● THE COLONIAL WILLIAMSBURG

interpreter

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The Bloomery

David Harvey is an apprentice blacksmith working under Peter Ross, master of the shop. He attended Christopher Newport College and Virginia Commonwealth University where he majored in theater arts. Many of us have been impressed with David's bloomery project for a number of reasons: first, although the making of iron has been discussed for many years here at Colonial Williamsburg, David Harvey was the first person to do it; secondly, before he began his work in the blacksmith shop, David had never really been involved in smithing before; thirdly, the difficult process of investigation and experimentation that David went through exemplifies what an effective interpreter does when developing a responsible interpretation of history; finally, we have applauded the encouragement that David has received throughout this project from his supervisors, Peter Ross and Earl Soles. Such support is essential. We congratulate David on his tenacity, his curiosity, and his skill. David responds to Bill Tramposch's questions about the project.

BT: Will you briefly describe your project?
DH: The purpose of the project is to make wrought iron in a colonial "bloomery" furnace and to interpret the process to the public. Since this method of iron making died out eighty years ago, I had to rediscover the technology through experimentation and practice. The interpretation of this process has taken many forms such as workshops, special demonstrations, exhibits, television programs and films, magazine articles, lectures, and training programs. All of my work on the project has been focused toward achieving these goals and making them into a comprehensive museum program.

I think that I should briefly describe the technology of the bloomery process. In order to make iron, you must put the ore through a series of chemical and physical transformations that will remove the impurities and leave the iron behind. Most iron ores are chemical combinations of iron and oxygen with some trace elements present. The oxygen is removed by heating the ore in contact with charcoal. The carbon-rich atmosphere will combine with the oxygen and burn off as CO_2. The physical impurities such as sand and clay will separate and melt at approximately 2300° F, forming a molten waste product called *slag*. The iron will form into a soft, spongy mass below the air nozzle. Since this soft lump contains entrapped charcoal and slag, it must be heated and hammered repeatedly to force out the remaining impurities and consolidate the metallic iron into a usable bar. Ideally, as little air as possible is used to create a maximum temperature in a bloomery furnace. The word *furnace* is somewhat misleading in this instance. At first glance a twentieth-century person would think that the furnace was a large backyard barbecue. It is built of brick, 5′ × 5′ × 3′, with a two-foot-deep pit in the middle. The use of bellows makes this a furnace, and the air nozzle is positioned halfway down in the pit.

B.T.: How did you become interested in this project?
D.H.: My interest in iron making began about three years ago when I read a book by a religious historian, Mircea Eliade, entitled *The Forge and the Crucible: The Origins and Structures of Alchemy*. It sounds mysterious, but the book pretty well demonstrates that when ancient man decided to manipulate and transform natural materials, he was in essence assuming the role of Nature. If you are even faintly acquainted with the Iron Age mythical heroes, Hepateus, Vulcan, and Thor, you can see that the craftsman has assumed the role of a demigod with magical powers to transform a stone into an invincible sword. These themes and ideas of the ancient ironworking traditions seemed exciting.

When I saw that a position was open in the Deane Forge Blacksmith Shop, I decided to apply for the job as a blacksmith, and one of the first things that I had to understand was the iron making process. Peter Ross, blacksmith and master of the shop, had me read five or six books on iron making and forging. I had a very difficult time understanding the concepts I was reading, and I found that different authors said different things, particularly about small-scale iron making operations called bloomeries. Every day I had to answer visitors' questions about how iron was made, and I had nothing but a confusion of concepts to rely upon. It was then that I developed the firm desire to track down footnotes, to correspond with scholars, and to try the process firsthand.

Recovery of old craft skills is a most important thing. A museum should be the meeting ground of the words of history, the discoveries of the archaeologist, and the collections of the curators, all used by individuals who physically shape materials into objects of material culture. It is here, in the workshop of the craftsman, a stable, an open field, or in a house, that we have the opportunity to encounter "real" experiences and not just verbal concepts. Because in the recent past many history museums relied on the "talking heads" approach to interpretation, many visitors expect either "spiels" or holograms. It is a much more captivating experience to visit a museum and to encounter people *doing things!*

BT: What assistance did you receive from your interpretive supervisors?

DH: I definitely owe the most to Peter Ross, who has, in large measure, molded my critical sensibilities in craft work, research, and interpretation.

I also owe Conny Graft, programs manager of the Historic Area, a debt of gratitude. When I felt I was ready to propose the iron making project on paper, Conny gave me the format for the proposal and the best advice in the world: "You have to answer who, what, why, where, when, and how much." I wrote nine or ten drafts, aiming for a proposal that would be accepted. The challenge was to create an interesting research and development project that would have maximum benefit on minimum dollars. Basically I, as well as the others working on the project, would use part of our forty hours per week on the bloomery, drawing labor from several shops so that no one would be shorthanded. This makes the work week more interesting, and it has zero budget impact. Both Conny and I realized this proposal should be a model for anyone else who had an idea for a future project or program, so it took several months to produce the final version.

The two administrative supporters of the project have been Earl Soles, director of Craft Programs, and Dennis O'Toole, vice president of Historic Area Programs and Operations. I give Earl a great deal of credit for creating an environment in which projects like this can happen with an absolute minimum of red tape. Also, Denny and Earl were very supportive of this project *as research and development,* rather than something that would stand or fall on ticket punches. It is very important to have support and help from museum administration on projects like this—their enthusiasm is also essential to its success.

BT: How did you know where to go for information?

DH: I started by tracking down footnotes and by corresponding with scholars in the field. I read absolutely everything that I could find on the subject. Susan Berg at the Foundation Library helped me track down references and gave me all the assistance I needed in getting sources on interlibrary loan. After nearly two years of reading and corresponding, I knew it was time to get my hands dirty and reconstruct the craft.

The best source of information was the archaeology collections at the Virginia Research Center for Archaeology and the National Park Service at Jamestown. I was allowed to see and study iron making debris from seventeenth-century sites on the James River. It was a very powerful connection for me to hold a three hundred-year-old piece of slag and to know what iron waste products should look and feel like; it was akin to gazing into a crystal ball. In the best sense, the project has been an experiment to re-create what the archaeologists have found.

BT: In what ways has this project changed your interpretation and your outlook on your job as an interpreter?

DH: As I said earlier, my interest in the project developed because *I had difficulty* in interpreting the iron making process to the public. In working on the project and acquiring experience in the process, I can not only say "I have done this," but I can now put the ore, charcoal, bloom, slag, and finished bar

into their hands. It is a much more powerful experience for the visitor to hold, look at, and feel the artifacts of the craft process. It is great for interpretation because I can use objects as a real anchor for what I am explaining. I have also found that it is most important to talk about a technological process such as iron making in the most direct, concise, and simplest manner possible. Instead of using conceptual words like smelting, I prefer to explain what we do with the ore and the charcoal in order to make iron. This makes the interpretation much more direct and accessible to everyone in the shop.

A project like this can only benefit your outlook as an interpreter. Instead of anticipating the same routine every day, I can look forward to my "bloomery time" during the work week. I think it is much healthier if you can strike a balance between research, interpretation, craft work, and days off. This way you tend to eliminate burn out, your concentration in each of these areas becomes more focused, and you are more enthusiastic in everything you do. Personally, I enjoy the challenge of creating and developing the project because it is my way of taking the little bit of knowledge that I have acquired and giving it back to others.

BT: Briefly, what were your findings? What have these led to?

DH: In terms of process we have been successful, the furnace does indeed work as it was designed to, and we made iron on the very first try. Samples of the iron are being analyzed by metallurgists at the Museum Applied Science Center for Archaeology at the University of Pennsylvania and at Yale University. We are now beginning to record systematically all of the observable data during each furnace run so that the process can be fine-tuned. By exploring each variable one at a time, the scientists who study historic iron making and I can form a more complete understanding of the bloomery process.

From my historical research I can pretty well make the case for bloomery iron making occurring on the lower James River between 1607 and 1690. I have been working very closely with the Virginia Research Center for Archaeology on the iron making debris and related artifactual material found in a series of shallow pits on the William Drummond site at Governor's Land (ca. 1680).

As far as demonstration of the process, the major event was the workshop on the industrial archaeology of iron making, which we sponsored at the end of March. These industrial archaeologists, historians, and metallurgists were put to work at running the bloomery during a day-long demonstration. Afterward they heard a series of reports on iron-related sites that started with the seventeenth century and ended with the last of the charcoal iron furnaces in Virginia, which went out of blast in the 1920s. I also arranged to have the artifacts from Jamestown Island (1620) and from Governor's Land (1680) on exhibit during the workshop.

The significant interpretive event was the videotaping of the bloomery for the "Woodwright's Shop," Roy Underhill's nationally televised PBS series. Collaborating with Roy in showing the entire process from mining, smelting, and producing a finished artifact in twenty-six minutes of air time was not only a challenge but hard work. On the show I was able to use a three hundred-year-old chisel found at Governor's Land, and Ken Schwartz reproduced it out of the bloomery iron and steel. At the end of the show the public sees the artifact and the reproduction side by side, and then Roy shaves a piece of wood with the reproduction. I can't think of any better way to show people how we work as museum craftsmen.

BT: What recommendations do you have for other interpreters with similar desires?

DH: Learn as much as you can. Read many books, and especially track down the footnotes and bibliographies. When you've exhausted the printed sources, write letters to the authors and scholars who specialize in that subject. Make sure to encapsulate the research you have done so that they won't waste time telling you what you already know. Archaeology has been a virtual gold mine for my research, but there are other resources as well—look anywhere for information. Put all of your information into a notebook in an organized fashion and then go to your supervisor and the programs manager. Work closely with both of them to develop your proposal. It is essential to take your time on this no matter how impatient you are. At the end of this process you should be able to state the project purpose in one concise sentence. Every action and word of the project should be an elaboration of your purpose. Once the proposal is ready, submit it for approval, but remember, it is difficult for a manager to *buy ideas*. Construct the program so that it has minimal

budget impact during its developmental phase. You will then sit through several meetings while the proposal is read and considered. Do not make immediate changes in your ideas but walk away and consider very carefully what the managers have told you. You will have to compromise and negotiate somewhat on your proposal, but that is natural. If you do take issue with something, make sure that it is essential. (Read your statement of purpose. Is this being altered?)

Once the proposal is accepted, sit down with your supervisor and a calendar and work up a schedule for your project. I have found that it is essential for me to carry a notepad with a "things to do" page. At this point focus on the details, step-by-step. Much of your time spent on this may be your own. You must be willing to work on days off or at night on the project in order to make your goal a reality. If you have other people helping you on the project, make sure that you get your hands dirty and that you work just as hard as they do. Thank the people who help! Often they aren't obligated to be there. Recognize their contributions at the end of the day. In all, treat your supervisor, managers, and co-workers as you would like to be treated, and you will be amazed at how much fun you can have developing your project.

BT: Finally, what is your definition of a good interpretation?

DH: A good interpretation is direct, simple, and it involves the public on a much deeper level than what is apparent at the moment. I personally dislike interpretations that throw words at you like an artillery barrage. It is important to use silence as an interpretive tool because this frames and punctuates everything you do and say. I like interpretations that involve the visitor directly, because it is much more valuable for the visitor to hold and feel an object than it is to talk about it. I have found that the most difficult skill to acquire as an interpreter is *listening*. Make sure that you understand the question or comment and its intent. Answer questions directly in one or two sentences and then elaborate if necessary. It is also paramount to tell the truth. If you are unsure or if you don't know the answer to a question, then say so! People can identify with this—it is a universal experience. Last but not least, the best interpreters *have fun*, they enjoy what they are doing. This attitude is essential for any kind of education to take place. It is very difficult to learn from someone who is bored, burned out, angry, or sad. Having fun in a busy history museum is a challenge when you encounter literally thousands of people a day.

The King's English

Bloom—derived from old Germanic words for "flower." A pasty lump of raw, unhammered iron.

Bloomery—a small furnace for making iron blooms. A bloomery can be a furnace used to smelt the ore directly into a bloom or it can be an oxygen-rich fire used to refine the carbon off of cast iron in order to produce blooms. Valley Forge and nearby Providence Forge were such operations.

Slag—a glassy waste from iron smelting, which is formed from the dirt, sand, and clay that were in the ore.

Smelt—to melt ore for the purpose of separating the pure metal from extraneous substances; to refine or extract metal in this way.

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