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VAS newsletter....

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A notice in the last issue told you that Jim Petersen's monograph was being shipped to you immediately under separate cover. Subsequently, the Board decided to distribute as many as possible at the Spring meeting to save postage, and so I got a lot of inquiring mail. Copies were distributed to members of record at the time of the Spring meeting (May 10) at no charge. If your 1980 dues were paid by that time and you have not received your copy, please notify me at Box 663, Burlington, VT 05402.

Joseph Popecki
Treasurer, VAS

GEOMORPHOLOGICAL SUMMARY OF THE WINOOSKI SITE

By Peter Beblowski

The Winooski site (VT-CH-46) occupies an area of approximately 43,000 square miles of floodplain on the north bank of the Winooski River, one mile downstream from the Routes 2 & 7 bridge over the river, in the town of Winooski VT. The University of Vermont Department of Anthropology's 1978 excavation of portions of the site revealed that it contained multiple components, the most extensive of which date back to the Middle Woodland Period.

The Winooski site's stratigraphy is representative of an alluvial floodplain, with its textural character dominated by fine sands and course silts. Compositionally, the sediments may be described as mature and multi-generational, composed primarily of quartz. The fine grained nature of the site's soil components is indicative of vertical accretion of sediments during overbank flooding - this depositional pattern has probably existed for the past 4,000 years. The site area's seemingly stable sediment accumulation rate of roughly 50 centimeters per thousand years (even with an upper rate of 80 centimeters per thousand years for a portion of the riverbank levee lends itself to odel of relatively steady-state aggradation.

Sediment accumulation at the Winooski site is influenced by a "downstream control system" which causes the deposition of fine-

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Search for Vermont Furnaces Yields Dramatic Discoveries

By Victor R. Rolando

Wrought and cast iron were made in at least 62 bloomery forge and 18 blast furnace sites in Vermont between 1775 and 1890. During this period, 75 bloomery forges and 28 blast furnaces were fired at these sites (Rolando 1980:107-113). Field investigations made in 1978 and 1979 to locate the surface remains of nine of these forges resulted in a few bits of slag, one flume and one possible dam site. The search for blast furnace sites, however, has netted more dramatic discoveries. Standing ruins of blast furnace stacks exist in Bennington, Dorset, Forestdale, Pittsford, and Troy. Trace ruins are also identifiable in Tinmouth and Plymouth. The remaining sites, which display either questionable or no surface evidence are in Brandon, Fair Haven, Shaftsbury, Sheldon, St.-Johnsbury, Vergennes, and Woodford.

These blast furnaces measure 20 to 30 feet square at the base and 23 to 40 feet high, tapering inward from the base. The outside walls of the earlier furnaces, such as those in Bennington, Dorset, and Troy, are of coarsely laid rough cut (or uncut) stone. Walls of the later blast furnaces at Forestdale and Pittsford are of uniformly laid large finished stone. All walls were laid without mortar or cement.

Each blast furnace was built close enough to a low hill to allow a short bridge to connect the hilltop to the top of the furnace, affording the means of charging the furnace with iron ore, fuel, and flux. Iron ore was mined locally and sometimes mixed with ore from New York State. The fuel was charcoal, made in kilns located in the surrounding forests or at the furnace site. Anthracite coal was considered at Dorset (Neilson n.d.:220), and actually used without success in 1854 at the Forestdale stack (Lesley 1859 b:25). At the Conant furnace in Bradon, a dense peat called lignite ("brown coal") was used to supplement expensive charcoal. To facilitate removal of impurities from the iron, a limestone flux was added to the charge of iron and coal. The limestone combined with the impurities to form slag, visible at most furnace sites as multi-colored "stone".

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1 ➧ WINOOSKI

grained material on floodplains, lawns, terraces and backswamps. Downstream control of a fluvial system is synonymous with "base level control." The surface of Lake Champlain has been identified as the base level for the aggradational system operable at the Winooski site. It is interesting to note that the sediment accumulation rate perceived at the site paralle's a slow but steady rise which has been projected for Lake Champlain, surface level. This projected use is approximately 80 centimeters per thousand years over the past 4,000 years, and is derived from a straight-line projection from two known points representing lake levels at particular times.

In a downstream aggradational control system, a "sedimentary wedge" is developed which becomes thicker as one approaches the control point, in this case the Lake Champlain shoreline. As a consequence prehistoric human occupation surfaces (sites) of any particular age on the Winooski floodplain are under a thicker mantle of sedimentary material the closer they are to the lake, given no major breaks in the stratigraphic record.

The Winooski site, it must be remembered, is but a small component of a large and complicated environmental system. With no comparative date to shape a geomorphological model around, the conclusions presented above are necessarily tentative. They will be expanded on in the forthcoming Winooski site mitigation report. A more complete geological history of the lower Winooski River Valley, of vital importantance to prehistoric archaeologists, awaits the collection of further data.

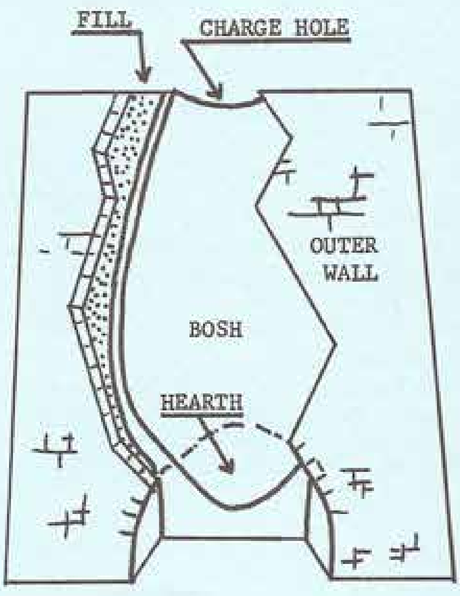
1 ➧ BLAST FURNACES

The forced draft for which the blast furnace was named was generated for earlier furnaces by large bellows, driven by waterwheels. Usually operated alternately and in pairs, 4-foot-wide by 20-foot-long bellows were not uncommon at the turn of the nineteenth century. Soon after, these bulky and cumbersome devices were replaced by wooden cylinders and pistons, the forerunners of today's air compressors. The 1839 alteration of Conant's furnace to accommodate two 6½-foot diameter cylinders is the earliest recorded use of these blast machines in Vermont (Lesley 1859 a:77). The cylinder heads were double-acting, with inlets and outlets closed by wood flap valves on leather hinges. (At a contemporary site at Tahawus, New York in 1977, I found the remains of wooden cylinders and pistons and their cast iron piston rods.) The pistons were operated by piston rods made either of cast iron or wood, (wood was used at Hopewell Furnace, Pennsylvania connected and driven from each side of the water wheel. The cylinders were mounted either next to the waterwheel (Tahawus) or on scaffolding above it (Hopewell).

The blast was connected to the furnace hearth through one of the arches at the base of the stack by cast iron nozzles called tuyeres. The tuyeres were usually double-walled and cooled by circulating water to keep them from melting.

Early blast furnaces had one or two arches; later furnaces had four. Early furnaces such as the ca.1820 stack in Bennington, employed corbelled arches with no decorative molded bands. The Dorset and Forestdale furnaces, of slightly later construction, contain splendid wedge-stone arches, while the Pittsford furnace, which operated until the 1880s has a three-tiered molding of mortared brick. The soffit, constructed of red brick underlain by yellow, extends the entire depth of the arch ceiling.

These archways also gave ironworkers access to the hearth, from which the molten iron and slag were periodically drawn off. The hearth sat at the center of the furnace base. It was massively walled and supported with stone and/or brick to support not only the heavy molten iron and slag in it but also the entire bosh, which extended to the top of the furnace. The bosh was the inner stone or brick-lined vertical cavity in which the actual melting took place. Its configuration was like an egg, standing on its wider end. It was at this wide point where the tuyeres were connected and melting temperatures were the highest.



Cutaway view into a typical blast furnace.

Early furnace boshes, such as one of those at Tinmouth, were lined with a hard stone possibly schist or gneiss. As the technology advanced, iron characteristics were found to be affected by the nature of the bosh lining, prompting the use of various refractory bricks. Bosh bricks from the ca.1840 Troy, Vermont, furnace appear to be ordinary red bricks; from the ca.1850 Forestdale furnace they are yellow firebrick made in Troy, New York.

Bosh brick is distinctive from decorative brick for its burned and/or glazed end, caused by the extreme heat in the hearth. Glass foundaries, bloomery forges, iron foundary cupola furnaces (air furnaces), lime kilns, and other metal processing furnaces also employ firebrick-lined hearths, as do present-day home heating gas and oil furnaces. Some firebricks were tapered to better fit the circular bosh configuration; all firebricks were mortared.

The space between the inner, circular bosh wall and the outer square furnace wall was filled with rough stone of all shapes and sizes. This fill provided an insulating jacket around the bosh and support to hold the bosh vertical. This fill is visible at the two Bennington furnaces, each of which is partially collapsed. Parts of the Forestdale and Pittsford furnace interiors are also exposed.

The two Bennington furnaces are located on private property off Route 9 at Furnace Grove. They are next to a residence which once served as the ironworks' company store and later as a chair factory. A good waterwheel pit remains next to the eastern stack, and a depression traces the route of the flume from the site of the forge pond to the wheel pit. Otherwise, all surface traces of bloomery forges, charcoal kilns, charging and casting shed, coal and ore houses, and a third smaller 'pocket' furnace (which stood between two stacks) are gone beneath gardens, lawn, roads, and underbrush.

The stack at Dorset stands on private property just west of a by-passed stretch of Route 7 one mile north of the town line. No other surface remains are visible. The Forestdale stack stands in a heavily wooded, state-owned area a few minutes' hike up an old road northeast of the villege. The Pittsford furnace is relatively hidden along Furnace Brook a mile northeast of Pittsford village. No surface remains except fallen arch and bosh bricks and much slag are visible at either of the latter two sites.

The most significant blast furnace site for the quantity and quality of interpretive surface remains is in Troy. This site is located about two and one-half miles north of Route 100 on the east bank of the Missisquoi River. It can be reached by a ten-minute hike through a pasture off River Road. The blast furnace was built in 1837 and abandoned in 1846 (Hemenway - 1877:325). It stands immediately downstream from a falls where a narrow gorge forms a right-angle bend in the river. An approximately 300-foot-long flume cuts diagonally across the inside of this bend, affording a good head at the waterwheel pit, near the stack. The flume is 15 to 20 feet wide and 6 to 10 feet deep, cut through the rock. The dam, which backed the water into the flume, was probably located in the narrow gorge although inspection during a low water period in 1979 failed to reveal any evidence here. Another possible dam location exists upstream, where the flume leaves the river.

The wheel pit is about 20 feet west of the furnace stack. A narrow rock-cut through a low hill between the stack and the pit leads to the speculation that (1) the blast machines were either located here, feeding air to a tuyere in a possible arch at the east wall, or (2) the waterwheel shaft came through this cut to power the machines closer to the stack. Locating the archways in the stack would help to interpret various features of the furnace site, but all walls except the southern one are partially collapsed, burying probable arch locations.

Directly east of the stack are stone walls, foundations, and an iron hollow-ware 43 inches in diameter and 23 inches deep, possible a potash kettle cast at the site. A tail race from one of the foundation holes may indicate a wheel pit that powered a bloomery forge or a cupola furnace for remelting and casting stoves, hollow-ware, and boundary markers. (Many of the latter, cast at this furnace, were used along the nearby international boundary.) Glazed firebricks are found in and around this hole. Heavy iron mounting, possibly to support a waterwheel, lie at one corner of the foundation. A small now-dry inlet in one side of the foundation could have fed water to run the wheel, but its connection to the flume or river cannot be found. Slag and waste iron are scattered throughout the immediate furnace area.

During its active ironmaking days, the furnace stack was probably abutted by buildings, in contrast to today's open appearance. These buildings would have protected the blast machines and casting activities around the base of the furnace and the charging operations at the top. The charging house sat directly on the furnace with a tall chimney that vented smoke and stack gases away from the work areas. Foundations on the charging hill behind the furnace indicate that the charging bridge might also have been enclosed. A sketch of a ca.1844 blast furnace at Tahawus, New York, which is contemporary with the Troy furnace in time and wilderness environment, indicates a likely configuration of the immediate furnace structures (Masten 1968:132).

A ca. 1844 blast furnace complex at Tahawus, New York, a contemporary of the Troy, Vermont furnace. (Masten 1968:132)

Threading through the rubble of the collapsed furnace walls are the twisted iron straps that held the stack walls together. Their ends are slotted for pins to hold iron end plates snugly against the wall. All pins have been removed, even from the undisturbed wall, but the only end plate was found a few dozen feet downstream, in knee-deep water. The vicinity of the river near the furnace should not be overlooked in a search for artifacts.

The ironworks supported a villege that had a boarding house and post office (Thompson 1842:174). No trace of villege cellar holes could be found. They may have been in the relatively smooth pasture that now borders the wooded furnace site. The old road that ran parallel to River Road leads down through the woods to the southeast and uphill out of the woods east of the rail race. The road is indicated on Beers' Atlas, and shows structures in the ironworks vicinity (Beers 1878:50).

Vigilance is one response to threats to archaeological and historic resources. But vigilance must be coupled with accurate identification and an ongoing inventory of sites. Unlike blast furnace sites that were destroyed years ago by later mills in Sheldon, a hydroelectric power station and recently a sewage treatment facility in Vergennes, and industrial development in St. Johnsbury, the Troy furnace site has managed tc escape relatively undisturbed. This is largely to its remote location. The Troy furnace site does, however, fall well within an area of the upper Missisquoi River that is threatened with inundation by the proposed construction of a high dam about two miles downstream. This would place most of the Troy ironmaking site under 25 feet of water.

Assisted by an inventory, the Vermont Division of Historic Preservation, already accomplished for the majority of the bloomery forge and blast sites in Vermont, the UVM contract archaeology team has started initial documentation of this potentially sensitive archaeological site plus an earlier bloomery forge site two miles upstream. This effort also includes the identification of other historic and prehistoric sites at this and five proposed downstream dam sites. The result of this identification effort will allow the Division for Historic Preservation to proceed effectively with compliance with federal and state historic preservation laws.

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REPORT OF THE STATE ARCHAEOLOGIST

Presented At The VAS Spring Meeting, May 10,198C

By Giovanna Neudorfer

The past six months have been hectic as usual, characterized by various and sundry routine tasks, both the daily and repetitive kind and long-term, never-ending projects such as the predictive model. Some of the activities bore more obvious or immediate fruits than others, and I will briefly summarize a few of the highlights of the winter. I completed draft rules and regulations for all archeology-related matters in the 1975 Vermont Historic Preservation Act. These specify the procedures for permit application and approval for sites both on state-owned lands and under water; for designinating State Archeological Landmarks; for ensuring cooperation with municipalities and state agencies; and so forth. Presently, the rules and regulations are undergoing internal Division review; they should be available for public comment shortly. In February, I presented a procedural and policy summary of the underwater rules and regulations to a small conference of underwater archeologists and scuba divers. Besides putting Lake Champlain on the maps as a major historic sites area, I got some excellent feedback on our proposed underwater program.

Using a scope of work that I prepared, the Village of Bellows Falls is about to initiate a contract, assisted by a matching grant-in-aid from the Division, to prepare a feasibility plan for developing and protecting the petroglyph site. The study will analyze the possibility of a site overlook in terms of the engineering potential, traffic access, safety, parking and costs. At the same time, the plan will detail methods of fully documenting the site through drawings and photography, outline measures for erosion control and site stabilization, and examine the engineering feasibility of removing the boulder riprap which presently abuts the site.

Past conversations with the Environmental Conservation Agency for conducting an archeological workshop for State Fish and Game personnel developed into a series of regional workshops for all Environmental Agency staff. Assisted by Peter Thomas, we plan to conduct six of these workshops over a four-month period and have expanded the participant list to include interested Soil Conservation Service folks as well as Environmental Agency Staff. Peter and I held the first workshop in Pittsford in mid April. It was well attended, and I think, well received.

Peter Thomas, Art Cohn and I attended a special two-day workshop for our benefit at the New York State Conservation Lab at Peebles Island, Waterford, New York. The purpose of this meeting was to obtain basic information to assist us in developing a plan for an artifact conservation lab in Vermont. Besides providing us with a sound understanding of what a lab would entail in terms of space and necessary equipment, we also were given an introduction to basic conservation procedures which was invaluable in impressing upon us the complexity and sophistication of most conservation processes.

The Vermont Historical Society is in the process of publishing my book on the stone chambers. While the main text of the book will be the same as the article in Vermont History, I have added a foreword by Bill Fitzhugh of the Smithsonian, revised and updated footnotes, an Epilogue, and a large assortment of photographs and tables. This should be availabe by early-to mid-June.

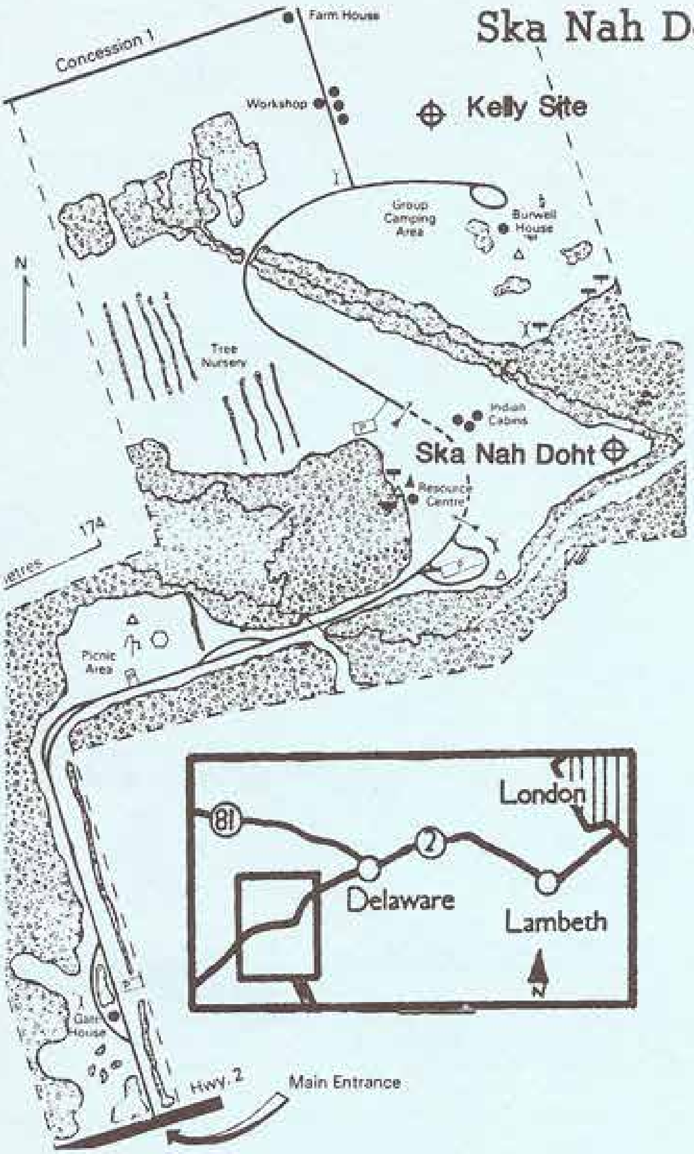
The predictive model takes up most of my "spare" time and I try to spend at least one to two days a week on it. The results, I hope, will be well worth the time and I look forward to sharing it with you in the not-too-distant future.

EDITOR'S NOTE

Due to an oversight, Brian Robinson, was not credited with authoring the article, "Plowed Fields: Diminishing Archeological Resource" in VAS Newsletter, Number 31 (April 1980). Sorry Brian. I hope a future issue will contain a report on your work at VT-FR-69, the Early Archaic site in Swanton.

Bill Bayreuther

Ska Nah Doht and Kelly Site Worth a Visit



Last year I discovered Wolstenholme in Virginia. This year, along with sons #2 and #3, we trekked to Michigan for a family visit and discovered Ska Nah Doht in the suburbs of London, Ontario.

In translation, the name means "Village that stands again". It's an apt name because local archaeologists, along with provincial assistance, have built a replica of an Attawandaron settlement. The people who lived there were similar to the Hurons, who lived on either side of them. They were given the name of the "Neutral Indians" by the first Europeans who visited there because they lived at peace between two warring groups.

A slide show in the Resource Center tells the story of the Attawandarons, who lived in the area until the Iroquois dispersed all of the tribes living in the area. The reconstructed village is thought to be very authentic. It is entered through a maze in the pallisade that surrounds the village area.

There are about 20 structures inside of the pallisade, including three longhouses. These include the sleeping platforms and the firepits. The smell must have been great on a hot summer night. Outside of the pallisade are a garden growing in Indian style, a deer run, used to capture game and a burial rack for drying dead bodies prior to burial.

The conservation area also contains some old Indian cabins, thought to be about 800 years old. Beyond these is a working archaeological "dig", the Kelly site. It is of the Glen Meyer culture, dating to about 1,000 A.D. This is only the second season of work on the site, but it is open to visitors accompanied by a guide. The whole area is open from 9 AM to 6 PM, Victoria Day to Labor Day and on weekends until Thanksgiving. JTP

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