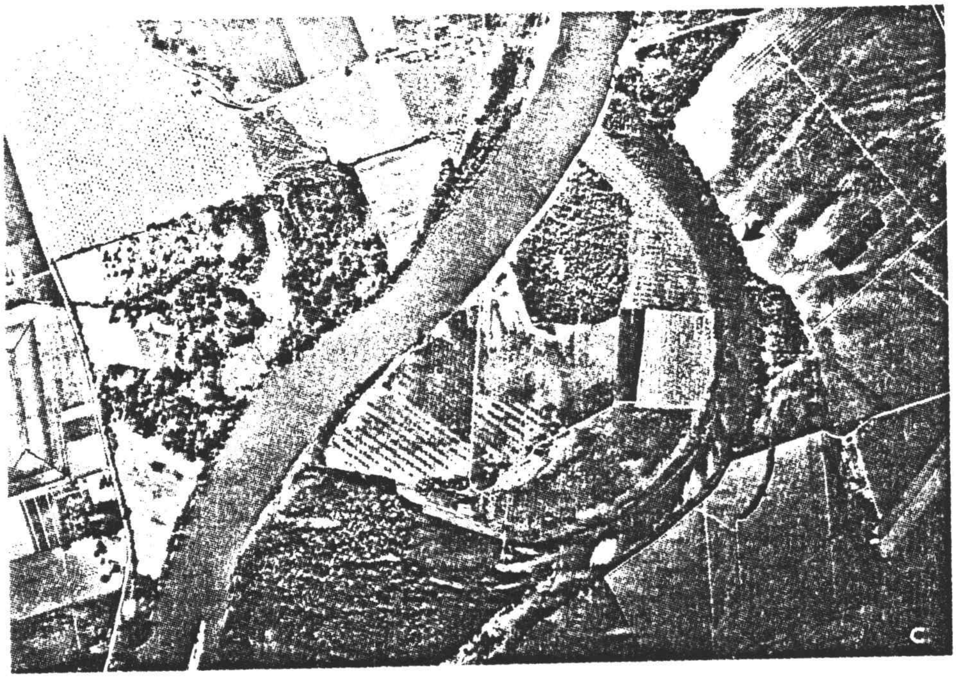


Figure 9.



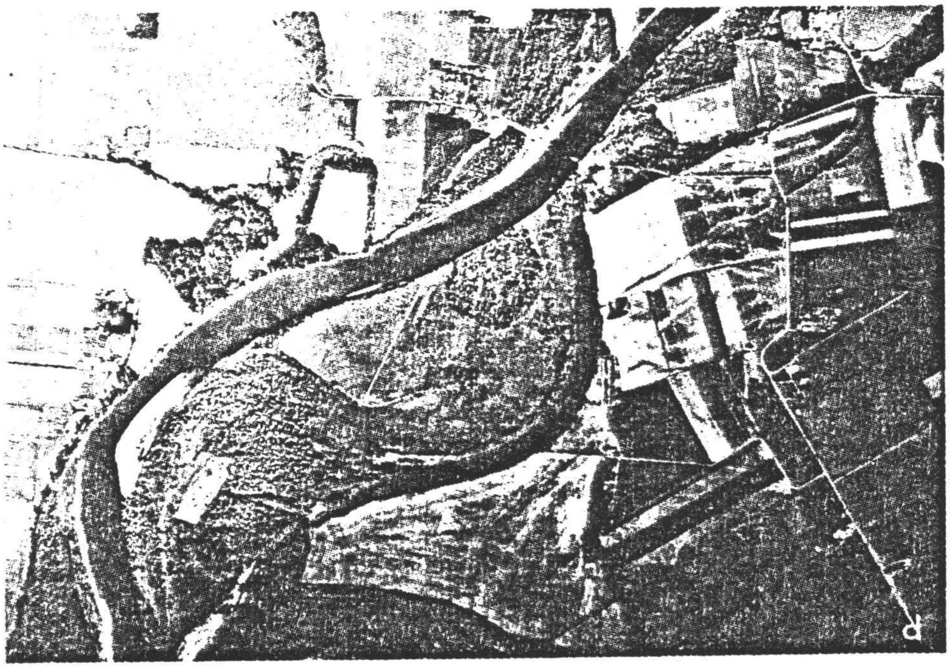


Figure 9, continued.

ETHNOGRAPHIC SETTING

Once in the Willamette Valley, Jason Lee and his party encountered the remnants of a once large aboriginal population collectively referred to as the "Kalapuyans." The Kalapuyans occupied the entire Willamette Valley and were politically subdivided into seven to thirteen territorially discrete, named macro-bands (Figure 10) (Berreman 1937; Frachtenberg 1913; Jacobs 1945; Loy et al. 1976). The Kalapuyans are included in the Penutian linguistic phylum, having spoken a language called "Kalapuyan." Berreman (1937:21) subdivided the Kalapuyan language into three distinct, almost mutually unintelligible dialects: Tualatin-Yamhill, Yoncalla, and Calapuya.

The Willamette Station of the Methodist Mission was located within the traditional territory of the Pudding River or Anhantchuyuk band (Figure 10). The west bank of the Willamette River, across from the mission, was included within the ancestral territory of the Luckiamute band (Berreman 1937:21; Jacobs 1945:154; Loy et al. 1976:6). Both the Pudding River and Luckiamute bands spoke the Calapuya dialect of the Kalapuyan language.

Prior to the physical presence of Euro-Americans in the Willamette Valley, European diseases rapidly and

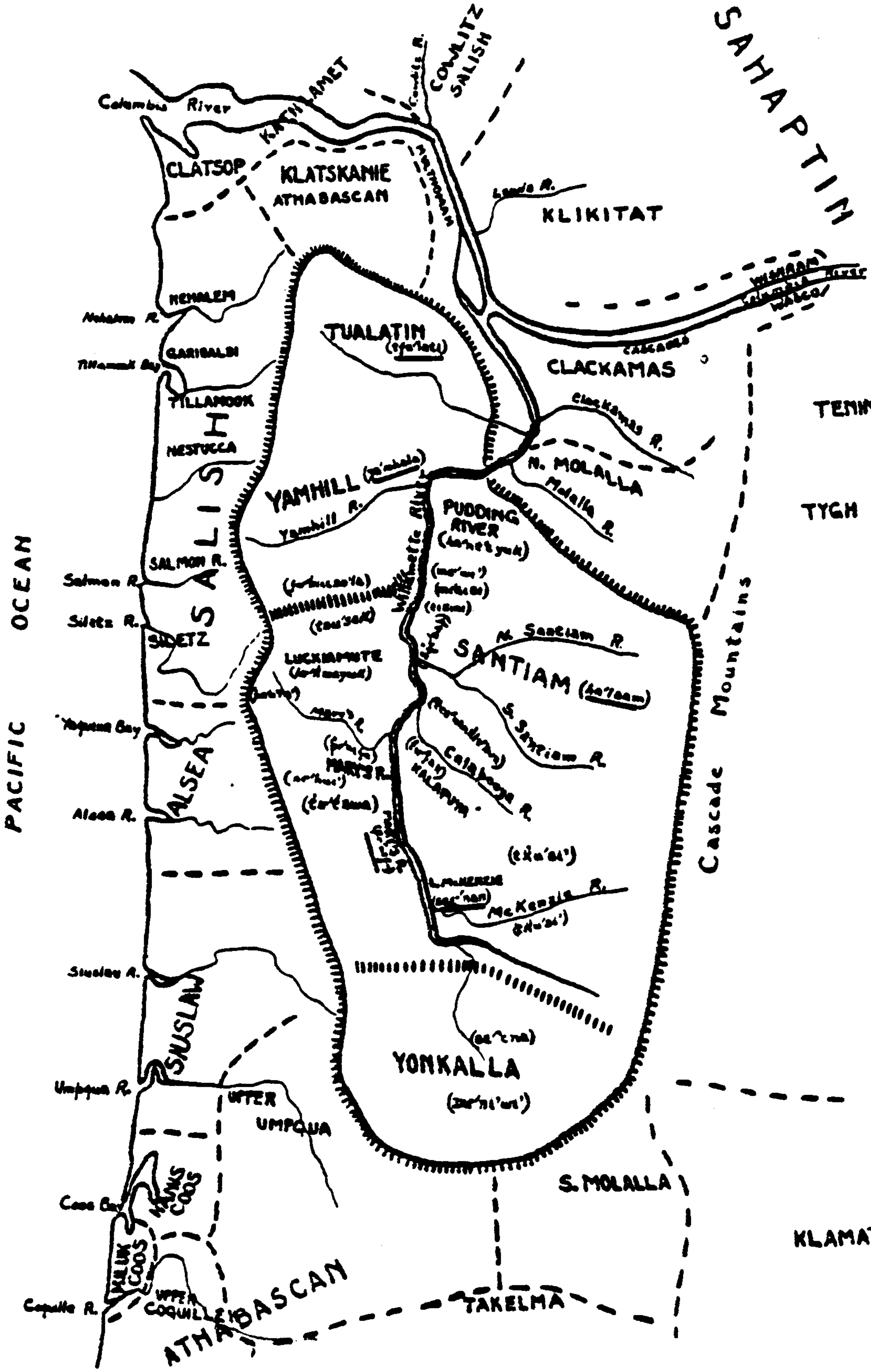


Figure 10. Historic distribution of Kalapuyan macro-bands in the Willamette Valley (Jacobs 1945).

significantly reduced indigenous populations. A smallpox epidemic swept through the valley in 1782-1783, killing an estimated 50 percent of the population (Mackey 1974:21). Between 1783 and 1830, a variety of European diseases swept through the native populations, exacting a heavy toll on human life. An epidemic described as either viral influenza or malaria killed an estimated 75 percent of the remaining native populations from 1830 to 1833 (Boyd 1975; Mackey 1974:21). When the missionaries arrived in the Willamette Valley in 1834, they were witness to a culture under stress, a fragment of a cultural system no longer able to sustain itself. The small, dispersed bands of Kalapuyans were no match for subsequent European settlers who quickly claimed the prime farm land. No Pudding River or Luckiamute band villages were historically noted in the immediate vicinity of the mission, and the missionaries met no resistance from indigenous populations.

For all practical purposes, extensive aboriginal exploitation of the Willamette Valley ended with the epidemics of 1830-1833. During the late nineteenth and early twentieth centuries the last surviving Kalapuyan speakers were interviewed. Unfortunately, the informants were several generations removed from precontact culture and therefore could not be expected to accurately recall a lifeway which ceased functioning during the late 1700s. Likewise, the occasional accounts of Kalapuyan behavior by Euro-American settlers may not reflect the "traditional" lifeway. Realizing the limitations of available data, a brief account of Kalapuyan culture is presented below. Unless otherwise noted, the following sketch was derived from Melville Jacobs' (1945) "Kalapuya Texts."

Details of Kalapuyan political organization are sketchy. In the northern Willamette Valley the largest integrative unit was the patrilineal band. The position of headman was hereditary. A class system based on wealth and prestige was present. Society was ranked into a noble or wealthy class, commoners, and slaves. Nobility was generally hereditary, although a commoner could, through the acquisition of wealth, move into this class. Slavery was generally not hereditary.

Religion was an individual affair. At or near puberty a male in particular and occasionally a female would attempt to acquire a guardian spirit. The animistic spirit being was obtained in a vision. The powers of one's tutelary spirit were manifest in the abilities and accomplishments of the individual. Without the aid of a guardian spirit, one could hope for no more than a mediocre life.

The Kalapuyans were hunters and gatherers. Their economy and settlement pattern probably revolved around two principal food sources: camas roots and salmon. Relative scarcity of economic resources occurred during the winter months in the Willamette Valley. The absence of dispersed resources, the need for substantial shelter, and a necessity for intergroup cooperation resulted in the aggregation of indigenous populations into semipermanent winter villages. The major requirement for this type of winter settlement was stored food surpluses. Dried salmon and processed camas roots were principal among storable food commodities.

Camas, which at one time was widely distributed in wet meadows over the entire valley, was harvested by women with the aid of a digging stick. Camas was roasted in earth ovens for several days. It then could be eaten immediately, or processed for storage by grinding and then being formed into thick cakes. The cakes were then stored in baskets.

Camas ripened in the lowlands in early spring and in the upland meadows by early fall. A similar elevational ripening gradient typified several other root and berry crops. Foremost among these were tarweed, salal berries, blackberries, huckleberries, salmonberries, and wild onions. Hazelnuts and acorns were late summer and fall commodities. The availability of these botanical resources determined to a large degree the Kalapuyans' spring-through-fall settlement patterns. Late spring, summer, and early fall settlement consisted of small camps situated adjacent to root grounds, berry grounds, or oak groves. From these base camps men would venture out and procure game animals. Hunting contributed less food to the total diet than did gathering or fishing. Mammals, birds, and insects were taken in organized hunts or by solitary hunters. Minimal seasonal variability of the abundance of these animals allowed hunting year-round.

Fishing probably provided the greatest amount of protein to the diet. Salmon was the principal exploited species. Trout, suckers, and eels taken from tributary streams were also important dietary adjuncts. A reliance on dried salmon as the main source of protein through the winter months required the procurement of large quantities of fish. Nets, weirs, and spears were used to accomplish the task. Salmon procurement required a settlement shift back to the main river systems and larger tributary streams during the fall migration. Major winter villages were situated near these fishing localities.

A settlement system involving major semipermanent villages situated adjacent to major rivers and streams during the winter months, followed by a dispersed settlement system from spring to fall centered on small upland camps, typified Kalapuyan culture.

FIELD METHODOLOGY

Phase III of the Willamette Mission archeological project entailed expansion of the test excavations begun during the second phase of the project. As described by Sanders and Weber (1980), the field methodology employed during phase II was designed primarily to confirm whether or not a mission-period occupation was present at the site. The preliminary testing program demonstrated that the site of the Willamette Station of the Methodist Mission had been located. A general impression as to the size of the mission compound and the location of certain structures also resulted from the preliminary sampling program. Questions relative to the internal integrity of the site and the exact location and arrangement of buildings, i.e., the basic scientific and interpretive potential of the site, remained unanswered.

Since a proper assessment of the site required more data than had been provided by the preliminary testing program, an eight-week excavation program was designed. Fieldwork began July 7, 1980. The 1 x 2 meter test pits used during the preliminary testing program were abandoned in favor of large, open surface excavations. The latter sampling strategy would ensure the recovery of architectural detail and behavioral loci (activity areas) if the site was relatively undisturbed. The degree of postabandonment disturbance to a site is easier to ascertain with this excavation technique, as well.

Based on the preliminary testing program, the least disturbed portion of the site was situated adjacent to Mission Lake in the vicinity of test pits E and F. This portion was determined to be the location of the main mission house, i.e., the complex of buildings illustrated in Agate's 1841 rendition (Figure 4) (Sanders and Weber 1980). A standard Cartesian grid was imposed on the entire site for horizontal control and a datum arbitrarily set at 100 meters provided vertical control. A 4 x 14 meter excavation block was defined, connecting and extending beyond test pits E and F. A second 4 x 8 meter excavation block was established north and west of the larger block on the edge of Mission Lake. The two blocks were eventually connected (Figure 11). Within each block the basic excavation unit was a 2 x 2 meter square. Excavation was conducted in 10 centimeter arbitrary levels because no well-defined stratigraphic units had been noted in the test pits. All 2-meter squares within a block were excavated simultaneously. Care was taken within each 10 centimeter level to find cultural material in situ and thereby preserve the spatial relationships of cultural materials until the

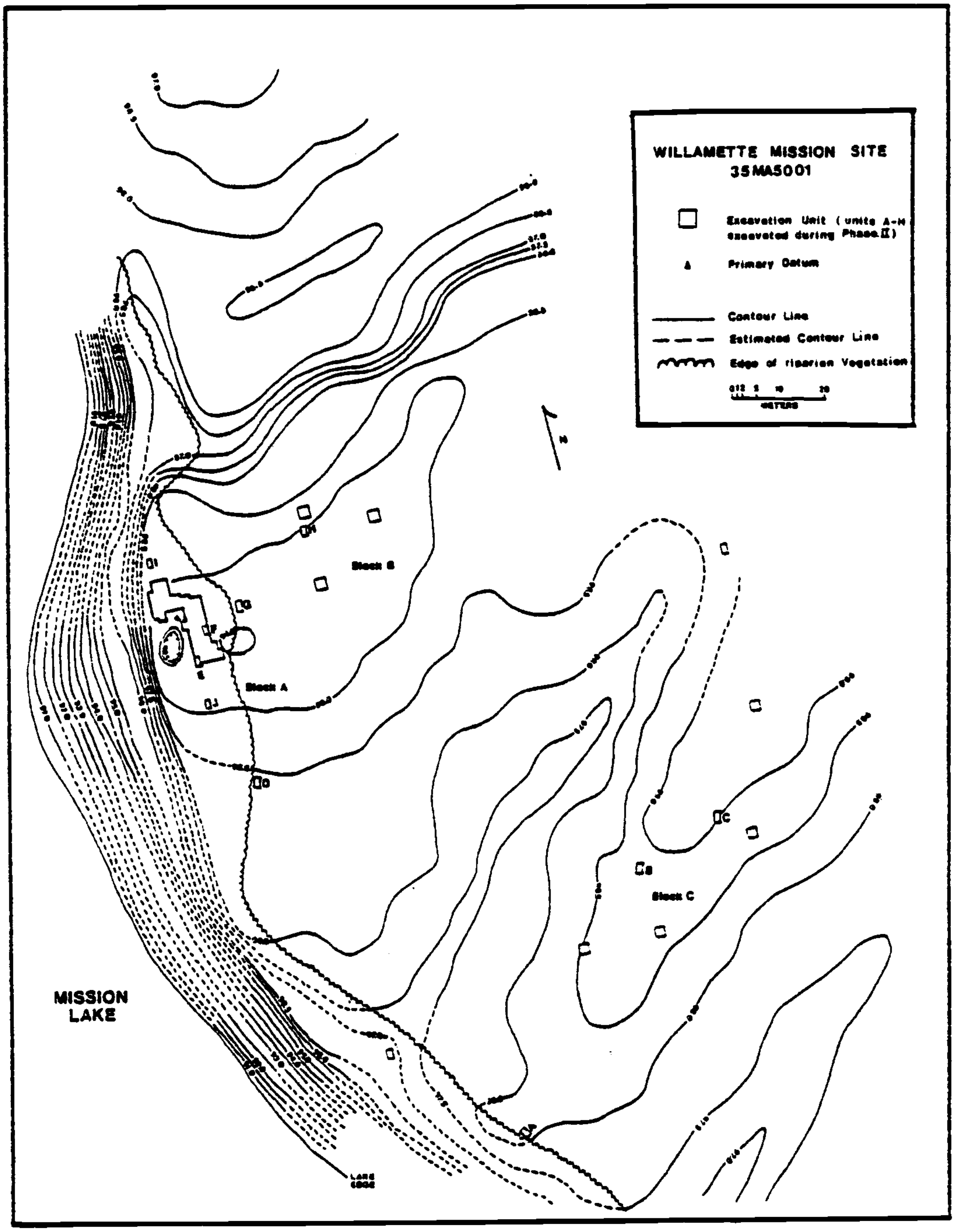


Figure 11. Site topography map depicting excavation grid and test units.

same level was complete over the entire block (Figure 12). Once the location of cultural material was mapped and photographed, the objects within the level or feature were removed and excavation continued. All sediments removed from the excavation were passed through quarter-inch mesh hardware cloth to assist in the recovery of cultural material.

The site area east of the lacustrian vegetation shown on Figure 11 has been badly disturbed by annual plowing of the fields. Rarely did mission period cultural material exceed 30 centimeters in depth. Plowing over most of the site had exceeded that depth. Further testing employing 2 x 2 meter test pits was accomplished in the open field, but other than enabling us to very generally define the possible location of buildings, the effort expended was not worth the information returned.

An attempt was made to locate buried features such as privies and cellars using aerial infrared photography in the plowed field (Figure 13). The imagery was provided by the 1042nd Military Intelligence Company, Oregon National Guard (Aviation). No features associated with the mission were located using this technique; burning pits associated with mid-twentieth century orchard removal were located in this imagery.

Figure 12. Excavation in progress.

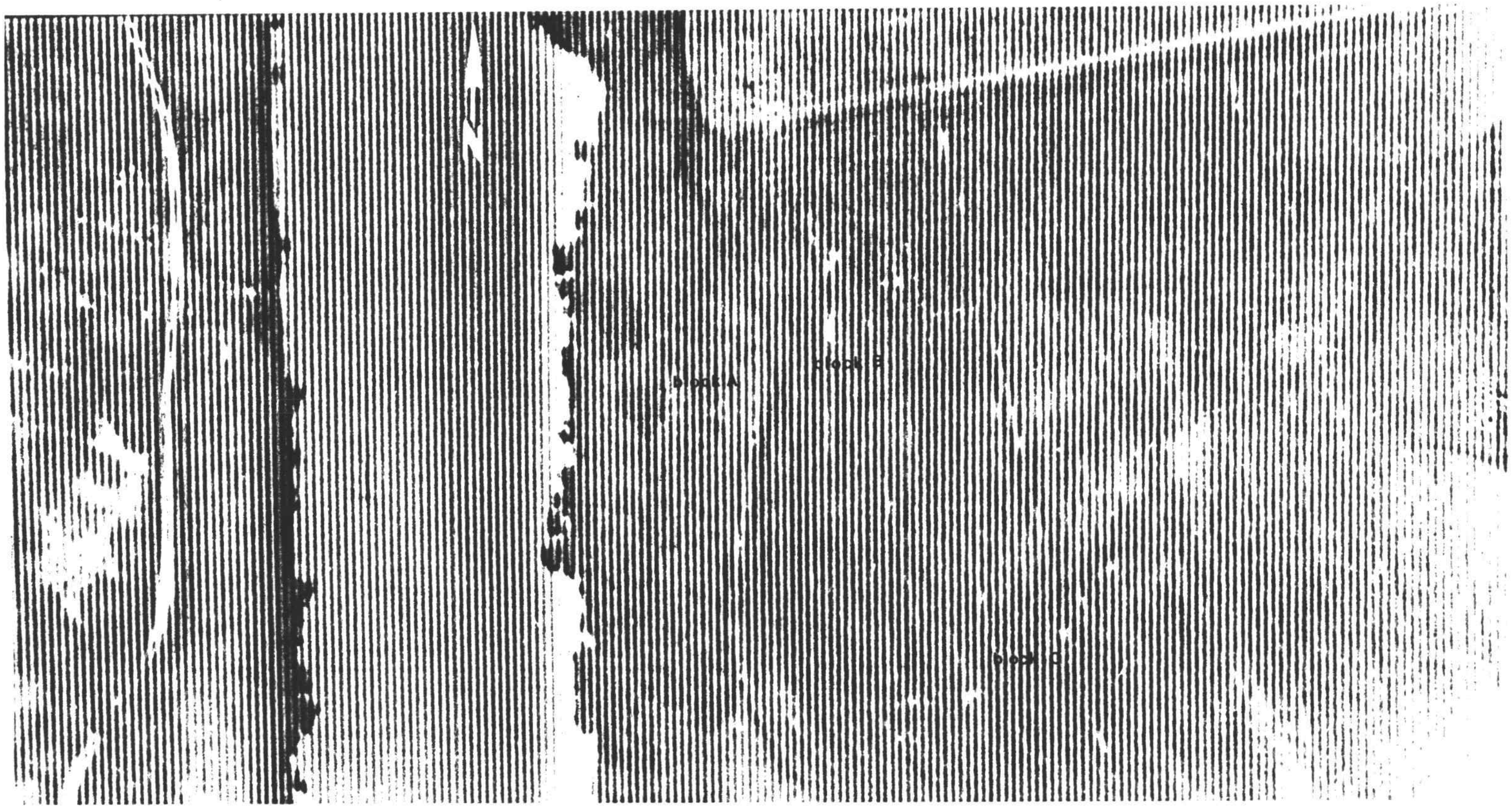


Figure 13. Aerial infrared.

DESCRIPTIVE ARCHEOLOGY

INTRODUCTION

Cultural materials associated with the mission occupation period are discussed under two separate headings: architectural features and material culture. Features, as applied to the mission component, are material representations of particular architectural elements. The features are continuously used as reference points during the artifact discussion.

ARCHITECTURAL FEATURES

Architectural features excavated in Block A offered invaluable insight for defining the architectural plan and orientation of the main mission house. The three features included evidence of one fireplace, one fire hearth, and one outdoor activity area distinguished by a gravel "floor." These features are identified as representing temporally and spatially associated configurations inherent within the mission component.

A portion of a fireplace feature was encountered approximately 20 centimeters below the surface. The feature is represented only by a close association of brick fragments, clay daub, and burned clay nodules. The core of the fireplace could not be excavated because root entanglements from a maple tree which grew subsequent to the mission occupation period obscured the archeological record. A fire hearth was encountered approximately 5 meters north of the fireplace feature. The fire hearth was identified by a hard-baked clay soil matrix in level 3 (20-30 cm) which, when excavated, defined an intrusive pit reaching to a depth of 50 centimeters (base of level 5). Brick fragments, clay daub, and burned clay closely associated with this feature further substantiated its function. Various artifact types clustered within the fire hearth. The gravel feature is composed of a compact gravel lens probably laid to provide a "floor" for an outdoor activity area. The feature was encountered within approximately 5 centimeters of the ground surface. Once exposed, the feature was left in situ (Figure 14) and excavation in this area was terminated. Numerous mission period artifacts were found overlying this feature.

The floor plan of the main mission house was determined by interpreting the associative spatial configuration of the architectural features with historical documentation and functionally supportive artifact type dispersal patterns. The historical

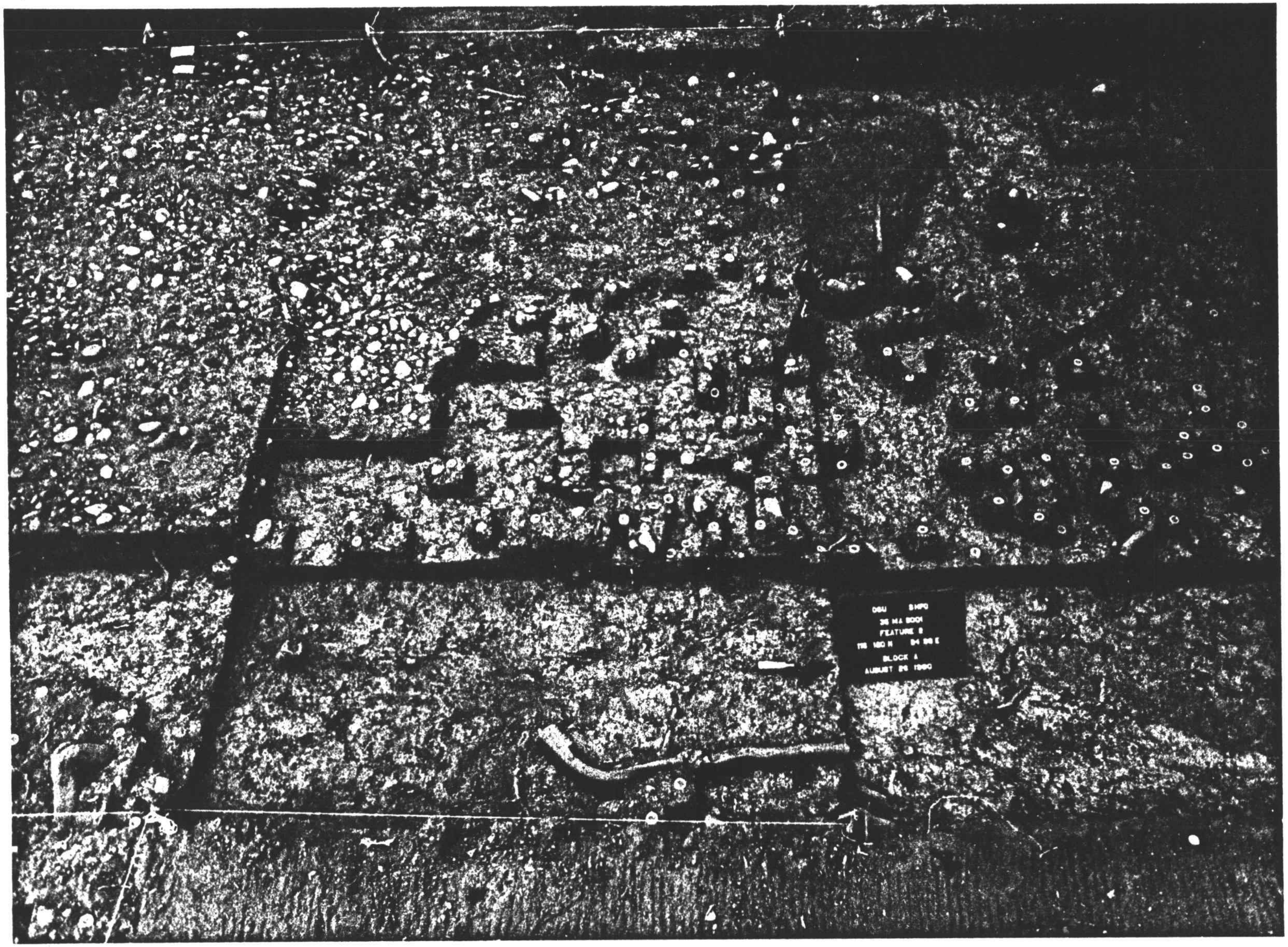


Figure 14. Gravel feature.

documentation utilized includes the historic renditions of the main mission house (Figures 4 and 5) and firsthand physical descriptions and dimensions of the first two structures built at the complex. Hypothetical dimensions of the third structure are based on the construction technique apparent from the historic renditions. A documented eastern directional siting of the house and its proximity to the Willamette River were also utilized. From this combined information a scaled architectural plan was produced and superimposed over the excavation grid based on the position of the archeologically recovered architectural features. A proportionately matched plan resulted. The gravel feature was found to be contained within the "L" of the fireplace of the first structure, and the fire hearth feature was sited at the historical location of the kitchen fireplace.

An archeological investigation carried out at the site prior to the 1980 excavations was also useful in interpreting the architectural plan. In the early 1920s, Robert M. Gatke, an historian at Willamette University, excavated what he assumed was the "root cellar" to the mission house (Gatke 1940). Unfortunately, the present location of the artifacts Gatke collected, as well as any detailed artifact analysis and site interpretation, is unknown. Historical data and the depth of Gatke's excavation (still visible in 1980) substantiates an hypothesis that he excavated a cellar. A cellar was observed at the complex in 1836 (F. Young 1912:194). The location of Gatke's intrusive pit falls within the confines of the first structure of the main mission house. A schematic rendition of the interpreted architectural plan is presented in Figure 15.

MATERIAL CULTURE

The 9542 artifacts recovered from the site were analytically identified, categorized, and quantified using a typological system which was employed to (1) distinguish a mission period artifact assemblage as opposed to post-mission occupation, and (2) delineate activity loci and associated architectural detail inherent within the mission component. The criteria for artifact classification are based on Sprague's 1980-1981 pragmatic functional classification scheme designed for analysis of artifacts dating to nineteenth and twentieth century historical sites. This classificatory scheme is structured to reflect cultural reality by forming a first analytic step towards cultural reconstruction. Each artifact is placed in a particular functional category and described in the context of that category. The

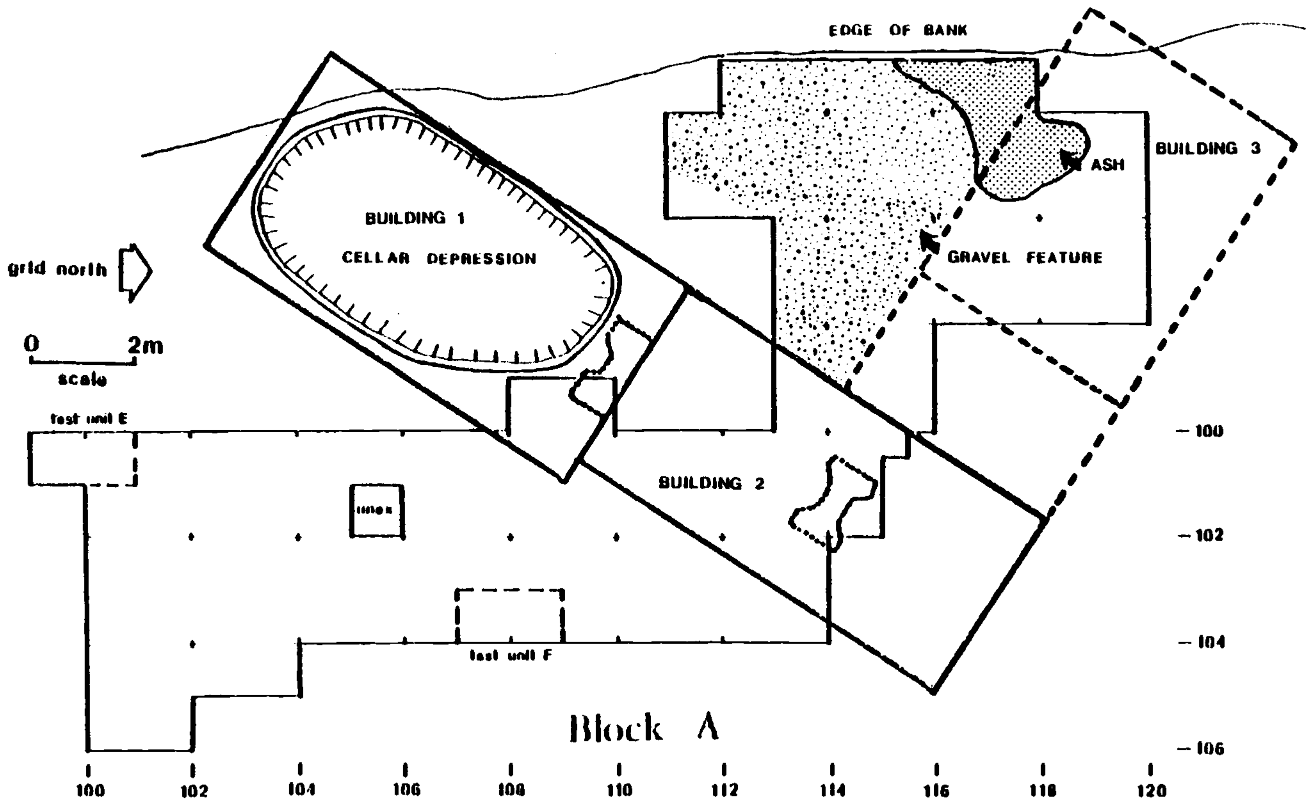


Figure 15. The postulated position of the main mission house in relation to the 1980 excavation.

function of an artifact is often determined not only by its form but by the context in which it was found.

Of the recovered artifacts, 89 percent are attributable to the temporal span of the mission occupation period. Of this total assemblage, 93 percent are classified into known functional categories, whereas 7 percent of the assemblage lack distinguishing morphological attributes and/or function-defining traits allowing their categorization with this system. As a consequence, these artifacts are classified by material of manufacture, and occasionally probabilistic identifications are presented. The post-mission occupation material culture is classed in a similar manner. These artifacts are delineated on the basis of their representing dissociated activities reflecting recreation, secondary refuse deposits, and agricultural pursuits.

Within the framework of Sprague's classification scheme, the mission assemblage was subdivided into primary, secondary, and tertiary levels of categorization. The primary level represents the context of utilization (example: Personal Items); the secondary level reflects the type of activity or use to which an artifact was applied (example: Clothing); and the tertiary level of artifact classification is then subdivided into type, class, and/or variety (depending on the artifact category). A description and identification of the form, function, condition, and size of each artifact, when feasible, is presented. Distribution data on each artifact grouping is discussed during artifact type analysis. Reference to the period and mode of manufacture, material content, and possible origin for certain artifacts is also discussed.

The Hudson's Bay Company Pacific Northwest headquarters and merchandise depot at Kanaka Village/Fort Vancouver (1825-1860) is frequently referred to only for comparative purposes, not to establish an acquisition source. Unfortunately, whether Hudson's Bay Company transactional records between Fort Vancouver and the mission have survived is unknown at this time. However, general Fort Vancouver inventories assisted in monitoring the availability and popularity of various material items during the temporal span of the mission occupation period.

Both the mission component classification scheme and the post-mission occupation cultural material classificatory format cover all the artifacts excavated from the mission site. However, artifacts recovered in areas extrinsic to the Block A excavation grid (including material from two test units in close association to

Block A, additional reconnaissance and "donated" artifacts, and artifacts from Blocks B and C) are also listed in Appendix A according to material of manufacture.

The following outline illustrates Sprague's classification scheme as applied to the Willamette Mission site. The frequency of occurrence is presented following the object type. The artifact discussion is organized according to this outline.

Personal Items

Clothing	
Buttons	27
Eye-loop button attachments	2
Adornment	
Glass beads	23
Signet ring seal	1
Body Ritual and Grooming	
Mirror fragments	6
"Wash" bottle fragments (minimum one bottle)	6
Indulgences	
Alcohol bottle fragments (minimum two bottles)	28
White clay pipe fragments (minimum five pipes)	56
Steatite pipe fragment	1
Pastimes and Recreation	
Agates	249
Petrified wood	6
Jasper	53
Other collectible rocks	24
Ritual	
Brass crucifix	1

Pocket Tools and Accessories

Pocketknife	1
Watch fob	1

Domestic Items

Furnishings

Tacks	6

Housewares and Appliances

White earthenware fragments (minimum 9 vessels)	1076
Transfer-printed earthenware fragments (minimum 32 vessels)	467
Shell-edge earthenware fragments (minimum 11 vessels)	133
Hand painted earthenware fragments (minimum 11 vessels)	144
Yellow ware fragments (minimum 5 vessels)	86
Redware fragments (mimimum 1 vessel)	3
Porcelain fragments (minimum 2 vessels)	5
Unidentifiable burned ceramic fragments	153
Utilitarian vessel fragments--stoneware and earthenware (minimum 7 vessels)	35
Spoons	4
Forks	2
Knife	1
Cast iron vessel fragments (minimum 1 vessel)	7
Cast iron fragments	157
Cast iron cauldron fragments (minimum 2 vessels)	2
Brass container cap	1
Flint strike-a-light	1

Cleaning and Maintenance

Brass sewing thimble	1

Architecture

Construction Materials

Window glass fragments	2490
Hand wrought nails	185
Machine cut nails	659
Nail fragments	891
Cast nails	2
Brick fragments	243
Mortar	4
Clay daub	160
Wood	2

<u>Construction Hardware</u>

Hand wrought iron object	1
probable identification: door latch bar	
Hand wrought or cast iron object	1
probable identification: door latch catch	
Hand wrought or cast iron butt hinge fragment	1
Hand wrought iron object	1
probable identification: hook	

<u>Commerce and Industry</u>

<u>Agriculture and Husbandry</u>

Buckles	3
probable identification: harness buckles	
Wagon bolt	1
Whiffletree hook	1
Horseshoe nails	6

<u>Hunting</u>

Copper percussion cap	1
Lead balls and shot	35
Projectile points	11
Scraper fragment	1
Lithic debris	64

<u>Construction and Manufacturing</u>

Adze blade	1
Copper rivets	2
Iron rivets	1
Nuts	2
Washer	1
Bolt fragment with attached washer	1
Screws	2
Punch	1
Coal pieces	2
Clinkers	311

<u>Group Services</u>

<u>Education</u>

Slate pencil fragments	17
Slate tablet fragments	28

Unknowns--Metal

Iron	
Unidentified iron implements and objects	11
Metal bushing fragments	2
Wire fragments	4
Thick wire fragment	1
Strap iron fragment--width 1/2 inch (1.3 cm)	1
Strap iron fragments--width 3/4 inch (2.0 cm)	5
Strap iron fragments--width 1 1/4 inch (3.2 cm) probable identification: barrel hoop fragments	3
Iron chunks	2
Concave metal disc with center perforation-- diameter 5/8 inch (1.5 cm)	1
Iron sheet fragments	6
Conical iron fragment	1
Unidentifiable metal fragments (0.58 lbs/0.26 kg)	334
Lead	
Square lead object with circular perforation-- dimensions 3/4 x 3/4 inch (1.9 x 1.9 cm) height 3/8 inch (1.0 cm) perforation diameter 3/16 inch (0.5 cm)	1
Lead object with eight longitudinal facets and bore through center (does not extend complete length of artifact)--length 7/8 inch (2.2 cm), width 1/4 inch (0.7 cm), diameter of bore 1/16 inch (0.15 cm)	1
Lead sheet fragments	14
Lead chunks	2
Brass	
Brass sheet fragments	3
Brass hinge with iron spring	1
U-shaped brass artifact	1
Brass footed object	1
Pewter	
Disc fragment	1
Chrome	
Chrome (veneered) sheet fragment	1

Unknowns--Glass

Green glass container fragments probable identification: bottle	35
Clear glass container base fragment with partial pontil	1
Green glass container fragments (minimum 4 containers)	36
Thin, curved clear glass fragments (including two rim fragments), probable identification: lamp glass or vial	5
Thin, flat, rimmed clear glass fragments, probable identification: watch crystal or locket glass	3
Miscellaneous unidentifiable melted glass fragments	40
Miscellaneous unidentifiable clear glass fragments	74

Burned Clay

Clay nodules	28.40 lbs/12.87 kg

Burned Wood

Charcoal	5.30 lbs/2.42 kg

PERSONAL ITEMS

CLOTHING

BUTTONS

Buttons recovered from the mission site are represented by two types totalling a maximum of 29 buttons. The categories include 16 flat disc buttons with eye-loop shank back attachment, 10 four-hole sew-through buttons, a button fragment, and 2 eye-loops (Table 1).

Flat disc buttons were manufactured by stamping circular button blanks out of metal sheets. A wire eye-loop shank was soldered to the back of each button. Gilt (composed of brass alloys) and brass buttons were manufactured by this process in large quantities after the introduction of button-making machinery (circa 1800) in both England and the United States (Luscomb 1967:78). These buttons could be decorated by gilding, molding, stamping, embossing, engraving, or japanning (Ross 1976:600-601). The popularity of metal loop shank buttons endured until the middle of the nineteenth century (Johnson 1948:13). Four plain faced gilt buttons were recovered from the site. Plain faced gilt buttons

Table 1. Buttons.

Type	Material	Quantity	Diameter inch	Diameter mm	Backmark Inscription
Flat disc, eye-loop shank	gilt	2	12/16	19	"Imperial Standard"
Flat disc, eye-loop shank	gilt	1	12/16	19	"Rich Orange-Gilt Colour"
Flat disc, eye-loop shank	gilt	1	11/16	17	"Warranted-Rich Orange"
Flat disc, eye-loop shank	brass	1	12/16	19	"Benedict & Coe..."
Flat disc, eye-loop shank	brass	1	9/16	14	"London"
Flat disc, eye-loop shank	brass	1	10/16	15	"Je Renais de Mes Cendres" "No.26"
Flat disc, eye-loop shank	brass	1	8/16	12	no device
Flat disc, eye-loop shank	brass	1	12/16	19	no device
Rimmed flat disc, eye-loop shank	brass	1	13/16	20	no device
Rimmed flat disc, eye-loop shank	brass	1	12/16	19	no device
Two-piece, convex face, flat back loop shank	iron	1	11/16	17	not applicable
Two-piece, convex face, flat back loop shank	iron	1	10/16	16	not applicable

Table 1, continued

Type	Material	Quantity	Diameter inch	mm	Backmark Inscription
Flat disc, eye-loop shank	pewter	1			not applicable
Four-hole, sew-through	japanned iron	2	11/16	18	not applicable
Four-hole, sew-through	japanned iron	6	10/16	16	not applicable
Four-hole sew-through	pewter	1	10/16	16	not applicable
Four-hole,	shell	1	3/16	13	not applicable

were manufactured from approximately 1800 to 1830. Most were gilded with a thin coating of gold, which usually wore off quickly. The absence of face ornamentation focused one's attention on the button's shine, color, or "orange tint" (Luscomb 1967:78).

Manufacturers often engraved or embossed backmark designators on their buttons. Most likely this was a distinguishing factor, or backmarks may have been a purely promotional procedure to attract buyers by emphasizing color and quality (Albert and Kent 1949:401; Luscomb 1967:79). The four gilt loop shank buttons from the site have impressed backmarks: "Imperial Standard" (two specimens), "Warranted-Rich Orange," and "Rich Orange-Gilt Colour" (Figure 16).

By the 1820s, button makers began to impress or emboss manufacturers' or distributors' marks on the backs of buttons, a practice which became general in the 1830s (Perry 1959:266; Olsen 1963:552). One small brass loop shank button from the site has the word "London" embossed on the back.

An American brass loop shank button has the embossed words "Benedict and Coe," indicating that the button was manufactured by Aaron Benedict at Waterbury, Connecticut. Benedict established his firm in 1812, changed the name to Benedict and Coe in 1829, and changed

Figure 16. Brass loop shank buttons.

a. "Imperial Standard"
b. "Warranted-Rich Orange"
c. "Rich Orange-Gilt Colour"
d. Phoenix button

the company name to Benedict and Burnham in 1834 (Albert and Kent 1949:402). Undoubtedly the recovered button was manufactured between 1829 and 1834.

Two stamped brass buttons have lipped or rimmed backs (Figure 17a). Luscomb (1967:79) notes that rimmed buttons were manufactured only during the 1800-1830 time period. Three iron loop shank buttons recovered at the site were manufactured from iron discs which were stamped and assembled with a separate face and back (Figure 17b). The face piece is slightly convex and is crimped at the edge over the back piece. This button type achieved popularity in the late 1820s (Johnson 1948:14).

One pewter loop shank button was recovered (Figure 17c). The button body and shank were cast in one piece. Pewter buttons of this type were being replaced in the United States by brass buttons in the 1820s, and their popularity ceased by the 1850s (Ford 1943:215-217).

One phoenix button was found at the site (Figure 16d). The button carries the motto "Je Renais de Mes Cendres" (I will rise from my ashes) encircling a phoenix with spread wings over a nest of fire, and regiment number 26. The phoenix disc button was manufactured from brass. The eye loop which would have been attached to the back of the button is missing. Phoenix buttons in general were not gilded.

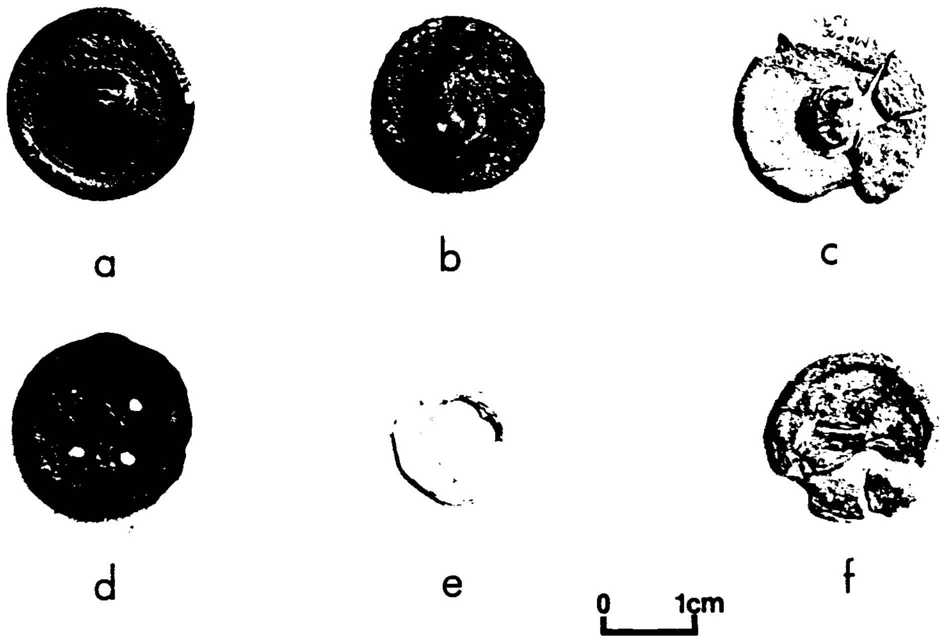


Figure 17. Buttons.

a. Rimmed brass button
b. Iron loop shank button
c. Pewter loop shank button
d. Four-hole sew-through button
e. Shell sew-through button
f. Pewter sew-through button

Phoenix buttons were manufactured by an English firm in the early 1800s and apparently were made specifically for King Christophe of Haiti. Christophe favored the phoenix motif for personal and military paraphernalia, including buttons for his army uniforms. These uniforms were no longer needed, however, when the king was deposed in 1820. Consequently, many of the uniforms and/or phoenix buttons may have entered the Northwest trade through Nathaniel Wyeth. Wyeth was a business entrepreneur in the West Indies prior to his trading ventures in the Northwest. He traveled to the Oregon Country in 1832 and again in 1834 with Jason Lee's initial overland party. Phoenix buttons have been found at numerous archeological sites in the West, with the largest quantities excavated at Native American fishing sites (known to predate 1835) on the Columbia River and its tributaries (Strong 1960, 1975).

After approximately 1840, changes in the manufacturing method of metal (especially gilt) loop shank buttons resulted in an inferior product and a decline in their popularity (Johnson 1948:13; Luscomb 1967:79; Perry 1959:266; Turner 1967:439).

Eight four-hole sew-through buttons found at the site were manufactured from iron (Figure 17d). Appearance indicates that some of these buttons may have been lacquered with coats of japan.

One sew-through button, made from shell, is lacking the interior portion; however, it is evident that four holes were used to fasten the button (Figure 17e). Shell buttons are commonly called mother-of-pearl buttons and were manufactured by cutting circular discs from large ocean shells with a tubular saw. These buttons were first produced in the United States at the end of the eighteenth century (Ford 1943:151-155).

One fragmented pewter sew-through button was also recovered (Figure 17f). Cast pewter buttons were very "soft" and thus had a short life-use span.

The sew-through button type with four holes and concave well may have been patented in the 1830s or 1840s (Ross 1976:606-607). The popularity of this button type is notable throughout the first half of the nineteenth century.

Buttons were the most common type of clothing fastener available during the mission occupation period. Gilt loop shank buttons were commonly used on men's coats, vests, jackets, and trousers. Rimmed loop shank buttons were frequently used on vests. Mother-of-pearl buttons fastened shirts, undergarments, and women's dresses. The iron four-hole sew-through buttons may have been used on men's shirts.

Sources of buttons available to the mission occupants reflect British and American origins. The missionaries acquired buttons and clothing from American East Coast markets and donations in the middle to late 1830s (Mission Account Book 1838-1841; Oregon Mission Correspondence). Numerous button types were on hand at British Fort Vancouver. In addition, Ewing Young offered "gilt coat buttons" at his store (1838-41) in the lower Willamette Valley. Young acquired many button types through transactions with the Fort Vancouver Sale Shop (F. Young 1920:272). The loss of buttons from clothing worn by the mission occupants would be the most likely source for their random occurrence within an archeological context. The majority of buttons were found in Block A in the northern section of the excavation grid.

ADORNMENT

GLASS BEADS

In general, beads represent a manifestation of cultural interaction at contact period sites in the Pacific Northwest. Beads were manufactured in seemingly infinite varieties, with those made from glass being by far the most prevalent and in demand. Beginning in the last quarter of the eighteenth century, beads became a common Northwest Coast trade item. Beads were also a favored decorative commodity used by Euro-American women in the nineteenth century.

The 23 complete glass beads found at the mission site were typed into manufacturing categories (Type), then subdivided into an intrasite archeological classification scheme based on specific method of manufacture (Class), and specific morphological attributes (Variety). The size of population for each variety was also determined (N Sample) (Table 2). Generally, in the Pacific Northwest, sizes of archeological beads cannot be accurately correlated with historical definitions or specific bead manufacturing centers.

Table 2. Glass Beads.

Type	Class	Variety		N Sample
Tube beads	Class 1			
	Faceted, short, unmodified double-layered bugle; six to seven facets	Length: Diameter: Color:	6.0-8.0 mm 8.0-9.0 mm Clear over semi-opaque white (N 9/)	6
	Faceted, short, unmodified double-layered bugle, six to seven facets	Length: Diameter: Color:	6.0 mm 6.0 mm Translucent blue over semi-opaque white (7.5 PB 3/10)	1
Tube beads	Class 2			
	Faceted, short, single-layered with ground facets (six to seven) and ends	Length: Diameter: Color:	7.0 mm 8.0 mm Translucent blue (7.5 PB 2/4)	1
	Faceted, short, single-layered with ground facets (six to seven) and ends	Length: Diameter: Color:	5.0-5.5 mm 6.0-7.0 mm Translucent blue (7.5 PB 2/4) Opaque black (N 0.5/)	2
Tube beads	Class 3			
	Hot tumbled, undecorated, short, single layered	Length: Diameter: Color:	3.0 mm 4.5 mm Opaque blue (5 B 4/6)	1
	Hot tumbled, undecorated, short, single layered	Length: Diameter: Color:	1.0-2.0 mm 2.0-3.0 mm Opaque white (N 9/)	9
Wire Wound Beads	Class 4			
	Undecorated, spherical single layered	Length: Diameter: Color:	9.0 mm 9.6 mm Translucent yellow (5 Y 7/10)	1
	Undecorated, spherical single layered	Length: Diameter: Color:	5.0-6.0 mm 6.0-7.0 mm Translucent blue (5.0 B 3/6) Translucent opaque blue (5.0 B 3/6)	2

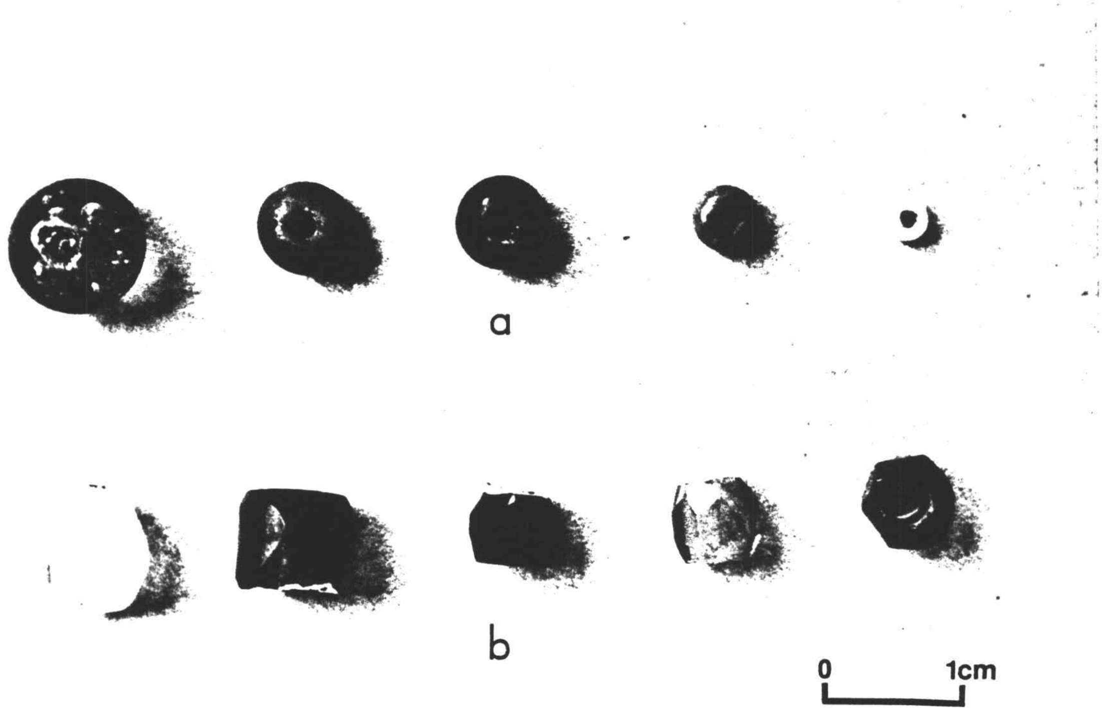


Figure 18. Glass beads.

a. Wire wound beads
b. Tube beads

Two discrete bead manufacturing types, tube and wire wound, are present in the mission sample (Figure 18a-b). To illustrate these bead types and to explain attribute terminology, the two manufacturing techniques are briefly explained. This information was derived primarily from Kidd and Kidd (1970).

In the early nineteenth century, glass tube beads were manufactured by a simple technique of stretching a glass bubble into a tubular shape. The layered color effect was achieved by adding molten glass of different colors to the bubble before drawing it out. The rigid tube of glass was then laid on slabs of wood to dry. Once cooled, the tubes were snapped or cut into prescribed bead lengths. Tube beads were then refined by "hot tumbling" and/or faceting. Generally, faceted beads are those which are cut or ground around each end, leaving the central section untouched. Beads subjected to "hot tumbling" are reduced to oval or rounded shapes by reheating and agitating the beads in a mixture of fine sand and charcoal.

Whereas tube beads were mass produced, wire wound beads were individually fabricated by wrapping a heated wire with a rod of molten glass until a bead of the desired size and shape was built up. Different colors of glass rods were often introduced to achieve polychrome effects. Throughout both tube and wire wound manufacturing processes, beads could be treated with infinite variation in color, form, texture, and size. Nineteenth century glass beads commonly were manufactured in Italy, France, the continental North Sea lowlands, central Europe, and China (Ross 1976:669).

Beads are extremely difficult to date in terms of assigning precise periods of manufacture. Noel Hume (1978:54-55) provides general information to this end, stating that glass tube beads averaging seven facets were most common in the first half of the nineteenth century. Glass wire wound beads generally date to the second half of the eighteenth century and into the early nineteenth century.

Archeological statistics and known historical data substantiate the fact that blue beads and, to a lesser extent, white beads were preferred by Northwest Coast Native Americans as items of trade from Euro-Americans (Ross 1976:674; Woodward 1965:14). Comparatively, data from the mission bead sample shows a predominance of white beads (15), followed with six blue beads, one yellow bead, and one black bead. The fact must be stressed, however, that the bead sample recovered from the mission site is relatively small.

Two opaque to translucent blue single-layer spherical wire wound beads found at the site are notable (Table 2, Class 4). Data from Fort Vancouver indicate that specimens such as these represent the most significant historical archeological bead variety in the Pacific Northwest for early historic contact sites (Ross 1976:746). Ross hypothesized that this bead variety represented one style of the "large blue China or Canton beads" imported by Lewis and Clark, and by the Pacific Fur, Northwest, and Hudson's Bay fur companies.

Archeologically, this bead variety is the most common in Pacific Northwest sites of the early nineteenth century (Ross 1976:746-747).

Historical bead groupings are not readily apparent in the mission sample because the majority of the beads were recovered from individual, random localities in Block A. However, bead varieties do reflect cultural selectiveness. The popular faceted bugle bead (seven examples) is documented as having been used by Euro-American women in making mats, table covers, and pendants. Native Americans worked beads into necklaces, sewed them individually on dresses, and made fringes of beads for cloth and skin garments (Woodward 1965:10). Small, white, hot tumbled tube beads (nine examples) are commonly referred to as "seed" beads and were used historically for ornamentation. Seed beads were the single most popular variety found at Fort Vancouver, with high frequencies recovered within Native American trading areas (as opposed to larger beads associated primarily with Euro-American sales areas) (Ross 1976:671, 709). Seed beeds were extensively favored at the beginning of the nineteenth century (Woodward 1965:11).

Beads were possibly used at the mission by Native American women boarders who were given instruction on sewing techniques to produce necessary clothing articles.

Clothing accounts for the boarders' consistently-listed deerskin "gowns," pants, and "moggasons," in addition to Euro-American articles (Mission Record Book 1834-1839).

A lack of known historical documentary sources listing beads supports a belief that the specimens were not utilized as trade items within the mission economic system. This is not surprising since the purpose of the mission was to supply local Native Americans with the necessary means of sustenance in return for manual labor. Glass beads, then, were possibly used solely as decorative commodities by both Native American boarders and mission personnel. Random occurrence of the beads suggests their presence in the archeological context as the result of loss by occupants of the mission.

SIGNET RING

A green glass setting (2.5 GY 5/2), possibly from a signet or seal ring, was recovered in the vicinity of Block C. The rectangular setting measures 0.45 x 0.34 inch (1.14 x 0.94 cm) and is 0.08 inch (0.2 cm) thick. The signet, which is composed of the words "IN CONSTANT" and a symbol, possibly a butterfly, are engraved in the glass. The words, printed in reverse, suggest that the setting was intended for use in conjunction with a soft tenacious substance such as wax. Although the glass is very worn, an impression is still imparted when pressed into wax today. Signet rings were very popular in the latter part of the eighteenth century and into the nineteenth century (Kunz 1917:158).

BODY RITUAL AND GROOMING

MIRROR GLASS

Six fragments of thin mirror glass were recovered. Thickness ranges from 0.065 to 0.074 inch (1.6 to 1.9 mm) with a mean thickness of 0.068 inch (1.7 mm). These measurements were taken in areas devoid of the mirror backing material.

The mirror backing appears to be of tin and mercury, the material used in the first part of the nineteenth century. A tin and mercury backing presents a granular metallic appearance when viewing the back of the mirror. When exposed to dampness, the tin and mercury surface tends to turn gray in roughly circular patches (Roenke 1978:14).

Based on thickness, fragments are probably from a small, light mirror(s). Roenke (1978) notes that mirror fragments recovered thus far from fur trade posts were made of fairly thin flat glass and that the majority recovered came from trade mirrors or small personal mirrors. Inexpensive hand-held mirrors were made from thinner cylinder glass rather than thicker plate glass (Roenke 1978:110).

BOTTLE

Six clear bottle glass fragments with a blue-green tint were unearthed. Original bottle shape is not discernible from the small fragments, which all appear to have come from the bottle's shoulder. Although no mold seams are visible on any of the fragments, a mold-blown bottle is indicated by the presence of embossing. Small bubbles, some elongated toward the top of the bottle, are observable in the glass.

The letters "WASH" are embossed but it is uncertain if these letters are part of a larger word (Figure 19). Embossed bottles would have been available to the missionaries. An 1810 advertisement presents the

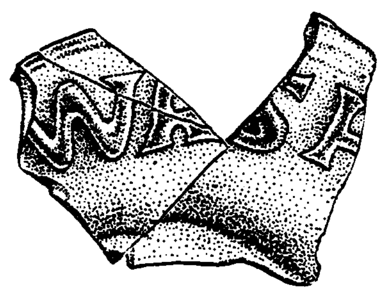


Figure 19. "Wash" bottle fragments (actual size).

first evidence of an embossed bottle manufactured in America (Munsey 1970:65). Embossed bottles were being made even earlier in England.

Several types of "washes" were available during the 1830s. Most were used for grooming purposes, although some washes were more medicinal in function. One example, "Gibney's Tetter Wash," apparently was not intended for human use. The following list, taken from Putnam (1968), gives an indication of the various types of washes that would have been available during the mission occupation period. Unfortunately, there is no description of the bottles which contained these contents.

1833 Florentine Tooth Wash "adheres the gums firmly to the teeth"

1834 Peruvian Tooth Wash "tightens up the gums and sweetens the breath"

1836 Stuckerts's Sore Nipple Wash "12 1/4¢ bottle"

1837 Gibney's Tetter Wash "removes ringworm"

1839 Michaux's Freckle Wash "cures freckles, tan and sunburn"

INDULGENCES

ALCOHOL BOTTLE GLASS

Since the Methodist missionaries were the organizers of the first temperance movement in Oregon, the relative lack of artifacts associated with the consumption of alcohol was not unexpected. Glass in various shades of green, often the reflection of alcohol bottles during the nineteenth century, represent only 1.2 percent of the entire mission artifact assemblage. It is possible to define seven discrete green glass containers. Unfortunately, definitive statements concerning these containers are not possible for several reasons:

1. Small fragment size and representation prohibit a determination of container form and function. In addition to bottles, bowls, milk pans, pitchers, and preserve jars were sometimes manufactured of green glass during the nineteenth century.

2. Diagnostic features are often found on container bases, necks, and lips. These container elements are lacking in the sample. With the exception of two base fragments (discussed later), the majority of the fragments appear to be from the body portions of the containers. For this reason, it is difficult to

determine the method of manufacture and the subsequent range of dates for manufacture. There are no seams visible on any of the body fragments recovered.

3. Based on the color and quality of the glass, fragments are datable to the nineteenth century. Without more specific data for dating purposes, it is difficult to positively assign fragments to the mission occupation period. The presence of this glass at the site could be attributable to several other sources. For instance, Lindsay Applegate and his party inhabited the mission structures in the winter of 1843-1844, after abandonment by the missionaries. Table 3 gives the frequency of green glass fragments for each defined container by level.

Fragments from two of the seven containers indicate parts of bottles which were originally manufactured to contain alcohol. Container 6 fragments include part of a kickup. Kickups are common on the bases of champagne and wine bottles. Container 7 is represented by a large base fragment of a black glass bottle. Black glass was manufactured as early as 1815 (Newman 1970), but was most common during the third quarter of the nineteenth century. The majority of the fragments associated with these bottles were found in the northwest portion of the Block A grid.

Table 3. Frequency of Green Glass by Level.

Container #1 Fragments
(7.5 Y 4/4)

Level	(N)
I	17
II	6
III	7
IV	1
V	

Container #2 Fragments
(7.5 GY 4/4)

Level	(N)
I	5
II	6
III	2
IV	
V	

Container #3 Fragments
(5.0 Y 4/4)

Level	(N)
I	1
II	4
III	3
IV	1
V	

Container #4 Fragments
(10.0 Y 4/4)

Level	(N)
I	
II	
III	2
IV	1
V	

Container #5 Fragments
(green opalescent)

Level	(N)
I	
II	
III	
IV	2

Container #6 Alcoholic Bottle Fragments
("black glass")

Level	(N)
I	1
II	
III	
IV	
V	

Container #7 Alcoholic Bottle Fragments
(2.5 Y 5/6)

Level	(N)
I	14
II	8
III	5
IV	
V	

Although it is not known if the missionaries were responsible for these bottle fragments, historical documentation does indicate use of some alcohol at the mission. Shortly before leaving the Sandwich Islands in 1837, several boxes were sent aboard the brig Diana. The boxes, a gift, were addressed to Dr. White of the mission. The missionaries opened the boxes enroute to Oregon. In the first box the missionaries found a dozen bottles of wine and in the second box eight bottles of brandy. The missionaries noted that all were invaluable in sickness (Allen 1850:50). In an 1838 letter to her husband, Anna Maria Lee mentioned having a glass of wine one evening after supper when she found it difficult to rest (Gay 1936:169). Further, Dr. John McLoughlin was known to have brought his own wine when visiting the mission (Allen 1850:118).

PIPES

A minimum number of five white clay tobacco pipes and one steatite pipe were present at the site. Included are one bowl and stem, two junctures, two spurs, sixteen plain stem fragments (no mouthpiece tips), and thirty-five bowl fragments. Approximately 50 percent of the pipe fragments were found in the vicinity of the gravel feature in Block A.

One white clay pipe specimen could be partially reconstructed (Figure 20). The stylistic bowl shape typifies a circa 1820-1840 general type (Oswald 1975:39). The bowl, which is thin and narrow, is fluted to the midsection with the molded initials "IF" on the side and a vertical frond on the base. The flat spur carries no initials. The decorated stem is unique among all pipe stems recovered from the site. The initials "IF" indicate that the pipe was manufactured in London, England, by John Ford--most likely at Stepney (1805-1865) or possibly at Pentonville (1831-1850). The Hudson's Bay Company imported John Ford pipes in the years 1831 and 1833-1835 (Oswald 1975:136). Apparently Ford of Stepney held a monopoly to supply pipes to the Hudson's Bay Company (Walker 1971:23).

Two bowl fragments each show evidence of the manufacturers' marks--"Ford Stepney" impressed within a circle (one dashed) on the back of the bowls. Two spurs which exhibit an "I" on one side and an "F" on the other side (Ford Stepney characteristics) may correlate with the two bowl fragments (Figure 21a-b). Similar Ford Stepney pipes were the most numerous type recovered during excavation at the Hudson's Bay Company Kanaka

Figure 20. Partially reconstructed clay pipe.

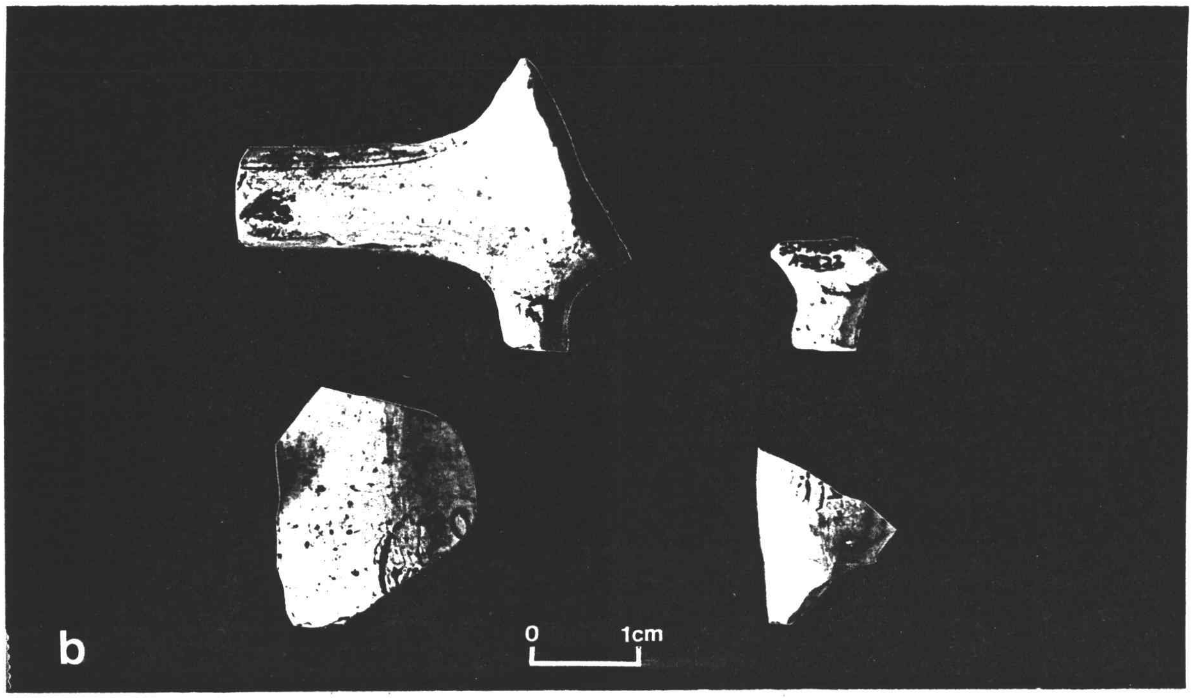


Figure 21. "Ford Stepney" clay pipe fragments.

a. Spurs
b. Bowls

Village/Fort Vancouver (Chance and Chance 1976:169-170). Ross (1976:805) notes that 95 percent of all pipes recovered archeologically at Fort Vancouver were manufactured by the Fords.

The steatite pipe is represented by one bowl fragment. Apparently steatite pipe carving was practiced regularly at Fort Okanogan and possibly at Fort Vancouver by recuperating patients in the hospital dispensary (Ross 1976:818). The location of manufacture of the mission steatite pipe is unknown.

PASTIMES AND RECREATION

COLLECTIBLE ROCKS

During excavation, 332 river worn agates, jasper, petrified wood, and "collectible" rocks were recorded as artifacts. Presumably the mission occupants collected the specimens from nearby gravel bars. Willamette River gravels near the mission contained "carnelians, agates, and chalcedony among the loose pieces of basalt" (Wilkes 1845:352). A visitor to the abandoned settlement in 1844 noted "specimens of quartz and carnelian from the pebbly shores of the Willamette River" in the mission house (Mudge 1848:220).

The presence of numerous rounded to subangular cryptocrystalline silica nodules in the mission period sediments corroborates Mudge's comments. The rocks probably were collected by the mission occupants as curiosities, but several specimens may have served a more utilitarian purpose. Thirty specimens were medially split, with one or more of the resultant edges crushed or flaked as though these specimens had been used. In the absence of, or in lieu of, manufactured flints for starting fires, these fine-grained silacious stones could serve as a readily available functional substitute when split to produce an obtuse angular edge. No evidence was found that locally available stone was modified into gunflints.

RITUAL

BRASS CRUCIFIX

The crucifix found in Block A near the main mission house is 1.3 inch (3.3 cm) long by 0.71 inch (2.1 cm) wide (Figure 22). The cross, which was stamped out of thin sheet brass, has elliptical design elements set in relief on the front with a plain back. The Christ figure was stamped in relief out of another piece of thin sheet brass and applied to the cross. An eyelet topped the cross. Most of the eyelet was missing on the mission specimen.

The occurrence of a religious symbol usually associated with the Catholic Church at a Methodist mission is problematical. Before the Catholic mission was established in St. Paul in 1836, a number of local French Canadian Catholics did frequent the mission and could have lost or discarded the crucifix.

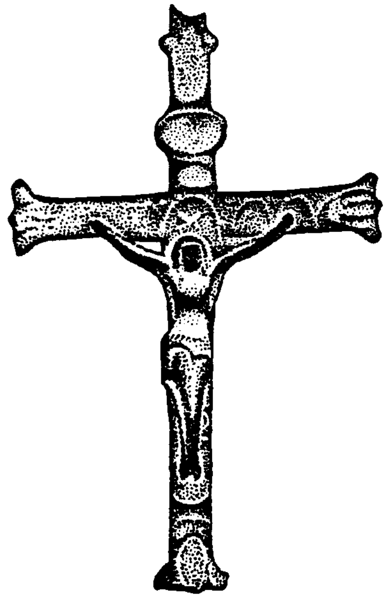


Figure 22.
Brass crucifix.

POCKET TOOLS AND ACCESSORIES

POCKETKNIFE

The juncture portion of one single-blade pocketknife was recovered from Block A near the postulated kitchen fire hearth (Figure 23a). Due to the condition of the knife, stylistic and material characteristics cannot be determined.

Single- and double-blade pocketknives are noted in various records kept by the missionaries (Mission Account Book 1839-41; Oregon Mission Correspondence). The missionaries may have acquired these items through American or British markets. Most knives used in America during the first quarter of the nineteenth century were manufactured in Sheffield, England; however, American cutleries were competing with the British by the early 1830s (Peterson 1958:146).

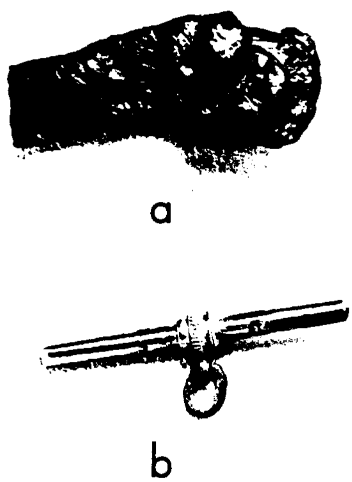


Figure 23. Pocket tools and accessories.

a. Pocketknife
b. Watch fob

WATCH FOB

One chrome-plated watch fob was present in Block A (Figure 23b). The fob measures 1 10/16 inch (4.1 cm) in length and 2/16 inch (0.3 cm) in diameter. Watch fobs are defined as small weights or ornaments worn at the end of a watch chain. The specimen recovered from the site was fashioned to be secured into a vest buttonhole.

DOMESTIC ITEMS

FURNISHINGS

TACKS

The actual function of the tacks (Figure 24a) recovered from the mission is not known. They are included under the functional category of furnishings since the type of tacks found were commonly used to affix fabric to furniture frames (Steele, Ross, Hibbs 1975:102).

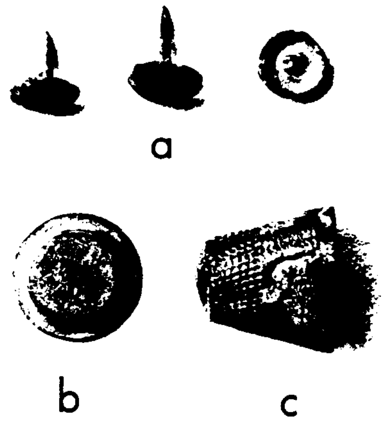


Figure 24. Miscellaneous brass artifacts (actual size).

a. tacks
b. container cap
c. sewing thimble

Two complete brass tacks, three brass tack heads, and one brass tack fragment are represented. All heads are stamped "umbrella" heads. The shanks, which taper on all four sides to a point, are soldered to the heads. The dimensions of each tack are listed in Table 4. Tacks measuring one-half inch in length were also recovered

Table 4. Tack Sizes.

N Sample: 5

Complete Specimens: 2

Length		Head Diameter	
8/16 inch	(1.28 cm)	3/8 inch	(0.95 cm)
7/16 inch	(1.08 cm)	4/16 inch	(0.87 cm)

Specimens with Complete Head/No Shank: 3

Head Diameter	
5/16 inch	(0.84 cm)
3/8 inch	(1.00 cm)
5/16 inch	(0.87 cm)

from the Fort Vancouver Sale Shop (Steele, Ross, Hibbs 1975:102).

HOUSEWARES AND APPLIANCES

CERAMICS

Ceramics comprise one of the largest categories of artifacts, with 2102 fragments. Although most fragments are extremely small, a great deal of information was conveyed with only preliminary research completed. Earthenwares comprise 98 percent of the total ceramic fragments. Ironstone, a more durable earthenware, is rare. A more detailed accounting of the ceramics, including stoneware and porcelain, is presented in Table 5. Not included in Table 5 are 145 burned, unidentifiable fragments and 7 unclassifiable earthenware fragments.

Using criteria that varied in accordance with the ceramic type being evaluated, a minimum number of individual vessels was calculated. A minimum of 78 vessels is represented; of these, 65 vessels (83 percent) can be considered dinnerwares, while 13 vessels (17 percent) represent utilitarian wares designed for food preparation and/or storage.

The problem of quantifying materials from archeological sites has been dealt with elsewhere (see Grayson 1979; Orton 1975). Minimum vessel counts were attempted with ceramics from the mission site in the hope of more closely approximating reality. Since ceramics serrate so well and frequently provide the most reliable data for dating a site, the unit of measurement used for quantifying ceramics must provide the most accurate picture of the relative abundance of ceramic types present in the site. Weber (n.d.), using data from the mission, found that quantifying ceramics on the basis of minimum vessel count provided data on the relative

Table 5. Percentage of Ceramic Types by Fragment.

Type	Number of Fragments	Rank	Percentage of Total Ceramics
White earthenware	1076	8	55.25
Transfer-printed earthenware	467	7	23.95
Hand-painted earthenware	144	6	7.40
Shell-edged earthenware	133	5	6.80
Yellow ware	86	4	4.40
Earthenware and stoneware utilitarian vessels	35	4	1.80
Porcelain	5	2	0.25
Redware	3	1	0.15

Table 6. Percentage of Ceramic Types by Vessel.

Type	Minimum Number of Individual Vessels	Rank	Percentage of Total Vessels
Transfer-printed earthenware	32	8	41.00
Hand-painted earthenware	11	6.5	14.00
Shell-edged earthenware	11	6.5	14.00
White earthenware	9	5	12.00
Stoneware and earthenware utilitarian vessels	7	4	9.00
Yellow ware	5	3	6.00
Porcelain	2	2	3.00
Redware	1	1	1.00

abundance of ceramic types that was quite different than that provided by fragment count. For instance, when using fragment counts, plain white earthenware fragments comprise 55 percent of the total ceramic fragments and 59 percent of the dinnerware fragments. This high percentage of white earthenware could suggest a site dating to the third quarter of the nineteenth century. During this period, the popularity of transfer-printed earthenware declined (Laidacker 1951:ix) and the popularity of plain white vessels increased. When calculations are based on minimum vessel number, the percentage of white earthenware drops to 12 percent (Table 6). This figure substantiates the probability that many of the plain white earthenware fragments are from the centers of shell-edged plates or from hand-painted wares. Transfer-printed earthenware fragments amount to 23 percent of the total ceramic fragments, but comprise 41 percent of the defined vessels and almost 50 percent of the dinnerware vessels. This higher percentage is expected for a site of the 1830s, given the popularity of transfer-printed earthenware at that time.

Dinnerwares

Ceramic dinnerwares are those vessels originally manufactured for use on the dining table. Nineteenth century dinnerwares were available in a large variety of functional categories. At Fort Vancouver dinnerwares were ordered by function rather than pattern and included dinner plates, soup plates, dessert plates, side plates, coffee cups, tea cups, saucers, mugs, slop bowls, teapots, sugar bowls, jugs, pitchers, butter boats, sauce boats, vegetable bowls, platters, platter strainers, and soup tureens (Ross 1976). While prescribed vessel function is not necessarily indicative of actual vessel use, vessel size and form limit utilization possibilities.

Determining the function of many of the mission dinnerware fragments is not possible because of small fragment size and fragment representation. To further complicate matters, there is a possibility that not all fragments are from vessels used on the dining table. For instance, ceramic chamber pots were often made in the same patterns as their counterparts used on the dining table. In many cases it is possible to determine if fragments are from hollow ware vessels or flat ware vessels. Hollow ware vessels are "open" vessels such as cups, bowls, and vegetable dishes. Flat ware vessels include plates of various sizes, soup plates, and platters. A minimum of 65 dinnerware vessels was recovered from the mission site--31 (47.7 percent) flat ware vessels, 22 (33.8 percent) hollow ware vessels, and 12 (13.5 percent) vessels for which a determination has not been possible.

Transfer-Printed Earthenware All of the 457 transfer-printed ceramic fragments have a white earthenware body with monochrome underglaze decoration. At least 26 patterns are represented on a minimum of 32 vessels (15 flat ware vessels, 11 hollow ware vessels, and 6 vessels of undetermined form). Only one trademark is present and has yet to be identified (Figure 30d). The variety of patterns represented suggests odd-lot purchases, donation goods, or the personal possessions of the numerous people associated with the mission. Twelve patterns have thus far been identified.

Canova (WM1): Ten fragments of *Canova*, printed in blue, were recovered (Figure 25a). At least two vessels are represented: one hollow ware vessel and one flat ware vessel. *Canova* was manufactured by Thomas Mayer, Stroke-on-Trent, between the years 1826 and 1838 (Godden 1964:423). Thomas Mayer's blue printed wares were

Figure 25. Identified transfer-printed earthenware patterns.

a. Pattern WM1 Canova
blue transfer print
(Munsell 7.5 PB 6/6)

b. Pattern WM2 Broseley
blue transfer print
(Munsell 7.5 PB 4/8-6/8

c. Pattern WM3 Italian Seaport
blue transfer print
(Munsell 7.5 PB 6/6-5/6)

d. Pattern WM4 Bluebells and Other Flowers blue transfer print
(Munsell 7.5 PB 4/8)

e. Pattern WM5 Scroll
transfer print
(Munsell 7.5 PB 6/6)

f. Pattern WM6 The Sower
red transfer print
(Munsell 2.5 R 4/9)

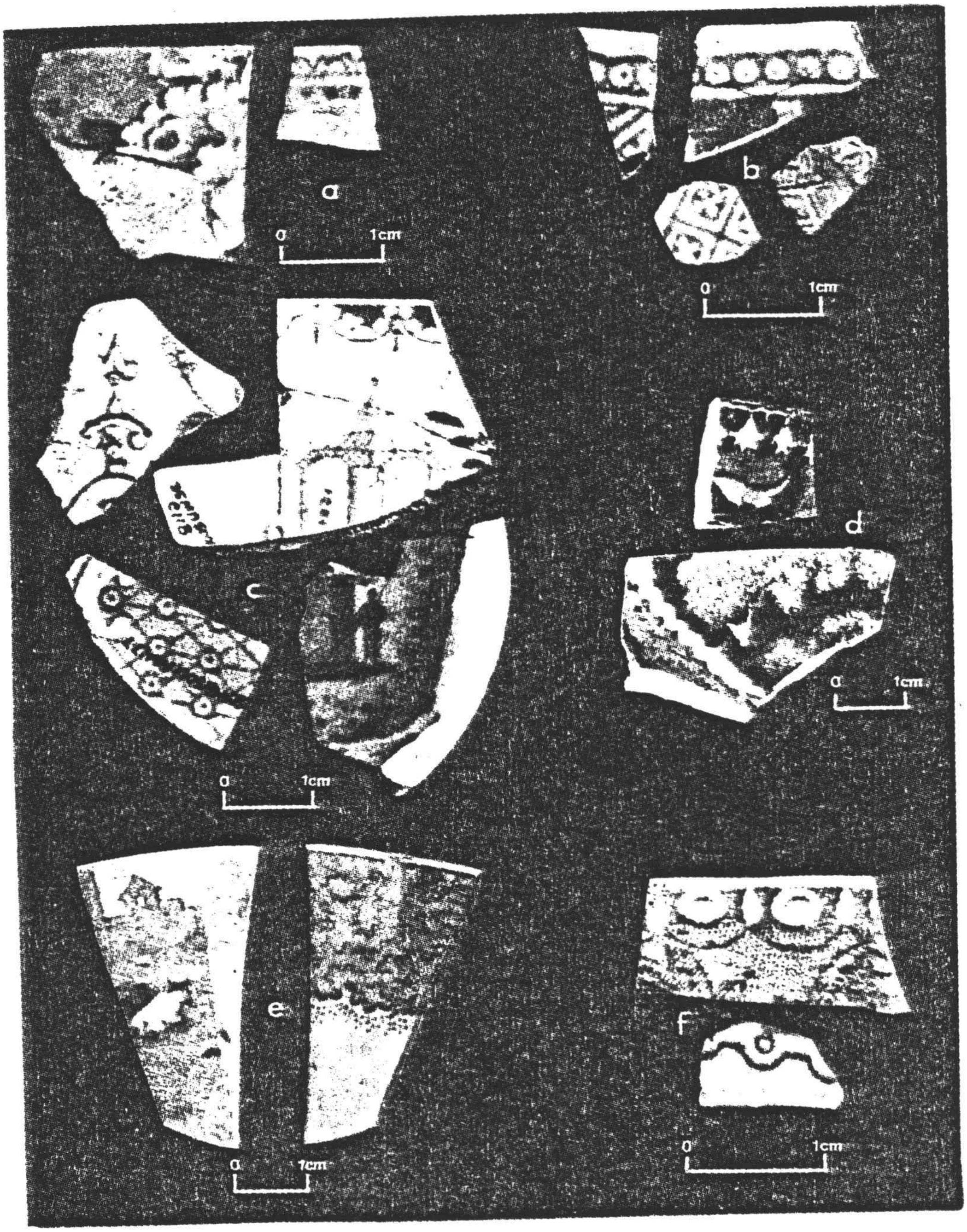


Figure 25.

extensively exported to the United States (Godden 1964:423). Mayer was not the only manufacturer of Canova. In addition to being manufactured by other English firms, Canova was manufactured by David Henderson of the American Pottery Company in Jersey City (Barber 1904:41). However, it was not manufactured in the United States until 1840, after the English method of transfer-printing was introduced to United States potteries. In the absence of a trademark, the manufacturer of the mission's Canova is not definitely known. Canova was also recovered at Fort Vancouver.

Broseley (WM2): Printed in blue, Broseley was registered by the Josiah Spode Company circa 1817 (Ross 1977:212) and was manufactured at least through the Copeland and Garrett (1833-1847) and W.T. Copeland (1847-1867) periods. Five fragments of Broseley were recovered--none with a trademark (Figure 25b). The two rim fragments recovered indicate at least one hollow ware vessel. Decoration is present on both interior and exterior surfaces. It is unlikely that all fragments are from one vessel, since one fragment was found in Block C.

Although Spode, or his successor Copeland and Garrett, was the most likely manufacturer of the mission pieces, a cup and saucer with the Broseley pattern recovered from Fort Vancouver excavations were tentatively identified to the manufacture of William Ratcliffe, circa 1831-1840 (Ross 1976:453). To further complicate matters, Broseley was produced by a variety of potters during the nineteenth century.

Beginning in the middle 1830s, Copeland and Garrett began to sell wares to the Hudson's Bay Company (Ross 1976:193). For this reason, occurrence of Broseley and other Spode/Copeland and Garrett patterns is widespread in early historic sites in the Pacific Northwest. Although suggestive, the source of the mission's Broseley remains unknown.

Italian Seaport (WM3): The mission site yielded 49 fragments of at least one cup in the Italian Seaport pattern (Figure 25c). This pattern, identified on the basis of comparison with a marked specimen in the Fort Vancouver collections, has not been traced to a manufacturer. The pattern in blue is printed on both interior and exterior surfaces. Based on stylistic attributes and its archeological association with early Hudson's Bay Company material at Fort Vancouver, Italian Seaport appears to be an early pattern. David Hansen (1980) notes that Italian motifs were popular during the early decades of the nineteenth century. Hansen further suggests the tentative possibility that Italian Seaport may be an early (1805-1815) registered Spode pattern.

Italian Seaport has been found at Fort Colville as well (Chance and Chance 1976).

Bluebells (WM4): Bluebells and Other Flowers is a border pattern used by William Adams at Stroke between 1820 and 1835 (Laidacker 1951:1). Seven fragments with this border design were unearthed at the mission (Figure 25d). A minimum of one flat ware vessel is represented, although fragments were recovered from Blocks A, B, and C.

The Bluebells border is the earliest pattern identified from the mission thus far, and it is printed in the dark blue characteristic of the early nineteenth century. This border was used on a series of at least 16 English views (Turner 1923:120). These views were primarily of castles and abbeys (Laidacker 1951:1). Since fragments recovered from the mission are from the border, we have no indication as to which of the 16 views was used in the center of the plate. An illustration of a complete plate with this border pattern can be found in Laidacker's work (1951:1).

Clews was known to have used this border pattern, probably under a financial arrangement with Adams (Laidacker 1951:2). In no case, however, did the two potters use the same central views with the Bluebells border (Laidacker 1951:2). Although the manufacturer of the fragments recovered from the mission cannot be identified, the specific manufacturer is unimportant for dating purposes since Clews used this pattern during the same time period.

Scroll (WM5): One fragment of the *Scroll* pattern, printed in blue, was recovered in Block C (Figure 25e). A flat ware vessel is suggested by the rim fragment. A plate printed in the *Scroll* pattern is illustrated in Williams 1978:409). Williams notes that the plate is marked with the letter "B" although no manufacturer has been ascribed to the mark. Godden (1964:709) notes that printed marks of the 1820-1840 period incorporate the initial "B" with the name of the pattern. Since this initial could fit many Staffordshire potters, Godden does not attribute this mark to any particular manufacturer. A fragment of this pattern was personally observed in the collection of cultural material from the 1981 Kanaka Village excavation.

The Sower (WM6): Four fragments of *The Sower*, a pattern by William Adams, were recovered (Figure 25f). Printed in red, all fragments are from a hollow ware vessel and have transfer-printing on both the interior and exterior surfaces. Williams (1978:526) dates this pattern between 1800 and 1864; however, Williams' dates are based on the period in which the associated mark was used rather than on pattern-specific information. Laidacker (1951:16) gives the date of manufacture between 1830 and 1840, with extra large cups and saucers manufactured between 1820 and 1830.

Unmarked Pink (WM7): Thirty-two fragments of one essentially complete vessel, a plate printed in red, were recovered (Figure 26). The plate is 5 3/4 inches (14.6 centimeters) in diameter. In addition, 25 fragments, some or all from a slightly larger plate of this pattern, were unearthed. The pattern has been tentatively identified as Unmarked Pink, manufactured by William Adams and Sons of Tunstall between 1830 and 1840. Identification was based on comparison with an unmarked vessel from a private collection (Munnick 1980). This pattern was also found at Fort Vancouver (FOVA 7059) (Ross 1976) and Kanaka Village (personal observation 1981). Williams (1978:691) illustrates a platter with this pattern, but does not attribute it to a manufacturer.

Unmarked Pink is a pattern name applied to an untitled series of temple scenes (Laidacker 1951:18). Laidacker (1951:10) notes that the mold used in the manufacture of this pattern was thick, with a flat border and a scalloped rim. The vessel recovered from the mission indicates the use of a thin mold with a concave

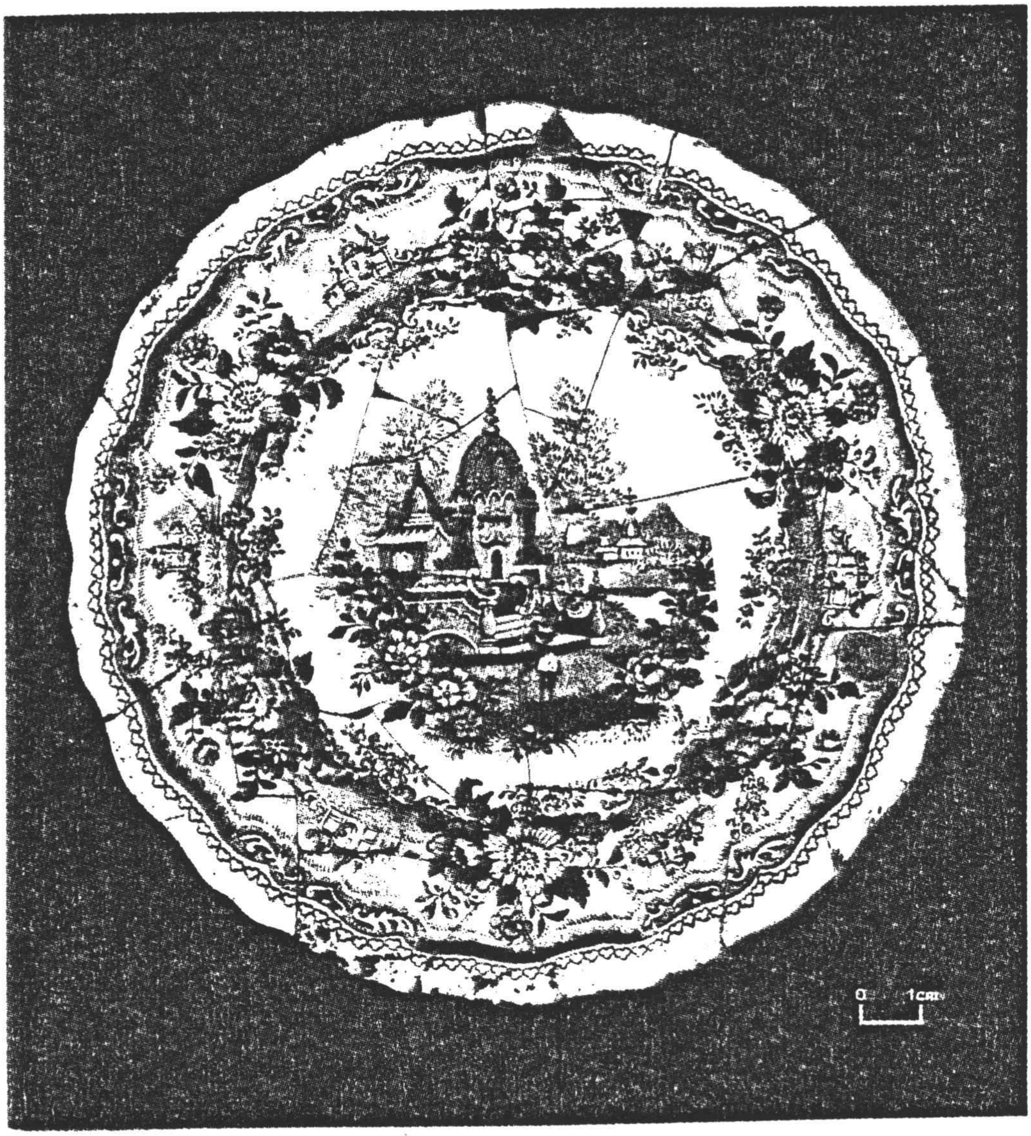


Figure 26. Identified transfer-printed earthenware pattern--WM7 *Unmarked Pink* red transfer print (Munsell 2.5 R 4/9).

border and scalloped rim. Although there is some conflicting information regarding this pattern, stylistic similarity with other patterns by Adams during this time period is notable. Based on a combination of attributes, such as the scalloped rim popular between 1830 and 1840, the color which was in vogue between 1830 and 1345, and the slight footring, the near-complete vessel recovered from the mission fits well into the period of mission occupation.

Hannibal (WM8): Hannibal is a circa 1830 pattern manufactured by Adams (Laidacker 1951:17). Five fragments of this pattern, printed in brown, were recovered (Figure 27a). All fragments are from one or more flat ware vessels with a slight scalloped shape. This pattern is illustrated in Williams (1978:725).

Fragments of a vessel with this pattern printed in brown were recovered during the Kanaka Village excavations. This pattern corresponds to the Kanaka Village pattern designation ET 78 (Chance and Chance 1976:89). Fragments of another vessel with this pattern, again printed in brown, have been observed at the original site of the Joseph Gervais farm (Munnick 1980). Gervais was a French Canadian trapper and guide who retired in the early 1830s to settle on the southern fringe of French Prairie, two miles above the mission

Figure 27. Identified transfer-printed earthenware patterns.

a. Pattern WM8 <u>Hannibal</u>
   brown transfer print
   (Munsell 7.5 YR 3/2)

b. Pattern WM9 <u>Italian</u>
   blue transfer print
   (Munsell 7.5 PB 3/8-5/8)

c. Pattern WM10 <u>Wild Rose</u>
   blue transfer print
   (Munsell 7.5 PB 3/6)

d. Pattern WM11 <u>Tyrol Hunters</u>
   blue transfer print
   (Munsell 7.5 PB 6/6)

e. Pattern WM12 <u>Belzoni</u>
   blue transfer print
   (Munsell 7.5 BG 4/4)
   and green transfer print
   (Munsell 5.0 BG 4/4)

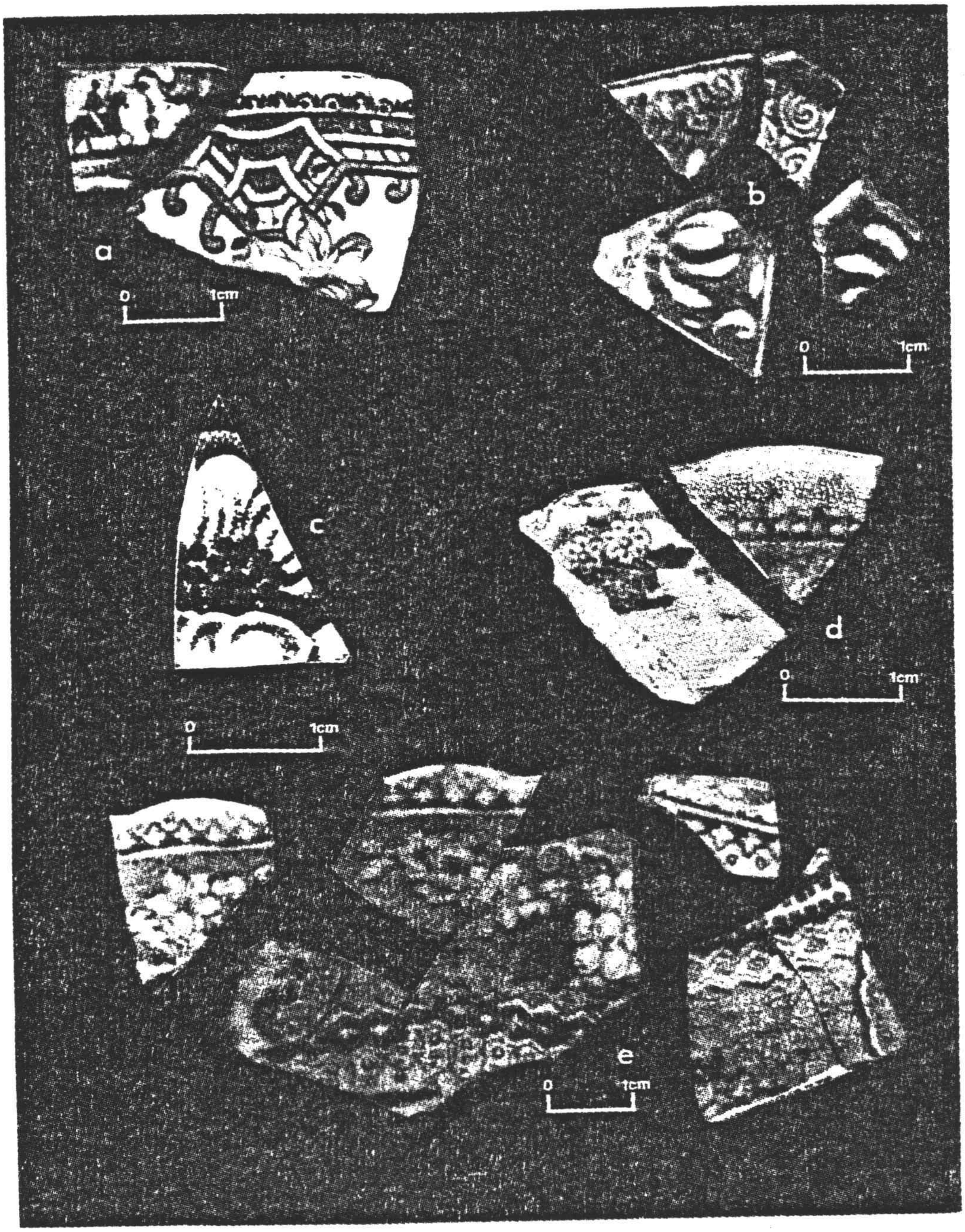


Figure 27.

site (Hussey 1967:54). Gervais, who aided the missionaries in selecting a location for the mission, was known to have interacted with the American missionaries (Mission Account Book 1838-1841).

Italian (WM9): Twelve fragments of Italian, a Spode/Copeland and Garrett pattern, were recovered (Figure 27b). This pattern, printed in blue, was registered in 1816. Italian was a very successful pattern and its manufacture has been revived today. At least two vessels are represented: a flat ware vessel and a hollow ware vessel.

Wild Rose (WM10): One fragment of the Wild Rose pattern, printed in blue, was unearthed (Figure 27c). The size of the fragment is too small to determine vessel form, but a flat ware vessel is suggested. This pattern was manufactured by a variety of potters throughout the nineteenth century and was second in popularity only to the Willow pattern between the years of 1830 and 1855 (Coysh 1974:48). The pattern's popularity was already well established during the 1830s (Coysh 1974:48).

Tyrol Hunters (WM11): Three fragments of Davenport's Tyrol Hunters, printed in blue, were recovered (Figure 27d). One fragment, from Block A, suggests the vessel form of a small plate. One of the fragments of this pattern was also found in Block C.

Identification was based on comparison with a marked vessel found at Fort Vancouver. Although a date of manufacture has not been determined, color and the presence of a pattern name on the vessel from Fort Vancouver suggest post-1830, because Davenport's early patterns did not have printed factory pattern names; this practice began in the 1830s (Lockett 1972:50-52). The Davenports were predominantly a firm of exporters (Lockett 1972:58) and were known to have manufactured wares for the American trade (Laidacker 1951:38).

Belzoni (WM12): The 33 fragments of Belzoni (Figure 27e) recovered represent at least three vessels: a flat ware vessel printed in blue, a hollow ware vessel printed in blue, and a plate printed in green. All vessels have scalloped rims.

Belzoni was manufactured by Enoch Wood and Sons of Burslem during the period between 1830 and 1840 (Laidacker 1951:108). Most of Wood's designs were of foreign subjects. Belzoni, named after the Egyptian "archaeologist," was no exception. The Wood family was one of the most important producers for the export market. Laidacker (1951:87) notes that an 1834 invoice of Wood's firm for a single shipment of ceramics to a Philadelphia china broker lists 262,000 pieces, indicating the substantial volume of this trade during the mission period.

Discussion of Transfer-Printed Earthenware: Based on fragment frequency, red and blue transfer occur in close proportions. However, this color ratio changes when considering individual patterns and their associated vessels. Blue transfer-printed patterns occur more frequently than red printed patterns (Table 7). Green, black, and brown transfer patterns occur, but less frequently. Transfer-printed ceramics in these colors would have been available during the period of mission occupation. Between 1830 and 1845 English ceramic manufacturers were producing transfer-printed wares in light blue, pink (red), purple, sepia (brown), green, and black (Laidacker 1951:ix).

The presence of transfer-printed ceramics in colors other than blue indicates that the missionaries were obtaining the latest in ceramic fashion. This is substantiated by dates available for the identified patterns which suggest that the time lag between manufacture and deposition was not great for many of the mission's transfer-printed ceramics. Figure 28 illustrates the relationship between the temporal span of the mission site and recovered ceramics. With the possible exception of the Bluebell pattern and the

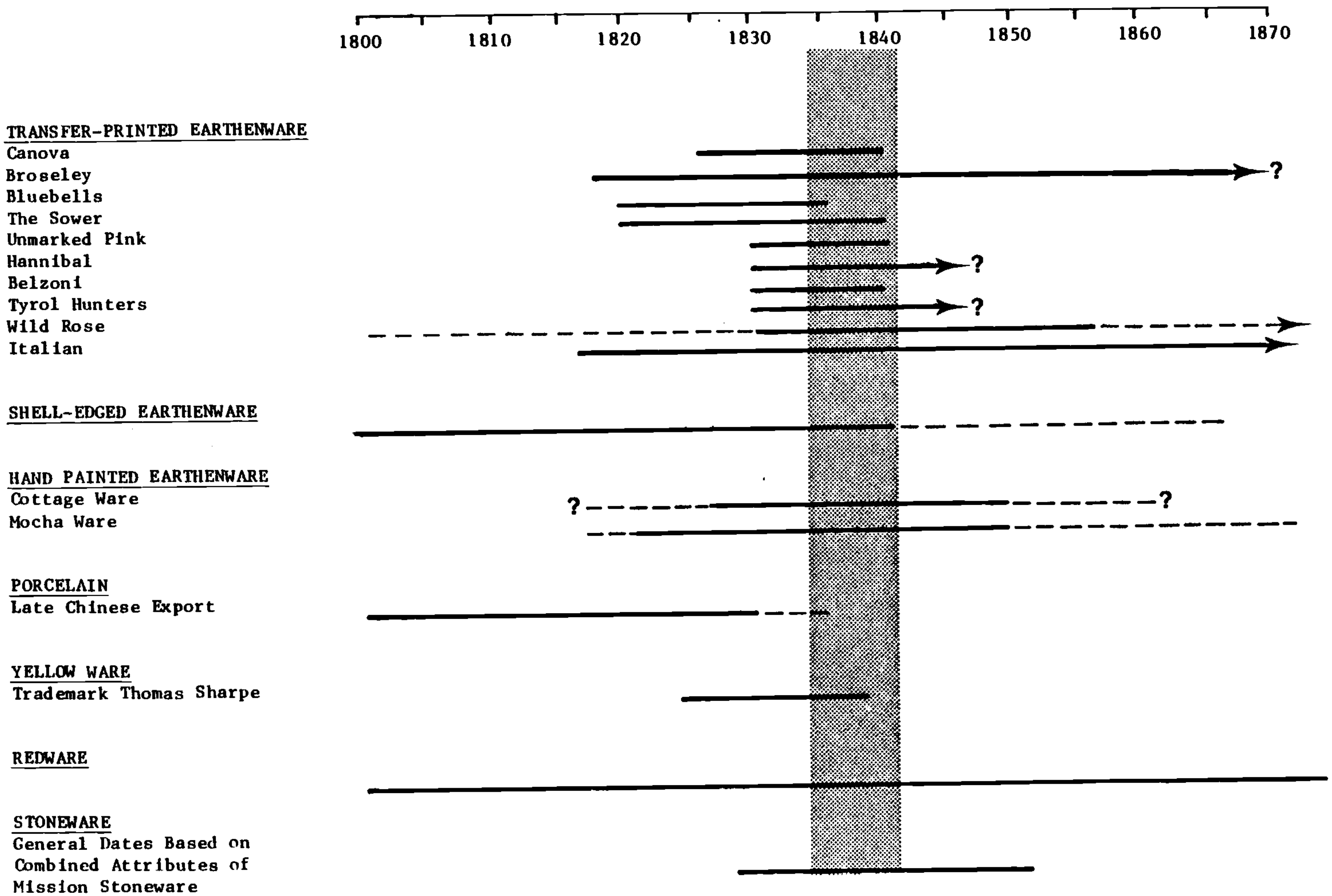


Figure 28. Relationship between temporal span of mission occupation (shaded) and recovered ceramics.

Table 7. Color Ratio of Transfer-Printed Earthenware.

	Percentage by Fragment		Percentage by Vessel	
	N Fragments	Percentage of Total Fragments	N Vessels	Percentage of Total Vessels
Blue	227	48.4	17	53.0
Red	201	43.0	7	22.0
Green	23	5.0	3	9.5
Brown	14	3.0	3	9.5
Black	3	0.6	2	6.0

Spode/Copeland and Garrett patterns, the missionaries were not using heirlooms from earlier decades but were obtaining contemporary ceramics. Many of these patterns were available to consumers in the United States between 1830 and 1840. Other than Spode/Copeland and Garrett, the manufacturers of the identified mission ceramics, Adams, Davenport, Mayer, and Wood, were among the heaviest English exporters to the American market (Coysh 1974; Godden 1964; Laidacker 1951; Little 1969). This is not to say that most of the transfer-printed ceramics were obtained from the United States. Nine of the twelve identified patterns were also recovered at Fort Vancouver or its environs. Broseley and Italian, both Spode/Copeland and Garrett patterns, suggest Fort Vancouver import, as does the Italian Seaport pattern.

The Hudson's Bay Company purchased the majority of its ceramics from Copeland and Garrett and W.T. Copeland during the years 1836 and 1853 (Ross 1976:257). The Spode Company apparently did not manufacture transfer-printed wares for the American market during this time period (Laidackaer 1951:63).

The presence of several patterns found both at the mission and at Fort Vancouver suggests an interesting possibility. Transfer-printed cups and saucers unearthed at Fort Vancouver were manufactured by a variety of companies other than Spode/Copeland and Garrett (Ross 1976:517). Variety in manufacturers did not extend itself to the recovered sample plates, however. With the exception of the ubiquitous Willow Ware patterns, the only transfer-printed plates recovered at Fort Vancouver not manufactured by Spode/Copeland and Garrett were Canova (WM1; FOVA 7069), Tyrol Hunters (WM11; FOVA 7041), Wild Rose (WM10; FOVA 7057); and Unmarked Pink (WM7; FOVA 7059) (Ross 1976:528). These patterns, which were observed on plates at the mission, appear to be somewhat anomolous at Fort Vancouver.

It is documented that the missionaries stored incoming supplies at Fort Vancouver. At the fort they unpacked and divided supplies in proportion to the needs of the different mission stations (Walton 1965:65).

Goods damaged during shipment may have been discarded at the fort. Further research, focusing on the archeological context of these ceramics, may reveal that these somewhat aberrant ceramics at Fort Vancouver are the result of mission related activity at the fort. This is only speculation at the present time.

While the possibility remains that many of the mission ceramics were obtained from Fort Vancouver, indications are that the missionaries did not obtain the bulk of their transfer-printed ceramics from this source. There is a noticeable lack at the mission of the Spode/Copeland and Garrett patterns heavily imported by Fort Vancouver. Of the 26 patterns represented at the mission, over half remain unidentified after extensive research (Figures 29 and 30). Using the data available thus far, it appears that none of the 14 unidentified patterns from the mission were recovered during the excavations at Fort Vancouver.

Further research devoted to the identification of these patterns will shed more light on the relationship between the American missionaries, the English Hudson's Bay Company, and the French Canadian settlements of the Willamette Valley. Since a proportion of the missionaries' transfer-printed vessels probably represent English ceramics exported to the American market, pattern

Figure 29. Unidentified transfer-printed earthenware fragments.

a. Pattern WM13 blue transfer print (vessel #1 Munsell 7.5 PB 3/4-5/4) (vessel #2 Munsell 7.5 PB 3/6-5/6)
b. Pattern WM14 blue transfer print (Munsell 7.5 PB 3/8-6/8)
c. Pattern WM15 blue transfer print (Munsell 7.5 PB 4/8)
d. Pattern WM16 blue transfer print (Munsell 7.5 PB 4/8)
e. Pattern WM17 red transfer print (Munsell 7.5 R 3/8)
f. Pattern WM18 red transfer print (Munsell 7.5 R 3/8)
g. Pattern WM19 red transfer print (Munsell 7.5 R 3/8)

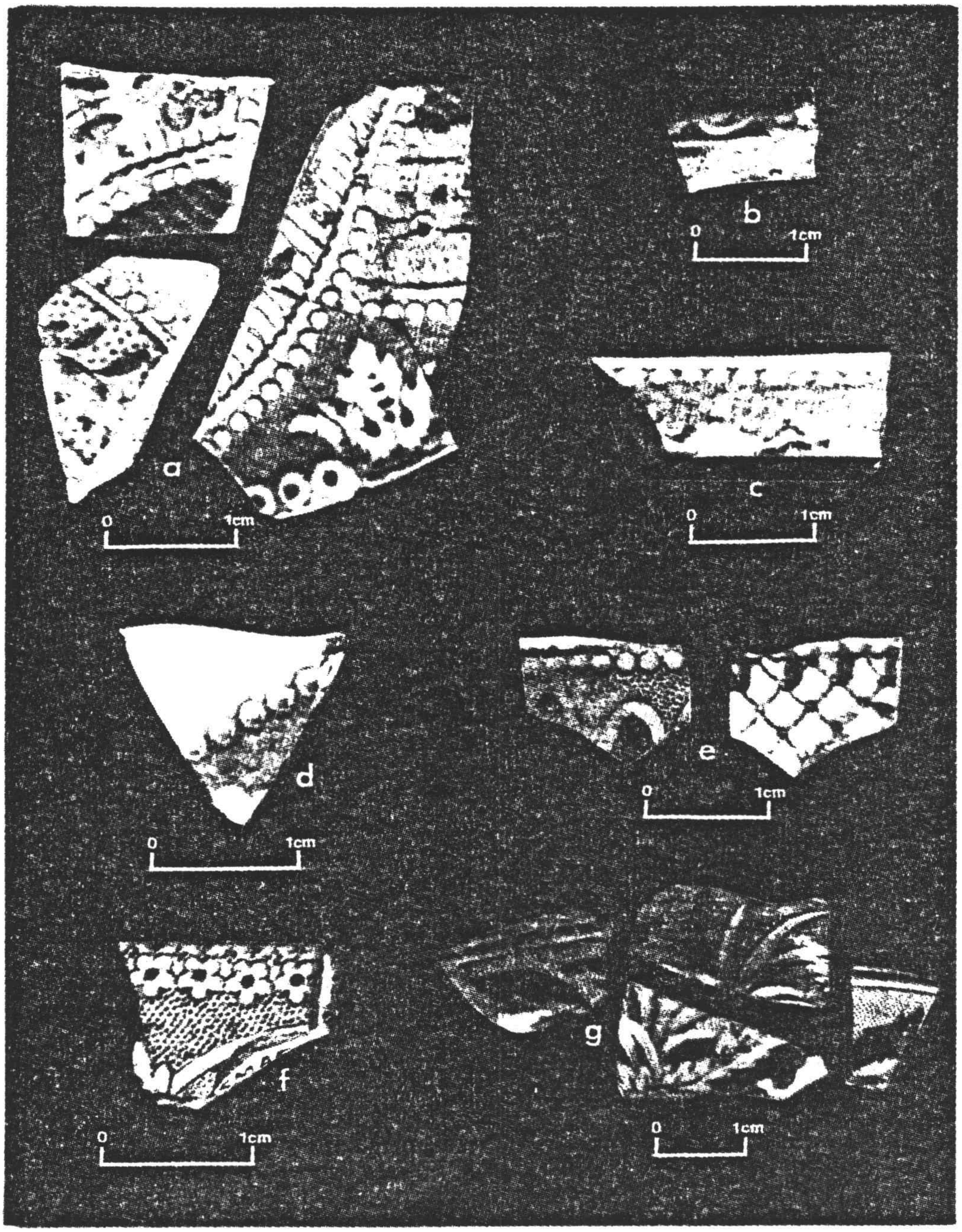


Figure 29.

Figure 30. Unidentified transfer-printed earthenware patterns.

a. Pattern WM20 red transfer print (Munsell 7.5 R 3/8)
b. Pattern WM21 black transfer print
c. Pattern WM22 black transfer print
d. Pattern WM23 brown transfer print, trademark, (Munsell 7.5 YR 3/2)
e. Pattern WM24 green transfer print (Munsell 10.0 G 3/4)
f. Pattern WM25 green transfer print (Munsell 2.5-5.0 YR 3/4
g. Pattern WM26 brown transfer print (Munsell 5.0 BG 5/4)

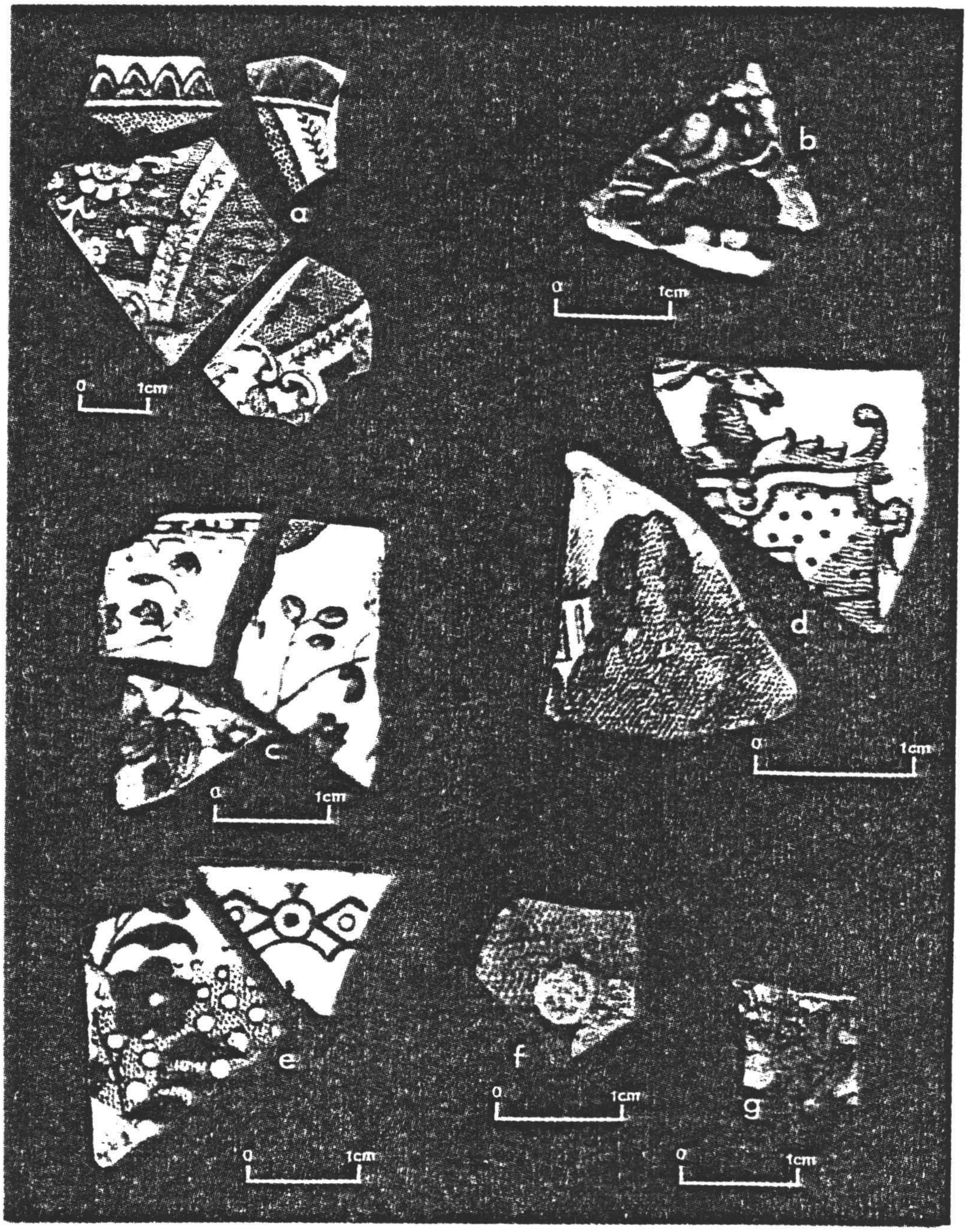


Figure 30.

identification will provide an important source of comparative data for archeologists working on early historical sites in the Northwest.

White Earthenware The most numerous ceramic fragments are of undecorated white earthenware. A total of 1076 fragments of white fabric earthenware were recovered, most with a clear alkaline glaze. Three fragments have slight embossed decoration. Because of small fragment size, it is not possible to determine if the white earthenware fragments are representative of plain white earthenware vessels. The relative percentage of white space on transfer-printed earthenware averages 20 to 25 percent (Ross 1976). This percentage would be substantially higher on hand-painted wares. Furthermore, given the number of individual shell-edge vessels represented at the site, many white earthenware fragments may come from the center of shell-edge plates.

In order to determine how many undecorated white vessels are represented in the sample, a minimum number was calculated based on distinct rim fragments. Rim thickness and style indicate a minimum of nine, probably undecorated, white earthenware vessels: one plate or platter (Figure 31a), four hollow ware vessels, and four vessel of undetermined form. All vessels have plain rims

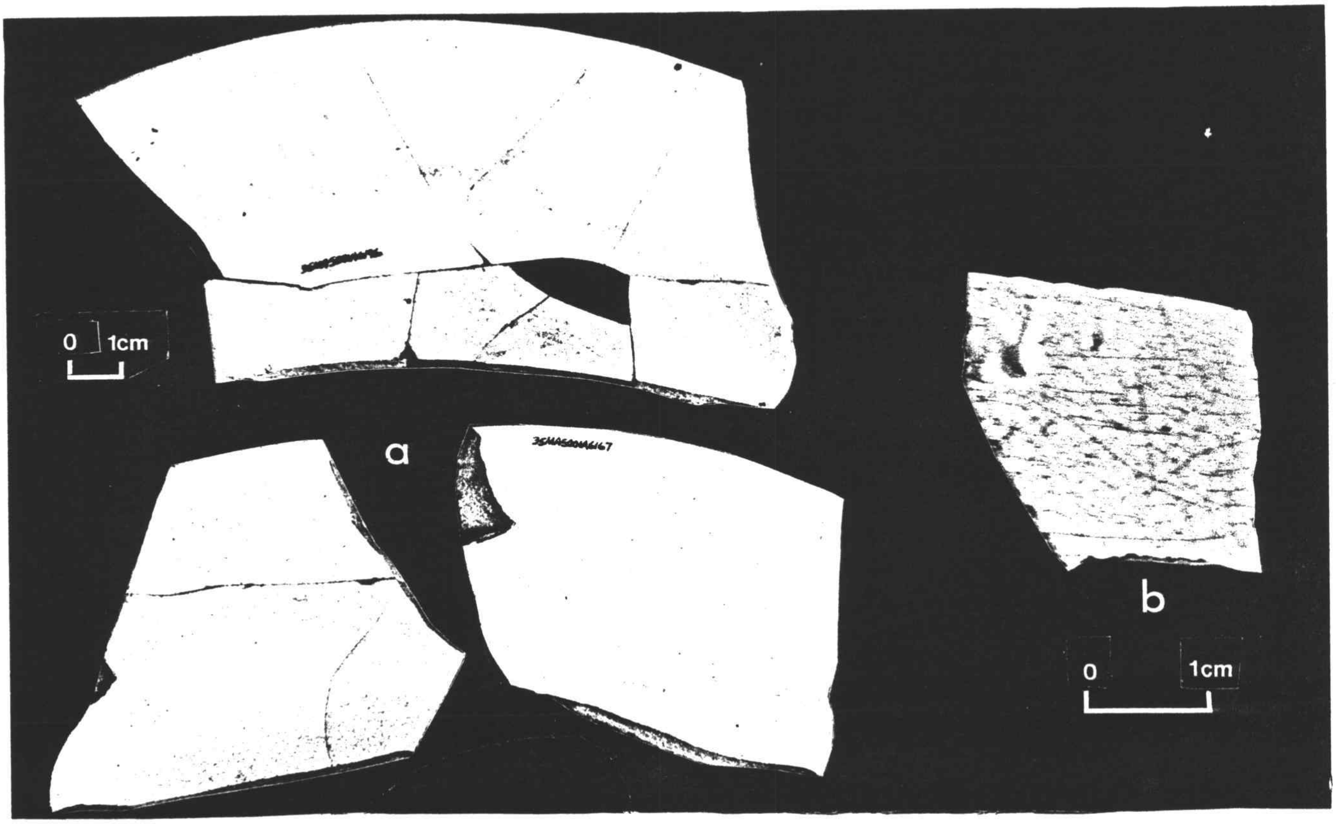


Figure 31. White earthenware.

a. Plate or platter fragment
b. Impressed trademark "W"

as opposed to the scalloped rims common to the mission shell-edge and transfer-printed earthenware.

One fragment of white earthenware has a portion of a trademark--an impressed "W" (Figure 31b). The placement suggests that the letter appears at the end of a word. However, it is possible that the letter is part of an abbreviated trademark.

Edge-Decorated Earthenware The mission site yielded 133 fragments of edge-decorated earthenware. The collection of edge-decorated fragments from the mission is notable for stylistic diversity (Figure 32). Based on rim treatment and thickness, a minimum of 11 individual vessels are represented, including at least six plates and one soup plate. All fragments have underglaze blue edge trim over a variety of molded rim decorations. While most of the fragments can be considered "shell-edge" ware, two fragments exhibit knob relief under the blue edge trim. Of the 11 individual vessels, nine have definitely scalloped shapes.

Shell-edge earthenware was popular throughout the first half of the nineteenth century and earlier, although declining in popularity during the second half of that period. This ware is frequently encountered in nineteenth century sites in the Pacific Northwest and elsewhere. Based on the amount found at Kanaka, Chance and Chance (1976:64) suggest shell-edge earthenware was an economy ware. Records dating to 1838 recorded by an Ohio general store owner indicate that shell-edge plates were consistently cheaper than blue transfer-printed plates (Miller n.d.:8).

This type of ware was produced at Leads, Swansea, and at numerous Staffordshire potteries including

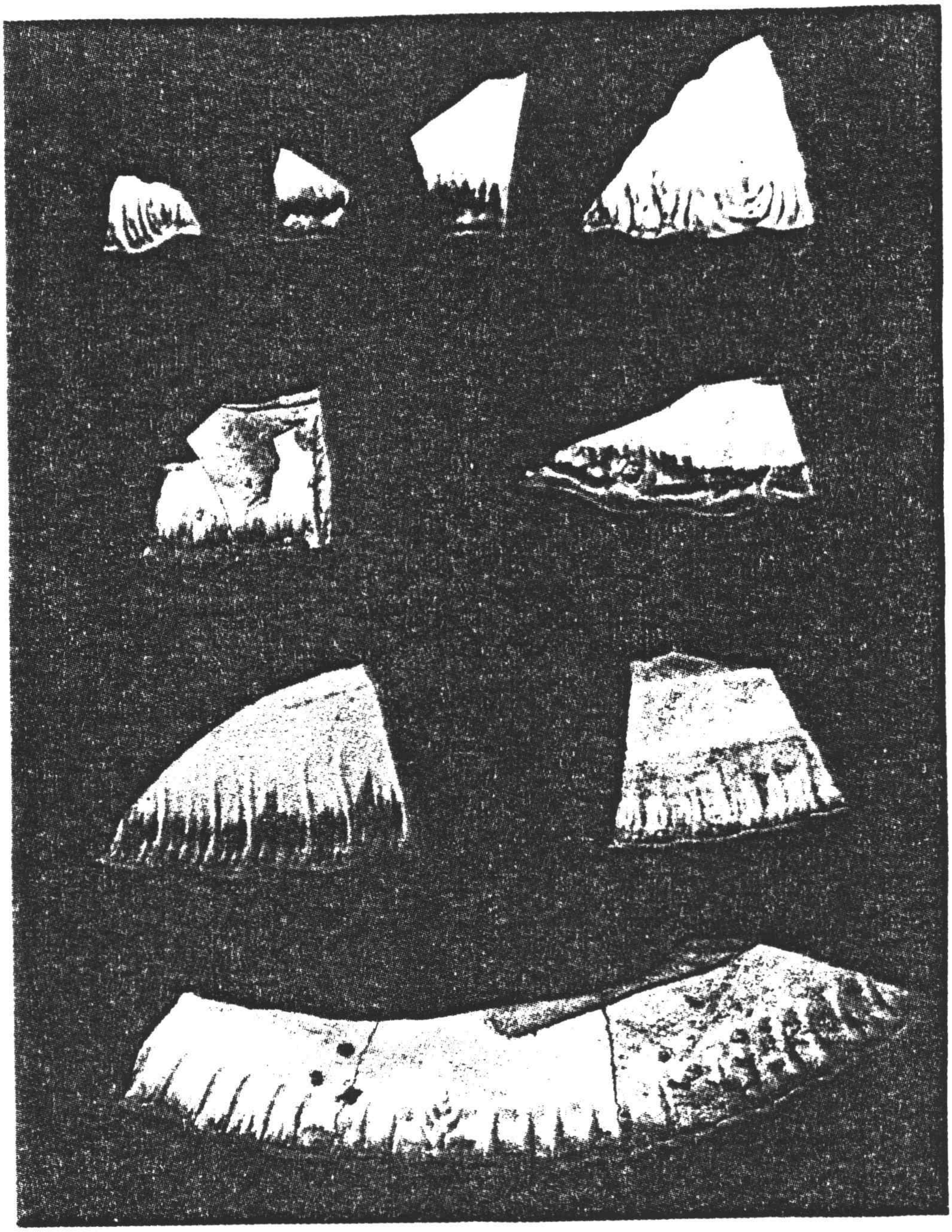


Figure 32. Edge-decorated earthenware varieties (actual size).

Davenport (post-1805), Clews (1818-1834), T. Mayer (1826-1838), and Enoch Wood (1818-1840) (Noel Hume 1969:394). Some potters, including Wood, produced batches of this ware specifically for the American market (Noel Hume 1969:394). Identification of the recovered fragments was not possible because no trademarks were present.

Hand-Painted Earthenware A minimum of 11 hand-painted earthenware vessels are indicated by the 144 fragments recovered. Included and discussed separately are two "Cottage Ware" vessels, one mocha ware vessel, and three vessels with a sprig motif. All vessels recovered are illustrated in Figures 33a-c and 34a-c.

Cottage Ware: Cottage Ware is a stylistically distinct hand-painted earthenware popular during the second quarter of the nineteenth century. Much of this type of ware has been attributed to the Staffordshire Potteries (Wood 1959:26). Recovered were 72 fragments representing two vessels: a cup and a bowl, possibly a slop bowl. Both are of white fabric earthenware.

Fragments from the handleless cup have a strawberry motif painted in pink (5 OR 7/4) and green (2.5 BG 6/3) on the exterior surface (Figure 33a). A black stripe beneath the rim encircles the vessel on both the interior and exterior surfaces.

Figure 33. Hand-painted ceramics.

a. Cottage ware "strawberry motif"
b. Cottage ware "polychrome floral motif"
c. "Sprig motif"

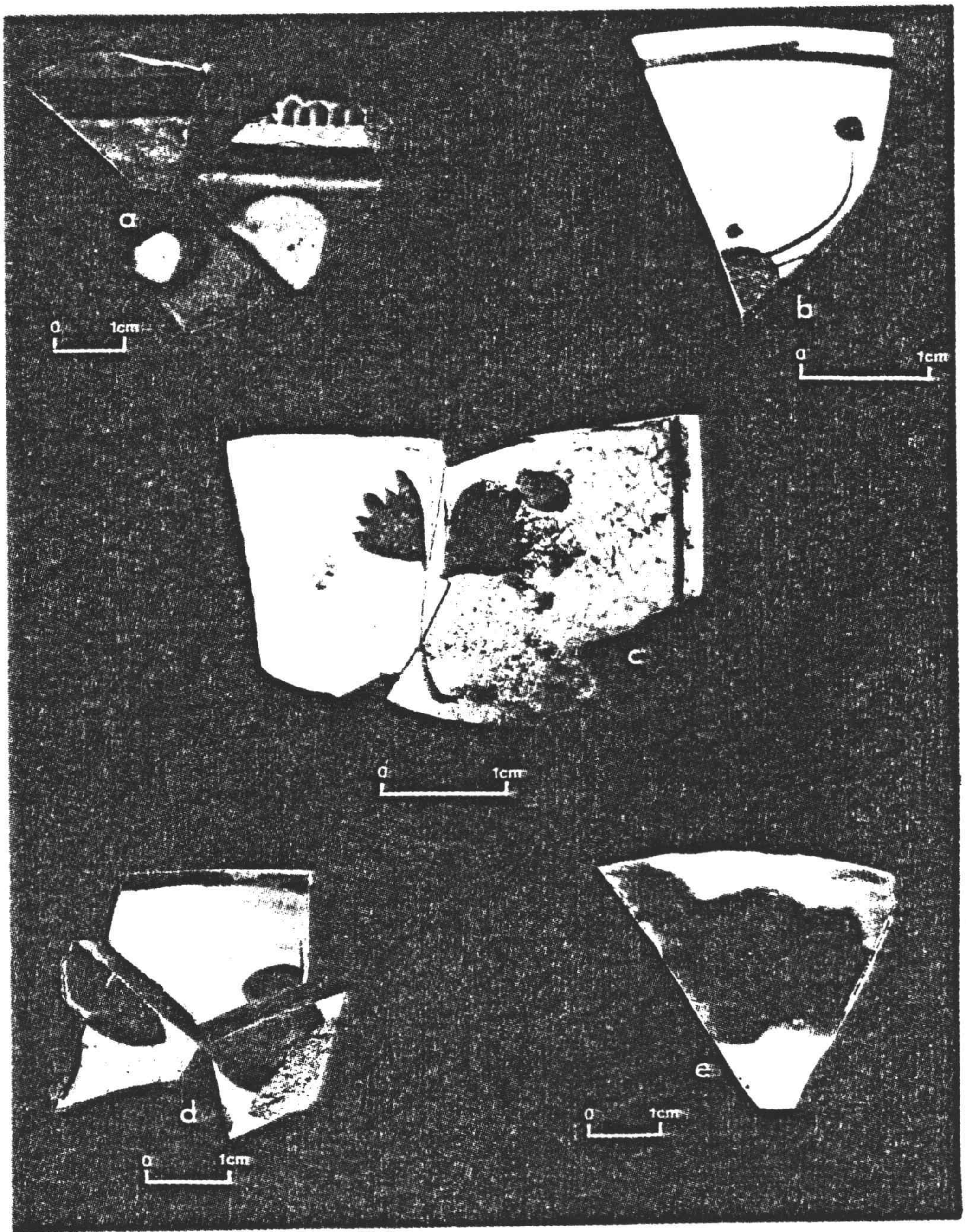


Figure 34. Hand-painted ceramics.

a. Mocha ware
b. Black on white
c. Red and black on white
d. Cobalt blue on white
e. Chinese export porcelain

Fragments from the bowl have a polychrome floral motif in red (5.0 R 5/6), blue (7.5 PB 4/8), green (5.0 GY 4/6), and yellow (7.5 YR 6/10) on the exterior surface (Figure 33b). A brown (7.5 YR 5/10) stripe encircles the vessel beneath the rim on both surfaces.

Sprig Motif: Fourteen fragments of hand-painted earthenware were recovered, with a red (5.0 R 3/10) green (5.0 GY 5/4 and 7.5 GY 7/6) and black-on-white sprig motif (Figure 33c). A minimum of two individual vessels are represented: a cup and a small plate. The single fragment from a cup has a thin black stripe beneath the rim on both interior and exterior surfaces, while the fragments of the plate have this strip only on the interior surface, the surface which is normally exposed.

Of this type of ware, Moore (1973:73) notes that the cups have a ring foot, a concave lower body, and straight-sided walls with a slight flare. Moore further notes that the saucers have only a token foot ring, a style the pattern shared with other white earthenware of the early second quarter of the nineteenth century (Moore 1973:173). Based on fragments recovered, this description fits the sprig-patterned ware found at the mission.

Mocha Ware: Seven fragments of mocha ware, possibly from a mug, were recovered (Figure 34a).

Decoration is applied under a clear glaze using color-slips on white fabric earthenware. In general, early mocha ware had a cream color fabric, but in the 1830s white earthenware was often used (Huges 1956:113).

An impressed elliptical pattern, coated with translucent green (2.5 GY 6/6), encircles the mug. Slip colors used for decoration include gray (2.5 Y 6/2), (2.5 Y 7/6), brownish-orange (2.5 YR 5/6), and black. Slip bands encircling the vessel are black.

Among the English potters producing this ware were Adams, Stevenson, and Wood (McClinton 1951:2-4), firms heavily involved in the American trade. It has been suggested that mocha ware was made in England specifically for the American trade (Kovel 1967:28). Mocha ware was available in the United States as early as 1815 (McClinton 1951:2), but was most popular between the years of 1820 and 1850 (Munnick 1980).

<u>Porcelain</u> Five porcelain fragments recovered indicate a minimum of two vessels. One white porcelain fragment is from a plate, and four fragments with underglaze blue decoration are from one or more vessels of undetermined form. The underglaze blue decoration (5 PB 5/6-4/6) of the second vessel is applied to a

relatively thick body that appears greenish gray (10 GY 7.5/1) under the glaze (Figure 34e).

Vessel color, thickness, and decoration indicate that this ware is late Chinese export porcelain common during the first 30 years of the nineteenth century (Noel Hume 1978:262). Ross (1981) notes that fragments of this ware are similar to porcelain recovered from the Fort Vancouver excavations. The occurrence of porcelain at Fort Vancouver has been attributed to Boston merchants who acquired these wares at Canton and presumably sold them to the Hudson's Bay Company in the Sandwich Islands (Ross 1976:241). The missionaries are also known to have obtained supplies from the Sandwich Islands (Walton 1965).

UTILITARIAN VESSELS

Utilitarian vessels refer to those wares such as crocks, jugs, and jars used primarily as food preparation and/or storage containers. The mission site yielded 38 fragments, representing a minimum of eight individual stoneware and soft-paste earthenware vessels (Figure 35a-e). (A description of each defined vessel is given in Table 8.)

Figure 35. Utilitarian vessels (actual size except c).

a. Stoneware vessel no.1
b. Stoneware vessel no.2
c. Stoneware vessel no.3
d. Stoneware vessel no.4
e. Stoneware-earthenware vessel no.5

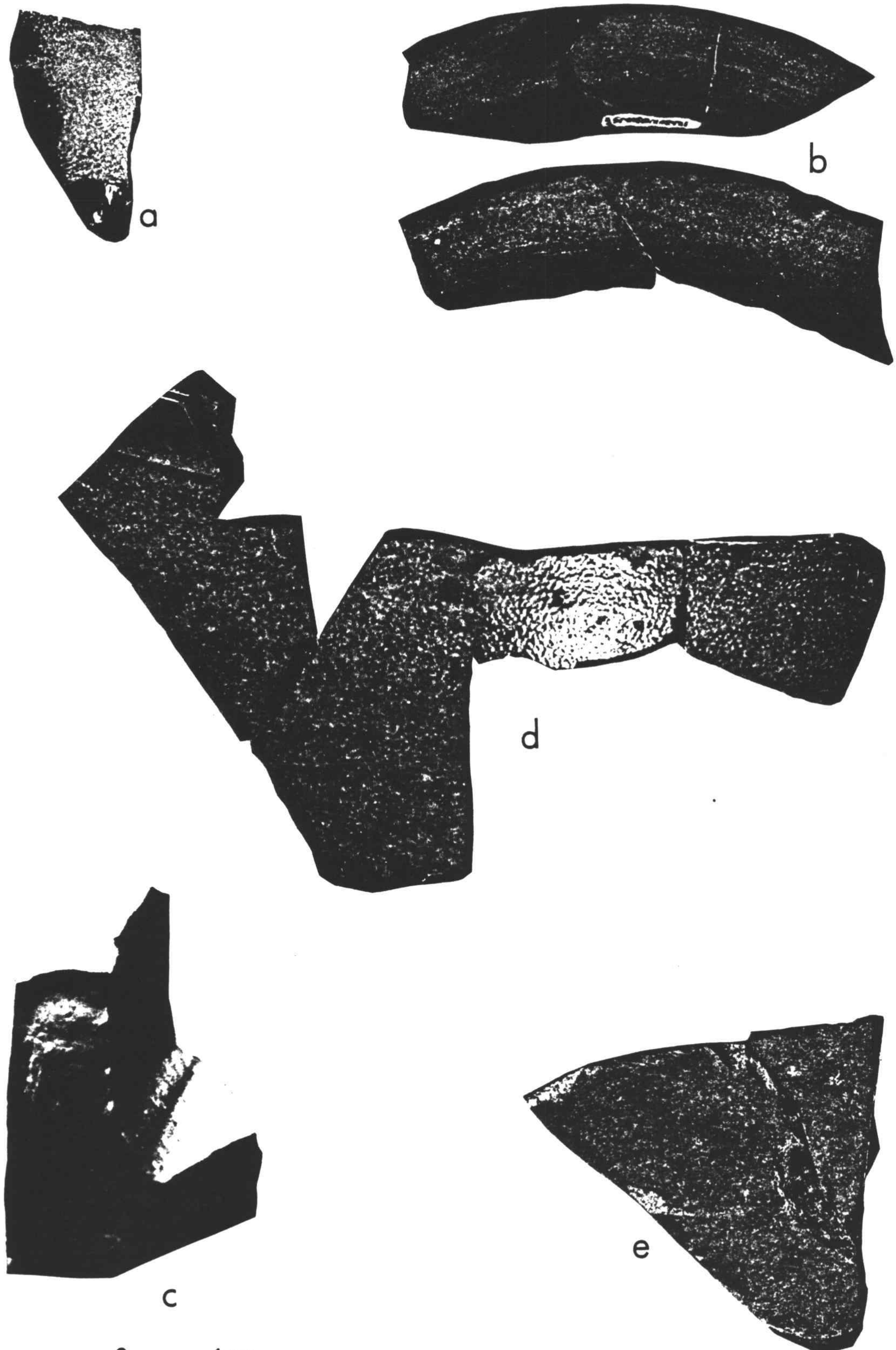


Figure 35.

Vessel Number	Number of Fragments	Body Fabric	Body Color	Exterior Glaze	Exterior Color	Interior Glaze	Interior Color	Decoration	Form/Function
1 Fig.35a	3	Stoneware	Light brownish gray 10 YR 6/2	Salt glaze	Gray to light gray	Although unusual, salt glazing is apparent on the interior surface There is also evidence that a clear glaze may have been applied in addition.	Same as exterior	Cobalt blue applied by brush	Curvature of the fragments indicates a hollow ware vessel. This curvature further suggests that fragments are from a vessel that was ovoid in part and not purely cylindrical.
Comment: One fragment has a slight knob relief in one corner, probably from a handle attachment. Cobalt blue decoration is applied in the area of this knob. Although the actual amount of cobalt decoration over the entire vessel is unknown, the use of cobalt decoration at handle bases is characteristic of earlier wares (Ketchum 1971:51; Watkins 1950:11).									
2 Fig.35b	7 brim fragments	Stoneware	Weak red 2.5 YR 5/2	Salt glaze	Light brownish gray 10 YR 6/2	No body fragments recovered for interior glaze determination.	---	None	The absence of body fragments makes form determination difficult. While not ruling out the possibility of a stoneware plate, this flat brim may have run perpendicular to a hollow ware vessel.
Comment: The color of the fired clay indicates a high iron content.									
3 Fig.35c	1 base fragment	Stoneware	Grayish brown	Salt glaze	Dark grayish brown 10 YR 4/2	Albany slip	Dark reddish brown 5 YR 2.5/2	None	Stoneware bottle.
Comment: Drying rack marks are evident on the base.									
4 Fig.35d	6	Stoneware	Grayish brown 10 YR 5/2	Salt glaze	Very mottled, most closely approximates yellowish brown 10 YR 5/4	Albany slip	Dark red 2.5 YR 2.5/4	Color slip applied to raised band which encircles the vessel. Color of this band is grayish green, 10 GY 5/1.	Large hollow ware vessel which was in part ovoid.
Comment: Mottled glaze is the result of iron in the clay that is pulled from the clay during the firing process.									
5 Fig.35e	3	Stoneware/ earthenware clay mix	Pale brown 10 YR 6/3	Clear thin brush-applied glaze	Brown 10 YR 5/3	Clear	Same as exterior	None	A shoulder fragment suggests a large jug or jar.
Comment: Glaze on the interior surface is very deteriorated.									
6	3	Earthenware	Very pale brown 10 YR 8/3	Clear glaze	Very pale brown 10 YR 8/3	Albany slip	Dark reddish 5 YR 2.5/2	None	Hollow ware. Fragments are too small to determine form and/or function.
7	13	Stoneware/ earthenware clay mix	Very pale brown 10 YR 7/3	Clear glaze	Mottled--most closely approximates yellowish brown 10 YR 5/4	Clear	Same as exterior glaze color	None	Hollow ware. Fragments are too small to determine form and/or function.
Comment: Glaze on the interior surface is deteriorated.									
8	3 base fragments	Earthenware (redware)	Reddish yellow 5 YR 6/6	Base of vessel is unglazed	---	Clear	Red 2.5 YR 4/8	None	Fragments from base only, do not allow for determination of form.

Table 8. Utilitarian Vessels.

Redware Redware is a soft, porous, "red" fabric earthenware frequently coated with a colorless soft lead glaze. Three fragments of this ware were recovered. All fragments appear to be from the base of minimally one flat-bottomed vessel. The fabric color is reddish yellow (5 YR 6/6) while vessel color in glazed areas is red (2.5 YR 4/8). The colorless glaze is crazed and peeling, as is usual for this type of ware because the glazes used were soft and easily scratched (Ramsay 1939:128).

The clear glaze is found only on the interior surface, but this does not necessarily imply that the whole vessel was glazed on the interior surface only. Bottoms of vessels generally were unglazed because glaze on the base would have adhered to other vessels or the oven floor during firing (Ketchum 1971:7). The presence of glaze on the interior surface indicates that this vessel was probably not the frequently produced redware flower pot. Other vessels commonly made of glazed redware included crocks, jugs, bowls, pitchers, porringers, jars, milk pans, pie plates, platters, churns, chamber pots, and bed pans (Ramsay 1939:128-130; Watkins 1950:234-241).

Stoneware Determining the original form of mission stoneware vessels would be mere speculation since all the fragments are very small. Among the more common stoneware forms manufactured historically were jugs, bottles, crocks, bean pots, water coolers, butter pots, mugs, pitchers, bowls, churns, and inkwells (McClinton 1951:54). Stoneware is ideal for the storage of salted and pickled foodstuffs because it is inert to alkali and acid solutions (Webster 1971:23).

All stoneware from the mission is hand thrown, the common method of manufacture during the first half of the nineteenth century (Ketchum 1971:54). After 1850, techniques changed and a plaster mold was employed to form the vessel. Although this method still required the use of a potter's wheel, scrapers were used to shape the interior. The result was a straight-sided cylindrical vessel rather than the ovoid form common for hand thrown vessels prior to 1850 (Ketchum 1971:54). With the exception of a base fragment, possibly from a stoneware bottle, fragments indicate that the mission vessels had "bulging" shapes rather than the later cylindrical forms.

American manufacture is suggested for many of the vessels. Stoneware manufacturers prospered in the United States after 1825, when canals and other transportation routes provided for easy shipment of raw materials and finished products (Ketchum 1977:12). Albany slip, utilized on three of the mission vessels, is manufactured from a bluish clay found only along the Hudson River near Albany, New York (Ramsay 1939:21). When fired this slip, which contains a high percentage of iron, forms a black or dark brown glaze (Ramsay 1939:21). By 1840, Albany slip was used throughout the country, often in combination with an exterior salt glaze (Guillard 1971:82; Ramsay 1939:22). Fragments of a gray stoneware vessel with cobalt blue decoration applied by brush were also recovered. Cobalt blue on gray was a traditional combination frequently employed by nineteenth century American potters in the Northeast (Guillard 1971:82).

A slight amount of porosity is noticeable in two of the mission vessels. While this porosity technically prohibits classification as stoneware, these fragments also defy classification as earthenware. Since stoneware clay in New England had to be imported from New Jersey and Long Island deposits, local earthenware clay frequently was added to "stretch" the expensive imported clay (Guillard 1971:82; Ketchum 1970:14; Ramsay 1939:19). A result of adding these local clays was a somewhat porous "stoneware" (Watkins 1950:10). Both vessels have a clear glaze as opposed to the more traditional salt glaze employed on stoneware. If too much earthenware clay was added to the batch, the vessels would not withstand the firing temperatures required for salt glazing. While by no means conclusive, the "porous" stoneware is suggestive of a New England manufacture location.

Yellow Ware Yellow ware, frequently utilized in food preparation and included in this discussion, may have functioned primarily as dinnerware at the mission. Evidence suggests that some of the mission's yellow ware fragments may have been from small bowls and mugs.

A total of 86 fragments of yellow ware, a yellow-to-buff fabric earthenware with a clear glaze, were unearthed. There is no indication that these fragments are from mocha ware vessels, which often have a yellow fabric earthenware body. A minimum of five vessels are represented. The colors of these vessels are described in Table 9. Although function cannot be determined because of small fragment size, four of the defined vessels suggest hollow ware forms while the fifth defined vessel is likely a plate.

Several of the mission hollow ware vessel fragments are decorated with blue and white slip bands. Historically, beginning in about 1830, slip bands were most commonly employed on bowls, mugs, and pitchers (Ramsay 1939). In general, yellow ware is usually found in the form of utilitarian vessels and simple tableware

Table 9. Yellow Ware Vessel Colors.

Vessel	Form	Color	Decoration
1	Not determined	2.5 Y 8/6	Blue, 2.5 PB 4/4, on rim
2	Hollow ware	2.5 Y 8/6	White slip bands on blue 2.5 PB 6/4, on rim
3	Plate	2.5 Y 8/6	None present
4	Hollow ware	2.5 Y 8/6	White slip bands, no rim fragments
5	Hollow ware	2.5 Y 8/5	None present

and kitchenware. Forms include jars, pitchers, baking dishes, mixing bowls, covered storage crocks, serving dishes, pie plates, cups, plates, platters, and bowls (Ramsay 1939:148; Ketchum 1970:17; Ketchum 1971:96).

Portions of trademarks are present on two fragments. An impressed mark (Figure 36a) has been tentatively attributed to the English firm of Thomas Sharpe of the Swadlincote potteries of Derbyshire, England (Godden 1964:570). Sharpe produced a large variety of earthenwares between 1820 and 1838 (Little 1969:115).

The second impressed mark (Figure 36b) most likely read "Patented or Warranted Fireproof." Fireproof earthenware of American manufacture was introduced in

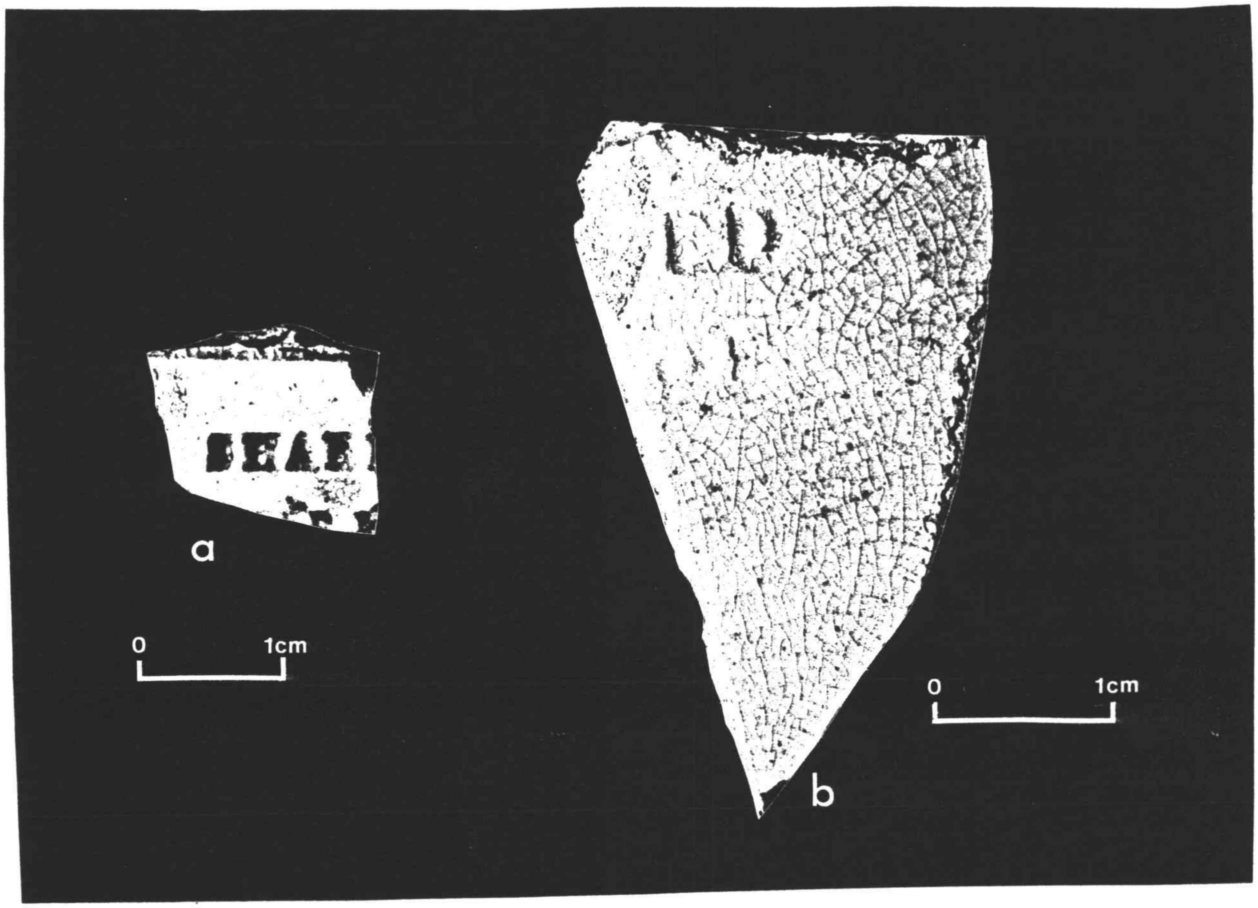


Figure 36. Yellow ware.

a. Impressed trademark--Sharpe Manufacturing
b. Impressed mark--Warranted or Patented Fireproof

1831, first produced by the Day family pottery of Norwalk, Connecticut (Watkins 1950:201), the area's oldest yellow ware manufactory (Ketchum 1971:102). In November of 1833, when the missionaries were making final preparations for their departure to the Oregon Country, the Norwalk Gazette advertised that this pottery's wares were also available for purchase in New York City (Watkins 1950).

Although yellow ware was manufactured by both American and English potteries, Watkins (1947:191) states that it was not frequently imported after the American Revolution because the manufacture of American pottery exceeded the demand for kitchen earthenware. However, an English trademark on one yellow ware vessel indicates that at least some of the mission's yellow ware is of English origin. Noel Hume (1978:131) notes that yellow ware decorated with bands of light blue and with raised ridges of white continued to be made in England and North America into the present century. Yellow ware produced in the United States was distributed throughout the country between 1830 and 1900 (Ramsay 1939:148).

TABLE UTENSILS

Spoons

Three tablespoons and one teaspoon are represented. A pewter tablespoon bowl measures 3 3/16 inches (8 centimeters) in length and 1 12/16 inches (4.5 centimeters) in width (Figure 37). Pewter spoons generally were outmoded by britannia spoons beginning in the late eighteenth century. Britiannia and, to a lesser extent, pewter spoons were popular in America until the introduction of electroplated silver spoons in 1840 (Snodin and Belden 1976:14-16).

Two tablespoons and one teaspoon recovered from the site were manufacturead from iron. The intact tablespoon bowl measures 3 inches (7.5 centimeters) in length with a width of 1 1/2 inches (4.5 centimeters) (Figure 38a). The other tablespoon specimen may in fact be a dessert spoon; however, only the stem and basal portion of the bowl are present, thus causing difficulty with size determination. The stem--flat, shoulderless and rectangular in section--flares toward the handle (Figure 38b). The handle is missing. The teaspoon bowl, intact but not complete, measures 1 3/15 inches (3 centimeters) in width (Figure 38c).

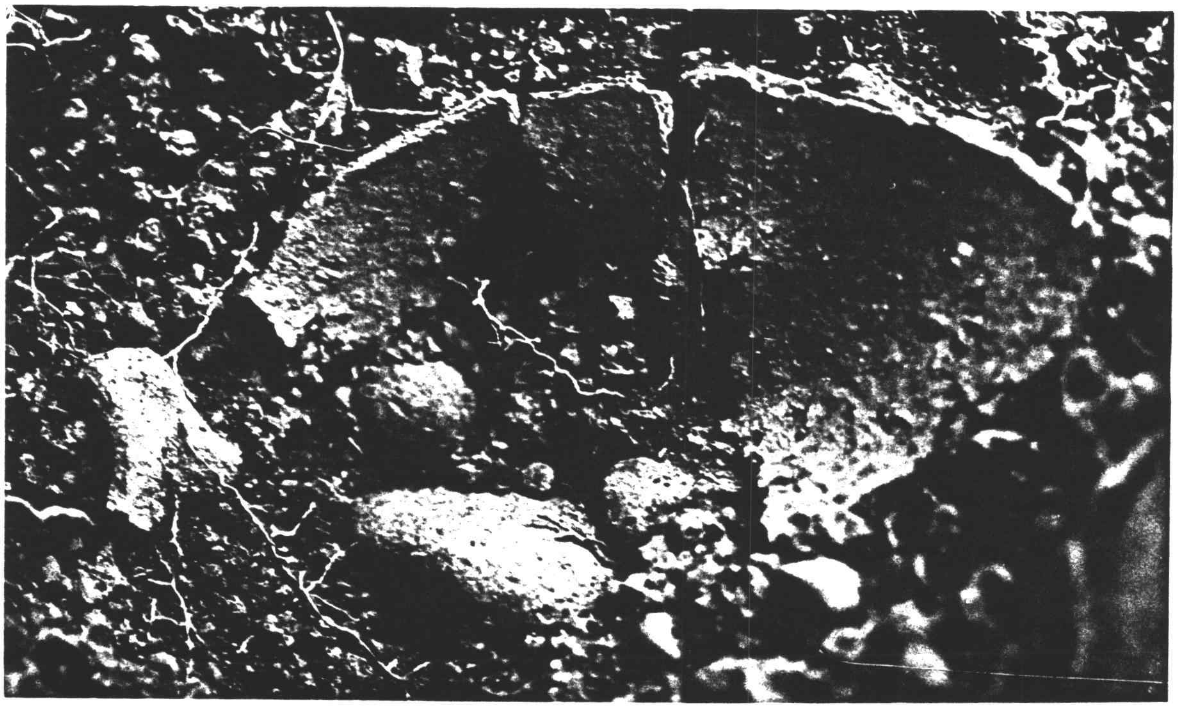


Figure 37. Pewter tablespoon bowl.

The iron spoons were most likely tinned in their original state. Tinned and close-plated (with silver) spoons became standard kitchen equipment at the start of the nineteenth century. Iron spoons in general were either cast, wrought, or stamped out of thin sheets of metal (Snodin and Belden 1976:14).

Spoons are noted in historical literature pertaining to the mission. Anna Maria Pitman imported "a good stock" of tablespoons and teaspoons from Canton, China, via the Sandwich Islands circa 1837 (Gay

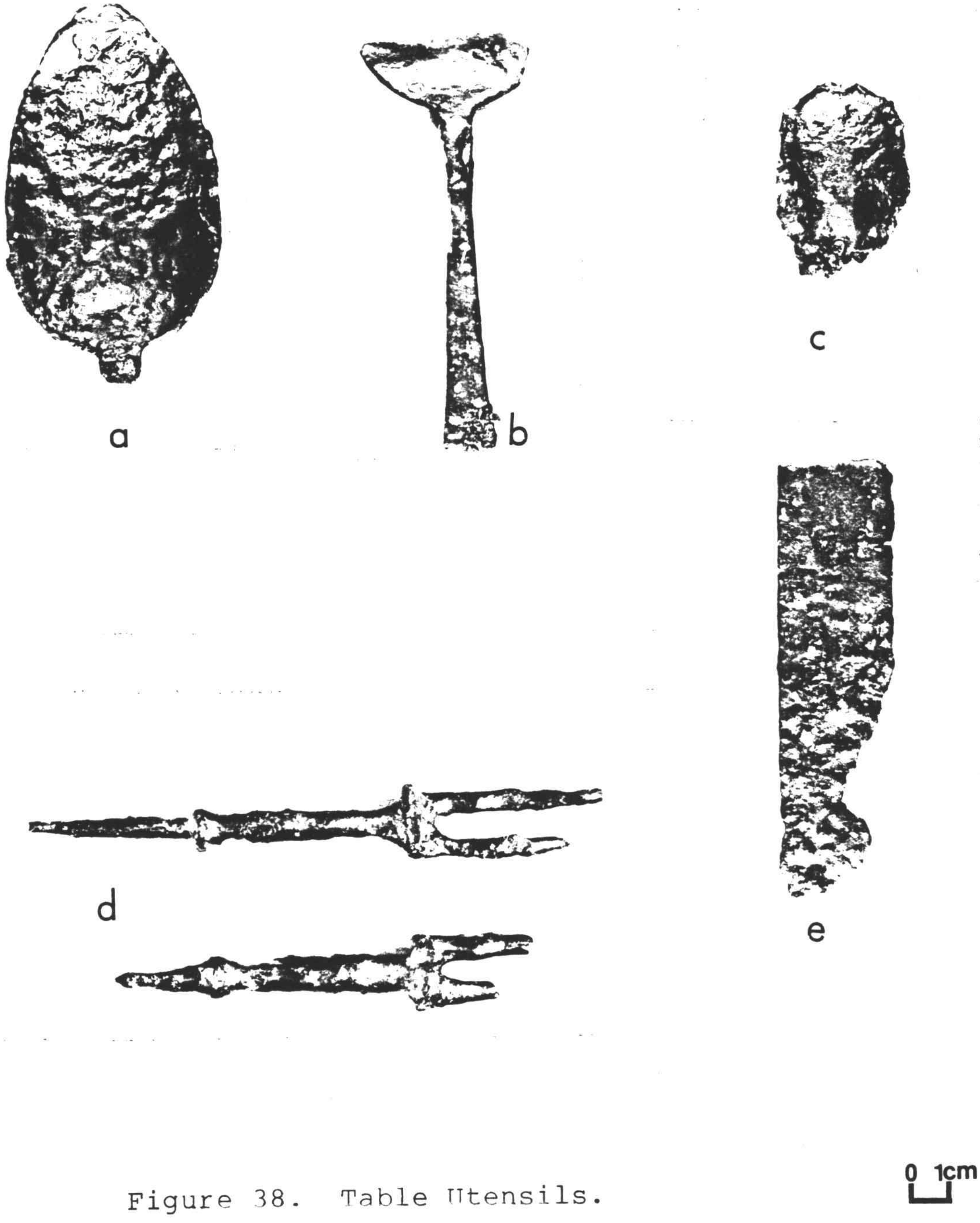


Figure 38. Table Utensils.

a. Tablespoon bowl
b. Tablespoon or dessert spoon
c. Teaspoon bowls
d. Forks
e. Knife blade

1936:147). Contemporary copies of English spoons were made in China in the nineteenth century (Snodin and Belden 1976:10).

It is unknown at this time if the missionaries also purchased table utensils at Fort Vancouver. However, it is interesting to note that both tinned iron tablespoons and plate steel spoons are listed in Fort Vancouver inventories (Ross 1976:566). Four functional types of britannia spoons--soup ladle, tablespoon, dessert spoon, and teaspoon--were imported to Fort Vancouver, though only one fragmented spoon bowl was recovered archeologically (Ross 1976:560).

Forks

Both iron fork specimens recovered are similar in style: they are of the two-tined variety (Figure 38d). Noel Hume (1978:180) notes that two-tined steel forks were common from the last quarter of the seventeenth century to the beginning of the nineteenth century, when the three-tined variety came into vogue.

The tines on both specimens are incomplete. The circular shanks are somewhat balastroid in shape with a slight mid-section bulge. Both shanks measure 1 2/3 inch (4.2 centimeters) in length from the juncture to the flaring shank base. Although the handles on both forks are missing, portions of the handle attachment bases are present. The shank bases were probably originally driven into either bone or wood handles.

Knife

One iron knife blade fragment was recovered (Figure 38e). The point section of the knife blade is missing. The blade was ground to a V-grind and measures 1 inch (2.5 centimeters) in width. The blade back is 1/16 inch (2 milimeters) thick and the edge is 0.06 inch (1.5 milimeters) thick. The handle juncture is not evident. The size, material, and bevel of the blade suggests an early utilitarian straight-blade table knife or butcher knife.

CAST IRON VESSELS

Material evidence of domestic activity at the mission includes a minimum of two cast iron vessels. Two heavy iron fragments appear to be from a cauldron(s), while at least one smaller cast iron vessel could be diagnosed from numerous recovered fragments (Figure 39a-b).

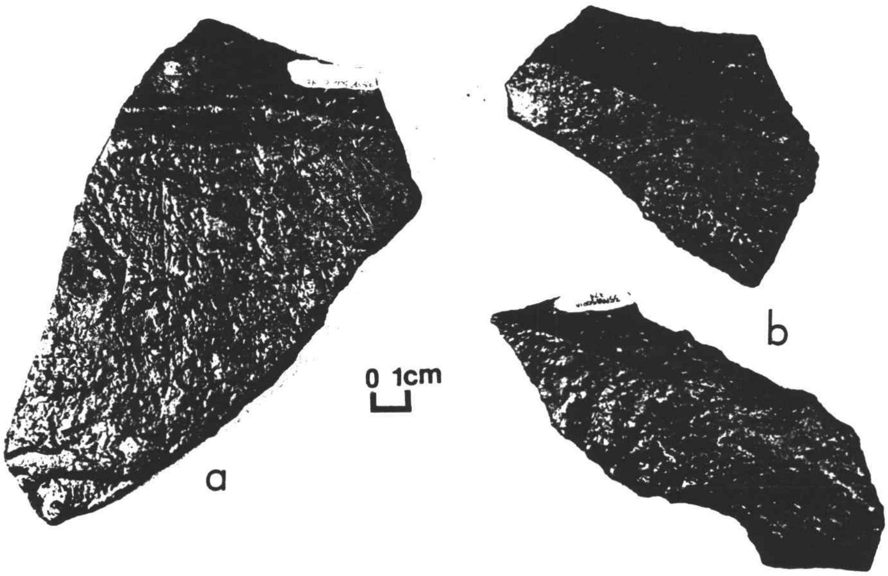


Figure 39. Cast iron vessel fragments.

a. Cauldron fragment
b. Diagnostic vessel fragments

Seven diagnostic cast iron fragments were found clustered within the site excavation. Though it is plausible that the fragments belong to one vessel, they cannot be ascribed as such. The seven fragments include three basal, two shoulder, and two handle attachment fragments. In addition, a vast majority of 157 (2.48 pounds/1.12 kilograms) flat to slightly curved cast iron fragments were found in close proximity to the seven diagnostic fragments. A high percentage of the cast iron fragments were found in Block A near the postulated kitchen locality.

Identification of vessel form and function is at best dubious. The curvature of the basal fragments indicates a vessel with a basal diameter of roughly 10 inches (25.5 centimeters). The shoulder and handle attachment fragments suggest a kettle or pot form, and not a low-sided pan. Though not necessarily restricting the vessel to a cooking function, the form leads to such a conclusion. The cauldron may have had any number of domestic functional uses, from boiling laundry or food to rendering animal fat.

Cast iron was developed in the early nineteenth century (Gould 1942:47). Cooking was accomplished in fireplaces and/or domed brick ovens prior to the advent of the iron cooking stove on the frontier in the early 1840s (Hussey 1976:177-178). Necessity called for the use of durable utilitarian food preparation vessels with even heating qualities. Cast iron vessels, which fit these requirements, were most commonly used.

A wide range of utilitarian cast iron items would have been available to the mission occupants. Common cast iron cooking items from the first part of the nineteenth century include kettles, tea kettles, Dutch ovens, stew pots, frying pans, baking pans, griddles, gridirons, bowls, and mortars (Meyer 1972:325-327).

BRASS CONTAINER CAP

One threaded brass container cap measuring 5/8 inch (1.6 centimeters) in diameter was recovered from Block A within the archeologically defined kitchen area (see Figure 34b).

STRIKE-A-LIGHT

A burned flint strike-a-light (10 YR 3/1) was found in close association with an ash deposit to the north of the gravel feature. Strike-a-lights were used with fire steels to produce sparks for igniting tinder in starting a fire.

The specimen measures 1 19/16 inch (3.3 centimeters) in length, 1 inch (2.5 centimeters) in width, and 5/16 inch (0.8 centimeter) in thickness. The flint weighs 0.36 ounces (11.1 grams) (Figure 40).

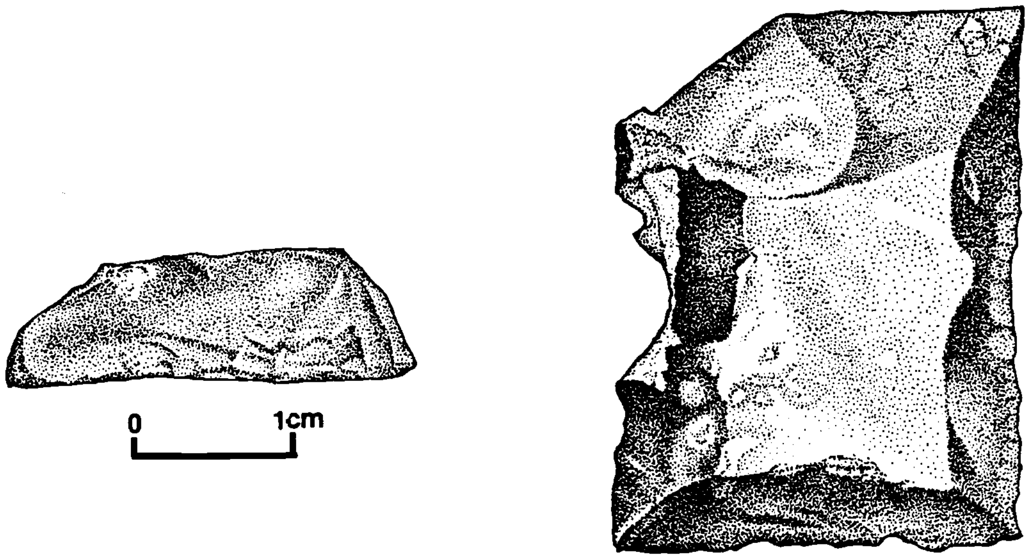


Figure 40. Flint strike-a-light.

CLEANING AND MAINTENANCE

THIMBLE

One sewing thimble was recovered from the northwest section of Block A (see Figure 24c). The thimble, manufactured from brass and possessing a silver veneer, has a wide plain band, no rim, one knurled tier, and no distinguishing makers' marks. The specimen measures

10/16 inch (1.7 centimeters) in length, with a distal end diameter of 6/16 inch (1 centimeter).

Historically, thimbles were identified by makers' marks, hallmarks, touchmarks, trademarks, or silver and gold standard marks (Lundquist 1970:76). Numerous thimble makers and factories were operating in America during the mission occupation period. Many of these are noted by Lundquist (1970:24-25) and Smith 1972:546).

ARCHITECTURE

CONSTRUCTION MATERIALS

WINDOW GLASS

The 2490 small window glass fragments recovered from the site verify the use of window panes in buildings constructed at the mission. Most likely the window panes were produced by the crown method (Hansen 1980). Crown glass was a high quality, clear, nonwavy glass with few or no air bubbles, and ground polished smooth surfaces (Steele, Ross, Hibbs 1975:88).

Crown glass was produced in England and, to a lesser extent, in the United States during the first half of the nineteenth century (Roenke 1978:6). American and English crown glass tended to correspond in thickness during this period. The Americans were also producing cylinder glass in the early nineteenth century, though its quality was not as high as that produced by the crown glass method. However, cylinder glass was more economical to produce, and this method in general superseded crown glass production in America by circa 1840 (Wilson 1972:89). The popularity of crown glass in England continued until about 1850 (Roenke 1978:6).

All the recovered window glass fragments have patinated surfaces, which occur when moisture comes into contact with glass over a long period of time after subsurface deposition (Persson 1969:24). The slight blue-green tint that characterizes most fragments is a result of batch material impurities common in glass in the early nineteenth century (Roenke 1978:21).

Window glass thickness has been used to date several historic archeological sites. An hypothesis on window glass thickness was proposed in the 1974 Kanaka Village/Vancouver Barracks report (Chance and Chance 1976). The hypothesis, later upheld by Roenke (1978), states that window panes in the Pacific Northwest increased in thickness through time during the nineteenth century. Window glass thickness data from the mission compare favorably to early nineteenth century sites excavated in the Pacific Northwest.

A random 20 percent sample of window glass fragments from Block A, the site of the main mission house, were measured for thickness with an Omega one-inch micrometer. A window glass frequency curve utilizing this information is presented in Figure 41. Due to the relatively small size of each fragment only one central measurement was recorded. Once the thickness data were calculated, the following results were revealed:

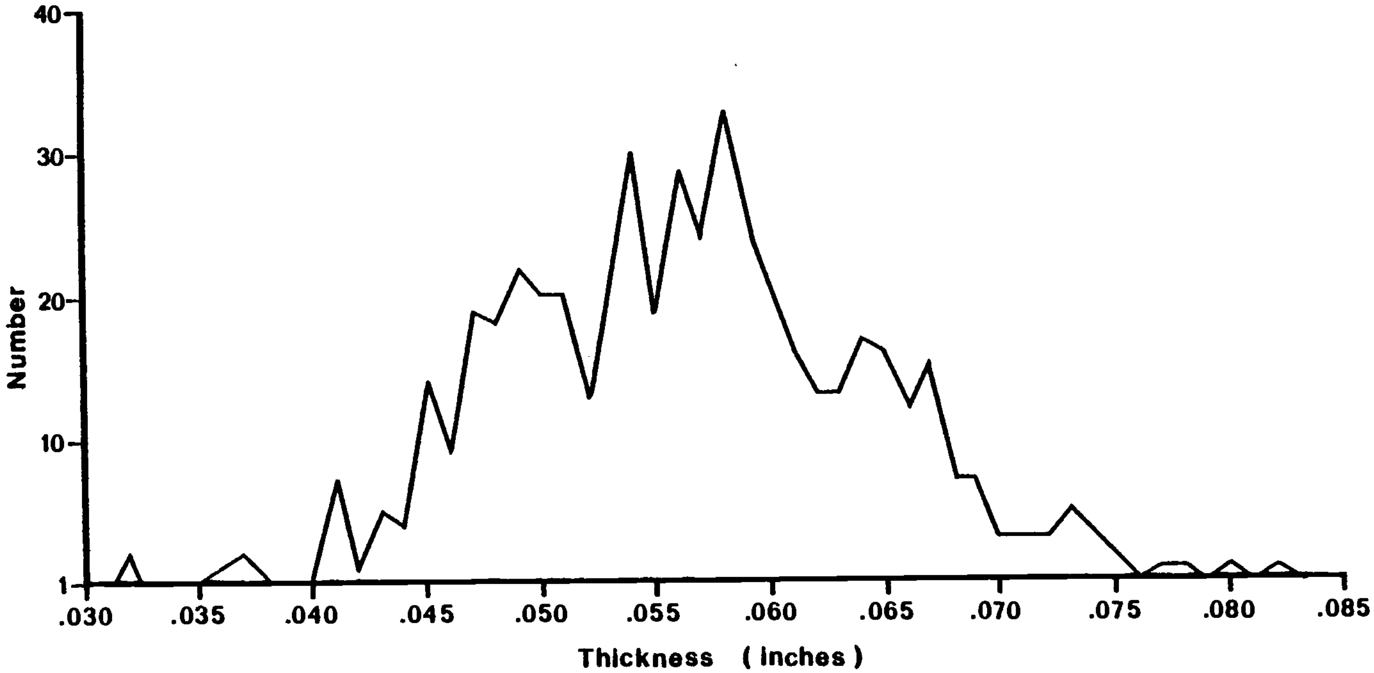


Figure 41. Window Glass Thickness Frequency Curve.

Primary Mode	0.058 inch	1.47 mm
Secondary Mode	0.054 inch	1.37 mm
Tertiary Mode	0.056 inch	1.42 mm
Mean	0.055 inch	1.39 mm

The primary mode of 0.058 inches falls close to the suggested age range for single strength window glass utilized in the Pacific Northwest from 1835 to 1845 (Roenke 1978:72).

The fact that the mean and modes are similar is not surprising since there was a short occupational time span at the mission. The three connected structures which comprised the main mission house were built within a seven-year time, leading us to predict little variability in window pane size. No structures were built at the site prior to 1834, when the missionaries arrived, and twentieth century window glass fragments (plate glass) were excluded from the sample, thus alleviating further variability in fragment thickness values.

Twenty window glass fragments from Block C (the postulated blacksmith shop locality) produced a mean thickness of 0.055 inches (1.39 mm), similar to Block A. A mode would be meaningless with such a small sample size. Three fragments distorted from heat were excluded from this sample. Only four window glass fragments were recovered from Block B. Though one fragment is heat distorted and thus excluded from the sample, the other three measure 0.045 inch, 0.046 inch, and 0.072 inch.

Roenke (1978:117) notes a primary mode for window glass thickness ranging from 0.045 to 0.055 inch in the period from circa 1830-1845 may reflect the ultimate perfection of thin crown glass manufacture in England. Crown glass window panes were on hand at Fort Vancouver during the mission occupation period. The Hudson's Bay Company inventory of goods for 1828 at Fort Vancouver included 367 squares of crown window glass (Roenke 1978:116). Window glass was received at Fort Vancouver from England in four standard sizes: 7 x 9 inches, 7 x 8 1/2 inches, 7 1/2 x 8 1/2 inches, and 8 x 9 inches (Hussey 1976:30; Ross 1975:1070). Agate's rendition of the mission house depicts varying window sizes and panes (Figure 4), thus causing difficulty in pane size estimations for comparison. The archeological record at the mission site revealed inconclusive window glass fragment distribution data from Block A. However, a few concentration localities are notable. The gravel feature area (within the "L" of the main mission house) yielded a high percentage of window glass fragments, as did the postulated east kitchen wall locality.

Historical research thus far has failed to locate reference to window pane purchases by the missionaries.

Possibly panes were purchased at Fort Vancouver for the initial mission structures. The missionaries may have imported window panes from the United States for use in later structures built at the settlement. Jason Lee (1837), in a request to the eastern United States for construction materials for new buildings, noted the scarcity of "glass" available to the missionaries in 1837.

NAILS

A total of 1737 complete and fragmented nails were recovered. Wire drawn nails, the result of later site disturbance, are not discussed in this section. Included in the above total are 891 small corroded fragments that lack diagnostic features except those that suggest they are parts of square nails. Although there are only 238 complete nails, the method of manufacture can be determined for 846 of the total specimens. Based on broad manufacturing technique, three distinct nail types exist. These are (1) hand forged or wrought nails, (2) American machine cut nails, and (3) cast nails. Table 10 gives the relative percentage of these nail types defined from the mission.

Table 10. Percent of Nail Types, Based on Manufacturing Technique.

	(N)	Percent
Total Nails		
Unidentifiable	891	51
Machine cut	659	38
Hand wrought	185	10
Cast	2	¼1
Identifiable Nails		
Machine cut	659	78
Hand wrought	185	21
Cast	2	¼1

Hand Wrought Nails

Approximately 21 percent of the identifiable nails are hand wrought. Wrought nails are manufactured from prefabricated nail rods of soft malleable iron. When fired in a forge, these rods are drawn by hammer blows to a point. The result is a shank that tapers from the head on both faces (Nelson 1968). By striking a blow to the rod, the nailer cuts the nail to the desired length. For this reason, wrought nail lengths are generally not as uniform as machine cut nail lengths. What has become the shank is then inserted into a nail header where several blows are struck to the upper end of the iron to form a head. Head shape is determined by the number and direction of the blows.

In general, morphological variability is a characteristic of hand wrought nails (Nelson 1968). The 185 hand wrought nails recovered at the mission exemplify variability in size, head treatment, and shank treatment. In the following typology, the hand wrought nails are grouped on the basis of broad morphological characteristics. However, in many instances each individual nail within a category exhibits unique morphological features, the reflection of a hand made commodity. An attempt has also been made to indicate the functional possibilities for each nail type. The ideas offered are not intended to suggest how these nails were actually used at the mission. However, these ideas have been employed when viewing nail distribution maps. In addition, the functional possibilities offered are by no means comprehensive. For instance, nail use in furniture construction, cupboard construction, and shelving is not discussed.

Clasp Nails/Bonnet Head (Figure 42)

N Sample: 49

Complete Specimens: 20

Length	N Sample
2 in (5.1 cm)	4
2 3/8 in (6.0 cm)	13
2 5/8 in (6.7 cm)	3

All examples from the mission were manufactured from square rods tapered to a sharp point downward, allowing the nail to be driven below the surface of the wood. Functionally, this type of nail is comparable to the finishing nail. Historically, clasp nails were utilized for flooring, molding, and trim work (Steele, Ross, Hibbs 1975:98). The size of the mission's clasp nails indicates they were probably not used in puncheon flooring; this type of flooring, known to have been incorporated into the first mission structure, required larger nails (Dole 1981). At the mission, the recovered clasp nails could have been employed in framing doors and windows, for general finishing work, sheathing, plank partitions, and possibly in the flooring of later structures.

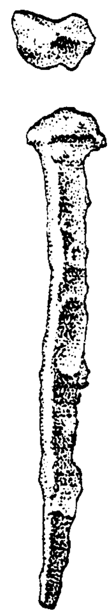
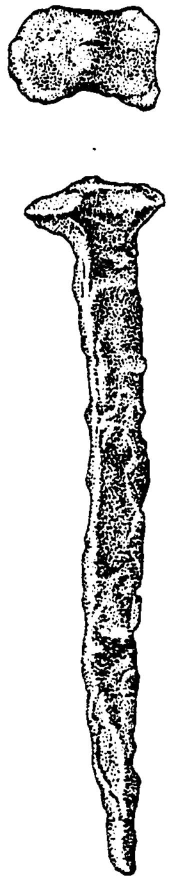


Figure 42. Nail.



Clasp Nails/T-Head (Figure 43)

N Sample: 6

Complete Specimens: 2

Length	Shank Morphology	N Sample
3 1/4 in (8.3 cm)	Flat	1
3 3/4 in (9.5 cm)	Sharps	1

The heads of these nails were commonly created by hammering two opposing sides of a rosehead (Nelson 1968). This served to give the nail its "clasping" ability. The square shank morphology varies for the two complete specimens: one has a sharps tip while the other has a flat tip. A flat tip nail was desired in situations where there was a danger of the wood splitting (Steele, Ross, Hibbs 1975:103). Historically, T-head nails could be utilized for trim, although they were most commonly employed for flooring. Size of the mission's T-head nails indicates they could have been used for flooring, including puncheon floors. This nail is also known as a plancher nail.

Figure 43. Nail.

Common Nail/Rosette Head (Figure 44)

N Sample: 37

Complete Specimens: 17

Length	Shank Morphology	N Sample
1 3/4 in (4.5 cm)	Sharps	3
2 1/4 in (5.7 cm)	Sharps	5
2 1/2 in (6.35 cm)	Sharps	6
2 7/8 in (7.3 cm)	Sharps	1
3 1/2 in (8.9 cm)	Flat	1
3 5/8 in (9.2 cm)	Flat	1

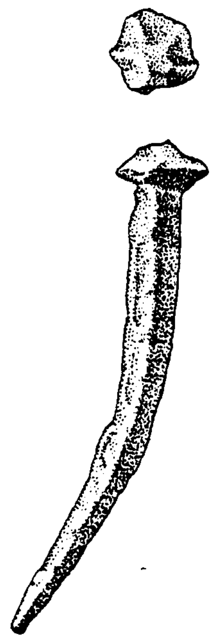


Figure 44. Nail.

In general, rosehead nails, fabricated from square nail rod, have a circular faceted head produced by three or more hammer blows (Steele, Ross, Hibbs 1975:98). Rosehead nails were historically utilized for a variety of construction purposes and in this respect are comparable to the machine cut common nail. Smaller rosehead nails, between 2d and 4d, could be utilized for shingling and trim work. Larger nails could be employed for the construction of board walls and interior partitions, for flooring, and for a number of other general construction tasks. Examples of this type of nail from the mission suggest a correlation between nail length and tip morphology: nails under

3 inches in length have a sharps tip while those over 3 inches in length have a flat tip.

Clinch Nail/Rosette Head (Figure 45)

N Sample: 3

Complete Specimens: 3

Length		N Sample	Total Wood Thickness
2 in	(5.1 cm)	1	1 1/4 in
2 1/2 in	(6.35 cm)	1	1 1/2 in
3 in	(7.61 cm)	1	2 in

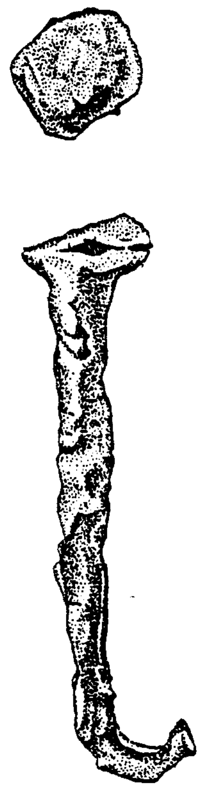


Figure 45. Nail.

The shank morphology of these nails distinguishes them from the common rosehead nail. The square shank has a relatively blunt tip produced by a tapered cut through the shank's cross section. This blunt tip made the nail ideal for clinching. This type of nail was frequently employed in batten door construction. All examples from the mission exhibit evidence of having been clinched. By measuring the unclinched portion of the nail it is possible to determine the approximate thickness of the total wood through which the nail probably passes. These thicknesses are noted above. Many of the clinch nails used at the mission may not be categorized as such since nails fragmented above mid-shank could not be identified as clinch nails during analysis.

Spike/Rosette Head (Figure 46)

N Sample: 17

Complete Specimens: 6

Length	Shank Morphology	N Sample
4 in (10.15 cm)	Flat	1
4 1/2 in (11.45 cm)	Fine Drawn	1
4 1/2 in (11.45 cm)	Flat	2
4 3/4 in (12.10 cm)	Flat	1
5 1/2 in (13.30 cm)	Flat	1

The designation "spike" has been applied to all "nails" over 4 inches in length. In the case of the incomplete specimens, categorization was based on shank diameters and head sizes which suggested the specimen's original length equaled or exceeded 4 inches. The majority of the spikes having a rosette head recovered from the mission site have a flat tip. In general, spikes are utilized for

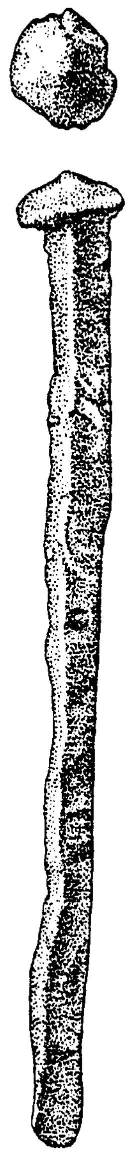


Figure 46. Nail.

medium to heavy construction purposes. In log cabin construction, spikes would be utilized to secure heavy members such as rafters and joists. In addition, logs utilized in the gable end were frequently piled and spiked into place without corner notching (Rustrum 1961:119).

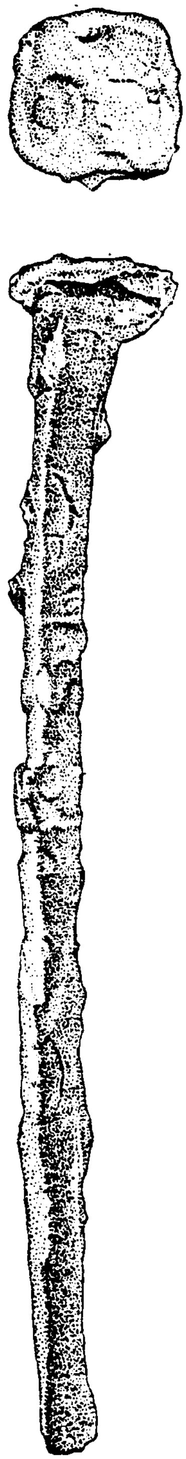


Figure 47. Nail.

<u>Spike/Flat</u> <u>Rectangular</u> <u>Head</u> (Figure 47)

N Sample: 3

Complete Specimens: 2

Length	Shank Morphology	N Sample
4 1/2 in (11.45 cm)	Flat	1
5 3/4 in (14.60 cm)	Flat	1

Based on size, the function of these spikes probably differed little from rosehead spikes. However, the flat, broad, rectangular head would serve to make the nail head more flush with wood. For this reason, it is possible that these spikes were made for a specific purpose such as attaching another material, perhaps metal, to wood (Hibbs 1982).

<u>Hinge Nails</u> (Figure 48)

N Sample: 9

Complete Specimens: 4

Length		N Sample
2 in	(5.1 cm)	1
2 1/4 in	(5.7 cm)	1
2 1/2 in	(6.35 cm)	2

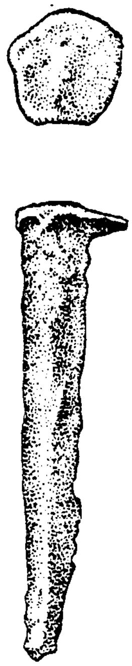


Figure 48. Nail.

Although these nails have been categorized as hinge nails, their actual function at the mission is unknown. The first completed mission structure initially employed wooden hinges. We do not know the type of hinges subsequently utilized. A fragment of a metal butt hinge was found during excavation. The heads of the mission hinge nails are circular and flat. With the exception of two corroded specimens, round stock was used for the shank and is visible at the upper end of the shank under the head. On the lower portions of the shank, flat facets are observable, probably the result of shaping the shank tip. At Fort Vancouver, the round stock of the shank was hammered to a flat tip (Steele, Ross, Hibbs 1975:104). Only one incomplete hinge nail from the mission suggests a flat tip. The majority have been shaped to a sharps tip. Hinge nails and clinch nails, often recovered in close proximity, aided in postulating the locations of several doors.

Clout Nails (Figure 49)

N Sample: 2

Complete Specimens: 2

Length	N Sample
3/4 in (1.9 cm)	1
1 in (2.5 cm)	1

Figure 49. Nail.

Historically, clout nails were used for fastening fine material like leather or sheet metal to wood (Steele, Ross, Hibbs 1975:103). The smaller of the two recovered clout nails has round stock; a sharps tip; and a large, flat, very irregular head. The larger specimen is morphologically more uniform and has a round shank with a pointed tip and a flat circular head. Unlike the smaller specimen, the shank of this nail does not taper to a point. It is interesting to note that the majority of clout nails recovered archeologically from the Hudson's Bay Company's Sale Shop were also 1 inch in length (Steele, Ross, Hibbs 1975:103).

Table 11. Hand Wrought Nails.

N Sample	Nail Length Range	Stock Size
47	1 to 2 5/8 inches	2/16 to 3/16 inch
9	3 1/2 to 4 1/2 inches	1/4 inch
9	4 1/2 to 5 3/4 inches	5/16 inch

Hand Wrought Nails Too Corroded to Determine Head Morphology

N Sample: 57

Specimens for which shank morphology is observable: 35

Sharps: 31, Flat: 4

Because of corrosion, the size of the iron rods used for the mission's hand wrought nails is difficult to measure. The stock of 65 relatively uncorroded nails was measured. Three stock sizes are observable that correlate to nail lengths (Table 11).

Machine Cut Nails

The majority of the identifiable nails (77 percent) are American machine cut nails. The shanks of machine cut nails are cut from metal sheets of uniform thickness. The result is a shank with two opposing parallel edges, Several sizes of machine cut reverse crimp nails are also represented (Figure 50b). This "flathead" nail differs from the common nail in that the cross section of the shank neck, created by the shank-holding dies during the heading process, is circular (Steele, Ross, Hibbs 1975:107). Machine cut reverse crimp nails between 1 inch (2d) and 2 inches (4d) are considered shingling nails (Hibbs 1982). The majority of reverse crimp nails found at the mission are fragmented; however, small shank dimensions suggest that the majority of these fragments may have been shingling nails. Finishing nails were also recovered in lesser quantities (Figure 50c). Mission machine cut nail varieties and frequencies are summarized in Table 12.

Upon visual examination during analysis, it was observed that head shapes of the machine cut common nails appeared to vary from square to rectangular. In order to determine if this variance was significant and thus possibly indicative of two distinct populations of machine cut nails acquired by the missionaries during different time intervals, an attempt was made to measure the heads of the nails to sort and plot the nails on distribution maps. Unfortunately, the corrosion factor prohibited measurements that were sensitive enough for sorting. The nails were then visually sorted and plotted reflecting the thickness of the metal sheet, and two opposing tapered edges, determined by the angle of the cutting tools. (Because of corrosion, it is difficult to determine if the mission nails were cut from opposite or common sides.) The nail blank is then gripped just below the end to be headed and a hammer or die is impelled against this end. The result is a flat or faceted head generally square to rectangular in shape (Steele, Ross, Hibbs 1975:94). All mission machine cut nails appear to have machine manufactured heads.

Varieties of machine cut nails recovered from the mission include common nails, reverse crimp nails, and finishing nails. The common nail was the most frequent variety of machine cut nail recovered from the mission. Ninety percent of the total machine cut nails are common nails ranging in size from 1 1/4 inches (3d) to 4 inches (20d) (Figure 50a). Historically, common nails were utilized for various light to medium construction purposes.

Figure 50. Machine cut and cast nails (actual size).

a. Common nails
b. Reverse crimp nails
c. Finishing nails
d. Cast nails

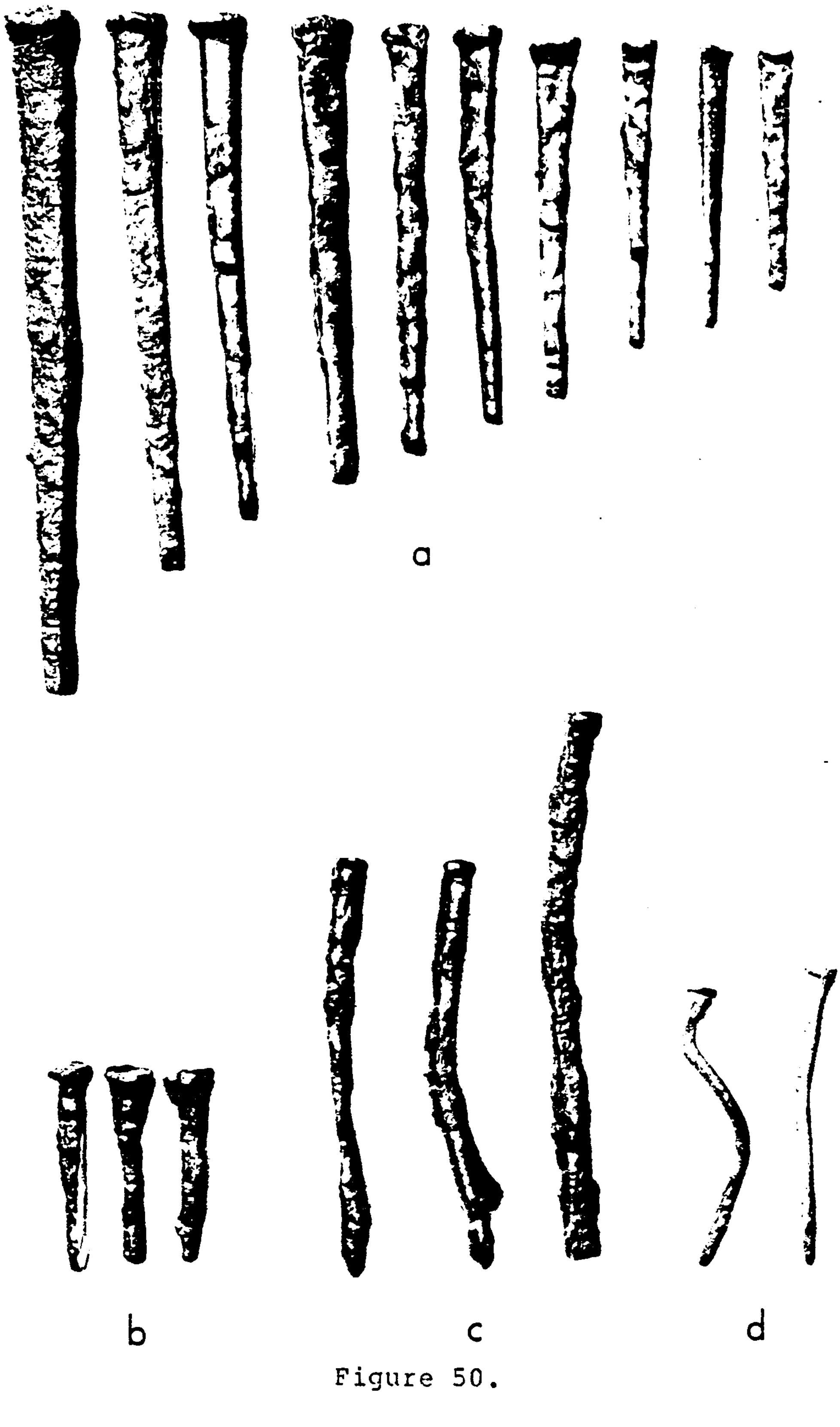


Figure 50.

Table 12. Machine Cut Nail Varieties[1] and Frequencies.

Common Nails

(N)	Size	
3	4 in	(20d)
21	3 1/4 in	(12d)
42	3 in	(10d)
7	2 3/4 in	(9d)
29	2 1/2 in	(8d)
20	2 1/4 in	(7d)
21	2 in	(6d)
11	1 3/4 in	(5d)
19	1 1/2 in	(4d)
7	1 1/4 in	(3d)
306	fragments	
486		

Finishing Nails

(N)	Size
1	3 1/4 in
3	3 in
1	2 3/4 in
1	2 1/2 in
10	fragments
16	

Machine Cut Nail Fragments

(N)	Size
125	(size and variety unidentifiable)

Reverse Crimp Nails[2]

(N)	Size	
1	3 in	(10d)
6	1 in	(2d)
25	fragments (most appear to be between 2d and 4d)	
32		

Total Machine Cut Nails

(N)
659

1 Nails are correlated to penny size solely for classification purposes; however, discrete size populations correspond to modern American penny sizes. Lengths are not entirely consistent, possibly reflecting the imperfection of the early industry and/or corrosion.

2 Smaller sizes considered shingling nails.

on distribution maps. No significant distributional differences were noted.

Cast Nails

Only two cast copper or copper alloy nails were recovered (Figure 50d). Cast nails are manufactured by introducing liquid metal, usually copper or brass, into a mold to form the head and shank in one operation (Steele, Ross, Hibbs 1975:95). The mission cast nails have a square shank that tapers evenly on all four sides. The regular flathead, which is circular in shape, exhibits evidence of hammer blows, probably from use. Both nails are 1 3/4 inch (4.43 cm) in length. Shank thickness near the head measures 0.08 x 0.08 inch (2.1 x 2.1 mm).

The function of the cast nails recovered from the mission is not known. Historically, cast nails were produced to fulfill needs that could not be met with ordinary wrought or machine cut nails (Steele, Ross, Hibbs 1975:108). A primary market was the maritime industry, which required more corrosion-resistant copper and alloy nails (Steele, Ross, Hibbs 1975:108). Cast nails were also employed in the construction of agricultural structures such as gates and fences (Ross, Thomas, Hibbs, and Carley 1975:108).

Brass and copper castings were recovered from the blacksmith shop at Fort Vancouver, suggesting the possibility that cast nails were manufactured there in small quantities (Ross, Thomas, Hibbs, Carley 1975:103). Cast nails were also inventoried in 1844 at Fort Vancouver (Steele, Ross, Hibbs 1975:108).

Discussion

The period between 1790 and 1830 witnessed the technological transition from wrought to machine cut nails (Nelson 1968). This transition mainly took place in the United States. By the turn of the century, cut nail manufactories were established in New England, New York, New Jersey, and Pennsylvania (Nelson 1968). Although the British began experimenting with machines for cutting nails early in the nineteenth century (Timmins 1967:615), hand forging remained the predominate technique until mid-century (Steele, Ross, Hibbs 1975:95). The state of the British nail industry is reflected at Fort Vancouver, where wrought nails were utilized almost exclusively from 1829 until circa 1844, at which time machine cut nails manufactured in both England and America were introduced (Steele, Ross, Hibbs 1975:95).

By 1834, the initial date of mission occupation, the technological transition to the machine cut nail in the United States was nearly complete (Nelson 1982); for this reason, the recovery of machine cut nails at the mission site was not surprising, especially in light of an 1838 entry in the mission account book that specifically lists 44 pounds of cut nails (Mission Account Book 1838-1841). Rather, the predominance of machine cut nails initially served to confirm American connections at the site.

The mission machine cut nails are among the earliest recorded archeologically in the Northwest. The machine cut nails are also indicative of a United States supply source. Further, earlier mission records mention the purchase of nails from the United States. A July 1836 record lists "Iron Steel Nails ¢ C" ordered from Perrin and Ellis, an American firm, for $479.07 (Oregon Mission Correspondence). In 1837 goods shipped to the missionaries on the brig Diana included 12 kegs of nails, 72 bars of iron, 22 bundles of iron, one bundle of blistered steel, and one case of cast steel (Oregon Mission Correspondence). Many of the above items were being sent to allow for the commencement of blacksmithing operations at the mission.

There are several possible sources for the mission's wrought nails. Although no specific references have been found pertaining to nail making at the mission, blacksmithing operations began in 1837 with the arrival of Alanson Beers, the mission blacksmith. Another possible source for the mission's wrought nails was Fort Vancouver. This may apply particularly to the bonnet head clasp nails and possibly to some of the rosehead nails. Before any conclusions are made, however, various statistical measurements comparing the nails from both sites are necessary. Wrought clasp nails from England were being imported from the United States. Wrought nails continued to be manufactured for several decades following the introduction of cheaper machine cut nails because of their superior clinching ability (Nelson 1968). An entry in the mission account book lists four pounds of wrought nails on November 10, 1838 (Mission Account Book 1838-1841).

Several statements can be made based on the distribution of hand wrought and machine cut nails at the mission site.

1. The frequency of nails per square meter area indicates that twice as many nails were found in the northwestern portion of the grid area (Block A:N111-120/E93-98) as compared to the southeastern grid area

(Block A:N99-116/E99-106). Although possibly reflecting the differential distances from the structures, this difference may also indicate less nail use in the earlier mission structures. In 1837, after the completion of the first two mission buildings, Jason Lee requested that glass and nails be sent from the United States. He noted that

> they [nails] are very scarce in this place and we are now in great want of large shingle nails or clapboard nails being obliged to fasten the shingles on our building with large poles (J. Lee 1837).

2. The frequency of machine cut nails per square meter area indicates machine cut nails are twice as frequent in the northwestern portion of the grid as in the southeastern portion. This possibly suggests that the first acquisition of machine cut nails was in 1837 or later, after the construction of the first two mission buildings. Machine cut nails found in the southeastern portion of the grid could be the result of later repairs and alterations.

3. The frequency of hand wrought nails per square meter area indicates that wrought nails are found in equal proportions in the northwestern and southeastern portions of the grid. This suggests that wrought nails continued to be used after the acquisition of machine cut nails. This may have been a matter of preference.

Historically, wrought nails were favored for use in lathed room partitions, trim, door battens, door latches, and door hinges, as well as for a number of other specialized functions. However, hand wrought spikes were much more frequent in the southeastern portion of the grid and relatively rare in the northwestern grid area where machine cut spikes and spike fragments were recovered.

A major reason for the continued preference for wrought nails was their clinching ability (Nelson 1982). Until the 1830s, most cut nails had fibers which ran crosswise to the shank. For this reason, early cut nails could not be satisfatorily clinched (Nelson 1968). Wrought nails, however, could be clinched since the fibers ran lengthwise (Nelson 1968). After circa 1840, cut nails generally were manufactured with iron fibers running lengthwise, making them capable of clinching without rupture (Nelson 1968).

Fiber structure visible on several of the mission's cut nails indicates a crosswise pattern. While not applicable to the entire cut nail population, this crosswise fiber pattern helps substantiate a pre-1840s date of manufacture for these nails.

More importantly, fiber structure may have implications pertaining to scavenging activities at the site. Eighty-seven percent of the machine cut nails from the southeastern portion of the site area were fragmented. Many of these nails may have been broken in a removal attempt. Cleavage could have occurred when stress was applied to nails having a crosswise fiber pattern. As a consequence, lesser amounts of nails in general, and of machine cut nails in particular, would be found in the southeastern portion of the grid since nails successfully removed would have been collected. If this were the case, then previously discussed ideas concerning nail distribution may not be valid. However, 56 percent of the nails from the northwestern grid area were also fragmented.

BRICK

A total of 243 brick fragments were unearthed (Figure 51). The weight of the combined fragments is 15.1 pounds (6.8 kilograms), indicating that the actual amount of brick recovered is small. No complete bricks are represented in the sample. The absence of complete brick may reflect abandonment or postabandonment scavenging activities.

All brick from the mission is water struck (Gurcke 1982; Hibbs 1981). Water struck refers to a technique of

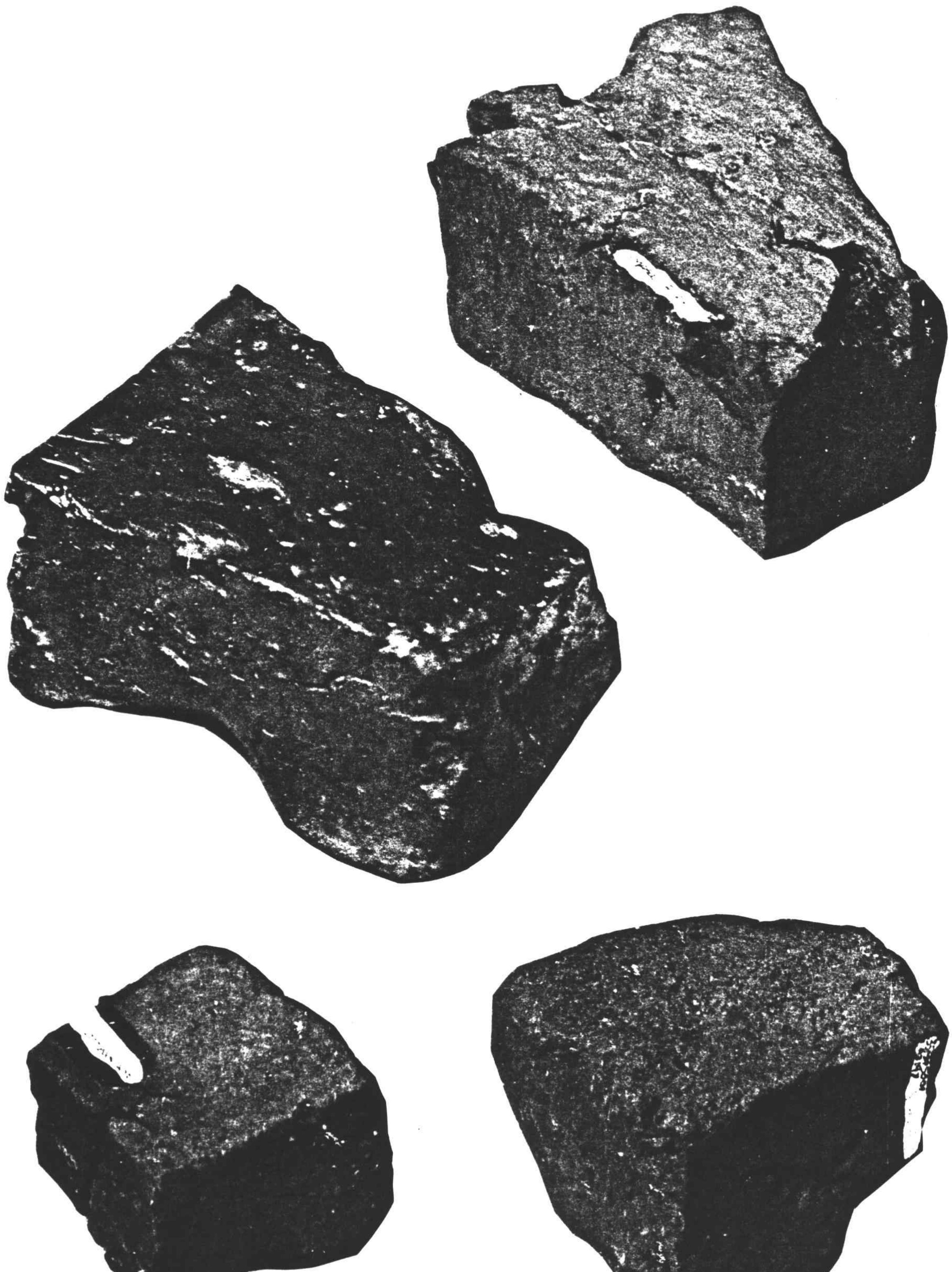


Figure 51. Brick (actual size).

hand molding brick in which water, rather than sand, is used to prevent the clay from adhering to the mold. The top faces of the bricks are coated with sand. Either sand was thrown on top of each brick prior to removal from the mold, a technique used today by a New England company producing water struck brick (Renner 1981:78), or the bricks were dumped from the mold onto a sandy surface (Gurcke 1981; Hibbs 1981). No examples of brick produced by a different method were recovered.

Perhaps the most striking feature of the mission brick is its size. Average width and thickness dimensions are 3 5/16 x 1 11/16 inches (8.4 x 4.3 cm). No length measurements are available. Mission brick dimensions are significant; the bricks are smaller than those generally found in nineteenth century archeological sites in the Northwest (Gurcke 1981; Hibbs 1981). Generally, Willamette Valley bricks, including those made in the 1840s, have dimensions of 8 x 4 x 2 inches. Table 13 gives the thickness range for the mission bricks. Width ranges are not given since there are only two bricks in the sample for which this measurement is possible. These two bricks have identical width measurements of 3 5/16 inch (8.4 cm).

Table 13. Range of Brick Thickness.[1]

High Fire Brick (N)	Size		Medium Fire Brick (N)	Size	
4	1 9/16 in	4.00 cm	0	1 9/16 in	4.00 cm
6	1 10/16 in	4.15 cm	1	1 10/16 in	4.15 cm
10	1 11/16 in	4.30 cm	3	1 11/16 in	4.30 cm
2	1 12/16 in	4.45 cm	5	1 12/16 in	4.45 cm
1	1 13/16 in	4.60 cm	1	1 13/16 in	4.60 cm
0	1 14/16 in	4.75 cm	1	1 14/16 in	4.75 cm

[1] No thickness dimensions available for low fire bricks.

A brick found at the Etienne Lucier homesite also measures 1 12/16 x 3 5/16 inches (8.4 x 4.3 cm) (Munnick 1982). Etienne Lucier was a French Canadian trapper and "engage" of the Hudson's Bay Company who retired in the Willamette Valley near Champoeg in 1831 or 1832 (Hussey 1967:53). The existence of a brick similar in size from the same time period in the Willamette Valley may be significant. Unfortunately, we have not seen the Lucier brick, so the technique of manufacture is not yet known.

The source of the mission brick is not clear, but local manufacture is suggested. The size of the mission brick eliminates the possibility that the missionaries were obtaining imported British brick from Fort Vancouver. While British brick dimensions were not entirely consistent, English law regulated brick size to 8 1/2 x 4 x 2 1/2 inches (Ross 1976:1066). Locally made

Table 14. High, Medium, and Low Fire Brick.

Fire	Munsell Equivalent	Percent of Sample
High fire	Very dark gray to reddish brown 2.5 YR 3/0-2.5 YR 4/4	72
Medium fire	Red 2.5 YR 5/6	25
Low fire	Light brown 7.5 YR 6/4	3

brick, including those imported from the Willamette Valley to Fort Vancouver beginning in the 1840s, were larger than the mission brick. Further research is needed to determine the range of techniques used to manufacture the various types of brick recovered from Fort Vancouver. However, all common brick recovered from Kanaka Village is sand struck.

The brick fragments vary in color and hardness. This variation is consistent. Examples range from dark dense bricks, many of which are glazed "clinkers," to light colored porous brick. Table 14 gives the relative percentage of high, medium, and low fire brick recovered from the mission. In the single firing of a field or stove kiln, variation in color and hardness results from uneven heat and the proximity of the brick to the heat source (McKee 1973:44; Noel Hume 1978:81). If the bricks were imported, a smaller range of brick color and hardness would be expected since it is likely that the bricks would have been sorted to some extent prior to export (Gurcke 1981). The mission brick fragments suggest the use of brick from all areas of a kiln.

Although it is probable that the mission bricks were manufactured in the Willamette Valley, it does not appear that the brick was made at the mission site. No evidence of this type of activity was observed archeologically at the mission site. Mention of the manufacture and use of brick by the missionaries is not recorded in available historic documents. In a letter written in March 1837, Jason Lee noted that the missionaries were obliged to act in the capacity of masons since their arrival (J. Lee 1837); however, he does not mention brickmaking in a long list of other capacities in which they worked. Furthermore, Lee may have been referring to the construction of the stick chimneys which required clay daubing.

The most conclusive evidence suggesting that the bricks were not made at the mission site is based on data from a trace element analysis of the mission brick and daub. The analysis was performed by Karl Gurcke of the University of Idaho using equipment belonging to the Idaho Bureau of Mines and Geology, University of Idaho.

In order to read the intensities of the trace elements, the brick and daub were x-rayed for 300 seconds on each face with the results averaged. For the ternary graph (Figure 52), Gurcke used the elements rubidium (Rb), strontium (Sr), and zirconium (Zr).

Results indicate different soils were used for the daub and brick. Since it is likely that the daubing was obtained locally, dissimilar proportions of trace elements suggests the soil used for the brick was located some distance away from the mission. However, trace elements can vary a great deal both horizontally and vertically. Sediment samples from various areas of the mission site should undergo trace element analysis in order to gain a clearer understanding of trace element variation in the locality.

Brick kilns were observed in the Willamette Valley in June 1841 (Wilkes 1845:357). Although the precise location of these kilns is unclear, the historical documentation indicates that these kilns were located on the west side of the Willamette River not too distant from the mission. It is likely that these kilns observed by Wilkes were being employed for the manufacture of brick from the George Gay house, the first brick house in the Willamette Valley. This house was completed in 1842 (McArthur 1974:165).

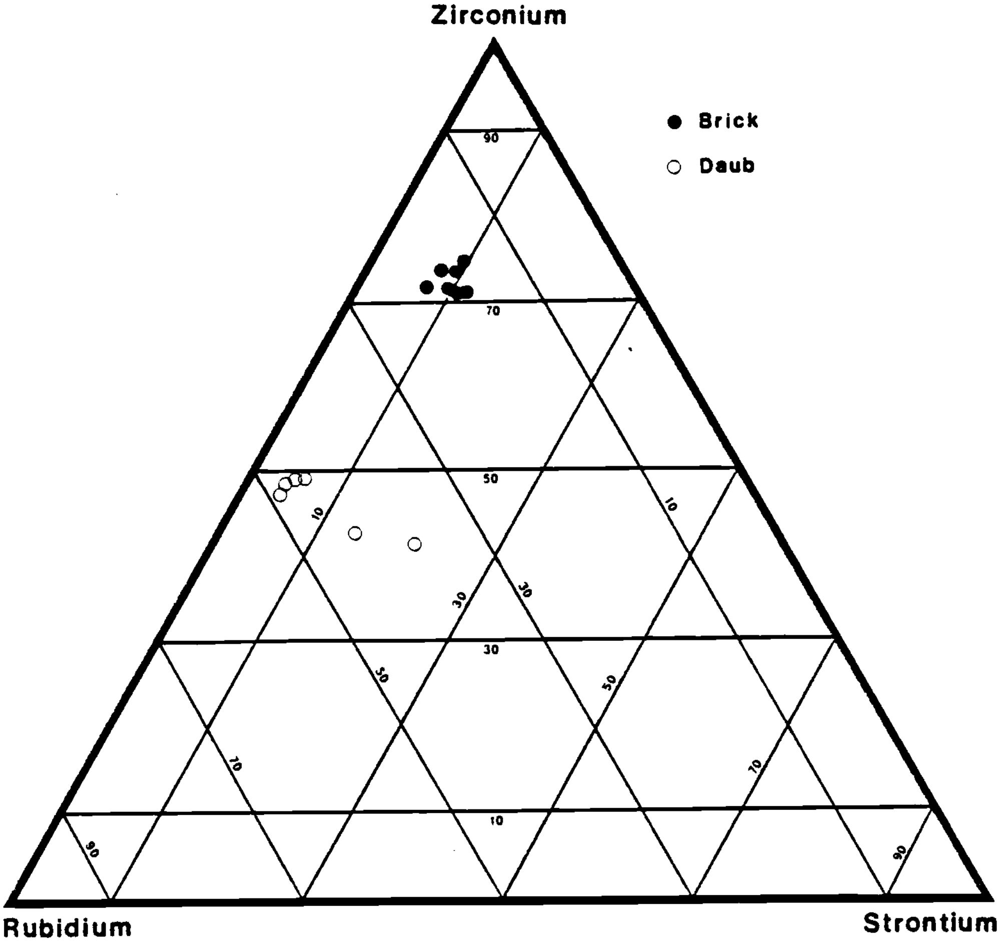


Figure 52. Trace element analysis of mission brick and daub.

The mission brick was compared to several bricks found at the site of the George Gay house. (The house was torn down in the 1950s.) Although several types of brick were found at the Gay site (Hibbs 1981), one brick was technologically similar to the mission brick; the brick was water struck with sand coating the top face. The color range of this brick is also identical to samples from the mission. However, this brick is larger than those recovered from the mission site. This discrepancy, while possibly significant, could be the result of separate manufacturing episodes in which different wooden molds were employed.

It is unlikely that the mission brick dates as late as 1841, the first recorded observance of brickmaking in the Willamette Valley. Given the valley's moist climate, the time required to air dry brick prior to firing necessitates summer or early fall manufacture. Abandonment of the original mission complex was already underway by the summer of 1841. It is unlikely that brick made that summer would have been incorporated into the mission buildings. Brick recovered from the mission site suggests that brick manufacture in the Willamette Valley began prior to 1841.

Brick function at the mission has yet to be determined although there is a definite correlation between brick concentrations and the postulated locations of the mission's fireplaces. However, only a few of the fragments exhibit evidence of having been burned from use. None of the brick has adhering mortar.

Brick use on the exterior of the mission structures is not apparent in the 1841 drawing of the mission executed shortly before abandonment (Figures 4 and 5). The construction materials used for the chimney of the first mission building included sticks, clay, and sand (D. Lee and Frost 1973:128). The missionaries considered this chimney to be "as durable as brick" (J. Lee 1835).

MORTAR

Four pieces of a soft mortar were found at the site. The mortar is made of lime and unsorted sand to which water probably was added to achieve the desired consistency. Soft mortars of lime and sand predominated as a construction material until the 1880s when cement mortars became widespread (McKee 1973).

The missionaries were obtaining coral (for lime) from the Sandwich Islands (Oregon Mission Correspondence). Coral was also being imported regularly at Fort Vancouver as the only readily available material which would be slaked for lime and used in mortar (Ross

1976:1069). Mortar recovered during the Fort Vancouver excavations consists of lime, crushed coral, and sand (Ross 1976:1069). This mortar was used for brick construction (Ross 1976:1069).

That mortar was not found on bricks recovered from the mission may be due to the consistency and quality of the mortar; it may not have adhered to the brick after drying. It is also possible that a mud mortar, which would deteriorate rapidly, was employed.

Lime mortar also deteriorates easily from moisture contact, perhaps explaining the small amount recovered from the mission site. Since all the mortar was found in the northwestern area of the excavation, however, it is possible that the source of recoverable mortar lies beyond the excavation grid.

CLAY DAUB

The clay daub sample recovered from the site includes 160 specimens weighing a total of 5.1 pounds (2.32 kilograms). Historical research and archeological context suggest the clay daub was probably used for fireplace and chimney construction (Figure 53).

The daub sample consists of irregular lumps of hardened clay which, to distinguish from brick, exhibit

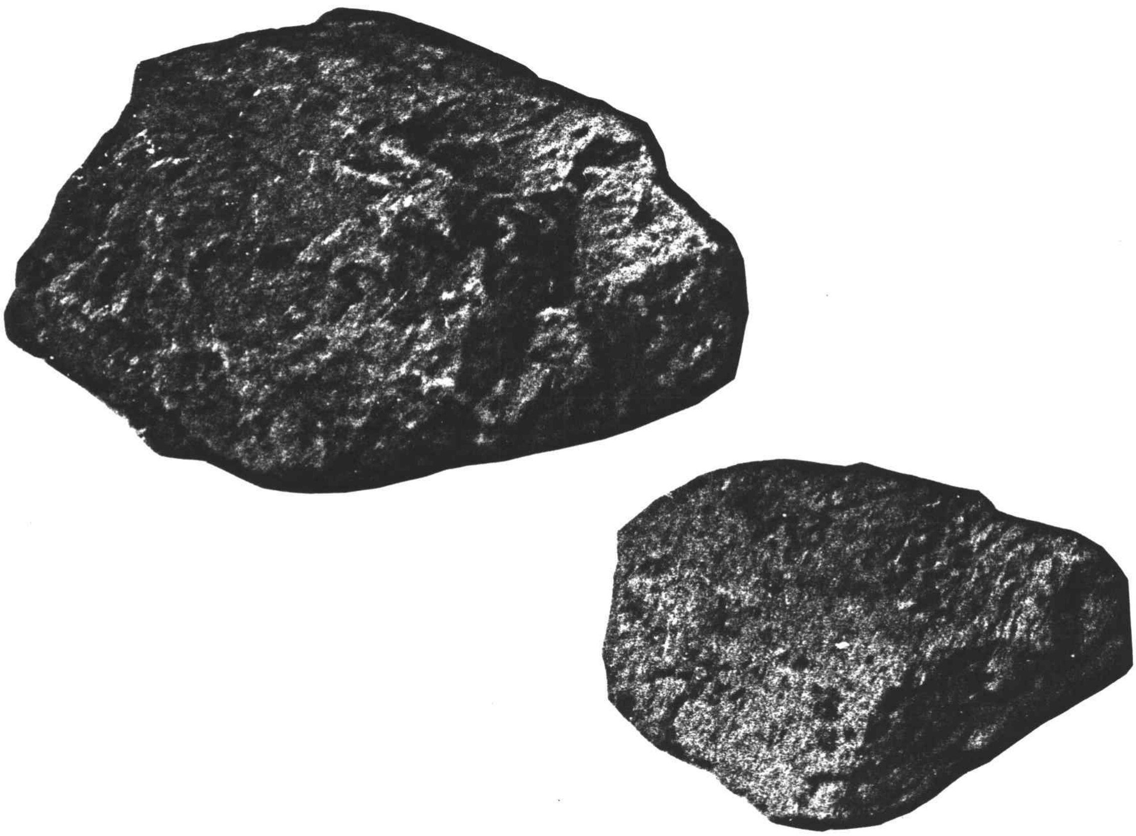


Figure 53. Clay daub (actual size).

only one flat surface and a high sand content. A wide range of colors is represented within each nodule and throughout the sample. Reds, browns, and grays predominate. The reds range from 5 YR 5/4 (reddish brown) to 5 YR 5/2 (reddish yellow). The browns and grays range from 5 YR 3/1 (very dark gray) to 10 YR 5/2 (grayish brown). The daub color originated with the natural clay soil source and became intensified throughout use; for example, a redder color indicates a more intense heat source.

Differing daub "types" are reflected in color range (degree of firing) and archeological clustering. The types include 21 low fire specimens (predominantly gray-brown) and 134 high fire red specimens. Of these 134 specimens (which were spatially clustered), 52 are distinct, being somewhat less dense than the other specimens. In addition, they appear to have sustained a lesser degree of weathering, and some examples exhibit a clay skin on the flat surface. The clay skin is possibly a result of intentional smoothing of the daub during preparation of the fireplace and/or chimney.

Sand and moss, or grass, were added to the clay daub matrix when the material was initially formulated. Most likely sand was included to reduce shrinkage when the substance was heated. Moss or grass was added to temper the clay. The organic particles evidently burned out of the high fire specimens.

The missionaries are known to have used sticks, clay, and sand for chimney construction material during initial building procedures at the first house (D. Lee and Frost 1973:128; J. Lee 1835). A small sample of low fire specimens recovered from the site exhibit the sap surface of a hardwood impressed on one surface, with moss particles mixed within the opposite surface. The moss particles are most likely members of the plant class Musci (mosses) (Walters 1981). These mossy specimens were possibly used to daub the top of a stick and clay chimney (farthest from the heat source). Other low fire specimens, with blackened flat surfaces, may have also been used in the chimney and became subject to creosote accumulation.

A similar clay and moss material was used to chink open wall spaces during mission house construction and repair. A member of the mission community noted the use of "moss and mud" as filler between the horizontal unsquared log walls of the blacksmith's house (Bailey 1854:56). However, the probability of discovering such a perishable material would be unlikely within an archeological context.

Known historical documentary sources left us with one clue as to fireplace construction material. In 1837, when the missionaries expanded their land claim to include the area extending one mile southeast of the subject locality, one community member noted her hearth was fabricated from "clay and ashes," the reason being a lack of suitable stone (no mention of brick) within miles of the mission settlement. The same reference noted the hearth eventually became "measurably, though not perfectly, hardened" (Allen 1850:88).

When building a log house or cabin it was not uncommon to construct a fireplace and chimney of logs, sticks, and clay. The fireplace and chimney usually were built entirely outside a gable end wall (Rempel 1967:19; Woods 1822:276). According to Agate's rendition of the main mission house (Figure 4), the missionaries built two gable end chimneys and one central chimney. However, the gable end chimney (and fireplace) which serviced the first house was contained within that structure. The precise location of the other end chimney is not apparent from the drawing.

A traditional type of wood and clay fireplace was formed by building two log cribs, one inside the other. Damp clay was tamped into the interstices and left to dry. A tapering stick and clay chimney would rise from the fireplace to a point above the roof ridge. Once the fireplace was used, the inner log crib would burn away, leaving the baked clay as a protective back. A hearth could be formed from rammed clay (often covering stones) leveled with the puncheon floor of the house (Beard 1916:196; Newcomb 1950:49). A semblance to this type of fireplace construction was fabricated at the home of Joseph Gervais, a contemporary neighbor to the mission settlement. Gervais' large fireplace was built from sticks tied together with buckskin thongs. This crib system was covered with a thick material composed of clay and grass (Lyman 1900:174).

For many reasons, then, one can conclude that the clay daub recovered from the mission site was used for fireplace and chimney construction. With the support of historical documentation, clay and wood are logical construction materials in lieu of more suitable materials like brick or stone, which evidently were not available. Though the missionaries did employ brick, its time of introduction at the settlement is inconclusive. Possibly brick was used to supplant certain features of the clay-daubed wood fireplaces at a later stage of the mission occupation period. The one flat surface on practically all the clay daub specimens may be a result of intentionally smoothed exposed surfaces or, as indicated by wood impressions on some specimens, the flat surfaces may have been rammed against the wood crib systems of the fireplaces and chimneys. The hardened state and appearance of the clay daub supports the fact that it was fired, thus eliminating a possibility that some of the clay daub may have been used as clay mortar or chinking. Finally, many of the clay daub specimens were found spatially clustered with brick, thus supporting the inference that brick may have been used to alter and repair the fireplaces. The chimneys used in the mission structures were apparently not replaced with brick. Both renditions of the main mission house (Figures 4 and 5) depict the chimneys faced with vertical boards. Such a precautionary procedure would be necessary to protect the clay chimneys from the weather.

There remain various problems concerning the clay daub recovered from the site. For one, the actual clay daub sample is skewed due to distinguishability factors. For example, some of the low fire specimens resemble the soil matrix at the site and thus were difficult to recognize during excavation. Also, clay daub is perishable and will easily crumble. In addition, clay daub and clay nodules (and even some brick specimens) bear a great similarity in overall physical appearance. Finally, the original source of the clay used for daub is inconclusive. In all probability, the clay used for the daub was indigenous to the soil from the site area. To test this hypothesis, a comparative trace element analysis between the clay daub and a soil sample from the site should be accomplished. Trace element analysis for the daub and brick (Figure 52) suggests spatially separate sources.

WOOD

Material evidence of the main mission house in terms of plan, wood framing system, and wood finishing features was not physically perceptible during excavation procedures since, in general, preservation conditions for organic remains in the Willamette Valley are poor. Three isolated wood specimens were, however, recovered from Block A. Included is evidence of two roofing shakes and one square nail fragments with small particles of hardwood adhering to the surface. Historically documented information on architectural data for the mission settlement can be applied to the identification of these three artifacts.

The roofing shakes are represented only by extremely deteriorated wood particles which, in their original state, left imprints in the soil matrix.

Analysis of the ray parenchyma cell particles with end walls revealed characteristics of western red cedar (Thuja plicata). The width and flat surface of the specimens suggests the cedar was either split or cut (Walters 1981). Split shakes four feet long were used to roof the mission barn (D. Lee and Frost 1973:129). Split cedar shakes, then, would be a likely roofing material for the three structures comprising the main mission house (see Agate's 1841 rendition, Figure 4). One of the archeologically recovered specimens was discovered in the locality of the school room/dining room structure, and the other in the vicinity of the kitchen building.

The wood adhering to the machine cut square nail fragment has been identified as a hardwood, possibly oak (Krahmer 1982). Oak logs were used to frame the first structure built within the mission complex (J. Lee 1835). The square nail fragment was found in the locality of the school room/dining room in the northwest section of the grid. The wood species used to fabricate this structure is not specified in the available historical documents.

CONSTRUCTION HARDWARE

DOOR LATCH MECHANISMS

Early door latch mechanisms were composed of two main groups: the front latch group on one side of the door, and the back latch group on the reverse side. The system was fabricated from either wood, wrought iron, or cast iron. The front latch included the handle, escutcheon, and thumb press. The back latch consisted of the bar, the staple, the catch, and the lift end of the thumb press device (Sonn 1928:23). Often a string was used to operate the bar mechanism. Variations of this system were plausible owing to the availability of materials and the ingenuity of the local blacksmith.

Two artifacts found in Block A credibly fall under the category of door latch mechanisms. One specimen (Figure 54a) appears to be a hand wrought bar, measuring 4 12/16 inches (12 centimeters) in length with an arm diameter of 7/16 inch (1.1 centimeters). The bar may have been associated with what appears to be an iron catch (Figure 54b). Though the catch was originally manufactured from either wrought or cast iron in a typical catch formation, the specimen was found in a fragmented condition. Both door latch mechanisms were

Figure 54. Construction hardware (actual size).

a. Probable door latch bar
b. Probable door latch catch fragment
c. Butt hinge fragment
d. Probable hook

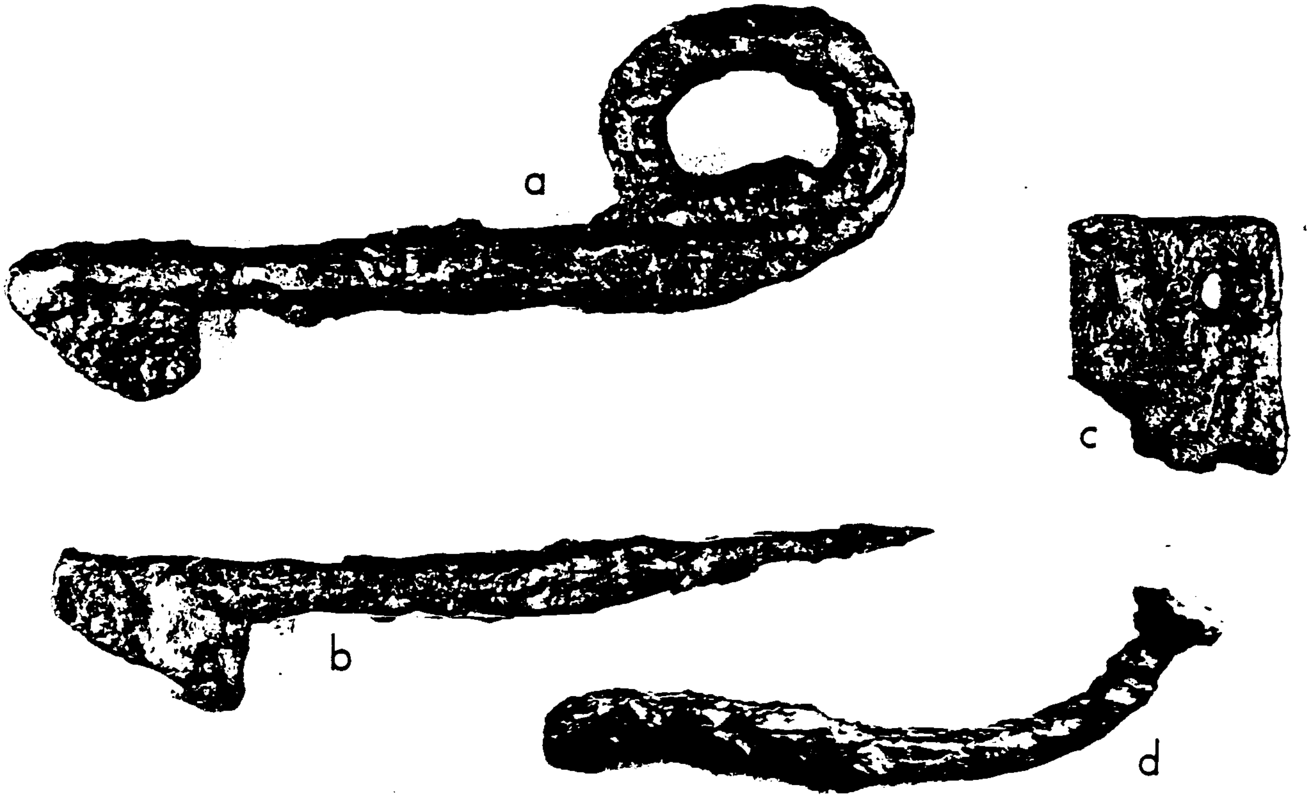


Figure 54.

recovered near the locality of the two front doors to the kitchen building.

Butt Hinge

One wrought or cast iron butt hinge fragment was recovered from Block A within the confines of the main mission house (Figure 54c). The corroded condition of the hinge renders an unclear manufacturing distinction. Cast iron hinges had generally superseded wrought iron hinges by the onset of the mission occupation period (Mercer 1924:178).

Only a fragmented half portion of the hinge was recovered. This portion measures 1 2/16 inch (2.8 centimeters) in width. The original hinge was apparently a three-part, single-thickness book hinge punched with three holes for attachment purposes.

Butt hinges were commonly used by joiners for doors and furniture (Ross 1976:833). The function of the mission hinge can only be surmised. As mentioned earlier, the missionaries hung their doors on wooden hinges in the first structure built at the settlement in 1834 (D. Lee and Frost 1973:128). The missionaries, however, employed a blacksmith in 1837 who undoubtedly produced some necessary hardware items for construction projects.

Hook

A specimen which appears to be a hand wrought iron hook for hanging articles was recovered in Block A (Figure 54d). The hook was fabricated from round stock and measures 3 14/16 inches (9.9 centimeters) in length. A round head measuring 1/2 inch (1.2 centimeters) in diameter was applied to the distal end.

COMMERCE AND INDUSTRY

AGRICULTURE AND HUSBANDRY

HARNESS BUCKLES, WAGON BOLT, WHIFFLETREE HOOK

Three iron buckle fragments excavated in Block A are thought to have been used for clinching harness (Figure 55a). One buckle is of the plain, center post, single tongue variety. The archeological context of the buckles indicates they date to the mission occupation.

An iron wagon bolt also was recovered in Block A. The bolt was possibly hand wrought (Figure 55b). Bolts and rivets such as this specimen were required to permanently join wooden and metal members of wagons.

An iron whiffletree hook fitting discovered in Block A appears to be hand wrought (Figure 55c). The harness buckles, wagon bolt, and whiffletree hook--all agricultural items--were found either in close proximity to or within the confines of the main mission house.

HORSESHOE NAILS

Six hand wrought horseshoe nail fragments were recovered from Block A (Figure 55d). None of the specimens is complete although each retains an intact head. The fact that the nails are fragmented indicates they may have been used in shoeing a horse. During removal of a shoe the nails will often break and are then discarded (Bewley 1982).

Based on head shape, the recovered horseshoe nails are little changed from types developed by the Celts in Britain (Bewley 1982). Hand wrought horseshoe nails were made in the United States until 1859, when the first machine made nails were successfully produced. It was not until about 1880, however, that the machine manufactured nail achieved popularity (Smith 1975:207).

All of the nails were found in the northern section of the excavation grid. Archeological context and the fact that the nails are a hand wrought type point to their being related to the mission occupation. Most likely they were fabricated by the local blacksmith.

Figure 55. Artifacts associated with agricultural and husbandry (actual size).

a. Probable harness buckles
b. Wagon bolt
c. Whiffletree hook
d. Horseshoe nails

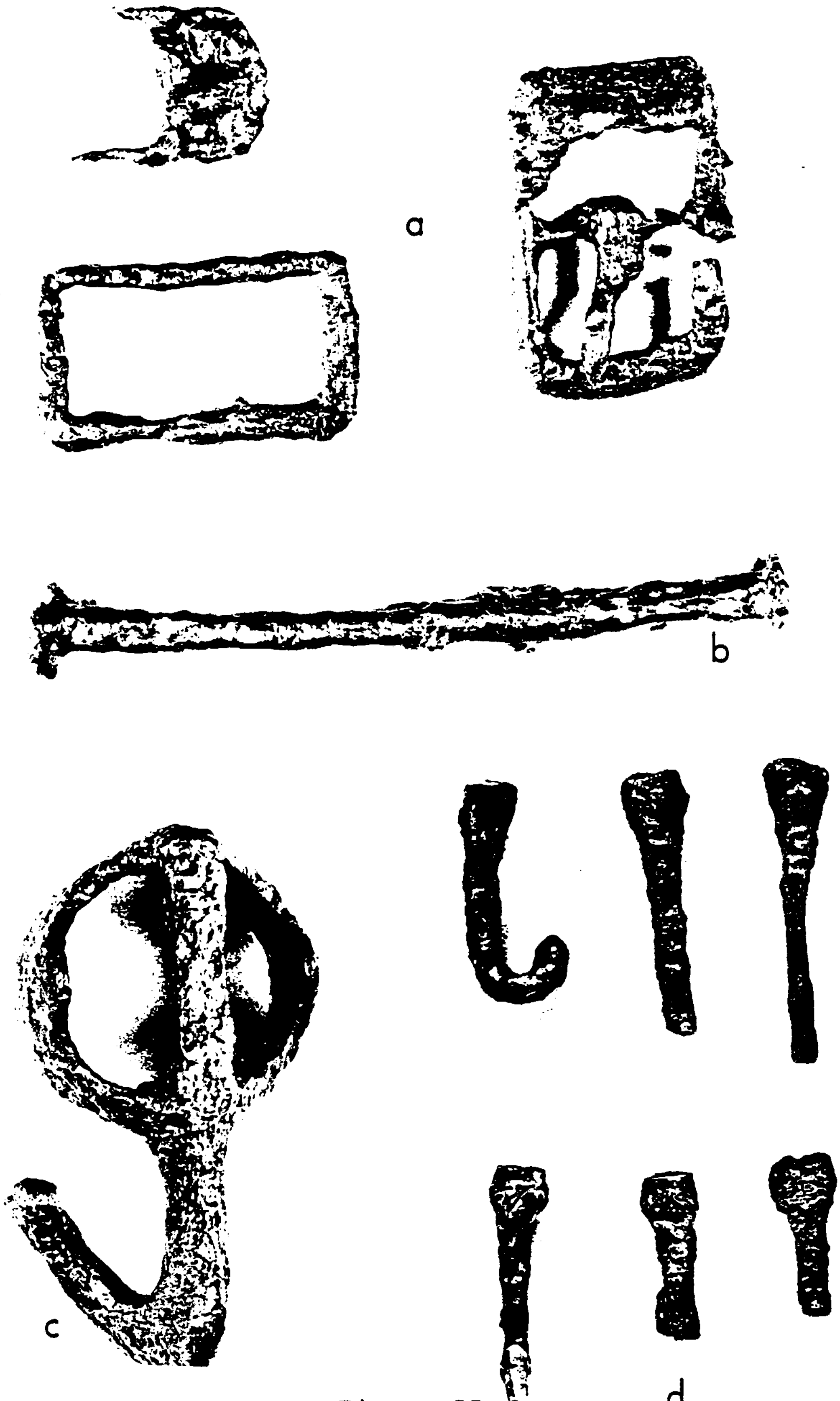


Figure 55.

HUNTING

PERCUSSION CAP

One copper percussion cap fragment may be indicative of the use of percussion system guns during the mission occupation period. Copper percussion caps were first produced in 1816 as an improved method for igniting gunpowder with a blow, as opposed to the flintlock spark system. The percussion cap was used on cap-lock guns as a container to hold the priming powder.

Percussion caps, manufactured from thin-gauge corrugated copper, are slightly conical with a flaring rim around the open end. Four slits extend halfway from the rim toward the dome of the cap. Since the mission percussion cap is fragmented, only two sections are present and the diameter dimension cannot be measured.

The percussion cap system came into general use in the western United States by the middle 1830s. Often, old flintlock weapons were converted to cap-lock guns (Russell 1957:242-243).

Table 15. Lead Shot Size Distribution.

Weight in Ounce	Weight in Grams	Diameter in Inches / Diameter in Millimeters							
		--	2/16	3/16	4/16	5/16	6/16	7/16	8/16
		--	3.5	5.0	6.5	8.0	9.5	11.0	12.5
.515	14.6	1							
.431	12.2								1
.406	11.5	1							
.321	9.1							1	
.311	8.8	1							
.194	5.5					1			
.106	3.0								
.081	2.3	1			1	1			
.074	2.1					1			
.071	2.0					1			
.067	1.9					1			
.025	0.7			2	1				
.021	0.6			7					
.018	0.5	1	1	2					
.014	0.4			3					
.011	0.3		1						
.007	0.2		1						
Totals		5	3	14	2	5	0	1	1

LEAD BALLS AND SHOT

Thirty-five lead balls and shot (Figure 56) recovered from the site indicate that people associated with the mission were using smoothbore flintlock weapons, the most readily available type of hunting firearm during the first half of the nineteenth century. The varying sizes of the recovered ammunition reflect the diversity

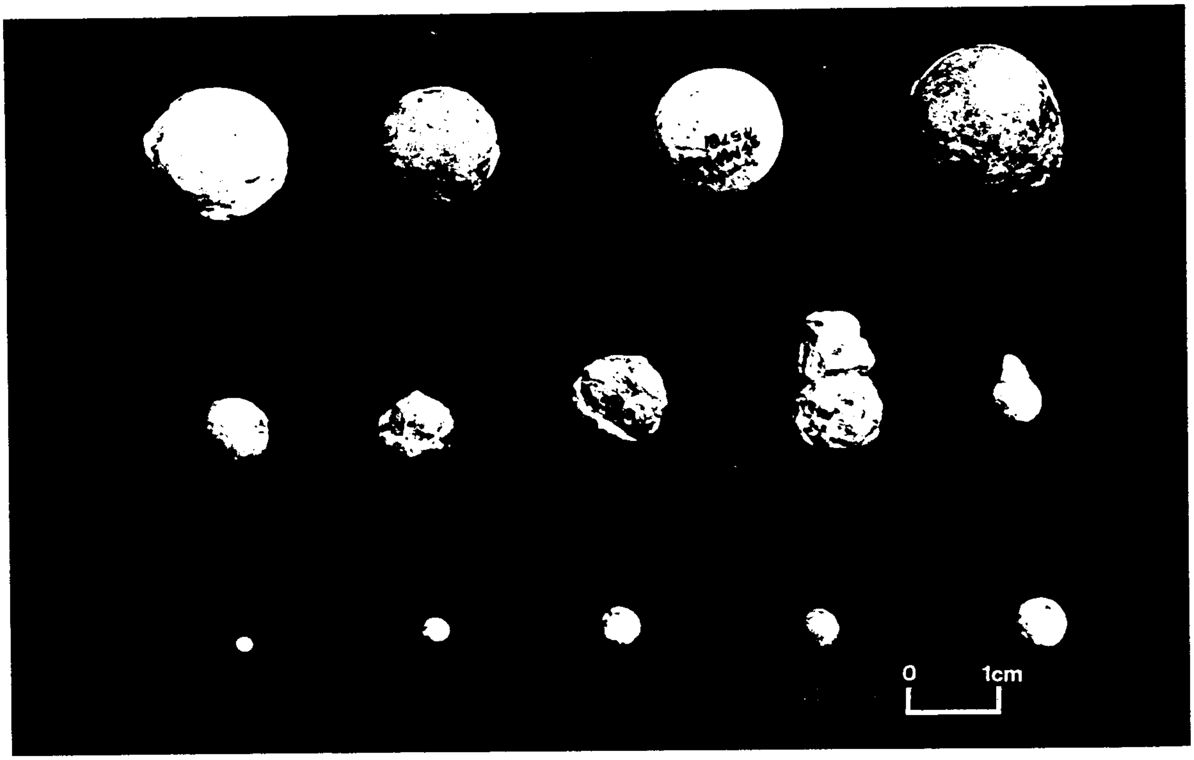


Figure 56. Lead ball and shot.

of specimens historically produced for use with flintlock weapons. Historically, sizes were determined by each manufacturer, with relative sizes denoted by small to large animals, by numeral, by various letter combinations, by weight, and by gauge sizes (Ross 1976:1258). An archeological classification scheme correlating the mission sample with any of these historically functional sizes would be extremely difficult for several reasons: many of the recovered specimens are distorted or worn from use; historical information referring to the importation, acquisition, and/or hand made production of ammunition at the mission settlement is unknown; in general, most historical sizing systems have not been accurately identified. Thus, the sizing system employed for the mission specimens is based on actual size (Table 15). The most frequent shot sizes, 3/16 inch (5 mm) and 5/16 inch (8 mm), correspond favorably with the most common sizes recovered from the Hudson's Bay Company component at Fort Vancouver (Chance and Chance 1976:189; Ross 1976:1258). As hypothesized for the fort assemblage, these sizes tentatively correlate with historically identified beaver and buck shot gauge sizes, respectively.

Approximately one-third of the lead ball and shot population (three sizes represented) were recovered in or near the kitchen fire hearth. The small sizes of some of these specimens indicate that they may not date to the mission occupation period; they were, however, recovered at approximately 40 centimeters depth, associated with numerous mission period artifacts in the fire hearth.

One lead ball found in the fire hearth locality retains a mold formation (i.e., tail not removed) which indicates that it was probably cast in a hand mold on the premises. The kitchen fireplace may have been utilized as a heat source to melt down pig lead. Ammunition production, then, may explain the high frequency of lead shot found in and near the fire hearth.

Five balls recovered at the site are badly distorted from use. Four of these specimens were found in a portion of the excavation grid archeologically defined as the front yard of the house. The balls may have been purposely discarded in this locality after a hunt. The possibility remains, too, that many of the ammunition specimens recovered were inadvertently dropped during the mission occupation period.

GUNFLINTS

The gunflint sample is represented by two blond (Figure 57a-c) and seven gray (Figure 57c-d) specimens recovered from Block A (Table 16). Some of the specimens are flaked from use in the ignition system of a flintlock gun. The majority of the specimens were recovered from the area postulated to be the front yard of the main mission house. Possibly, when this occurrence is correlated with the lead ball and shot distribution, a gun priming and subsequent post-hunt discard area can by inferred.

All of the recovered gunflints appear to have been produced from blades. The blade technique of gunflint

Table 16. Gunflints.

Color	Length in	cm	Width in	cm	Thickness in	cm	Weight oz	gm
10 YR 5/1 gray dull, coarse grained	15/16	2.4	14/16	2.3	4/16	0.7	.205	5.8
10 YR 4/1 dark gray waxy lustre	13/16	2.1	12/16	2.0	5/16	0.9	.169	4.8
10 YR 3/1 very dark gray spalls and flecks white interior (burned)	14/16	2.2	11/16	1.8	4/16	0.6	.113	3.2
10 YR 2/1 black brownish waxy lustre	13/16	2.1	12/16	2.0	4/16	0.6	.102	2.9
10 YR 2/1 black brownish waxy lustre	11/16	1.8	5/16	0.8	5/16	0.8	.141	4.0
10 YR 2/1 black brownish waxy lustre	15/16	2.4	11/16	1.8	3/16	0.5	.099	2.8
10 YR 2/1 black brownish waxy lustre					4/16	0.7	.113	3.2
10 YR 5/4 yellowish brown blond, translucent, waxy lustre	15/16	2.4	11/16	1.9	5/16	0.9	.208	5.9
10 YR 5/4 yellowish brown blond, translucent, waxy lustre	11/16	1.8	11/16	1.8	4/16	0.6	.123	3.5

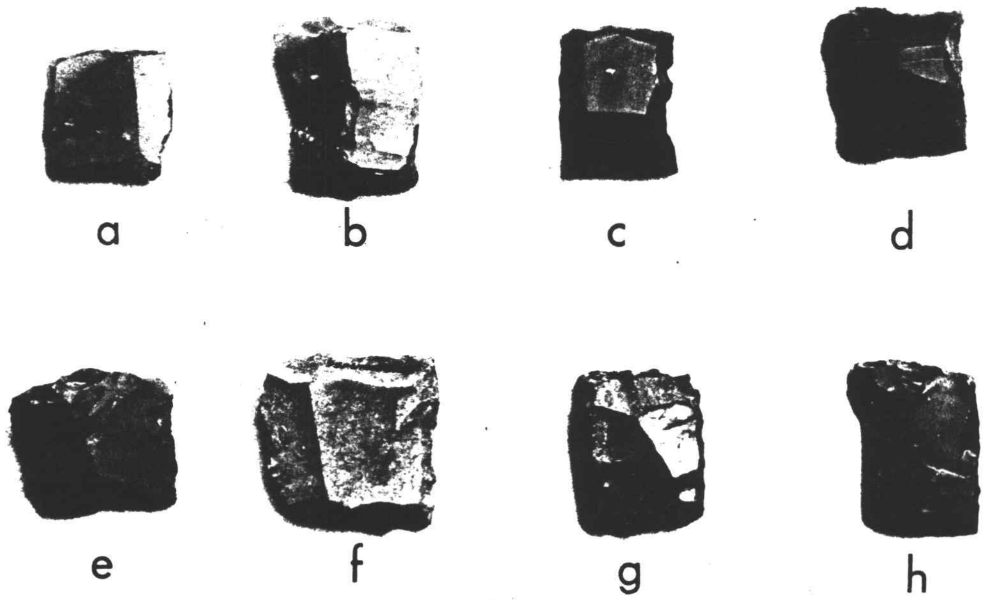


Figure 57. Gunflints (actual size).

a-b. Blond specimens
c-d. Gray specimens

manufacture involved flaking a nodule of flint into prismatic blades that were sectioned into individual gunflints by hammer blows. Once the striking edge was determined and beveled to a thin, acute edge, the two sides were cut and secondarily retouched (Witthoft 1966:27).

The blade technique was developed circa 1750, once the gunspall technique (individually removed nodules trimmed to size) became obsolete (Hamilton 1960:77; Witthoft 1966:28). The vast majority of blade gunflints were produced in France circa 1800, when this technique was introduced to the English (Hamilton 1960:74; Mitchell 1837). In all probability, the gray gunflints from the mission site were manufactured in England and the translucent yellow gunflints with a waxy lustre were manufactured in France. Although the majority of the mission gunflints are English, Americans in general preferred the French gunflint as late as 1840. Apparently the French material was considered superior to English flint (Witthoft 1966:32). French gunflints may have been introduced to the Northwest by American explorers and settlers (White 1975:52). The Hudson's Bay Company at Fort Vancouver imported only English gunflints (Ross 1976:1267). Thus, gunflints recovered at the mission site possibly reflect that the mission occupants exploited diversified acquisition sources. The known historical documentation has failed to supply information required to satisfy this speculation.

LITHIC ARTIFACTS

A lithic assemblage recovered within the mission period archeological context consists of 11 projectile points and projectile point fragments, 1 scraper fragment, 58 flakes, and 6 obsidian nodules (Table 17). The diagnostic projectile points are typical of late prehistoric specimens recovered from mid-Willamette Valley archeological sites (Davis et al. 1973) (Figure 58). The absence of prehistoric cultural material or features within excavations exceeding 40 centimeters in depth at the site suggests there is no prehistoric component (in the immediate vicinity) pre-dating the mission occupational context.

The lithic artifact assemblage displays a lack of cultural homogeneity. The relatively small assemblage may be a collection of specimens acquired, produced, and/or utilized by Indian students at the mission school, the only known historic occupation by an aboriginal population in the site vicinity. Practically all of the projectile points are impact shattered, indicating some may have entered the site in the carcasses of game animals intended for food processing.

A correlation of material between the projectile points, flaking debris, and cores suggests that some of

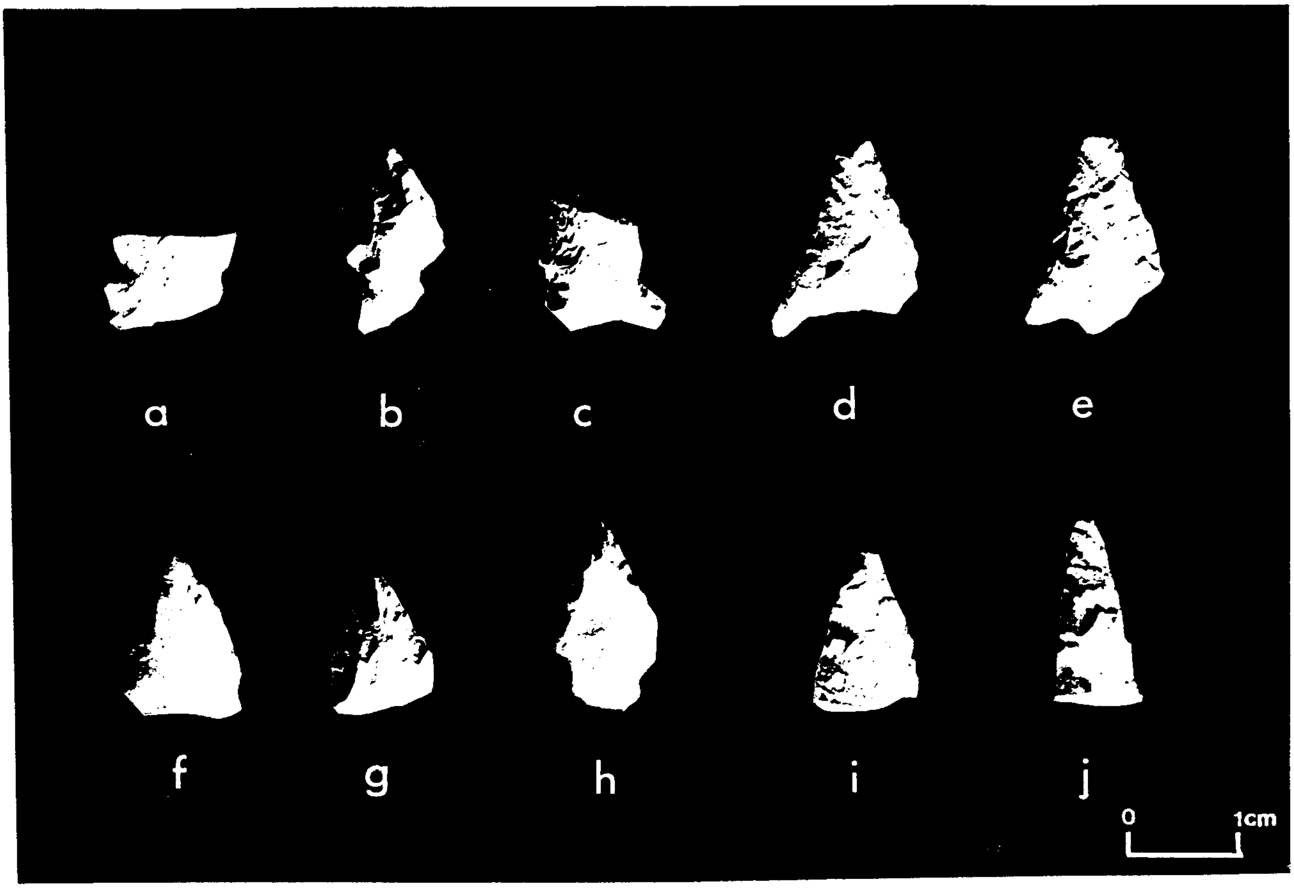


Figure 58. Projectile points.

a-c. Side-notched
d-e. Base-notched
f-g. Pentagonal
h. Stemmed
i-j. Tip fragments

the points may have been manufactured at the site. Seven of a total of eleven projectile points are obsidian, however, whereas most of the lithic detritus is cryptocrystalline silica. The projectile points and projectile point fragments in Block A tended to be

Table 17. Lithic Artifacts.

<u>Projectile Points</u>

Small side-notched projectile point; base straight to concave; short triangular blade produced on a thin flake; edges straight to slightly convex; flaking random (Figure 58a-c).

Length:	17 mm	Thickness:	3 mm
Blade Width:	9-11 mm	Neck Width:	5-8 mm

Material: Cryptocrystalline silica 1
Obsidian 2

Small base-notched projectile point; triangular blade; straight to slightly concave edges; constricting stem (one specimen); flaking random (Figure 58d-e).

Length:	17-19 mm	Thickness:	3 mm
Blade Width:	9-10 mm	Neck Width:	5-6 mm

Material: Cryptocrystalline silica 1
Obsidian 1

Small pentagonal projectile point produced on thin flake; flaking random (Figure 58d-e).

Length:	12-15 mm	Thickness:	2-3 mm
Blade Width:	9-10 mm	Neck Width:	9-10 mm

Material: Obsidian 1

Small stemmed projectile point; slightly convex base; triangular blade with straight to slightly convex sides; tip acute; original flake peripherally modified to produce shape (Figure 58h).

Length:	16 mm	Thickness:	2 mm
Blade Width:	9 mm	Neck Width:	6 mm

Material: Cryptocrystalline silica 1

Projectile point lateral fragment.
Material: Obsidian 1

Projectile point tip fragments (Figure 58i-j).
Material: Cryptocrystalline silica 1
Obsidian 1

Table 17, continued

Scraper

Steep end scraper fragment, produced on a thick flake; obtuse, convex working edge manufactured on end of flake; working edge crushed and slightly polished through use; one fragment of working edge recovered.
Material: Cryptocrystalline silica 1

Cores

Small water-worn obsidian nodules; split and fractured; may have served as cores.
N Sample: 3

Flakes

Cryptocrystalline flakes
N Sample: 50

Petrified wood flake
N Sample: 1

Obsidian flakes
N Sample: 3

Basalt flakes
N Sample: 4

clustered with four specimens in the archeologically defined area of the front yard to the main mission house, and with three specimens in the vicinity of the gravel feature. The specimens were most likely inadvertently dropped in these areas.

CONSTRUCTION AND MANUFACTURING

ADZE BLADE

One small iron adze blade was found in Block A (Figure 59a). The eye is missing and only the blade remains. The blade has rounded shoulders and slightly convex edges. The blade measures 2 7/16 inches (62 mm) long by 2 13/16 inches (71 mm) wide with the widest point at the cutting edge. In transverse section the blade is 13/16 inch (20 mm) thick at the eye and 2/16 inch (4 mm) thick at the cutting edge. The blade and cutting edge were mounted transverse to the handle. A variety of adzes was undoubtedly employed at the mission for woodworking projects ranging from building construction to tool manufacture.

Figure 59. Artifacts associated with construction and manufacturing (actual size).

a. Adze blade
b. Copper rivets
c. Nuts
d. Washer
e. Bolt
f. Screws
g. Punch

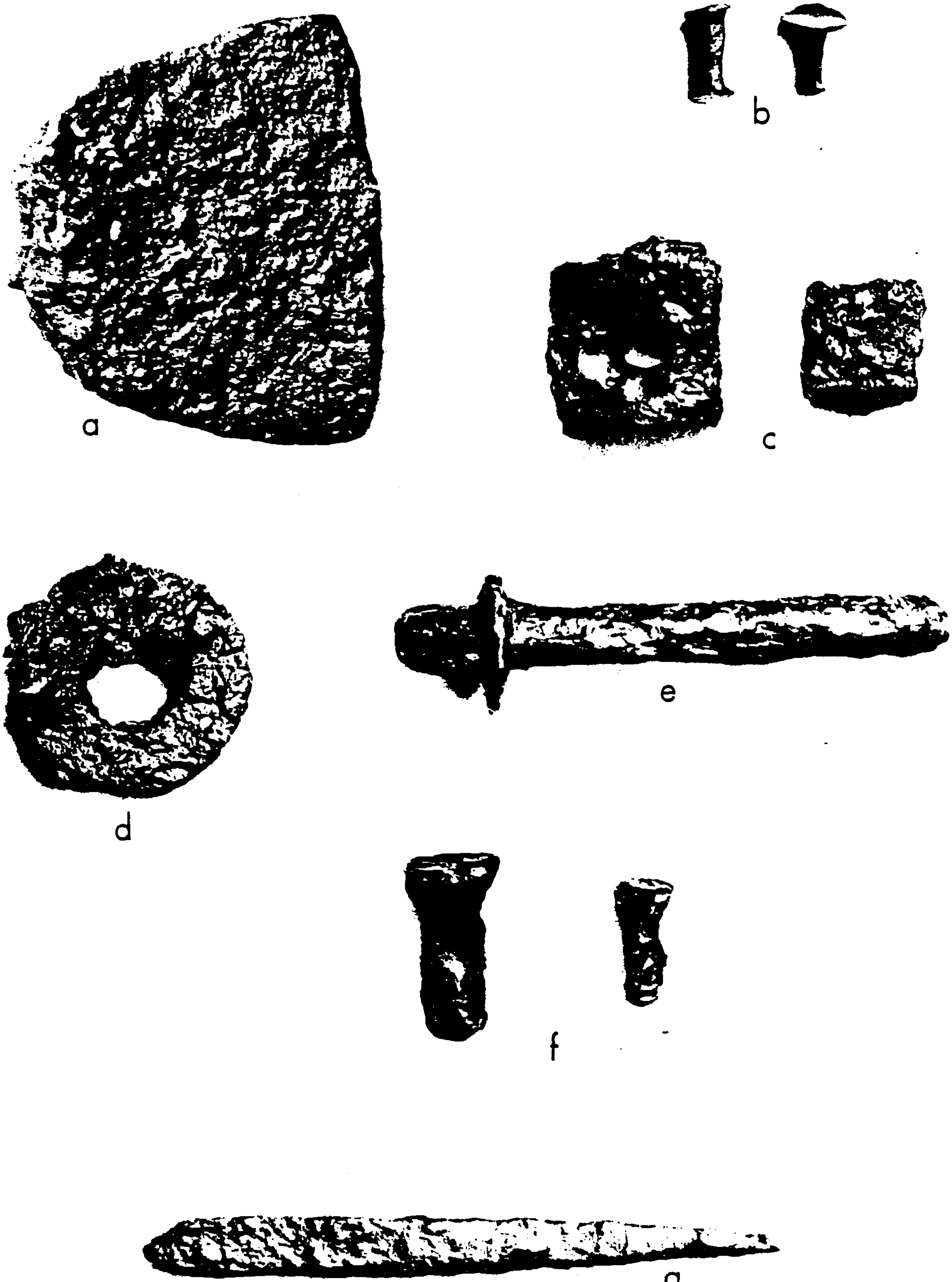


Figure 59.

RIVETS

One iron rivet and two copper rivets were found in Block A in the northwest section of the excavation grid (Figure 59b). None of the rivets are complete.

Rivets are permanent fixing devices. Copper rivets were frequently used on harness leather for decoration or binding. Iron rivets were used when joining metal to metal, or metal to wood.

NUTS, WASHER, BOLT

Two nuts, one washer, and one threaded bolt fragment with attached washer were recovered from Block A (Figure 59c-e). All were manufactured from iron. Based on their archeological context, these items appear to date to the mission occupation. One nut and the bolt were discovered on the gravel feature near the school room/dining room building. The other nut and the washer were found in the fireplace feature of the first mission building.

SCREWS

Two countersunk flathead wood screws were found in Block A (Figure 59f) within the confines of the main mission house. Both specimens, manufactured from round iron stock, are broken at the shank. Archeological context indicates that the screws were used at the mission.

PUNCH

An iron shank recovered from Block A is classified as a punch (Figure 59g). The punch, which appears to be hand wrought, is missing both head and tip. Punches were commonly used to puncture holes in leather and wood.

COAL

"Sea coal" was being imported to Fort Vancouver as early as 1825 specifically for the blacksmithing forges (Ross 1976:1086). "Sea coal" or "Newcastle coal" was a bituminous coal favored by blacksmiths in England (Parks and Parks 1844:98). In 1837 two "tons" of coal were shipped to the Willamette Mission aboard the brig Diana (Oregon Mission Correspondence). Although not recorded, the coal probably was destined for the blacksmith's forge and probably was bituminous coal. Two small coal fragments were found in test pit B during preliminary testing (Sanders and Weber 1980:30). No coal was found during the Phase III sampling program.

CLINKERS

A total of 311 clinkers, with a combined weight of 2.5 pounds (1.134 kg), were recovered from the mission site. Clinkers are regularly produced in the high intensity fires associated with a blacksmith's forge (Bealer 1976:134). A clinker is a hard, black, irregular coal residue composed of sulfur and other impurities that sinks to the bottom of the hearth. Clinkers are removed daily from forges in regular use, and are frequently placed on the floor of the blacksmith shop around the forge as a safeguard against fire (Smith 1975:60).

Twenty-six percent (80 specimens) of the clinkers were recovered from Block A. Clinkers are small and randomly scattered across the entire excavated area, with the exeption of the gravel feature.

Approximately 74 percent (231 specimens) of the clinkers were found in the Block C area. The high frequency of clinkers in this area suggests that the point of clinker origin, i.e. the forge, may have been nearby.

Clinkers in Block A, near the primary mission building, probably originated in the blacksmith shop and were purposely or inadvertently brought to this area. The small size of clinkers in Block A suggests inadvertent disposal, i.e. in mud adhering to shoes. Some of the Block A clinkers may have originated in the fireplaces of the main mission building if coal was occasionally used as fuel.

GROUP SERVICES

EDUCATION

SLATES

A total of 28 fragments of slate writing tablets and 17 slate pencil fragments (5 YR 3/1) (Figure 60) indicate that slate writing implements were used by Indian students during instruction at the mission school. Sixty-one percent of the slate tablet fragments were found in Block A, near the gravel feature in the postulated school room/dining room locality. The slate pencil fragments were discovered randomly scattered

Figure 60. Slate pencil and tablet fragments (actual size).

through the excavation grid. One table fragment and one pencil fragment were recovered from Block C.

During the manufacture of slate tablets, natural slate sheets are split into thin, light tablets, polished, beveled at the edges, and framed (Lindsay 1974). The largest tablet fragment recovered from the mission site appears to have a beveled edge, while all tablet fragments have use/wear marks. The tablets average 0.097 inches (0.25 cm) in thickness. The slate pencil fragments range from 0.16 to 0.24 in (0.4 to 0.6 cm) in thickness. Each fragment has six or seven irregular longitudinally faceted sides. Though the length of each fragment ranges from approximately one-half to one inch (1.2 to 2.6 cm), only three have a stylus end, resulting from use. None of the remaining recovered fragments appear to fit together, and therefore are thought to represent a maximum of 17 pencils.

Natural slate deposits, quarried throughout the British Isles, were processed and exported to America beginning in the late eighteenth century (Lindsay 1974:98). Slate was also quarried and manufactured in America as early as 1805. Thomas Symington of Baltimore, Maryland, patented machinery in 1828 for the purpose of making roofing slates and slate pencils (Bishop 1966:109, 349).

Slate tablets and pencils are noted in historical documentation pertaining to the mission school. Requested from the United States in 1836 were ". . . three dozen slates, two hundred pencils, twelve copy books of penmanship, quills, black lead pencils, etc. . . ." (Shepard: May 6, 1836). Slates were also donated: "One of Mr. Shepard's kind friends, at Lynn, had sent him, among many other things, some slates, with the names upon them of each of her sons who gave them" (Mudge 1848:181).

BURNED CLAY

CLAY NODULES

Burned clay nodules weighing a total of 28.4 pounds (12.87 kg) were recovered from the mission site. Clay nodules are defined as small, rounded lumps of hardened clay which are possibly the result of purposeful as well as natural firing of the indigenous clay.

Ninety-nine percent of the sample was found in Block A because the magnitude of excavated area in this block exceeded that in Blocks B and C. The nodules were found consistently dispersed (with concentration pockets) throughout the soil matrix intrinsic to the excavation grid.

A direct correlation exists between clusters of clay nodule features in Block A. Numerous nodules were concentrated with brick and clay daub specimens at two archeologically defined fireplace features. Like brick and clay daub, relatively few specimens of clay nodules were recovered from the gravel feature. A large amount of nodules was found at the southern portion of the excavation grid. This may be a result of intentional burning of debris after the mission occupation period, especially in view of the fact that the nodules were associated with a relatively high percentage of charcoal.

BURNED WOOD

CHARCOAL

Charcoal recovered from Block A totals 5.3 pounds (2.42 kg) in weight. The sample is represented by small charcoal specimens (wood not identified) found randomly scattered throughout the excavation grid. Relatively few specimens were discovered in association with the gravel feature. Two charcoal concentrations and one ash feature are represented.

The ash pocket, intermingled with numerous artifact varieties (some burned), was situated directly north of the gravel feature in the northwest section of the excavation grid. The ash could be residue from some specific activity at the mission, such as soap making. Alternatively, fireplace ash with associated burned objects may have been intentionally deposited in this locality during or shortly after mission abandonment. A lack of heavy concentrations of associated charcoal rules out a burn area.

A relatively high percentage of charcoal and clay nodules predominated within the southern end of the excavation grid at a point farthest from the main mission house. This feature is possibly the result of intentional burning of debris following the mission period. A charcoal concentration found northwest of this locality is also attributed to post-mission abandonment burning activity. Practically all of the sample was found in the top 20 centimeters of excavation.

SHELL

A clustering of mollusc shell fragments in Block A has been identified as river mussel (Andonta sp.), a genus native to the Columbia River drainage. The location and nature of the shell deposit suggests mission abandonment activities or post-mission activity at the site. Mussel was most likely utilized as a food resource and the shells then discarded. The highest concentration in the shell cluster is situated directly northeast of the first structure of the main mission house.

FAUNAL REMAINS

Approximately 1300 complete and fragmented bones were unearthed. Only 14 percent of the sample, 179 bones, are identifiable to genus level. The remainder of the faunal material proved to be too fragmented for this level of identification. Of the total, 40 percent are mammal bones while 60 percent could not be identified at all.

The majority of the recovered bone appear to be the result of cultural activities. Fifty-three percent of the sample is charred and four percent exhibits evidence of butchering. Since in-depth faunal analysis is not yet completed, evidence of butchering has been discerned only on larger fragments. This accounts for the low percentage of butchered bone relative to the total sample.

Faunal identification was completed by Dave Schmitt, graduate student at Oregon State University. Domestic mammals represented include sheep (Ovis), pig (Sus), and cow (Bos). The only fowl bones identified are chicken (Gallus) bones. Historical records document the use of cattle, swine, and poultry by the missionaries; however, the use of sheep was never recorded. At the time of mission occupation, sheep were being raised in the Northwest. In 1837, Slacum reported that Fort Vancouver had a herd of 200 sheep (Young 1912:186). In 1840, James Douglas of the Hudson's Bay Company went to California to drive 4000 sheep to Oregon. It has been suggested that some of these sheep were distributed to the American missionaries (Bowen 1978:86).

Based on the distribution of sheep bones, the majority of which are close to the dwelling, a pattern of disposal not characteristic of day to day site occupation is suggested. This mode of disposal may reflect the period of occupation immediately preceding abandonment. It is also possible that the sheep bones are not the result of mission activities. Rather, Lindsay Applegate and family, who inhabited some of the mission structures during the 1843-1844 winter, may have been responsible for discarding these bones. Joseph Gervais, a nearby neighbor of the mission (see Figure 6), was known to have run sheep at "Mission Bottom" in 1844 (Bowen 1978:85).

Among the nondomestic mammals represented are deer (*Odocoileus*) and elk (*Cervus*). White-tailed deer, black-tailed deer, and elk were numerous in the Willamette Valley (Willamette Basin Comprehensive Study 1969:3) and would have been procurable by hunting or, as has been documented, obtained from the Indians (D. Lee and Frost 1973:128-129).

DISCUSSION AND CONCLUSIONS

BLOCK A

Archeological excavation focused on the main mission house, the nucleus of the mission community and headquarters of the Methodist's missionary campaign in the Northwest between 1834 and 1841. The location of the main mission house has been archeologically confirmed to be within the Block A grid. (For a view of the architectural arrangement, see Figure 15). Structural elements, such as wooden members, were not archeologically perceptible. Evidence of a foundation was not unearthed. The specific location of the main mission house in relation to the archeological grid was determined by (1) the relative spatial arrangement of the archeological features, including the cellar depression, (2) variation in the depth of cultural materials, (3) associative groupings of artifacts, and (4) historical documentation, including the historical renditions of the mission house. Excavation within the postulated interior areas of the main mission house was by no means exhaustive. Excavation primarily encompassed exterior spaces such as the "front yard" and the gravel floor area located within the "L" of the contiguous buildings.

The following data, which summarize the construction sequence and physical attributes of the main mission house, are derived from historical and archeological information. The historical renditions were used to interpret various architectural features on the mission structures. However, it must be pointed out that the architectural authenticity of these drawings is questionable. The engraving (Figure 4) appears to be more accurate in terms of artistic merit and architectural truth. Apparently, though, the original drawing from which this engraving was later produced was not executed on location. Eld's drawing (Figure 5) was most likely drawn on location, though Eld was not an artist per se.

The missionaries completed their first structure in the late fall of 1834. This building is the farthest to the left in Agate's rendition of the main mission house (Figure 4). Located adjacent to the river and elevated on a slight rise, the building faced southeast. The dimensions of the one and one-half story log cabin were 18 by 32 feet (J. Lee 1835). Oak logs, hewn on the inside and saddle-notched at the ends, were employed in wall construction. Although possibly related to availability, the missionaries' use of oak may reflect their New England background; oak was the traditional material used for log cabin construction in that region (Dole 1981). Fir was utilized in the manufacture of the puncheon floor and doors. Glass window lights were inserted into hand carved window sashes. A partition, possibly fabricated from single vertical boards, formed two rooms in the house. Archeological evidence suggests that the split roofing shakes were made from western red cedar (*Thuja plicata*), a species historically available in isolated pockets in the Willamette Valley (Franklin and Dyrness 1973:116). A fireplace and chimney made of sticks, clay, and sand were located on the north gable end of the building. Until a second building was completed in 1836, this structure served as the center of all domestic and religious activities.

Today, that portion of the site which encompassed the first mission building is indicated by a large ground depression located immediately to the west of the excavation grid. The dimensions of the depression are approximately 27 by 18 feet. During the early stages of fieldwork, this depression was viewed as a relic of Gatke's excavations in the 1920s. Gatke (1940) noted that he dug in what might have been a filled-in root cellar. [In 1836 William Slacum mentioned the existence of a cellar associated with the main mission house

(F. Young 1912:194)]. A reevaluation of this feature suggests that disturbance from Gatke's excavation may not be as extensive as previously believed. Gatke's excavations may have primarily encompassed fill material, possibly leaving a portion of the cellar, including the floor, intact.

Only the northeast corner of the first mission building was excavated in 1980. Within this area, concentration of brick and daub suggested the location of a fireplace. A charcoal concentration associated with numerous hand wrought nails in front of the structure area may indicate that some wooden members were removed and burned. Several clinched nails were recovered approximately one meter from the postulated door location of the first structure. Since the nails are still clinched, this suggests that the door, or boards from the door, remained on the ground after abandonment.

The second building, also a saddle-notched log cabin, was completed in 1836. Dimensions of the one and one-half story building were 16 by 32 feet (D. Lee and Frost 1973:139; Mudge 1848:158). Construction materials were not historically documented. A major difference between the first and second structures was the use of a central fireplace and chimney in the latter. The pole ends extruding from the eave line, seen on the historical renditions, indicates a loft was present. A portion of this building, presumably the south portion, functioned as a kithcen. The other portion served as a combination school room and dining room until a third structure was completed for those purposes in 1839. The only diagnostic cast iron cooking vessels fragments recovered from the site were found in the excavated portion of the second building, the presumed locality of the kitchen. A concentration of hinge nails on the gravel feature suggests a door was located on the west side of this building, leading to the graveled area. An eastern directional siting of the mission buildings is indicated by the historical renditions which depict the laced roof ridging in the first two structures backing the weather. The fence placement and plantings seen in Eld's drawing also support this conclusion (Dole 1983). Since no poles to hold down roofing shakes are seen in the drawings, it must be assumed that by this late date (1841), roofing nails had replaced an earlier use of poles, such as was required for the barn in 1835. The recovery of machine-cut shingling nails, which may have been purchased by the missionaries possibly as early as 1836, indicates the first mission building probably did sport a shingled roof secured by horizontal poles. The chimneys on the first two structures, fabricated of daub, were apparently faced with vertical boards secured by a horizontal strap of wood on metal. Indicated by the historical renditions, the tops of these chimneys were ragged from burning.

Agate's rendition of the mission house shows the first mission structure situated on a slight rise. This difference in elevation between the first and second buildings was perceptible in the archeological record and helped substantiate postulated building locations. While mission period artifacts were not frequently encountered below level three in the vicinity of the first building, mission period artifacts were recovered throughout level four in the grid area of the second building, indicating a slope in the living floor.

In 1839 an additional structure was completed to function as a combination school room and dining room (Mudge 1848:185). No firsthand physical descriptions of this third structure are known. This building is presumed to be the structure farthest to the right, running perpendicular to the other structures in Agate's 1841 rendition (Figure 4). This same rendition suggests that a different construction technique was employed. The combination of horizontal and vertical members resembles the _pieces-sur-pieces_ log cabin construction method traditionally associated with French Canadians.

There were examples of this construction type in the French Prairie area (Dole 1983). Since this building was built in 1839, five years into the mission occupation, use of this construction method may represent a cultural influence from French Canadian settlers in the French Prairie region and Fort Vancouver. Archeological evidence substantiating use of this constructing technique was not recovered. This structure had a west gable end chimney, according to the historical renditions. The chimney may have been built of brick, since brick was recovered in the general vicinity of this structure. Brick, known only through the archeological record, may have also been used in the later period of the mission occupation to repair and alter the fireplaces in the other two mission buildings. Only a small portion of this building, however, was subjected to excavation.

The second and third buildings were connected by a "room" (function unknown) that possibly also served as a passageway between these two buildings. Over the connecting room was a "cricket" roof designed for efficient water drainage (Dole 1981).

A high frequency of nails and associated post holes are suggestive of the placement of a roof structure over the gravel feature located within the "L" created by the attachment of the second and third buildings. Several hinge nails recovered on the gravel feature near the south wall of the third building suggest that there was a door in this vicinity leading from this structure to the gravel feature.

In order to determine the parameters of the site of the main mission house, two 1 x 2 meter test units were excavated--one to the north of the Block A grid and one to the south of the Block A grid. The bank of the lake defined the site's western boundary, and Block B, located 30 to 50 meters to the east of Block A, sampled the site's eastern boundary.

Test unit I was situated three meters north of the main grid. A summary of the artifacts found in test unit I is presented in Appendix A. Test unit I was located in an area postulated to be the interior space of the third building. Since numerous artifacts dating to the mission occupation period were recovered from this unit, the northern limits of the main mission house site have not been delineated.

Test unit J, located 8 to 10 meters south of the Block A grid, was excavated to determine the site's southern boundary. Excavation resulted in the recovery of post-mission occupation materials in a highly disturbed context. Based on the insignificant amount of mission period artifacts in this locality, the main site area does not appear to extend to the south beyond test unit J. A summary of the artifacts recovered from test unit J is presented in Appendix A. The possibility of secondary refuse areas (i.e., dumps, privies, wells, etc.) south of test unit J still exists since heavy vegetative growth in this vicinity prevented investigation of this area.

Vegetation and rodent burrowing proved to be the primary forces of postabandoment disturbance in Block A. Disturbance related to the use of the site area as a park between 1930 and 1960 is less clear. Trampling would have some impact on the condition and, to some extent, the location of cultural material. Most important but least subject to measurement is the possible displacement of cultural material by "souvenir hunters." This activity may have affected the site's artifact content to a great extent. Evidence for this type of activity was substantiated during fieldwork when a site visitor returned several artifacts picked up years earlier in the vicinity of Block C.

Recreational activities and sporadic use of the Block A area as a dump resulted in a post-mission secondary refuse scatter. A listing of these materials is presented in Appendix B. The wire drawn nails were primarily confined to the locality of the mission period gravel feature. No explanation for the presence of these nails has been suggested.

There is little indication of plowing disturbances in Block A. No evident plow zone was observed and the gravel feature with its associated post holes (10 centimeters below the surface) was intact. There was also no truncation of the hearth feature.

Only five years after the construction of the school room/dining room, it was described as a roofless tenement, partly thrown down (Mudge 1848:220). Since this building was closest to the river bank, this description may reflect damage from the flood of 1843. The effects of flooding on the site in general have not been clearly delineated, although those floods occurring prior to the channel shift, presumably in 1861, would have affected the site most severely.

Writing in 1868, Gustavus Hines noted that the mission structures had long since been washed away (Hines 1973:140). The archeological record does not support this statement. Clearly a portion of the site, that closest to Mission Lake today, was subject to erosion as evidenced by the abrupt termination of the gravel feature at the bank's edge. The third mission structure would have been the most severely affected by this erosion. The recovery of associated cultural materials, such as the "Unmarked Pink" plate, overlying the intact gravel feature indicates that there was little washing over the top of the site by swift water action. Appreciable amounts of silt were not deposited over the strata bearing cultural material, indicating that standing water did not frequently cover the site. In an aerial photograph of the 1964 flood, the site of the main mission remained visible above high water. The 1964 flood was considered one of the worst since the 1861-1862 flood. It appears that the elevation of the site kept sediment accumulation and smearing of the archeological record to a minimum.

BLOCK B

Excavation of peripheral site areas was limited to expanded testing procedures in an attempt to locate satellite dwellings, workshops, and outbuildings. Block B consisted of three 2 x 2 meter test units located within an area 30 to 50 meters east of and on the same ridge as Block A (Figure 11). Cultural material was not recovered in quantitites sufficient to suggest the site of a structure extraneous to Block A. Block B cultural material is likely the result of primary refuse (i.e., refuse located in close proximity to the area of its use) scatter stemming from Block A. A listing of the items recovered from Block B is given in Appendix A.

BLOCK C

Block C is located on the southernmost ridge of the site area (Figure 11). The Block C vicinity was identified as the possible location of the mission blacksmith shop and associated dwelling during Phase II testing procedures. Historically, the blacksmith shop was located a "few rods" from the main mission house (Bailey 1854:56). Three 2 x 2 meter test units were excavated in the Block C locality. In addition, one 1 x 2 meter test unit was placed near Mission Lake on the same ridge.

Cultural material recovered during Phase III assessment in Block C favorably supports the interpretation that this area is the general locality of the mission blacksmith shop. While 75 percent of the recovered clinkers (by-products of the blacksmith's forge) were recovered from Block C, scrap metal (another by-product) was notably scarce. Historical documentation records an incident which may have affected this aspect of the archeological record, however. Reverend George Gary, superintendent of the mission after Lee's dismissal, was responsible for dissolving much of the mission property. At one point he ordered that all the metal lying about the blacksmith's shop be picked up, weighed, and disposed of (Gary 1923:159). The lack of brick in this area suggests that the forge was dismantled, although it is possible that brick was not used for forge construction. A list of artifacts recovered from Block C is presented in Appendix A.

The Block C area has been subjected to intensive farming practices. Because of plow disturbance the precise location of any mission structure outside of the Block A locality is speculative. Testing in the Block C vicinity confirmed the presence of a mission period structure, the blacksmith's shop. In addition, artifacts associated with domestic activities suggest the presence of a dwelling. Historically, the dwelling of blacksmith Alanson Beer's family was near the blacksmith shop.

BEHAVIORAL ANALYSIS

The location of the main mission house (Block A) was sampled using an open surface excavation technique designed to maximize behavioral data recovery. Though general statements can be made, it became apparent after analysis that inferences regarding human behavior at the mission site would be limited. Primary reasons include (1) the changing functions of the buildings during the short span of occupation (seven years), (2) the distance involved in mission relocation (10 miles to Salem) which allowed the missionaries to transport many of their possessions, (3) postoccupation site disturbances, (4) the perishability of primary mission house construction materials, and (5) the fact that only a limited area of the site of the main mission house was subjected to excavation. However, excavations in the locality of the main mission house did reveal artifacts representing a range of activities. Activities represented include those related to food storage, preparation, serving, and consumption; procurement; grooming; clothing construction and repair; shelter construction; recreation; education; and site abandonment. Relative to the number of Native Americans known to have resided at the mission house, there is a notable lack of associated Native American cultural material. This may be a reflection of the missionaries' zeal for rapid assimilation or the Native Americans' prior acculturation by the Hudson's Bay Company.

In 1836 William Slacum, United States Navy officer, visited the mission. He commented on the cleanliness and good order apparent about the premises (Mudge 1848:160).

In the summer of 1841, shortly before the mission house was completely abandoned, Charles Wilkes, a representative of the United States government, visited the mission. Wilkes' comments emphasized the general neglect and absence of neatness about the premises (Wilkes 1845:350-351). The discrepancy between these two statements most likely reflects the differing behavior of the occupants during normal use of the site (day to day use of the site during the duration of occupation) and site use immediately preceding abandonment. The archeological record substantiates a living area relatively free of debris for the duration of the missionaries' occupation. The lack of primary refuse and the small size of recovered primary refuse items indicates that during the course of day to day site occupation the missionaries disposed of refuse in an area located away from the main mission house. Unfortunately, no secondary refuse areas such as dumps or privies were located during the 1980 field season.

Ceramic fragments and glass container fragments provided the best examples of primary refuse discarded during the mission occupation. The majority of defined ceramic and glass vessels at the mission are characterized by (1) small fragment size, (2) vessel representation by only a few fragments (none of which fit together), and (3) the scattered distribution of fragments, often from the same vessel. This pattern suggests that larger fragments of broken vessels were removed by the mission occupants for disposal in secondary refuse areas. Only small unobtrusive sherds remained after the clean-up process. Sherds remaining in the site area would then be subject to disturbance as they are "shuffled about" by residents of the site during the course of daily activities. In conclusion, those artifacts which fit this pattern were used, broken, and discarded during the normal day to day occupation of the mission; and that for the most part the activities associated with these artifacts occurred in the proximity of the area in which they were recovered.

With the exceptions of artifacts that were intended for discard and artifacts that entered the archeological record because of loss, such as beads and buttons, much of the artifactual material recovered from the mission is the result of abandonment. The process of site abandonment also produces primary refuse. Since this refuse resulted from abandonment activities rather than normal daily activities, however, it has been differentiated by the designation de facto refuse.

De facto refuse consists of tools, facilities, and other cultural materials that, although still usable, are abandoned within an activity area (Schiffer 1976:14). Much of the mission archeological record reflects the abandonment process. Among the artifacts at the mission which can be considered de facto refuse are nails, window glass fragments, bricks, clay daub, building hardware, and collectible rocks.

At the mission, abandonment was anticipated. The archeological record substantiates a modification of disposal behavior only hinted at by Wilkes' comments. Ceramics and bone represent the most conclusive evidence that the missionaries began accumulating refuse in areas immediately adjacent to or inside the buildings. Evidence presented by the bone will not be discussed in this report since the faunal analysis is incomplete. In general, an appreciable amount of bone was found peripheral to or within the structures. The recovery of at least five ceramic vessels, each represented by numerous and sometimes relatively large fragments (often fitting together), illustrates a disposal pattern which is in striking contrast to that previously described. These ceramics, all recovered on the gravel floor in close proximity (i.e., some on top of each other), indicate that the missionaries were no longer taking the trouble to remove refuse materials from the main house area.

It is, of course, possible that the missionaries were not responsible for depositing these ceramics on the gravel feature. The missionaries might not have removed them from the area in which they were initially used and/or broken. Rather, the only other known site occupants, the Applegate Party, may have deposited the ceramics and other items on the gravel feature in an attempt to tidy up the place.

In the winter of 1843-44, Lindsay Applegate and members of his family made their way across the Willamette Valley

> to Lee's Old Mission, ten miles below where Salem now stands, and on the first day of December entered one of the old buildings to remain for the winter (Applegate 1921:14).

Unfortunately, historical documents do not indicate which mission building was inhabited. Furthermore, the number of members in the Applegate family is far from certain.

Although no specific cultural material can be attributed to the Applegates, certainly their use of the site would have affected the mission archeological record by adding materials, removing materials, and altering the spatial organization of materials left by the missionaries. Unfortunately, the degree to which the archeological record was modified cannot be determined.

SIGNIFICANCE

The mission artifact assemblage is a highly significant time marker for Northwest archeology. The site consists of only one significant historical component, the mission, representing a tightly dated seven-year occupation. Additionally, the mission site is one of the few early historic sites in the Northwest occupied by Americans. In some cases, in-depth research on the artifactual material distinguished those goods received from the American market and those goods which possibly emanated from Fort Vancouver.

The presence of American goods in the Willamette Valley during the 1830s has implications for areal archeological research. For example, it was previously believed that the earliest machine cut nails available in the Willamette Valley were those imported by Fort Vancouver in the 1840s. Data from the mission dispute this claim and indicate that machine cut nails were available in the Willamette Valley by the late 1830s.

Several important insights concerning the Willamette Mission have been generated with the addition of data supplied by the archeological record. The sample of material remains recovered from the Willamette Mission graphically reflects the political viewpoints of the missionaries as far as the Oregon Territory was concerned. The lack of artifacts traditionally associated with the Hudsons' Bay Company, such as Spode/Copeland and Garrett ceramics, helps substantiate the idea that the missionaries wished to keep their dependency on the supply center at Fort Vancouver to a minimum. The mission established its own supply network linking the western mission with the eastern states. There was certainly an attempt by the missionaries to establish a lifestyle in Oregon that was similar to the one they had left behind. The material items recovered from the mission site do not reflect the intention of a temporary sojourn in the Oregon wilderness.

A testimony to the permanency of American settlement in the Willamette Valley--spiritually, economically, and politically--is embodied in the Willamette Mission site. The archeological and historical data described in the preceding pages have not exhausted the knowledge contained in the site.

Current plans call for acquisition of the site area by the State of Oregon, and its inclusion within the boundaries of Willamette Mission State Park. A commemorative monument designed to interpret the mission to the public will be placed on the west side of Mission Lake (across from the site). Long-term protection of the site will be facilitated by its inclusion on the National Register of Historic Places.

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APPENDICES

APPENDIX A

CULTURAL MATERIAL RECOVERED FROM SITE AREAS EXCLUDING BLOCK A

BLOCK B

Material	Description		Quantity
Metal	Machine cut square nail fragment ($\geq$5d)		1
	Unidentifiable square nail fragments		8
	Iron sew-through button		1
Glass	Crown window glass fragments		4
	Green container fragment		1
	Amber container fragment		1
Ceramic Fragments	Blue transfer-printed "Italian Seaport" WM3		1
	Blue transfer-printed "Bluebells" WM4		1
	Blue transfer-printed		1
	Red transfer-printed		1
	Shell-edge earthenware		1
	Yellow ware		5
	White earthenware		13
	Burned, unidentifiable		2
	Pipe stem		1
Burned Clay	Nodules	1.28 oz/40.0 gms	
	Brick fragments	0.28 oz/ 9.0 gms	2
Miscellaneous	Clinkers		4
	Agates		4
	Other collectible rocks		2
	Cryptocrystalline flakes		4

BLOCK C

Material	Description	Quantity
Metal	Hand wrought rosehead spike	1
	Hand wrought sharps nails, head morphology undeterminable	3
	Horse shoe nail	1
	Machine cut square nail, 1 3/4 inch (5d)	2
	Machine cut square nail fragment	1
	Machine cut square nail fragment (½3d)	1
	Machine cut square nail fragments (½5d)	6
	Machine cut square nail fragments, heads missing	5
	Unidentifiable square nail fragments	39
	Unidentifiable iron metal fragments	136
	Cast iron cauldron fragment	1
	Cast iron fragment	1
	Brass sheet fragment	1
	Iron chunk	1
	Bushing fragment	1
	Chrome veneered sheet fragment	1
	Wire fragment	1
	Brass button fragment	1
	1954 Schlitz tin beer can	1
	Crown bottle cap	1
	Large treble fish hocks	2
	Iron staple	1
Glass	Crown window glass fragments	20
	Miscellaneous unidentifiable clear glass fragments	4
	Miscellaneous unidentifiable melted glass fragments	4
	Miscellaneous container glass fragments	13
	Clear vessel basal fragment	1
	Amber glass fragments (minimum one beer bottle)	7

Material	Description		Quantity
Ceramic Fragments	Blue transfer-printed "Brosely" WM2		1
	Blue transfer-printed "Italian Seaport"WM3		1
	Blue transfer-printed "Bluebells" WM4		1
	Blue transfer-printed "Scroll" WM5		1
	Blue transfer-printed "Tyrol Hunters" WM10		1
	Blue transfer-printed		8
	Red trransfer-printed		3
	Brown transfer-printed		1
	Hand painted, black-on-white		2
	White earthenware		63
	Mocha ware		1
	Yellow ware		1
	Shell-edge earthenwre		5
	Burned, unidentifiable		18
	Pipe stem		2
Burned Clay	Nodules	2.05 oz/ 63.9 gms	
	Brick fragments	4.22 oz/131.6 gms	15
Miscellaneous	Cryptocrystalline projectile point		1
	Agates		2
	Jasper		5
	Clinkers		231
	Slate tablet fragments		1
	Slate pencil fragments		1
	Fountain pen		1

TEST UNIT I (0-3 cm)

Material	Description		Quantity
Metal	Hand wrought rosehead spike		1
	Hand wrought clasp nail		1
	Machine cut square nail (10d)		1
	Machine cut square nail (9d), finishing nail		1
	Machine cut square nail (8d)		1
	Machine cut square nails (≥5d)		3
	Machine cut square nail (≥5d), possibly finishing nail		1
	Machine cut square nail (4d)		1
	Machine cut square nail, head missing		1
	Unidentifiable square nail fragments		5
Glass	Crown window glass fragments		10
	Melted glass fragment		1
	Melted green container fragment		1
Ceramic Fragments	Blue transfer-printed		1
	White earthenware		1
	Shell-edge earthenware		1
	Burned, unidentifiable		1
Burned Clay	Brick fragments	4.84 oz/150.8 gms	18
	Clay daub	0.37 oz/ 11.6 gms	4
	Clay nodules	0.81 oz/ 25.5 gms	
Miscellaneous	Slate tablet fragments		3
	Obsidian projectile point		1
	Petrified wood		1
Bone	Unidentifiable bone fragments		2

TEST UNIT J (0-50 cm)

Material	Description		Quantity
Metal	Machine cut square nail fragment		1
	Unidentifiable square nail fragments		4
	Wire drawn nails		4
	Fragmented tin can		1
	Crown bottle caps		2
Glass	Crown window glass fragments		8
	Miscellaneous unidentifiable clear glass fragments		8
	Clear flat glass fragments (average thickness 0.134 inch)		259
	Amber bottle fragments		39
	Amber beer bottle		1
	Faceted glass bead		1
Ceramic Fragments	Earthenware crockery		3
	Yellow ware		1
	Red transfer ware		1
	Blue transfer ware		1
	White earthenware		10
Burned Clay	Clay daub	0.07 oz/ 2.2 gms	1
	Brick fragments	0.05 oz/ 1.6 gms	2
	Clay nodules	0.98 oz/30.5 gms	
Miscellaneous	White plastic fragments		9
	Cryptocrystalline projectile point		1
	Cryptocrystalline flakes		3
	Wood plank, Douglas fir (<u>Pseudotsuga</u> <u>menziesii</u>)		1
	Burned unidentifiable bone fragment		1

CONTRIBUTIONS FROM A LOCAL COLLECTOR

RECOVERED WITHIN MISSION SITE VICINITY

Description	Quantity
Petrified wood fragment	1
Black glass bottle lip and neck fragment	1
Melted glass fragments	2
Redware fragment	1
Blue transfer-printed fragments	2
Red transfer-printed fragments	2
Hand painted earthenware fragment	1
White earthenware fragments	13
Shell-edge earthenware fragments	2
Signet ring seal	1

APPENDIX B

POST MISSION OCCUPATION CULTURAL MATERIAL

Material	Description	Quantity
Metal	1957 Heidelberg tin beer can	1
	1954 Schlitz tin beer can	1
	Tin beer can base	1
	Olympia beer crown bottle cap	1
	Crown bottle caps	4
	Fragmented double-seam tin cans (post 1895)	4
	Small unidentifiable tin can fragments	26
	Tin can key fragment (post 1895)	1
	Hole-and-cap tin can lid, internal (pre 1922)	1
	Tin can lid fragment, internal	1
	Large treble fish hook	2
	Wheel hub with spokes, diameter 9 inches, 22.9 cm	1
	Barbed wire fragments, unidentifiable	5
	Wire fragments	16
	Insulated wire fragment	1
	Flared copper tubing fragment diameter 1 inch, 1.3 cm	1
	Springs, diameter 5/8 inch, 0.8 cm	3
	Springs, diameter 7/8 inch, 1.1 cm	2
	Cylindrical knurled fitting	1
	Iron staples	3
	Iron bracket	1
	Wire bail	1
	Steering wheel spoke,	1
	width 15 inches, 38.1 cm	1
	Chain link fragment	1

<table>
<tr><th>Material</th><th>Description</th><th>Quantity</th></tr>
<tr><td>Metal</td><td>Wire drawn nails
<table>
<tr><th>Quantity</th><th>Penny Size</th><th>Length</th></tr>
<tr><td>1</td><td>60d</td><td>6"</td></tr>
<tr><td>16</td><td>30d</td><td>4 1/2"</td></tr>
<tr><td>3</td><td>12d</td><td>3 1/4"</td></tr>
<tr><td>3</td><td>10d</td><td>3"</td></tr>
<tr><td>36</td><td>8d</td><td>2 1/2"</td></tr>
<tr><td>2</td><td>7d</td><td>2 1/4"</td></tr>
<tr><td>47</td><td>6d</td><td>2"</td></tr>
<tr><td>4</td><td>5d</td><td>1 3/4"</td></tr>
<tr><td>21</td><td>4d</td><td>1 1/2"</td></tr>
<tr><td>24</td><td>3d</td><td>1 1/4"</td></tr>
<tr><td>12</td><td>2d</td><td>1"</td></tr>
</table></td><td>169</td></tr>
<tr><td></td><td>Wire drawn nail fragments</td><td>178</td></tr>
<tr><td>Glass</td><td>Container #1
Clear rectangular alcohol bottle fragments (minimum one bottle), embossed side lettering: "...FEDE...BIDS SALE OR...BOTTLE" date range 1932-1964</td><td>75</td></tr>
<tr><td></td><td>Container #2
Clear/brown rectuangular alcohol bottle fragments (minimum one container)</td><td>9</td></tr>
<tr><td></td><td>Container #3
Clear/amethyst container fragments (minimum one container)</td><td>118</td></tr>
<tr><td></td><td>Container #4
Amber alcohol flask fragments (minimum one container)</td><td>11</td></tr>
<tr><td></td><td>Container #5
Clear embossed container fragments (minimum one container)
probable identification: alcohol bottle</td><td>3</td></tr>
<tr><td></td><td>Container #6
Clear/amethyst container fragments (minimum one container)</td><td>3</td></tr>
<tr><td></td><td>Container #7
Clear-clouded container fragments (minimum one container)</td><td>3</td></tr>
<tr><td></td><td>Container #8
Clear/blue-green container fragments (minimum one container)</td><td>3</td></tr>
</table>

Material	Description	Quantity
Glass	Container #9 Clear/green Coca-Cola bottle (6 oz) 1938 embossed side lettering: "COCA-COLA TRADE MARK REGISTERED BOTTLE PAT D-105529" 20 38 "COCA-COLA TRADE MARK REGISTERED MIN. CONTENTS 6-Fl. Oz." embossed basal lettering: SALEM ORE	1
	Container #10 Clear alcohol bottle--basal portion, embossed side lettering: "$/5 QUART"	1
	Container #11 Clear embossed square screw-top bottle with diagonal ridges (post 1927)	1
	Container #12 Amber beer bottle, embossed side lettering: "NO DEPOSIT - NO RETURN - NOT TO BE REFUNDED"	1
	Container #13 Clear ink bottle basal fragment, embossed basal lettering: "...G INK S..."	1
	Container #14 Clear/blue-green container fragments (minimum one container)	5
	Container #15 Clear/slight blue tint container fragments (minimum one container)	3
	Amber bottle fragments (minimum three beer bottles)	62
	Miscellaneous clear container fragments	9
	Clear (blue-green tint) "safety plate" flat glass fragments (average thickness 0.134 inch)	259
	Blue-green (5 GB 5/4) flat glass fragment (0.064 inch)	1
	Opaque blue-green (5 BG 7/1) flat glass fragment (0.080 inch)	1
	Pressed glass fragment (water worn)	1
	White glass fragment (water worn)	1

Material	Description	Quantity
Miscellaneous	Fountain pen	1
	Nylon monofiliment fishing line fragment	1
	Fragmented light bulb	1
	Rubber banding section	1
	White plastic fragments	8
	20 gauge shotgun shell	1
	20 gauge shotgun shell base	1
	12 gauge shotgun shell bases	4
	10 gauge shotgun shell base	1
	Plastic shotgun shell shot casing	1
	22 caliber slug	1
	33 caliber short shells	6
	22 caliber long shell	1
	22 caliber long cartridges	2
	32 caliber shells	3
	Ironstone ceramic fragment manufacturer's mark: "Homer Laughlin U.S.A." (post 1874)	1
	Wood plank with four wire drawn nails Douglas fir (*Pseudotsuga menziesii*) Length: 72 cm (28 6/16 inch) Width: 9 cm (3 9/16 inch) Thickness: 2 cm (12/16 inch)	1