SOME PREHISTORIC COPPER FLAKING TOOLS IN MINNESOTA

John C. Whittaker and Anthony D. Romano

ABSTRACT

Prehistoric copper artifacts in Minnesota include two types that are probably pressure flaking tools. Most common are short copper rods, often classified as awls. A larger socketed tool from the Vach sites represents a second type of flaking tool. The function of these tools is hypothesized from distinctive patterns of wear, all of which can be reproduced experimentally. Wear includes striations, worn facets, mushrooming of copper edges, and bending.

INTRODUCTION

Among the ulus, spear points, celts, and ornaments of hammered native copper that are found in prehistoric sites in the Great Lakes region (Wittry 1951) are many less spectacular and more enigmatic tools and other objects. Some of the tools were hafted by means of rolled sockets typical of the Archaic Old Copper tradition, and others appear to have been hafted by forcing them into a drilled hole or soft pith in an organic handle. Of particular interest to us are the short copper rods, often with one dull end and one sharper end, which are frequently referred to as "punches" or classified with awls and perforators in the literature (e.g. Bleed 1969; Brose 1970; Penman 1977; Wittry 1957). They have also been given such descriptive labels as "ovates" (Gibbon 1972:187, plate 25). However, comparing the form and wear of some of these tools to modern knapping equipment suggests that they are the tips of pressure flaking tools. Although prehistoric copper knapping tools have occasionally been reported in the past (Brose 1970:134; Ritchie 1969:185; Rapp, Allert and Peters 1990:235; Romano and Altiere 1992), archaeologists finding copper tools have rarely considered knapping as a possible function. Reasons include the poor condition of much prehistoric copper, the assumption that knapping tools were of stone, bone, and antler rather than "valuable" copper, and the lack of experimental knapping experience on the part of many archaeologists.

In the late 1980s Romano, who like most modern knappers habitually uses copper tools for pressure flaking, began to notice potential knapping tools among the copper artifacts from Minnesota sites (Figure 1). Our purpose here is to report two types of tools which we believe are pressure flakers, and to alert other archaeologists to them. We hope that eventually better evidence confirming their function will be available, and some of the interpretive potential we see will be realized.

WEAR ON PRESSURE FLAKERS

Archaeological and ethnographic pressure flaking tools, which are usually of antler, can be recognized by their wear patterns (e.g. Benson 1980; Crabtree 1967; Semenov 1973; Muto, Mehringer, and Warren 1976; Olsen 1979). The flaker is normally softer than the material being flaked, and develops nicks and striations at the tip which run from the tip toward the hand. The tip is often grossly facetted; if it is held in a consistent position the accumulated wear abrades away one or more faces, beveling the end of the tool. Most of the nicks and striations occur on the wear facets, and tiny particles of stone can sometimes be seen embedded in the flaker.

These patterns have been duplicated experimentally by many knappers, and are similar whether the flaking tool is of antler, bone, or copper. Copper tools are more durable and are favored by most modern knappers. That illustrated (Figure 2) was made by Romano to imitate the prehistoric copper objects he was seeing in collections. He used copper wire rather than a piece of native copper, but hammered it to the form of the prehistoric tools in question. It was hafted simply by forcing the sharp end into the pith of a sumac branch. In use Romano's replicas developed wear as described above. In addition, the malleable edges of copper tools "mushroom" slightly away from the

John C. Whittaker, Department of Anthropology, Grinnell College, Grinnell, IA, 50112
Anthony D. Romano, Department of Restorative Sciences, School of Dentistry, University of Minnesota, Minneapolis, MN 55455

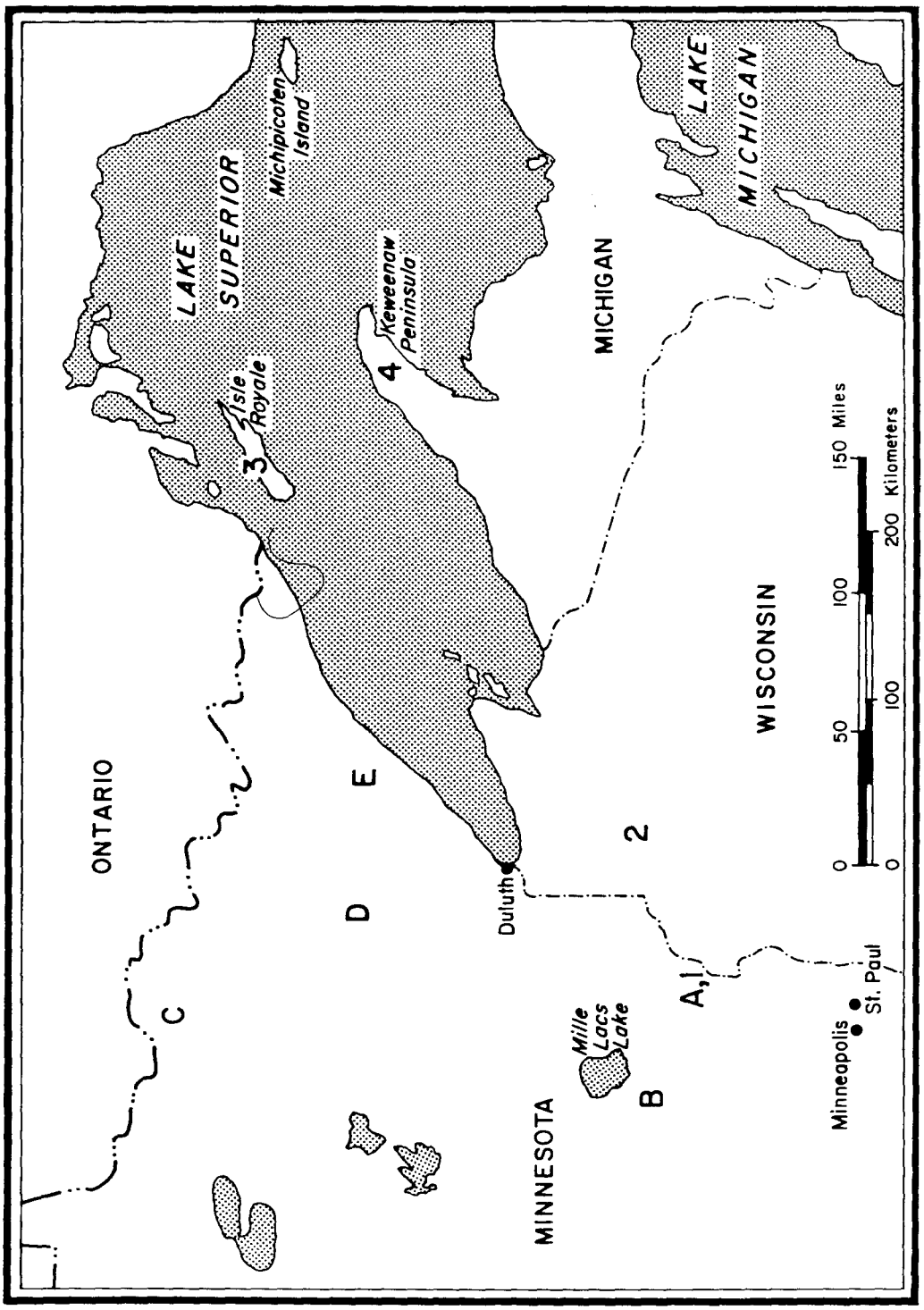

Figure 1: Locations of prehistoric native copper source areas and selected sites with copper knapping tools in Minnesota. Reported Source Areas of Native Copper: 1. Pine City/Snake River area, MN. 2. Minong area, WI. 3. Isle Royale. 4. Keweenaw Peninsula, MI. Selected site finds of copper knapping tools in Minnesota: A. Vach Sites; B. Petaga Point; C. McKinstry Mound; D. Big Rice Lake; E. McDougal Lake.

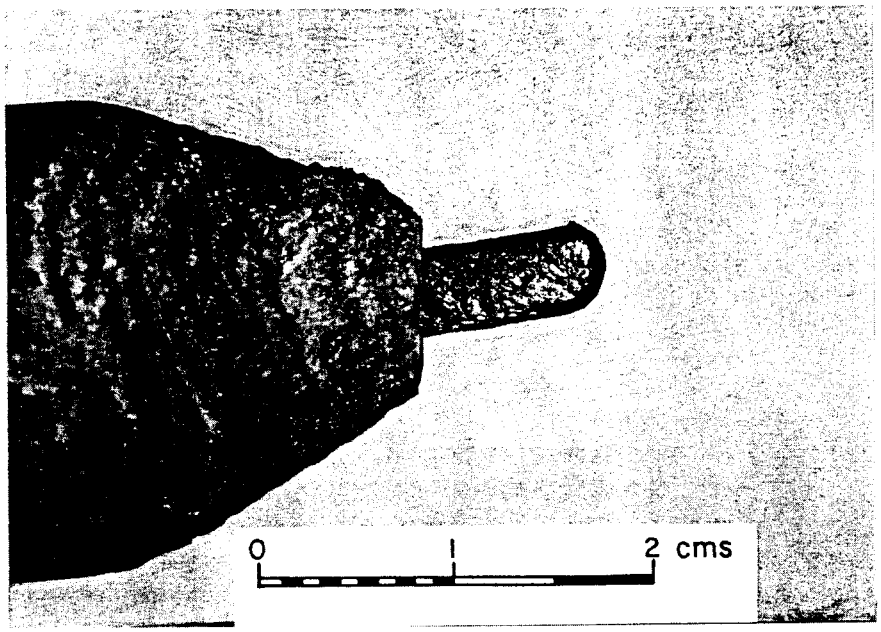

Figure 2: The working tip of a replica awl-type copper pressure flaker, showing striations, beveling, and mushrooming.

pressure, leaving a raised, ragged lip on the upper margin of the worn facets. All the kinds of wear described can be seen in Figure 2. The copper also flexes and sometimes bends away from the pressure when over-stressed, as can be seen in some of the prehistoric examples in Figure 3. In fact, the features of prehistoric specimens that had suggested their use as knapping tools were nicely duplicated on Romano's replications.

AWL TYPE FLAKERS

Of the prehistoric tools we identify as pressure flakers, the "awl" type flakers are much the most common. Figure 4 shows typical specimens from the Vach site complex, which will be described below, and one replica by Romano. Figure 3 shows typical specimens from Initial and Terminal Woodland contexts at the Big Rice Site, (Superior National Forest 09-09-034; 21-SL-163). These tools are typically short, less than 5 cm in length, and mostly have one end which is sharp, but not as sharp as larger awls, and another end which is blunt and distinctively beveled. They are hammered out of solid, annealed native copper, or sometimes made by rolling and hammering thin annealed pieces together (Vernon 1990). The cross-section is rectangular, which should help the tool resist bending.

Cold working by hammering increases the hardness of copper materials considerably (Phillips 1973; Vernon 1990). Unfortunately, it also lowers the metal's resistance to corrosion, and on the copper specimens we have examined, most of the minute distinctive traces of use, the striations and mushrooming, have been lost. The beveling is sometimes obscured, and it could be argued that it is merely the uneven shape of the original tool rather than wear. However, the wear facets consistently occur as a bevel like that on experimental flakers, and on pieces which are bent, the bend is always away from the bevel. Although similar tools are sometimes called "punches," the mushrooming on a tool used as a punch is more extensive and quite different. Pleger (1992:167) illustrates the contrast between a tool we would consider a probable flaker, and one that was definitely used as a punch.

It is not safe to assume that all of the short awl-like copper tools in prehistoric sites were pressure flakers, but many of those we have examined are

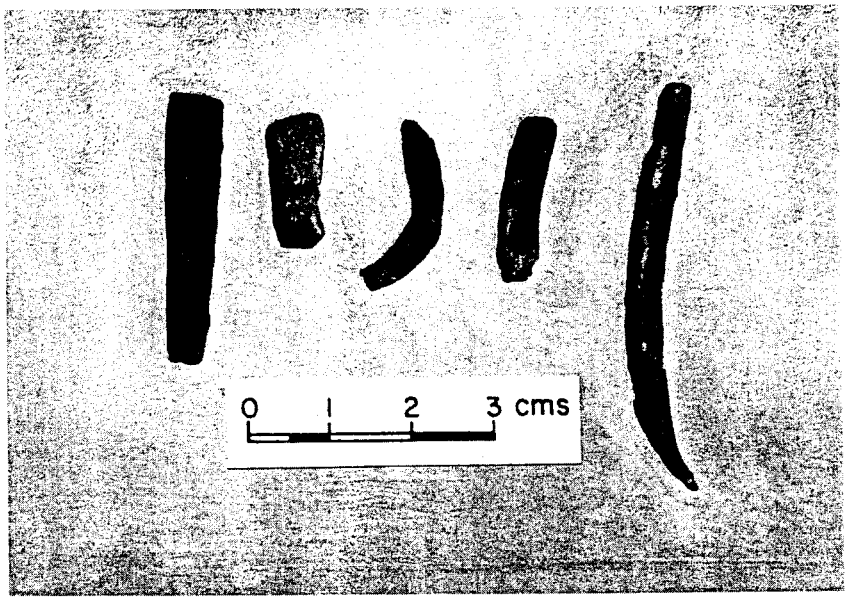

Figure 3: Typical specimens from the Big Rice Site. The working end is up, and the sharp proximal ends on all but the far right example have been damaged by removing samples for trace element analysis.

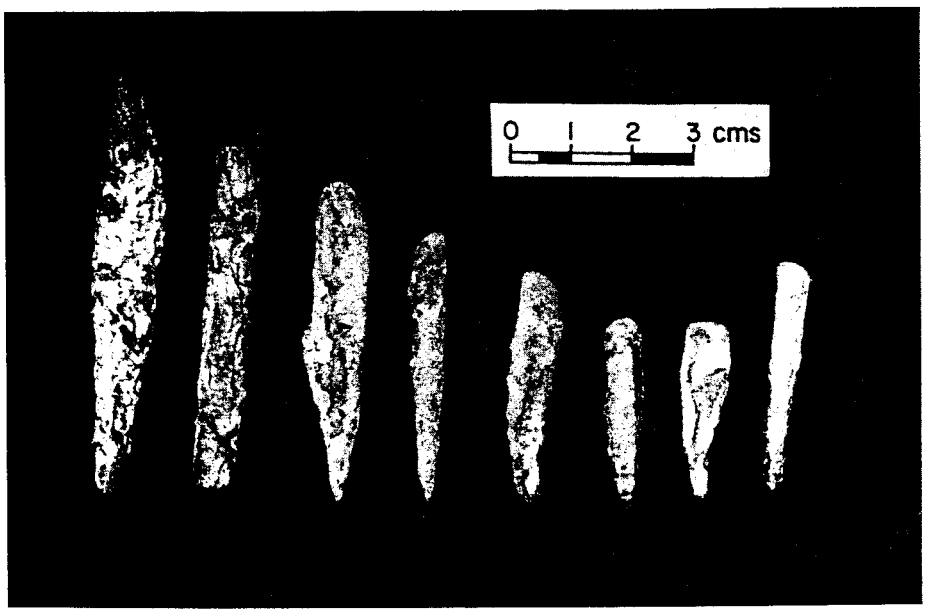

Figure 4: Typical specimens from the Vach site complex in the collection of Joseph Neubauer. On the far right is a replica by Romano. The working ends are up.

consistent with this interpretation. In the Big Rice site, where they were the most common copper tools, they were associated with abundant tertiary flakes (Rapp, Allert, and Peters 1990), and Brose (1970:134) reported a similar association. Tools of this sort occur in all time periods in which copper was used, and there are examples from Archaic (Bleed 1969:24, plates 8, 22), Woodland (Brose 1970:134, Plate XXIV; Rapp, Allert, and Peters 1990; Stoltman 1973:138, plate 39), and Oneota (Gibbon 1972) sites.

SOCKETED PRESSURE FLAKERS

The second type of pressure tool we call the socketed type. The only example we have seen is in the collection of Mr. Joseph Neubauer of Pine City, Minnesota (Figure 5). It was found in an area that has produced over 100 copper tools and pieces, a complex of sites or a large multicomponent site area along the Snake River, called the Vach sites by Caine (1969, 1974). Although material ranging in age from PaleoIndian to Woodland and historic has been found on the Vach site complex, the large size and socketed form of this tool is typical of Archaic Old Copper Culture material rather than later copper items. Other copper material from the same site included celts, socketed and cut points, ulus, long bipointed awls, and other typical Archaic types.

The distal end of this socketed knapping tool has been hammered more or less flat into a "duck-billed" spatulate projection 11 mm wide, 10 mm long, and 1.75 mm thick at the working end. The spatulate projection is in a straight line with the upper surface of the tool, thereby affording a direct transfer of the knapping forces from the hand to the lithic material being worked. On the underside, there is an abrupt transition from the spatulate end to the full diameter of the tool, which ranges from 16 to 22 mm. The entire length of the artifact is 68 mm and it weighs 61.1 grams (2.4 oz).

The socket opening is 13 by 16 mm, and the socket extends 37 mm into the body of the tool, where it tapers to a blunt end. The distal half of the tool is thus solid copper, which could be reannealed, and rehammered to form a new tip as the old wore down. The tool was also designed so that when the

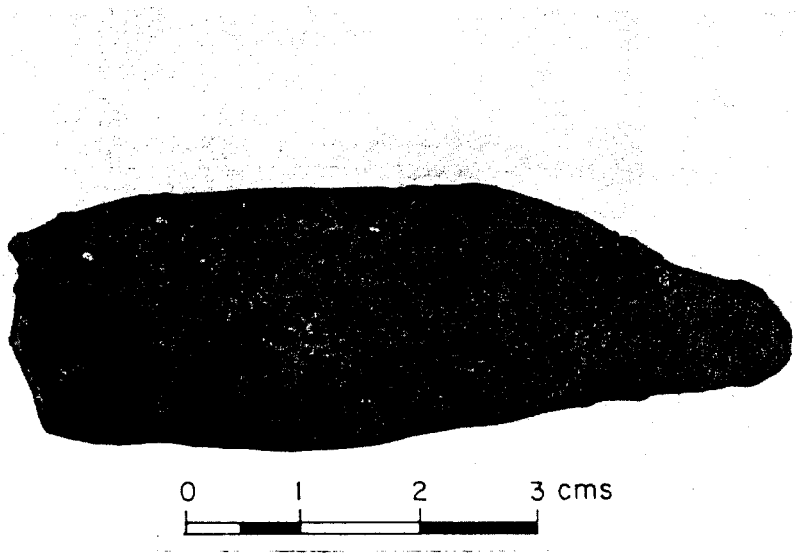

Figure 5: Socketed copper pressure flaker from the Vach site complex. Seam side is down, and the worn part of the spatulate tip is on its upper right corner. The tool would be reversed in use, with the working tip (upper right) pressed down on the stone.

copper was hammered flat and rolled to form the socket, the ununited seam was placed on the under surface, leaving the upper surface unbroken to withstand the greater forces generated in that area while knapping.

If the tool is held in the right hand with the seam down, as we believe it was used, the right corner of the spataluate tip, which would have been the area applied to the stone, has been worn off. Use has also "mushroomed" up a rough ridge of displaced copper on the upper surface along the worn bevel, although this is difficult to see in **Figure** 5.

Again the wear conforms to that expected on a pressure flaker and the spatulate tool is too dull to have been an awl, point, chisel, or other cutting or puncturing tool. This tool required a greater investment in material and manufacturing time than the awl type flakers, but the extra thickness of the copper at the end would have allowed a new point to be formed by hammering as the old was worn down, allowing it to be used for a long time.

INTERPRETIVE DIRECTIONS

The evidence for flaker use on all these tools may be summarized as follows:

1. Wear in the form of heavy striations on tips, not usually visible on corroded copper artifacts, leading to working ends which are facetted or beveled.

2. Mushrooming of copper edges from pressure.

3. Bending of copper rods away from the bevels on working ends.

At this point, our interpretation of these tools should be considered an hypothesis, and we have not attempted to do an exhaustive survey of specimens. There ought to be examples yet to be found or already in collections, where the copper is well enough preserved to show the finer details of use wear and confirm our interpretation of the grosser features. Some interpretive directions can be suggested for the future.

Pressure flakers are of course evidence for some kinds of activities at sites. For instance, the numerous flakers and debitage at the Big Rice site "suggest that retouching and sharpening of stone tools was a major activity" (Rapp, Allert, and Peters 1990:235).

The awl type flakers are relatively common, and widely distributed. We need to ask why this should be so. As they occur in many cultures over a span of thousands of years, they do not seem likely to be associated with particular point types or techniques. Experimentally, there is nothing you can do with the copper tools that cannot be done with antler, but the copper pressure tools are a bit easier to use and last longer than equivalent antler tools. This may give them some edge, in spite of the fact that an antler tine flaker is far easier to make, thus "cheaper" in terms of labor. Acquiring the copper might have been expensive too. There are extensive outcrop areas containing native copper in the Great Lakes region, and derived copper in glacial and riverine deposits is quite widespread (Rapp, Henrickson, and Allert 1990). In the area of the Vach sites in the Snake River drainage, float copper is still to be found, and there are pits along the river that are probably ancient copper diggings. Nevertheless, a good deal of effort would have been expended to collect the copper represented in the artifacts from the sites, especially in such relatively large tools as the socketed flaker. It is however possible that antler was also hard to come by, at least in particular times and places. For instance, Lukens (1973:42) felt that deer were rarely procured by the Middle Woodland Laurel Culture, whose mounds do contain our awl-type flakers (Stoltman 1973:138). However, in this case we may simply lack adequate evidence; Gordon Peters (personal communication) points out that there have been no excavations of Laurel Culture winter hunting camps, where deer might be expected. A thorough distributional study of the copper tools, in conjunction with other cultural geography, would be useful.

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