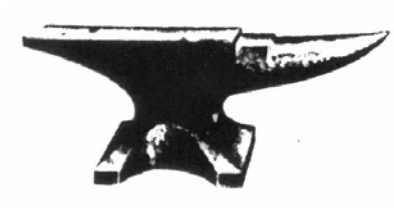
New Jersey Blacksmiths Association
"EAGLE"

N.J.B.A.

NJBA Volume 11, Issue 2 08/01/06

Editors Soapbox

Hi, to all! The temperatures are dropping and winter its on it's way so let's get together and come out the Holiday Party at Marshall's home. If you have any recent item to show off bring them along and if you are making item for the holidays share the ideas! Sorry the newsletter is running late but there have been some problems on this end, actually I need longer days or more time in the ones I have. The next event is a meet at Eric Cupers shop in February, so I hope to see you soon. Larry Brown, Editor



Upcoming events for 2006

Get you calendars out and mark these events down. Please bookmark our web site and check for meet information. Remember most of our meets have an "Iron in the Hat" drawing, so be sure to bring something.

December 3rd
Holiday Party at Marshalls home in Howell. Information on this page.

February 17th
Meet at Eric Cupers shop in Easton, PA. (Right over the boarder)

March ?
We are setting up a forge hood workshop. Those who are interested contact Dave Macauley or Larry Brown, More information in the next newsletter in February

NJBA Holiday Party!

The holiday party is to be held on December 3rd at Jan and Marshall's house starting at 2PM. Many thanks again, to Marshal and Jan for opening their home to us in the holiday season. Guests are asked to bring a covered dish, salad, desert, etc. and your favorite beverage. Please coordinate with Jan on what to bring. NJBA will pick up all of the utensils, plates, cups, and some soda. Members are asked to also bring various trivets, candle holders, or other holiday items they are making to the party. Despite the emphasis on blacksmithing, members are encouraged to bring their families.

Directions to Marshalls' Home:

Marshall and Jan's "cabin" is not on Marshall's farm, but about 3 miles east of it on the same road. Casino Drive is just off Rt. 9, about 3.5 miles north of interstate I. 195 (exit 28). and about 4 miles south of Rt. 33. Either of these routes can be easily reached from the major north-south highways including the Gar-

The NJBA Web Site!

The NJBA Web Site is up and running at:

http://njba.abana-chapter.com/

The Newsletter is at:

http://
members.bellatlantic.net/
~vze25jcc/index.htm

Official NJBA Address

NJBA
P.O. Box 224
Farmingdale, NJ
07727-9998

Rather than use room in the newsletter, All correspondence between ABANA and NJBA is now being posted on the NJBA web site. If you cannot access it there, contact me and I will send you copies

NJBA Board of Directors

February Meet at Eric Cuper's Studio

On Saturday, February 17, I would like to invite everyone out to my studio in Easton, PA for another winter meeting. I plan on demonstrating several forging techniques including the forge welding of my squid forms. This involves pipe forging and about a dozen forge welds so safety glasses are a must. Tailgating is welcome and the heaters will be on. Hope to see you there!
The address is:
1301 Lynn Street
Easton, PA 18042
Any problems finding my shop, call: 908-642-6420 or 610-438-8694

Directions:
Assuming everyone is coming from the east. Get to 78 or 22 west from wherever you are coming from. 78 and 22 merge for a while. Take the last exit in NJ, which is 22 into Phillipsburg. Take 22 all the way through Phillipsburg, through the toll (75 cents) into PA. You are taking the very first exit immediately off the bridge so stay to the right out of the toll. Exit right and stay to the right on the exit ramp and pass under 22 until you come to a stop sign at Larry Holmes Drive. Turn left onto Larry Holmes Drive. You pass McDonalds and WaWa on your left. Take the first left onto Lehigh Drive immediately after the WaWa strip mall. My shop is on the corner of Lehigh Drive and Lynn Street. It is the first white building on the right, my shop may be entered through the green door. Parking is available in front of my entire building and all up Lynn Street but please do not park in the driveway on the left side of my building, it is an active driveway for a delivery company.

You may also take 78 west into PA (also a toll) and take the first exit in PA. I do not know the street names but turn right at the end of the exit and follow the signs for the Crayola Factory/ Canal Museum/ or Attractions. These signs will bring you to a light with McDonalds on your left. Turn left at this light and take the next left onto Lehigh Drive as above.

CUPER STUDIOS
Eric Cuper, Artist Blacksmith

Cuper Studios specializes in architectural, functional, sculptural, hand-forged ironwork and restoration.

Eric Cuper, the founder of Cuper Studios, holds an MFA in Blacksmithing from Southern Illinois University at Carbondale. While at SIU, Eric won the prestigious Rickert-Ziebold Trust Award, a senior competition in art and design. He was also the First Place winner at the James Renwick Alliance student competition. His work Odyssey was auctioned to benefit the Renwick Gallery of the Smithsonian Institute. Eric's work is exhibited and collected nationally. His art has been published in Dona Meilach's books, Architectural Iron Work and Fireplace Accessories.

March Forge Hood Workshop

We are starting to arrange a forge hood workshop for March. All who are interested contact David Macauley or Larry Brown to get your names on a list in case the participants gets limited.
Date(s) and cost to be determined

Employment

Metal Fabricator/Welder:

Fabricator and Working Supervisor positions available. Must have experience in high-end custom fence and gate fabrication and installation. Measuring, design, layout and computer knowledge preferred. Benefits and pleasant work environment. Fax resume to 973 481-5551.
www.airmetmetalworks.com
Airmet Metalworks
671 North 3rd Street
Newark, New Jersey
973 481-5550; office phone

Web Links

Any members who have web sites and want to list them in the newsletter or as links on the web site contact Larry Brown

Delaware Valley Old Time Power Show

Report by John Chobrda

The "Days of the Past" old time power show was held this September and NJBA was there again demonstrating. True to form we had rain again. Friday was a total wash out with only a few people arriving with there antique engines, tractors, and trucks. The field was very soft and muddy from the previous rains. Mike Erdie, Mitch Swirsky, and I (John Chobrda) arrived with the trailer, set up the rain tarp and sat back to watch the entrance turn in to a hog wallow. It's amazing just how many four wheel drive vehicles got stuck in the mud.

John Chobrda forging baler hardware

We even watched a small dozer get mired down.

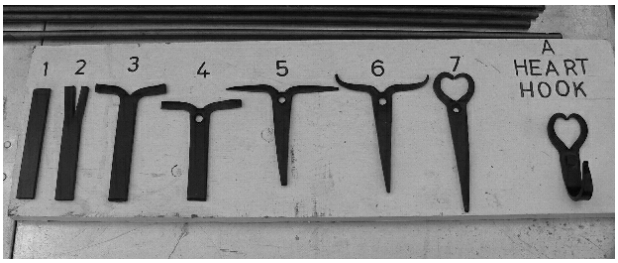
The sun came out Saturday and things started to dry out (but there were still some very wet spots) we set up the equipment, started a fire, and started forging. Mike Erdie forged and sold a bunch of heart hooks and got some of the young people in the crowd to help crank the blower and do a little forging. Mitch Swirsky was our interrupter, explaining to the onlookers what we were doing, and forged a few leafs. A member of the group that runs the show came with some broken pieces off of an antique baler and asked if we could forge some new pieces for him.

Sunday was a warm beautiful day and the crowds responded by really coming out. Mike worked on some more hooks, finished up a bell he has been working on and we helped one of the young show attendees forge a heart hook to take home. Mitch was our lecturer again and I finished the hardware for the bailer.

We had some NJBA members show up over the weekend Larry Brown, Tom Majewski, Larry Fogg and Tom Eden. We hiked up to the flea mkt. area a couple of times but only saw one anvil (beat and overpriced) and some foundry tongs (so I saved money). One day the owner of the steam tractor that was there parked it right next to us, so between the sound of the steam whistle and the ring of the anvil we had a large crowed all day. All in all it was a nice weekend and if you could not make it this year we hope to see you next September.

Mitch explaining

Mike Erdie teaching at the forge



Heart hook demonstration board

Report on the MASA Conference

From Bill Futer

Just a short note on the MASA conference. I got there at about 8:30 and already the place was hopping. John Chorbda arrived at about the same time. Also making an appearance was Tim Suter and his friend whose name unfortunately I can't remember. There were just a few blacksmith tail-gaters, but another tool group was having a 'yard' sale on the same day. There were a lot of interesting machine tools, metals, and various pieces of equipment.

Dan Boone and Glen Horr were the demonstrators. On Saturday, Dan made his famous dragon head which is to complex to detail here, but we did get a small booklet on how to accomplish this. Glens demo was on how to use an air chisel to move metal in a very short time. He made a smaller dragon head in about 20 minutes. Of course there was the Iron in the hat and auction. Dan's sample dragon head went for $135. Dinner was roast beef or chicken breast sandwiches with all the fixins. After dinner there was an informal question and answer session, a lot of it centering on pricing your work and how to handle yourself at craft fairs.

Sunday Dan made some quick and relatively easy projects in response to the question session. He made a firepoker, wall hanger, corkscrew all within 15-20 minutes. Glenn continued with the fair scenario and made a nice bottle opener, large leaf wall hook.

Bottle opener:

¼ round x 6 inches. Forge one end to a screw-driver type taper. Scroll this end to a diameter of 5/8. The other end taper round and scroll to make handle.

Walnford Day

NJBA's participation in the event was canceled by us due to rain. We look forward to a invite again and better weather next year

The Scrap Corner;

Aug. 9, 2006

Submitted by Tim Suter.

If you have a problem or a solution send it in and we will publish it to help you or others.

PROBLEM To hold small pieces firmly in position on irregular surfaces for tacking, gas, MIG or stick.

SOLUTION - Use Babbitt Right, the clay like substance used to make dams for Babbitt pouring. It has very good adhesion but releases cleanly. It has good heat tolerance and can be used multiple times before it becomes to dirty to work well.

Grip the piece with a small vise grip. Place a suitable sized gob of Babbitt Right close to the location then press the body of the vise grip into the gob and adjust to suit.

For Sale

I am selling a Landis Machine sanding machine and also a Landis Machine polishing machine.

Both machines are manufactured by Landis Machinery in St. Louis and were purchased from a saddle & tack shop that went out of business. The smaller one is a sanding machine & the larger one is a polishing machine (Landis 100 model). They were both used to work leather, but could also be used on wood or metal, etc. They would work well for knife making. Both have dust collection systems w/bags (one bag is decent & one can be used as a pattern for a new bag). They could also be hooked up to a modern dust collection system w/ a few 6" stove pipe fittings. Both are 110v. The polishing machine runs. The sanding machine may need a motor or switch. I haven't taken the time to diagnose it. There is some extra belting and some sanding paper sized for the sanding machine. They were originally purchased to use in my shop, but decided I need the space for a wood lathe instead. They need to go. I'd like to get $200 for both of them, just to get my investment back. I can load them on your truck or trailer here at my shop in northwest NJ.

Please pass this on to anyone you might think would have an interest in them. Any questions, please email me back or call me on my cell phone, 908.337.2057. Thanks, Roger Dixon.

Peters Valley Pig Iron Fest and Iron Smelt

by Larry Brown,

The Pig Iron Fest was held on October 7th this year, which was later than usual to take advantage of the cooler weather and to avoid scheduling conflicts with events in other areas.

Bruce Ringier

Josh Kavett

It was held in conjunction with a three day Iron Smelt with the two events having an overlapping day on Saturday. People attending the Pig Fest could watch the iron fest but they couldn't participate unless they had paid for that event. Dick Sargent, who is the head of the Peters Valley Blacksmithing Department, spent most of the day interpreting what was going on at the iron smelt to spectators as the smelt was held behind the shop in front of the barn.

There was food aplenty with a pig and a large piece of beef cooking in ovens on spits. It was delicious to say the least.

Bruce Ringier was selling raffle tickets for a few items, including an anvil. After the initial round of beer, other beverages and food, Bruce Ringier became an auctioneer. With the help of Josh Kavett showing the items, he auctioned off the donated pieces of forged art pieces, tools and other items. Many of the items are donated by smiths who have taught there over the years and by people who have enjoyed taking classes there.

The Star (The Pig)

In the afternoon several smiths including Tom Ryan gave demonstrations. Tom demonstrated forging some of the iron from the morning iron smelt and then proceeded to draw different shapes out of the bar he was working on the power hammer. It was getting too crowded in the shop too see well so I went outside and missed the rest of the demonstrations that Tom gave and the smiths who came afterwards.

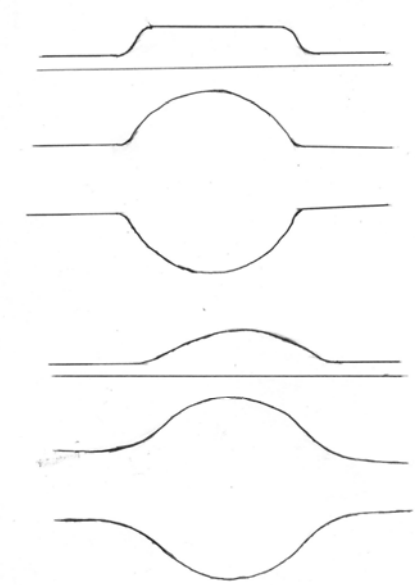
It was a good time with a lot of nice people, although is could and should have been better attended. Peters Valley offers the best opportunity in NJ to learn blacksmithing and we should show our support for it so it will still be there when we want to go there. So next year lets have more than just a few NJBA faces there. For more information on the Iron Smelt look for the article in this newsletter by Bruce Freeman about the summer class held at Peters Valley.

Tom Ryan

Jonathan Nedbor Meet on Oct 14th

Report by Larry Brown, pictures by Larry Brown and Bill Futer

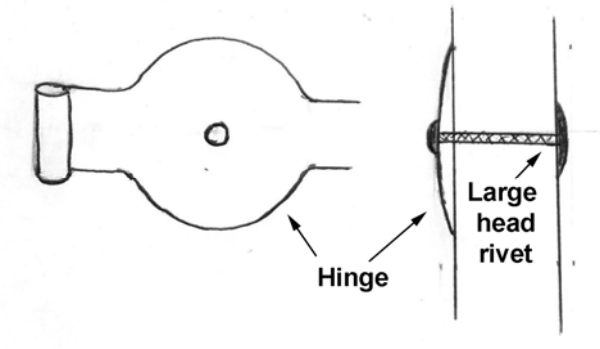
On Saturday October 14th NJBA hosted a demonstration by Jonathan Nedbor of High Falls, NY at the shop on Marshalls Farm. The weather was good and we had a turn out of about 25 members. Jonathan started by discussing old iron work and the rediscovery of the techniques used to make it. By understanding the technique you can try to determine the region of Europe the smith was from. He discussed how the transition of mass is important in setting up your forging work, especially



More abrupt changes in mass give a sharper corner when forging out the hinge.

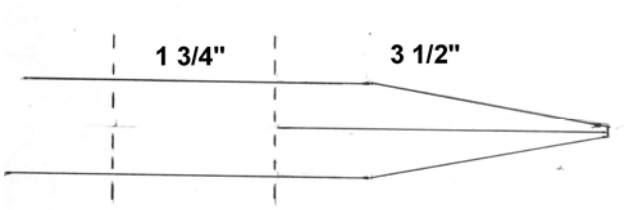
Less abrupt changes in mass give a more rounded corner

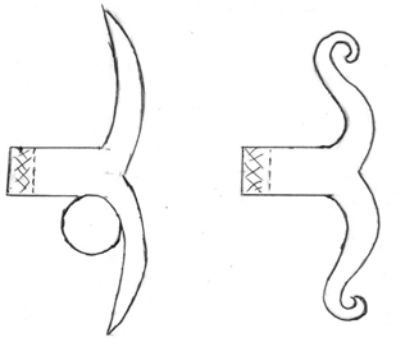
in relation to making hinges. By forging sections of the bar thicker and thinner, you can then go back and forge the thick areas wider and the thinner areas less to create the different sections of the hinge.



Next he discussed some of the old hardware he has collected and some of the pieces he brought to show. He had one hinge still attached to a piece of the door showing how many times a large flat head rivet was used to hold the hinge to the door using the first hole in the hinge. This would hold the hinge securely to the door and the rest of the nails going through the hinge would hold the hinge straight and hold the door together.

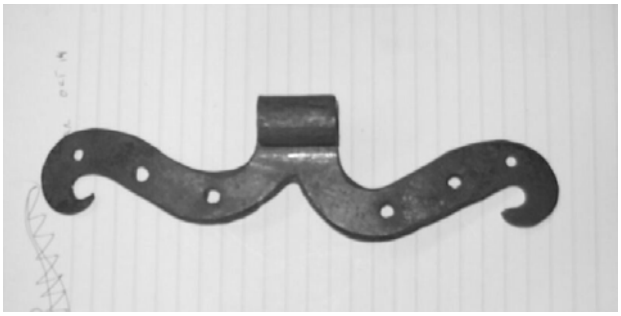
Next he made a moustache hinge from 1/4" x 1", tapering the end for about 3 1/2" then splitting part-

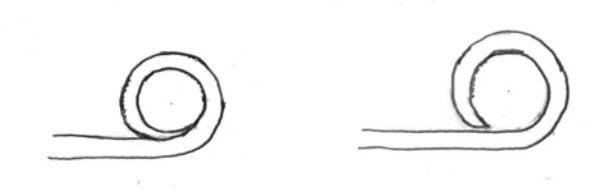




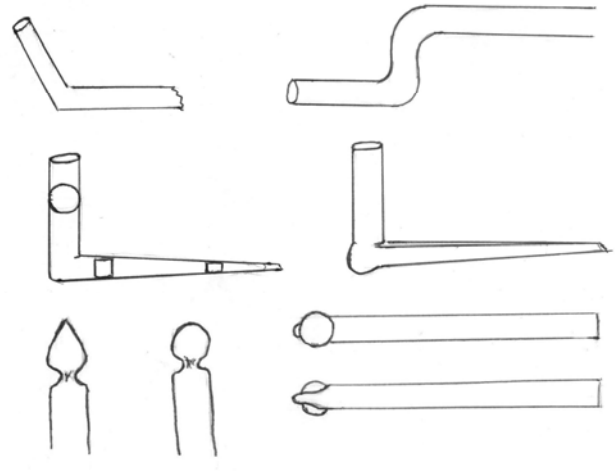
way from the front with the slitting chisel and then shearing it open using the leg vise to hold the piece along the slit line. He then cut off the piece 1 3/4" from the end of the split and tapered the end so that it was 2 1/4" long. The split ends were then worked out over the horn and then on the face hitting the back side of the hinge to spread. Work the outsides of the hinge to form the ends.

He showed two styles of eyes for Dutch hinges, neither of them welded. one is rolled to a short taper butt end and the other tapered more so it rolls around inside behind the pintle.





Tapered Hinge Eye Butt Hinge Eye



Pear Apple

He then showed a pintle he had that showed how the smith who forged the pintle did so

in such a way as to have the elbow end stick out a little past the shaft of the pintle, strengthening it and giving a surface to hammer on so as not to bend the pintle. He bent the rod to about 60 deg. , then cooled the end and hit it to upset the elbow in the corner as the bend was formed. He then put a convenience bend in the shaft to allow for easier rounding of the pintle section. After rounding the shaft was straightened and the corner was drawn out a little. One pintle should be a little taller than the other to make it easier to hang the door. He showed two decorative ends, a pear and an apple, one a little taller than the other. He says he doesn't finish his work and that he uses a vinegar and salt mixture to pickle the work clean and then tells customer they are responsible for painting immediately to prevent rusting.

Josh Kavett's Fisher-Norris Anvil Museum

After Jonathan finished the morning part of his demonstration, we mover up the road to Josh Kavett's, where he has build a new building to house the Fisher Norris Anvil Museum.

I can't explain how many Fisher Norris items are in the museum, but he has anvils of almost every size and type that they produced. He has the dual screw leg vises they made and the patterns they used to produce the items. All I can say that the museum is amazing without getting into the fire engines and other items he has there. If you are interested in the museum contact Larry Brown for Josh's contact information.

Peters Valley Bloomery Smelting Workshop, July 21-25, 2006

by Bruce Freeman, with contributions by Marshall Bienstock
Photographs by Sean Thorne and Dave Martin

Thursday evening, July 20, I met Marshall at his home and we carpooled up to Peters Valley, where we were rooming at Valley Brook (one of the dormitory houses). Friday morning at breakfast we met Michael McCarthy, who had no trouble recognizing us as blacksmiths.

Mike is a personable character. His bio from the Peters Valley website (PVCrafts.org) reads, "As a demonstrating blacksmith at The Farmers Museum [http://www.farmersmuseum.org/] in Cooperstown, NY, Michael McCarthy has become one of the leading traditional/research blacksmiths in the country. He is developing the iron bloomery program at The Farmers Museum in association with Rockbridge Bloomery [http://iron.wlu.edu] and Wareham Forge [http://www.warehamforge.ca/]. He is a cofounder and director of the first and second annual Iron Smelting Symposiums of 2004 and 2005 in Cooperstown, NY."

Bruce watching, Dick breaking charcoal 2-handed, Mike supervising, Dave and Marshall (hidden) breaking charcoal

After breakfast, the class met at the blacksmith shop. In attendance were Mike, Dick Sargent (artist blacksmith at PV), Beth Slater (this summer's blacksmithing assistant at PV), Dave Martin, Sean Thorne, Philip Kim, Marshall and I. Unfortunately, the weather was not cooperative, being rather rainy on Friday and Saturday.

We started with some preparatory work toward the smelt. We started by grading the charcoal. Dick had ordered in a pallet commercial hardwood charcoal, which proved quite good. Mike had brought down a grading table, consisting of a sheet of expanded metal (diamond-shaped openings roughly 1" wide by 2.5" long), with an sheet of expanded metal (openings roughly 1/2" wide by 1.25" long) beneath at an angle.

We poured a sack of charcoal on the top and whaled on it with wooden mallets, then sieved the pieces on the lower sheet with a hoe, accumulating a box of fines, the rest being the "graded" charcoal for the general charge.

Roasted ore for crushing

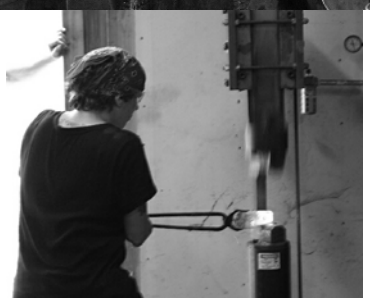
Meanwhile, we broke up some previously-roasted iron ore in a sturdy metal box, reducing it to "sunflower seed" size. We also selected raw ore for roasting. and set up a bonfire in which to roast it. (For further reading on iron ore, see http://en.wikipedia.org/wiki/Iron_ore.

Mike tending the bonfire to roast the ore

L to R -- Ore on pickup truck. Dennis (visiting), Mike, Dick (laying base sheets for bonfire), & Bruce

Bucket of ore, ready for charging into furnace

With some of the preparation work out of the way, we recessed to the blacksmith shop where Mike demonstrated forging a bloom from a previous smelt. To get a large enough fire on an ordinary blacksmith forge, he placed firebricks around the firepot to deepen the fire. Then, with Dick manning a sledge hammer, he consolidating the bloom, which is rather porous as it comes from the bloomery.



Mike and Dick working the bloom. Beth working the bloom on an air hammer.

This turned out to be akin to a crucible furnace or a small cupola furnace, but with some critical differences. Our bloomery furnace has a floor of charcoal "fines", and a downward-directed copper tuyere (3/8" copper sheet rolled into a conical tube tapering from about 2" down to about 1" ID). The fines act as an essentially inert catch-basin for iron and slag, and the downward-directed tuyere ensure that the iron collected remains in an oxidative atmosphere. The copper tea is thick enough and conductive enough that it does not burn or melt during ordinary operation, providing it is kept clear of slag.

(A cupola furnace, by contrast, has a number of tuyeres above the bottom of the furnace. Hence, these serve only to supply air to the burning coal. The molten, high-carbon iron (i.e., "cast iron") and the slag drop down below this, with the slag forming a protective layer above the iron so that the carbon in the iron is not oxidized away.)

Despite the rain, we began work on a bloomery furnace. We started by setting up a tarp on a peaked pipe framework Dick had kicking around. Then Mike arranged placed a steel plate up on bricks, and arranged four cement blocks on this to make a square, which he then filled with charcoal fines. Atop this, sticks about three feet long were bundled into a conical mandrel and taped together. Gaps were filled in with smaller sticks. Our work was interrupted at this point by dinner and a slideshow by the demonstrators.

Mike assembling the mandrel (form) for the furnace.

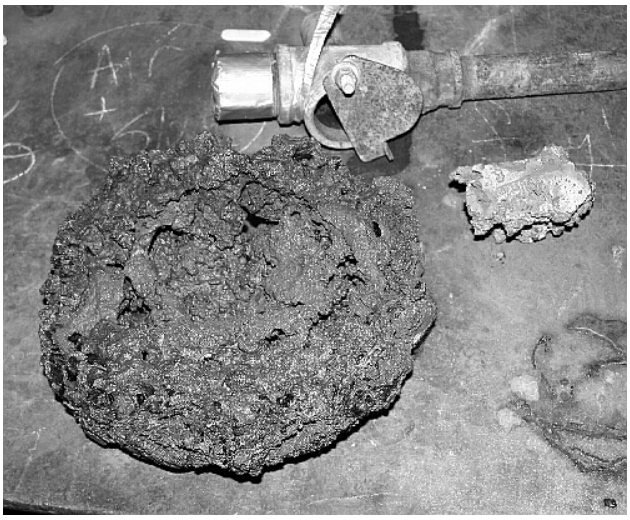
Saturday morning we completed the furnace. A couple bags of ball clay and some short pieces of hay were then mixed with water and applied to the mandrel to make a wet clay cone, about 2" thick, about a foot across in diameter at the base and about two feet high. The structure tapered slightly to the top, then flared. The furnace tapers inward on the inside as well so that the ore will tend to drop straight down, away from the walls of the furnace. If hot ore encounters hot clay, the result may be a "wall gromp," - a lump on the interior furnace wall that both wastes ore and constricts the furnace. (For further informtion, see http://www.jernmager.dk/docs/Treatise%20on%20iron%20smelting.pdf.) Mike cut a hole for the tuyere, and also marked an arch about 3" high and about 8" wide on one side.

The base for the bloomery furnace: Four cement bricks on an elevated steel plate, the center filled with charcoal fines.

The partially completed clay furnace and Dave and Marshall finishing clay furnace.

Mike then had us ornament the furnace in various ways. To my surprise, he then removed the wooden mandrel from the furnace piece by piece, before starting a fire inside to cure the furnace. Not to my surprise, the structure soon sagged. Mike attributed this to the very damp weather. As the inside dried and firmed up a bit, he and others carved off the worst of the sags from the outside. Then fired the outside of the furnace, leaving a much firmer structure. Since the furnace had sagged about six inches, we then added clay to the top to build the height back to two feet.

Mike then installed the copper tuyere in the furnace and attached the air plumbing to this. This plumbing consisted of a turbine blower discharging into a 2" flex tube, which supplied the tuyere via a 1.5" plumbing cross. Opposite the flex tube on the cross was a vent, consisting of a simple pivoted plate to open or close this leg of the cross. Perpendicular to these was a removable sight-glass on one leg and a length of steel pipe, tapered on the far end to fit the copper tuyere. (The tuyere must either be stout copper or must be water-cooled steel. Uncooled steel would burn up in the furnace.)

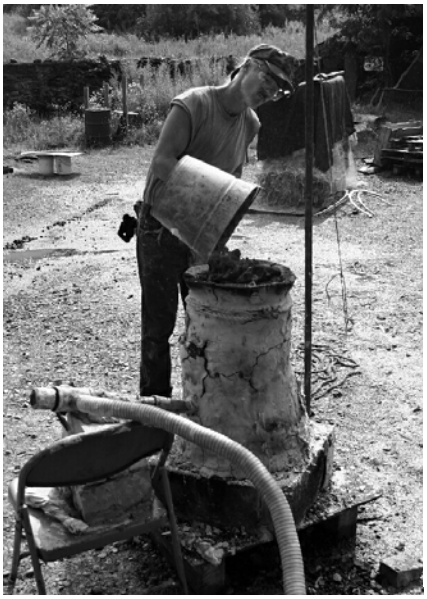


A well-formed bloom (note bowl shape) from a previous smelt. Middle ground: The plumbing to supply the tuyere, with tuyere-connection to the right, inlet back, blast control vent front, and sight glass to left.

We continued firing the furnace with wood until Mike judged it ready for charging. The furnace developed cracks during the firing, and at first we tried to keep them plugged, but eventually we learned we could tolerate considerable leakage.

We used one bag of upgraded charcoal for the first charge. Mike turned on the blower, setting the vent upstream of the tuyere to a known setting so the blast was predictable. As this burned down, we fed in about six 4 lb charges of graded charcoal, which Mike estimated was sufficient to fill the furnace. At this point, the smelting began. Mike had me keep records of the smelt. Dave made of 4 lb charges of graded charcoal whenever the dome of charcoal at the top of the furnace had burned down sufficiently. At the end of each charcoal charge Marshall charged a variable amount of crushed ore.

We started with small (~1/2 lb) charges of ore along with each 4 lb charge of charcoal. Mike was shooting for a burn rate of 8 to 10 minutes per 4-lb charge of charcoal. If the burn rate was faster than this he would increase the ore charge; if slower, he would decrease it.



Charging the furnace with charcoal.

However, as we continued the smelt, pulsing of the blast could be heard and the tuyere showed signs of plugging (visible through the sight glass). Mike tried "rogering" out the tuyere (by removing the sight glass and covering the opening with the

hand while running a 1/2 steel "roger" rod down between the thumb and forefinger), with some success. The cause of the problem became obvious when the outside of the furnace began to spall off in places. By this time, there were many cracks in the furnace and small flames were issuing from these cracks. This alone was not a problem, but the spalling on the outside was certainly mirrored on the inside. These little pieces of clay react with the slag and iron, making a treacle-thick slag and ruining the smelt. Mike attempted to rectify the problem by adding iron, in the form of blacksmithing scale, and this did thin the slag. Ultimately, however, the furnace started breaking up and before we'd charged 40 lb of ore we had to abandon the smelt. We continued the blast into the broken furnace to burn up the remaining charcoal.

Later, we examined the residue from the bottom of the furnace. There was some sign of iron, but very little. It was clear that the clay that spalled from the inside of the furnace had ruined the smelt. Mike feels this would have not been a problem if (1) the weather were dryer, aiding the ball clay to dry, and (2) if we'd been using a different ore. Mike felt that the ore we were using, which he and Dick had mined in Virginia from a limestone stratum, was too reactive with the ball clay. Mike recommends using a known furnace type (e.g., a furnace made of a known clay) with a known ore type before experimenting with different materials. He says small changes in materials may lead to large changes in results.

Because of the reactivity of the ore with the clay, Mike decided we'd have another go at building a furnace, but using a different approach. He'd had considerable luck recently with a furnace built from a 12" flue tile. (A "flue tile" is a fired clay pipe, square with rounded corners, used in the construction of chimneys. See http://iron.wlu.edu/ Bloomery_Iron.htm and http://iron.wlu.edu/ Coatedtyle%20Construction.htm) Dick was unable to find a dealer that stocked flue tiles that would be open before Monday morning, but Bruce Ringier (NJBA director and PV board member) thought he could get one for us.

In the meantime we cut up a steel bloom (yes, you can make steel in a bloomery) from a previous smelt by heating it in a gas forge and cutting it on a

Dick holding the bloom, Marshall holding the axe, while Dave and Mike strike

wet stump with a sledge-driven axe. Mike and Dick gave us pieces of this bloom to work in the blacksmiths shop. We worked one piece, squaring it off, then folding and rewelding it a few times, Marshall as smith and I as the striker.

Sunday, Bruce Ringier came through with two 12" flue tiles, two feet long. Dick picked these up from Bruce's farm and we started work on them. First you mark the tuyere hole and the arch (90 degrees apart). The tuyere hole should be at the center of one side, seven inches above the bottom. This hole is not round, but elliptical, because the conical copper tuyere is to be with an downward angle sufficient to point at a spot three inches above the bottom of the opposite side. The hole should be about 1/4" wider and 1/4" longer than needed to fit the tuyere tightly when inserted 3" past the inside of the furnace wall and properly angled downward. You rough out with a 1/4" ma-

Two 12" flue tiles supplied by Bruce Ringier. Marshall in the background.

masonry bit in a hammer drill. The arch is 3" high at the center and about 8 5/8" wide at the base, and is "nibbled" out using a Stilson wrench. We prepared both tiles. to this stage.

We then turned one of these tiles into a furnace. Next we mixed up an equal amount of clay and cellulose-insulation fiber with water to make a lumpy paste (it is a mistake to make it too smooth, as the insulating properties of the cellulose would be lost), and applied this to the outside of the tile, that had previously been coated with clay slip. This was covered with a cylinder of chicken wire, the edges tied together, and tightened by appropriate crimping of the loops. An outer layer of the clay mixture finished the furnace. The arch and the tuyere hole were cut out again, and the furnace fired inside and out with wood.

Next, we carried the tile furnace out to the site and set it on the same foundation we'd used for the clay furnace- four bricks with charcoal fines filling the space between - such that each corner of the tile was supported by a brick. Since this furnace was of prefired ceramic, spalling would not be a problem. However, cracking began even during the wood-firing stage. That was the reason for the clay -and-chicken-wire coating. (The cellulose fiber is for insulation, but probably adds strength as well.) As we fired this furnace, we poked the clay full of holes with 1/8" wires to let out the steam from the wet clay. When Mike judged the furnace ready, we charged it with a bag of ungraded charcoal, he inserted the tuyere, using clay to seal between the copper and the furnace wall, and started the blast.

Dave and Marshall applying the outer layer of clay

I again did the recordkeeping. As before, graded charcoal was added in 4 lb charges. After 28 lb had been added, we began the ore charging. The first ore charges were 1/2 lb, but Mike gradually had us increase the ore charge to 3.5 lb, before stabilizing on a rate of 3 lb ore for 4 lb of charcoal. We maintained this charge ratio for 3.5 hours, with 6.5 to 9 minutes between each charge. The smelt was fairly well behaved. Occasionally, one of use would roger out the tuyere, but little of this was needed.

The furnace burning charcoal, showing cracks and the holes made to release the steam from the clay.

During this process slag would occasionally run like water from cracks at the bottom of the furnace - a good sign. Mike said this was a high-iron slag that he referred to as fayalite slag (see http://en.wikipedia.org/wiki/Fayalite). We charged much of it back to the top of the furnace. This was partly to reclaim the iron from the slag. However, the

The furnace in blast. Marshall charging ore. Dick viewing the smelt through the sight glass. Mike and three visitors watching.

The furnace in blast. Dave charging coal.

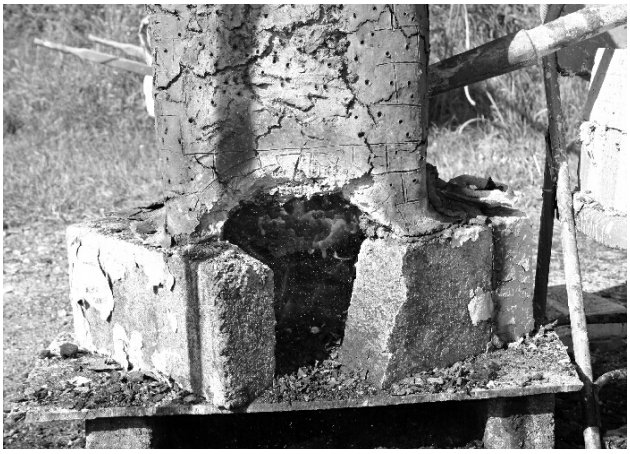
Mike examining the slag running from the furnace

mass of molten material at the bottom of the furnace also acts (in Mike's words) like a "thermal flywheel." This hot mass of slag and wrought iron seems to aid the smelt.

It is my conviction, and I believe Mike's as well, that as the ore is reduced in the furnace stack, the first iron formed is "cast iron" - high in carbon and molten at the furnace temperature. It is only when this liquid, high-carbon iron falls into the direct blast of the tuyere that the carbon in it is oxidized out, leaving wrought iron. This would explain why small changes in smelting conditions can produce wrought iron, steel, or cast iron - a fact observed by Mike and others.

By the end of this smelt, we had charged slightly more than 100 lb of iron ore - the maximum a furnace of this size can handle. Mike expected about 40 lb of iron from this, at best. We stopped charging ore, and began the burn-down of the remaining charcoal. During this time, Mike and Dick opened the arch and built a wood fire under the bloom to keep it hot. After another hour and a half, the charcoal was largely consumed and it was time to break out the bloom. First we tried to do this without wrecking the furnace. Unfortunately, the bloom was firmly attached to the bottom of the furnace and could only be removed by breaking the structure. Therefore, we knocked over the furnace and broke the bloom out from the bottom.

The bloom was immediately lifted onto a wet log and split in about four pieces with axe and



The furnace near the end of the smelt. Half of one brick removed. Bottom of bloom is visible.

sledges. Once these cooled, we weighed them and found the good iron pieces to weigh about 35 lb - not bad at all.

Tuesday, the last day of the class, we spent the morning working on the pieces of the bloom. By building up the forge with bricks, it is possible to get enough heat to heat a large iron chunk. I, however, chose a rather small piece of the bloom and worked it on an unmodified forge, using a hand hammer. I was impressed with how little slag was incorporated in the bloom. However, a welding heat and heavy blows are needed to fuse the bloom into a block of iron, so I desisted till I could get to the Grasshopper Treadle Hammer. (The following Monday, I tried this, but having not built up the firepot with bricks the way Mike did, I couldn't get the necessary heat from the fire without overheating the firepot.)

Mike built a wood fire under the bloom, fanned by a second blower, to keep the bloom hot

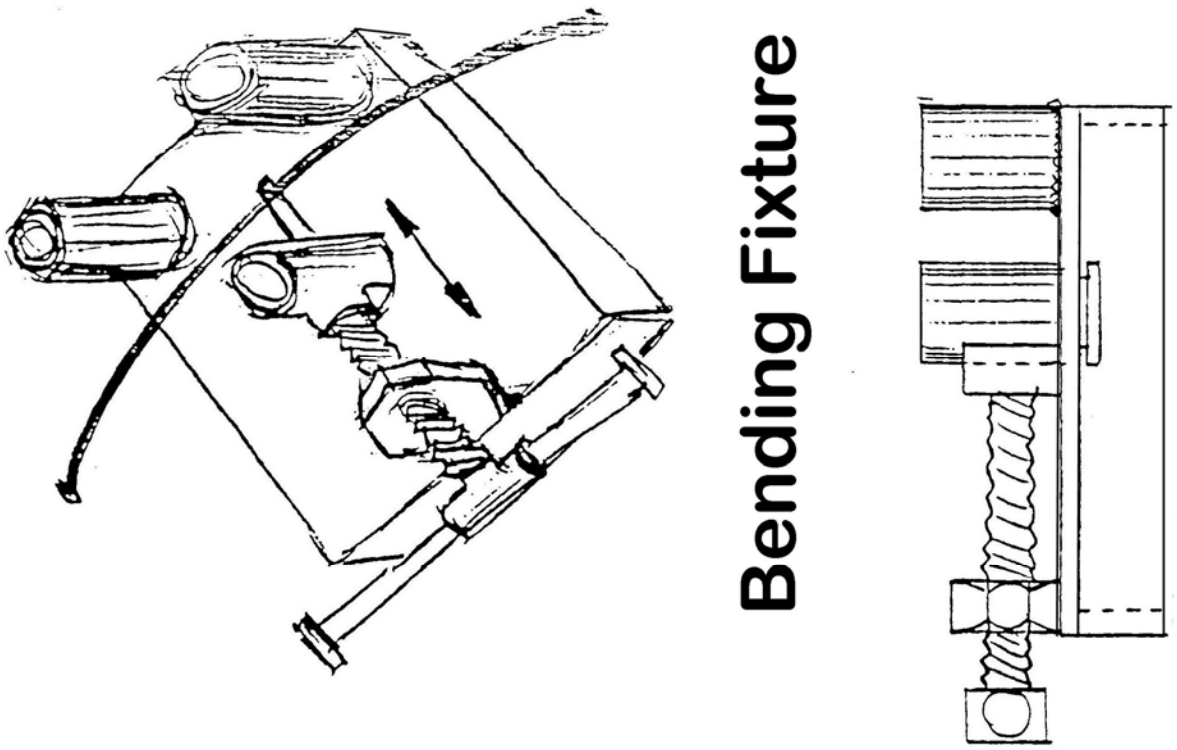
Mike finished the workshop with a demonstration of the use of a simple side-draft forge to oxidize cast iron into steel. This process is a crude form of "puddling." Puddling is normally done in a reverbatory furnace, which separates the iron from the fuel, and produces a wrought iron bloom. We worked with the iron in a bed of charcoal, so oxidized the cast iron only as far as steel.

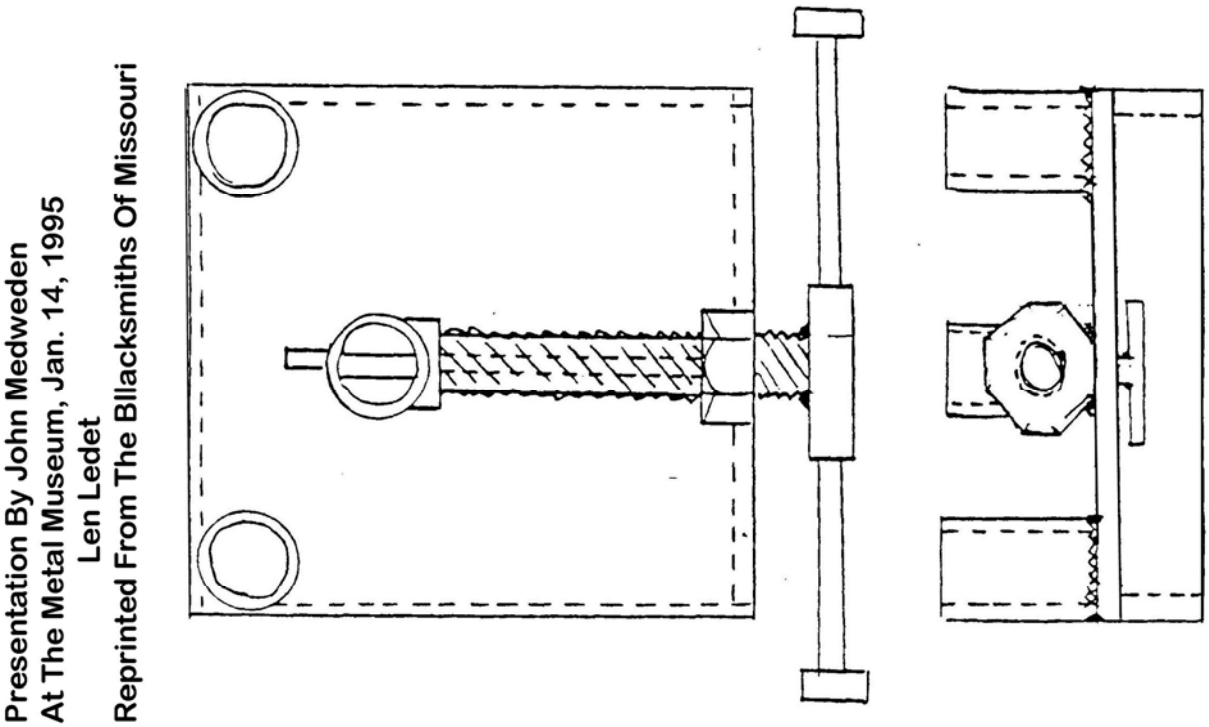
Beth Slater, the Blacksmithing Assistant at Peters Valley, writes:

I'm a student at Marywood University where my concentration is in sculpture. I'm a junior there in Scranton, PA. I took a blacksmithing class here at Peter's Valley with Elizabeth Brim two years ago. I study under Robert Griffith at Marywood. He told me about the summer assistant residency in the blacksmithing with Dick Sargent who he knew 30 some years ago. I applied and was accepted. I wanted to gain skill and knowledge with metals to better my work. So here I am the end of my residency and this experience with Dick, the instructors and students far exceeded my expectations.

I wasn't sure what smelting was when I read through the Peter's Valley workshop catalog for the summer 2006. When I found out what it was I did not think it would be of interest to me. Spending five days making iron did not sound fun until the class started separating the iron and rock. We crushed charcoal, roasted the ore, made not one furnace, but two in this five-day workshop, and finally at the end of it all, produced a beautiful bloom of wrought iron. The hard work, the process, the crew and our fearless leader (who will be at the pig roast and smelt in October) created a wonderful experience for this first time smelter. That's why I'm attending the Peter's Valley Pig Iron Fest in October.

Bending Fixture





Presentation By John Medweden
At The Metal Museum, Jan. 14, 1995
Len Ledet
Reprinted From The Blacksmiths Of Missouri

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Open Forges

We are looking for members who are interested in opening their forges up to members as a open forge. This does not have to be a weekly forge as is Marshall's the others can meet once or twice a month. Please contact, Larry Brown, Editor.

We want to encourage all to join us at:

Monday Night Open Forge in N.J.

Marshall Bienstock is hosting an open forge in his shop at 7 pm almost every Monday night (Please call ahead on holidays to make sure , (732)780-0871)

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Sunday from 10:00 am to 6pm.
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Northeast Blacksmiths holds its meets twice a year at the Ashokan Field Campus in New York State.

The Ashokan campus is located in Olivebridge, N.Y., several miles west of Kingston, N.Y. The meets are held the first weekend in May and in the first weekend in October every year. The main demonstration is in the blacksmith shop and there is a "Hands On" workshop for beginners. A main demonstrator is brought in for each meet, food and bunk-house style lodging are provided as part of the cost of the weekend long meet.

Contact : Tim Neu
to register for hammer-ins
or subscribe to the newsletter;
Tim Neu, Ashokan Field Campus,
447 Beaverkill Rd.
Olivebridge, N.Y. 12461 [914]657-8333
For more information check out the web site; <http://nba.abana-chapter.com/>

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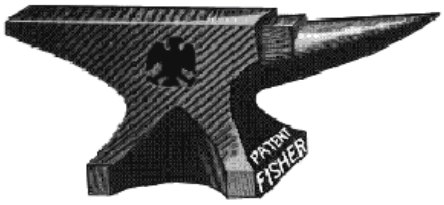

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NJBA Dues are $18 per year (as of July 1, 2001).
Please make your check out to: "NJBA"
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Please include payment with the information listed below. You will receive a postcard confirmation of your membership, and will receive a newsletter within a month. NJBA's "year" runs from June to June. If you join mid-year, the postcard will offer a prorated dues option which will then allow you to extend your membership till the following June. The following information will be listed in a roster available to other members.

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