AN ANALYSIS OF IRON GOODS
RECOVERED FROM LA SALLE’S BELLE

A Thesis
by
MARK ANTONY FEULNER

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of
MASTER OF ARTS

May 2002

Major Subject: Anthropology
AN ANALYSIS OF IRON GOODS
RECOVERED FROM LA SALLE'S BELLE

A Thesis

by

MARK ANTONY FEULNER

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

MASTER OF ARTS

Approved as to style and content by:

Donny L. Hamilton
(Chair of Committee)

Kevin Crisman
(Member)

Joseph G. Dawson
(Member)

David L. Carlson
(Head of Department)

May 2002

Major Subject: Anthropology
ABSTRACT

An Analysis of Iron Goods Recovered from La Salle's Belle. (May 2002)

Mark Antony Feulner, B.A., University of Central Florida

Chair of Advisory Committee: Dr. Donny L. Hamilton

In 1686, a French ship known as the Belle was anchored off of the Texas coast in Matagorda Bay when a storm struck. The vessel wrecked in that storm and sank into the shallow waters of the bay, taking with it a sizable portion of the supplies and equipment of an attempt to establish a colony in North America. The wreck and its contents would lay largely undisturbed for more than three centuries.

During the summer of 1995, the Belle was relocated in Matagorda Bay by J. Barto Arnold, and subsequently identified. The historical and archaeological value of the wreck was readily recognized and a full excavation was undertaken by the Texas Historical Commission. Using a cofferdam to expose the site, the excavators recovered a sizeable collection of artifacts, including the remains of the hull, which were taken to the Conservation Research Laboratory at Texas A&M University for treatment.

The artifacts recovered from the site represent a great wealth of cultural materials, notable not only for their wide variety, but for their vast quantities. A large number of these artifacts were goods intended for trade with the native population. Among them were a number of cases and barrels containing a large quantity of straight knives, folding knives, and axe heads. The knives were badly corroded for the most part, and molds had to be cast from the encrustation surrounding them in order to recover any information
about their features. The axes were found in a much better state, most of which were in excellent condition with their features intact.

The purpose of this thesis will be to document the iron axe heads and knives recovered from La Salle's Belle. A thorough study of their manufacture and characteristics will serve to record these artifact collections and place them within their historical context. This work may also serve as a database for future comparative studies of late seventeenth century iron tools.
ACKNOWLEDGMENTS

I would like to thank Dr. Donny Hamilton, Dr. Kevin Crisman, and Dr. Joseph Dawson for their support and advice during the preparation of this thesis. Their patience and efforts are greatly appreciated. I would also like to thank Dr. James Bruseth for granting me permission to work with this artifact collection, and the support given to me by the staff of the Texas Historical Commission. I offer a special thanks to the Conservation Research Laboratory, particularly Helen Dewolf and Amy Borgens, for providing me with access to the artifacts and records, and aiding my efforts to study the collection.

To my friends, I give my undying gratitude. Particularly, Cory Arcak, Sara Brigadier, Katie Custer, Alex Harris, Sara Keyes, Travis Mason, Mike Quennoz, Will Rosenberg, Anne Summers, and Gail Vermillion. Your constant friendship has helped to sustain me, and made it possible for me to complete this endeavor.

Finally, I would like thank my mother and father. Their unending support throughout the years has allowed me to pursue my dreams. For this I am eternally grateful.
TABLE OF CONTENTS

ABSTRACT ......................................................... iii
ACKNOWLEDGMENTS .............................................. v
TABLE OF CONTENTS ............................................. vi

CHAPTER

I INTRODUCTION .................................................. 1
   Iron Tools in Trade ...................................... 4
   La Salle and the Mississippi River ................... 6
   The Significance of the Belle ....................... 8

II AXES ............................................................. 10

III THE TRADE AXES OF THE BELLE ....................... 12
   The Manufacture of the Axes ......................... 14
   The Typology of the Axes ............................. 16
   Maker's Marks .......................................... 19
   Historic Context ....................................... 21
   Historic and Aboriginal Sites in Canada
   and the Northeast ................................... 21
   Tunica Axes ............................................ 25
   Texas Sites ............................................ 27
   Port Royal Axes ...................................... 28
   Summary ................................................ 29

IV KNIVES .......................................................... 30

V THE TRADE KNIVES OF THE BELLE .................... 36
   The Manufacture of the Knives ...................... 38
   Maker's Marks ......................................... 41
   Historic Context ...................................... 42
   Aboriginal and Historic Sites in the Great
   Lakes Region ......................................... 42
   Tunica Sites .......................................... 46
   Texas Sites ............................................ 48
<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary</td>
<td>50</td>
</tr>
<tr>
<td>VI CONCLUSIONS</td>
<td>51</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>54</td>
</tr>
<tr>
<td>APPENDIX A- TABLES</td>
<td>58</td>
</tr>
<tr>
<td>APPENDIX B- FIGURES</td>
<td>67</td>
</tr>
<tr>
<td>VITA</td>
<td>82</td>
</tr>
</tbody>
</table>
CHAPTER I
INTRODUCTION

René Robert Cavelier de La Salle’s ship, *Belle*, excavated by the Texas Historical Commission in Matagorda Bay between 1996 and 1997, may be one of the most significant shipwrecks ever found in the state of Texas. The loss of this vessel heralded the end of La Salle’s effort to colonize the mouth of the Mississippi River, and was soon followed by the murder of the great explorer by his own men. Its historical importance is amplified by the fact that it is the only 17th-century French ship that has been archaeologically studied in North America. And its greatest significance lies in the great wealth of cultural materials that the investigation yielded.

Project investigators uncovered a well-preserved hull and retrieved a vast array of artifacts from the *Belle*. Among the many finds were goods acquired to equip the expedition and items brought for trade with the native population. The wreck contained numerous glass beads, brass pins, brass rings, and brass hawk bells, all coveted by Native Americans for personal adornment. In addition, workers located various metal goods, either laying loose in the wreckage or remaining packed in the casks or boxes in which they were placed for shipment to North America. Amongst the more prominent containers were four large barrels filled with iron edged tools, all of them appearing to have been also intended for trade.

This thesis will serve to examine these edged tools recovered by the excavation of

This thesis follows the style and format of *Historical Archaeology.*
the Belle. The artifacts contained within the casks were knives and axes, and are interesting due to the large number of individual pieces that comprise each collection. Many of these artifacts were found largely intact and in a reasonably good state of preservation. Other tools, in a more deteriorated condition, left behind molds of their diagnostic features in encrustations which were cast to create epoxy replicas.

Several questions will be addressed in this study. First, with such a large collection, would there be sufficient variations and diagnostic attributes present to allow the development of a typology for the artifacts? Second, can any conclusions be made regarding the origins of the tools by examining their styles, methods of manufacture, and identifying marks? Third, were these tools specifically intended for trade? And, finally, were they different in any way from contemporary tools available in France and other areas of Europe?

This thesis will also serve to contribute to the body of knowledge concerning knives and axes of the 17th century. Due to the paucity of written records, little is known about these items of everyday life. Therefore, the analysis of the artifacts themselves will be the focus of this study and the emphasis will be on the documentation of the collection. The styles of the axes and knives will be examined, as well as their various attributes and identifying marks. The methods of manufacturing axes and knives in this period will be discussed and the manufacturing processes of these artifacts will be examined. Texts and documents concerning early trade with Native Americans will be consulted to gain some insight into the role of iron goods in the barter economy of 17th-century North America. Furthermore, in order to arrive at valid conclusions, the various features of these artifacts
will be compared to contemporary and later collections of similar artifacts found in other North American archaeological sites.

Chapter I of this thesis will be a brief exposition on the role of iron tools in New World colonization and their use in trade by the French in the 17th century. The doomed expedition of René Cavelier Sieur de La Salle will also be related, as well as the sinking of the Belle, its eventual rediscovery, and the excavation of the wreck. Finally, the chapter will discuss the contribution of the Belle and its artifacts to our understanding of North American colonization in the 17th century.

Chapter II will briefly discuss the general terminology used to describe axes, and how they are manufactured, while Chapter III will provide a detailed analysis of the axe heads recovered from three casks excavated from the Belle. These artifacts will be examined in terms of their style and method of manufacture. The maker’s marks found on some of the axes will also be documented. The details and attributes of the Belle axes will be compared with contemporary collections of similar tools.

Chapter IV will provide a general overview of knives and knife making, defining general terms and manufacturing processes. Chapter V will then discuss the knives recovered from a fourth cask in the Belle. The analysis of the knives will concentrate on their distinctive attributes, method of manufacture, and distinguishing marks. The knives will also be compared with similar examples from the 17th century.

Chapter VI will serve to summarize what has been learned from the examination of these artifacts. Their role in 17th-century trade will be reviewed, and the manner in which they aided the colonists in their interactions with the natives of the Gulf coast will
be discussed.

*Iron Tools in Trade*

The simplest definition of a tool would be an object used to perform a task (Moxon 1677:1). This broad definition encompasses a variety of items which may have a wide range of complexities and compositions. Tools also vary greatly in their utility, from highly specialized implements that serve a sole purpose to highly adaptable tools capable of performing numerous functions. Ironically, the simplest tools often can be utilized for a great variety of tasks, while the more sophisticated ones are only useful in doing the work for which they were designed.

Edged tools are implements that can be specialized and limited to a single function, or generalized and suitable for many different tasks. The primary function of an edged tool is to cut. However, such a simple definition belies their utility. The axe and the knife are two of the more common edged tools, possessing a high degree of flexibility and appearing in a variety of types and sizes. These simple tools are excellent examples of implements that are versatile and have a wide range of uses, yet also have specific types adapted to perform specialized tasks.

Nowadays, as in the past, axes and knives are necessary items required for the performance of everyday tasks. Many modern households possess examples of each. In the wilderness, they are vital to survival. A knife or axe in the hands of a competent individual can provide food, clothing, shelter and protection in the wild. The axe is the original and most practical tool for working wood, used not only to fell trees, but to also shape timber into the required shapes (Walker and Proudfoot 1984:13). The knife
performs of many tasks, from fine woodworking, to the dressing of meat, to the preparation of lines and fabrics. With a piece of flint, either tool can start a fire. And both can be used as weapons. In the past, the usefulness of knives and axes as basic survival tools made them valuable items in the wilderness. As such, they were commodities for trade in those areas. These tools were highly desired by Native American populations, who lacked iron edged tools, and they were extensively traded within various tribal groups.

In North America, early European colonists quickly learned that their success or failure was closely tied to their interactions with the native populations. Maintenance of friendly relations with Native Americans greatly aided the development of early colonies, while the breakdown or lack of positive interaction often led to fierce and sometimes fatal opposition to the settlers. The Europeans found that the best way to foster an agreeable atmosphere was through trade. The basis of this trade was the exchange of European manufactured goods for food, goodwill, and various raw materials, such as hides and pelts, for which there was a market in Europe.

Europeans had a distinct advantage in trading with the American natives. The comparatively advanced technology and manufacturing practices employed in Europe cheaply produced goods that were either vastly superior to those normally available to the indigenous populations, or never before seen by them. Trinkets such as beads and bells, and more useful items like textiles and metal tools, became desirable to the Native Americans. Used both in trade and as gifts, European goods were often useful in securing a positive relationship between the colonists and their neighbors.
The French were well aware of the benefits of trade with Native Americans. The economy of New France (present-day eastern Canada) was dominated by the fur trade in the 17th century, highlighted by annual trade fairs held in Montréal (Quinn 2000:48). Trading European goods for pelts from the natives, French traders turned a healthy profit selling the furs in Europe. In turn, individual power and wealth within indigenous tribes came to be defined by the possession of foreign goods, particularly metal objects (Quinn 2000:48-9). This system of trade served a political purpose as well. Trade and gift exchanges provided social cohesion and political stability, and frequently secured alliances between the French and the Native Americans (Quinn 2000:50).

*La Salle and the Mississippi River*

In 1663, Jean-Baptiste Colbert became the chief minister of royal finances for King Louis XIV of France. Charged with the administration of the country’s overseas possessions, Colbert sought to strengthen France economically through imperial expansion (Eccles 1998:66). He sought to reduce the influence of the Dutch in the maritime trade of France by the creation of a merchant fleet, and to develop a favorable trading situation in the New World based on the model of the English colonies. The French economy would receive a boost from the raw materials supplied by the colonies, which would also provide a market for manufactured goods. In addition, all shipping would be handled by a French merchant fleet (Eccles 1998:66). To accomplish this end, Colbert undertook some radical and daring measures.

One such measure was the exploration and settlement of the Mississippi Valley. Under the guidance of Colbert, who controlled the claims of France along the upper
Mississippi River system, René Robert Cavelier de La Salle established trading posts in this area that were to dominate the late 17th-century fur trade in the region southwest of the Great Lakes (Eccles 1998:95). La Salle was further authorized to explore the Mississippi to its mouth, a task he completed in 1682. With the discovery of the mouth of the river, La Salle claimed all the lands drained by the Mississippi for King Louis XIV of France. The fact that such a claim drove a wedge through Spain’s interests in North America was conveniently ignored.

La Salle returned to France late in 1683 with the information he had gathered in his exploration of the Mississippi River, and a proposal was presented to King Louis XIV to found a colony near the mouth of the Mississippi (Weddle 2001:5). Such a colony would serve as a convenient, year-round outlet for shipping between France and Canada. Falling in line with Colbert’s plan for the economic development of North America, the scheme gained royal approval and garnered sufficient government support to become a viable enterprise. Charged by the king with leading a venture that had both commercial and military objectives, La Salle departed France on August 1, 1684, with the 36-gun warship Joly of the French Royal Navy, the light frigate Belle, and two leased cargo vessels, the 300-ton storeship Aimable and the ketch Saint-François (Joutel 1998:49-50; Weddle 2001:119-126). These ships carried in their holds the materials and people needed for founding the new colony.

La Salle’s final venture was severely hampered from the start. Due to inaccurate latitudinal estimates, no reliable means of determining longitude, and several misconceptions regarding the geography of the Gulf of Mexico, La Salle believed that the
mouth of the Mississippi River was located much farther west along the coast than it actually was (Weddle 2001:77-80). After a difficult voyage, La Salle’s little fleet made its landfall west of the Mississippi, and compounded this error even further by sailing westward along the coast in search of its mouth. On February 18, 1685, Belle crossed a bar into the head of a channel that La Salle believed was a branch of the Mississippi River. In reality, the colonists were several hundred miles west of their objective at present-day Matagorda Bay on the Texas coast (Joutel 1998:87; Weddle 2001:8). It was here that La Salle would establish a small settlement, and where the Belle would be lost a year later.

During the spring 1686, Henri Joutel was in command of the settlement while La Salle searched overland for the Mississippi River with a small party. The Belle was anchored in the bay with a small crew and much of the colony’s remaining supplies. On May 1, Monsieur Chefdeville and a handful of survivors from the Belle joined Joutel and the other colonists, and reported the loss of the ship and their struggle for survival (Joutel 1998:135-139). Driven aground by winds and heavy seas, the Belle would remain buried near the mouth of Matagorda Bay until its rediscovery by modern archaeologists in 1995 (Arnold 1996:66).

The Significance of the Belle

The wreck of the Belle is of considerable archaeological and historical value. The ship was carrying a large portion of the expedition’s supplies when it ran aground. The survivors salvaged what they could, using a makeshift raft to land goods on a nearby island. They recovered part of the provisions, casks of wine, a few other stores and some
of La Salle’s personal possessions that he had placed aboard the vessel (Joutel 1998:137, 140). However, they only saved a small portion of what had been left onboard the ship. Separated from the settlers at the fort, the marooned survivors were only able to remove a limited amount of goods due to the frailty and small size of the raft. The winds soon came up again during their salvage efforts and heavy seas drove the Belle deeper into the sand until only the poopdeck was exposed, ending their work (Joutel 1998:137). The salvaged goods were later conveyed to the fort in a canoe that was recovered by the survivors.

The colony’s vital supplies—food, weapons, tools, trade goods, and personal items—settled into the sand along with the vessel, where they would remain for over three centuries. These remains demonstrate what Europeans considered essential to a colonization effort. The French colonists brought with them the necessities of daily life in the late seventeenth century, as well as those items they felt were needed to confront the challenges they would face, the environment they would find, and the peoples they anticipated encountering. Viewed as a whole, the artifacts recovered from the Belle do more than merely chronicle daily colonial life. They also reveal how the French colonists perceived their world and the manner in which they confronted it in their attempt to transfer French ways and culture to the wilds of 17th-century coastal Texas.
CHAPTER II

AXES

The axe is one of the oldest tools used by humanity. Although it can and has been used for hunting, butchering and fighting, the axe was designed to hew and shape timber, making it the ancestor of all woodworking implements. They underwent an evolutionary development, from the lumps of stone lashed to sticks to modern steel axes with fiberglass handles. They are all the same tool, recognizable by their defining characteristics of a broad blade that lies perpendicular to the handle to which it is attached (Blackburn 1998:248).

The iron axe can be broken down into four basic components. These consist of the blade, the flat or rounded face opposite to the cutting edge of the blade, the socket for the handle which is called the eye, and the handle itself (Mercer 1975:1). The poll found on some axes is a thickened portion of the face located on the eye opposite the blade, which gives an axe balance and provides a pounding surface for hammering. An axe that does not have this feature is usually referred to as poll-less. The blade is sharpened into an edge, called the bit, and is comprised of the heel at the proximal end and the leading edge at the distal corner (Peterson 1971:6-7). The eye is commonly lipped, or given “ears,” at the bottom to better receive the handle (Figure 1).

There are several distinctive features of the early trade axe that set it apart from other styles of axes. It has a long, flat-topped blade that flares downward from the eye along its lower margin. The eye is circular or ovoid, and lacks a lip. And, most
noticeably, the trade axe has no poll, meaning that the iron that encircles the eye is not thickened on the face opposite the blade (Mercer 1975:1). Felling axes similar to this style had been in use in Europe for two millennia. Colonial trade axes are almost identical to axes recovered from peat bogs in Ireland that are 2000 years old (Blackburn 1998:248). The simple design made trade axes quick and easy to manufactures (Figure 2).

A basic felling axe could be easily forged by any competent blacksmith. A wrought iron bar was heated and bent into an U-shape. The two ends of the bar were then brought together around an iron drift, which molded the final shape of the eye. The two ends were then welded to each other by hammering the heated metal together. The final shape of the axe was drawn out with additional hammering to form the faces of the blade. Once given its shape, the cutting edge could then be ground onto the iron (Stokes 1992:60-62). A thorough description of the manufacture of this kind of an axe can be found in a contemporary blacksmith training manual by J. B. Stokes (1992). The technique described by Stokes is more modern, and involves the addition of a steel bit, but the basic technique of manufacture is present and appears consistent with what can be seen of the manufacture of colonial trade axes, with or without the steel inserts.
CHAPTER III

THE TRADE AXES OF THE BELLE

Cask feature #72 was the smallest of the three casks of axe heads and the first to be disassembled. It was recovered from the main cargo area of the Belle, aft of the other casks. When it was found, the cask was on its side, lying laterally across the length of the ship with one head of the cask lying over the keelson and the other facing the port side of the hull (Figure 3). The cask was fashioned of oaken staves held together with hoops of withy made of willow, and measured 53.5 cm in length and had a diameter of 43.5 cm at its widest point. The exterior diameter at one head was 39 cm, while the opposite one measured 36.4 cm.

Once the staves and heads of this cask were removed, rows of lightly concreted axe heads were revealed, with over half of them still in their original positions. The axes had been arranged with their eyes to the outside and the blades oriented toward the center, the overlapping blades forming a helical pattern (Figure 4). About one third of the axes had been shifted out of this pattern, either due to the wrecking process or to the cask being partially unpacked by the settlers. There were 87 complete axe heads recovered from the cask, along with blade fragments that suggested the presence of another 17 axes, for a minimum total of 94.

The two larger barrels, cask feature #29 and cask feature #63, were also made of staves of oak held together with hoops of willow. Cask feature #29 was found on its side directly across the keelson in the main cargo hold with either head facing the port and
starboard sides of the hull, forward of cask feature #72. It measured 74.8 cm in length, and diameters of 44.5 cm and 45.5 cm at either end. Cask feature #63 was located directly to starboard of #29 in a similar orientation, with the end on the outboard side slightly forward of the inboard face (Figure 3). Cask feature #63 was 44.3 cm in diameter at one head and 45.2 cm at the other, and was 67.5 cm in overall length.

Neither one of the larger casks was as neatly packed as the smaller one. In fact, there was no discernible pattern to their arrangements, and the random positioning of the axe heads allowed thick layers of encrustation to form between them, producing large concreted masses inside of the two casks. Although the axes may have shifted when Belle wrecked, evidence of packing material in the form of straw or pine needles was found in both of the larger barrels that was not found in cask feature #72. The use of packing material and the heavy amount of concretion found in these two barrels suggest that they were loosely packed, perhaps because the larger diameters of these casks did not lend themselves to the helical packing pattern found in the smaller barrel.

There were 119 complete axe heads recovered from cask feature #29. An additional 157 fragments were recovered, indicating a possible total of 276 axes. Cask feature #63 contained 101 whole axes. Also, 154 fragments were recovered, 108 of them blades, for an estimated total of 209 or more axes.

The estimates regarding partial blade fragments were based on counting fragments that retained approximately seventy percent of the original axe head. Pieces that were substantially smaller were disregarded since multiple pieces may have come from the breakup of one axe, or broken off of one of the larger fragments. Occasionally complete
eyes separated from their blades or large portions of eyes were recovered. Due to the fact that they presented a smaller number of specimens than the blade fragments, the eye fragments were not counted for the same reasons as the smaller blade fragments.

*The Manufacture of the Axes*

The trade axes recovered from *Belle* were made by a simple process. A wrought iron bar was heated and bent into a U-shape. The two ends of the bar were then brought together around a drift, the shape of which determined the final shape of the eye. The two heated ends were then welded together as they were hammered, and the final shape of the axe was drawn and chiseled out. Once the axe head was given its shape, the edge of the bit was then formed and sharpened (Figure 2). This method of construction for European felling axes was typical of the period. Early smiths attempted to keep the manufacturing process as simple as possible, hence the practice of utilizing a single piece of strap iron and the tendency to produce eyes that were much shorter than blades, which broadened towards the cutting edge (Blandford 1976:150).

It is possible that the range of circular and ovoid shapes found in the axe heads from the *Belle* may be due to the deformation of circular drifts as they are subjected to multiple uses. This would be dependent upon the material used to make a drift, and how much use a smith would attempt to get out of one before discarding it. However, European smiths probably used hardy materials, such as iron, to form their drifts. It is more likely that the differences may be attributed to a number of blacksmiths using differently shaped drifts and employing slightly different techniques for the manufacture of axes.
Steel was a scarce commodity during the 17th century, which accounts for trade axes being made from iron instead of steel (Woodward 1970:85). By the late 17th century it was a common practice to insert a steel bit into the iron blade in order to provide an axe with a more durable and stronger bit that better held a cutting edge (Figure 2). The steel was welded to the iron blade, with either the iron sandwiching the steel bit, or with the steel overlapping the iron. This process was known as “laying on an axe” (Woodward 1970:85). The axes from the Belle were inspected for seams and welds that would indicate the presence of a steel bit, but no evidence of this process was observed in them. Steel-bitted axes may have been among those that La Salle’s colonists were using and trading, though to date no such axes have been recovered from the Belle or the Fort Saint Louis site. All-iron trade axes were cheaper and may have been considered a better bargain for the colonists when trading with natives.

Steel bits were valued due to the fact that they wore better, held their edges longer, and made it possible to recycle axes. Axes with iron bits lost their edges more rapidly than steel bits, and the blade grew shorter as fresh edges were sharpened from them. Ultimately, such axes had much shorter lives. However, when a steel bit became worn or broken, a smith could remove it and lap-weld another piece of steel to the iron. Conversely, the steel bit could be salvaged from an eye that had become damaged beyond use, and used to repair another axe. Extensive evidence of this activity was recovered from the excavation of a refuse pile near the forge at the 17th-century Pętagoët settlement near Castine, Maine, which will be discussed later (Faulkner and Faulkner 1987:142-144).
The Typology of the Axes

An initial typology for the axe heads was designed by the staff of Texas A&M University’s Conservation Research Laboratory as they were removed from the casks and cataloguing began. This typology was based simply upon the shape of the eyes. It consisted of Type I axes, which possessed ovoid eyes, and Type II, which had circular eyes. All of the axes with intact eyes could be grouped in one of these categories (Figure 5).

This system was further differentiated by categorizing the axe heads by size. If a sufficient amount of the blade remained, the axes could be divided into three or four size ranges, large, medium, small, and very small. To determine the size of the axes, the length along the leading, or distal, edge was gauged, which was measured along the top of the axe from its cutting edge to where the eye began. This measurement was selected in order to fit axes with broken eyes into the typology. There were three initial sizes: small, medium and large. The small size was designated for any axes that measured between 11 cm and 8.5 cm along the leading edge of the blade. Those axes with blade lengths of 11 cm to 12.5 cm were considered to fall into the medium category. Any blade that measured more than 12.5 cm was counted as large. In this typology there were six possible variations: Type I- small, medium or large; or Type II- small, medium or large.

The typology based on the two categories of eye shapes and the three size ranges worked well until the axes from cask feature #63 were analyzed. The system of categorization was not sufficiently descriptive for the 72 small Type II axes from this cask. There was a pronounced difference in their size range when compared to each
other and to axes from the other casks. A number of the axes from cask feature #63 were considerably smaller than the others, measuring less than 9 cm. A new category of very small was established for the typology, which would contain the axes that measured 8.5 cm or less (Table 1).

Eighteen of the 72 Type II small axes from cask feature #63 fit into this category. The remaining 54 were between 8.5 cm and 11 cm, and were designated as Type II small. None of the Type I axes from this cask were short enough to be categorized as very small. The small axes from the other casks were reexamined, and only one very small axe was noted from a different cask. This was the 8 cm-long Type II axe from cask #29. The typology now provided for eight different varieties of trade axe, with the addition of the category of very small to the size ranges of small, medium and large.

The method in which they were packed did not seem to have a particular order or reasoning in regards to the observed and defined attributes of the axe heads. The only exceptions were the very small axes recovered from cask feature #63, but an axe of this category was also recovered from cask feature #29. The homogenous manner in which they were packed suggests that the variations in the sizes and types noted in the laboratory analyses are a result of the non-standardized manufacturing process, and not due to design. If axes of various sizes and different eye shapes were specifically desired by La Salle and the settlers, some effort would likely have been made to keep them separated into their respective groups. Keeping the axes in groups would have made it easier to access the axe head of the desired size and shape at any given time. Instead, most of the various sizes appear in all the casks, suggesting that there were no
distinctions made between them. The differences between each axe more likely represent the normal size ranges that would result from the manufacturing process. It is probable that the axe heads were produced by several different blacksmiths forging them from differing sizes of wrought iron stock, and each using their own drifts of various sizes to shape the eyes. The distribution of the various categories of axes within the casks suggests that the axes were purchased in bulk from various sources and were packed in the containers that were available at the time. This is supported by the variety of maker's marks found on the axes.

The size of the axe head and its intended use would have influenced what sort of handle was fitted to it. The shape of the haft was largely at the discretion of the user, the two most common being the familiar dog-leg pattern and the straight handle (Blandford 1976:150). Large axes were usually fixed with long handles to accommodate the two-handed grip and swing. Such axes are referred to as felling axes. Smaller axes that would be used with one hand would have had a shorter haft. These are often called hatchets (Blandford 1976:150).

The handle would be socketed tightly into the eye to hold the axe head in place. A resin or pins could also be employed to ensure that the connection remained secure. Another method was to use wedges to spread the handle within the eye, which would maintain a tight fit. Some axe heads are designed with eyes that have a narrower waist at proximal end to further secure the axe when wedges are employed (Blandford 1976:150). Such an eye would also provide a tight fit for a tapering handle that was passed through the distal end, the thicker part of it wedging into the eye. However, this feature was not
found on the *Belle* axes.

*Maker's Marks*

A distinctive attribute appears in the form of maker's marks stamped on the blades of some of the axes. After an item was manufactured, it has always been a longstanding tradition amongst smiths to use a steel stamp to mark their handiwork with a personalized device, and the blacksmiths that forged the axe heads recovered from the *Belle* were no exception. The marks on the axes were one to two square centimeters in size, and were found in eight different designs.

The most common marks were the initials “DG” or “DC” in raised letters within a depressed rectangle (Figure 6). The imprints of these marks were not distinct enough to determine conclusively if the second letter was meant to be a “C” or a “G.” However, the second letter appeared more like a “G” and was noted as such. One of the axes from cask feature #29 was double stamped, with the initials from each stamp overlapping each other. There were 50 axes bearing these initials distributed throughout all three casks (Table 2a-c.)

The second most common mark was a cartouche bearing a fleur-de-lis over the symbol “♀,” commonly recognized as the symbol for women (Figure 7). In biology, this symbol is used to refer to things that are female or have feminine attributes, while in astronomy it is used to designate the planet Venus, or Earth when the symbol is inverted. The intended meaning of the symbol here is unknown, particularly in its association with the fleur-de-lis. There were 16 examples of this mark, all from cask feature #29.

There were 13 axes from cask feature #63, and one from #72, that bore the letter
“M” located in a round cartouche (Figure 8). The raised letter was bracketed by three
dots on either side of it, and one dot above and below it. Less common was a mark
consisting of a raised crescent surrounded by three raised dots (Figure 9). Four axes
bearing this design were recovered from cask #63. This cask also contained the only axe
to bear the punched mark of an eight-pointed star (Figure 10), and two that had a cluster
of three round cartouches with crosses in them (Figure 11). One of these axes was
marked on both sides of the blade with the cluster.

Fourteen axe heads from cask feature #72 had an asterisk, consisting of four
raised bars intersecting within a round cartouche (Figure 12). There were also three axes
found here that were marked with the symbol “?” in an oblong cartouche (Figure 13).
In these examples, the symbol was larger than the ones from cask feature #29, and the
fleur-de-lis was absent.

Not much can be determined from the distribution of the maker’s marks. Several
symbols appeared exclusively in only one cask, but this is probably due to their low
overall occurrence. All of the casks contained axes with “DG” stamped on them. The
only deduction that can possibly be made is that the axes in cask feature #29 likely came
from fewer sources than those from the other two casks, due to the fact that there were
only two styles of trade marks found in it. The other two casks each contained a greater
variety of marks, with four styles in cask feature #72 and seven different styles of marks
in cask feature #63. This assumption is not very helpful, in that it does not point to a
specific place of origin, nor to a specific manufacturer.

Analysis and documentation of maker’s marks are a very useful tool for the
archaeologist and historian. As the base of knowledge grows, and more examples come to light, correlations between various sites can be made. Theories on manufacturing processes can be developed and trade patterns may be scrutinized. This process can be facilitated by the adoption of standard procedures for the documentation of various features. Perhaps the most important of these is determining the size of the trade axe. For the axe heads from the Belle, it was determined that the length along the distal edge from the bit to where the eye began was the most important in determining the size of both intact and fragmentary specimens. If future finds are recorded in the same manner, more and more comparisons can be made, and much more can be learned.

Historic Context

Historic and Aboriginal Sites in Canada and the Northeast

The axes recovered from Belle are a good example of the iron trade axes brought to North America by 17th-century European traders. These trade axes had heavy 8 in. (20.3 cm) blades, and were typical of the common European felling axe (Mercer 1975:1). The Belle axes present an especially large collection of specimens from this period, the significance of which becomes apparent when viewed alongside other contemporary collections.

Evidence of the dispersal of 17th-century European axes in the Great Lakes can be seen at the Bell site in Winnebago County, Wisconsin. Iron trade axes were among the artifacts recovered from the site, which was a palisaded village of the Fox Indians between 1680 and 1730 (Quimby 1966:117-121). Interestingly, the European goods at this site may have direct ties to La Salle. In mid-September of 1679, he landed at Rock
Island in the mouth of Green Bay on Lake Michigan, relatively close to Winnebago County. La Salle came aboard the *Griffon*, the first European ship to sail the Great Lakes, in an effort to expand his interests in the fur trade (Mason 1981:396). Modern archaeological excavations have revealed the presence of numerous European goods on the island, including iron trade axes. They have also uncovered pottery fragments that have been credited to the Fox Indians, dating to a time when Rock Island was occupied by the Potawatomi (Mason 1981:402).

Additional artifacts from the fur trade have been found in the Great Lakes region. Between 1960 and 1973, a series of archaeological investigations was conducted in the boundary waters bordering Minnesota and Ontario to locate any trade goods that had been lost in their rapids. This system of rivers and lakes joining Lake Winnepesug to Lake Superior carried the traffic of explorers, trappers and traders that moved out into the western Great Lakes region during the 17th and 18th centuries. These expeditions yielded several collections of trade axes that are similar to those recovered from *Belle*, dating from the later 17th century to the late 18th century.

In July of 1961, 36 axes were recovered along with other metal artifacts from the Basswood River. The investigators designated half of the axes as small, their measurements being 5.25 in. (13.3 cm) to 7.0 in. (17.8 cm) in overall length by 2.33 in. (59.2 cm) to 3.0 in. (7.6 cm) in width at the blade. There was one large specimen at 7.75 in. (19.7 cm) by 3.75 in. (9.5 cm), and the rest were in the medium range. The medium-sized axes averaged 7.125 in. (18.1 cm) by 3.75 in. (9.5 cm) (Woolworth 1975:69).

The size ranges utilized for the Basswood River axes were determined by weight,
not length. The small axes weighed 9 to 16 oz. (252 to 448 g), the medium ones averaged in at 1 lb., 8 oz. (674 g), and the large axe weighed 3 lbs., 2 oz. (1406 g) (Woolworth 1975:69). The Belle axes were not weighed due to the fact that the metal lost to corrosion or breakage in a number of the specimens would render such an analysis inaccurate. In addition, a classification using the weight of an axe head could not have been employed until all concretions and corrosion products had been removed. In most cases, the lengths of the blades were immediately observable, making it possible to catalogue the axes as they were removed from the casks.

The Basswood River axes were characterized by ovoid eyes, a flare of 24° on their narrow blades, and small notches on their lower margins where the blade meets the eye. The degree of flare is the measurement of the angle at which the lower margin of the blade drops from the horizontal plane that parallels its upper margin (Woolworth 1975:82). In comparison, the axes from Belle had a range of blade widths, as well as a variety of notches, from a large notch to a smooth transition between the eye and the blade (Table 2). Their flares ranged from 20° to 35°.

Another collection of trade axes was recovered in Manitoba by joint Canadian-American expeditions to Boundary Falls on the Winnipeg River in 1966 and 1967. The divers recovered the remains of a pine packing crate with 29 trade axes, which measured 6 to 6.75 in. (15.2 to 17.1 cm) in length and averaged 3.5 in. (8.9 cm) in width. All of the blades were stamped “B.A.R.” and are thought to be from late 18th-century England, manufactured in Sheffield or Birmingham (Woolworth 1975:78, 82). The most obvious difference between these axes and those from Belle is that the blades from Boundary Falls
had flares of around 42°. The Boundary Falls axes also had circular eyes and broad blades, but had no notches where they met (Woolworth 1975:82-83).

A collection of 110 axes was also recovered from the French river by Canadian divers. The series of larger trade axes found here resembled the Boundary Falls group, and are believed to also have been manufactured in England during the 18th century (Woolworth 1975:82-83). These axes are typified by their flares of 51° that proceed from deep notches at ovoid-shaped eyes. One of the large specimens from the French River is stamped with the initials “IN.” The smaller French River axes are believed to be of French manufacture with an earlier origin, and featured ovoid eyes with wide blades and small notches (Woolworth 1975:82).

Only one axe was found among the trade goods uncovered during the excavation of a mid-17th-century English settlement at Pemaquid in Maine (Camp 1975:49). The axe found there is also representative of the style of axes that was offered in trade with the Native Americans. Measuring about 7 in. (17.8 cm) in length, it had a flat upper margin, a downward flaring lower margin, and lacked a poll. The only difference between this axe and those recovered from Belle is that the lower edge of the eye on the Pemaquid axe had a downward slope from where it met the blade to its rear face, while the edges of the eyes of the Belle axes are parallel.

Additional specimens that bear similarity to the Belle collection were recovered from the 17th-century settlement at Pentagoet, located at present-day Castine in Maine. Here, the French trade axe was the predominant style among the axes recovered from that site, represented by two complete specimens and 17 fragments (Faulkner 1987:142).
While these axes were similar in form to those of Belle, they were also alike in that there were trademarks stamped into a number of the blades. Round cartouches featuring asterisks or crosses, like those found on the Belle, were set in the metal of three axe blades and a meat cleaver, and another axe head bore a simple cluster of punch marks (Faulkner 1987:145).

A much later collection of trade axes was excavated from a blacksmith shop at Old Fort Saint Joe Point on Saint Joseph Island in Ontario. The point was occupied by the English from 1796 to 1828 (Light 1987:5). The shop, which was located outside of the fort, yielded 20 axe remnants. None of these specimens were complete, the majority of which were steel bits snipped from the blade (Light 1987:21-22). The others were damaged blades that had most likely been brought to the smithy for repairs. Two of the blades had marks stamped into them, but only one, a “D,” was discernable (Light 1987:22-23). An analysis of the construction details of four of the recovered blades reveal that they are very similar to the axes of the Belle. Manufactured from a bar of wrought or faggoted iron folded around a drift and welded together, the axes from Saint Joe Point only differ in the presence of steel bits in all of the blades (Light 1987:84-85).

Although the practice of placing steel bits in axes began during the 17th century, the fact that all the examples from this site had them is an additional indication that they are from the mid-18th century or later, since this technique became more universally applied at this time.

**Tunica Axes**

Examples of trade axes have been recovered from various Native American sites
as well. The Tunica is a well-documented tribal group who occupied various regions of the lower Mississippi River from the mid-16th century and earlier until the 19th century. Excavations of Tunica cemeteries and trash pits in West Feliciana Parish in Louisiana have yielded a wealth of artifacts of European origin. Two iron axe heads were recovered from the grave of an adolescent female on Bloodhound Hill near the state penitentiary (Brain et al. 1988:171-172). A third was found in close proximity to the remains and is thought to be part of the burial (Brain et al. 1988:407).

Just south of the Bloodhound site in Tunica Bayou, a wealth of materials of both aboriginal and European origin were recovered from the excavation of another Tunica settlement at Trudeau. The collection from Trudeau included 21 iron trade axes of various sizes (Brain et al. 1979:140). A later excavation of a trash pit at Trudeau provided another intact axe head with a bent blade, which measured 21 cm in length (Brain et al. 1988:75-84, 407).

Brain classified the Tunica axes by size, using their weights to define them in a system similar to the one employed with the Basswood River collection. Axes that weighed less than 500 g were categorized as small, those that were greater than 1000 g were considered large, and the axe heads that were between 500 and 1000 g were labeled as medium (Brain et al. 1979:140). Although the criteria utilized was different, these classifications were very close to those used for the Belle collection. The Tunica axes that were considered small measured between 12.5 and 15 cm in overall length, the large axes were between 21 and 25 cm long, and the medium axes fell in between (Brain et al. 1979:141). Under this classification, seven of the Trudeau axes were small, three were of
a medium size, and the remaining 12 axes were categorized as large (Brain et al. 1979:142). The three axes recovered from the grave at Bloodhound were each classified as medium (Brain et al. 1988:407).

These axes had traits identical to those from the Belle. They were constructed from a single piece of iron wrapped around a drift and welded to itself. The blades flare sharply towards the hand, lacked a poll, and did not show signs of carrying a steel bit (Brain et al. 1979:141). The Tunica axes mostly had eyes that were circular or ovoid in shape, as well, but two specimens possessed eyes that were triangular in shape (Brain et al. 1979:143). This shape could have been the result of the style of manufacture, or the axes being reversed and used for hammering. Both sites were occupied in the first half of the 18th century, with Bloodhound occupied between 1706 and 1731, and Tunica Bayou from 1731 to 1764 (Brain et al. 1988:21).

Texas Sites

Additional examples of European trade axes have also been found at native settlements in Texas. One intact axe and two fragments were recovered from the Gilbert site in northeastern Texas (Harris et al. 1967:25-26). Two of these specimens were manufactured by the same method as those from the Belle, while the third was indeterminate.

Also in Texas, three complete axes and three fragments were recovered in Lamar County from the Womack site on the Red River, which had been occupied by the Wichita Indians (Harris et al. 1965:344-346). One of the intact specimens was a common trade axe, while the third was referred to as a “camp axe.” The camp axe appears very similar
to the trade axe, but had an eye that raked forward towards the cutting edge at its lower
margin, requiring the use of a haft that was bent at about an angle of 70° to receive the
axe head (Harris et al. 1965:346).

**Port Royal Axes**

The excavations of the sunken city of Port Royal also produced comparable
specimens. Decimated by an earthquake in 1692, this Jamaican port had served as the
major English trade center in the Caribbean during the second half of the 17th century
(Hamilton 1984:11-12). The underwater site yielded a total of 18 axes, nine of which
were classified as felling axes (Fix 1998:c3-c20). These axes shared the same features as
those recovered from the *Belle*, a flat upper margin, a flaring lower margin, no ears or
lugs, and no poll. One axe had a piece of iron welded to the back of its eye to serve as a
crude poll. Only one of these axes appeared to have carried a steel bit, the others having
their cutting edges ground out of the iron like the axes from the *Belle* (Fix 1998:c4, c13).
The main difference between the two collections is that the axes from Port Royal appear
to have been formed around a triangular drift, giving their eyes a triangular shape rather
than the circular or ovoid eyes found on the *Belle*. This would require a handle that was
triangular in shape where it fitted into the eye. An eye shaped in this manner would have
provided surface for hammering when the axe was reversed, but, as previously
mentioned, it is possible that the triangular shape was due to deformation caused by
hammering. There were no discernable maker’s marks found on the Port Royal axes.

The European felling axe was not limited to use on land. Two such axes were
found amongst the basic carpenter’s tools recovered from the wreckage of the *San*
Pedro, a Spanish merchantman that wrecked on the coast of Bermuda in 1596 (Hoyt 1985:37). Artifacts from the San Pedro are on display at the Bermuda Maritime Museum.

Summary

The iron trade axes recovered from the wreck of Belle present a collection of artifacts representative of a significant component of early colonial trade in North America. By the early 17th century, towns such as Utrecht in Holland were exporting thousands of axe heads to meet the demand in the New World (Mercer 1975:1). In colonial North America, the value of an iron axe to white settlers as a tool was only surpassed by its worth in barter with natives. The demand for iron axes amongst Native Americans and the level of trade promoted by the French led to widespread redistribution of European axes throughout the Great Lakes region in the 16th and 17th centuries. Axes circulated with such rapidity that often Native Americans in the West came to own iron axes before any member of their tribe ever laid eyes upon a white man (Kaufman 1972:13).
CHAPTER IV

KNIVES

The knife is one of the earliest tools employed by humanity, and can be found in various forms in every society, developed for cutting a variety of materials, fighting, hunting, and butchering meat. The first stone knives, no more than flakes, were simple devices that crudely served their purpose. The range of functions for knives expanded as the technology evolved and lifestyles changed. The early lithic knives evolved into specialized metal tools, first of copper and of bronze, and later of iron and steel. They were used for hunting, food preparation, woodworking, making clothes, grooming and other purposes. This wide assortment of uses all developed from the simple need for an implement that could cut.

There is a basic format that is commonly used in discussing and describing knives. The knife is considered in a horizontal position, with the handle to the left of the viewer, and the point of the blade on the right. When the knife is oriented in this manner and the edge of the blade is facing down, the side being viewed is called the obverse side. The side away from the viewer is called the reverse (Peterson 1958:2). This format and terminology are applicable to folding knives as well. The folding knife is described while open and orientated in the same manner of a knife with a fixed blade.

In contrast, artifacts that can be held in the hand are described as they are normally grasped. The handle would be at the proximal end of the artifact, and the blade would be at the distal end. The obverse would be called the right side of the blade, which
refers to its position when held by the wielder with the edge down and the point oriented away from the body, and the reverse would be the left side.

While a knife is a rather simple tool, through the ages numerous designs and variations in components have evolved. The two basic parts of a knife are its blade and its handle. The primary parts of the blade are its sharpened side called the edge, the opposite and unsharpened side known as the back, the point, and the tang, to which the handle is fastened. The portion of the knife where the blade meets the tang usually has a bolster, a piece of molding which aids in positioning the handle. The part of the blade between the edge and the bolster is referred to as the choil (Peterson 1958:1-3).

Additional components can be added to the blade to suit various purposes, dependent on the type of knife being made (see Figure 14).

The term “knife” is commonly used to refer to a blade that is sharpened only on one side, and can be designed and used for a variety of purposes. A dagger is specifically defined as a weapon used for stabbing and slashing with a sharp point and a symmetrically tapering blade that has two cutting edges, though some varieties may have three or four edges (Peterson 1958:2). A variant of the knife that may be confused with the dagger is the dirk. Like the dagger, a dirk has an even, symmetrical taper to its blade that comes to a sharp point. However, only one edge of the dirk is sharpened for cutting (Peterson 1958:2).

Blades have a wide variety of designs that have evolved over time to serve specific purposes. In the kitchen, gently curving cutting edges can be found on the blades of heavy butcher’s knives as well as the slender filet knives, while bread knives have very
sharp and straight cutting edges (Blandford 1979:16). Curved, semicircular blades with the handle fixed over the cutting edge, such as the Eskimo ulu or saddlemaker’s knife, are used for skinning and cutting leather (Blandford 1979:16-17). A substantial general purpose knife is usually desirable in the outdoors. These knives normally have heavier backs and thicker blade cross-sections, and a cutting edge that curves up to the back at the point (Blandford 1979:18). General purpose knives usually have blades that are longer than their handles, unless they are designed for skinning. Skinning knives are often sharp, curving blades that are shorter than their handles (Blandford 1979:19). Another blade design has a blade that is wider and stronger near the tip. Such a knife is referred to as a “sheepfoot” blade, and is useful when paring is done towards the operator (Blandford 1979:20).

A distinctive and obvious feature of a knife is its point. There are several different styles for points. The half-spear is the most basic point, often referred to as the common butcher knife point. A half-spear point involves the edge having a convex curve up to a straight back. When the back swoops in a concave arc to meet the convex curve of the cutting edge, it is called a clipped point. A slanted point has a straight back that changes direction and angles towards the cutting edge in a straight line (Peterson 1958:4). Another point is formed by the back curving in a convex arc to a straight cutting edge. Such a point is called a beak point or Wharncliffe point (Peterson 1958:4). When the back and edge meet in symmetrical convex arcs, it is called a spear point (Peterson 1958:4) (Figure 15). Table knives are often given a rounded tip, which is safer than having a point (Blandford 1979:20).
There are also a variety of handles that can be attached to the blade, but there are a number of basic parts that are common to most knives. The part of the handle that is held in the hand is referred to as the grip. When the grip is fashioned from two separate pieces fastened to either side of the tang, they are called scales. Scales can be made from a variety of materials, including wood, metal, bone and ivory. These scales are normally secured with rivets passing through the assembly, but other methods can be employed to secure the handle to the tang. The end of the handle furthest from the blade is referred to as the butt, which can be capped with a pommel. Additional components can be added to the handle, such as guards to protect the hand, depending on the function of the knife (Peterson 1958:5).

The type of handle used on a knife is influenced by the type of tang the blade has. The most basic handle involves a full tang, which is the length of the handle. The tang is then wrapped with some material, usually leather, to form the grip (Blandford 1979:14). Scales can also be fastened to either side of a full tang to form the handle. A half tang is one that extends only partially into the length of the handle (Blandford 1979:14). Full and half tangs are normally flat to provide a better surface to which the scales can be attached. A knock-on or whittle tang was another type that was formed by a narrow rod that passed into the handle (Moore 1995:6). This type of tang is also known as a rat tail, and the handle was cemented or pinned to it (Figure 16). A whittle tang can be long enough to pass through the length of the handle, in which case it was called a through tang. A pommel could be fastened to the terminal end of a through tang with pins, or screwed onto threads on the tang, securing the handle in place (Moore 1995:8).
A folding knife has one principal difference from other knives. Its blade does not have a fixed position in relation to the handle. Instead, the blade has a shortened tang which has a small hole in it. A rivet is placed through this hole and one end of the handle, securing the blade to it and forming a hinge on which the blade swings (Peterson 1958:4; Moore 1999:7) (Figure 17). Most folding knives have their blades centrally located, allowing the blade to nestle in a central slot in the handle.

The blade of a folding knife could be held open in several ways. The simplest method was to incorporate a lug into the blade that would form a thumbrest to keep it open, which often had a strip of metal on the back which served as a support for the open blade. Another way was to utilize large rivets in the end of the handle which could be manipulated to lock and unlock the blade. The most efficient design is found in the spring-back, which used a strip of spring steel in the handle to keep the knife from opening or closing accidentally (Moore 1999:4-7).

The making of an iron or steel knife blade is a straightforward process. After an appropriately sized piece of iron stock is selected, it is heated and the shoulders of the tang are set. The tang is then drawn out and the shoulders are trued. The blade is then hammered from the stock, after which its shape is trimmed with a chisel (see Figure 18). The knife at this point is allowed to slowly cool, or it is annealed in lime, before the edge is ground out. The edge is left relatively dull since a sharp one can warp during the hardening process. To harden the metal, the knife is slowly heated to a specified temperature and then cooled rapidly in liquid, normally water or an oil. The temper is drawn by polishing the blade, heating it, and then rapidly cooling it again. The final edge
may then be ground out and the handle affixed to the knife (Harcourt 1920:152-154).
CHAPTER V
THE TRADE KNIVES OF THE BELLE

Cask feature #30 offered two groups of artifacts that were very different from the previously discussed casks. Located in the main cargo area of the vessel, the cask was found in an extremely fragile condition, since the ferrous encrustation within it was not substantial enough to hold the conglomerate together. The cask was jacketed in plaster prior to its removal in order to consolidate the feature. After the feature was extracted in the field, it was discovered that this jacket was not strong enough to maintain the integrity of the artifact and it was reinforced with a strap for transport to the Conservation Research Laboratory at Texas A&M University in College Station.

Once the cask was analyzed and recorded, the strap was removed and it was taken apart along natural fracture lines within the feature (Figure 19). This process yielded 10 sections of encrustation, which were labeled A through J. Each section contained the wooden handles of case knives, and the remains of the iron blades to which they had been attached. There were 130 complete knife handles and 10 scales found in these sections. An additional 36 handles and 48 scales were found loose in the collapsed portions of the cask. Counted together, the cask yielded 166 complete knife handles and 58 scales, which could form 29 complete handles, indicating a minimum total of 195 iron trade knives. Section A also contained the remains of seven folding knives, also referred to as clasp knives, which lay on top of and perpendicular to the case knives in the section. These clasp knives are identical to those found in box feature #5556, which had carried a
number of other trade goods.

There was a discernable pattern to the packing of the knives, although there appeared to some shifting of the contents of cask feature #30. The patterns of the concretions suggested that the case knives were arranged in bundles of twelve, each parallel to the other. Six of the knives were placed in the bundle with their handles oriented upwards, the other six with their handles facing down. The blade of each knife was nestled between the handles of the pair of knives opposite it (Figure 20).

The blades of the case knives were each wrapped in paper, which covered portions of the handles on most specimens. In a few instances, it appeared that the entire handle had been wrapped in paper. The paper helped in the formation of ferrous encrustation molds of the blades, allowing the blades of a few of the knives to be cast with epoxy (Figure 21). However, these molds were very friable, breaking apart and turning to dust as they dried. This limited the number of knives that were successfully cast.

The clasp knives in cask feature #30 were even more fragile and no specimens were recovered, intact or partial. The handles of these knives were fashioned from iron instead of wood, and they suffered from complete deterioration along with the blades. However, encrustation molds of these artifacts have provided some information.

The clasp knives were packed in bundles of four with the blades folded into their handles. The butt end of each handle was placed in an orientation opposite that of the knife preceding it. There was also evidence of paper found with the clasp knives, but they had not been wrapped individually, as the case knives had been. Instead, the paper
appears to have been used to consolidate each bundle of clasp knives while protecting them. It is likely that the papers enclosing all of the knives had been impregnated with grease or an oil to protect the metal from rusting in the damp air of the ship’s hold. This oil probably helped to preserve the paper.

The replicas cast from the molds of the clasp knives were not as complete as those of the case knives. Partial casts were made of some blade fragments and handles, providing some clues to the actual appearance of these knives. The iron handles had been octagonal in shape, enclosing a simple blade. The casts of the blade fragments revealed the style of the points, and some displayed the trademark of the cutler who made them (Figure 22).

The methods in which both styles of knives had been packed are indicative of a larger number of blades than had been physically counted. The case knives were packed by the dozen, and this would suggest that there were an additional nine knives in the cask, for a total of 204. Since the clasp knives had been packed in groups of four, there should be five more specimens to even out the groupings, suggesting a total of 12 clasp knives. However, it is impossible to determine if the unaccounted knives were removed for use or trade prior to the wreck of the Belle, or if they had fallen out of the cask or deteriorated completely after the vessel sank. Adjusting the specimen count for these missing knives would be speculative.

*The Manufacture of the Knives*

The design of the case knives from the Belle was simple, which likely aided in their mass production. The blade of each knife was about 15.5 cm long, from its tip to
the bolster, 2.8 cm at its widest, 0.3 cm thick along its back, and had a half-spear point. The choil was not sharply defined, but curves gently back 1.3 cm to the bolster. The bolster was a very small piece that was forged integrally with the blade. The knife had a full tang that was about 9 cm long, giving the knife an overall length of 24.5 cm. The full tang was flattened to receive the scales, which were carved from wood to match the profile of the tang. The handle was 2.5 cm wide and 2 cm thick at the butt, and 1.5 cm wide and 1.5 cm thick at the bolster. Three small 1-2 mm diameter holes were punched through the tang along its length, and matching holes were drilled into the scales. Iron rivets were passed through these holes to secure the scales to the tang, forming the grips of the handle (Figure 21).

One of the scales recovered from cask feature #30 displayed an interesting difference from the others. Throughout the length of its outer surface, there was a pattern of pinholes that were much smaller than the rivet holes and did not completely penetrate the wood to the inside. These may have received pins to secure an escutcheon plate or some other decorative device. However, there were no pins or any other material found with the scale to indicate the presence of ornamentation.

The molds of the clasp knives provided substantially less information due to the deterioration of these artifacts. The handles, as well as the blades, were fashioned from iron and suffered from extensive corrosion. Fortunately, the concretion molds left behind allowed various features to be cast piecemeal as they were encountered, allowing a partial reconstruction of the original appearance of the clasp knives.

The most complete casting had a handle length of 15.5 cm. The handle was also
2.6 cm wide at the fulcrum, tapering to 1.9 cm at the butt, and possessed an octagonal cross-section. The maximum width of the handle including the blade folded into it was 4 cm. The blade rested centrally within the handle, and another mold yielded a cast that was 11.5 cm from the tip to the rivet hole. It had a maximum width of 2.7 cm, an approximate minimum width of 1.5 cm, and a thickness of 0.2 cm along its back. The blade was narrower at the tang and wider near the point like a sheepfoot knife (Blandford 1979:20). The back of the blade curved sharply down in a convex arc to a flat edge in what is referred to as a beak, or Wharncliffe, point (Peterson 1958:3-4). The presence of a lug, or any other device to keep the knife open, was not discernable on any of the casts. However, deterioration may have obscured any signs of a locking mechanism (Figure 22).

By the late 17th century, a technique had been developed in the cutlery trade to take advantage of the strength of steel while minimizing production expenses. The practice involved welding a steel blade to an iron bolster and tang, and was utilized to make knives of all styles and qualities. The process left a distinct mark where the metals were joined, which was called a “thumbprint” (Dunning 2000:32). The casts from cask feature #30 showed no signs of this process. Though the thumbprints may have been obscured by corrosion, it is unlikely considering the features that survived, particularly in the examples of the case knives. It is more likely that the knives were constructed entirely from iron. However, tempered iron/steel blades, which are also thin, are notorious for their poor preservation in marine sites. It is possible that steel was present in some of the blades and that it deteriorated completely, but there is no evidence to
support this.

Maker's Marks

A trademark was stamped into one of the blades of the case knives recovered from cask feature #30. It had the appearance of a cursive “Y,” visible on one of the casts (Figure 23). There were no indications that this was a fragment of a longer mark, suggesting that it was a single initial or symbol.

Several casts of the clasp knives bore a more descriptive mark. It was partially obscured on most of the blades, revealing only fragments of the maker’s mark. However, one of the molds produced a complete casting of it. The mark consisted of a full name in capital letters, bordered by a fleur-de-lis on its side to the left of the name, and the outline of a heart, also on its side, to its right. The name read “HUGUES Y” over “PERRINET” (see Figure 24). It is likely that this was the name of the cutler, or the shop, that produced these knives. An identical stamp and other marks were found on other clasp knives recovered from the Belle.

As with the axes, documentation and analysis of maker’s marks provide useful information for the archaeologist. Correlations between various sites can be made as more examples come to light and the base of knowledge grows. This process can be facilitated by the adoption of standard procedures for the documentation of various features. Perhaps the most important aspects of knives are their size and the shape of their point. These normally provide an indication of their intended use. Other details, such as the type of tang, the form of the handle, and the size of the bolster, may display changes in regional tastes and evolutions over time, that can be used to determine points
and dates of origin. Theories on manufacturing processes can also be developed and trade patterns may be scrutinized. If future finds are recorded in the same manner, with an eye for such details, more comparisons can be made, and much more can be learned.

_Historic Context_

Iron knives were an important aspect of trade in North America during the 17th century. They were superior to the stone and bone knives of the native populations, and an appetite for metal goods would characterize the interactions of Native Americans with Europeans. The increasing contact between these two groups led to lithic technologies being supplanted by iron trade goods, and a trade network rapidly evolved in the 17th century. Iron knives were used and traded in the same manner as iron axes, which usually places them together in the historical and archaeological context along with other European trade goods.

_Aboriginal and Historic Sites in the Great Lakes Region_

The dispersal of European trade goods into the western Great Lakes region by the middle of the 17th century can be seen in Huron archaeological sites. The University of Toronto discovered European trade items in the excavation of the 17th-century Huron town of Cahiague in Simcoe County, Ontario. Among the French goods recovered there were axes, knives, awls, and needles, all made from iron (Quimby 1966:103-106).

The excavation of an ossuary near Ossoissane by the Royal Ontario Museum of Archaeology is also demonstrative of this relationship, showing not only the presence, but the importance of these goods. The Huron burial pit contained a number of European trade goods, including 25 blades of iron clasp knives and butcher knives (Quimby
1966:108-111). The Huron burial practices involved elaborate ceremonies, and the presence of these items are indicative of their importance.

Seventeenth-century European trade goods in the western Great Lakes region have also been found in the United States. The Chequamegon Bay area of Lake Superior in northern Wisconsin displays evidence of their presence amongst the native tribes. The iron blades of French clasp knives were recovered with a number of other cultural items from Madeline Island, located in the mouth of the bay. This region was inhabited by around eight different tribal groups at various times during the late 17th century, predominately by the Huron and Ottawa, and later by the Chippewa (Quimby 1966:114-115).

French clasp knives were also among the trade axes found at the previously discussed Bell site in Wisconsin. The blades found amongst the cultural remains of the Fox Indians at this site displayed a range of styles, including sheepfoot blades similar to those recovered from the Belle. These blades were stamped with the names of their makers as well, such as “JEAN PERRIOT,” “CLAUDE PERRIN,” and “HUGUE PALLE” (Quimby 1966:68-69, 118-121). Though similar, none of the names matched the one found in cask feature #30.

Another Native American cemetery site with burial goods of European manufacture can be found in Mackinae County, Michigan. The bodies were buried rather than cremated, and were accompanied by various items of both European and indigenous origins. Among the trade goods found at the site were a number of knives. Four were butcher knives, two of which retained their wooden handles. There were also three
French clasp knives which had blades that were 4.25 in. (10.8 cm) in length and beak points, making them very similar to those recovered from the Belle (Quimby 1966:125-132).

As with the iron axes, knives were among the cultural remains from the fur trade recovered by the archaeological investigations conducted in the boundary waters bordering Minnesota and Ontario in 1960 and 1973. Conducted in the system of rivers and lakes joining Lake Winnipeg to Lake Superior, these expeditions yielded several collections of trade knives that are similar to those recovered from Belle, dating from the late 17th to the late 18th century.

In 1964, 12 wooden knife handles were recovered with a bundle of files and other trade goods from Horsetail Rapids on the Granite River in southeastern Manitoba (Woolworth 1975:59). These handles were unlike those recovered from the Belle. They were carved from one piece of wood and had a cross-section at the butt that was shaped like a diamond. In addition, the files they with which they were discovered are believed to have been manufactured sometime in the late 18th century in Sheffield, England (Woolworth 1975:60-62). However, the knife handles are significant in that they demonstrate the continued presence of iron knives in fur trade inventories.

Nine knives of four different types were recovered in 1961 from the rapids west of Horse Portage on the Basswood River, which flows on the border between Superior National Forest in Minnesota and Quetico Provincial Park in Ontario (Woolworth 1975:74). Very different from the Belle knives were two bone-handled carving knives and a table knife with a beak point. There were also two clasp knives found at the site,
but very different from the French clasp knives in design, for one had two blades and the other sported a pistol-grip handle. However, four butcher knives were recovered, two of which were similar to the Belle knives. Both had wooden handles that were held together by three pins, one of which tapered to the bolster. The other two butcher knives had wooden handles that tapered at the butt, but their blades had straight backs like the case knives (Woolworth 1975:77).

The same joint Canadian-American expeditions in 1966 and 1967 to the Winnipeg River at Boundary Falls that recovered 29 trade axes also reclaimed knives and knife handles. The most interesting are the 16 French clasp knives. They had blades that were 5 in. (12.7 cm) long with thumbrests at the tang to hold open the knife. Their handles were carved from a single piece of curved wood 5.25 in. (13.3 cm) in length with a sawn slot to house the blade (Woolworth 1975:78, 83). The wooden handles are vastly different from those of the clasp knives from the Belle, and their association with the trade axes is also indicative of an 18th-century origin.

The 1971 excavation of the Marquette Mission site near Saint Ignace in Mackinac County, Michigan, provided examples of two knives from the late 17th century. The mission was originally established in 1671, and the site had been previously excavated by Reverend Edward Jacker in the 1870s and 1880s (Stone 1972:5-6). One knife was represented by a small fragment of the bolster. The other, however, bore similarities to the case knives from the Belle, and had a two-piece wooden handle 11.2 cm in length (Stone 1972:25). The slightly longer handle length suggests a larger knife than those from the Belle.
One clasp knife and a clasp knife fragment were found among the European goods recovered during the excavation of a mid-17th-century English settlement at Pemaquid in Maine (Camp 1975:67). Other items of tableware were discovered at the site, including the remains of two knives (Camp 1975:48). However, these knives bore no resemblance to those from the Belle, one having a blunted tip and the other a whittle tang.

A case knife similar to those from the Belle was recovered during the excavation of the blacksmith shop at Old Fort Saint Joe Point, a late 18th-century site in Ontario, Canada. The straight-backed blade was about 14 cm in length, had a rounded choil, and ended in a half-spear point. The tang was broken off, but it appeared to be a full tang and retained one of the holes for the rivets near the bolster (Light 1987:10-11). Although it is a much later example of the case knife, it is still demonstrative of the sort of knives that were being employed in the frontiers of North America during colonial expansion. However, it and the previous examples indicate the wide time frame in which this style of knife was used, and the inadequacy of these artifacts for dating a site.

Tunica Sites

The dispersal of iron case knives and folding knives amongst Native Americans can be seen in the late 17th-century and early 18th-century South. There are a number of archaeological examples from the Tunica along the lower Mississippi River. One of the earliest finds comes from Hayne’s Bluff on the lower Yazoo River near Vicksburg. The site was occupied by the Tunica when the French first encountered them in 1699 (Brain et al. 1988:196-197). An 11-cm-long blade from a folding knife was recovered from a
leather bag found near the head of an adult male buried at Hayne's Bluff (Brain et al. 1988:209-211, 408). Though it was badly corroded, the point of the blade appears to have been of the Wharncliffe variety, similar to those found on the Belle.

Similar folding knives were found at the early 18th-century Bloodhound site in West Feliciana Parish in Louisiana. Two folding knives with beak points were found at the head of a child burial, a grave that was rich in European goods (Brain et al. 1988:171-173). Two more folding knives that appear to have beak points were recovered with the disassociated remains of a grave that was disturbed by laborers at Bloodhound (Brain et al. 1988:175-177). The excavation of a trash midden at the site yielded two fragments of a single case knife and two additional folding knife blades, one of which had a hawksbill point (Brain et al. 1988:188, 192, 408).

Just south of Bloodhound in the Tunica Bayou, a rich cache of mid-18th-century European and aboriginal artifacts was recovered at the Trudeau site by an individual untrained in archaeology in the years between 1968 and 1970 (Brain et al. 1979:xv). The collection, which was donated to the Peabody Museum at Harvard University, contained a number of examples of iron case knives and folding knives. There were 11 examples of case knives in the collection, along with 28 blade fragments that were unclassifiable. Four of these knives were butchers' knives, 35 to 40 cm in overall length with clipped points (Brain et al. 1979:152-153). Another case knife was found more similar to those from the Belle. It had a blade that was 15.5 cm long, and ended in a half-spear point. A fragment was recovered that had a similar blade, and four wooden handles of this knife size, in the collection (Brain et al. 1979:152-153).
There are two whole and three fragmentary examples of folding knives in the Peabody collection. The handles of these clasp knives were smaller than those from the \textit{Belle}, measuring only 13 cm in length, but the blades were of similar size at 11 cm in length (Brain et al. 1979:154). However, the Trudeau knives had handles that were rounded and curved to better fit the hand, not the hexagonal grips of the \textit{Belle} knives, and the blades appear to have been spear points, with the backs of them curving symmetrically to meet the curve of the edges.

A surface survey at Trudeau conducted in 1980 revealed a number of European metal artifacts, including badly corroded iron fragments that were identified as case knives and folding knives (Brain et al. 1988:90, 98-100). More examples of European goods were recovered from the excavation of a large trash pit at the site, which had a surprising quantity of discarded metal objects. Among them was the blade of a folding knife, about 10 cm long with a missing tip (Brain et al. 1988:75-84, 408). Two additional examples of case knives were recovered from burials at Trudeau. One was a blade fragment found with the remains of an adolescent female (Brain et al. 1988:73-75). The other was an intact knife, 24 cm in length and 3 cm in width, recovered from the grave of a young adult male (Brain et al. 1988:132-134). This knife was similar to the case knives from the \textit{Belle}, but had only two rivets securing the handle to the tang.

\textbf{Texas Sites}

Additional examples of European trade knives have been found in Texas as well. Fifteen examples of case knives and 14 clasp knife specimens were recovered from the Gilbert site in northeastern Texas (Harris et al. 1967:18, 23). There were two complete
specimens of case knives and the rest were fragments. One was of a design similar to the knives from the *Belle*, having a straight-backed blade 13.1 cm in length and 2.2 cm wide that ended in a half-spear point. The full tang had only two rivet holes for securing the handle, and the blade was marked with the name “COOBON” (Harris et al. 1967:23). Six of the fragments appeared to have come from knives of the same type (Harris et al. 1967:24).

Three of the 14 specimens of folding knives found at the Gilbert site were similar to those from the *Belle*. These blades ended in beak points, and were 10.5 to 13.3 cm long and 1.9 to 2.5 cm at their widest points (Harris et al. 1967:21). All three of the blades bore trademarks. “GIBODIEF OL” was the only complete mark found on one of the blades. Another was stamped “...CHEL,” which appears to be the end of a full name, under which appears the letter “T.” The last blade only displayed an “R,” which seems to be part of a full name rather than an initial (Harris et al. 1967:21). The five fragments were of the proximal ends of the blades, and it could not be determined what kind of point they had. Three of these fragments were also stamped, one with an “N,” another with “RA” over “U,” and the last with an “N” over an indeterminate letter (Harris et al. 1967:22). It is possible that these letters were parts of full names that were obscured by oxidation and corrosion.

One complete clasp knife and six fragments were recovered in Lamar County from the Womack site on the Red River (Harris et al. 1965:348). The intact specimen had a clipped point and was stamped with the letters “...NNE...” over “...LAVD...,” which is most likely part of the name Claude (Harris et al. 1965:348-349). One of the fragments
bore a heart stamped at a 90° angle to the right of a French name, similar to that found on the Belle. The name on this blade was “MATHIEV R” over “CALLE LAVNE” (Harris et al. 1965:349).

Summary

The iron case knives and French clasp knives recovered from the wreck of Belle represent a significant component of early colonial trade in North America. As with axes, iron knives were greatly superior tools to the lithic technologies most Native American tribes employed, and they became valuable trade items. The significance of case knives and folding knives can be seen in their presence in various aboriginal sites dating to the 17th and 18th centuries, particularly amongst grave goods. Their abundance should also be noted, suggested by the presence of knives not only in burials, but also in refuse piles.
CHAPTER VI
CONCLUSIONS

The collection of tools recovered from four of the casks found in the main hold of the Belle totaled 781 wrought iron axes and knives. However, not all of the containers recovered by the excavation have been examined, and it is likely more tools will be discovered when they are finally conserved and analyzed. Three types of tools were found, and each of them were significant items of trade in colonial North America during the 17th century. The tools were axes, case knives, and folding knives. A sufficient number of axe heads were recovered in a good state of preservation to permit them to be classified by size and shape. The knives suffered a great deal of deterioration due to their less robust construction, and their details were examined by making casts of the natural molds and impressions they left behind. These casts yielded a good deal of information concerning the style and manufacture of the knives.

Tools such as these were common items throughout Europe and were likely manufactured regionally in a number of locales within each country. The observable characteristics of the Belle tools do not provide much information as to where and by whom they were manufactured. The most telling attributes of these tools were the various trademarks stamped into the blades of a number of them. However, there is not much information available on the marks made on iron tools, particularly those from the 17th century. The most informative stamp was the name of “Hugues Y Perrinet” on one of the folding knife casts. It was most likely the name of the cutler who made it, but does
little to indicate the region in which it was made, other than increasing the probability that it was of French manufacture. The fairest assumption that can be made is that the tools were made in France, probably in the region of the port of La Rochelle from which La Salle’s expedition sailed.

Axes and knives would have undoubtedly been put to use by the French colonists as they worked to establish their settlement in North America. Yet the number of specimens recovered from the Belle, and the fact that they were being stored on the ship as the colonists built their new home, indicate that these were items intended for trade. Their lithic counterparts were also commonplace in North America amongst the indigenous population, and iron provided a superior cutting edge. Both the archaeological and historical records indicate that iron tools were highly prized by Native Americans. This is indicated in the numerous sites and settlements in which these 17th-century tools can be found. It is also supported by contemporary accounts, particularly within those of La Salle’s expedition. Henri Joutel, a friend and confidant of La Salle, indicates on numerous occasions in his diary that axes and knives, along with other goods, were frequently used to develop and secure feelings of friendship with the natives and to procure items that the settlers needed (Joutel 1998:73, 89, 92, 134, 177, 180, 205, 236).

It is possible that the goods brought specifically for trade were of an inferior quality when compared to those commonly used in Europe. However, there is little evidence to indicate that this was the case. Steel was beginning to supplant iron for tool manufacture in the late 17th century, since it is stronger, more durable, and holds an edge better than iron. Although it was relatively expensive, steel was used to fashion
components of these tools to reach a compromise between cost and quality. By the end of the 17th century, iron axes were receiving steel bits, and steel knife blades were being welded to iron tangs. However, there are no indications of steel elements among the tools recovered from the Belle. Despite this fact, it is not a fair assumption that tools lacking steel components were regarded as inferior, or that they were traded differently than those with steel parts.

This collection provides valuable examples of the trade goods that Europeans brought to the New World in the 17th century. The descriptions of their maker's marks, and of the tools themselves, should provide a ready source for comparative study of similar archaeologically recovered materials. The information presented here can be used in current and future studies to place similar tools and trade goods into a historical framework, and provide unique insight into their role within the culture that produced them, the people that traded them, and the individuals that used them.
REFERENCES

Arnold, J. Barto III

Blackburn, Graham J.

Blandford, Percy W.
1976 *Old Farm Tools and Machinery: An Illustrated History*. Gale Research Company, Fort Lauderdale, FL.
1979 *How to Make Your Own Knives... etc.* Tab Books, Blue Ridge Summit, PA.

Brain, Jeffrey P., T. M. Hamilton, I. W. Brown, V. P. Steponaitis and M.-G. Lajoie

Brain, Jeffrey P., T. M. Hamilton and Arthur Spiess

Camp, Helen B.

Dunning, Phil
2000 Composite Table Cutlery from 1700 to 1930. In *Studies in Material Culture Research*, edited by Karlis Karklins, pp. 32-45. The Society for Historical Archaeology, California, PA.

Eccles, William J.
Faulkner, Alaric, and Gretchen Faulkner.

Fix, Peter
1998 Axes and a Smithy from the 1692 Context, Port Royal Jamaica. Manuscript on file with the Conservation Research Laboratory, Texas A&M University, College Station.

Hamilton, Donny L.

Harcourt, Robert H.

Harris, R. K., Inus M. Harris, Jay C. Blaine, and Jerry L. Blaine

Harris, R. K., Inus M. Harris and J. Ned Woodall

Hoit, Cathryn A.

Joutel, Henri

Kaufman, Henry J.

Light, John D. and Henry Unglik
Mason, Ronald J.

Mercer, Henry C.

Moore, Simon
1995 Table Knives and Forks. Shire Publications Ltd., Buckinghamshire, UK.


Moxon, Joseph
1677 Mechanik Exercises; or the Doctrine of Handy-works, Applied to the Art of Smithing, Joinery, Carpentry, Turning, and Bricklaying. J. Moxon, London.

Peterson, Harold L.


Quimby, George I.

Quinn, Frederick
2000 The French Overseas Empire. Praeger, Westport, CT.

Stokes, J. B.

Stone, Lyle M.

Walker, Philip and Christopher Proudfoot
1984 Woodworking Tools. C.E. Tuttle Co., Rutland, VT.
Weddle, Robert  
2001  *The Wreck of the Belle, the Ruin of La Salle.* Texas A&M University Press, College Station.

Woodward, Arthur  

Woolworth, Alan R.  
APPENDIX A

TABLES

Table 1 - Distribution of Axe Head Typologies

<table>
<thead>
<tr>
<th>Cask</th>
<th>Type I</th>
<th></th>
<th></th>
<th></th>
<th>Type II</th>
<th></th>
<th></th>
<th>VS</th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L</td>
<td>M</td>
<td>S</td>
<td>Total</td>
<td>L</td>
<td>M</td>
<td>S</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#29</td>
<td>1</td>
<td>15</td>
<td>19</td>
<td>35</td>
<td>3</td>
<td>43</td>
<td>38</td>
<td>1</td>
<td>84</td>
<td>119</td>
</tr>
<tr>
<td>#63</td>
<td>8</td>
<td>7</td>
<td>8</td>
<td>23</td>
<td>0</td>
<td>6</td>
<td>54</td>
<td>18</td>
<td>78</td>
<td>101</td>
</tr>
<tr>
<td>#72</td>
<td>0</td>
<td>18</td>
<td>10</td>
<td>28</td>
<td>20</td>
<td>31</td>
<td>8</td>
<td>0</td>
<td>59</td>
<td>87</td>
</tr>
<tr>
<td>Axe Type</td>
<td>Overall Length (cm)</td>
<td>Blade Width (cm)</td>
<td>Mark</td>
<td>Flare (deg.)</td>
<td>Notch at eye/blade intersection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>---------------------</td>
<td>------------------</td>
<td>------</td>
<td>--------------</td>
<td>---------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II large</td>
<td>21.2</td>
<td>9.0</td>
<td>none</td>
<td>24</td>
<td>none</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II large</td>
<td>21.0</td>
<td>9.0</td>
<td>*</td>
<td>26</td>
<td>small</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II large</td>
<td>20.5</td>
<td>9.2</td>
<td>*</td>
<td>28</td>
<td>medium</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I large</td>
<td>20.0</td>
<td>8.8</td>
<td>none</td>
<td>27</td>
<td>medium</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II large</td>
<td>20.0</td>
<td>9.1</td>
<td>*</td>
<td>26</td>
<td>medium</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II large</td>
<td>20.0</td>
<td>8.3</td>
<td>none</td>
<td>26</td>
<td>small</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II large</td>
<td>19.6</td>
<td>8.7</td>
<td>*</td>
<td>29</td>
<td>small</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I large</td>
<td>19.3</td>
<td>10.2</td>
<td>*</td>
<td>35</td>
<td>small</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I large</td>
<td>19.3</td>
<td>9.1</td>
<td>none</td>
<td>31</td>
<td>small</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II large</td>
<td>19.3</td>
<td>8.4</td>
<td>none</td>
<td>26</td>
<td>small</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II large</td>
<td>19.2</td>
<td>8.7</td>
<td>none</td>
<td>27</td>
<td>small</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II large</td>
<td>19.2</td>
<td>8.2</td>
<td>*</td>
<td>24</td>
<td>medium</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II large</td>
<td>19.1</td>
<td>8.5</td>
<td>none</td>
<td>22</td>
<td>small</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II large</td>
<td>19.0</td>
<td>8.3</td>
<td>*</td>
<td>22</td>
<td>none</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II medium</td>
<td>18.9</td>
<td>8.2</td>
<td>*</td>
<td>29</td>
<td>medium</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II medium</td>
<td>18.9</td>
<td>8.0</td>
<td>*</td>
<td>20</td>
<td>large</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I medium</td>
<td>18.8</td>
<td>9.0</td>
<td>none</td>
<td>31</td>
<td>large</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II medium</td>
<td>18.8</td>
<td>8.1</td>
<td>*</td>
<td>26</td>
<td>large</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I medium</td>
<td>18.7</td>
<td>8.2</td>
<td>none</td>
<td>31</td>
<td>small</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II medium</td>
<td>18.7</td>
<td>8.7</td>
<td>*</td>
<td>26</td>
<td>small</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I medium</td>
<td>18.5</td>
<td>8.7</td>
<td>none</td>
<td>33</td>
<td>none</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I medium</td>
<td>18.4</td>
<td>9.3</td>
<td>none</td>
<td>33</td>
<td>small</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Axe Type</td>
<td>Overall Length (cm)</td>
<td>Blade Width (cm)</td>
<td>Mark</td>
<td>Flare (deg.)</td>
<td>Notch at eye/blade intersection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>---------------------</td>
<td>------------------</td>
<td>------</td>
<td>--------------</td>
<td>---------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I medium</td>
<td>18.3</td>
<td>8.3</td>
<td>none</td>
<td>32</td>
<td>none</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II medium</td>
<td>18.3</td>
<td>7.9</td>
<td>none</td>
<td>24</td>
<td>large</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II medium</td>
<td>18.2</td>
<td>8.2</td>
<td>*</td>
<td>28</td>
<td>small</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II medium</td>
<td>18.2</td>
<td>8.0</td>
<td>none</td>
<td>28</td>
<td>small</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II medium</td>
<td>18.0</td>
<td>7.9</td>
<td>?</td>
<td>22</td>
<td>small</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I medium</td>
<td>17.8</td>
<td>9.0</td>
<td>none</td>
<td>31</td>
<td>small</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I medium</td>
<td>17.7</td>
<td>9.0</td>
<td>none</td>
<td>28</td>
<td>small</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II medium</td>
<td>17.7</td>
<td>8.3</td>
<td>DG</td>
<td>25</td>
<td>small</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I medium</td>
<td>17.5</td>
<td>9.0</td>
<td>none</td>
<td>33</td>
<td>medium</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II medium</td>
<td>17.5</td>
<td>7.8</td>
<td>DG</td>
<td>28</td>
<td>large</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I small</td>
<td>17.0</td>
<td>8.1</td>
<td>none</td>
<td>29</td>
<td>small</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II small</td>
<td>17.2</td>
<td>8.3</td>
<td>none</td>
<td>27</td>
<td>none</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II small</td>
<td>17.1</td>
<td>8.4</td>
<td>none</td>
<td>26</td>
<td>small</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I small</td>
<td>16.2</td>
<td>7.2</td>
<td>none</td>
<td>32</td>
<td>small</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AXE TYPE</td>
<td>AXE SIZE</td>
<td>MARK</td>
<td>FACE MARKED</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>----------</td>
<td>-------</td>
<td>-------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>medium</td>
<td>“M”</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>small</td>
<td>“M”</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>very small</td>
<td>“M”</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>very small</td>
<td>“M”</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>small</td>
<td>“M”</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>small</td>
<td>“M”</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>small</td>
<td>“M”</td>
<td>bit to right</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>small</td>
<td>“M”</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>small</td>
<td>“M”</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>very small</td>
<td>“M”</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>very small</td>
<td>“M”</td>
<td>bit to right</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>partial</td>
<td>partial</td>
<td>“M”</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>medium</td>
<td>“DG”</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>small</td>
<td>“DG”</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>small</td>
<td>“DG”</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>broken eye</td>
<td>very small</td>
<td>“DG”</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>partial</td>
<td>partial</td>
<td>“DG”</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>partial</td>
<td>partial</td>
<td>“DG”</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>partial</td>
<td>partial</td>
<td>“DG”</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>medium</td>
<td>crescent</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>medium</td>
<td>crescent</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>small</td>
<td>crescent</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>medium</td>
<td>crescent</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AXE TYPE</td>
<td>AXE SIZE</td>
<td>MARK</td>
<td>FACE MARKED</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>----------</td>
<td>------------------</td>
<td>--------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>large</td>
<td>cluster of 3 crosses</td>
<td>both faces</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>broken eye</td>
<td>medium</td>
<td>cluster of 3 crosses</td>
<td>bit to right</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>broken eye</td>
<td>medium</td>
<td>eight-pointed star punch</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AXE TYPE</td>
<td>AXE SIZE</td>
<td>MARK</td>
<td>FACE MARKED</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>----------</td>
<td>------------</td>
<td>-------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>small</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>small</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>small</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>small</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>small</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>small</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>small</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>small</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>small</td>
<td>&quot;DG&quot;</td>
<td>bit to right</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>small</td>
<td>&quot;DG&quot;</td>
<td>bit to right</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>medium</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>medium</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>medium</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>medium</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>medium</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>medium</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>medium</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>medium</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>medium</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>medium</td>
<td>&quot;DG&quot; (double-stamped)</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>large</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AXE TYPE</td>
<td>AXE SIZE</td>
<td>MARK</td>
<td>FACE MARKED</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>----------</td>
<td>------------</td>
<td>-------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>large</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>medium</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>broken eye</td>
<td>small</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>broken eye</td>
<td>small</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>broken eye</td>
<td>small</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>broken eye</td>
<td>small</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>broken eye</td>
<td>small</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>broken eye</td>
<td>medium</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>broken eye</td>
<td>medium</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>broken eye</td>
<td>medium</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>partial</td>
<td>partial</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>partial</td>
<td>partial</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>medium</td>
<td>fleur-de-lis</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>medium</td>
<td>fleur-de-lis</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>medium</td>
<td>fleur-de-lis</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>medium</td>
<td>fleur-de-lis</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>very small</td>
<td>fleur-de-lis</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>small</td>
<td>fleur-de-lis</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>small</td>
<td>fleur-de-lis</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>small</td>
<td>fleur-de-lis</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>large</td>
<td>fleur-de-lis</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>broken eye</td>
<td>very small</td>
<td>fleur-de-lis</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>broken eye</td>
<td>small</td>
<td>fleur-de-lis</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AXE TYPE</td>
<td>AXE SIZE</td>
<td>MARK</td>
<td>FACE MARKED</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>----------</td>
<td>----------</td>
<td>-------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>broken eye</td>
<td>small</td>
<td>fleur-de-lis</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>partial</td>
<td>partial</td>
<td>fleur-de-lis</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>partial</td>
<td>partial</td>
<td>fleur-de-lis</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>fragment</td>
<td>fragment</td>
<td>fleur-de-lis</td>
<td>indeterminate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>fragment</td>
<td>fragment</td>
<td>fleur-de-lis</td>
<td>indeterminate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AXE TYPE</td>
<td>AXE SIZE</td>
<td>MARK</td>
<td>FACE MARKED</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>----------</td>
<td>------</td>
<td>-------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>large</td>
<td>asterisk</td>
<td>bit to right</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>medium</td>
<td>asterisk</td>
<td>bit to right</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>medium</td>
<td>asterisk</td>
<td>bit to right</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>large</td>
<td>asterisk</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>large</td>
<td>asterisk</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>large</td>
<td>asterisk</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>large</td>
<td>asterisk</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>large</td>
<td>asterisk</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>large</td>
<td>asterisk</td>
<td>bit to right</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>large</td>
<td>asterisk</td>
<td>bit to right</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>broken eye</td>
<td>medium</td>
<td>asterisk</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>medium</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>medium</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>small</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>medium</td>
<td>&quot;DG&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>medium</td>
<td>&quot;♀&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>medium</td>
<td>&quot;♀&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>broken eye</td>
<td>very small</td>
<td>&quot;M&quot;</td>
<td>bit to left</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. A piece of iron is heated and bent around a drift.

2. The ends are welded together to form the blade of the axe.

3. The final shape is hammered out and a bit is ground from the blade or a steel insert.

FIGURE 2. Trade axe manufacture (after Peterson 1971:19).
FIGURE 3. Site plan of the Belle with cask feature distribution.
FIGURE 4. The packing arrangement of cask feature #72 (photo by S. Judjahn; courtesy of Conservation Research Laboratory, Texas A&M University, College Station, TX).

FIGURE 5. Trade axes from the Belle. From left to right: a very small Type I, a small Type II, a medium Type I, a medium Type II, and a large Type II (photo by S. Judjahn; courtesy of Conservation Research Laboratory, Texas A&M University, College Station, TX).
FIGURE 6. The "DG" stamp, the most common maker's marks found on the Belle trade axes (photo by A. Borgens; courtesy of Conservation Research Laboratory, Texas A&M University, College Station, TX).

FIGURE 7. The cartouche bearing the fleur-de-lis and the venusian symbol (photo by A. Borgens; courtesy of Conservation Research Laboratory, Texas A&M University, College Station, TX).
FIGURE 8. The maker's mark consisting of the initial "M" surrounded by raised dots (photo by A. Borgens; courtesy of Conservation Research Laboratory, Texas A&M University, College Station, TX).

FIGURE 9. The raised crescent and dots stamp found on four axes from cask feature #63 (photo by A. Borgens; courtesy of Conservation Research Laboratory, Texas A&M University, College Station, TX).
FIGURE 10. A punch in the form of an eight-pointed star found on an axe in cask feature #63 (photo by A. Borgens; courtesy of Conservation Research Laboratory, Texas A&M University, College Station, TX).

FIGURE 11. The cluster of three crosses in round cartouches found on two axes from cask feature #63. The third cross in the upper right corner of the image is partially obscured by the deterioration of the axe’s surface (photo by A. Borgens; courtesy of Conservation Research Laboratory, Texas A&M University, College Station, TX).
FIGURE 12. An example of the maker’s mark consisting of an asterisk in a round cartouche (photo by S. Judjahn; courtesy of Conservation Research Laboratory, Texas A&M University, College Station, TX).

FIGURE 13. The venusian symbol found stamped into the faces of three axes found in cask feature #72 (photo by S. Judjahn; courtesy of Conservation Research Laboratory, Texas A&M University, College Station, TX).
FIGURE 15. Styles of knife points (after Peterson 1958:3).
1. A knife with a full-tang wrapped in leather to form its handle.

2. Two scales rivetted to a full-tang to form the handle.

3. A slotted handle rivetted to a knife with a half-tang.

4. Whittle tang being inserted into a hole drilled into a handle.


FIGURE 18. Stages in the manufacture of knife blades. From iron stock (1.), first the blade shape is formed and the shoulders set at the bolster (2.), then the tang is shaped (3.), and finally the blade is tempered and an edge is ground out of it (after Smithurst 1987:15).
FIGURE 19. Cask feature #30 after it began to break apart (photo by S. Judjahn; courtesy of Conservation Research Laboratory, Texas A&M University, College Station, TX).

FIGURE 20. Packing arrangement of case knives from cask feature #30, before and after disassembly (photos by S. Judjahn; courtesy of Conservation Research Laboratory, Texas A&M University, College Station, TX).
FIGURE 21. Cast of case knife with wooden handle attached (photo by S. Judjahn; courtesy of Conservation Research Laboratory, Texas A&M University, College Station, TX).

FIGURE 22. Casts of clasp knife components, and a reconstructed clasp knife.
FIGURE 23. Cast of maker's mark found on a fragment of a case knife blade (photo by S. Judjahn; courtesy of Conservation Research Laboratory, Texas A&M University, College Station, TX).

FIGURE 24. A mold and cast of the maker's mark found on the clasp knives in cask feature #30 (photo by S. Judjahn; courtesy of Conservation Research Laboratory, Texas A&M University, College Station, TX).
VITA

Mark Antony Feulner
2807 Normand Avenue
College Station, TX 77845
mafeulner@netscape.net

Education:

University of Central Florida, Orlando, FL; Bachelor of Arts degree in History, 1994.

Publications:


“The Trade Axes of La Salle’s Belle,” in *The INA Quarterly*, vol. 27, no. 2/3; Summer/Fall 2000.


Lectures:


Awards & Honors

1999 Texas Mining and Reclamation Association Annual Achievement Award, in the category of Unique Projects - Coal, for “Restoration of an Early Twentieth Century Coal Car.”