DUGOUT CANOES

By Oliver Cameron
with Ole Wik

When I was a youngster, I went fishing in a lake that was in a logged-off area quite a distance from home. A couple of loggers had hewed a canoe out of a cedar log.

It was quite a versatile, useful thing for fishing in that particular lake. There were lots of dead snags sticking out of the water, so in most places it was rather hard to fish from the shore. The way they like to fish there was trolling. That's a lot more interesting to me than waiting for a bobber to sink or something like that. Anyway, I have fond memories of the times that I spent with that canoe.

And then when I was in Norway, Heidi and Rein Dammann wanted to build a dugout canoe. The oldest extant boat in Norway is a dugout. Some scientists dug one up in the lower part of the Glomma River in 1997. It was very well preserved, owing to the fact that it was buried in mud all that time. That's the way they preserved their dugouts—they filled them full of rocks and sank them under the water. Otherwise they would have dried out and cracked and so forth.

In the marine literature, they stress that dugout canoes are very tippy, and that unless you're an expert and can swim like a frog, you'd better stay out of them. That's not strictly true, since they have a ballast built into them sort of like a sailing ship, though much different of course.

The outside of a dugout canoe was left just round. On the inside, they were hewn down to a thick, flat floor that was five or six inches wide. The cottonwood soon saturated with water, so it took some force to tip the thing over, though of course it could be done.

Those canoes were designed as float boats. They were made at the head of the river by people who wanted to bring their produce down to the lowlands for sale, along with other things that were available to them in the timbered country. It would have been a major project to carry a lot of produce upstream in a boat, but a pocket full of paper money didn't weigh much. So, rather than trying to paddle the dugouts back upstream, they would just abandon them and walk home.[1,2]

The lifestyle of those people was such that they didn't need to import much. They made just about everything they needed, or it was available commercially near to where they were at home.

Since I was not working on a boat primarily for a drift boat for things that they had up in that country that they could trade or sell, such as pine tar and wool products and cheeses and so forth, I designed the boat that was slightly different at the ends. The boat we made was 32' long or slightly more, and I guess about 20" wide.

The finished dugout. Image: ?

Anyway, I wanted a double bit axe for the project, along with a good adze, a splitting maul or a hammer, some fairly thick wedges with wooden handles on them, a curved blade slick, and some measuring tools. I had to make all of those.

You would think that it wouldn't be a problem to get almost any kind of woodworking tools in a timbered country like Norway, but that didn't turn out to be the case. It's a socialized country, and they're much more oriented toward doing peoples' safety for them. For example, it's illegal to own a double bit axe other than a specialized kind that they use for throwing contests.

I guess that in that part of Norway, at least, they went through the age of woodworking a long time ago, and there hasn't been much of that type of woodworking going on for quite a few years. And then along comes this small gasoline engine with chains fastened onto it.

I guess I could start with those tools. This is infringing on the tool section of our book, but I think that these are specialized enough that it won't hurt to include them here, along with the jobs they're made for.

There was a fellow who had a machine shop right at the highway where the road came out of the forest. He also did a lot of welding, so I made good use of him.

I'll start with the axe. I took two single bit axes and cut them in two right through the eye, in such a way that they could be welded together to make a double bit. I wanted this axe a lot for hewing and for cutting out areas where I wanted the bit to cut in a curve, to facilitate the same thing that we talked when we discussed sharpening a regular double bit axe.

So, I accentuated the shaping of the axe to facilitate that a little bit. Instead of cutting the eyes off square off the single bit axes, I cut them each at a slight bevel. That way, when

they were put together, one side of the axe was more nearly straight than the other. If I'd cut them off straight, the tool would have been the same shape as any axe.

[Drawing here. Where is this tool today?]

The machinist welded the longer side of each axe eye together. Of course I filed the eye out after I got it, the way I described for the other double bits, so that the eye tapered from both sides and the handle drove in there very solid.

I also filed off some of the bulge that most axes have down to the cutting edge, so that the axe had almost no bevel on the shorter side. If you laid a ruler on the short side of the axe head, the end of the ruler would rest on the cutting edge of the bit, just touch the side of the axe at the eye, and then go across to rest against the other cutting edge of the axe.

This was similar to a hewing axe, which is what it was: a double bitted hewing axe. That's why I wanted one side straight.

Hewing broadaxe, showing flat cross-section.
Image: http://axessive.com/

When you're using a regular axe with quite a bit of bevel on it, the eye of the axe has to be up quite a bit above the line of your cut in order to get the bit of the axe to bite. Since the weight is off center from the direction of your stroke, it wants to tip up when it bites. I wanted the weight of my axe to stay more behind the cutting edge when I was using it

Oliver using his custom-made double bit axe in Norway. Image: Heidi Dammann

When I say that the welded axe head was all flat on one side, that's relative. After I started sharpening it and using it, there was a very slight bevel right at the edge, so that the head was just a little bit above the surface that I was working. When I was getting a

chip, the bit didn't want to bite in too much or tend to tip up, the way an ordinary axe would.

The axe was not as heavy as I would have liked, but when I wanted to true up a section of wood, I quite often used it something like a slick, which is a huge chisel with a long handle. It was more like sliding the axe along on the surface than striking with it.

Example of a slick. Image:
http://www.antiqbuyer.com/All_Archives/TOOLS_ARCHIVE/archive-CHIS-SLICK.htm

Since they didn't have double bit axes over there, and even the single bit axes were comparatively short handled, I had to manufacture my own handle. They did have hickory handles, perhaps imported. I sorted through a bunch and found one with the right grain, and then whittled it down.

I also wanted an adze. I assumed that some of the woodworkers had some old adzes, but we couldn't find one for sale anyplace.

I could've made an adze like the original canoe makers or boat builders used. I would have flattened out part of a spring leaf, rolled the edges up, and made a slot on one side of the end to slide a handle into. But I wanted something rather heavy and something that wouldn't take too much time to make, and I didn't have all of the blacksmithing tools I would have liked.

So I took another single bit axe and cut most of the eye off. Here again I cut at a slight bevel, not straight across. I had it welded onto the pole[3] of the splitting maul head, right out to the front so that was something like a pulaski, only heavier of course.

Heidi Damman using Oliver's homemade adze.
Image: Rein Dammann

The adze part wasn't near as long as the one on a pulaski. The longer leg of the remainder of the eye was away from the handle of the splitting maul, to give a slight upward tilt to the blade of the finished adze. I did a lot of the shaping with that tool. I used it a lot.

Then for a slick, Rein got a fairly heavy spring leaf somewhere. I cut off a piece that was maybe 16" long.

With my help, Rein made a stove—just a sheet iron box so, to speak, with a pipe coming up out of one corner. There was an opening in the end of it for a milk can-type door like I usually make.

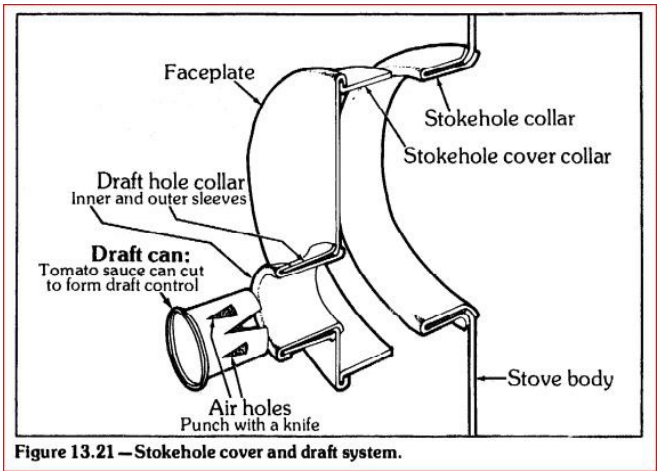


Figure 13.21—Stokehole cover and draft system.

Any suitable type of can, with various air hole patterns, can be inserted into this type of stove door. Image: Ole Wik, *Wood Stoves: How to Make and Use Them*, p. 101. Illustration by Jon. Hersh

We got a good charcoal fire going. When the draft of a stove like that is coming in through the front, the hottest coals are just inside the door. I would heat that iron red hot, take it out, and hammer the curve out of it. Then I'd stick it in a little farther, get it red hot again, and hammer out another section. I ended up with a flat piece of steel that was 2-1/4" wide, and maybe 5/16" thick.

Stove at the Dammann's home, similar to the one Oliver describes. Image: ?

Next, I heated the very edge of the short end and hammered it out thin to make a blade for the cutting edge. Here again it was shaped to act like a chisel—flat on one side and with all of the bevel on the other side.

It was heavy enough that I could slide it along and just take off a little wood if I wanted to. Or I could cut out a little more, for smoothing and truing up surfaces, especially on the inside. If I was chiseling down on the bulge at the side of the canoe on the inside, I'd use the bevel side against the work so that I could kind of gouge things out there to smooth them up.

For the handle end I got the steel very hot and bent it over so that maybe 3/8" was bent up at a right angle, sort of like a hoe, on the bevel side of the blade. When I got ready to put a handle on it, I cut a crossways groove in the handle, back maybe seven inches from the end. I cut out a channel in the end of the handle, so that the blade fits into sort of a pocket.

That bent-over tab extends a little deeper into the handle. The lip gives a bearing surface for pushing against that was more than 1/2" wide.

[Drawing]

I put two flat head 1/4" bolts through the steel and handle, flush mounted. The side of the handle was right in line with the blade, because like any tool, you don't want much of a bevel there when you're holding it. You have a very slight bevel anyway, but it's the same way it is with axes: you want a slight bevel even on the unbeveled side, so that you have some maneuvering power and can guide the blade out of the cut. If you can't pry the cutting edge up a little bit, it will just keep going, and you won't be able to maneuver the thickness of the chip you're taking off.

We did find some commercial splitting wedges over there, but they were not suitable for what I wanted. I had the machine shop operator cut me two wedges out of very heavy steel. They were nine or ten inches long and the heads were square, probably 2-1/2" wide at the very end. The taper ran all the way from there to the cutting edge.

Of course if you're beating on a wedge with a sledgehammer, you don't want steel that's too hard, because there would be a danger of a piece of metal breaking off and flying into your shin or something. So the heads were annealed, and they tended to rivet out on the edges.

To get away from that problem, I had a piece of pipe about 3" long welded onto the end of the wedge, in such a way as to make an eye for a handle that stuck out right in line with the wedge. I fit a piece of seasoned birch into it, and left it sticking out maybe 8" or so.

Then I had a ring made out of the same pipe, same diameter, about 5/8" long. I whittled the other end of that stick of wood down to where I could slip that ring snugly over it. That end of the birch was the striking end, and the little ring held the wood together so that it wouldn't split when struck. You were driving on a piece of wood, instead of bare metal.

That wedge was quite handy in many ways. If you weren't taking off too big a piece, you could use the handle to lever a piece up to get it off.

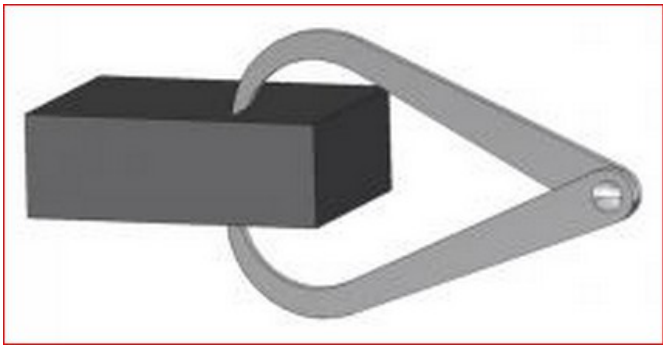
I remembered seeing a tool like this when I was a kid. It could very well have been commercial, but I don't know what it was made for. Anyway, here's how we used them:

We had a chain saw, being modern. We would cut a channel, a chain saw kerf, down each side of the boat, leaving the edge plenty thick so we had wood to work with there. Then we could cut across every 8" and join those two cuts together.

So then we had these chunks of wood sticking up. At first, at the end of the dugout part of the canoe, we cut them out with the head of the adze, so that we had room to start working. From there on we would have these isolated blocks of wood sticking up. We'd split them off with the wedges, using a regular maul, probably with an eight pound head.

In other words, we used the wedges kind of like huge chisels, cutting parallel the length of the boat, with the grain. That saved a whole lot of hewing.

We needed a pair of calipers so that we could gauge the thickness of the walls.



Measuring thickness with commercial calipers
Image source: http://www.craftsmanspace.com/knowledge/calipers-measuring-tools.html

I made the legs out of small birch trees, maybe 1-1/2" in diameter, with pretty skookum[4] branches sticking out on the side. By fastening the two of them together, with the branches sticking in toward each other, I had a versatile tool. It was 16 or 18" long, and the side branches stuck out maybe 3".

I needed to be able to set the calipers to the thickness I wanted, in order to test the walls of the dugout. So I trued off the joining sides of the two halves with an axe a little bit, and then fastened them together with a small wing nut. When the two halves of the caliper were set for the thickness I wanted, I'd tighten the wing nut to keep them in that position. I could then slide the caliper down the side of the canoe, and trim the wood until the fit was just snug. If it was too thick, I would know it.

The long branch parts of the caliper allowed me to measure down around the curving sides of the boat all the way to the bottom, which was flat and five or six inches thick. I didn't have to measure the thickness all the way around.

We had the canoe sitting on a surface that we were working on. We'd measure up from that surface to the top of the sides so that we knew how far we could cut out the inside. We laid a string edge across the gunwales and measured down in order to gauge the thickness of the bottom.

There are two other tools that I used a great deal. One was just a short handled hatchet out of the store. It was shaped like the hewing axe—it was nearly flat on one side, and had quite a bit of bevel on the other side. The other tool was a wooden club that I used to drive the hatchet. With the club I could be quite accurate, rather than trying to strike directly with the hatchet. I used these tools mostly for trimming out the inside, and they were quite useful.

The original Norwegian canoes were made out of cottonwood trees, and that's what we used. There was a lot of interest in our project, as you could imagine. The state forester found a tree for Rein and Heidi, and we had it trucked out to camp where we could work on it.

Beginning work on the dugout canoe. Oliver is at the far end, in blue. Rein Damman is wearing the rain suit. Dyre Dammann is wielding the slick to remove bark. Two young friends look on. Image: Heidi Dammann

The ends of the old-time Norwegian canoes were pretty blunt and thick, with maybe 10 or 12" of solid wood in the end. We left ours the same way, but when we rolled it over, I fudged just a little bit to make a little easier entry for paddling in a lake. When you had it sitting in the water, it looked very much like the original.

The walls were about 1-1/2" thick. We wanted to make the cockpit as wide as we could, because the camp was for all sorts of people, and there would be some pretty broad individuals who would want to be sitting in it at one time or another. We didn't put in any thwarts. That was not necessary.

Since there were other duties to tend to, we didn't work on the canoe eight hours a day. We kept it covered with wet sacks most of the time, especially the ends, in order to keep the wood from drying and cracking.

Rein hadn't done this kind of project in his growing up or in his working life—he was more used to building houses with dimension lumber and so forth—but he got a lot better at it. One of my main contributions was that I had had more experience in visualizing what I could get out of a stick of wood.

We couldn't get the tree as soon as we had liked, and I had to leave for home before the canoe was finished. I helped them for about ten days, I guess, and got them started. We had the canoe partly cut out, and they finished it up. I don't know how long they worked on it, off and on.

It had been quite a big event when they'd found that dugout in the Glomma River that dated back that far. So after we made that replica of such a famous boat in Norway, there was quite a bit of publicity. To give it a test run, they had it trucked to the head of the river, launched it, and drifted down with it, pretty much in the way that the people who originally used the boats did.

Lowering the dugout canoe. Heidi Dammann sits inside.
Photo: Rein Dammann?

Floating the Glomma River.
Photo: ?

There were places in the river where it was not obvious which way to go. In one place they took the wrong channel, got caught in the rocks, and dumped everybody into the water. The canoe lodged in such a way that it didn't get away from them.

There were two big dugouts—they made one, and had a commercial shop make the other. We also made a short one to start with, for practicing. Rein and Heidi had already started working on a tree that had fallen in a storm. The people that owned the property let him cut off a section of it, and he started to make a small dugout out of that. He was having trouble because he didn't visualize what would be the best way to get the most of the log, so I altered it a little bit.

Oliver watches Dyre Dammann try out a small dugout on the lake at the camp. Photo: Heidi Dammann

Rein and Heidi had commercially made paddles with very wide, thin blades, so I only made one. It was single bladed. It was about 5' long, made out of a single piece of spruce, I think. It was from a tree that had been cut out of the way for one of the sites where they had set up their place.

The blade was a little longer than the others, probably 2', and was quite thin on the edges. The end was narrower than the commercial ones, maybe 5".

I left a spine down the middle of the blade on both sides and let it go right to the edge. The blade was tapered, but right at the end it didn't come to a fine edge. That way you could use it kind of like a pole, pushing against rocks or the bottom or a dock or whatever, without damaging that blade.

I shaped it mainly with that double bit axe, one of my favorite tools. When I got it roughly to shape, I used my knife.

The shaft wasn't uniform. It wasn't quite round, and had a knob at the top. The shaft was quite small just below the knob, so that you could wrap your fingers around well. From there it swelled out a bit, to maybe 1/2" by 1". Then, as it got down toward the blade, I let it get a little more slender again, so it would have a little spring to it.

When you're pushing something or prying something with a stiff paddle, you're liable to be bearing on it, and it is liable to break. But when your paddle has a little spring to it, you have a sense of whether you are going too far.

There were some small cracks in the end of the canoe. Rein caulked them with some kind of compound, but otherwise we didn't put anything on the wood. Ordinarily I would have used pine tar. I have a lot of it in Alaska, and I treat a lot of things with it. Samson's Hardware[5] had quite a supply, in gallon cans.

The canoe that we made was quite a bit faster than the one that was commercially made, and quite often they would have races with the two of them. Rein had it figured out so that our canoe had a handicap. It always came in first, but it didn't always win because of the handicap.

Sometimes the parties that they had coming to the camp arrived at the end of the lake. They were transported from there to the camp itself in those long canoes and in some borrowed from the Boy Scout camp. For some of the clients, that was a real wilderness experience.

Oliver in one of the dugouts on the lake at the camp in Norway.
Photo: Heidi Dammann

The camp was quite a popular place for weekend walkers who liked to get out in the park. Sometimes it was a problem, in that they would have a party, burn up the firewood, and leave a mess. Human nature.

I helped a Norwegian friend make another canoe in exchange for his help with some translation. His name was Per [Øyvind Sørebø]. He was a civil engineer who spoke English well.

He had a friend who had a piece of land that had been more or less clear-cut and replanted to white fir less than seventy years earlier. That white fir grows quite rapidly. It was amazing how far apart the winter grain was.

I don't know why the land was planted that way. White fir was a softwood, and was hard to sell. Sawmills didn't want it—the only market for it was as firewood. Maybe that's all the original owners wanted.

We found one of these firs growing right between two rocks. It wasn't an ideal tree, but it was the only one on the property that was big enough for a canoe. Even though it was a fourth bigger in diameter than the others, it was a little smaller than the logs that we'd used for the large canoe.

The diameter of our tree tapered fairly rapidly. It had a swelled butt at the base. In order to get the maximum length, we cut it at the ground. It was perhaps 16 or 18" in diameter halfway up trunk—wide enough that we could make a canoe that people with narrow hips, like Per, could sit in.

Of course Per and I didn't have all the kind of connections that Rein had, so we made our dugout right where the tree fell. We trimmed the outside where it was swollen at the butt. That swelling wasn't uniform—it was sort of fluted. So we cut it off as long as we figured we could use.

We laid it on a couple of small logs so that we could roll it over and decide what was the best way to work with it. I guess from there on it was just about the same as the other one.

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1) This essay stems from a series of telephone conversations that Ole Wik had with Oliver between December 2007 and February 2008. Highlighted text indicates remarks made by Ole.

2) Rein and Heidi Dammann offered additional information, some of which disagrees with Oliver's recollections in some details, including these. See additional text below.

3) The pole of a single bit axe is the end of the head away from the cutting edge.

4) Sturdy, substantial, strong. "Skookum is a Chinook Jargon word that has come into general use in the Pacific Northwest." (http://en.wikipedia.org/wiki/Skookum)

5) Samson's Hardware is located in Fairbanks, Alaska.

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Heidi Dammann offered these comments on Oliver's narrative:

- The oak tree that the Glomma dugout was made of was 2,200 years old, so the boat would be around 2,000 years old. The fact that it was so well preserved is likely due to the restricted access to oxygen under the mud. That dugout was also made of oak, which is known to preserve much better than other woods.
- We tried the dugout upstream on Glomma and found out that it worked well. We had to slow down the speed because we almost took in water in the front. That shows that people in ancient times were able to paddle upstream.
  Good metal tools where hard to get two thousand years ago, so I don't believe that

they just would make one trip downstream, leave the dugout behind, go home, and make a new one.

Heidi Dammann sits in the front of the dugout, with son Dyre in third place. Rein Dammann sits in the stern, just behind son Narvaq.

- We also tried the dugout in a rapid. There were four of us. We had not checked the depth of the water in the rapid at that time of the year and we got stuck in some places, but we made it through.
- The commercial dugout that Oliver mentioned was made by Knut Thorsen's company. Ours was a little wider at the rear for larger people. Knut's dugout lay a little deeper in the water, but the difference was slight.

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Rein Dammann offered these comments on Oliver's narrative:

- Unfortunately, Oliver wasn't there when we launched the dugout in the Glomma River, and did not see how easily it moved upstream.
- Oliver wrote that the original dugouts in Norway were made of cottonwood. We don't know that. I recently heard of a few that were made of cottonwood, but almost all of the ones that have been found were made of pine. The old one from the Glomma River was made out of oak. The reason we made our boat out of cottonwood was that we couldn't find one single oak tree that was big enough.
- We were extremely tense as the dugout was being lowered to the water for the very first time. The scientists were claiming that no one could paddle a canoe like this without a lot of training, and that it would tip over right away.

  There was a lot at stake for us because we had pretty loudly claimed the opposite, and had invited the press to the event. The scientists wanted us to fail, and were very negative about the project. Luckily, the boat floated like a swan!

- Oliver made one paddle, and we made seven more after he left. We took them on the expedition, but lost some when the boat tipped over in the rapids. We had to use some commercial ones for the rest of the trip.

Left to right: Heidi Dammann, two friends, and Rein Dammann struggle to get the dugout free of the rapids.

- The caliper tool you are referring to was made of birch branches, as Oliver said. The shape was very much like the tool on your picture, but it didn't have a wing nut, so it wasn't possible to change angles. We had no reason to adjust it, because all the walls in the dugout were supposed to have the same thickness.

  But still, it was very efficient. It was longer and more curved than the tool in the picture, so that it reached all the way down to where the bottom started.

- Oliver wrote that the trunk was brought to the camp, and that we worked on it there. Actually, it was brought to our house in a small place called Sørumsand, and that's where we made the boat. The house was just a few miles upstream from where the old boat was found. We didn't bring it to the camp until after our expedition on the Glomma River.

  We got a horse to pull the dugout from the truck down to the lake by the camp. I can tell there is a guy in the back of the picture holding a huge film camera. They made a documentary film of the camp that time (this is not the documentary from the dugout expedition which I mentioned before). That film was also shown on Norwegian national television.

Hauling the dugout to the Dammann's outdoors camp.
Image: Heidi Dammann