

THE BLOCKADE RUNNER



AND HER CARGO

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FOREWORD

Few aspects of the American Civil War hold a more compelling interest than the history of the blockade runners who tried the Federal blockade of the Southern ports. This history is filled with romantic tales of valuable cargoes brought through with great bravery to a Confederacy starved by war. Wrecks like the MODERN GREECE bear a silent witness to those vessels that did not make it.

The cargoes of the blockade runners have long been known; but until 1962 when the Navy divers found the MODERN GREECE and began an operation which brought to shore most of the materials inventoried in this publication, no vessel had been salvaged so extensively. This publication is an inventory of all the materials recovered from the MODERN GREECE. These are of interest to the professional, serious student, collector, and amateur who wants to know more of the vessels and goods of the mid-nineteenth century that came through the Federal blockade.

The arrangement of the work itself is aimed at these interests. The first section is an overview of the history of the vessel from her building to her present day protected status. This also frames her within the general history of blockade running so that the value of her contents might be better understood.

The second portion, the inventory itself, is in the form of a modified encyclopedia. The text is set up to give ready access to desired data. The articles are alphabetically arranged based upon their use: hardware, housewares, surgical instruments, etc. This allows the reader to review all the items of a specific type without having to scramble through the entire volume. The Fort Fisher Preservation Laboratory inventory number is placed next to each article entry for ease in using the publication relative to the Laboratory's collection. The number recovered of each type of artifact is given to allow the reader to get for himself an accurate impression of the cargo contents and the Laboratory's collection. This also points out the significance of unique items. Basic measurements are given to work in conjunction with the scale drawings. These give a clear picture of the actual size of the artifacts. Drawings, descriptions, and information relative to the markings found on the artifacts are also included. The descriptions of the artifacts are as brief as possible. In the interest of thoroughness, all the known different types of similar artifacts are illustrated.

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It is important for the reader to know the condition of the artifacts. This enables him to better know what to expect for study purposes. Deviation in measurement is often explained by differences in condition. This is of particular importance for the student comparing the MODERN GREECE artifact collection with another of similar items. The poor condition of some artifacts accounts for the incomplete markings found on some artifacts. It is hard to gather data about a manufacturer's marking from an artifact either barely visible due to concretion or totally corroded.

Finally, photographic plates are included to aid in depicting an artifact having details or dimensions that are not clearly shown solely by line drawings. In these the artifacts are either placed on a grid or have a scale positioned nearby to give an indication of the size.

The third section includes technical information about the methods used in preserving the artifacts, for without preservation the artifacts could not be exhibited for any period of time without disintegrating. They would also not be available for study.

Any project of the size and scope of this one is not just done at the moment, nor is it the work of just one or even a few people. The first phase of any such project is the collection of data. With this publication it has been the result of an on-going operation begun with the recovery of the artifacts. The staff of the Fort Fisher Preservation Laboratory has kept notes and photographs of the artifacts since the original cleaning and preservation began. The conservators responsible for this were Leslie S. Bright, the late John D. Miller, and Samuel P. Townsend. The concentrated effort to put together this publication was begun in 1975 when additional staff became available through the Comprehensive Employment Training Act (CETA). This enabled the Laboratory to employ the artists and staff necessary to produce a publication of this size and scope.

Prior to the actual writing all of the necessary data had to be accumulated. The unpreserved artifacts were recounted to verify the inventory and thoroughly examined for markings not already noted by the conservators. Further all of the early notes were verified for accuracy. This entailed numerous hours for the staff in the wet and dry storage facilities recording measurements, quantities, and selecting artifacts to be illustrated. In each instance the best preserved sample of a given type of artifact is illustrated, for it shows the artifact most nearly in its original condition. Paul Longnecker, Jeff L. Starling, Mark F. Weaver, and George E. Williams did this often grimy and wet portion

of the data gathering. Any new information was placed on cards and readied for the actual writing and illustrating. Preliminary scale drawings of the artifacts were done by Donald R. Jackson, Anna Partusch, Johnny R. Sneed, and Martha L. Wilson. The final drawings used in the publication were done by Donald R. Jackson and Johnny R. Sneed. Photographs were made of all items to aid the illustrators and for the actual publication plates. These were made by Jerry A. Morrison.

Once all the data was gathered and the illustrations made, the format was decided upon. During its development the publication had three editors who worked under the supervision of Leslie S. Bright at the Fort Fisher Preservation Laboratory. They were Sandra E. Croom, Jane L. Spellman, and Amanda G. Watlington. Sandra Croom and Jane Spellman did the original chapter organization and wrote a number of artifact descriptions. Martha L. Wilson assisted during this phase. Amanda G. Watlington devised the final format, wrote the historical portion, and edited the entire work.

Over the years a number of different people have been involved in the typing and clerical work connected with the project. They were Elizabeth M. Benbow, Margaret A. Brown, Patty D. Farmer, Wayne Funderburk, Amy L. Harris, and Rhonda King. Cynthia S. Elliott assisted in preparing the copy for final typing. Margaret M. Godber typed the final copy.

Special thanks are owed to a number of people outside the Fort Fisher Preservation Laboratory who have assisted the project. The late brothers Charles and John Foard with the Blockade Runner Museum, Carolina Beach, North Carolina have been of continuous help with their vast knowledge of the locale and its history. Two other local enthusiasts, A.E. Kure and W. Hall Watters, lent a hand with the initial recovery and have sustained an interest in the vessel. Leo Vereen with the Francis L. LaQue Corrosion Laboratory of the International Nickel Company, Inc., Wrightsville Beach, North Carolina, has answered numerous metallurgical questions. William R. Williamson answered questions regarding the knives and edged weapons. Without the assistance of these people the volume would be considerably less complete.

Various libraries both in this country and abroad have rendered enthusiastic assistance with the project. The overseas libraries have been especially helpful in

adding to our knowledge of the manufacturers whose wares were aboard the MODERN GREECE. The staff of these libraries deserve special thanks: University of North Carolina at Wilmington, Wilmington, North Carolina; Mariners Museum, Newport News, Virginia; Brown, Picton, and Hornby Libraries, Liverpool, England; Maritime History Group, Memorial University, Newfoundland, Canada; Middlesbrough Borough Council, Middlesbrough, England; and Sheffield City Libraries, Sheffield, England.

In addition, thanks are offered to Stanley A. South, who provided the Archaeology Section with the photographs of the 1962 recovery operation which appear in the publication.

Finally the entire project would not have been possible without the support of the Archaeology Section, Department of Cultural Resources, Division of Archives and History of the State of North Carolina. It is with a debt of gratitude to all these people named above and any others whose names may have been inadvertently left out that the staff at the Fort Fisher Preservation Laboratory presents this volume in the hope that it will benefit students and professionals for years to come.

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THE VESSEL



THE MODERN GREECE 1859 - 1977

On June 27, 1862, the British-owned steamer MODERN GREECE ran aground off the North Carolina coast near Fort Fisher while attempting to run the Federal blockade. The vessel was loaded with munitions, hardware, and other materials bound for the Confederate States. Although the crew was able to salvage some of the cargo, the ship was blown up with much of its cargo still aboard. The wreck was well known for many years, but became accessible to divers only in 1962 when a severe storm removed much of the sand which had covered the vessel. The MODERN GREECE sank during the heyday of blockade running and now lies in an area littered with other wrecks of ships lost in trying to run the blockade at Wilmington. The cargo of the MODERN GREECE is a good example of the type of goods that were brought through the blockade during this period. For this reason the ship, the cargo, the sinking, and efforts at salvage bear consideration.

BLOCKADE RUNNING AND WILMINGTON

Thirteen days after the evacuation of Fort Sumter, President Lincoln proclaimed a total blockade of the coastline from Cape Henry to the Mexican border, a distance of over 4,000 miles. At first this blockade was sneered upon by the Confederates who recognized the difficulties involved in enforcing a blockade of this magnitude. The Confederate government was slow to react to Lincoln's proclamation. They made no provision for government supply of their armies, for they assumed falsely that the secession would be peaceful. This lack of governmental concern led to the rise of the lucrative private business of blockade running. Enormous profits could be made on both the inward and outward journeys until the end of 1864 when the effect of the blockade became more severe.

Manufactured goods were brought in at exorbitant prices; and cotton, desperately needed by English mills, was shipped out at equally inflated prices. The sale of the inbound cargo itself often brought 500 to 1,000 percent of its original cost. These enormous profits made

it possible for a shipper to pay for his vessel with two runs or even a single run through the blockade. Many vessels, however, made numerous runs. With the possibility of enormous profits secured with relatively small risk, there was no lack of interest in running the blockade until 1864 when the losses from capture and sinking by Federal troops outstripped the profits.

Since the Confederate government made no attempt to regulate the blockade running trade until March, 1864, the whim of the captains and the shippers dictated what goods and how they were brought through the blockade. A large number of consignments were indeed war materials desperately needed by the Confederate armies, but intermixed with this type of cargo were luxury items which would attract high prices while taking up little space and weight in shipment. The period of 1862-3, during which the ill-fated steamer MODERN GREECE sank, was the peak of the lucrative blockade running trade. Her cargo is representative of what a ship coming through the blockade at this period might have carried.

Not all the ports along the 4,000 mile coastline were suitable for blockade running. Gideon Welles, U.S. Secretary of the Navy, recognized the virtual infeasibility of completely blockading the 4,000 mile coastline and focused his attention on certain key cities. These cities were major Confederate shipping points with accessible harbors and reasonable connections to the interior. The ten key ports on which he focused his attention were Norfolk, Virginia; Beaufort, New Bern, and Wilmington, North Carolina; Charleston, South Carolina; Savannah, Georgia; Pensacola, Florida; Mobile, Alabama; New Orleans, Louisiana; and Galveston, Texas. Of these ten ports the most difficult to completely close off was the port of Wilmington in North Carolina. This was the last Confederate port to close.

Wilmington was uniquely suited for use by blockade runners. The port itself was 28 miles up the Cape Fear River and was thus protected from a direct enemy attack. Goods could easily be on and off-boarded without fear. Further, there were two approaches to the port. One was from the east through New Inlet; the other further south was through Old Inlet. The treacherous and famous Frying Pan Shoals and Smith's Island separated these two inlets. By land the inlets were only six or

seven miles apart, but by sea the distance expanded to nearly forty miles. In addition to the presence of these natural protections, Forts Fisher and Caswell offered incoming vessels support from their guns. Fort Fisher was the last fort to fall, and it was not until after its fall that the Federal blockade of Wilmington became truly effective; therefore, the importance of this fort must not be underestimated.

Wilmington was also valuable for the supply of the Confederate army in that it was considerably closer to Virginia and Lee's forces than either Savannah or Charleston. This proximity was of considerable importance since the problems involved in overland shipment were immense. Railcenters and good river transportation were at a premium in the South. Wilmington was also a good port for shippers to obtain goods. North Carolina produced cotton and naval stores in abundance. Cotton brought to Wilmington was compressed by steam presses to its smallest possible bulk enabling the blockade runners to carry 600 to 1,200 bales of cotton weighing 500 to 600 pounds each.

Wilmington was ideally situated for shippers who transshipped their goods through Bermuda. Wilmington was 674 miles from Bermuda. With a swift blockade running vessel, the journey took about 48 hours. This proximity was key in so far as the vessels coming through the blockade were forced to run under the cover of darkness and were, therefore, subject to the changes of the moon and weather. Bermuda was also a healthier place for greater portions of the year than Nassau, another favorite transshipment place, where yellow fever, the scourge of the tropics, was a major threat. Bermuda was not spared the disease, but its more northerly location made it less subject to the dread disease. This meant that Bermuda could send goods to ports such as Wilmington for more months without risk of contagion.

THE MODERN GREECE PRIOR TO THE SINKING

The MODERN GREECE was attempting to run the blockade at Wilmington when she ran aground and sank. Little is known of the vessel prior to her sinking. Currently, plans of the ship, which was built by Richardson's of

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Stockton, England in 1859, are unavailable. Some information, however, can be pieced together from Lloyd's Register. The MODERN GREECE was a 753 ton vessel, 210 feet in length and 29 feet in breadth. She drew 17 feet 2 inches making her ill-suited for the shoals around the entrances to Wilmington. She was a large deep draft freighter by comparison with the small light shallow draft boats designed especially for blockade running. The vessel was driven by an iron propeller screw and had schooner type rigging for assistance. She was owned by the London firm of Pearson and Co. and was originally built for the Hull-Baltic timber trade. She was a freighter pressed into the service of blockade running rather than a blockade runner per se.

The firm of Pearson and Co., mentioned as owners in Lloyd's Register, is undoubtedly Zachariah C. Pearson and Co. of London, who did business through Bermuda during the blockade. The records of John T. Bourne, the famous Bermuda middleman, show that he had dealings with the firm during 1862. The firm of Pearson and Co. was purchasing coal through Bourne. Mr. Bourne's records also show that Pearson's went bankrupt during 1862-3 leaving unpaid accounts with him in Bermuda. The firm was apparently engaged in blockade running and suffered reverses in the trade sufficient to render it bankrupt. The role that the sinking of the MODERN GREECE played in this bankruptcy cannot be ascertained at this time, but it is reasonable to assume that she represented a considerable loss.

Although Bermuda was a favorite transshipment point for British merchants such as the owners of the MODERN GREECE and an excellent place for ships wishing to re-coal before attempting the blockade, we have no way of knowing whether the MODERN GREECE stopped in Bermuda on her way to Wilmington. Bourne's manifests and other records make no mention of the vessel. Although there is no indication of a Bermuda stopover, the movements of the MODERN GREECE are fairly well recorded as she set out from England.

The Federal intelligence was very concerned with the movements of blockade runners, and the Official Naval Records mention the movements of the MODERN GREECE several times. On March 13, 1862, Gideon Welles, U.S. Secretary of Navy, forwarded to L.M. Goldsborough, his commanding officer of the North Atlantic Blockading Squadron, information obtained from the State Department that a number of vessels were suspected of having intentions of running the

blockade. The list in the letter included the MODERN GREECE. Welles enclosed additional information about the ships in the form of a communiqué dated February 21 from the U.S. consul at Cardiff. In this communiqué the consul noted (ORN Ser. 1, 8, 107):

The MODERN GREECE sailed on the 19th from Gibraltar with coal, and the CIRCASSIAN (another vessel) is now loading with coal for Bermuda. From these places or elsewhere they intend to take arms and stores and sail for the United States.

This is the only mention of the MODERN GREECE in connection with Bermuda. The period of time from February to June of 1862 is so long as to suggest that this note does not refer to the MODERN GREECE's fateful trip to Wilmington. She may have been engaged in some other trading associated with the blockade, perhaps as a freighter bound for Bermuda to be off-loaded there for further shipment of her goods by another vessel.

On May 16, 1862, Acting Secretary of the Navy G.V. Fox transmitted to Goldsborough further information about the movements of the MODERN GREECE. He noted that "...the consul at Falmouth reports the departure of the steamer MODERN GREECE from that port on the 2d ultimo with a cargo, it is suspected, for the rebels." (ORN Ser. 1, 8, 372) The slip from the Liverpool paper has not survived, but it probably noted the sailing of the ship.

The movements of the MODERN GREECE were of equal concern to the Confederates to whom she was bringing goods, for the Wilmington Journal noted her sailing in its June 26, 1862, edition: "...the steamer MODERN GREECE, fitted out at Hull, sailed from Falmouth 28th April ostensibly for Tampico..." The list of ships given in the Wilmington paper with this reference to the MODERN GREECE was datelined New York. It gave ships sailing from England during the prior two months. This notice appears peculiarly the day before the sinking and may have been some form of code alerting interested parties in Wilmington of the vessel's impending arrival. This is a matter for conjecture. The use of Tampico as a destination in the notice is not at all unusual. Tampico is a Mexican port and would have been outside the blockade. Virtually all of the ships

setting out to run the blockade gave neutral ports as their destination. The use of a neutral port as a supposed destination was a protection from immediate pursuit by Federal ships, which actively hunted ships proclaiming the Confederate States as a destination.

THE SINKING OF THE MODERN GREECE

Details of the destruction and sinking of the MODERN GREECE are given in the Official Naval and Army Records and Wilmington Journal newspaper. Two U.S. Navy ships, the U.S.S. CAMBRIDGE and the U.S.S. STARS AND STRIPES, were involved in running aground and sinking the MODERN GREECE. L.M. Goldsborough, Commander of the North Atlantic Blockading Squadron, received reports from the commanders of both vessels. These reports survive, and it is in them that the story of the MODERN GREECE's destruction is told. On July 2, 1862, Commander W.A. Parker aboard the U.S.S. CAMBRIDGE filed a report of his ship's role in the sinking. (ORN Ser. 1, 7, 514) In this report he mentions being assisted by the STARS AND STRIPES, the only other member of the blockading squadron present for the engagement. Lieutenant A.S. McCook, Commander of the STARS AND STRIPES, did not give an account of his vessel's role in the engagement until August 17; and this was only after Goldsborough specifically requested one. McCook's account gives more details of the actual firing and augments Parker's basic summary report. In the following account McCook's report is used to fill out details not given by Parker.

According to Parker the CAMBRIDGE spotted the MODERN GREECE on the morning of June 27 at 4:15 A.M. near the land about three miles from the Federal Point batteries. (ORN Ser. 1, 7, 514) The CAMBRIDGE immediately opened fire on her with its Parrott gun. When attacked the MODERN GREECE hoisted British colors and ran parallel to the shore as fast as she could; however, about a half-mile from Fort Fisher she ran aground under heavy fire from the CAMBRIDGE. Parker stated that immediately after the vessel was hard aground the crew abandoned the ship by boat. The CAMBRIDGE continued firing on the MODERN GREECE for about three hours; however, she was unable to sink the MODERN GREECE in spite of striking the vessel several times. The CAMBRIDGE had some difficulty sighting and hitting the MODERN GREECE because the atmosphere

was hazy and the vessel slate grey. The ship was also protected by the guns of Fort Fisher.

McCook reported on August 17 that the STARS AND STRIPES sighted the MODERN GREECE at 4:00 A.M.; moreover, as soon as the STARS AND STRIPES turned around to attack her, the CAMBRIDGE signaled "Enemy in sight." (ORN Ser. 1, 7, 517-518) McCook, like Parker, noted that the vessel did not run aground until after they fired on her. McCook gave a more detailed account of the firing on the MODERN GREECE than Parker, who simply noted that he used the Parrott gun. McCook's account shows that the attack was more difficult than Parker's report suggests. He reported:

I used my rifled howitzer and 20 pound-
er Parrott chiefly, but tried to get
close enough to use my 8-inch guns.
Finding I could not get close enough
to use my broadside guns at direct
firing without coming under the guns
of the battery, I tried to ricochet
my shell in. I think I succeeded in
striking her twice in this way.

McCook even noted that the firing ceased long enough for them to eat breakfast and was resumed shortly thereafter. The CAMBRIDGE and the STARS AND STRIPES were forced to withdraw soon after breakfast in order to protect themselves from the Federal Point batteries. According to McCook a shot from the battery narrowly missed the STARS AND STRIPES, passing between her mizzen and main masts. Another shell burst overhead throwing pieces of shrapnel all around the CAMBRIDGE. McCook reported that after the original engagement his vessel stayed around firing occasionally on the MODERN GREECE to prevent the discharge of cargo. He noted that in all his vessel fired 106 rounds of ammunition during the engagement.

On July 12, 1862, after Goldsborough received Parker's initial summary report, he forwarded it to the Department of the Navy with a note saying that he would query Parker further about the sinking. (ORN Ser. 1, 7, 515) His request dated July 12, 1862, questioned Parker along several lines. He first questioned how the MODERN GREECE got so close to shore before she was discovered and whether she had been seen by any other blockading vessel earlier. Goldsborough was obviously concerned about

the effectiveness of the blockade. His second line of questioning was about the wreck itself. He wanted the latest information about the condition of the wreck; what further activity had gone on in the area of the wreck; what portion of the cargo had been salvaged; and what was in the cargo. He also wanted the name of the vessel which was not given in the initial report. Since he had not yet received information from the STARS AND STRIPES, he asked Parker to furnish him additional information about the STARS AND STRIPES' role in the initial engagement.

On August 1 Parker filed a supplementary report on the sinking; wherein, he answered the questions in Goldsborough's July 12 order. (ORN Ser. 1, 7, 516) Parker offered a simple solution as to how the MODERN GREECE got so close to the shore without being discovered. He stated that a combination of hazy weather, the early dawn light, and the slate grey color of the MODERN GREECE rendered her so indistinct that she could easily move along the shore without being spotted. McCook's report offered an even better answer. (ORN Ser. 1, 7, 517-518) He was confident that the MODERN GREECE could not have succeeded in running the blockade in any case, because of where the blockading ships were anchored. As to their location he reported:

I was anchored nearly abreast of the entrance (presumably to New Inlet); the steamer was run ashore about half a mile to the northward of the battery on Federal Point. The CAMBRIDGE was anchored to the northward and westward of me, probably 2 1/2 miles distant.

This positioning was such that incoming ships, like the MODERN GREECE, could approach reasonably near the inlet before being detected and trapped.

Parker answered in great detail Goldsborough's questions about the condition of the MODERN GREECE after the attack. (ORN Ser. 1, 7, 516) He replied:

I counted nine distinct shot holes made by our battery, some of which were near the water's edge, thus admitting the sea water to flow into the steamer freely. A curious

circumstance connected with the affair was that after several of our shot had struck the steamer the fort fired several shot at her. We were unable to account for the maneuver at the time, but I have since learned that the officers at the fort fired at the steamer solid shot to admit water into her and thus prevent our shells from exploding the large quantity of powder in her hold, and also to insure her sinking in case we should try to tow her off the beach.

The Official Army Records show that the Rebels themselves intentionally fired on the MODERN GREECE. Confederate Brigadier General S.G. French at Wilmington, N.C., wrote to General S. Cooper at Richmond about the sinking. His letter reinforces Parker's statements quoted above and gives additional information as to why the ship was hit by Confederate shells. (ORA Ser 1, 41, part 2) He wrote:

Last night the English steamer MODERN GREECE, in attempting to enter New Inlet, off Fort Fisher, got aground. She is laden with powder, rifles, and rifle cannon. The enemy are shelling her. We have sunk her to wet the powder and prevent an explosion. Have sent down steamers to aid and push to save some of the cargo. She is three-quarters of a mile from shore, which prevents us keeping the enemy's vessels far enough off to prevent their shelling her.

The shelling sunk the ship, for Parker had already declared the vessel a total wreck noting that the spar deck was, by August 17, 1862, level with the water and that the upper areas had been washed away leaving only the masts and smokestacks still standing. He also mentioned that the vessel had already settled into a bed of sand making its ultimate recovery doubtful.

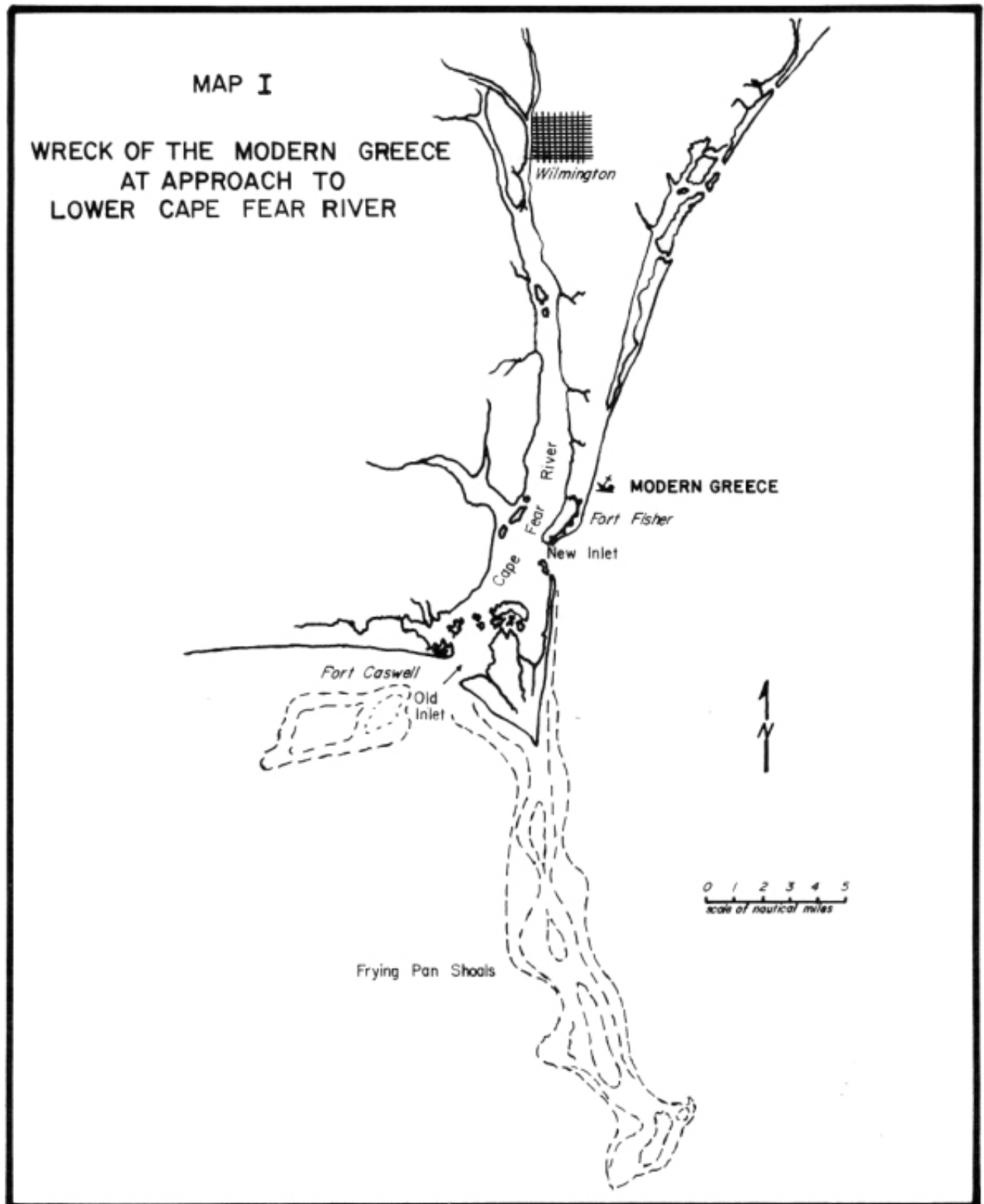
Goldsborough also queried about activity in the area around the wreck. In answer to this Parker mentioned that the MONTICELLO, STARS AND STRIPES, and CAMBRIDGE were continuing to fire occasionally on the wreck to prevent salvage. The guns of Fort Fisher still kept the Federal ships from approaching too near. A portion of the cargo, however, was salvaged in spite of the Federal ships' efforts. Parker also relayed to Goldsborough what he knew of the cargo and its salvage. (ORN Ser. 1, 7, 516) He stated that

...her cargo consisted of 1,000 tons of gun powder, some rifled cannon and other arms and equipment, the quantities of which I am not informed, together with bales of clothing and spirituous liquors.

I believe that the liquors and clothing have been saved, as we could see that a large quantity of bales, boxes, and barrels had been placed on shore from the steamer during the three days after she was beached. I have information from contrabands from shore that not one pound of powder nor a single cannon was saved.

By the time of his August 1 report Parker had ascertained that the ship was the MODERN GREECE and notified Goldsborough of this. The Official Naval Records show that Goldsborough forwarded the information received from Parker to Gideon Welles, Secretary of the Navy. (ORN Ser. 1, 7, 516-517)

The reports filed by Parker and McCook were pessimistic about the salvage potential of the vessel. Another contemporary source, the June 27 edition of the Wilmington Journal, gave a different picture. This was the same day the MODERN GREECE was run aground. The paper reported "...that quite a large portion of the cargo will be saved... The passengers and crew, with their baggage and private property all are safe." The July 10 edition of the Wilmington Journal gave more details about the salvage:



Col. Leventhorpe has already got out and landed a large quantity of arms etc. If the weather continues favorable during the day, he thinks he will be able to save all the cargo and the vessel also.

The local newspaper, as other information proves, was better informed than the Federal blockaders who relied on observation and spies for their information. Nevertheless, as the other information shows, the paper's optimism about the possibility of salvaging the entire ship was unwarranted.

SALVAGE EFFORTS IN 1862

The MODERN GREECE was a large ship carrying a valuable cargo, and her sinking represented a considerable loss which was diminished only slightly by the salvage of some of her cargo. As the reports of Parker and McCook show, salvage efforts began immediately after the ship ran aground. The Federal blockaders tried to block Confederate efforts at salvage by firing on the wreck. Federal forces were especially interested in preventing salvage of goods from aboard the MODERN GREECE, for they thought that the vessel was loaded exclusively with military equipment. The available information and the artifacts recovered in 1962 show that the cargo contained a large quantity of civilian goods as well as military supplies. The Official Naval Records detail to a limited extent the military cargo. The Wilmington Journal of July 1, 1862, gives details about civilian materials salvaged in the form of a list of goods from the MODERN GREECE due to be sold at auction on July 8. An actual manifest of the cargo is at this time unavailable. Its utility would be questionable, if it was available, since the manifests on blockade runners were often intentionally vague.

Parker, the commanding officer aboard the attacking ship CAMBRIDGE, in his supplementary report on the sinking of the MODERN GREECE sent to Goldsborough on August 1, 1862, noted that some of the cargo was saved in spite of Federal efforts to prevent it. (ORN Ser. 1, 7, 516) Parker stated that the cargo consisted of 1,000 tons of gunpowder, rifled cannon, arms and equipment, clothing, and liquor, all in undetermined quantities. Parker did not feel that either the powder or the cannon were salvageable. O.S. Glisson, senior officer aboard the U.S.S. MOUNT VERNON stationed in the

Cape Fear River area, gave similar information in his report to Goldsborough dated July 22, 1862. He stated that "...the steamer MODERN GREECE... was principally loaded with gunpowder, all of which was destroyed when she went down. She had on board several rifled cannon which will be lost." (ORN Ser. 1, 7, 589) Other information shows that both Parker and Glisson were underestimating the quantity of material that could be salvaged from the MODERN GREECE. Surviving reports from two other commanders of blockading ships in the Cape Fear area furnish more details about the amount of materials salvaged from the wreck. Commander Armstrong aboard the U.S.S. STATE OF GEORGIA and Commander D.L. Braine aboard the U.S.S. MONTICELLO furnished more information in their reports to Acting Rear-Admiral S.P. Lee, the commander with the North Atlantic Blockading Squadron at Norfolk, Va., than either Parker or Glisson did to Goldsborough. Armstrong reported on August 19 that "...the MODERN GREECE, beached at New Inlet, brought in many articles, and much of her cargo was saved; she brought four brass guns." (ORN Ser. 1, 7, 659) Braine reported on September 22 that he had learned the following information from spies:

...the rebels succeeded in getting out of the MODERN GREECE (which vessel was run ashore near New Inlet) six rifled cannon, which from their description, I should judge to be Whitworth's breech-loading guns; also 500 stand of arms and a large amount of powder and clothing, the last two in damaged condition.

Each of the reports mentioning the Whitworth cannon gave a different number. For example Armstrong (ORN Ser. 1, 7, 659) reported that there were four guns, and Braine (ORN Ser. 1, 8, 88) reported that there were six guns. A third report (ORN Ser. 1, 8, 89-90) dated September 23, 1862 from G.H. Scott, commanding the U.S.S. MARATANZA stationed off the Cape Fear River gave this information about the MODERN GREECE received from William Robins, a Confederate ship's carpenter:

her cargo consisted of powder and arms and whiskey. Much was taken out and much remains. Powder was

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all wet. They dried some of it.
She had two heavy guns.

There is no way of accounting for the variance in the number of guns reported as aboard the MODERN GREECE except to suggest the possibility of unreliable informants.

Blockade Command at Newport News, Virginia reported to the U.S. Navy at Washington, D.C. that there were six guns. Acting Rear-Admiral S.P. Lee aboard the U.S. Flagship MINNESOTA at Newport News, Virginia sent the following information to Gideon Welles (ORN Ser. 1, 8, 118):

...the rebels got out of the MODERN GREECE which was run ashore near New Inlet, 500 stands of arms, 6 rifled cannon, and a large amount of damaged powder and clothing...

This report is worded almost exactly like Braine's and was probably compiled from it.

The Federal reports were inaccurate. Surviving sources show that only four Whitworths were saved. Col. William Lamb, who took command of Fort Fisher on July 2, 1862, wrote (Clark 5, 351):

Shortly after taking command of Fort Fisher I recovered from the wreck of a blockade runner, the British Steamship MODERN GREECE, four 12 pounder Whitworth rifle guns, with a range of five miles. With these guns, we made the U.S. Blockading fleet remove their anchorage from two and a half miles to five miles from the fort. So many vessels were saved with these guns that they soon had a reputation throughout the South, and three of them were transferred to other commands, two going to Virginia.

There are two other references about the use of the Whitworths salvaged from the MODERN GREECE. On October 27, 1862 Acting Rear-Admiral S.P. Lee at Hampton Roads, Virginia reported (ORN Ser. 1, 8, 152) to Gideon Welles:

...They state that the battery which fired on the MARATANZA on the 11th instant, as I had the honor of informing the Department on the 15th, consisted of two field pieces, Whitworth guns, landed from the MODERN GREECE, and brought from Fort Fisher, to which place they were returned on the 15th...

Confederate reports also show that the guns were of strategic importance for the defense of the Wilmington area. Major-General Whiting on August 24, 1863, wrote (ORA Ser. 1, 18, 415) to James A. Seddon, Secretary of War at Richmond:

The efforts of the enemy to stop our steamers are increasing. This force is largely increased. I have met with a serious and heavy loss in that Whitworth (lost earlier 9 mi. North of Fort Fisher), a gun that in the hands of the indefatigable Lamb has saved dozens of vessels and millions of money to the Confederate States. I beg that a couple of the Whitworth guns originally saved by him from the MODERN GREECE may be sent here at once. Their long range makes them most suitable for a seaboard position. Could I get them with horses we could save many a vessel that will now be lost to us.

The Whitworths were used on the beach in an area from Fort Fisher to Masonboro Inlet.

From the Official Naval Records it seems that the most important military supplies saved from the MODERN GREECE were the Whitworths and the rifles. Although the Whitworth guns themselves were saved, not all the ammunition for them aboard the MODERN GREECE was saved, for 75 Whitworth bolts and 10 case shot were recovered in 1962. In addition to this ammunition, the majority of the 200 tons of powder purportedly aboard the MODERN GREECE was lost.

The MODERN GREECE was not completely laden with military goods. A major portion of the artifacts recovered in 1962 is hardware and other civilian goods. The Wilmington Journal of June 31, 1862, offers evidence that the civilian goods salvaged from the MODERN GREECE were sold at auction on July 8. Everything, however, was not recovered in good condition, for the newspaper reports:

We understand a large proportion of the cargo of the ship MODERN GREECE, advertised for sale at auction 8th inst. is in a damaged condition, and we are requested to say catalogues of that saved in good order will be prepared as soon as the ship is discharged, and the quantity ascertained.

On July 1, the paper gave a notice of the auction sale. This notice lists the typed of goods salvaged. It reads in its entirety:

Auction sale by Wilkes Morris, Auctioneer/Cargo sale at auction by the package. Per steamship MODERN GREECE, direct from London. On Tuesday next, 8th inst., at 11 o'clock, A.M., I will sell at No. 2, Granite Row, the entire cargo (900 tons) of steamship MODERN GREECE reserving such articles as may be required by the government.

This is one of the most valuable cargoes ever imported into the Southern Confederacy, and consists of/Cases dry goods/Casks hardware/cases, boots and shoes/bales, blankets/cases ready-made clothing/cases under shifts/bales shirts/cases felt hats/bags pepper/bags pimento/kegs bi-carb, soda/kegs soda ash/cases mustard/drugs and medicine/black lead/gunny bags/sacks salt/qr casks choice dark cognac brandy/qr casks choice pale cognac brandy/baskets champagne/qr casks red wine/qr casks white wine/hhds choice scotch whiskey/cases santerine/cases claret/cases of maraschino/cases red sparkling burgundy/with various other

articles./ Damaged portion of cargo will be sold first. Catalogues will be furnished as soon as the quantity landed in order can be ascertained.

The 1962 divers did not recover items similar to many given in this list. For example, no other reference mentions clothing or spices, both of which were aboard according to the auction sale list. Further, none of the other accounts specifically details the various types of spirituous liquors aboard the MODERN GREECE. Not all the liquor made it to the auction sale, for the soldiers at Fort Fisher drank some of the salvaged liquor, much to the chagrin of their military superiors and the local populace. The list of auctioned goods augments our knowledge of the total cargo aboard the MODERN GREECE.

Another contemporary report of a young soldier at Fort Fisher also records goods salvaged from the vessel. The July 5, 1862, letter from W.B. Taylor at Camp Lamb to his mother is now in the possession of J. Foard, Blockade Runner Museum, Carolina Beach, North Carolina. It reads:

I arrived at camp safe; and when I got here, I found companies at Camp Lamb were absent. They were down at Confederate Point unloading a steamer, the MODERN GREECE, which ran aground about half a mile from Fort Fisher. She was a very large steamer. She had twelve thousand rifles aboard of which four thousand were saved, and two hundred tons of powder also, and immense lot of other goods of every description. There was enough to fill Wilkes' mill and Granite Row, but one half the cargo was lost there where schooner ran into Masonboro Sound yesterday, and company has gone down to see to it....

Although the Rebels were able to salvage a portion of both the military and civilian cargo, they could not refloat the vessel. Evidence suggests that a portion of the engines may have been removed and placed in a gunboat

being built at Wilmington in 1862. Major-General J.G. Foster at New Bern reported on October 3, 1862, to Major-General H.W. Halleck in Washington, D.C. about activities in eastern North Carolina. He wrote (ORA Ser. 1, 18, 416):

I omitted to mention, in speaking of Wilmington, that yellow fever has broken out there and bids fair to become an epidemic. The inhabitants have fled the town; the telegraph office is closed, and all work on the iron-clad gunboats now building there is suspended. Concerning these gunboats I have some information which I deem accurate, and which I will give in brief as you may desire to communicate the same to the Navy Department: They are some 150 feet in length, 35 or 40 feet beam, and will draw some 14 feet water. They are simply intended for river defense and are not designed to cross the bar. The engines are from the MODERN GREECE and the UNCLE BEN. They are not yet set in. Five weeks work will be necessary to finish the first and three months for the second. They are plated with railroad iron and built after the pattern of the MERRIMAC No. 1.

Two sister gunboats, the NORTH CAROLINA and the RALEIGH, were built at Wilmington during this period. Their dimensions roughly coincided with those given in this report. The NORTH CAROLINA's engines supposedly came from the UNCLE BEN (ORN Ser. 1, 8, 88) which suggests that, of the two similar gunboats, the RALEIGH received the engines from the MODERN GREECE. Other reports (ORN Ser. 1, 8, 90 and 119) stated that one of the engines came from the UNCLE BEN, and the other was new from Richmond. Both accounts can be reconciled by an examination of the wreck itself, which still contains the boilers and the propeller. This suggests that a portion of the RALEIGH's engines may have come from the MODERN GREECE and that a portion such as the boilers

may have been new from Richmond. How much of the engines removed from the MODERN GREECE was placed aboard the RALEIGH cannot be determined with any accuracy. An examination of all the evidence relative to salvage in 1862 suggests that a portion of the military and civilian cargo as well as a portion of the machinery off the MODERN GREECE was saved before the vessel settled into the sand where she laid virtually undisturbed for 100 years.

THE 1962 RECOVERY OF ARTIFACTS

The location of the MODERN GREECE was known for many years, and this knowledge was passed down through the generations by historians and fishermen. For a number of years a fishing pier jutted out in the vicinity of the wreck, marking the site. However, the ocean currents had covered the wreck with sand in 30 feet of water making it virtually inaccessible.

In early spring of 1962, a fierce storm ravaged the North Carolina coast. The high winds and the surging waves removed the sand uncovering the remains of the MODERN GREECE. Shortly after this storm divers from the Naval Ordnance School at Indian Head, Maryland, while visiting the area on a holiday, descended onto the iron hulled wreck. Upon surfacing they reported that the wreck had been cleared of sand to a level below the main deck and the cargo was virtually intact inside.

News of this discovery was passed to the North Carolina State Department of Archives and History, North Carolina State Confederate Centennial Commission, and the Governor's office. The Office of Archives and History with cooperation of these other agencies organized salvage operations to recover some of the cargo.

This initial salvage operation lasted slightly more than three weeks during which time a large number of artifacts were recovered. Then operations halted so that the divers could return to the Naval Ordnance School. However, the divers were able to return to the Fort Fisher area during the summer and resume diving on the MODERN GREECE. During this period they also investigated ten other wrecks in the lower Cape Fear area. Both diving operations are well documented and furnish an interesting account.

Eleven Navy divers on their holiday first started exploring the area around the MODERN GREECE on Thursday,

March 15. They were working from a rented shrimp boat, WAYNE R, commanded by E.L. Lewis of Carolina Beach, N.C. The divers located the wreck 300 yards offshore in 25 feet of water. By Saturday evening they had brought to shore 17 Enfield rifles, 3 Whitworth shells, 1 triangular bayonet, several saber bayonets, and a ship's anchor. The diving continued on Sunday the eighteenth with 20 more Enfield rifles being brought ashore as well as 10 Enfield carbines, a lead pig, more shells, and bayonets. On Sunday seven of the eleven divers were forced to return to Indian Head.

The departure of the seven divers did not put an end to the operation. The four remaining divers, realizing the enormity of their find and recognizing the limits of the resources available to them, sought aid from the Coast Guard. They hoped to get a 90 foot craft with diving gear and a winch from Southport. This would have made the diving operation easier. The Coast Guard, however, sent a different craft. On Tuesday, March 20, the buoy tender JONQUIL was ordered by the Coast Guard to help with the salvage program.

The divers spent Monday battling with swift currents and 38 degree water as they recovered 30 more rifles, a few shells, and some more bayonets and waited for news of additional support. On Tuesday morning the divers received encouraging support from North Carolina Governor Terry Sanford, who asked their commanding officer, Commander B.J. Belmore, for more divers and permission for the divers to remain as long as needed. Belmore sent the permission and an additional team of six divers that arrived ready for work on Thursday.

When the JONQUIL arrived on Tuesday evening her captain, Lieutenant G.A. Pehaim, said that it would be too dangerous to take his vessel in as close to the shore as the diving operations required. Although the JONQUIL was unable to give direct assistance, Coast Guard headquarters at Portsmouth, Virginia ordered her to stand by and give whatever aid possible. She was to work closely with A.L. Honeycutt, Jr., the supervisor of the North Carolina State Historic Site at Fort Fisher.

Thursday, March 22, was a big day for the divers. They brought up 13 lead pigs, 12 tin pigs, rifles, 15 Whitworth shells, and 12 packages of tin plated steel sheets.

The large number of artifacts being recovered by the divers posed storage and preservation problems. The state turned to Smithsonian for expert advice on how to handle the relics. A vacant building on the Fort Fisher Air Force Station provided temporary storage facilities. Wet storage space, however, was so scarce that some of the artifacts were even kept in a bathtub belonging to one of the state officials working on the project.

The recovery had attracted so much media attention that the salvage operation was faced with yet another unexpected problem. On Thursday March 22, the divers ordered a 38-foot civilian diving tender, HELEN MARIE, to stand clear of the wreck. The tender was attempting to anchor over the wreck and commence salvage operations of its own. The attention given the wreck also had a positive effect, for the North Carolina Confederate Centennial Commission agreed to help finance the divers' stay and defray some of the other costs involved in the operation. The State Department of Archives and History also planned to reimburse the divers for their expenses.

Rough weather precluded diving operations for Friday, March 23; however, by Saturday a Navy minesweeping boat (MSB) had arrived from Charleston, S.C. for the divers to use as a floating platform. During the weekend of March 24-25, bad weather and strong winds hindered the diving activities. The wind and waves were so strong that it took the MSB more than two hours to tie up before the divers could go down. As the wind increased the boat was forced to return to port after only about one hour of diving.

The bad weather continued and the divers were forced to discontinue operations until Tuesday, March 27. The remainder of the week, however, was extremely fruitful. During this time the divers recovered the files, handsaws, picks, and a brass bullet mold. The picks were recovered in excellent condition. To get at this cache of artifacts the divers had used dynamite to blow open a compartment of the ship. The use of dynamite is not an accepted archaeological technique, but the Navy divers were not archaeologists and their interest was simply the salvage of the cargo. After the dynamite laid open the compartment, picks and saw blades were found lashed to the hull within the compartment. The divers continued working for one more week until Tuesday, April 10, when operations were discontinued.

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The divers returned to the Cape Fear area in July of 1962 to continue recovering artifacts from the MODERN GREECE. At this time they were assisted by a minesweeper from Minron 10 at Charleston, S.C.; by an amphibious landing craft from the Atlantic Amphibious Force at Norfolk, Va.; and by a barge with a crane from the Sixth Naval District at Charleston, S.C. Later these vessels were joined by the U.S.S. PETREL, a submarine rescue vessel. It brought heavier equipment than was previously available and furnished a platform for the divers to work from.

This equipment allowed the divers to recover boxes of goods, an anchor, more lead, the spool of wire, and other heavy articles. Dynamite was again used on July 8 to lay open the cargo area. With the use of an air pump the divers were able to recover a large number of knives and small medical tools.

The entire summer was not spent simply working on the MODERN GREECE. Exploratory dives were made on ten other vessels in the lower Cape Fear area including the PHANTOM, HEBE, VENUS, BEAUREGARD, IRON AGE, RANGER, ELLA, BENDIGO, and two other unidentified sites to ascertain the type and condition of the vessels and the prospects for future work. Similar diving operations on a lesser scale were conducted in the summer of 1963. During 1962-63, some 11,500 artifacts were recovered from the MODERN GREECE.

STORAGE AND PRESERVATION OF THE ARTIFACTS

The recovery of so many artifacts presented a problem of storage and preservation. An appropriation by the North Carolina General Assembly made possible the establishment of a preservation laboratory administered by the Office of Archives and History. Herein the artifacts could be stored and preserved.

The laboratory is located at the Fort Fisher State Historic Site not far from where the MODERN GREECE lies. This location allowed the recovered materials to be transferred promptly to the laboratory for storage and eventual preservation. From 1963 to 1965, as budgets permitted, the laboratory was equipped with chemical supplies, drying ovens, and equipment for sandblasting, water distillation and deionization, and electrolysis. A study collection room with controlled atmosphere and a storage room for untreated artifacts were also constructed.

Experiments were conducted to determine the best treatment for preserving artifacts suffering from varying degrees of deterioration caused by salt water. Because of the large number of identical objects recovered, it was feasible to use trial and error tests which in some instances caused destruction of the artifacts. Successfully preserved artifacts from the MODERN GREECE have been sent to a number of museums, historic sites, and individuals and groups for temporary use in classes and exhibits. A summary list would include the following: The State of North Carolina; Smithsonian; Fort Gordon, Georgia; Mariner's Museum; Naval Historical Display Center; Woodrow Wilson Birthplace; New Hanover Museum; the town of Southport; and the Blockade Runner Museum.

Efforts have been made to protect the MODERN GREECE. In 1967 the North Carolina General Assembly passed the underwater archaeology law, declaring state ownership of all historical and archaeological material lying unclaimed in state waters for 10 years or more. This statute also provided the authority for the state to grant permits or licenses for exploratory, recovery, and salvage operations. To date approximately 200 divers have participated in dives on the MODERN GREECE under the terms of the Short Term Sport and Hobby Diving Permit. These divers continue to add to our knowledge of the wreck. The MODERN GREECE and artifacts from her cargo represent a valuable resource for students of the Civil War, marine archaeology, and preservation.



A. Salvage boat en route to site



B. Work aboard salvage boat



A. Deck of salvage boat



B. Recovery of anchor



A. Enfield bullets aboard salvage boat



B. Lead ingots aboard salvage boat

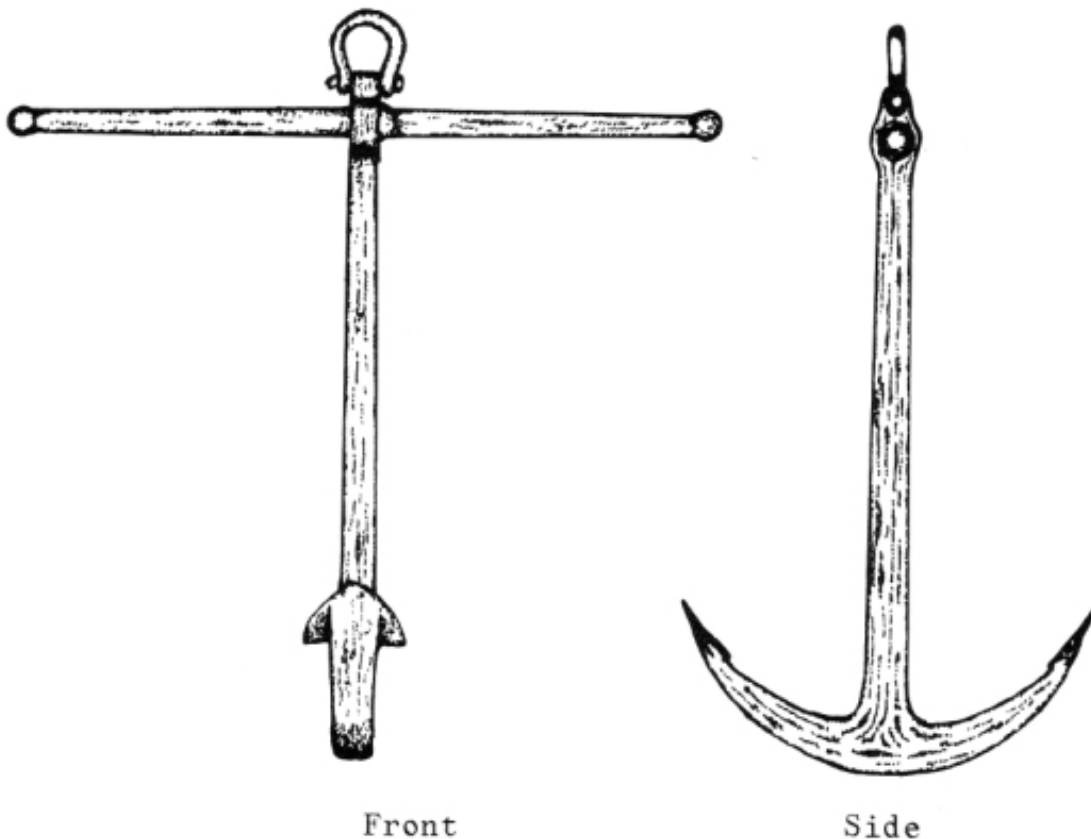
THE INVENTORY



SHIP'S EQUIPMENT AND FITTINGS

Article:	Anchor, large (MG-5G)		
Recovered:	1		
Size:	Height (crown to shank)	8'	
	Height (of ring)	14'	
	Length (of stock)	9' 6"	
	Width (of ring)	0'12"	
	Width (of stock)	0' 4 1/4"	
	Width (of fluke)	0'17"	
	Width (of shank)	0' 4 1/2"	
	Height (of fluke)	0'10"	
Weight:	1,800 pounds		
Markings:	None		
Description:	Kedge type anchor.		
Condition:	Good. The overall deterioration, which produces a grainy effect, averages 3/16".		

Figure 1. Anchor, large
Scale: 1/15



26 Ship's Equipment

Article:	Anchor, small (MG-5G)		
Recovered:	1		
Size:	Height (crown to shank)	9'	
	Height (of ring)	14'	
	Length (of stock)	9' 6"	
	Width (of ring)	0' 12"	
	Width (of stock)	0' 4"	
	Width (of fluke)	0' 16"	
	Width (of shank)	0' 5"	
	Height (of fluke)	0' 11"	
Weight:	1,700 pounds		
Markings:	None		
Description:	Kedge type anchor.		
Condition:	Good. Surface deterioration, as in the large anchor, produces a grainy effect averaging approximately 3/16".		

Figure 2. Anchor, small
Scale: 1/15

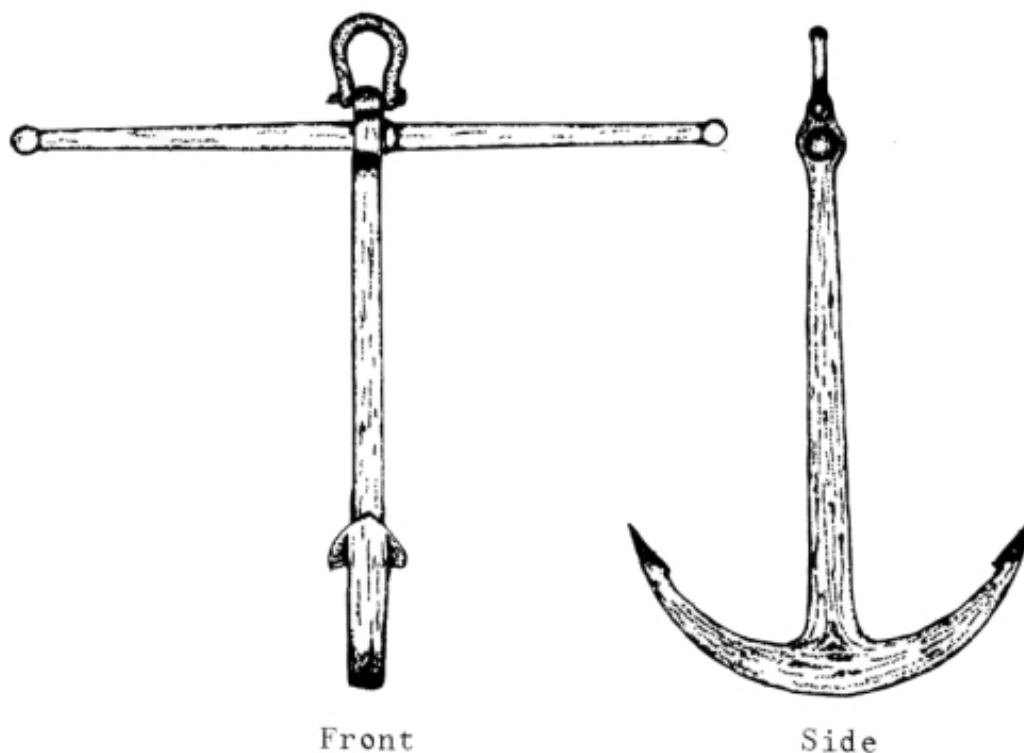
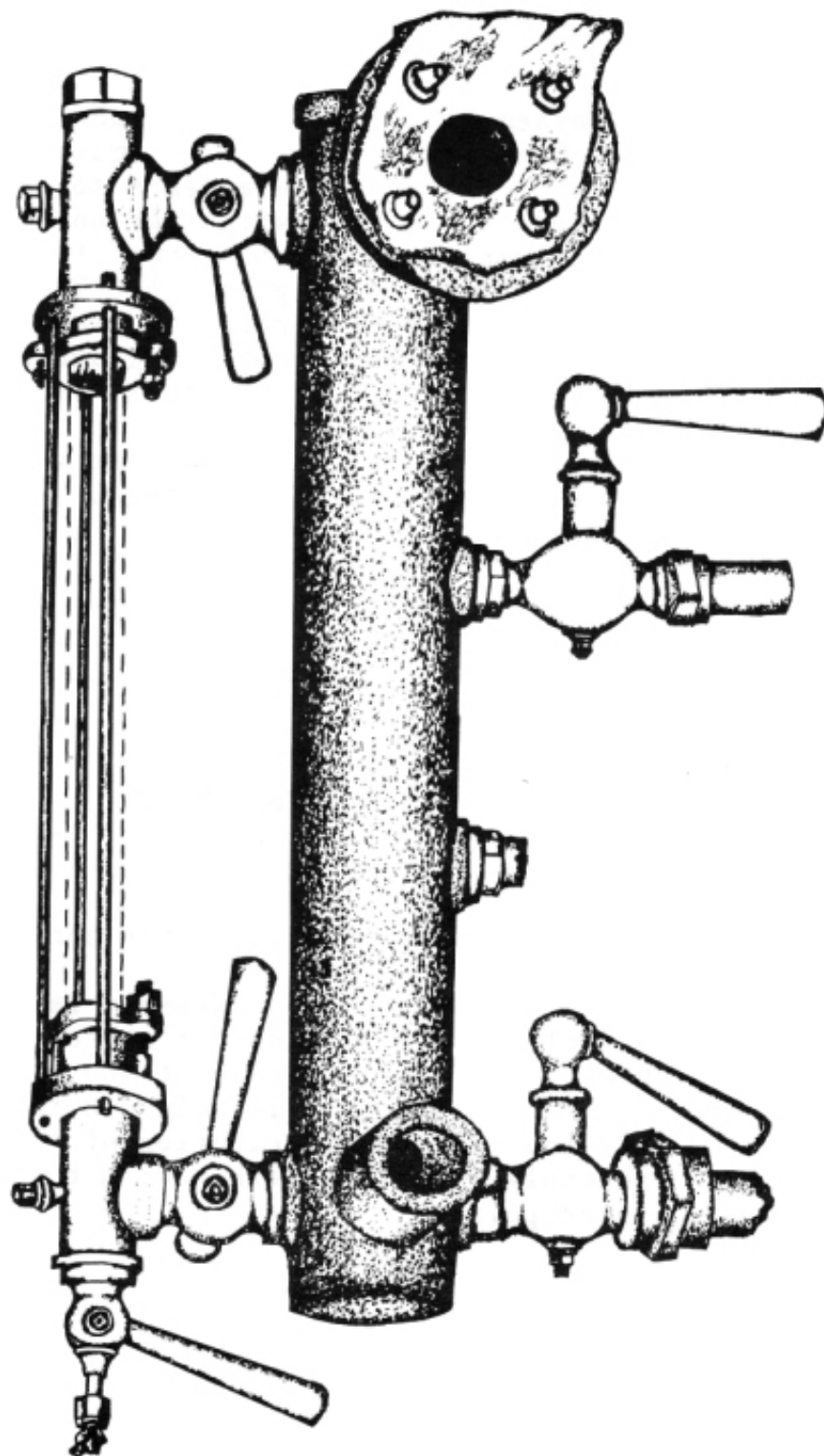


Figure 3. Assembly, steam pressure
Scale: 1/4

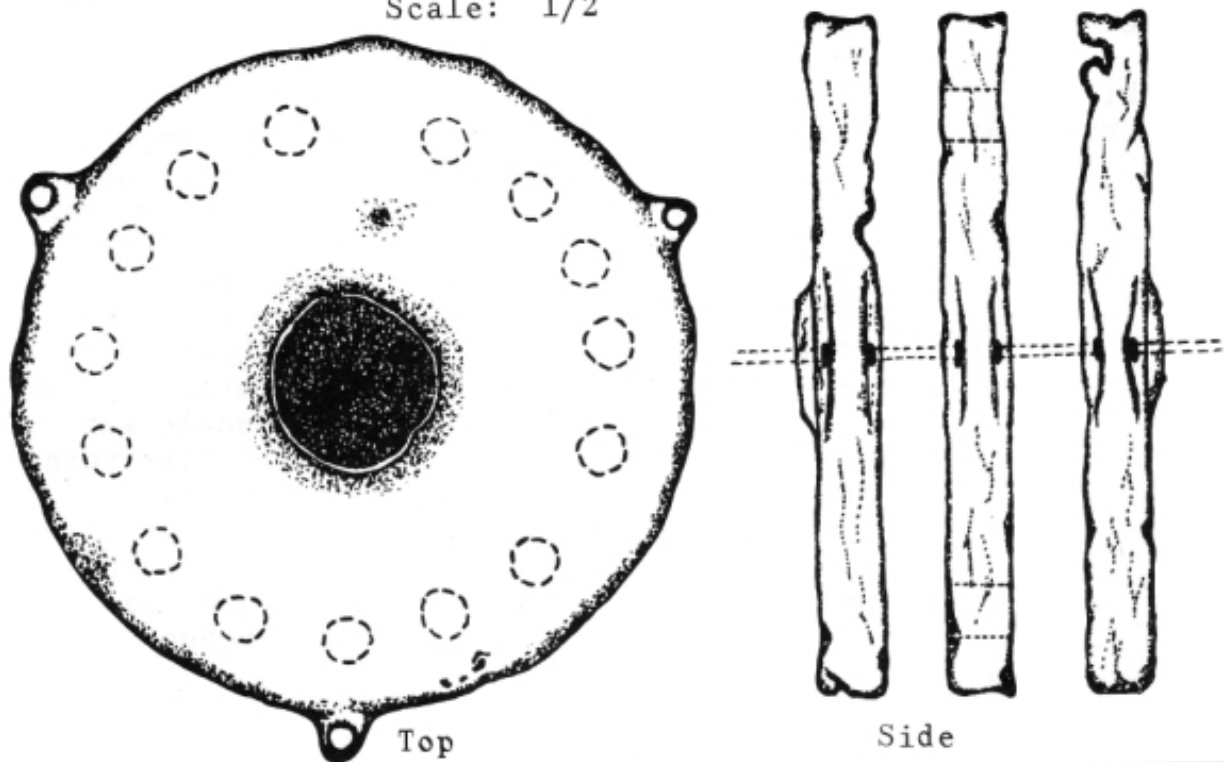


28 Ship's Equipment

Article: Assembly, steam pressure (MG-2W)
 Recovered: 1
 Size: Length (overall) 32 "
 Length (of gauge) 26 1/2"
 Markings: None
 Description: The assembly column is constructed of iron with brass gate valves. The main inlet at the top of the column appears to have been mounted to the hull with four bolts. From the column there are four run-off points for supplying steam pressure. Two of these have gate valves. Traces of glass remain around the screws where the gauge was mounted. An on-off valve is at either end of the gauge with a bleed-off valve at the bottom. When they are disassembled, the various valve parts do not interchange.
 Condition: Good

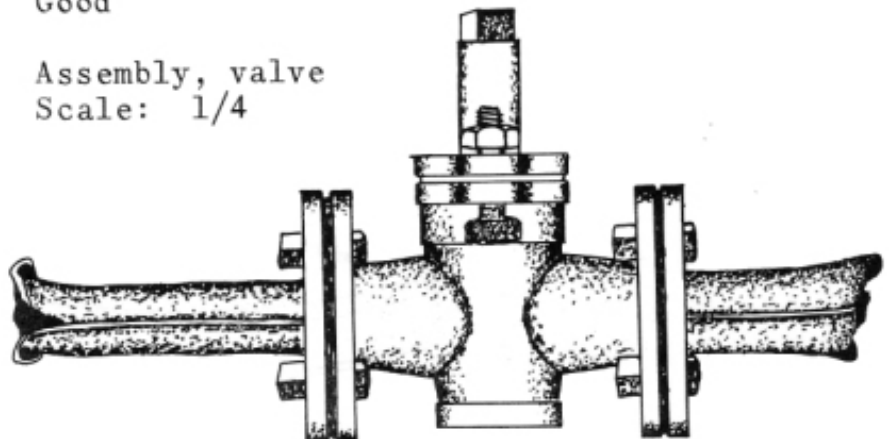
Article: Assembly, unidentified (MG-2W)
 Recovered: 1
 Size: Diameter (of assembly) 10 3/8"
 Diameter (of center inlet) 2 1/2"
 Diameter (of holes in center section) 1/2"
 Markings: None
 Description: This three-piece iron assembly is possibly a cooling device, since it contains a 2 1/2" hole as an inlet in each of the outer sections and fifteen 1/2" holes in the center section for the distribution of flow. The assembly is held together with bolts at three points.
 Condition: Good

Figure 4. Assembly, unidentified
Scale: 1/2



Article:	Assembly, valve (MG-2W)		
Recovered:	1		
Size:	Length	(of valve portion)	7"
	Diameter	(of flanges)	5 1/4"
Markings:	None		
Description:	On-off valve made from copper pipe brazed to brass flanges. The in-line valve flanges were bolted in place with four iron bolts. This is probably the most typical on-off valve used on the MODERN GREECE since a large number of them have been seen on the vessel.		
Condition:	Good		

Figure 5. Assembly, valve
Scale: 1/4

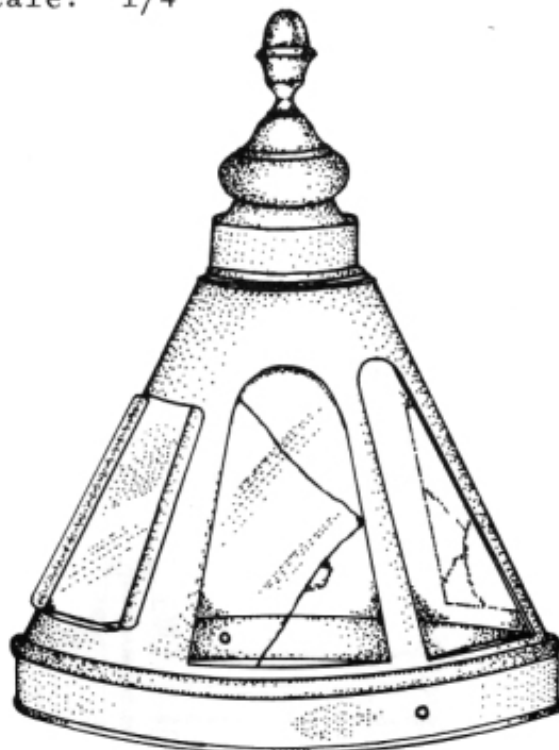


30 Ship's Equipment

Article: Binnacle (MG-7G)
Recovered: 1
Size: Diameter 11 1/2"
Height 14 1/2"
Markings: None
Description: The cone shaped cover for ship's compass is in four soldered sections of thin sheet brass. Two of the four transparent glass windows are fitted with outside brackets presumably for covers to slide into. The small three-tiered hood flaring into the top of the cover consists of a basal rim, a middle tier with three ventilation spaces, and a bolted top knob. The binnacle was found with a small chain wrapped five turns around it. The remainder of the chain trailed off under a pile of ship's debris outside the hull. The chain was possibly used to hold the compass and stand together so that they could be thrown overboard and retrieved later.

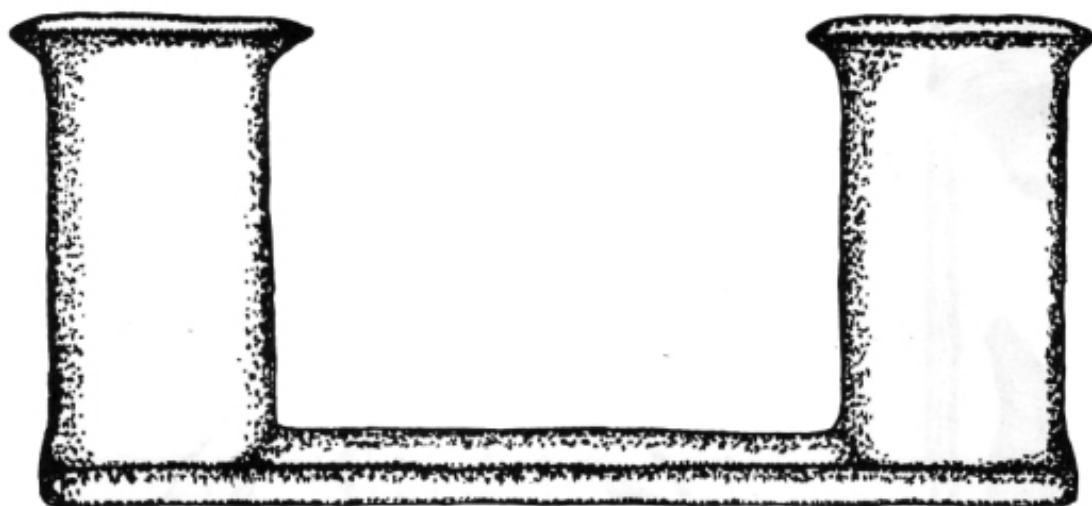
Condition: Good. It is slightly dented and gouged with some of the glass broken out of the windows. All windows, however, have some glass.

Figure 6. Binnacle
Scale: 1/4



Article: Bitt (MG-5Z)
 Recovered: 1
 Size: Width (of base) 7"
 Width (of bitt) 6"
 Width (at top of bitt) 10"
 Length (of outer edge) 30"
 Markings: None
 Description: Double posted ship's bitt. Another of similar design has been observed in the forward section of the hulk.
 Condition: Good. Reverse side slightly broken off. Very little decay.

Figure 7. Bitt
 Scale: 1/5



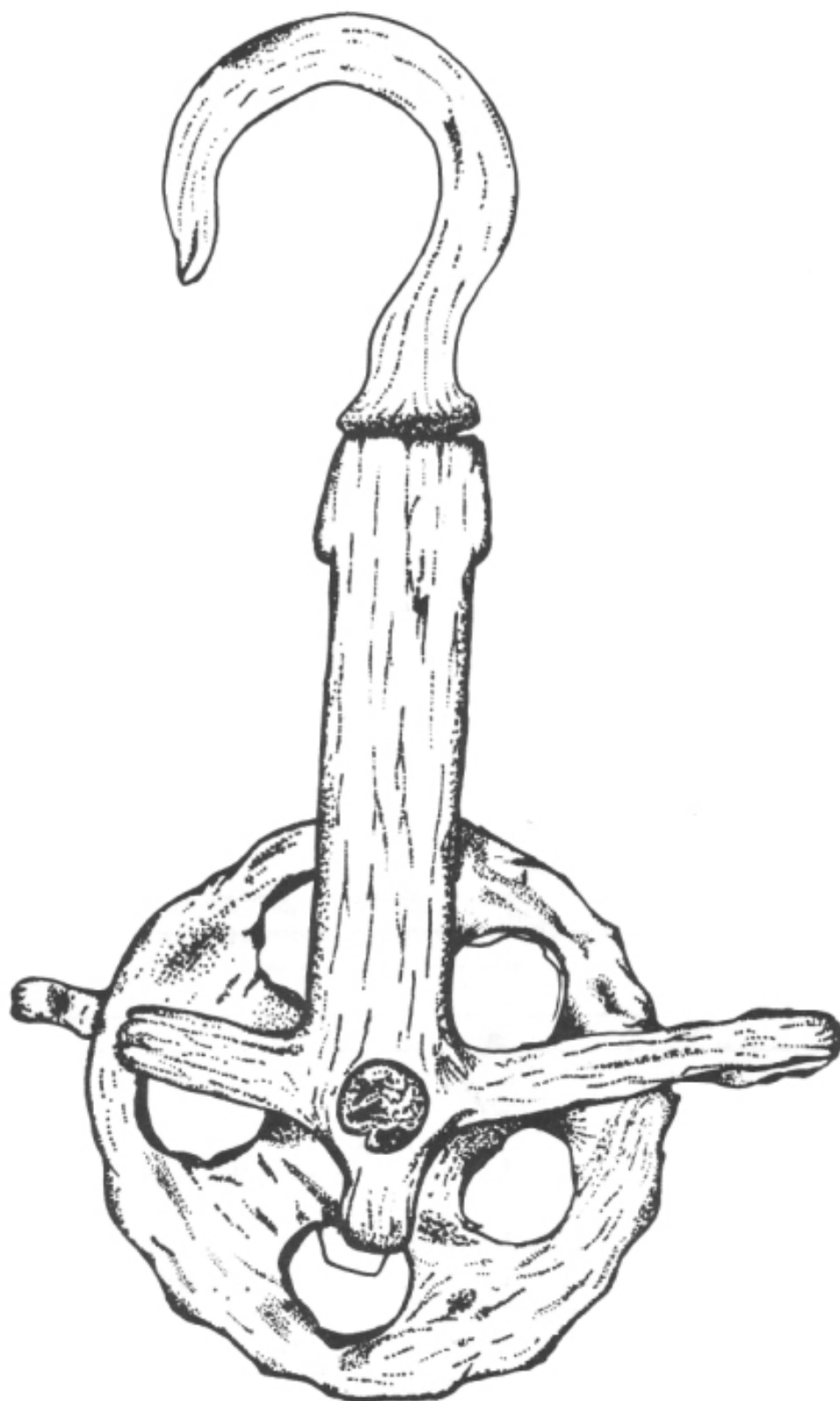
Article: Block, large (MG-5Q)
 Recovered: 1
 Size: Length (overall) 22 1/2"
 Diameter (of sheave) 9 3/8"
 Markings: None
 Description: A metal plain sheaved block constructed to swivel.
 Condition: Good. Neither the hook nor wheel will turn.

Figure 8.

Block, large (MG-5Q)
Scale: 1/3



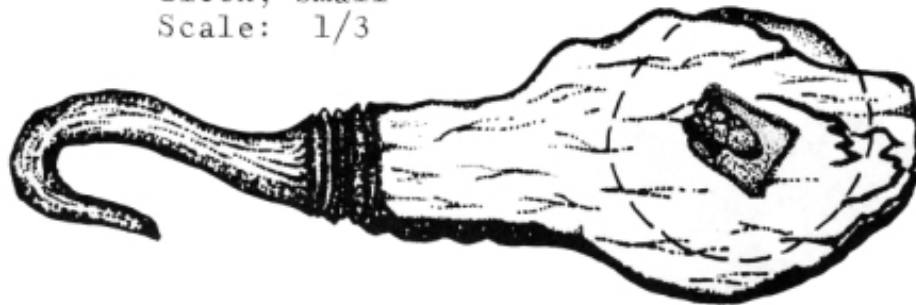
Front



Side

Article: Block, small (MG-5Q)
 Recovered: 1
 Size: Length (overall) 14 1/2"
 Diameter (of sheave) 4"
 Markings: None
 Description: A metal plain sheaved block constructed to swivel.
 Condition: Good. Metal is corroded and has a grainy texture.

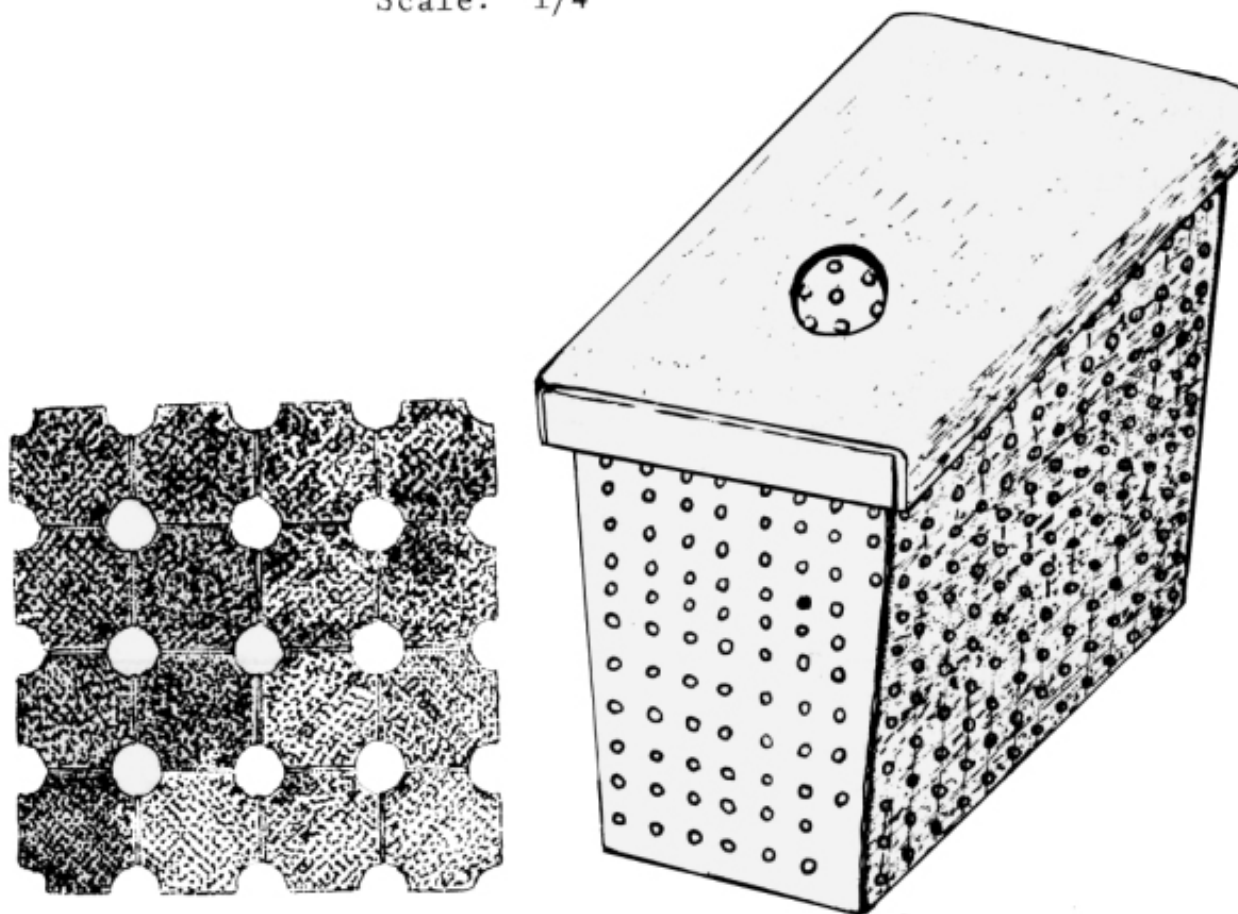
Figure 9. Block, small
 Scale: 1/3



Article: Box, bilge strainer (MG-6U)
 Recovered: 1
 Size: Length 10"
 Upper width 7"
 Lower width 5 1/4"
 Cover length 10 3/8"
 Cover width 7 5/8"
 Markings: None
 Description: The strainer appears to have been made from a single piece of sheet lead 3/16" thick cut into three pieces and formed into a rectangle with one side sloping inward at the bottom. The bottom and sloped side are one piece. One narrow side panel is a separate piece. Three sides are perforated with 1/4" holes 5/8" apart. Holes on the fourth side are 3/16" in diameter. The holes are punched out, and the individual sides are joined together with the bottom, which has no holes, by soldering. The cover is a lead sheet with a hole 2 1/8" in diameter centered near one end. Corners were cut off the lead sheet and the edges bent down and soldered to form the lid, which measures 10 3/8" by 7 5/8".
 Condition: Good with only a few scars.

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Figure 10. Box, bilge strainer (MG-6U)
Scale: 1/4



Detail of positioning and guide marks for holes (Full scale).

Article:	Capstan, bell shaped (MG-5Y)
Recovered:	1
Size:	Diameter (of top) 24 3/4"
	Diameter (of middle) 15 3/4"
	Diameter (of base) 19 1/4"
	Height 24 1/4"
Markings:	None
Description:	A bell shaped capstan was recovered without its mount. It is equipped to operate manually or mechanically.
Condition:	Poor. Metal is very rusted.

Figure 11.

Capstan,
bell shaped
Scale: 1/6

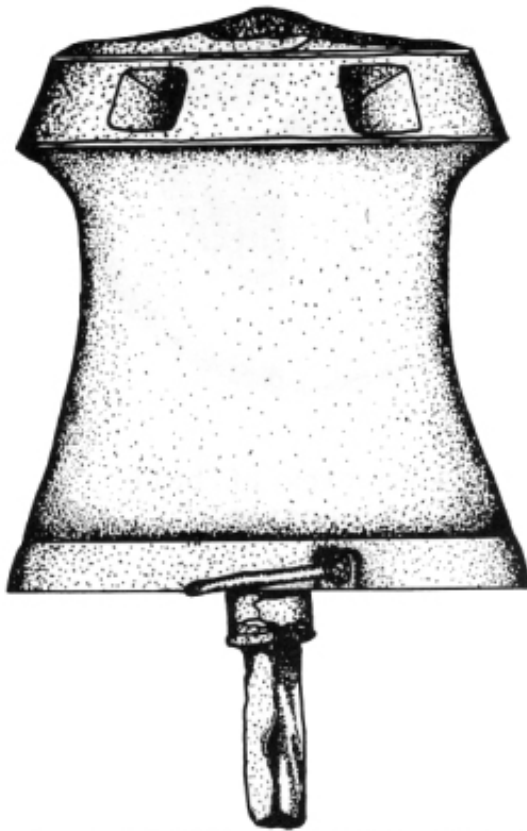
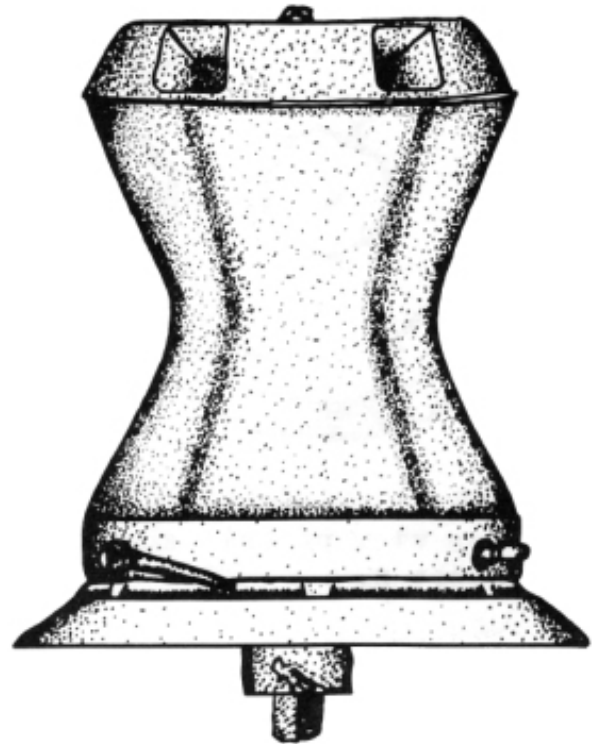
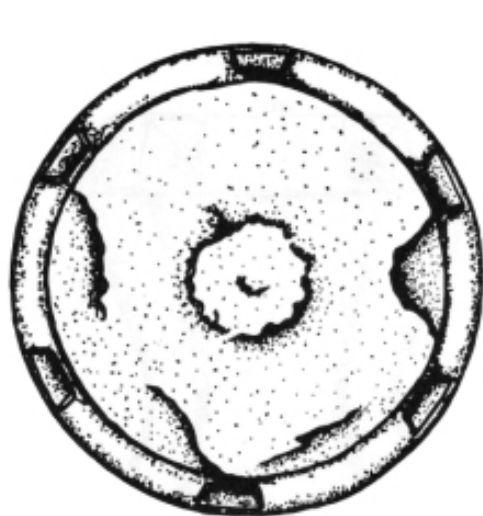


Figure 12. Capstan, hour-
glass shaped
Scale: 1/6

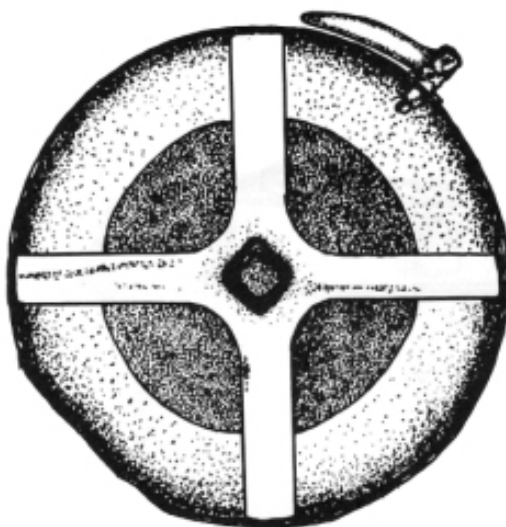


Article:	Capstan, hour-glass shaped (MG-5Y)
Recovered:	1
Size:	Diameter (of top) 18"
	Diameter (of middle) 9 3/4"
	Diameter (of mount) 24"
	Height 26"
Markings:	None
Description:	An hour-glass shaped capstan was recovered with its mount. It is equipped to operate manually or mechanically.
Condition:	Poor. Metal is very rusted.
Remarks:	See Figure 13 for a comparison of the top and bottom views of the two types of capstan.

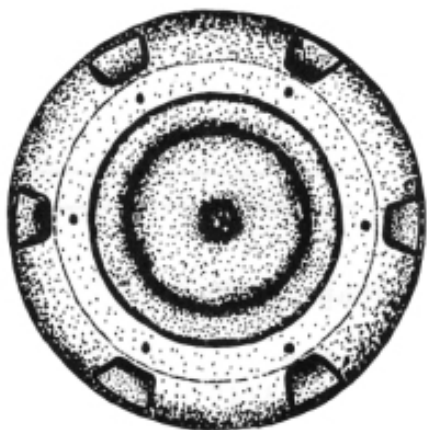
Figure 13. Comparative views of the tops and bottoms of the capstans.



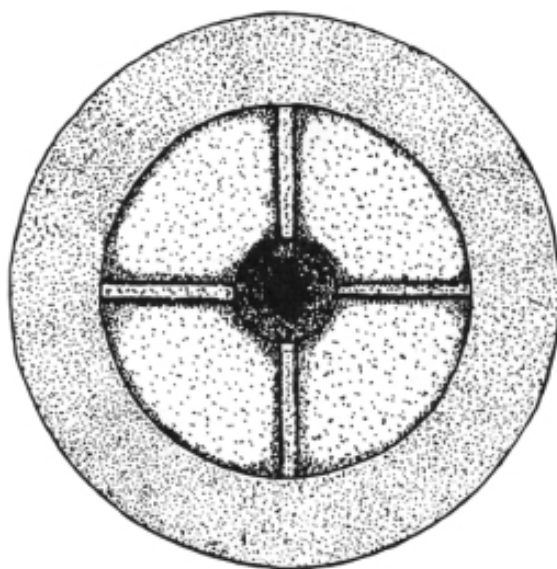
a. Top view of bell shaped capstan.



b. Bottom view of bell shaped capstan.



c. Top view of hour-glass shaped capstan.



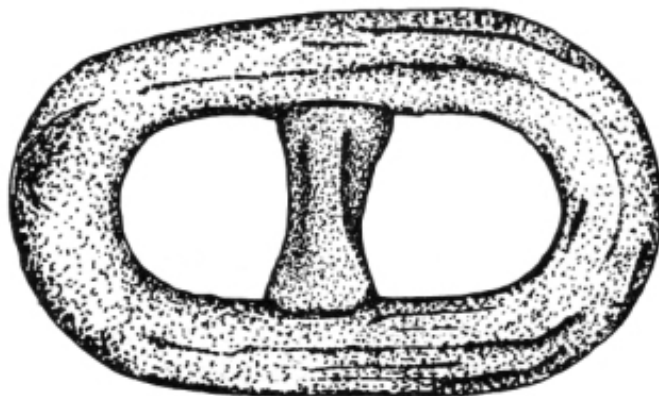
d. Bottom view of hour-glass shaped capstan.

Article:	Chain, stud (MG-3J)
Recovered:	1 section
Size:	Length (of chain fragment) 42 1/2"
	Length (of stud link) 6 3/4"
	Width (of stud link) 4 1/8"
	Stud (diameter) 0 3/4"
Markings:	None
Description:	Metal stud link chain. The large size suggests that it is an anchor chain.
Condition:	Good. Corrosion has given the metal a grainy texture.

Figure 14. Chain, stud section
Scale: 1/6



Figure 15. Chain, stud link
Scale: 1/2

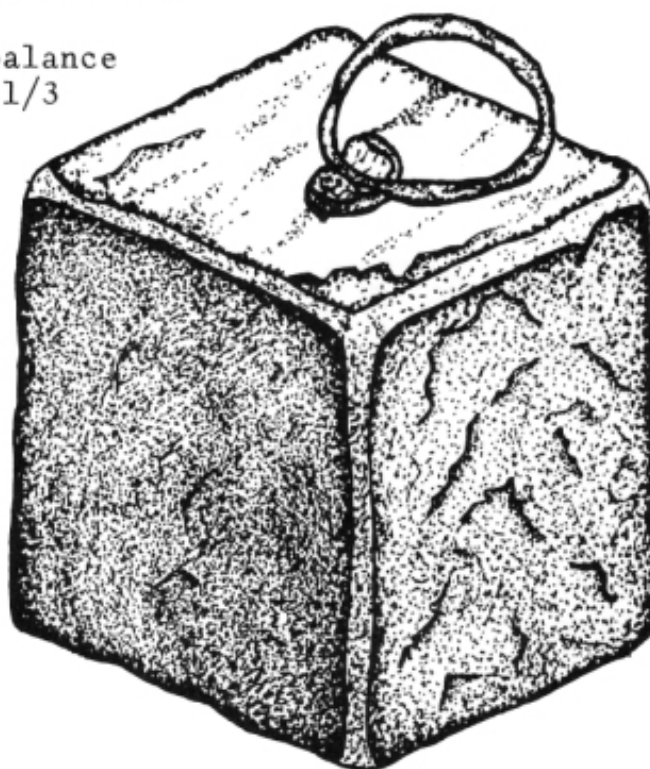


38 Ship's Equipment

Article: Counterbalance (MG-6J)
Recovered: 1
Size: Height 6 1/2"
Width 5 5/8"
Length 6 1/4"
Diameter (of ring) 4 1/8"
Weight: 52 pounds and 12 ounces
Markings: None
Description: An iron ring was connected by a single bolt to the top of the rectangular shaped iron weight.
Condition: Good. The bolt has deteriorated and the ring is now loose.

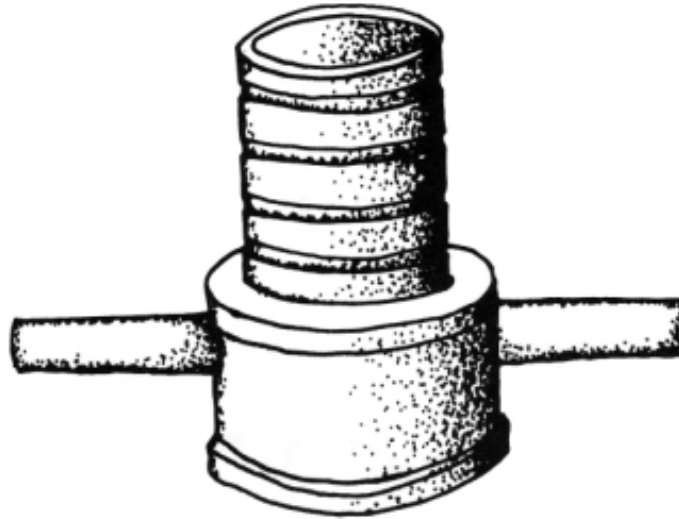
Figure 16.

Counterbalance
Scale: 1/3



Article: Coupling, hose (MG-5W)
Recovered: 1
Size: Length 7"
Width 3 1/2"
Width (of fitting) 2 3/8"
Markings: None
Description: A brass hose coupling with two cast on tightening spurs. The coupling apparently was made for a hose having an inside diameter of 2 1/4". The threaded portion of the coupling has eight threads per inch.
Condition: Good

Figure 17. Coupling, hose
Scale: 1/2



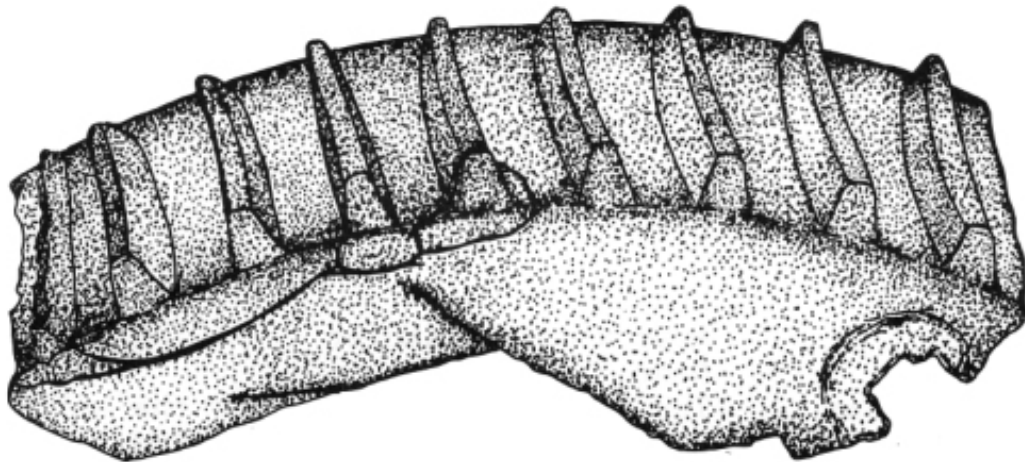
Article:	Davit (MG-2P)		
Recovered:	1		
Size:	Length	14'	3"
	Approximate diameter	3 3/4"	
Markings:	None		
Description:	The davit has a cleat near the middle with a swivel block mount located on the upper end. The davit at some time appears to have been twisted and was bent slightly below the shoulder of the mounting socket.		
Condition:	Good. Corrosion has given the metal a grainy texture.		

Figure 18. Davit
Scale: 1/24



40 Ship's Equipment

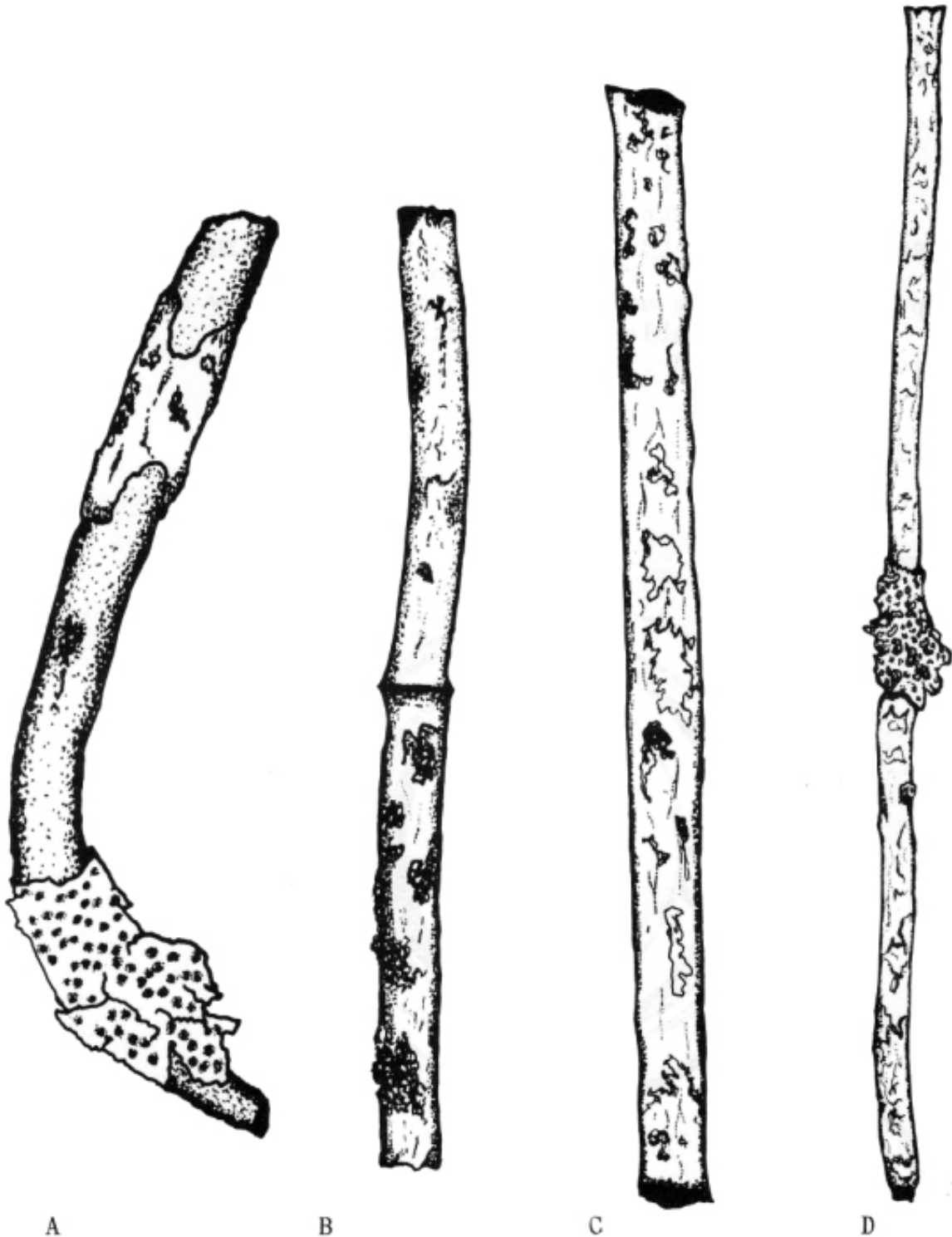
Article: Gear, worm, (MG-3F)
 Recovered: 1 fragment
 Size: Length (of fragment) 20 1/2"
 Projected diameter (of gear) 3'
 Height (of teeth) 0 1/2"
 Spacing (of teeth) 1 "
 Markings: None
 Description: This metal fragment was broken from a gear projected to be approximately 3' in diameter.
 Condition: Poor
 Figure 19. Gear, worm
 Scale: 1/4



Article: Pipe, lead (MG-6M)
 Recovered: 4 sections (labeled A, B, C, D below)
 Size: A -- Length 21 1/2"
 Outside diameter 2 "
 B -- Length 14 1/2"
 Outside diameter 2 "
 C -- Length 60 "
 Outside diameter 3 "
 D -- Length 75 "
 Outside diameter 1 7/8"
 Markings: None
 Description: These sections of pipe were cut or torn from the wreckage. One pipe appears to be two sections joined (Figure 20. C).
 Condition: Good. Several, however, have considerable concretion on them.

Figure 20.

Pipe, lead (MG-6M)



A
(A) Outside
diameter 2"
Scale: 1/4

B
(B) Outside
diameter 2"
Scale: 1/4

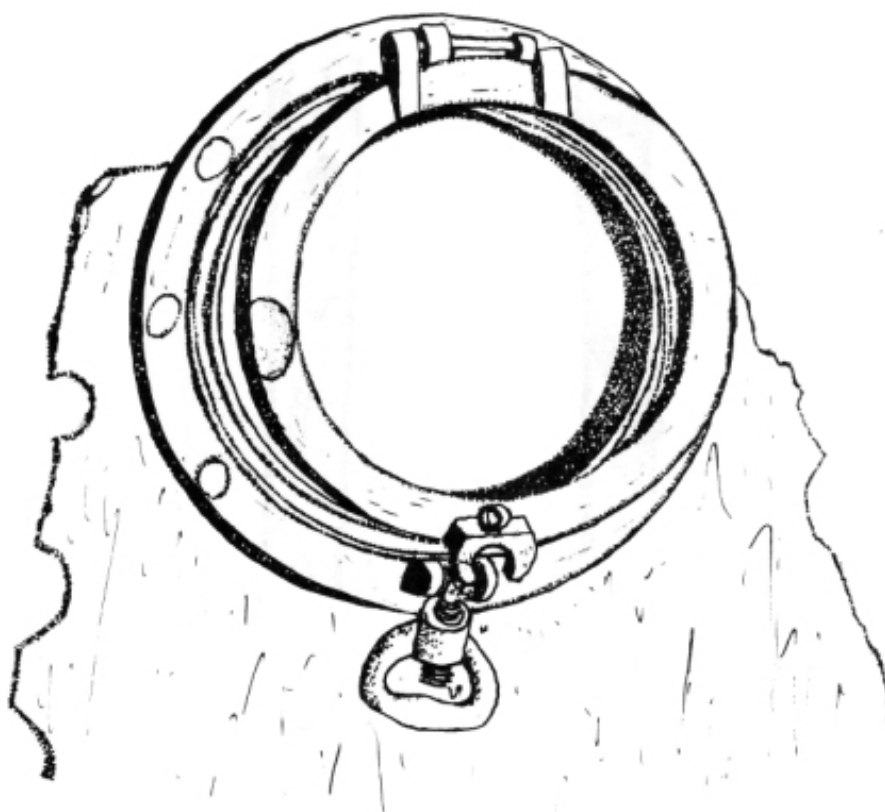
C
(C) Outside
diameter 3"
Scale: 1/10

D
(D) Outside
diameter 1 7/8"
Scale: 1/10

42 Ship's Equipment

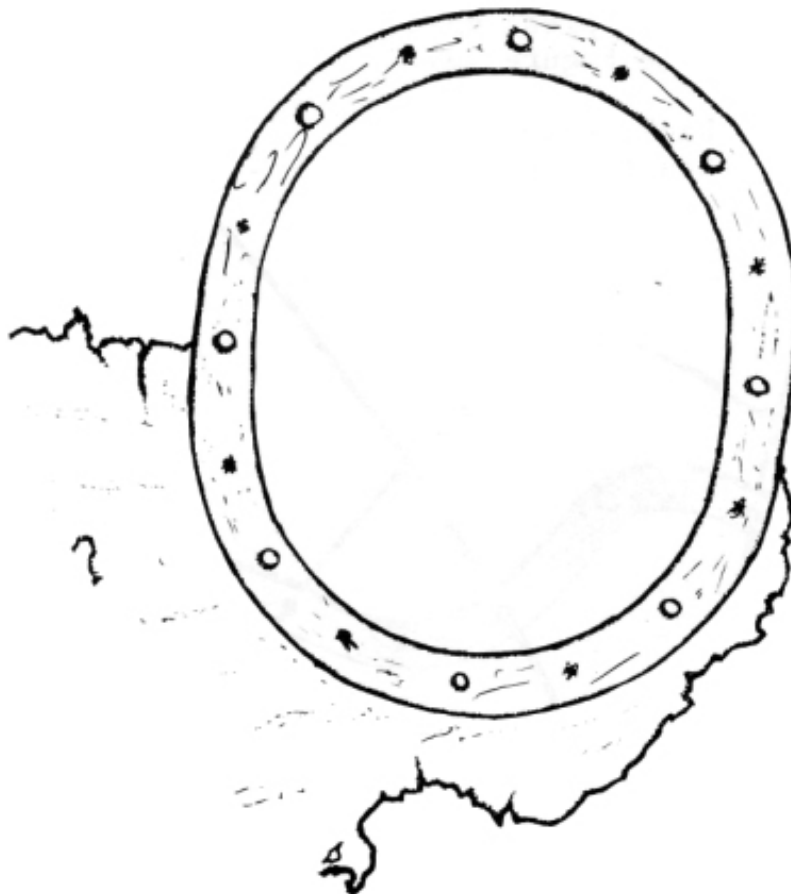
Article: Porthole (MG-7C)
Recovered: 2
Size: Width (at outside of larger rim) 12"
Width (at inside of larger rim) 9 1/2"
Width (at outside of smaller rim) 8 1/2"
Width (at inside of smaller rim) 7 3/4"
Thickness 1"
Markings: J. Abbott & Co., Gateshead-on-Tyne is on
outer rim of one porthole.
Description: Made of brass. Joined to hull by six rivets.
Movable ring slightly bent.
Condition: Good

Figure 21. Porthole
Scale: 1/3



Article:	Portlight (MG-7C)		
Recovered:	1		
Size:	Length	(at outer rim)	18
	Length	(at inner rim)	15"
	Width	(at outer rim)	15 1/2"
	Width	(at inner rim)	12 1/2"
Markings:	None		
Description:	Ferrous portlight made of two rings that were joined to the ship's hull plating by sixteen rivets.		
Condition:	Good		

Figure 22. Portlight
Scale: 1/3



44 Ship's Equipment

Article:	Racks, towel (MG-3B)		
Recovered:	1 three piece unit		
	1 single unit		
Size:	Length (of single unit)	53	"
	Diameter (of tubing in single unit)	5/16	"
	Length (of tubing in three piece unit)	45	"
	Length (of support)	25	"
	Diameter (of tubing in three piece unit)	1/4	"
Markings:	None		
Description:	Both units are made of brass with screw threaded wall fasteners that were affixed to the bulkhead by three screws. The single unit with its thicker tubing is sturdier than the three piece unit. The three piece unit has a support that now shows no evidence as to how it might have been attached.		
Condition:	Single unit is in excellent condition. The three piece unit is badly twisted and bent (See Figure 23).		

Figure 23.

Rack, towel
Scale: 1/4

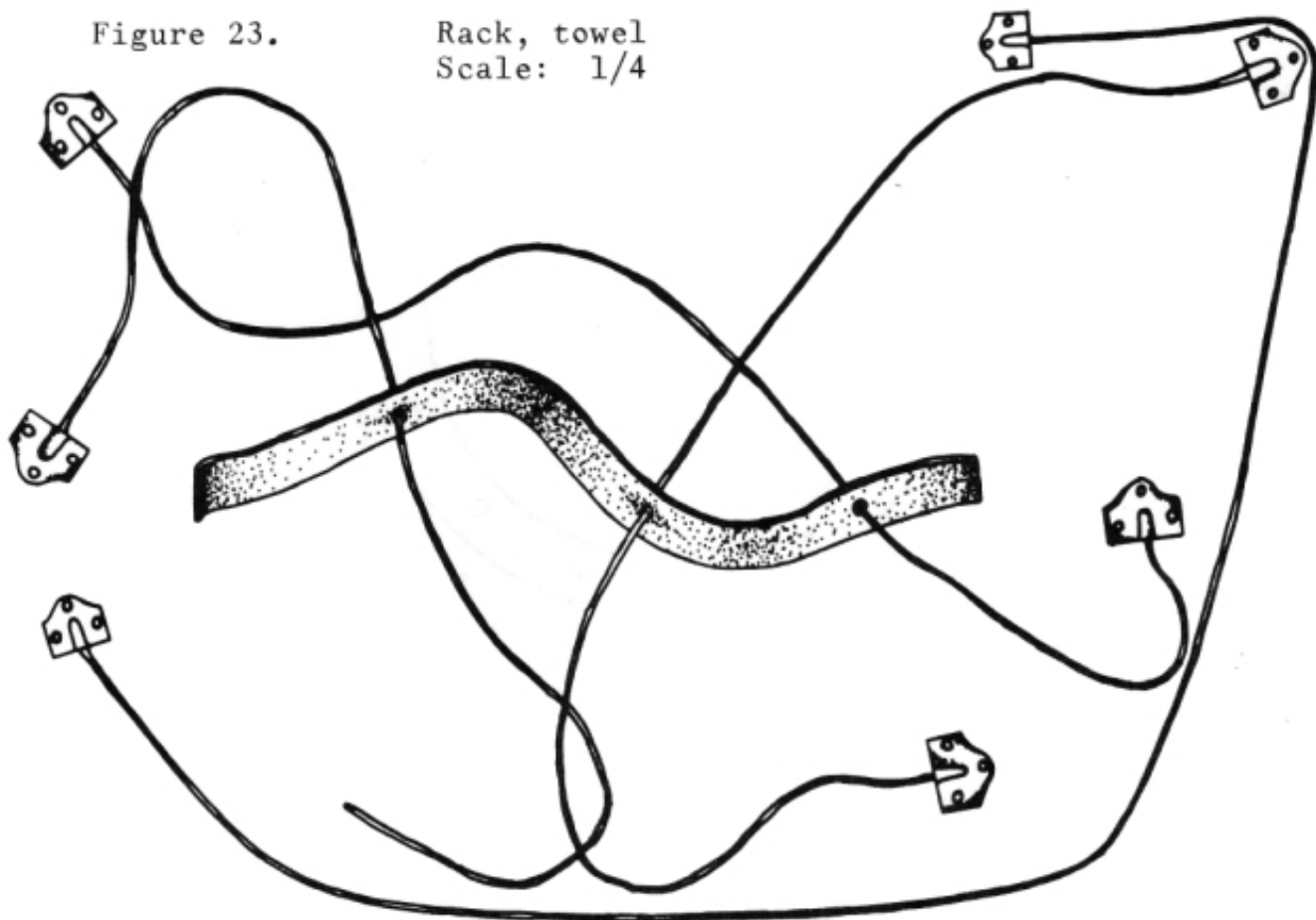
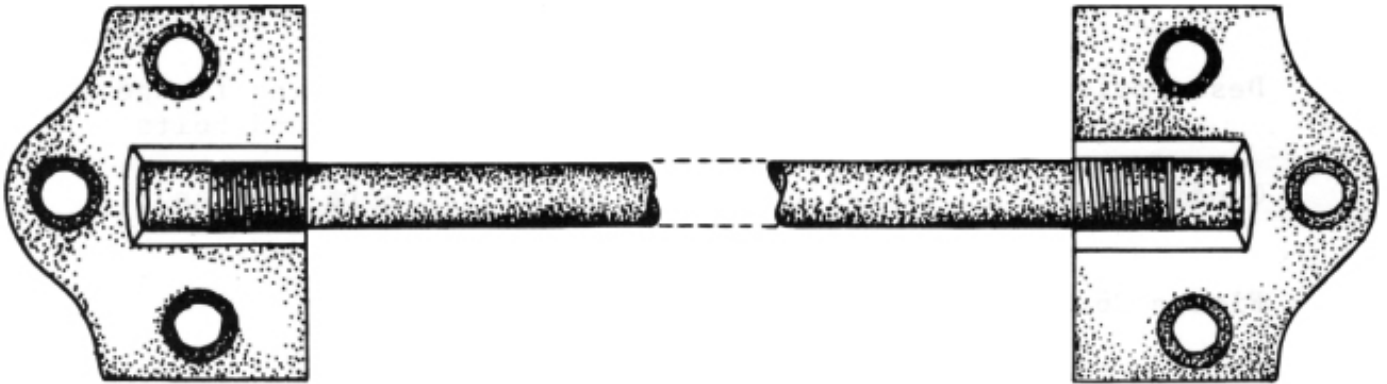
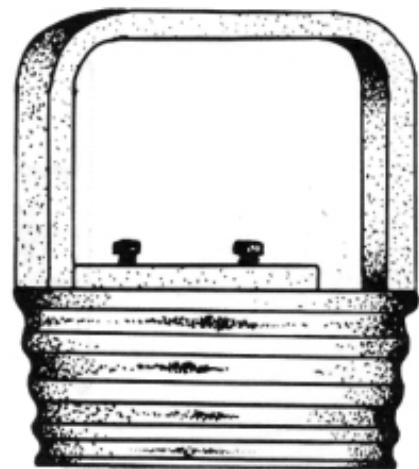
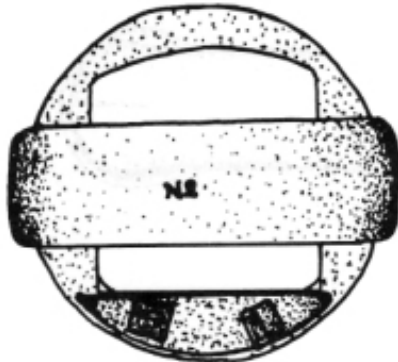


Figure 24. Detail of wall mounts of single unit rack.
Full scale



Article:	Valve, check (MG-2W)
Recovered:	1
Size:	Diameter 4"
Markings:	<u>N2</u> is stamped on the top of the handle.
Description:	A brass valve with a leather flap attached on one side by two screws.
Condition:	Good. The leather flap is missing.

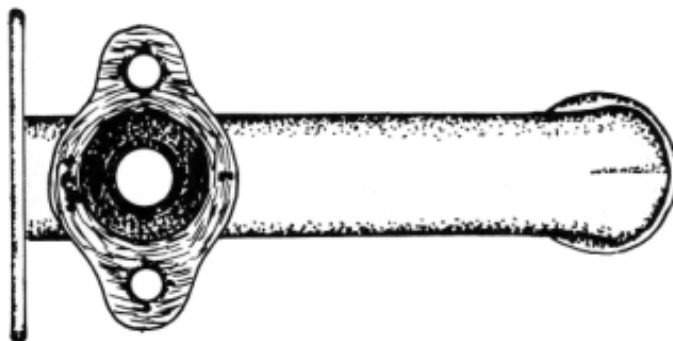
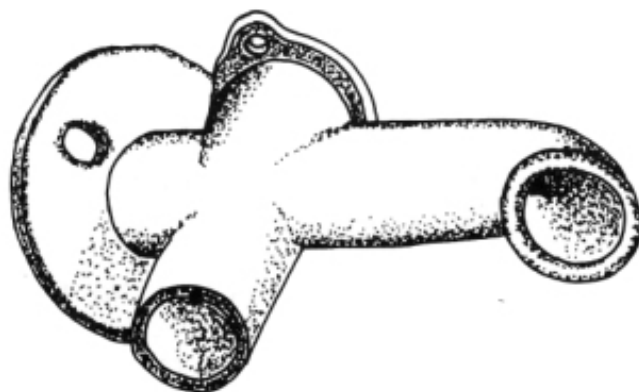
Figure 25. Valve, check
Scale: 1/2



46 Ship's Equipment

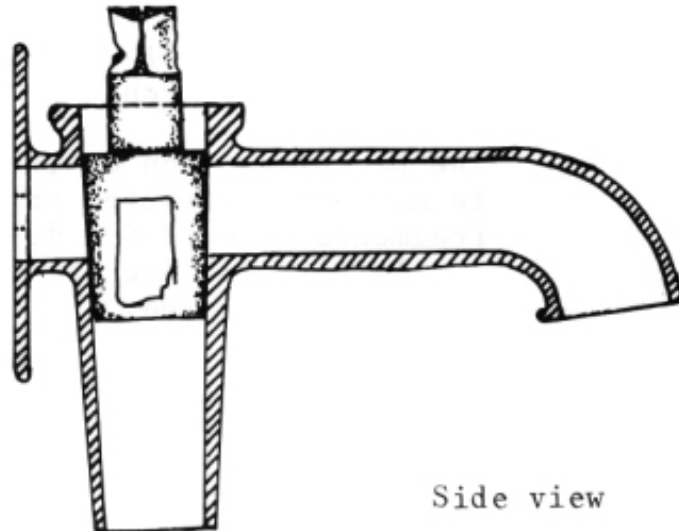
Article: Valve, spigot (MG-2W)
Recovered: 1
Size: Length (from flange to nozzle) 10 "
Height (overall) 6 1/2 "
Diameter (of pipe) 2 "
Diameter (of flange) 5 "
Markings: 2, 7, and 4 are stamped on the upper portion of the gate cover flange. A smaller number 7 is on the opposite side.
Description: A spigot valve has a brass mounting flange and nozzle. The top gate cover and bolts are missing.
Condition: Excellent. The on-off valve is free and it appears that it would work.

Figure 26. Valve, spigot
Scale: 1/3



Top view

Figure 26. (continued)



Side view

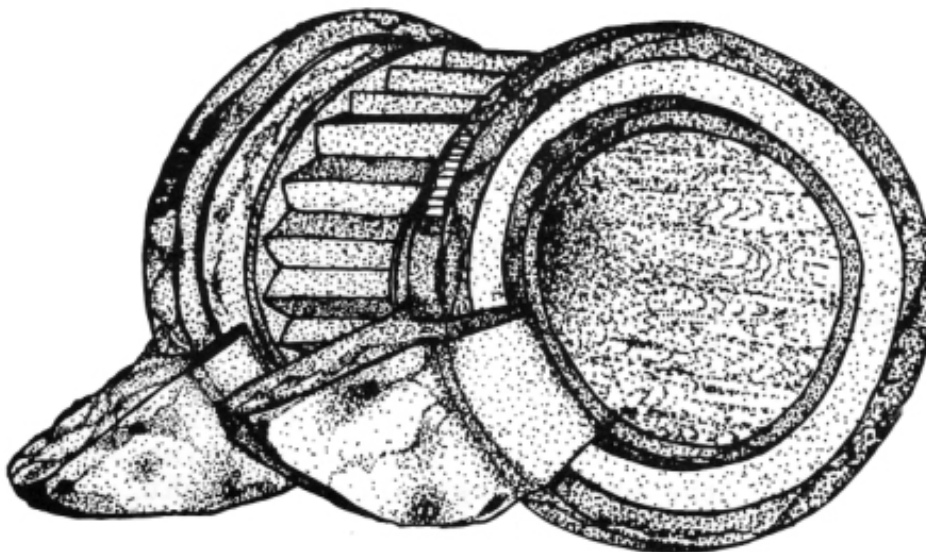
Article:	Wheel, ship's (MG-3K)
Recovered:	1 section
Size:	Length (of fragment) 28 "
	Width (of fragment) 1 1/2 "
	Diameter (projected) 36 "
Markings:	None
Description:	Rim and spokes are iron with ebony spacers. A projection of the arc around the wheel fragment indicates that the original wheel was 36" in diameter. Figuring from the space between the two existing spokes, the wheel originally had eight.
Condition:	Fair. Due to deterioration only this fragment remains intact.

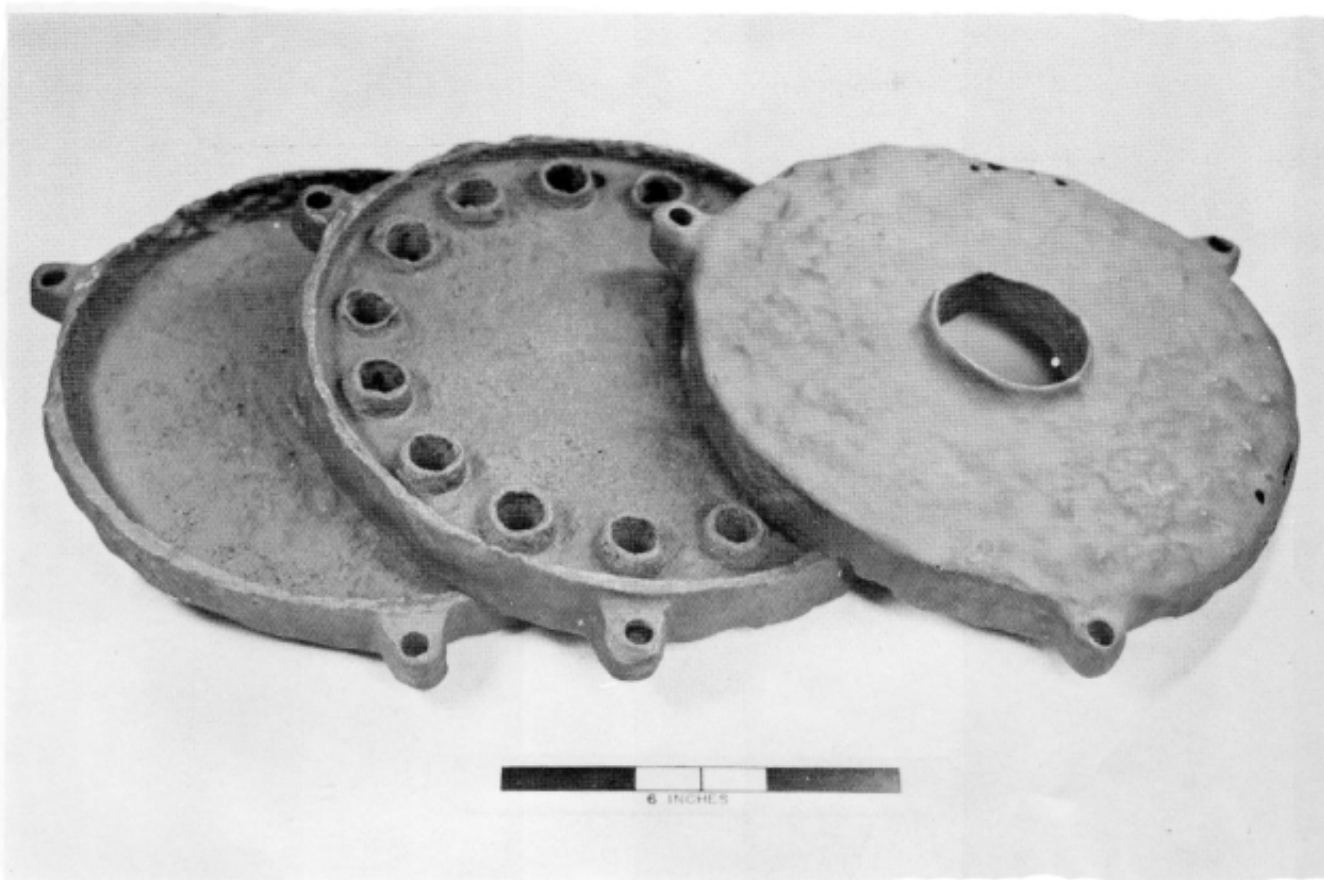
Figure 27. Wheel, ship's
Scale: 1/3

48 Ship's Equipment

Article: Windlass (MG-7H)
Recovered: 1
Size: Diameter (of pawl rim) 25"
Diameter (of purchase rim) 19"
Markings: None
Description: The barrel section of the windlass seems to have been stripped or torn out leaving fragments of wood inside the otherwise completely metallic section.
Condition: Poor, badly rusted.

Figure 28. Windlass
Not to scale

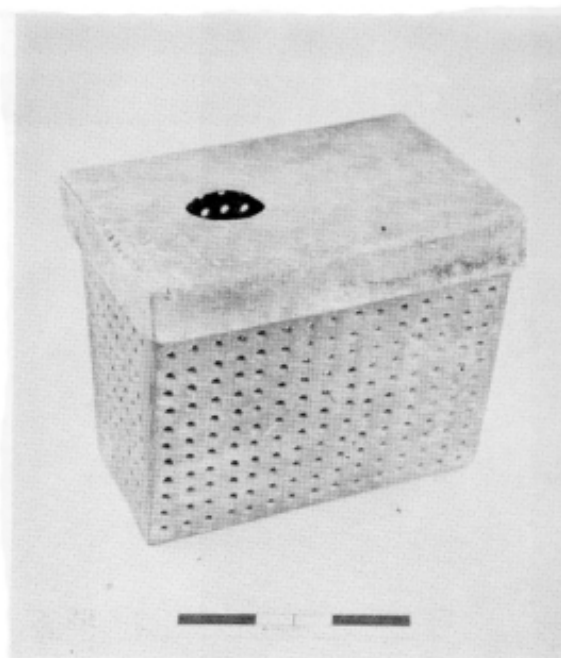




A. Fig. 4 Assembly, unidentified

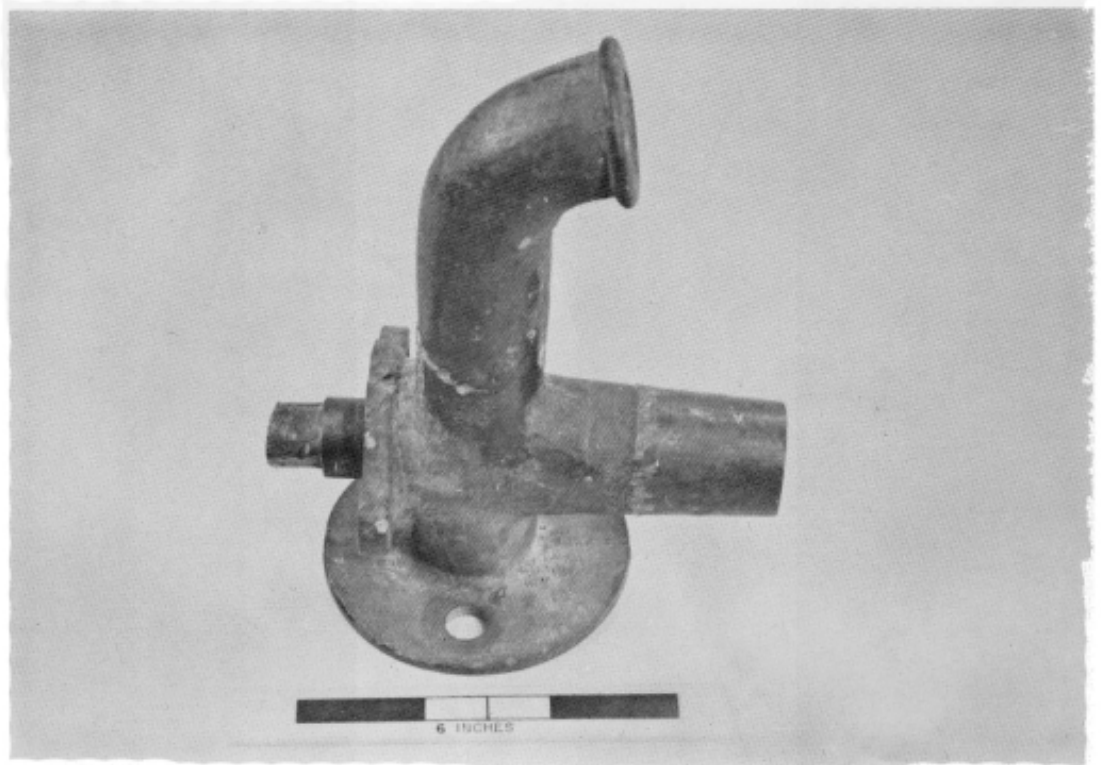


B. Fig. 6 Binnacle



C. Fig. 10 Box, bilge strainer

PLATE V



A. Fig. 26 Valve, spigot



B. Fig. 28 Windlass

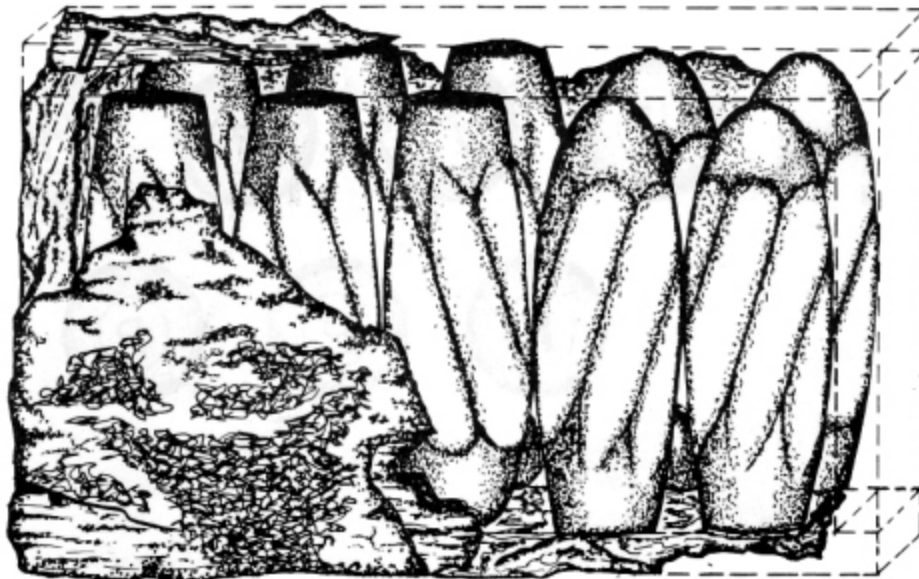
FIREARMS AND ORDNANCE

Article: Bolt, 12 pounder Whitworth (MG-2M)
Recovered: 75
Size: Length 9 1/2"
Weight: 10 1/2 - 12 pounds
Markings: None
Description: The bolts were originally packed in cases of ten (See Figure 30). The major variance in weights is probably due to differences in the metal density. The Whitworth rifle that used these bolts was far advanced for its time with exceptional accuracy and a range of more than 9,500 yards. It was developed in England by Sir Joseph Whitworth (Ripley, 1970).
Condition: Good

Figure 29. Bolt, 12 pounder Whitworth
Scale: 1/2

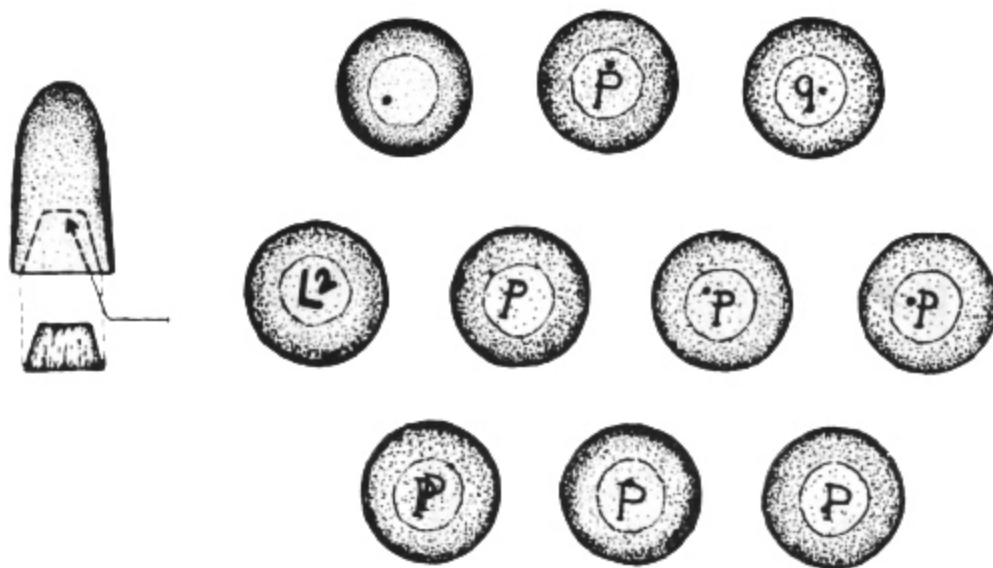


Figure 30. Whitworth packing case
Scale: 1/4



Article: Bullet, Enfield rifle (MG-4T)
 Recovered: Several hundred
 Size: .577 caliber
 Markings: Raised markings are found on the inside of the cavity at the base of the bullet. Figure 31 illustrates the types found to date.
 Description: Most of the Enfield bullets still have box-wood plugs in their bases. A large number of bullets still remain in the aft section of the wreck. They were found in piles with their packing eroded or torn away.
 Condition: Good
 Remarks: See Appendix I for a statistical analysis of .577 caliber Enfield bullet measurements.

Figure 31. Enfield rifle bullet with raised markings found inside the base cavities. Full scale



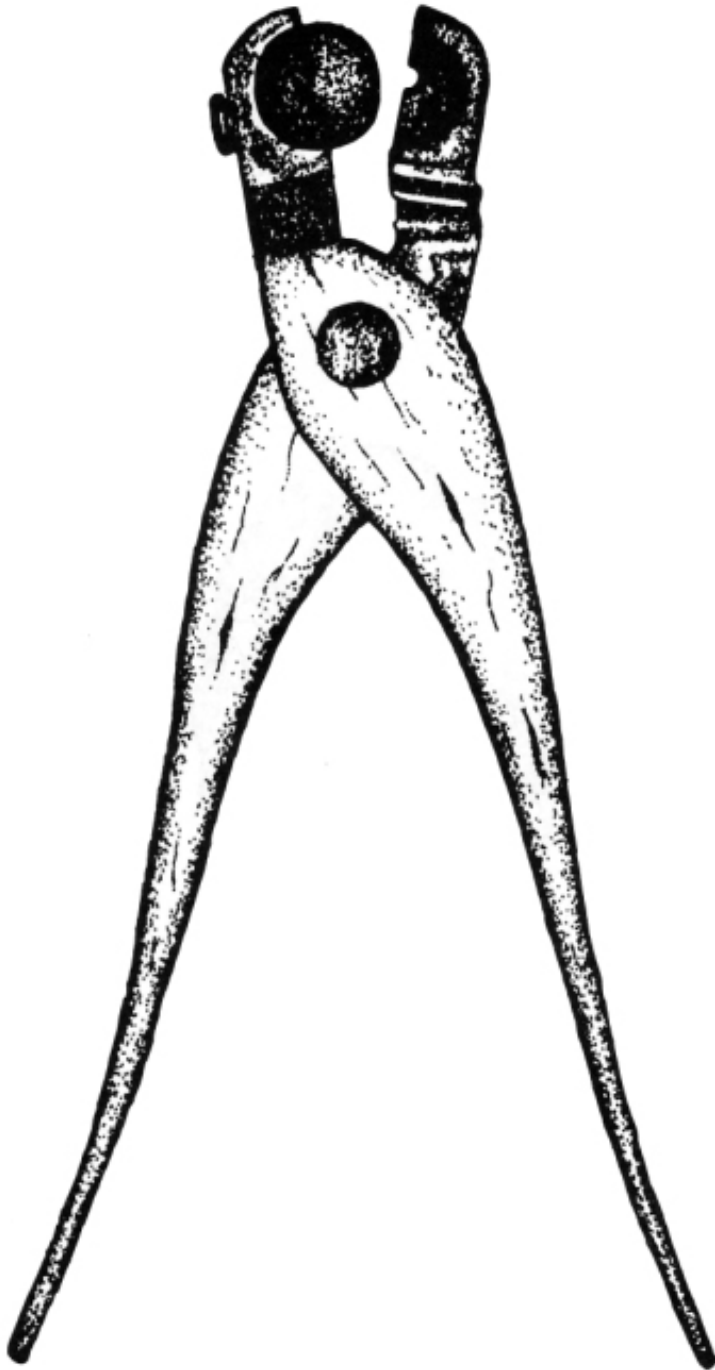
Article: Caps, percussion (MG-2J)
 Recovered: 15 clusters
 Size: Diameter (of cluster) 3"
 Height (of cluster) 1"
 Markings: None
 Description: These percussion caps were probably for use in the Enfield rifles. About 300 caps were packed in each round metal box 3" in diameter and 1" in height. The metal boxes have disintegrated leaving only the clusters of badly deteriorated and cemented together percussion caps.
 Condition: Poor

Figure 32. Percussion caps
Full scale



Article: Mold, Enfield bullet (MG-2Z)
 Recovered: 2
 Size: Length 7 1/4"
 Cavity .577
 Markings: The number 18 appears on the bottom near the mold end.
 Description: The molds are made of brass.
 Condition: Good

Figure 33. Mold, Enfield bullet
Full scale



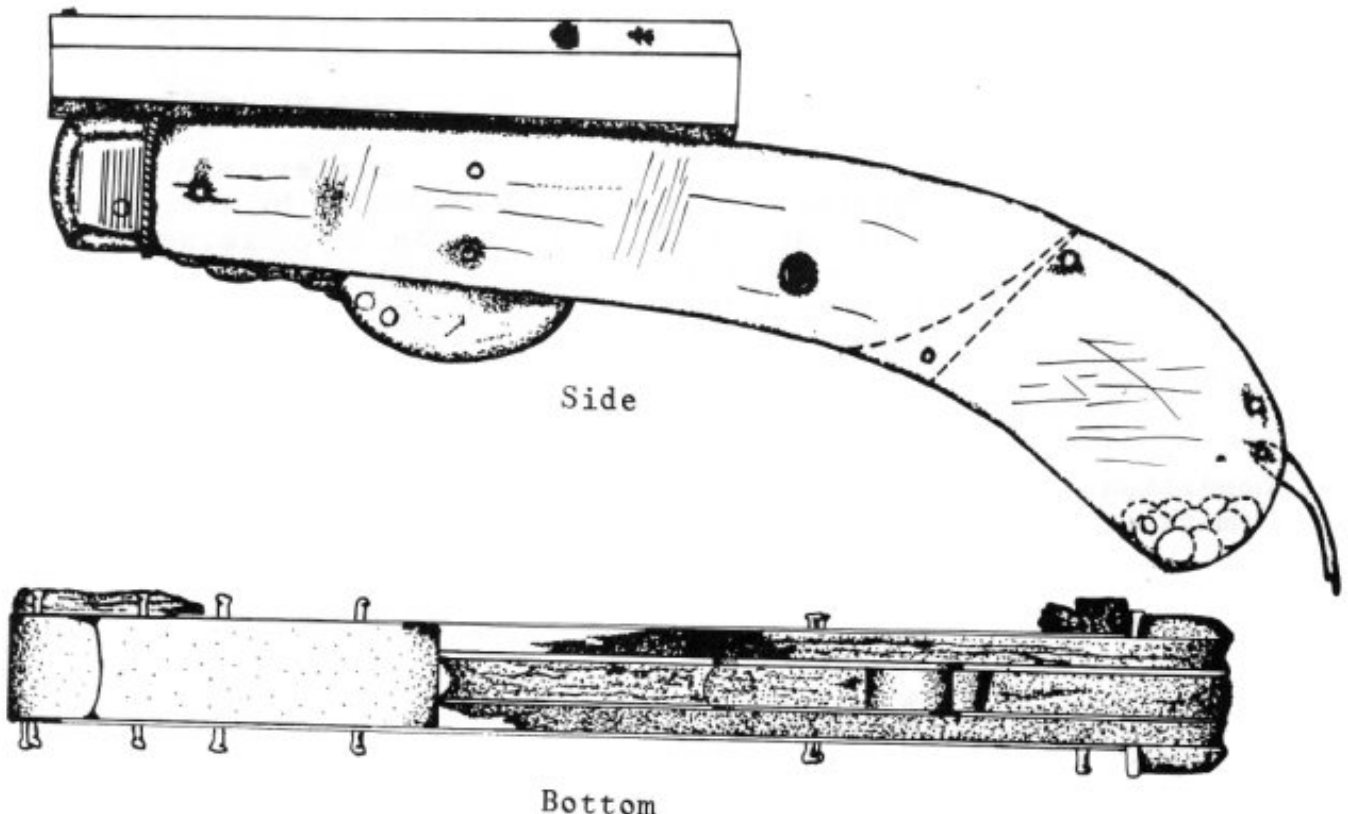
Front



Side

Article: Pistol, Unwin and Rodgers knife (MG-7I)
 Recovered: 1
 Size: .28 caliber
 Markings: None
 Description: This Unwin and Rodgers knife pistol has two slots approximately 3 1/2" long and 1/4" wide located on either side of the trigger mount where the partial remains of the two blades are still visible. The trigger is decayed, and the hammer is missing. The 3 3/8" long barrel is German silver and has two starlike stamps on the left side. There are eight pins protruding from either side. These originally held the stag grips. Ten small .28 caliber shot were found in the capbox built into the rear of the hilt.
 Condition: Good
 Remarks: Since only one knife pistol was recovered with shots still in the capbox, it is assumed that this item belonged to a person on board the ship and was not part of the cargo.

Figure 34. Pistol, Unwin and Rodgers knife
Full scale



54 Firearms and Ordnance

Article: Rifle, Tower Enfield (MG-A)
 Recovered: 50 complete rifles
 215 fragments broken as follows:
 30 butt fragments
 24 butt and center fragments
 128 center and forearm fragments
 14 forearm fragments
 19 miscellaneous short fragments

Size: Caliber .577
 Length (of rifle) 58"
 Length (of carbine) 48"
 Average length (of butt fragments) 9 1/2"
 Average length (of butt and center fragments) 27 1/2"
 Average length (of center and forearm fragments) 40"
 Average length (of forearm fragments) 18"

Markings: Three rifles that have ferrous butt plates, trigger guards, trigger housings, and nose caps are stamped on hind stock Ward & Sons Makers, Birmn (See Figure 41).

Description: The rifles were originally packed in cases of twenty-four (See Figure 38). One of the boards forming the top of a case was painted with the mark illustrated in Figure 40. Leather shoulder straps were packed in one end of the boxes (See Figure 39). The 215 fragments could combine to form at least 139 Enfield rifles. Collectively, a projected total of 215 Enfield rifles were recovered from the MODERN GREECE by the State of North Carolina. An undetermined number of Enfield rifles had been recovered by others before the State claimed jurisdiction. Many of the rifles were broken during recovery. All the rifles are similar except for the three having the ferrous guards and butt plates noted above.

Condition: Vary from excellent to fragmentary.
 Remarks: See Figures 41-44 for details of the rifles.

Figure 35. Carbine, Tower Enfield
 Model 1862
 Scale: 1/8



Figure 36.

Rifle, Tower Enfield
Model 1862 (observed on several lock plates
during cleaning).
Scale: 1/8

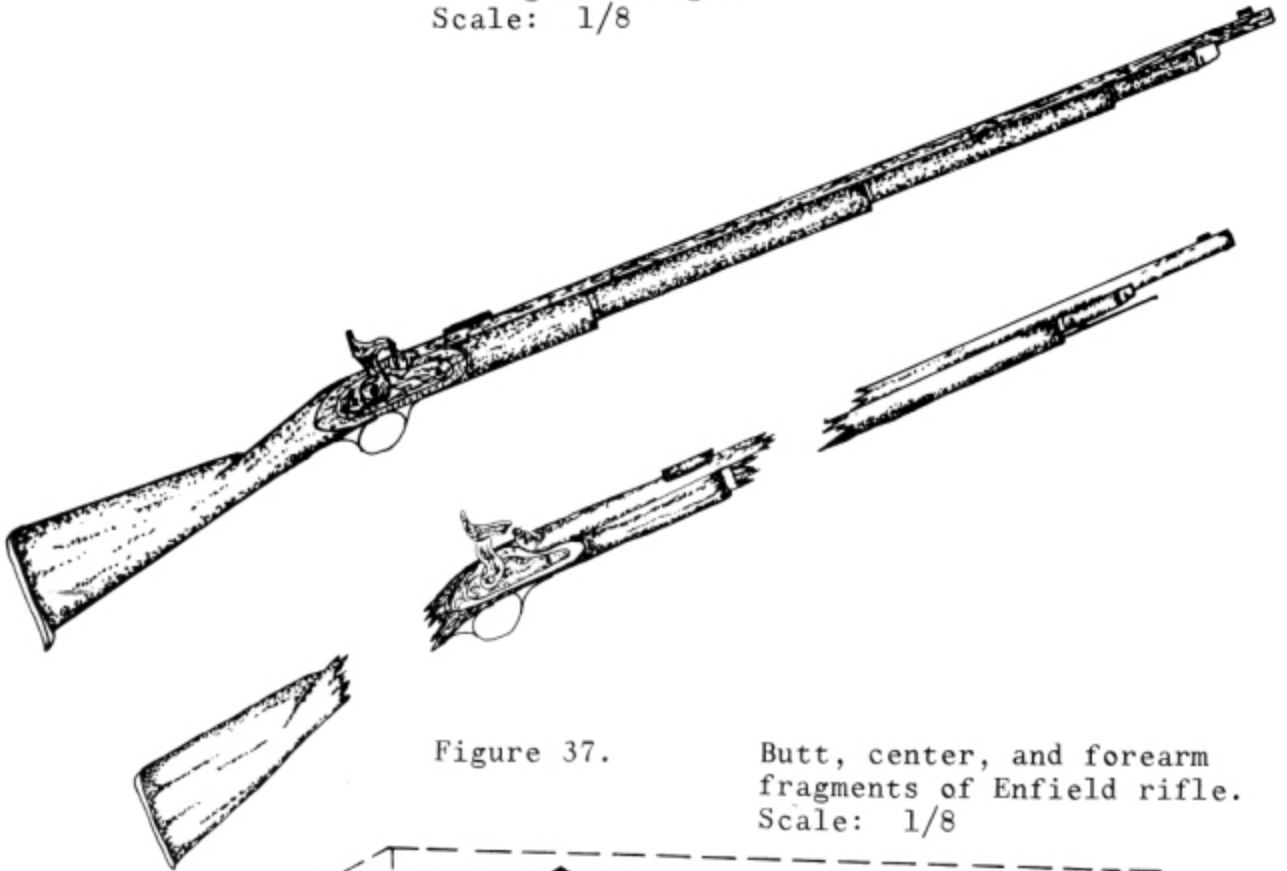


Figure 37.

Butt, center, and forearm
fragments of Enfield rifle.
Scale: 1/8

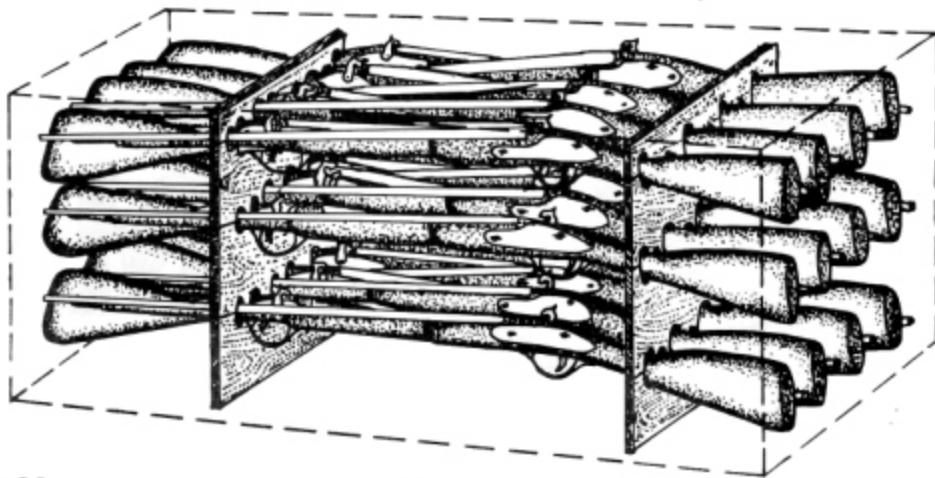


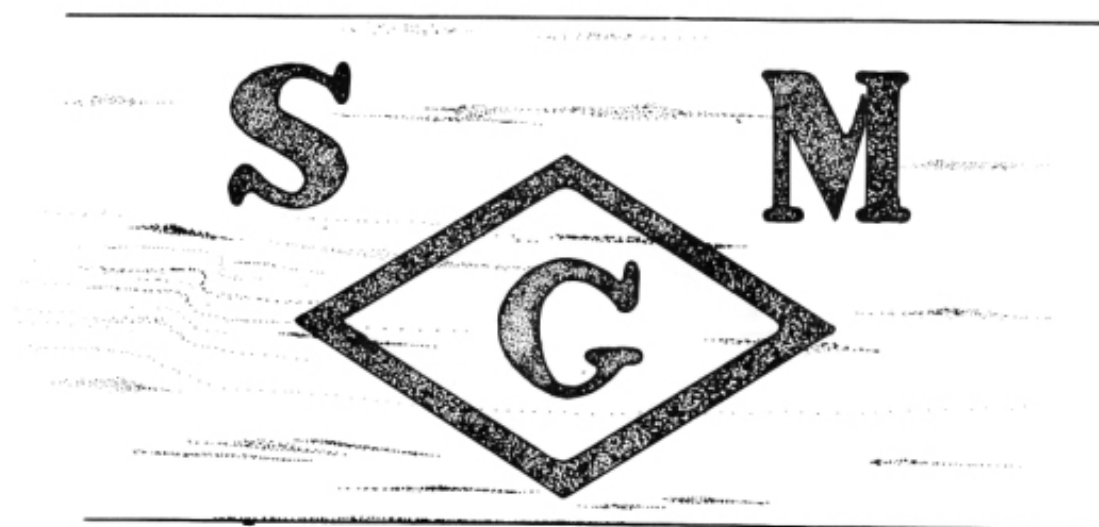
Figure 38.

Enfield rifles recovered in cases of twenty-four.

Figure 39. Shoulder straps found packed in rifle cases.
Scale: 1/2



Figure 40. Rifle case cover
Scale: 1/4



Detail of Enfield rifles:

Figure 41. Maker's mark found on 3 Enfields having no brass parts.
Scale: 2/1

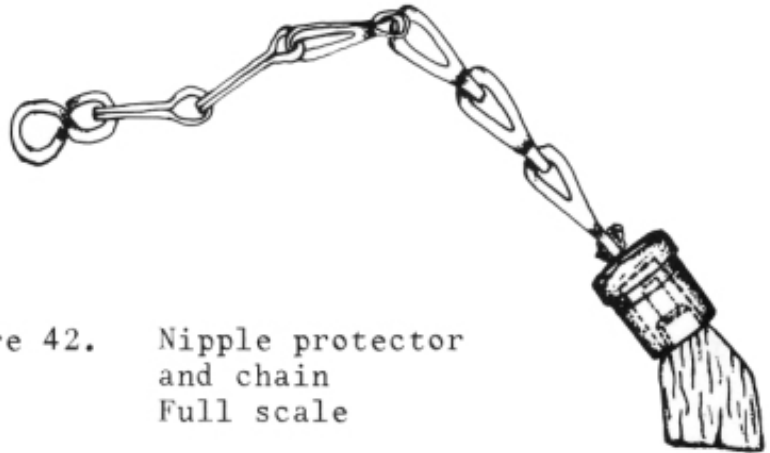


Figure 42. Nipple protector and chain
Full scale

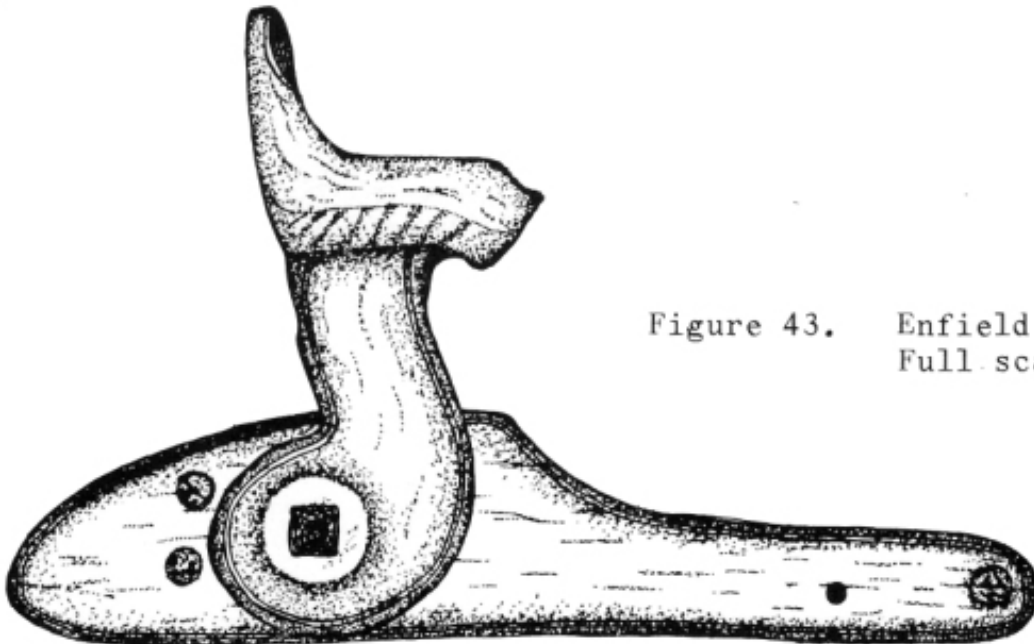


Figure 43. Enfield lock
Full scale

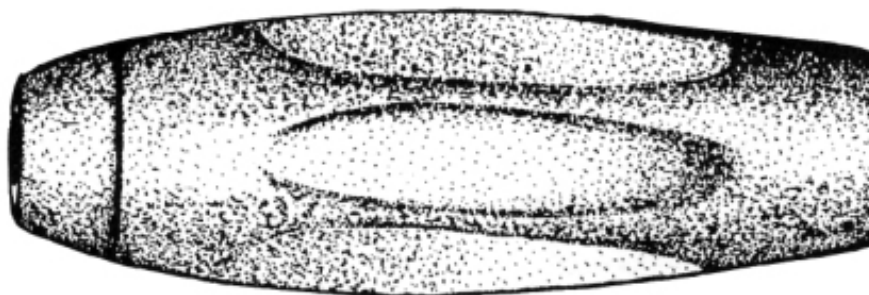


Figure 44. Rifle shipping plug
Full scale

58 Firearms and Ordnance

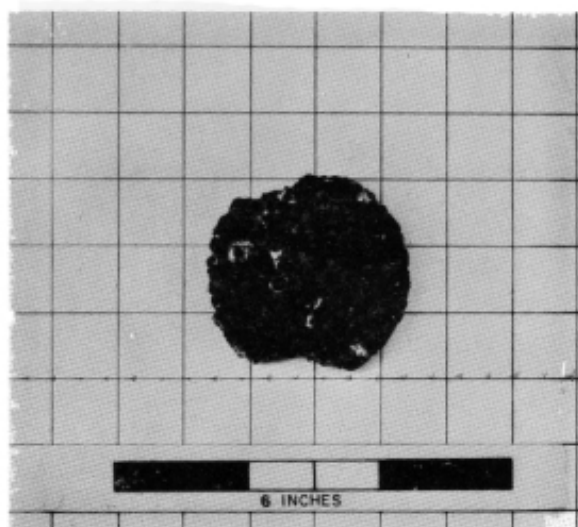
Article: Shot, 12 pounder Whitworth case (MG-2M)
Recovered: 1 box containing 10 projectiles
Size: Length 9"
Weight: 7 1/2, 8, 8 1/4, 8 3/4, and 9 1/4 pounds
are recorded.
Markings: None
Description: The iron projectiles were packed unarmed
with their cavities empty and without fuses.
They all have similar dimensions but vary
in weight. The variance of the weights re-
corded could be caused by differences in
cavity sizes, decay, and metal density.
Condition: Good

Figure 45. Shot, 12 pounder Whitworth case
Scale: 1/2

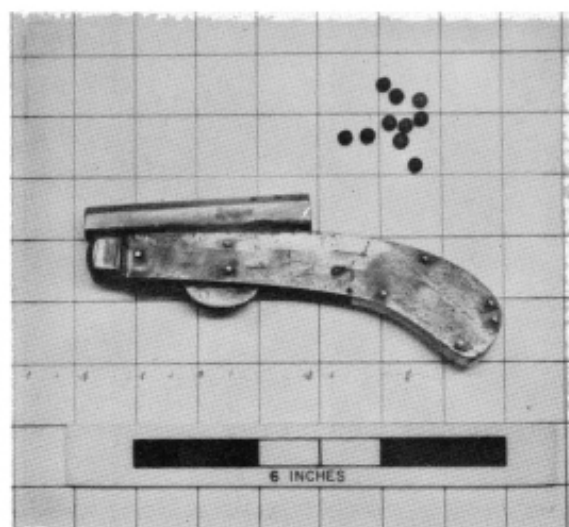




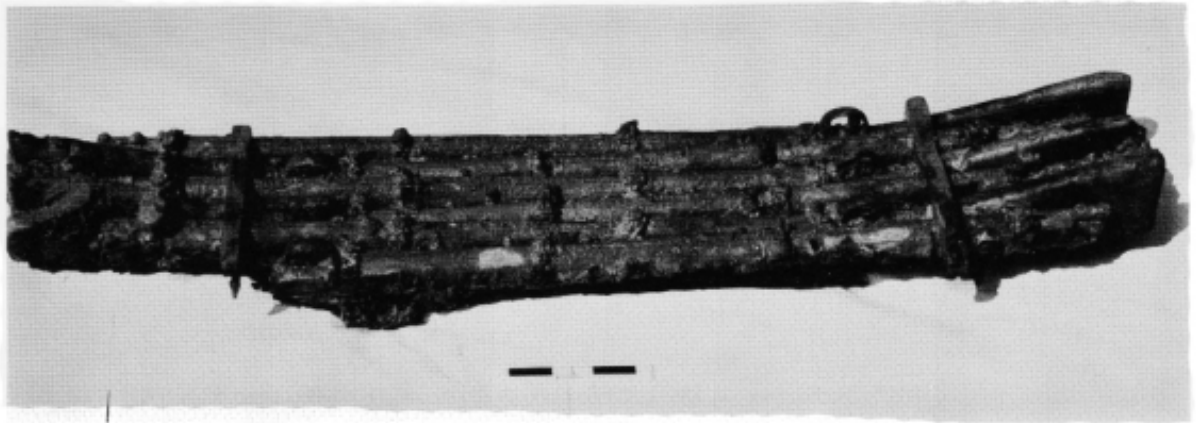
A. Figs. 29 and 45 Bolt, twelve pounder Whitworth and Shot, twelve pounder Whitworth case



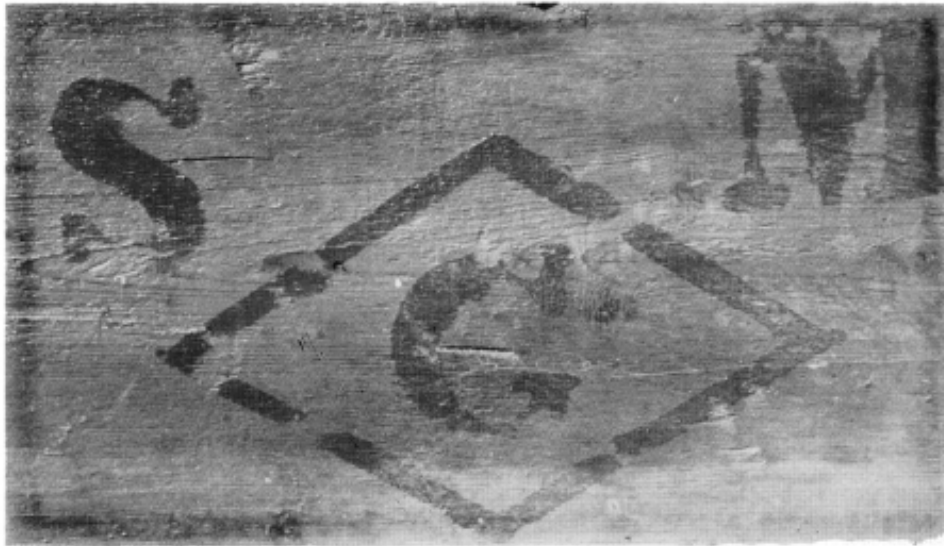
B. Fig. 32 Caps, percussion



C. Fig. 34 Pistol, Unwin and Rodgers knife



A. Fig. 38 Enfield rifles recovered in cases of twenty-four



B. Fig. 40 Rifle case cover



C. Fig. 41 Maker's mark found on three Enfields

BULK MATERIALS

Article: Ingots, lead (MG-2L)
Recovered: 70
69 Type I
1 Type II
Size: See Table I for complete dimensions, weights,
and locations of marking on lead ingots.
Average width 5 3/4"
Average length 33 "
Average height 2 1/2"
Weight: Average 142.50 pounds
Markings: There are two different marks.
Type I - Bagillt Works, Newton Keates & Co., Liverpool is stamped on 69 of the ingots. All are numbered, and combinations of p, FD, EE, and D are on 61 of them (See Figure 47).
Type II - Bagillt Works, Newton Lyon & Co., Liverpool is stamped on one ingot. This ingot is numbered 399 with FD and D stamped on the reverse side.
Description: Long and narrow with ends molded so that they might serve as handles.
Condition: Excellent
Figure 46. Ingots, lead
Scale: 1/6



Type I



Type II

Figure 47. Letters, numbers, and marks on lead ingots.
Full scale

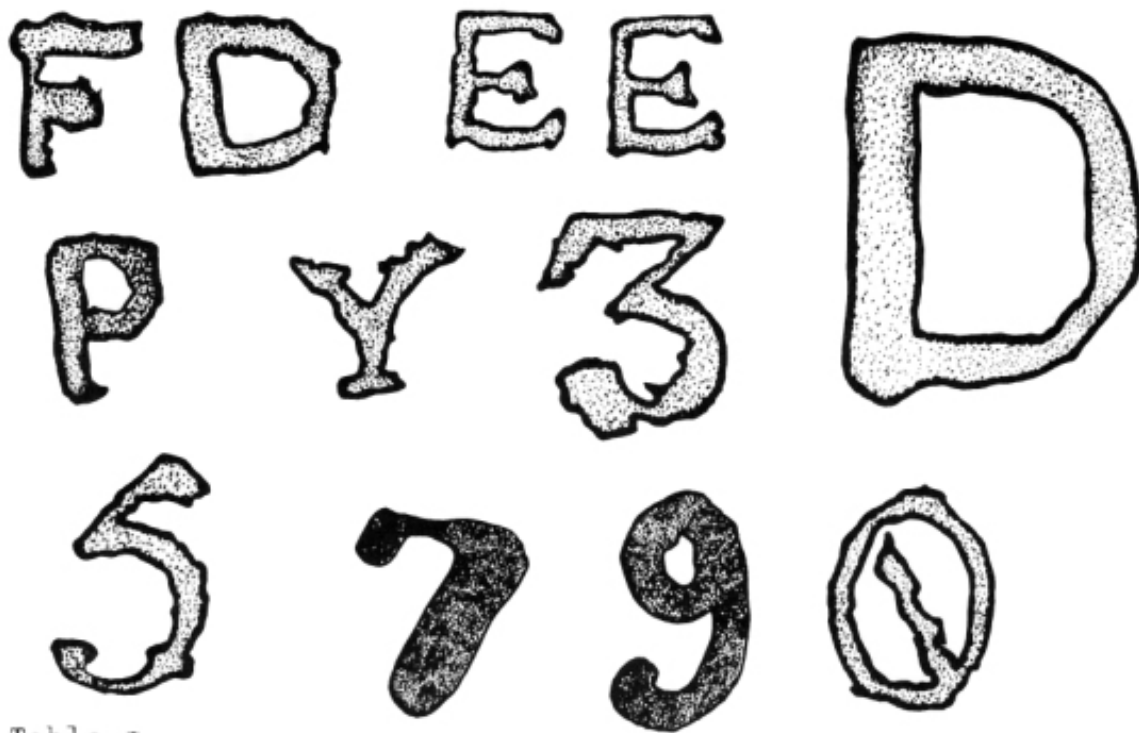


Table I

Dimensions, weights, and locations of markings on lead ingots.
U.S. weights and measurements used.

Width	Length	Height	Weight	Markings
5 7/8"	32 7/8"	2 1/2"	149.75	
5 7/8"	33"	2 1/4"	147.50	
6"	33"	2 3/4"	141.75	
5 3/4"	34"	2 3/4"	144.50	
5 3/4"	33 3/4"	2 3/4"	148.25	
6"	33 1/2"	2 1/2"	128.00	
6"	33"	2 1/2"	152.50	
5 7/8"	33 5/8"	2 1/2"	145.25	
5 3/4"	33 7/8"	2 1/2"	133.50	

Table I (continued)

Dimensions, weights, and locations of markings on lead ingots.
 U.S. weights and measurements used.

Width	Length	Height	Weight	Markings
5 3/4"	33"	2 3/4	146.00	356
5 1/2"	33"	2 5/8"	140.25	356 2
5 3/4"	32 5/8"	2 3/8"	148.50	357 2 2
5 7/8"	34"	2 1/2"	145.50	357 2 1 FD
6"	33"	2 1/2"	153.50	361 2 1
5 3/4"	33 1/2"	2 3/4"	144.00	361 2 0
5 3/4"	33 1/2"	2 1/2"	137.50	366 D
6"	33 1/8"	2 3/8"	148.50	366 D
6"	33 1/8"	2 1/2"	141.00	367 2 0
5 7/8"	33 1/2"	2 1/4"	142.00	371 2 1
5 1/2"	33"	2 1/2"	135.00	375 FD
5 3/4"	33 3/4"	2 5/8"	144.50	379 2 1
5 3/4"	33 1/8"	2 1/2"	145.00	385 2 1
5 3/4"	33 1/4"	2 1/4"	148.00	387 FD
5 3/4"	33 1/4"	2 1/4"	132.50	389
6"	33 3/4"	2 1/2"	153.75	389 2 1 FD
5 5/8"	33"	2 3/4"	152.75	389 FD
5 3/4"	33 1/4"	2 5/8"	152.00	392
5 3/4"	33"	2 1/2"	132.00	399 FD
5 3/4"	33 3/4"	2 1/4"	146.00	399
6"	33 1/4"	2 5/8"	148.50	399
5 3/4"	33"	2 1/2"	148.75	399 2

62 Bulk Materials

Table I (continued)

Dimensions, weights, and locations of markings on lead ingots.

U.S. weights and measurements used.

Width	Length	Height	Weight	Markings
5 7/8"	33 1/4"	2 3/4"	127.50	
5 3/4"	33"	2 1/2"	147.00	
6"	33 3/4"	2 3/4"	146.75	
5 5/8"	33"	2 1/2"	141.00	
5 7/8"	33"	2 1/4"	133.50	
5 3/4"	33"	2 1/2"	132.00	
6"	32 7/8"	2 1/2"	151.75	
5 3/4"	33 3/4"	2 1/2"	140.50	
6"	33"	2 1/2"	148.50	
5 7/8"	33 3/4"	2 1/2"	132.00	
5 1/2"	33"	2 1/2"	149.50	
6"	34"	2 3/4"	144.50	
5 3/4"	33 1/4"	2 3/8"	130.25	
5 5/8"	33 3/4"	2 1/2"	134.50	
5 7/8"	33 1/2"	2 1/2"	142.50	
5 3/4"	32 3/4"	2 1/2"	133.00	
5 3/4"	33"	2 1/2"	141.50	
6"	33"	2 1/2"	148.25	
6"	33 1/4"	2 1/2"	147.00	
5 3/4"	33 3/4"	2 1/2"	136.50	
6"	33"	2 1/2"	149.00	
5 3/4"	34"	2 1/2"	138.00	

Table I (continued)

Dimensions, weights, and locations of markings on lead ingots.
U.S. weights and measurements used.

Width	Length	Height	Weight	Markings
5 7/8"	33 1/4"	2 3/8"	143.75	
5 7/8"	33 7/8"	2 3/4"	158.00	
5 3/4"	33"	2 3/4"	147.50	
5 3/4"	33"	2 1/2"	136.75	
5 7/8"	33"	2 3/8"	137.00	
5 3/4"	33"	2 3/4"	147.00	
5 3/4"	32 3/4"	2 1/2"	139.75	
5 5/8"	33"	2 1/4"	138.50	
6"	33"	2 5/8"	144.50	
5 3/8"	33 1/2"	2 1/2"	134.00	
5 3/4"	33 1/2"	2 1/2"	140.50	
6"	32 3/4"	2 1/2"	142.50	
6"	34"	2 3/4"	141.50	
6"	33"	2 1/2"	142.00	
5 5/8"	33"	2 3/4"	139.75	
5 3/4"	33 1/2"	2 1/2"	134.50	
5 3/4"	33 1/2"	2 1/4"	155.50	

Article: Ingots, tin (MG-2K)
 Recovered: 43
 Size: See Table II for the complete dimensions, weights, and markings of the tin ingots.
 Average length (of side A) 14 15/16"
 Average length (of side B) 4 11/16"
 Average width (of side C) 4 5/16"
 Average width (of side D) 4 5/16"
 Average length (of top) 20 3/4 "
 Average width (of top) 5 9/16"
 Weight : Average 58.85 pounds
 Markings: T. Bolitho & Sons, Penzance (See Figure 49) is molded in one end of the ingot. On 9, however, it is turned sideways on the end. Chyandour beneath a lamb holding a banner appears on the other end. There are three variations of this lamb logo. (See Figures 50, 51, and 52). P, S, and A (See Figure 48 and Table II) are stamped on 23 of the 43 ingots beneath T. Bolitho & Sons, Penzance.
 Description: The molds, in which the ingots were cast, were laid out on an irregular surface which caused them to tilt. The markings were cast by resting the stamp on the molten surface and then removing it as the tin hardened and cooled.
 Condition: Excellent
 Figure 48. Letters as they appear on tin ingots.

P S A

Figure 49.

Foundry or distributor's marking in relief
on mold.
Full scale

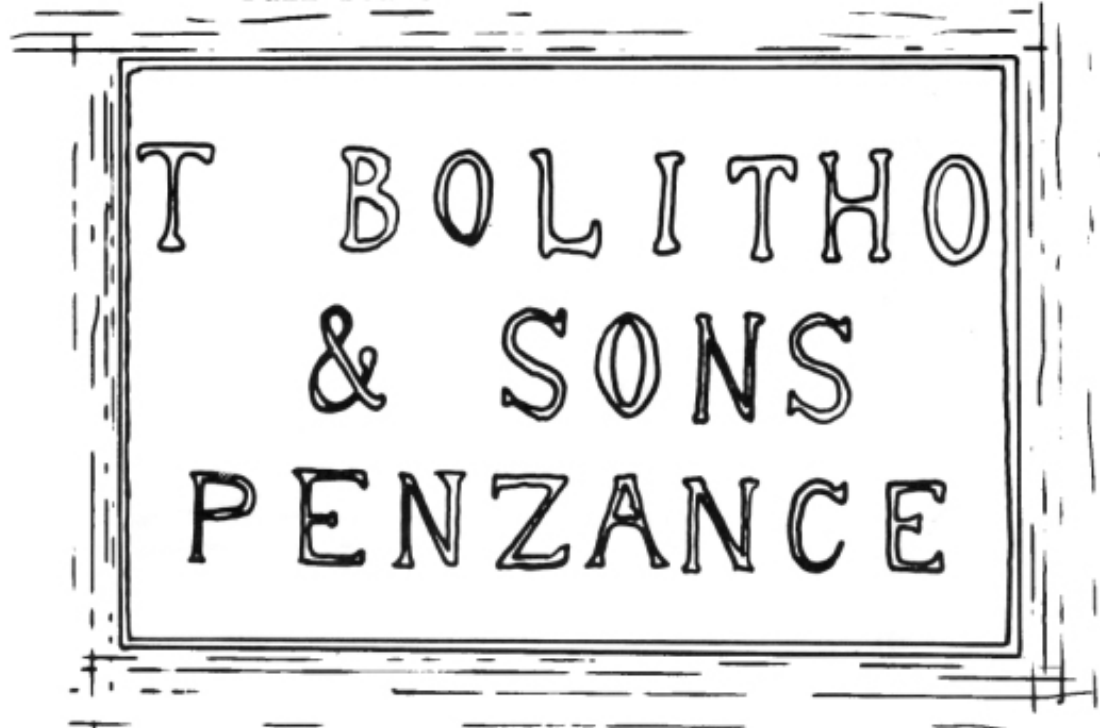


Figure 50.

Type 1 manufacturer's insignia in relief
on mold.
Full scale

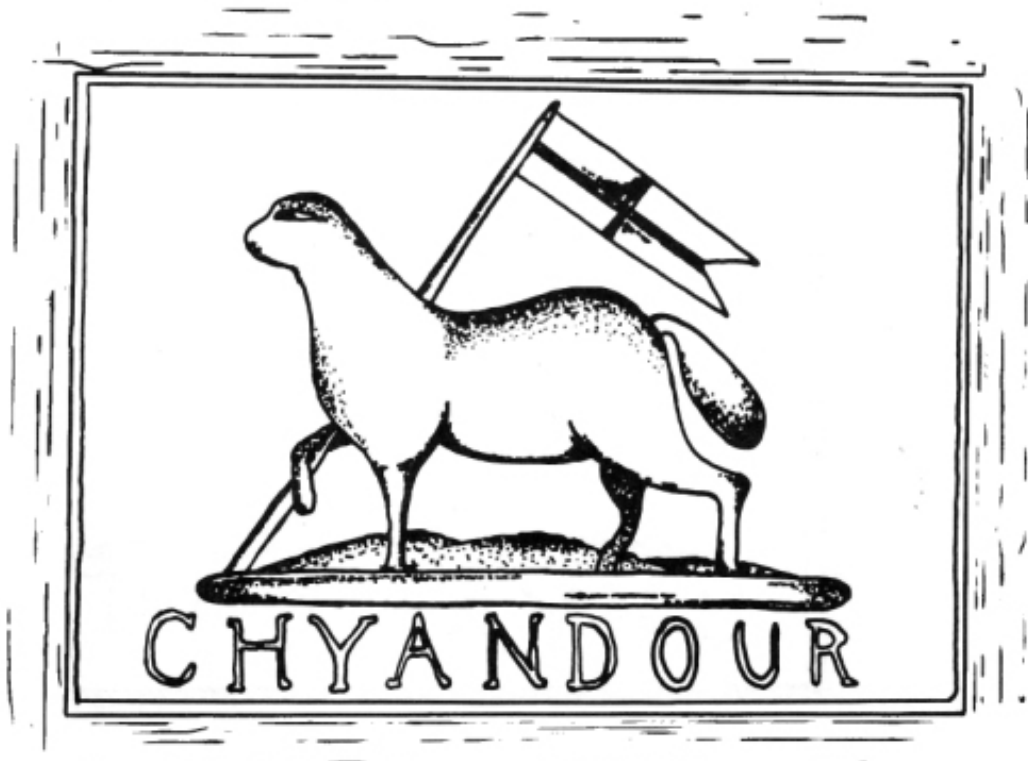


Figure 51. Type 2 manufacturer's insignia
Full scale

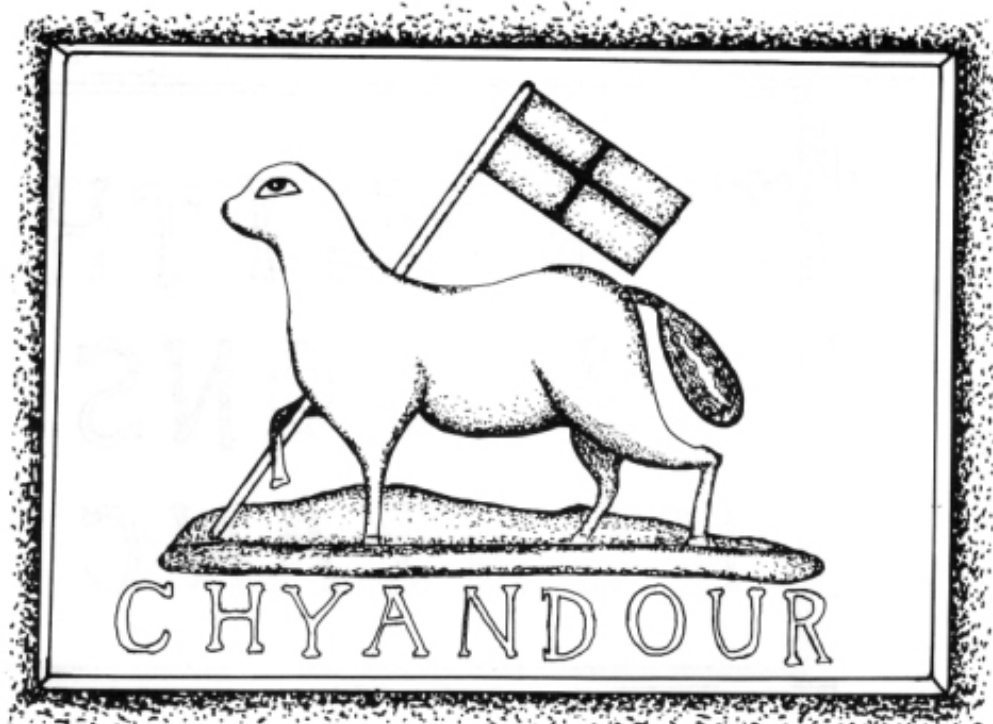


Figure 52. Type 3 manufacturer's insignia (Note difference in banners).
Full scale



Figure 53. Top view of tin ingot.
Scale: 1/4

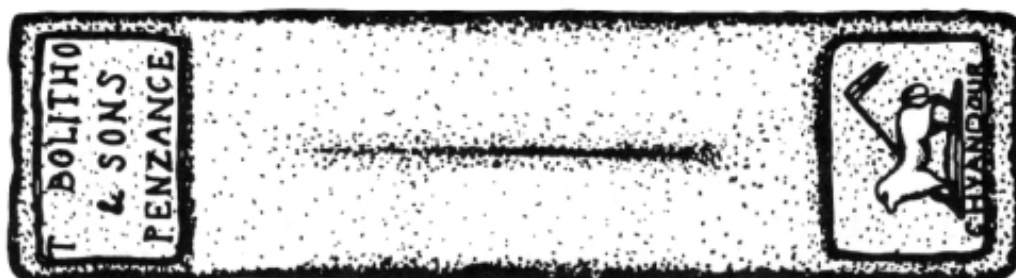


Figure 54. Side view of tin ingot.
Scale: 1/4

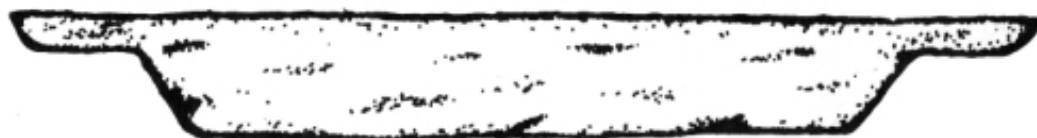


Figure 55. Bottom view of tin ingot.
Scale: 1/4



68 Bulk Materials

Table II Dimensions, weights, and markings of tin ingots. U.S. weights and measurements used.

Side ¹				Type ²	Weight	Mark-ings
A	B	C	D			
15.13	15.13	4.63	4.63	I	68.	--
13.88	13.88	4.75	4.75	I	68.	--
15.00	14.88	4.38	4.38	I	61.5	S
15.00	15.00	4.25	4.25	I	55.25	S
15.00	15.00	4.25	4.13	I	59.00	S
15.00	15.00	4.13	4.13	I	57.75	--
15.00	15.00	4.50	4.63	I	60.5	--
15.00	15.00	4.25	4.25	I	55.0	--
15.13	15.13	4.50	4.50	I	56.5	--
15.13	15.00	4.25	4.25	I	51.5	P
15.00	15.00	4.38	4.25	I	53.0	S
15.00	15.00	4.38	4.38	I	56.0	S
15.38	15.38	3.75	3.75	I	57.5	* ³
15.50	15.38	3.88	3.88	I	60.00	*
15.38	15.50	4.00	3.34	I	58.25	A
15.50	15.38	4.00	3.88	I	54.0	A
13.75	13.75	4.63	4.75	II	57.0	P
13.75	13.75	4.63	4.63	II	64.0	S
15.00	15.00	4.38	4.38	II	58.25	--

¹For indication of which side is A, B, C, or D see Figure 53. Individual dimensions are not given for the length and width of the top, because the variance is insignificant.

²Type I, II, and III refer to Figures 48, 49, and 50, which show the three slightly different logos.

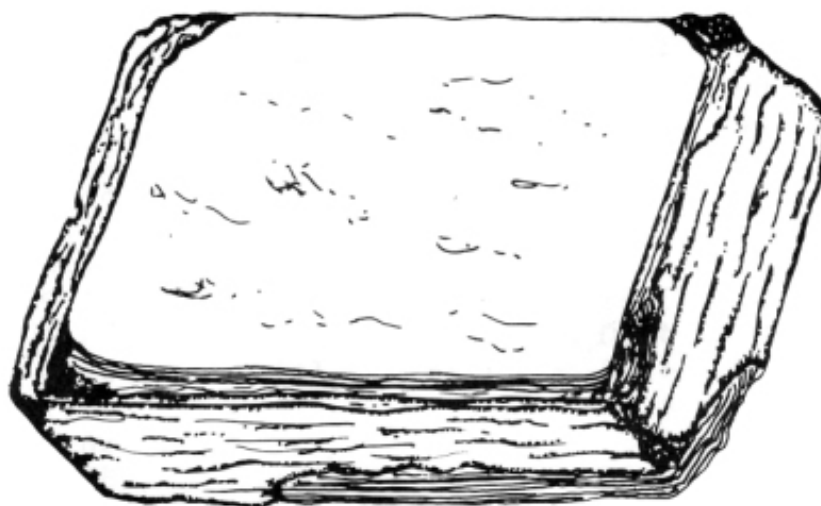
³*Indicates that the stamp T. Bolitho & Sons is placed side-wise.

Table II: (continued)

Side				Type	Weight	Mark- ings
A	B	C	D			
13.75	13.75	4.63	4.63	II	57.5	P
15.00	15.00	4.38	4.50	II	66.75	S
14.88	14.88	4.38	4.38	II	69.0	S
13.88	13.25	4.88	4.75	II	60.5	S
15.25	15.25	4.50	4.50	II	68.0	--
15.00	15.00	4.25	4.25	II	61.5	--
14.88	14.88	4.38	4.25	II	62.5	--
15.13	15.25	4.38	4.38	II	59.5	S
15.00	15.00	4.38	4.38	II	54.5	S
15.00	15.00	4.50	4.38	II	53.5	P
15.25	15.25	4.50	4.38	II	49.25	P
15.00	15.00	4.50	4.50	II	64.5	P
15.00	15.00	4.38	4.25	II	56.0	P
15.00	15.00	4.13	4.25	II	58.0	*
15.00	15.00	4.25	4.38	II	58.5	*
15.00	15.00	4.38	4.25	II	56.5	*
15.25	15.38	3.75	3.88	II	57.5	*
15.38	15.38	3.88	3.88	II	54.0	A
15.50	15.50	3.88	3.75	II	54.0	*
15.25	15.25	4.50	4.50	III	74.00	S
15.00	15.00	4.63	4.25	III	56.0	P
15.00	14.88	4.88	4.50	III	56.75	*
15.00	15.00	4.38	4.25	III	56.0	*
15.13	15.00	4.38	4.38	III	55.25	*

70 Bulk Materials

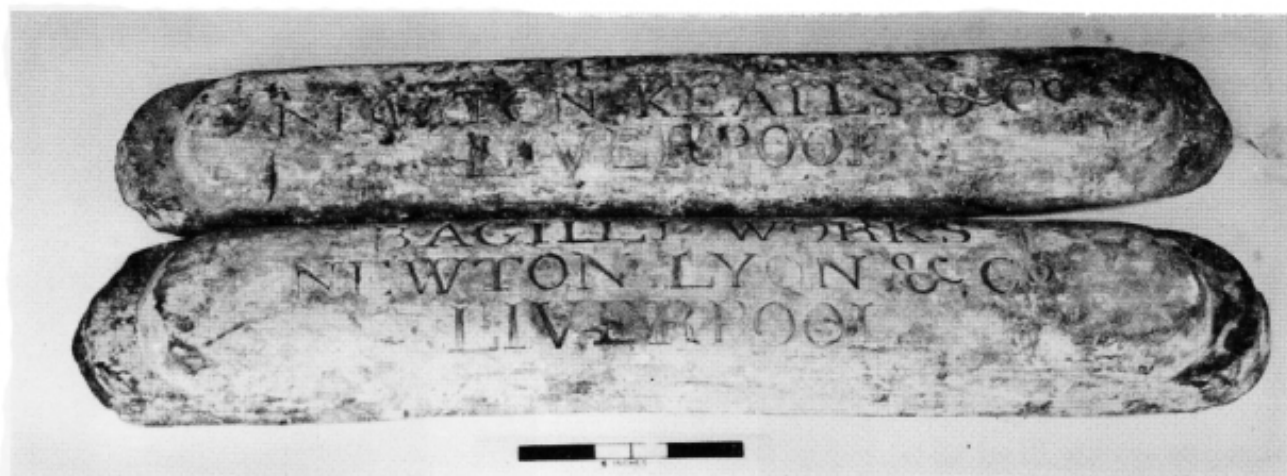
Article: Sheets, tin plated steel (MG-5I)
 Recovered: 17 cases
 Size: Length 16"
 Width 11"
 Height 4"
 Thickness (of single sheet) 0.026"
 Number (of sheets per case) 125
 Markings: None
 Description: The tin plated sheets were found still in their wooden packing crates. The darker area in the illustration is the packing case. Several cases still remain in the wreckage.
 Condition: Fair. The packing case is badly deteriorated.
 Figure 56. Tin plated steel sheets with packing case.
 Scale: 1/4



Article: Wire (MG-3X)
 Recovered: 1
 Size: Diameter (of spool) 18"
 Height (of spool) 36"
 Gauge (of steel wire) .055"
 Gauge (of copper wire) .125"

Markings:	None
Description:	One spool of wire consisting of steel wire over a core of copper wire.
Condition:	Good. Intact but covered with concretion.
Figure 57.	Spool of wire Scale: 1/8

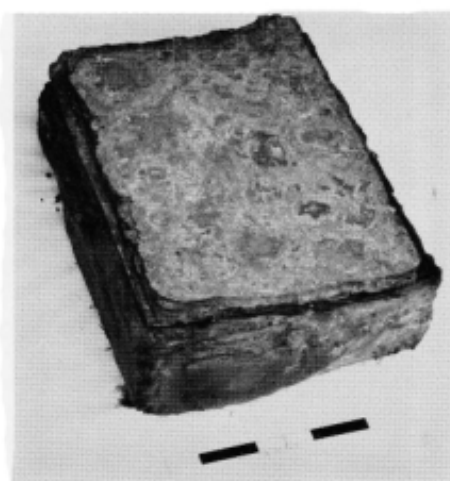




A. Fig. 46 Ingots, lead



B. Figs. 53, 54, and 55 Ingots, tin



C. Fig. 56 Tin plated steel sheets with packing case



D. Fig. 57 Spool of wire

SURGICAL INSTRUMENTS

Article: Depressors, tongue (MG-2G) 220098a 23
Recovered: 2
Size: Length 5"
Width 3/4"
Markings: None
Description: Made of brass and very ornate. Design on handle is readily visible.
Condition: Excellent

Figure 58. Depressor, tongue
Full scale



Front



Back

Article: Handle, surgical knife (MG-2F)
Recovered: 1
Size: Length 4"
Width 1/2"
Markings: None
Description: This wooden handle was apparently used with a fixed scalpel blade. The blade had deteriorated. Two pins protrude from the handle.
Condition: Good

SURGICAL INSTRUMENTS

Article: Depressors, tongue (MG-2G) 220098a 23
Recovered: 2
Size: Length 5"
Width 3/4"
Markings: None
Description: Made of brass and very ornate. Design on handle is readily visible.
Condition: Excellent

Figure 58. Depressor, tongue
Full scale



Front

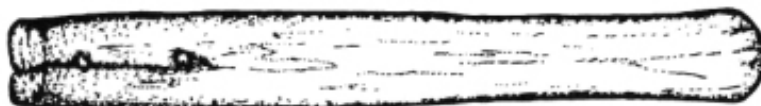


Back

Article: Handle, surgical knife (MG-2F)
Recovered: 1
Size: Length 4"
Width 1/2"
Markings: None
Description: This wooden handle was apparently used with a fixed scalpel blade. The blade had deteriorated. Two pins protrude from the handle.
Condition: Good

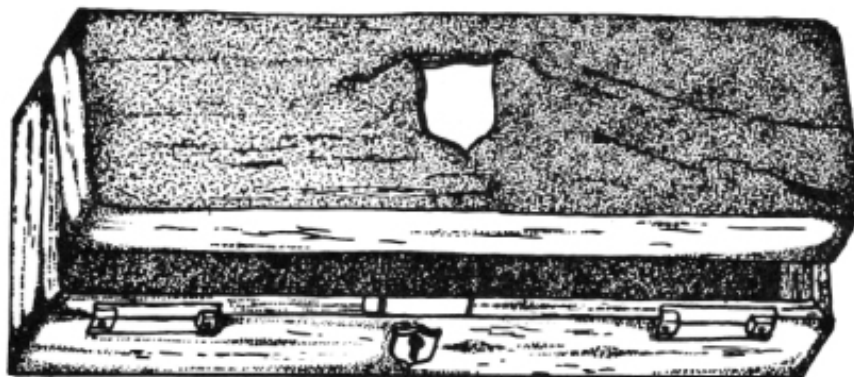
74 Surgical Instruments

Figure 59. Handle, surgical knife
Full scale



Article: Kits, surgeon's medical (MG-4Y)
Recovered: 6
Size: Length 16 1/4 "
Width 4 1/4 "
Depth 2 3/16"
Markings: None
Description: The rectangular mahogany kit has brass fittings. The veneered lid, which is secured by two hinges, has a brass shield centered on it. There are two brass hasps located on either side of the front with a lock set in the center front. The boxes were glued together with thin metal or wood fasteners across each corner. The kits were found broken apart and partially disassembled with several medical instruments concreted to the inside of several of the wooden fragments.
Condition: Good to fragmentary.
Remarks: It is expected that all the surgical instruments recovered were shipped in the medical boxes and were scattered when the vessel sank.

Figure 60. Kit, surgeon's medical
Scale: 1/4



Article: Knives, amputation (MG-2F)
 Recovered: 10 blades
 2 handles
 Size: Length (of blade) 9 1/2"
 Width (of blade) 7/16"
 Length (of handle) 4"
 Width (of handle) 3/4" tapering to 5/8"
 Markings: None
 Description: The fixed sharp blade was attached to the gutta-percha handle with three brass pins.
 Condition: Fair. The blades are badly corroded and broken off. Several are fragmentary. Handles are in good condition.

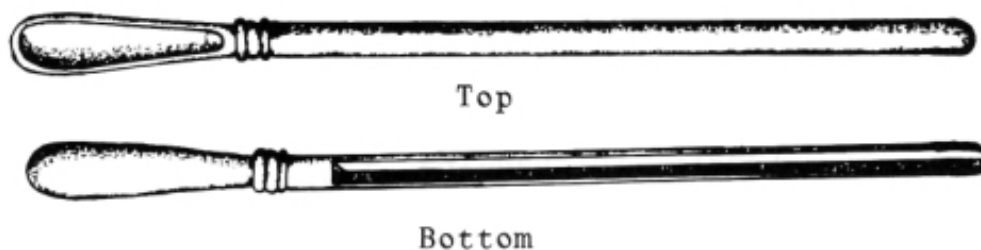
Figure 61. Knife, amputation
 Blade scale: 1/2
 Handle: Full scale



Article: Probes, surgeon's (MG-2G)
 Recovered: 2
 Size: Length 5"
 Width (of shaft) 1/8"
 Width (of spoon) 1/4"
 Markings: None
 Description: Brass with a concave groove along the shaft. One end is shaped somewhat like a spoon. The shaft and spoon appear soldered together.
 Condition: Excellent

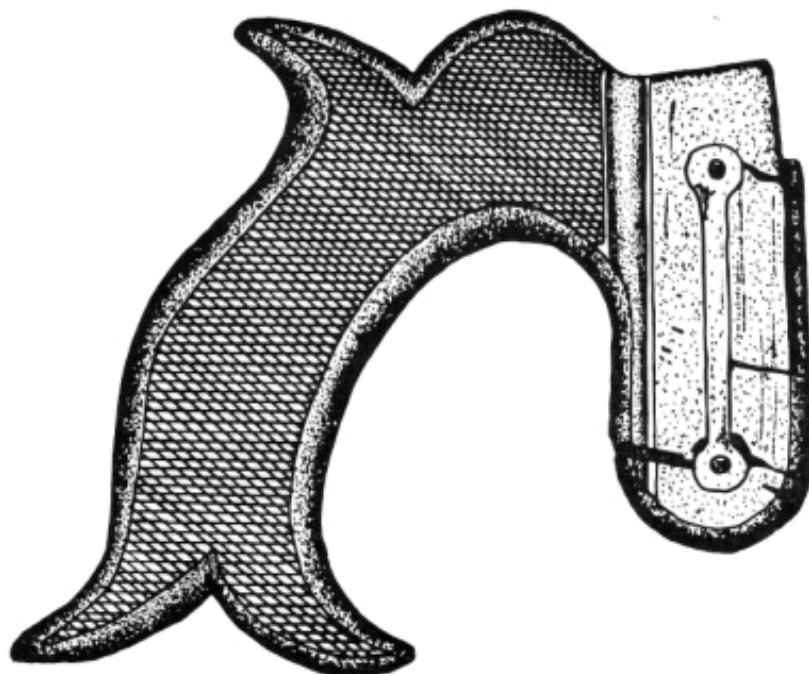
76 Surgical Instruments

Figure 62. Probe, surgeon's
Full scale



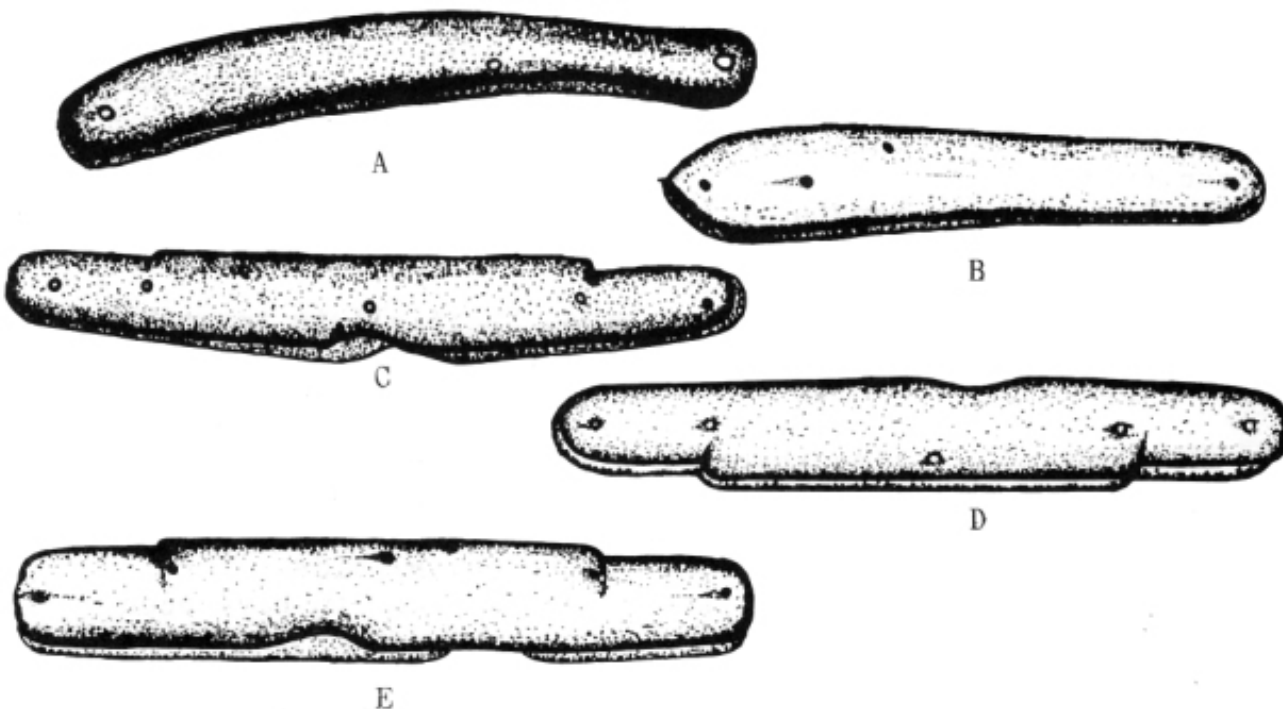
Article:	Saws, bone (handle only) (MG-2C)
Recovered:	2
Size:	Length (of body) 3 1/2"
	Width 4 1/4"
	Thickness 1"
Markings:	None
Description:	The handles are checkered gutta-percha with brass screws for attaching the blades.
Condition:	Excellent

Figure 63. Saw, bone (handle only)
Full scale



Article: Scalpels, folding (MG-2B)
 Recovered: 47
 Size: (of illustrated scalpels)
 A -- Length 3 5/8"
 Width 3/8" tapering to 5/16"
 B -- Length 3"
 Width 9/16" tapering to 3/8"
 C -- Length 3 3/4"
 Width 1/2"
 D -- Length 4 1/4"
 Width 1/2"
 E -- Length 3 3/4"
 Width 9/16"
 Markings: None
 Description: The gutta-percha handles are intact, but
 the blades have completely deteriorated.
 Condition: Good.

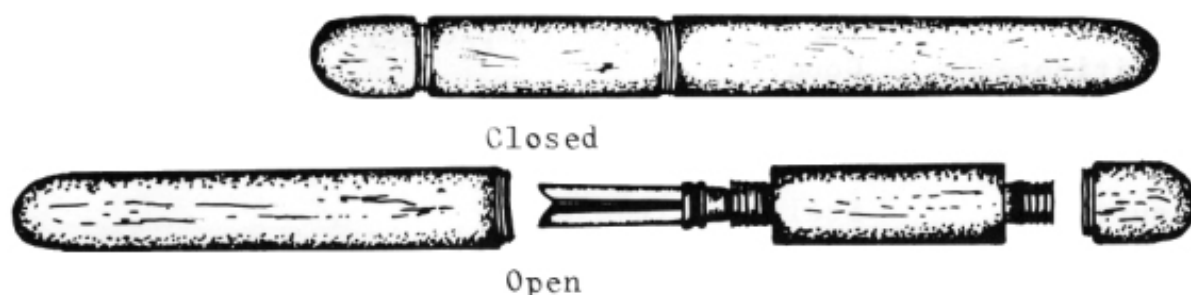
Figure 64. Scalpels, folding
 Full scale



78 Surgical Instruments

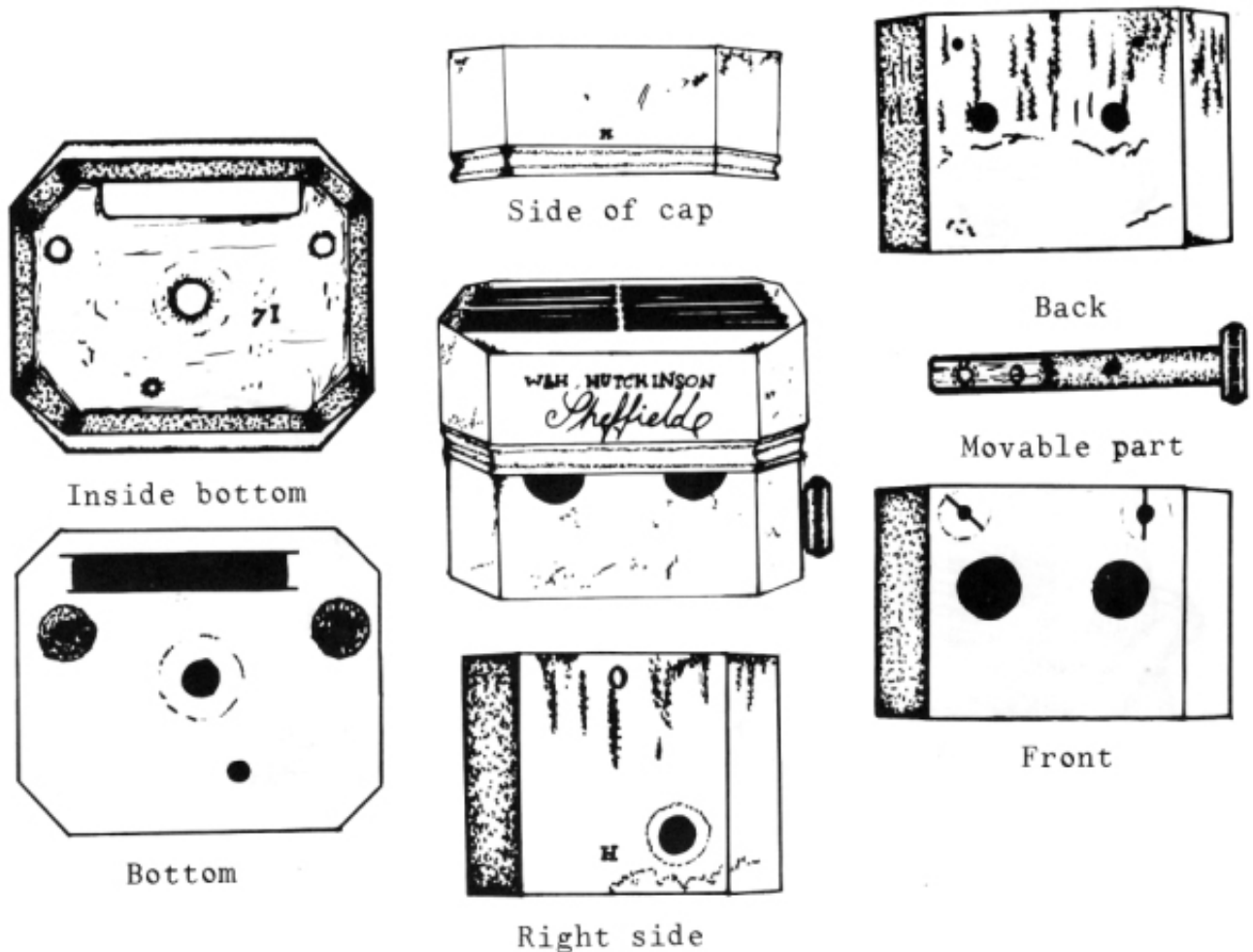
Article: Scalpel, pocket (MG-2B)
 Recovered: 1
 Size: Length 4 1/2"
 Diameter 7/16" tapering to 5/16"
 Markings: None
 Description: Scalpel is gutta-percha. It is smooth on the exterior with a groove in the middle and at the tip resembling a fountain pen. The sections are threaded and can easily be screwed apart. The blade mount is slotted allowing for the use of various blades.
 Condition: Good, except for the deteriorated blade.

Figure 65. Scalpel, pocket
 Full scale



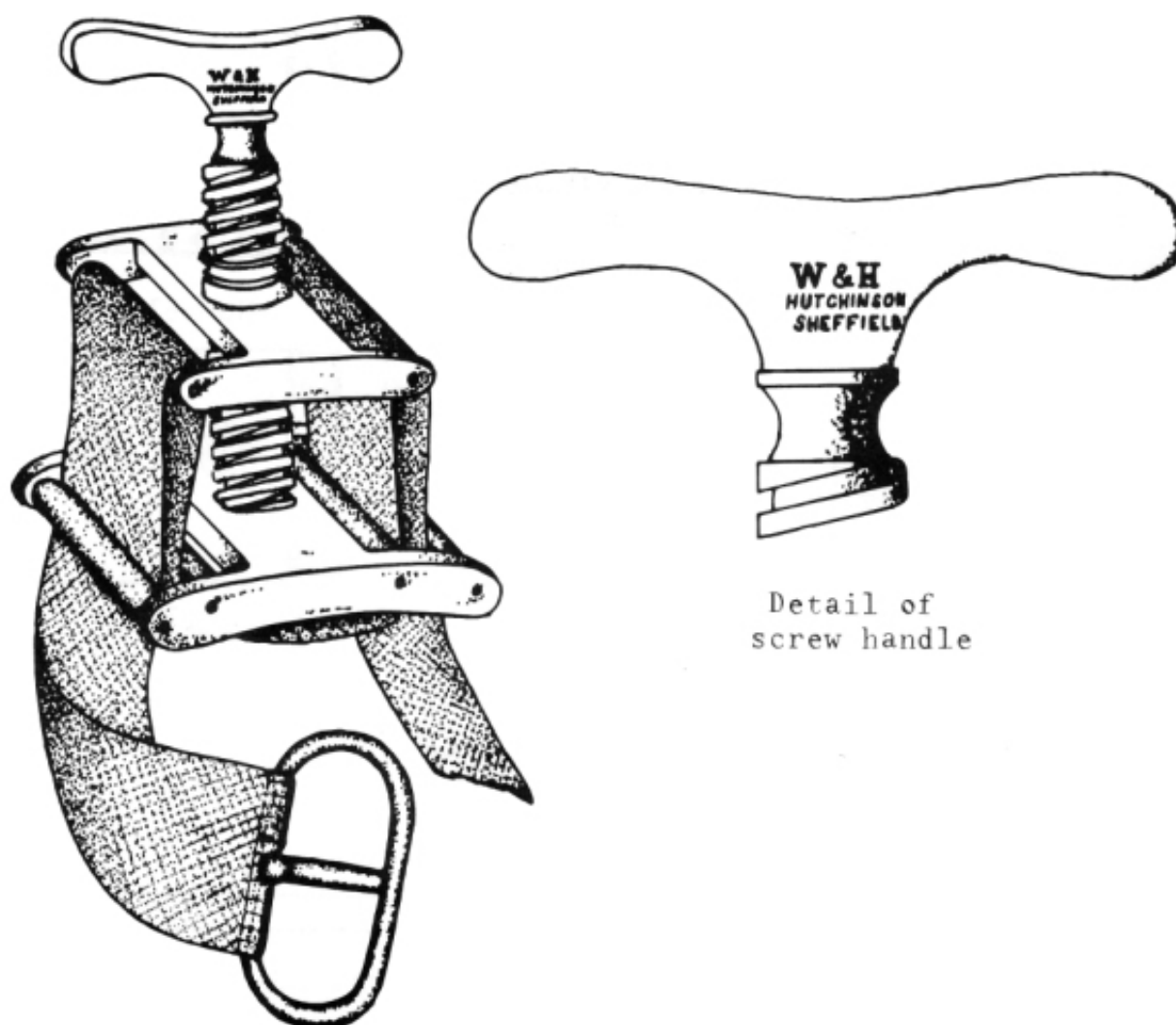
Article: Scarifiers (MG-2G)
 Recovered: 2
 Size: Length 1 1/8"
 Width 1 2/5"
 Height 1 2/5"
 Markings: W. & H. Hutchinson, Sheffield is inscribed on the face of the lid.
 Description: Twelve slots appear on the top of the brass scarifier. These were apparently for 12 tiny sharp blades, which have decomposed. The blades were probably cocked and triggered by a spring action, when one pushed or pulled the button on the side. The height of the blades appears to have been adjustable.
 Condition: Excellent. The lid is still detachable and the small bolt can be removed. There is very little corrosion.

Figure 66.

Scarifier
Full scale

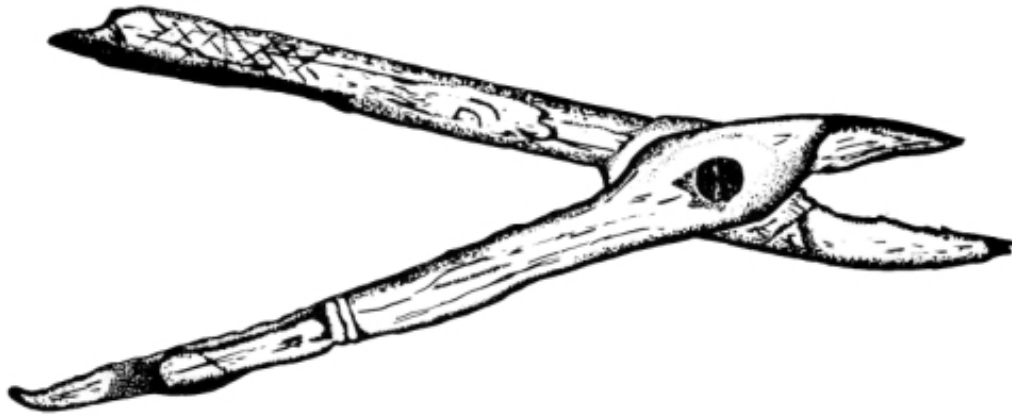
Article:	Screws, tourniquet (MG-2D)
Recovered:	8
Size:	Height 3 7/8" Width 1 7/8"
Markings:	<u>W. & H. Hutchinson, Sheffield</u> is inscribed on the top of the screw handle.
Description:	The tourniquet screws are brass. When they were recovered, several fragments of white webbing were still attached to the rollers and small buckles. These have been fully reconstructed in the drawing.
Condition:	Good. The belt fragments, however, have deteriorated since recovery.

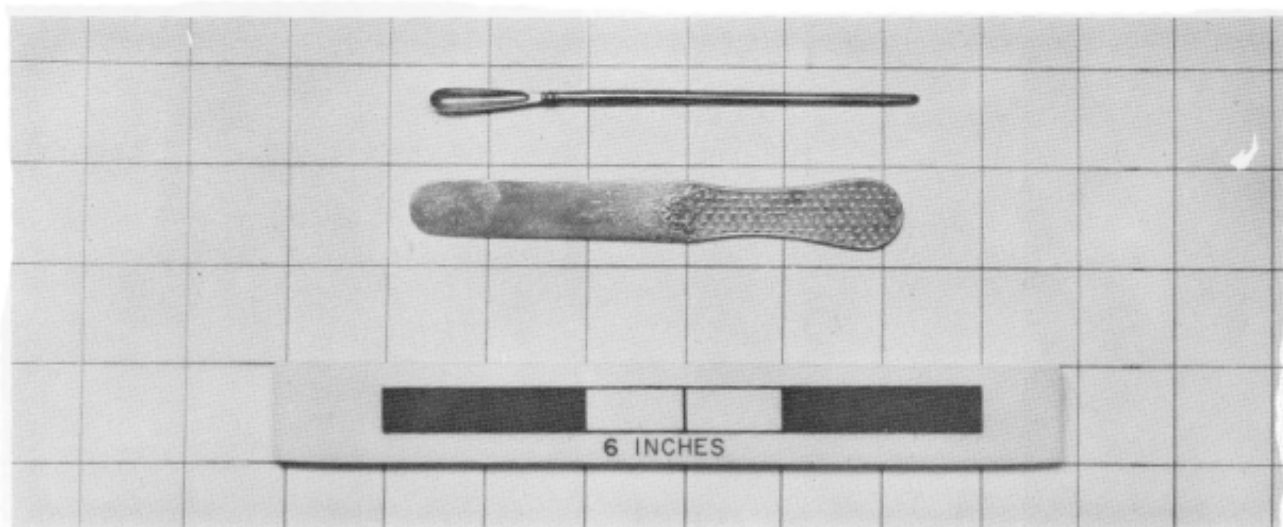
Figure 67. Screw, tourniquet
Full scale
Detail
Scale: 2/1



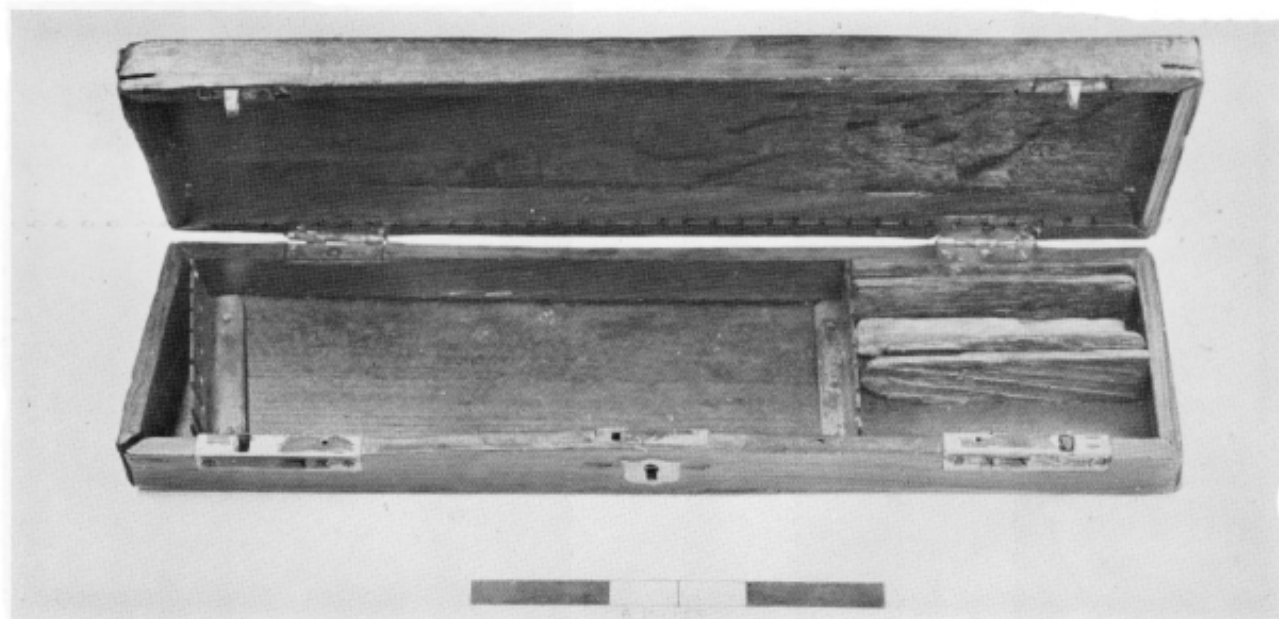
Article:	Snips, bone (MG-2E)
Recovered:	6
Size:	Length 5 3/8"
	Width 1/4"
Markings:	None
Description:	A checkered pattern is visible on the illustrated snip. The snips are side cutting.
Condition:	Illustrated snip will still open and close; however, some of the examples are badly decayed, particularly around the handles.

Figure 68. Snips, bone
Full scale

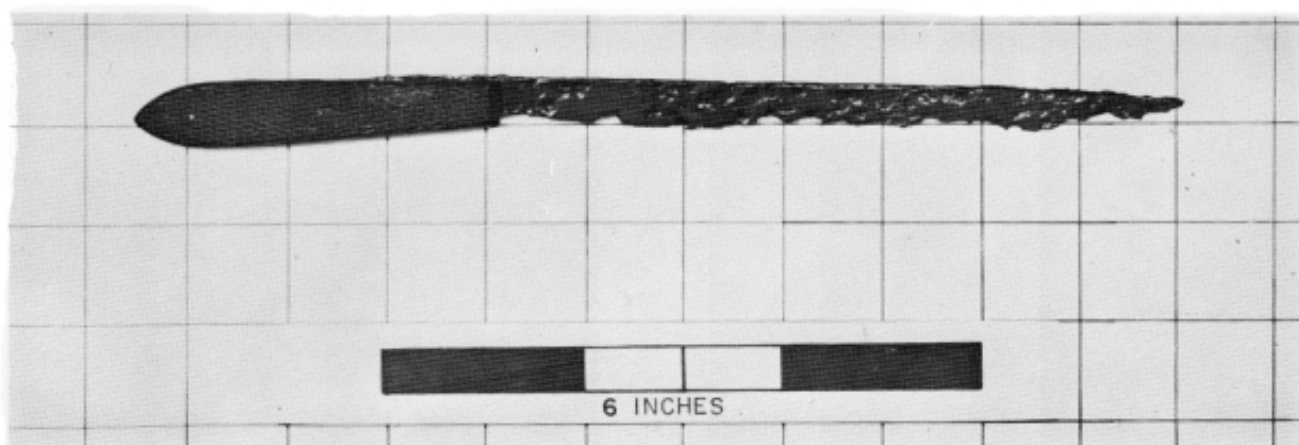




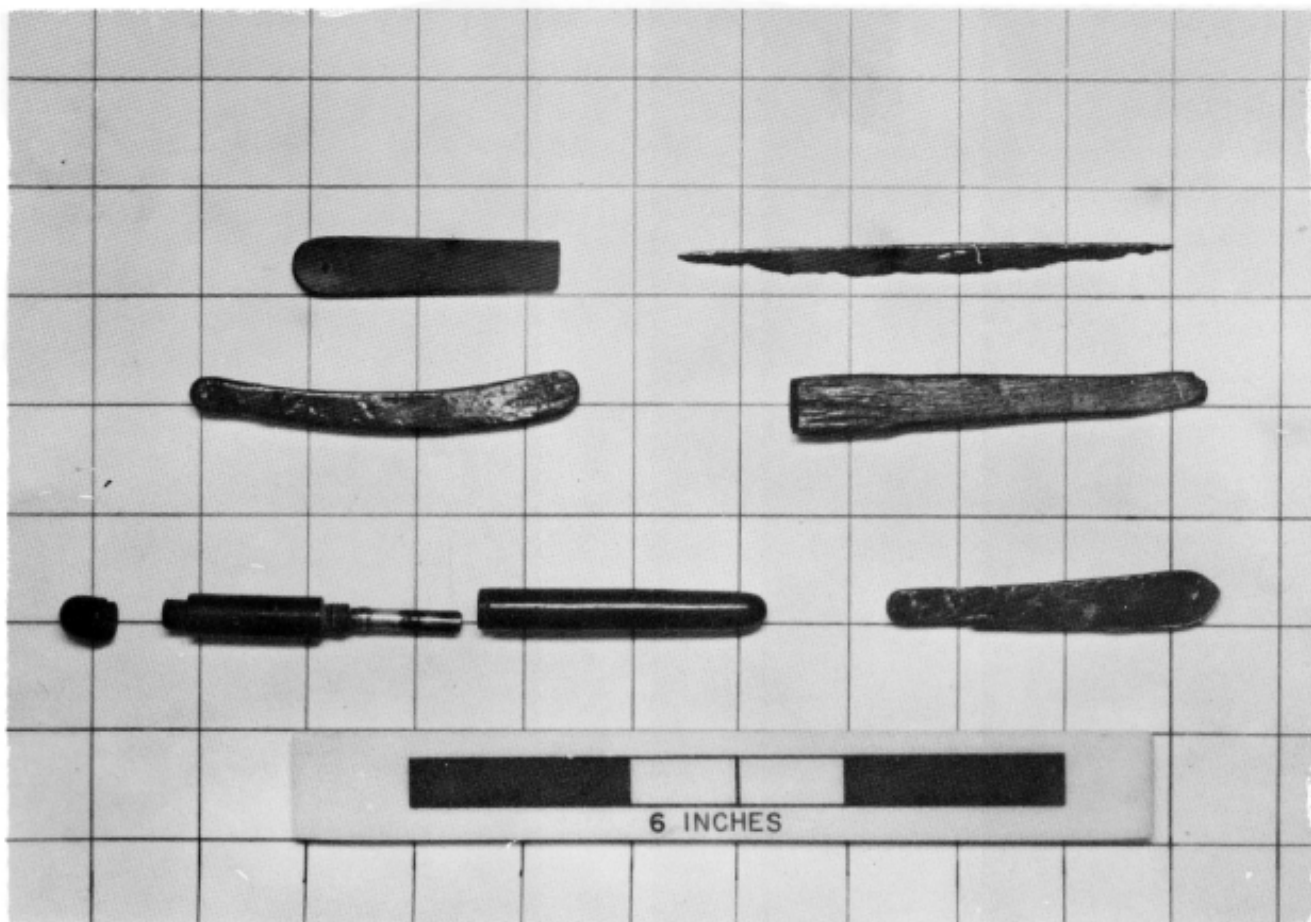
A. Figs. 58 and 62 Depressor, tongue and probe, surgeon's



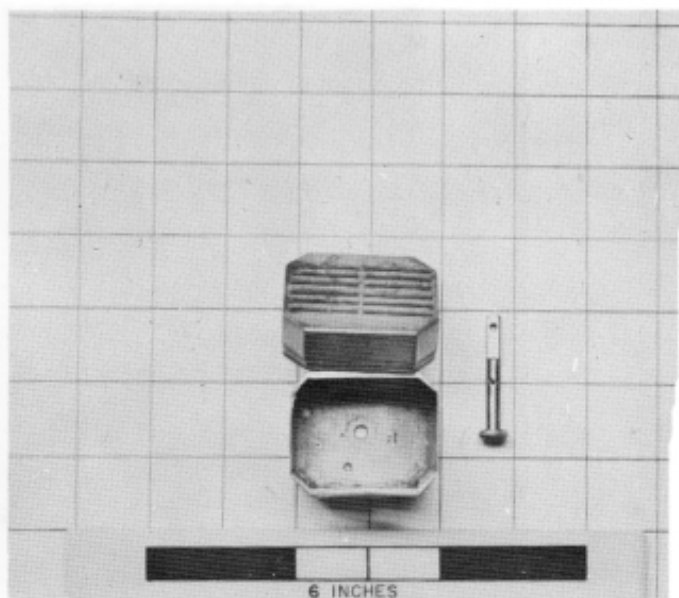
B. Fig. 60 Kit, surgeon's medical



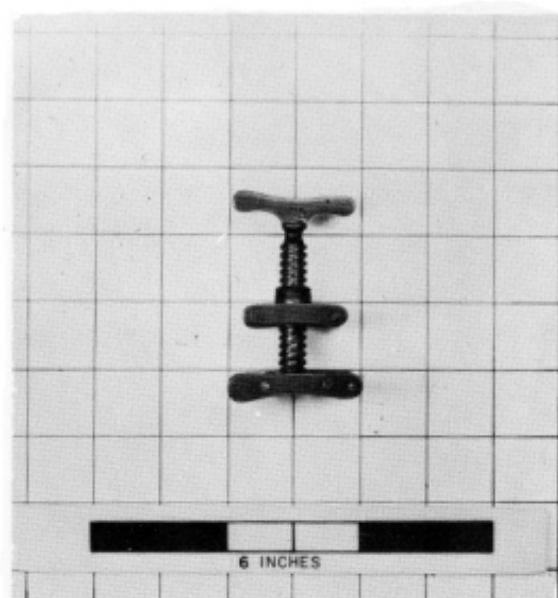
C. Fig. 61 Knife, amputation



A. Figs. 64 and 65 Scalpels, folding and scalpel, pocket



B. Fig. 66 Scarifier

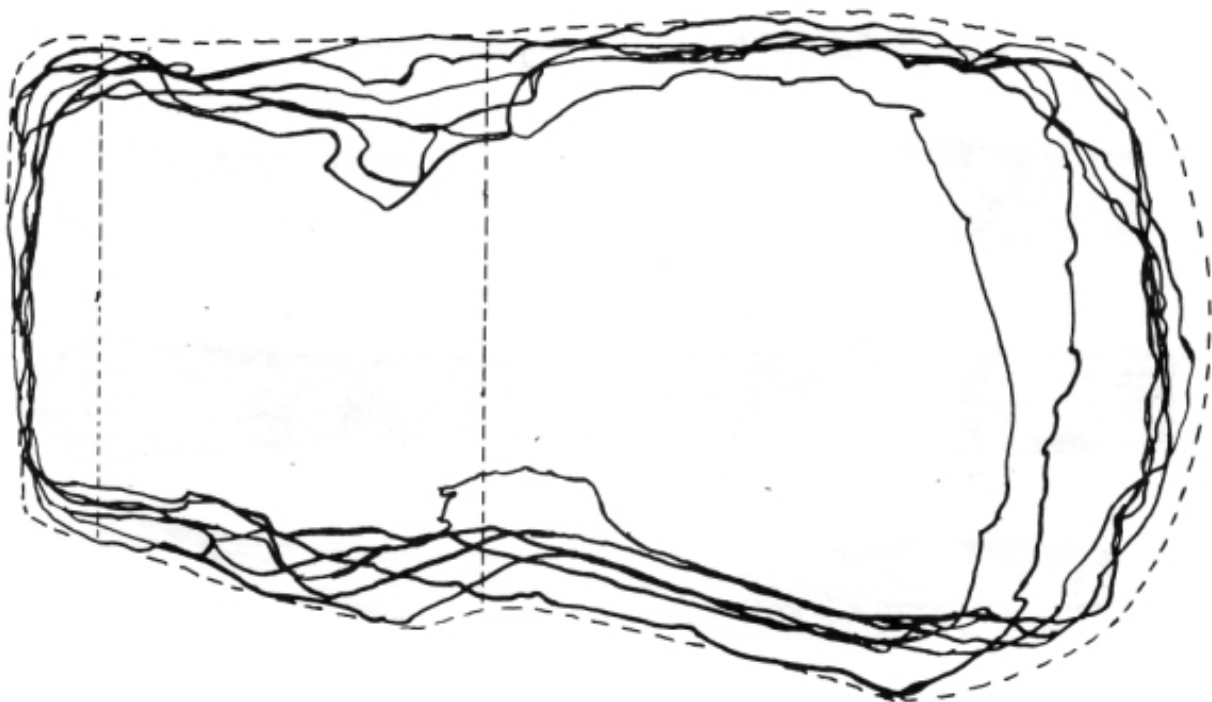


C. Fig. 67 Screw, tourniquet

TOOLS AND IMPLEMENTS

Article:	Axes (MG-3R)
Recovered:	12
Size:	Maximum length (of fragments) 6 1/4" Maximum width (of fragments) 3 1/2"
Markings:	None
Description:	Axes are steel. They were packed in a material resembling tar paper. One still has some clinging to it.
Condition:	Poor. Badly deteriorated.

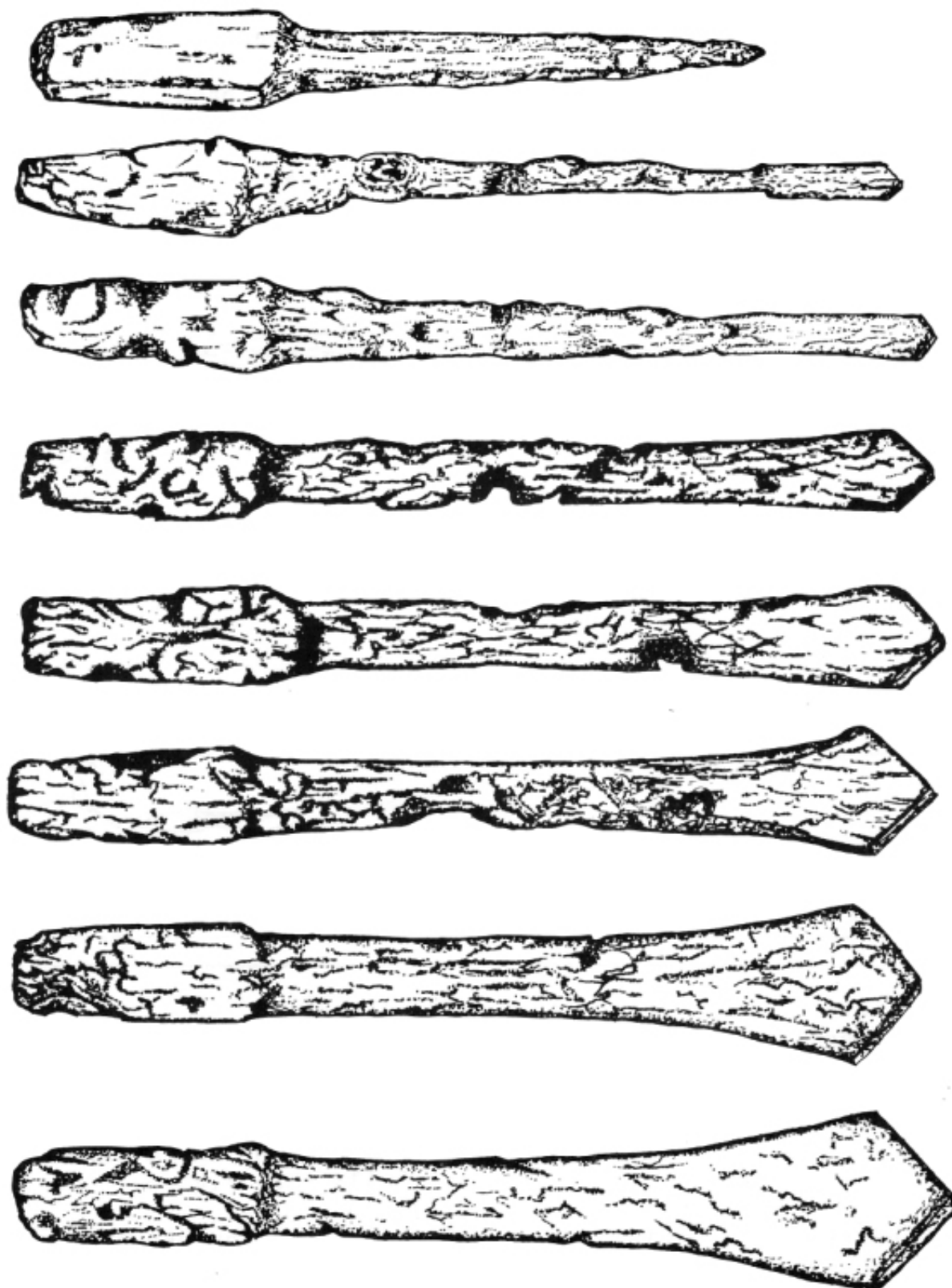
Figure 69. Ax
Full scale



Article:	Bits, flat drill (MG-R)
Recovered:	38
Size:	Nine cutting edges 1 1/4" to 1/4".
Markings:	None
Description:	The bits are cast steel with square tangs. The tangs fit snugly in the chuck holes of the ratchet drills (See Figure 77 for the ratchet drills).
Condition:	Vary from good to fair. A number are deteriorated at either the tang or shaft.

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Figure 70. Bits, flat drill
Full scale



Article: Chisels, cold (MG-S)
Recovered: 11
Size: Length 10"
Width range (of blade) 1/2" to 1"
Markings: None
Description: Ferrous metal. One is a cape type (Figure 71.C) chisel.
Condition: Poor

Figure 71. Chisels, cold
Scale: 1/2



A



B



C



D



E



F

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Article: Chisels, wood (MG-P)

Recovered: Approximately 1,600 in three types. Exact quantities of each type are unascertainable without injuring many of the artifacts which are still in concreted bundles.

Size: A wide range of cutting edges is represented from 1/8" to 1 1/8". The length and tangs overall are proportionate to the size of the cutting edge.

Markings: The majority of the chisels have manufacturer's markings. A very few chisels have been observed that do not have markings. This number is so small that it is presumed that they were mistakes made during casting or factory seconds. Three different manufacturers are represented.

Type I --- Wright Holdsworth & Co., Cast-steel is stamped on both sides of the shaft at the base of the neck (See Figures 72 and 75).

Type II -- John K. Turner & Co., Sheffield is stamped on the unbeveled side of the shaft near the base of the neck with Caststeel on the reverse side (See Figures 73 and 75).

Type III - C. Henry, Sheffield is stamped on one side of the shaft near the base of the neck. On chisels larger than 3/8" this logo is usually on the beveled side. On chisels smaller than 3/8" this is reversed (See Figures 74 and 75). There are exceptions to this.

Description: The chisels were shipped in bundles packed in wooden kegs or barrels. They were organized in sets, bundled, and then wrapped in a type of paper unknown at this time. The exact number of sets of 10 or 12 chisels in each bundle cannot be determined. The quality of the steel in the chisels varies. Types I and II are good quality metal; whereas, Type III is of a poorer grade.

Condition: Good to poor. The chisels are badly corroded particularly at the cutting blades. The quality of the metal partly accounts for the deterioration. The Type III chisels are in the poorest condition.

Remarks: Wood gouges were occasionally packed with chisels.

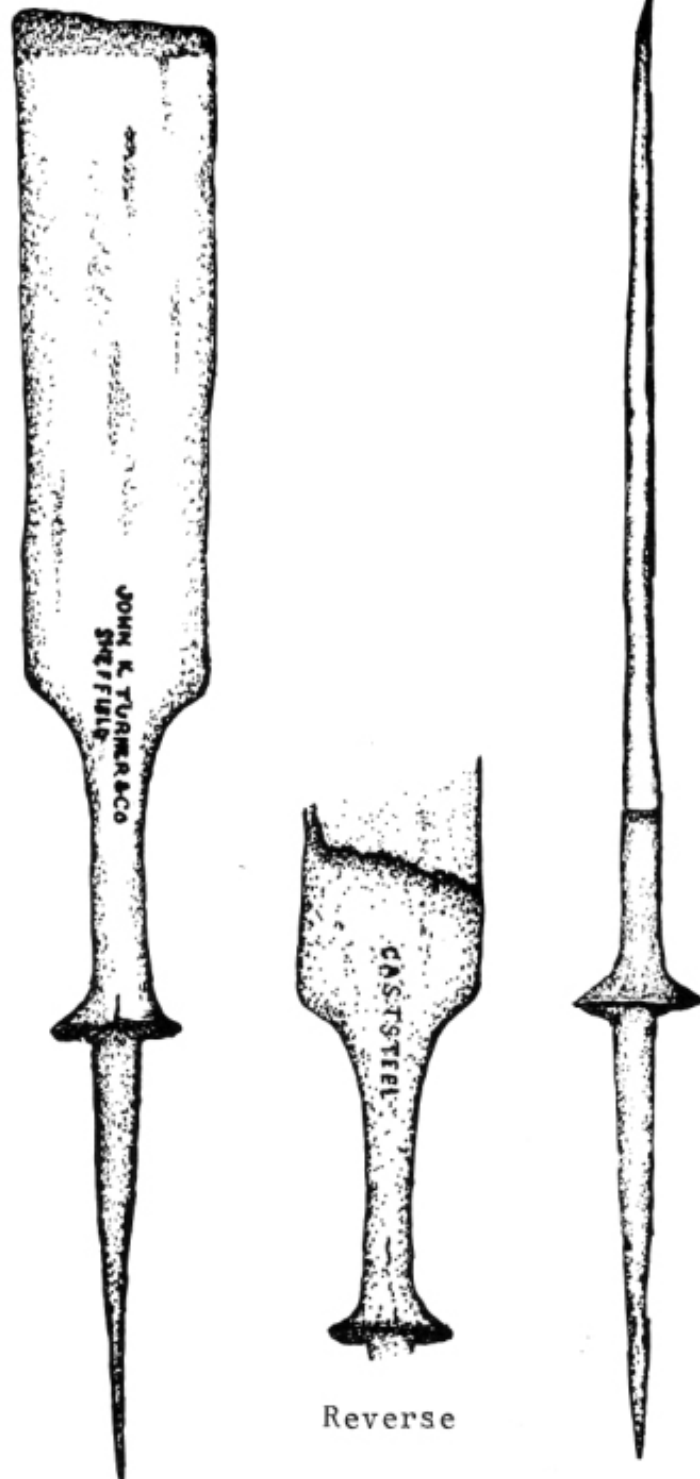
Figure 72. Chisel, wood
(Type I)
Full scale



Front

Side

Figure 73. Chisel, wood (Type II)
Full scale



Front

Reverse

Side

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Figure 74. Chisels, wood (Type III)
Full scale

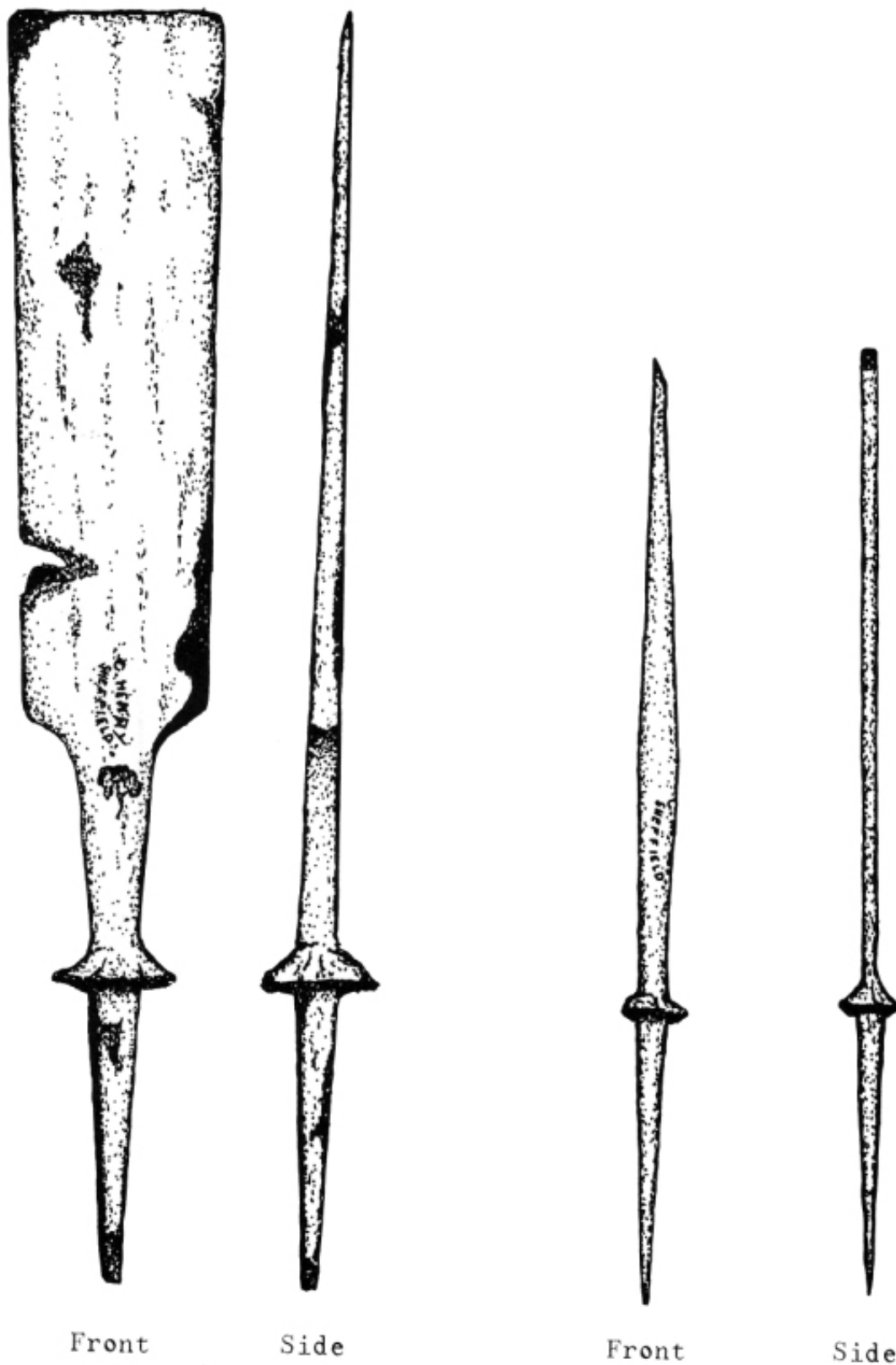
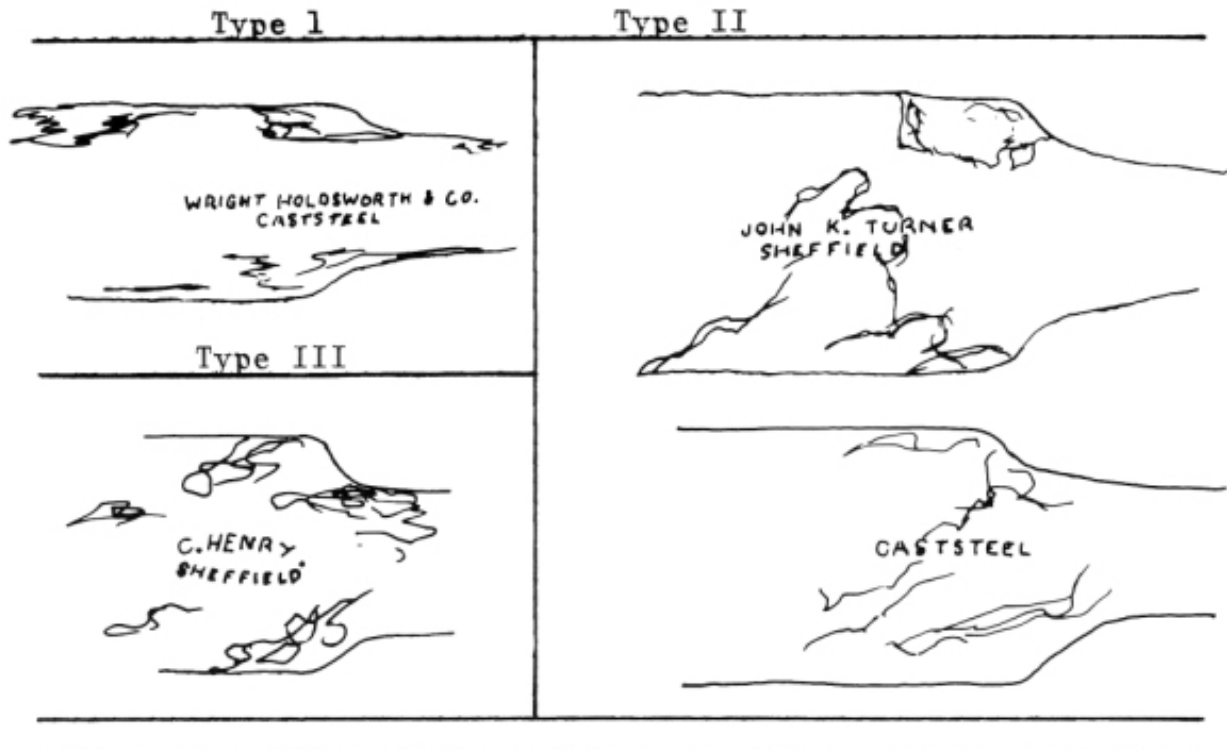


Figure 75. Details of maker's marks on wood chisels.
Scale: 2/1



Article:	Dies, pipe (MG-W)			
Recovered:	7			
Size:	A --	Threads (per inch)	21	
		Length	1	3/16"
		Width		3/4 "
		For use with		1/4 " pipe
	B --	Threads (per inch)	21	
		Length	1	3/16"
		Width		3/4 "
		For use with		1/4 " pipe
	C --	Threads (per inch)	18	
		Length		1/8 "
		Width		11/16"
		For use with		3/8 " pipe
	D --	Threads (per inch)	11	
		Length	1	1/2 "
		Width	1	"
		For use with		5/8 " pipe
	E --	Threads (per inch)	10	
		Length	1	1/2 "
		Width	1	"
		For use with		3/4 " pipe

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Size: (continued)

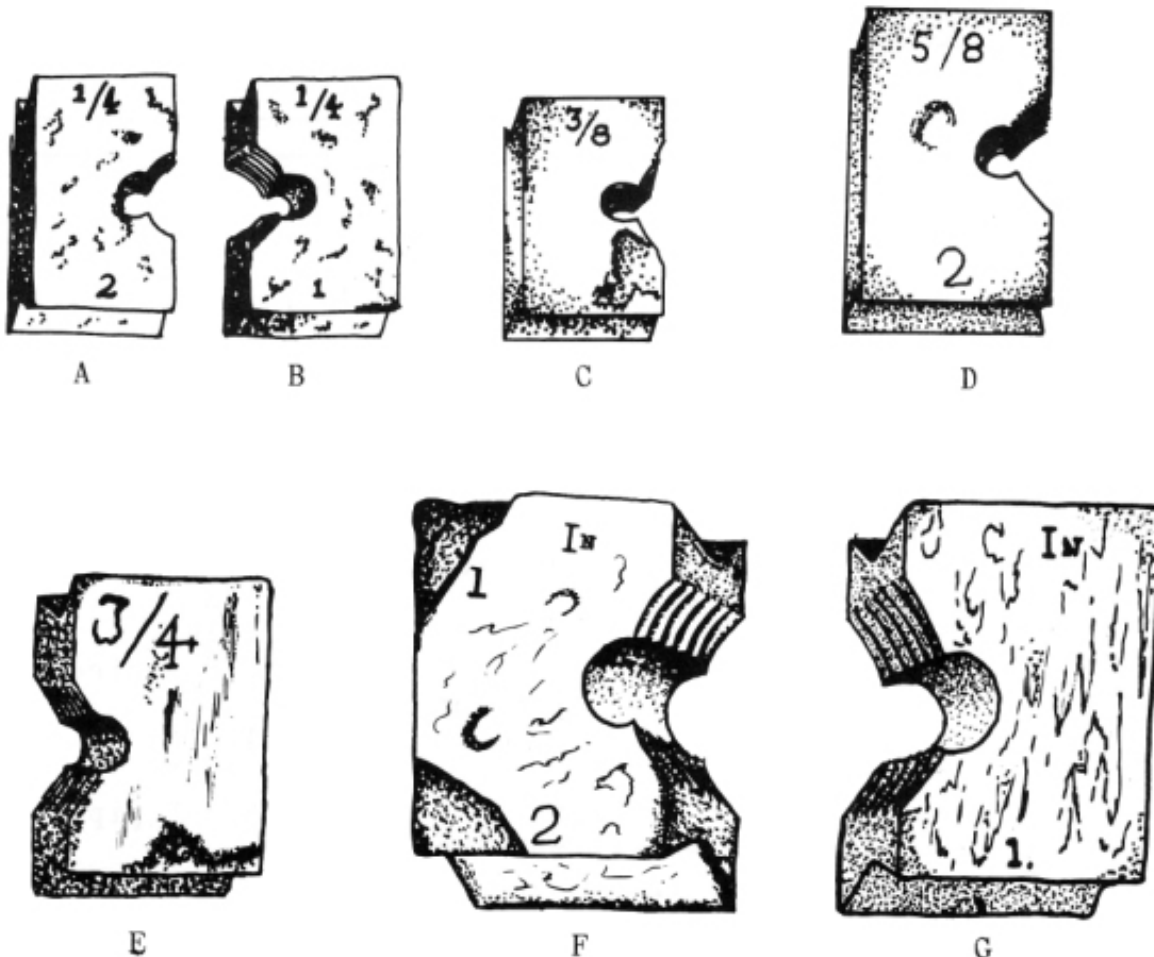
F -- Threads (per inch)	8
Length	1 7/8 "
Width	1 3/8 "
For use with	1 " pipe
G -- Threads (per inch)	8
Length	1 15/16 "
Width	1 1/4 "
For use with	1 " pipe

Markings: The dies are stamped with numbers 1 or 2 to differentiate the left from the right half as well with the size pipe that they fitted.

Description: The dies are cast steel and have different thread counts. They appear to be part of a tap and die set (See Figure 99 for taps).

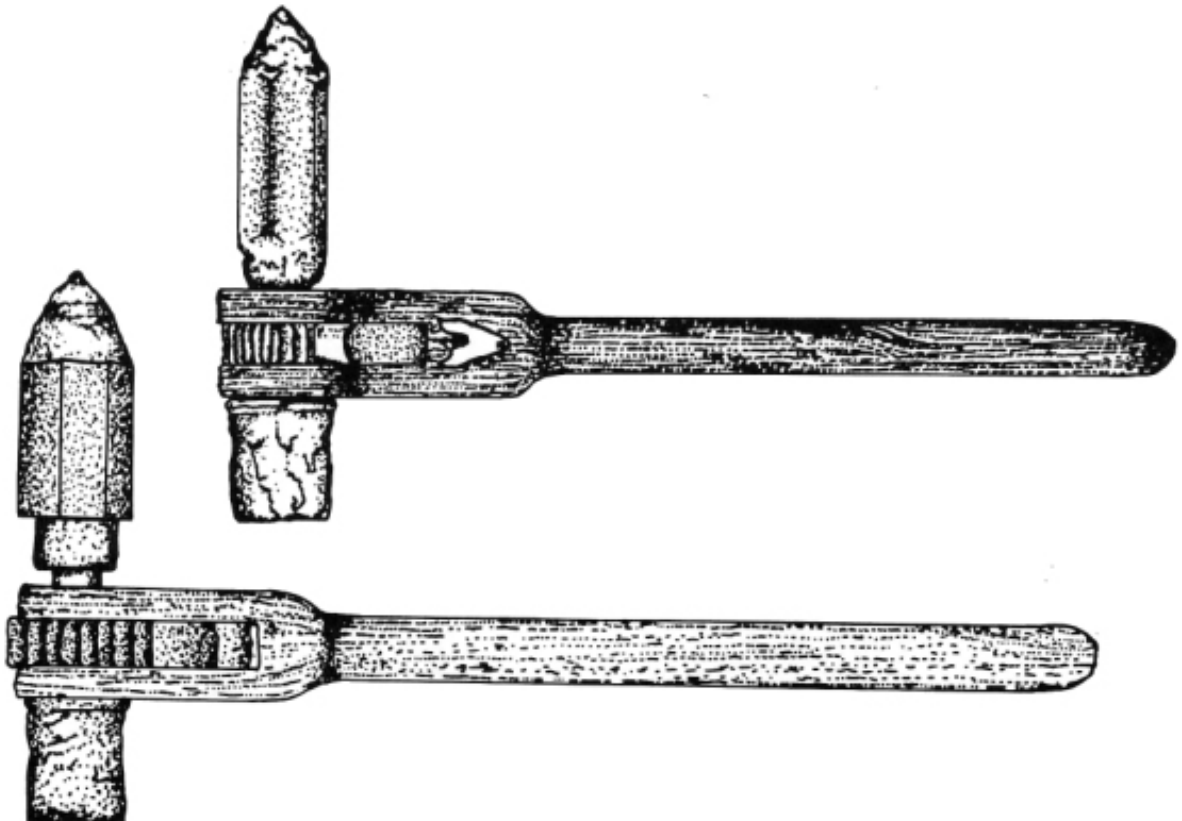
Condition: Good

Figure 76. Dies, pipe
Full scale



Article: Drills, ratchet (MG-M)
 Recovered: 14
 Size: Length range (of handles) 13 1/2" to 19"
 Markings: None
 Description: The chuck portions of the cast steel drills are all the same with square holes that taper slightly inward. These chuck holes are the same size and shape as the tangs of the flat drill bits (See Figure 70 for flat drill bits). These drills also fit with the pipe taps (See Figure 99 for pipe taps). The top of the drill is hexagonal and tapers to a point. It is expected that this drill could be used in a press or with additional weights to increase the efficiency of the cutting edge of the bit. If these were aboard among the cargo, they were misplaced before the drills were recovered.
 Condition: Fair. The moving parts do not work. Corrosion has given the metal a furrowed appearance.

Figure 77. Drills, ratchet
 Scale: 1/3



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Article: Files (MG-3I)
Recovered: Approximately 2,306 divided as follows:
1 keg containing approximately 1,000 files
(See Figure 78).
35 clusters with a total of approximately
1,150 files.
156 loose files.
Size: Length range 5" to 19".
Markings: None
Description: Three types of files are found packed in the
same keg: flat, half-round, and triangular.
There is a wide variety of sizes of each
type.
Condition: Although a number of files have been pre-
served and are in good condition, the ma-
jority still remains in concreted bundles.

Figure 78. Keg of files
Not to scale

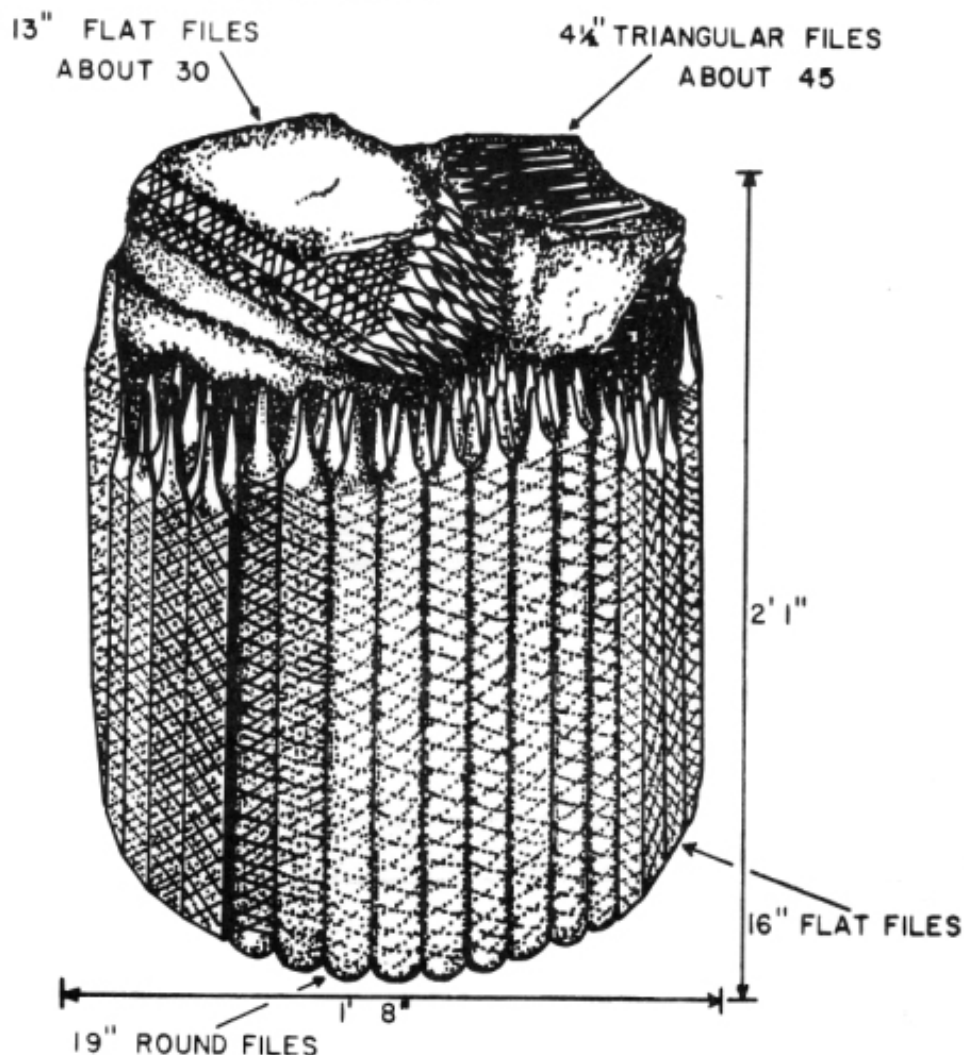


Figure 79. Files
Full scale



Flat



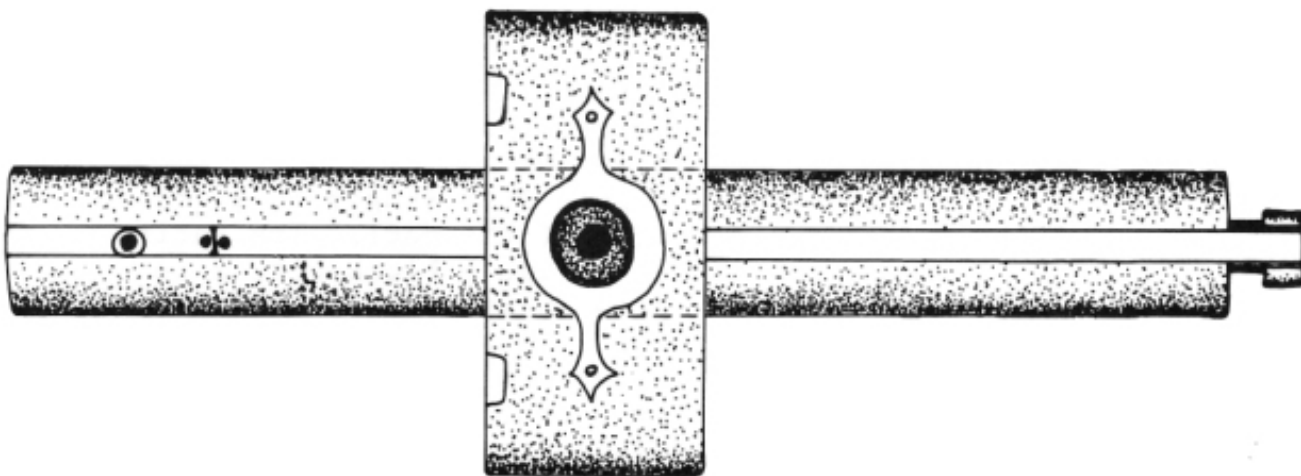
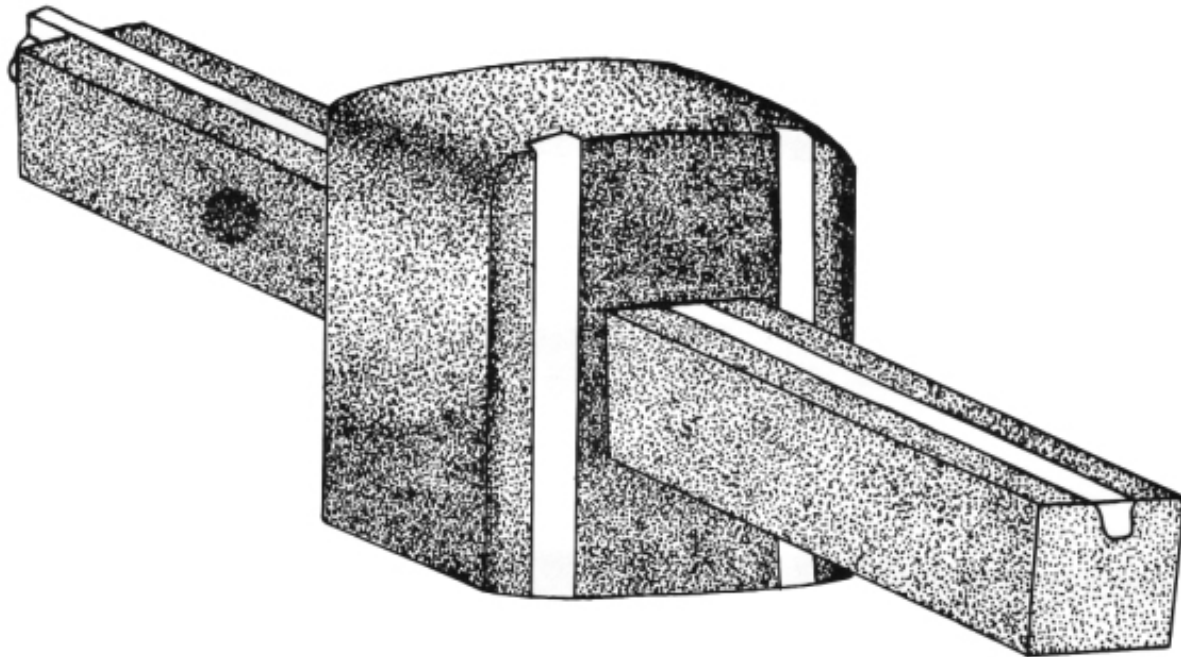
Half round



Triangular

Article:	Gauge, carpenter's marking (MG-Y)
Recovered:	1
Size:	Length 6 1/4" Height 2 1/2"
Markings:	None
Description:	The gauge is ebony. Although the markings are now obliterated, the rule was probably marked off in inches and divided into sixteenths. The rule fits snugly in a groove along the length of the tool. The entire section slides inside a block with a tension thumb screw in its edge. The measured distance can be slid out and the block secured in place with the tension screw. A pin at the end of the rule would mark a wooden board in a straight line when the block strips on the riding edge prevent the wooden block from wearing out when it is used against rough wood.
Condition:	Excellent. The gauge is one of the best preserved artifacts from the MODERN GREECE.

Figure 80. Gauge, carpenter's marking
Full scale



Top view

Article: Gouges, wood (MG-Q)
 Recovered: Approximately 746, mostly in sets of 12.
 Size: 1/8" to 1".
 Markings: M & C is on all the gouges near the neck
 (See Figure 81).
 Description: The gouges were recovered in clusters (See
 Figure 82). These clusters are composed
 of sets of 12 gouges concreted together.
 A set consists of one gouge in the 1", 7/8",
 3/4", 5/8", 1/2" sizes; two gouges in 3/8"
 and 1/4" size; and three of the 1/8" size.
 Condition: Although some of the gouges have been pre-
 served and are in good condition, the major-
 ity are still in concreted bundles.

Figure 81. Detail of maker's mark on wood gouges
 Scale: 2/1



Figure 82. Wood gouges in bundle
 Scale: 1/2

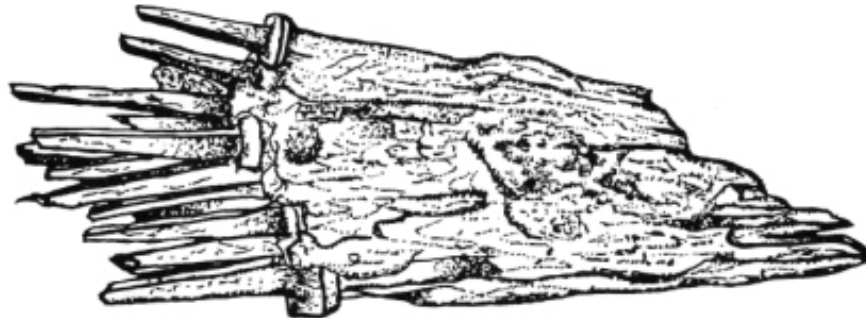
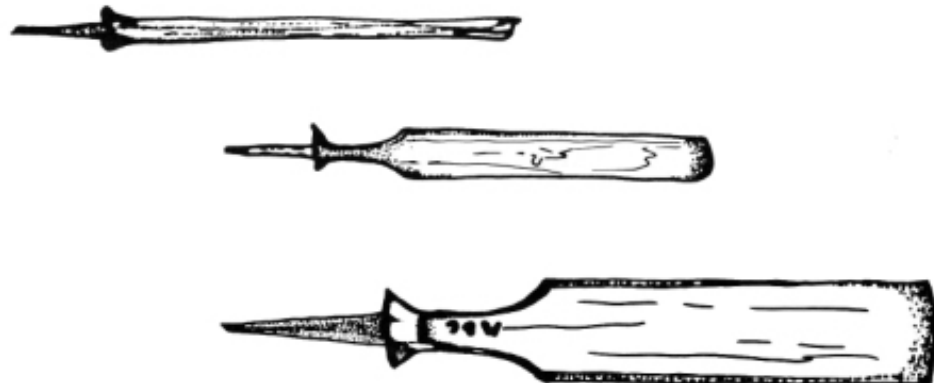


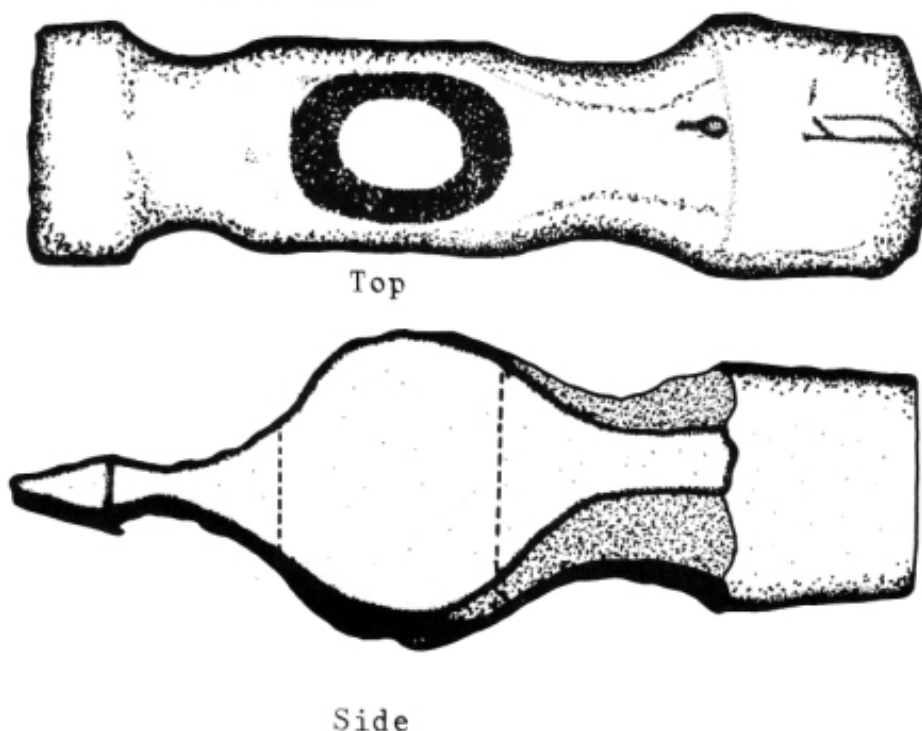
Figure 83. Wood gouges
 Scale: 1/2



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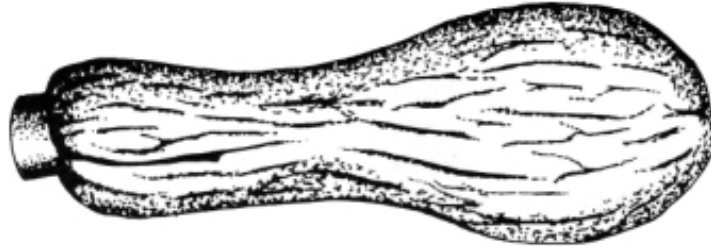
Article: Hammers, cross peen machine (MG-V)
Recovered: 9
Size: Maximum length 4 5/8"
Maximum width 1 5/16"
Markings: None
Description: They are made of steel. The hammers vary slightly in size due to corrosion.
Condition: Good.

Figure 84. Hammer, cross peen machine
Full scale



Article: Handle, awl (MG-Z)
Recovered: 1
Size: Length 3 1/2"
Width 1 1/4"
Markings: None
Description: The handle is wood with a brass ferrule. In size and shape it closely resembles a modern day awl handle.
Condition: The wood and brass are both in excellent condition.

Figure 85. Handle, awl
Full scale



Article:	Handle, rasp (MG-2A)
Recovered:	1
Size:	Length 5 1/2" Width 1 1/4"
Markings:	None
Description:	The handle is made of soft wood with a brass ferrule. Inside the ferrule there is a tapered rectangular hole in a mass of pine pitch or resin. This would fit and hold in place the tang of a rasp.
Condition:	The wood and the brass are both in excellent condition.

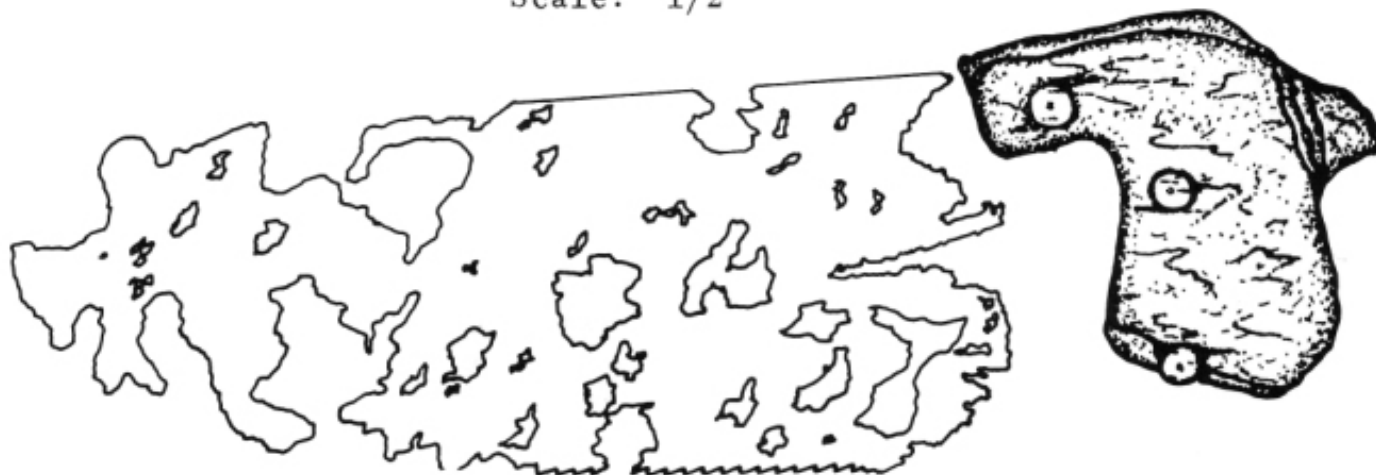
Figure 86. Handle, rasp
Full scale



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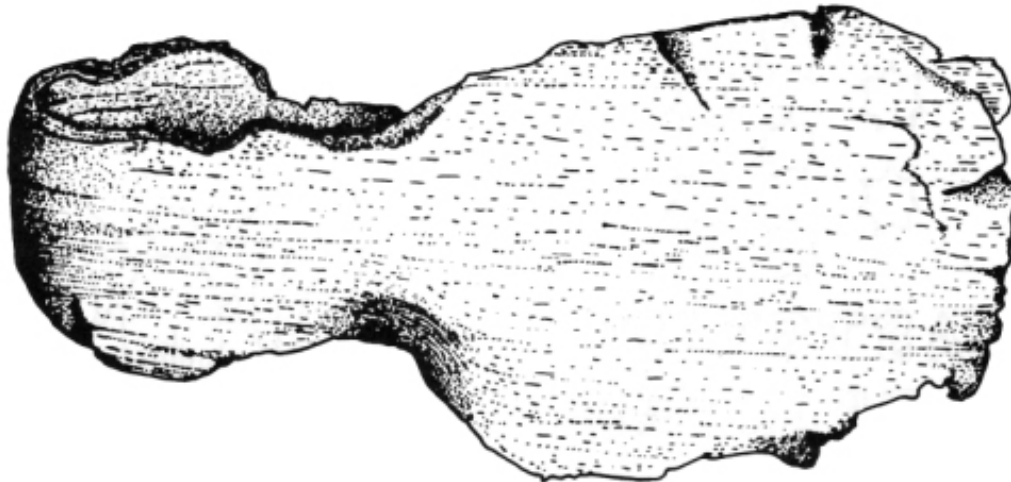
Article: Handsaws (MG-3M)
 Recovered: 50 blades in a bundle
 3 handle fragments
 Size: Maximum length (of blade fragments) 15 5/8"
 Maximum width (of blade fragments) 5 1/16"
 Teeth (per inch) 6
 Approx. height (of handle body) 4"
 Approx. width (of handle body) 4 1/4"
 Markings: None
 Description: The blades and handles were in one concreted bundle. Only three handle fragments were salvaged. These handles are badly decayed with few original lines remaining. The saw teeth are rip type.
 Condition: Poor

Figure 87. Handsaw
 Scale: 1/2



Article: Hatchets, broad (MG-K)
 Recovered: 13
 Size: Maximum length (of fragments) 5"
 Maximum width (of fragments) 2 1/2"
 Markings: None
 Description: Made of cast steel. Measurements taken from impressions in a concretion indicate that the blade was originally 4 1/2" wide.
 Condition: Badly deteriorated.

Figure 88. Hatchet, broad
Full scale



Article:	Hoes (MG-3G)
Recovered:	134
Size:	Width range 8 1/2" to 9 1/2" Height range 7 1/4" to 8"
Markings:	<u>Yates & Co.</u> , <u>Aston Manor</u> and a stylized bird are on one side of the blade; on the other the number 4 and either of two types of star patterns appear (See Figures 91 and 92 for types of hoes and Figures 88, 89, and 90 for details).
Description:	The manufacturer's marking appears to have been hand stamped on the metal hoes, for the placement is not exactly the same on each hoe.
Condition:	Good
Figure 89.	Star markings (Type I) Scale: 2/1



CAST STEEL
WARRANTED

4

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Figure 90. Star marking
(Type II)
Scale: 2/1



Figure 91. Maker's mark
Scale: 2/1



Figure 92. Hoe (Type I)
Scale: 1/2

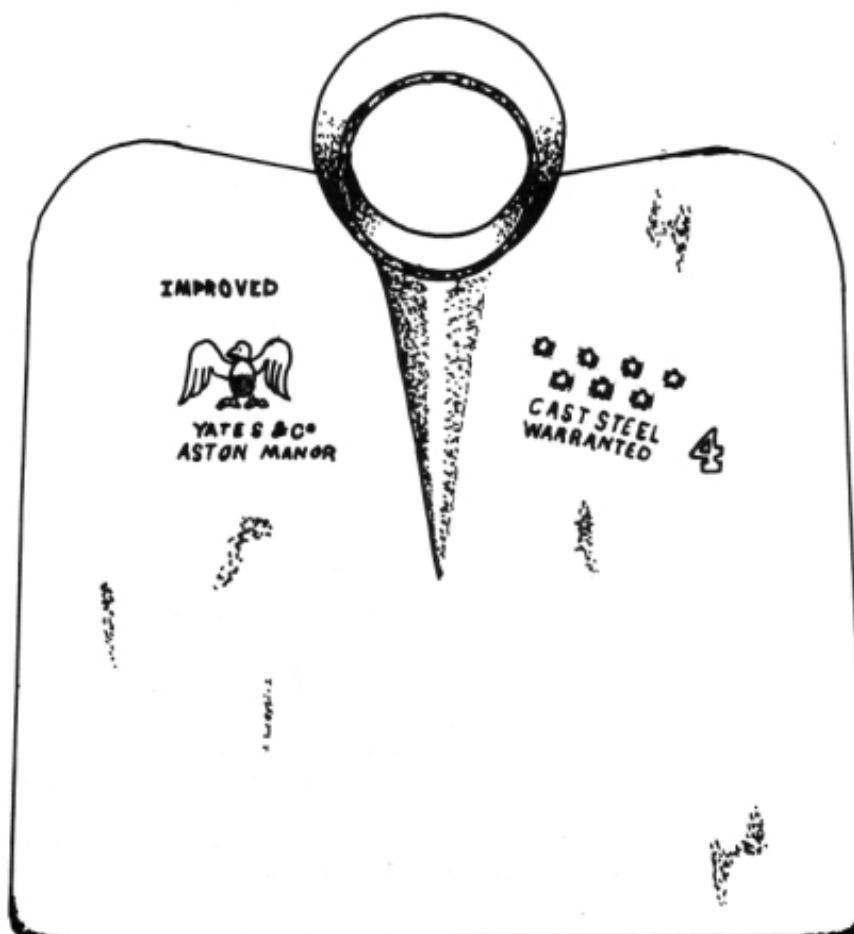
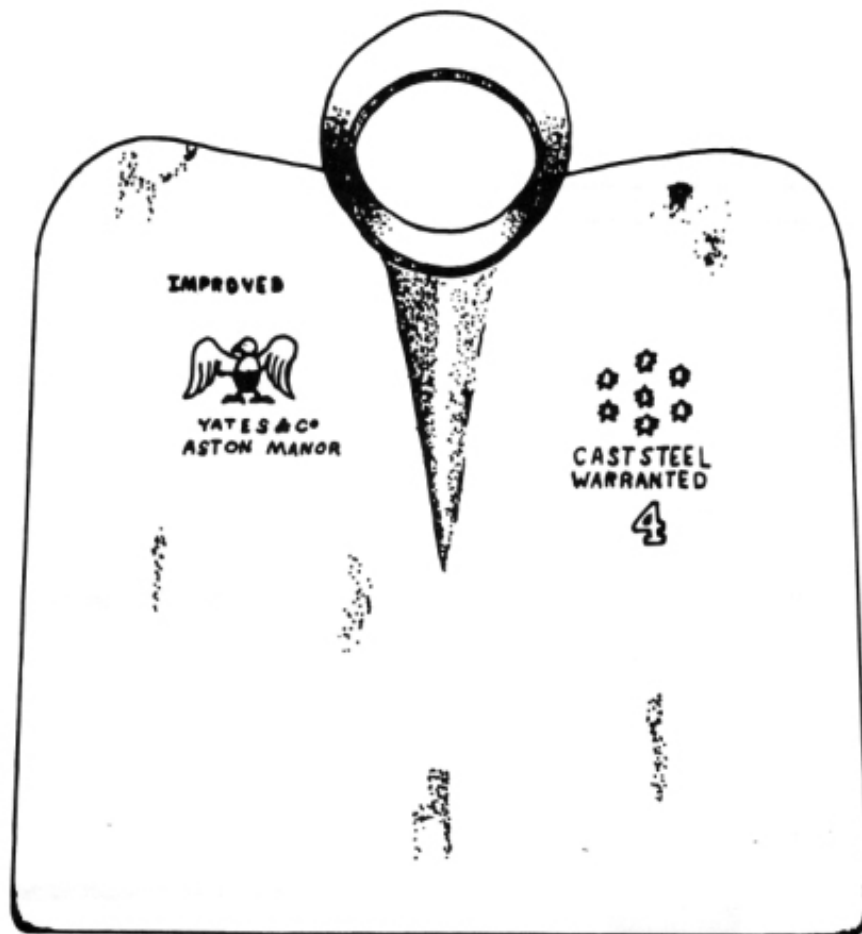


Figure 93. Hoe (Type II)
 Scale: 1/2



Article:	Knives, farrier's (MG-5T)
Recovered:	2
Size:	Length (overall) 7 1/2"
	Length (of handle) 4 3/8"
	Length (of blade) 1 1/2"
Markings:	<u>NON-XLL</u> is stamped on the blade.
Description:	The knife has a horn hilt secured to the tang by two pins. The blade curves upward and rather abruptly to the side on the forward end where it is chopped off square.
Condition:	Good

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Figure 94. Farrier's knife
Scale: 1/2



Article:	Ladles, lead (MG-I)
Recovered:	3
Size:	A -- Length 16 1/2"
	Diameter (of bowl) 3"
	B -- Length 19"
	Diameter (of bowl) 4 1/2"
	C -- Length 23"
	Diameter (of bowl) 6"
Markings:	None
Description:	The metal handles and bowls were probably constructed separately.
Condition:	Good

Figure 95. Ladles, lead
Scale: 1/4



A

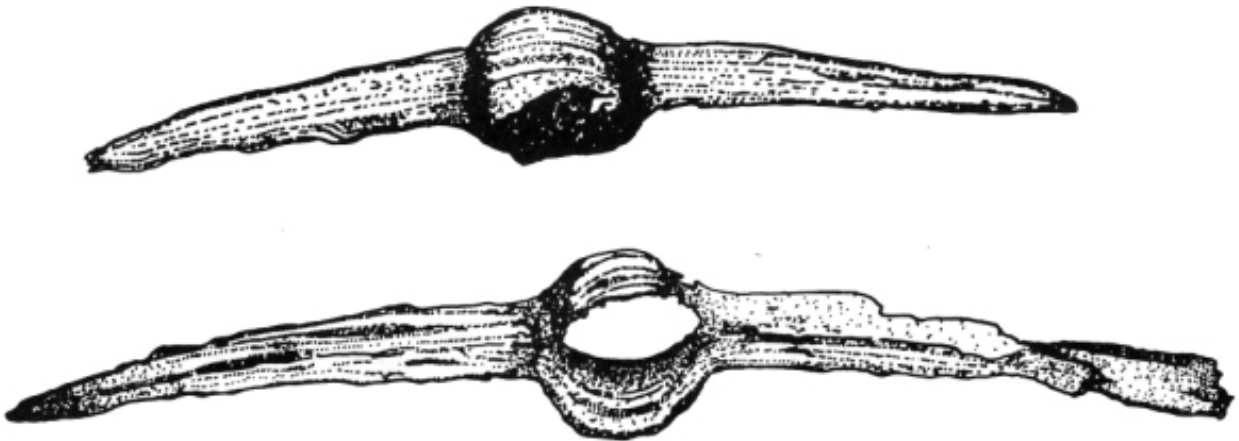


B



C

Article: Picks (MG-0)
 Recovered: 91 of two types;
 55 have mattock blade and a pick end
 36 have two pick ends
 Size: Length range (from tip to tip)
 16 1/2" to 23 1/4"
 Width range (at handle attachment)
 2 1/2" to 2 3/4"
 Maximum width (of mattock blade)
 3/4" to 2 1/4"
 Markings: None
 Description: All these ferrous picks are pitted and
 gouged. The corrosion is greatest at the
 handle attachment. The state of decompo-
 sition makes it difficult to ascertain
 the exact size of the picks.
 Condition: Fair to poor
 Figure 96. Picks
 Scale: 1/4



Article: Screwdriver (MG-4W)
 Recovered: 1
 Size: Length (overall) 12 1/4"
 Width (of point) 1/4"
 Markings: None
 Description: The wooden handle is pear shaped and flat
 on two sides. The steel blade is reason-
 ably intact.
 Condition: Good. The tip of the blade has corroded
 somewhat.

Figure 97. Screwdriver
Scale: 1/2



Article:	Spokeshaves (MG-X)
Recovered:	3
Size:	Length (overall) 10"
	Length (of blade) 3 3/4"
Markings:	None
Description:	The slot for the blade is cut at an angle to the wooden handles with a mounting screw hole on either side.
Condition:	Wood is in very good condition, but the blade has completely decomposed leaving only traces of iron oxide.

Figure 98. Spokeshave
Scale: 1/2

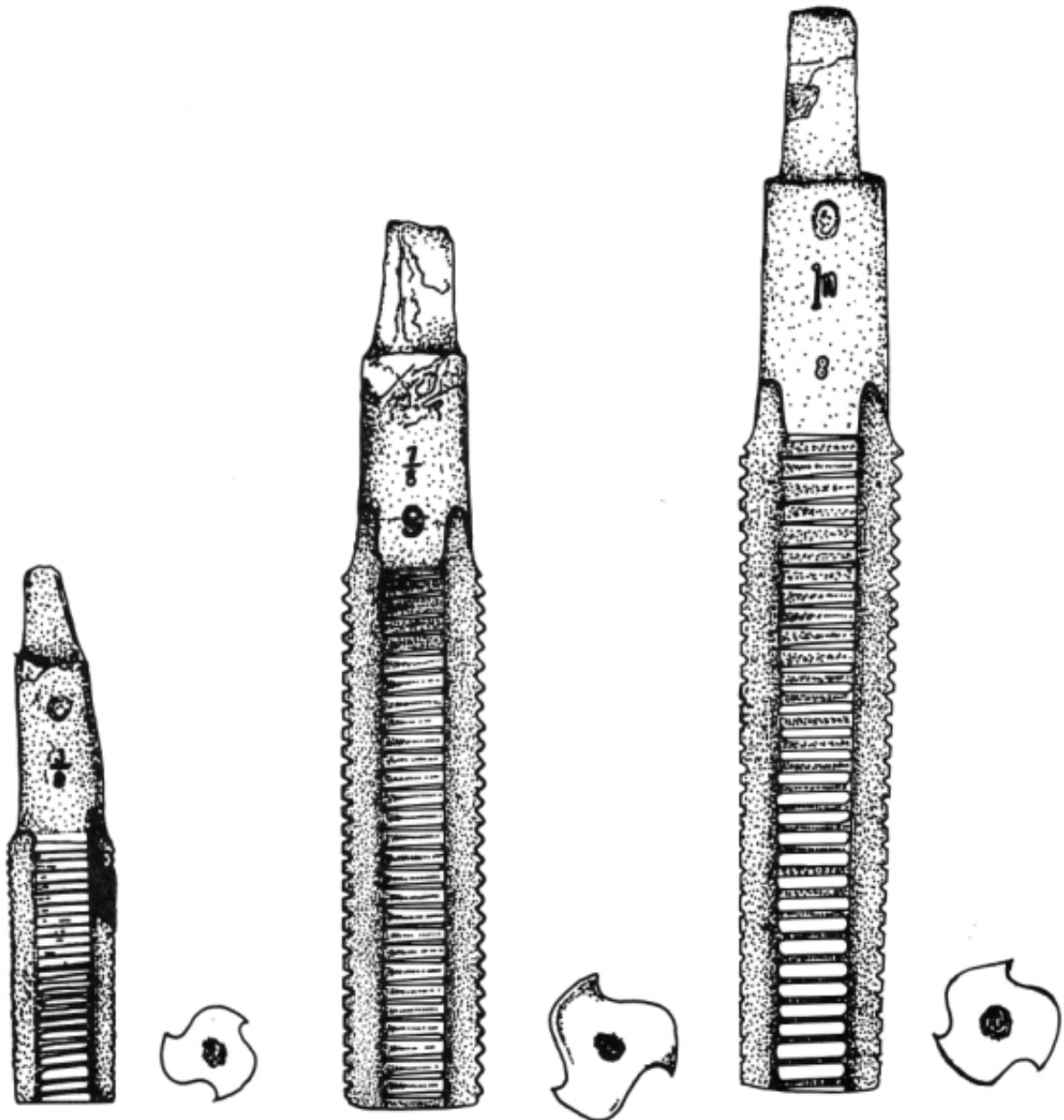


Article:	Taps, pipe (MG-T)
Recovered:	16
Size:	Diameter 1/4" to 1"
	Threads (per inch) 20 to 7
Markings:	A manufacturer's seal is present, but it is too indistinct to be read. The outside diameter and the number of threads per inch are also stamped linearly on the shank (See Figure 99).

Description: Each cast steel tap has three flutes cut across the threads and a square shank end so that it can be turned with a wrench. These taps will fit with the ratchet drills (See Figure 77). They appear to be part of a tap and die set (See Figure 76 for dies).

Condition: Good. Some are more corroded than others.

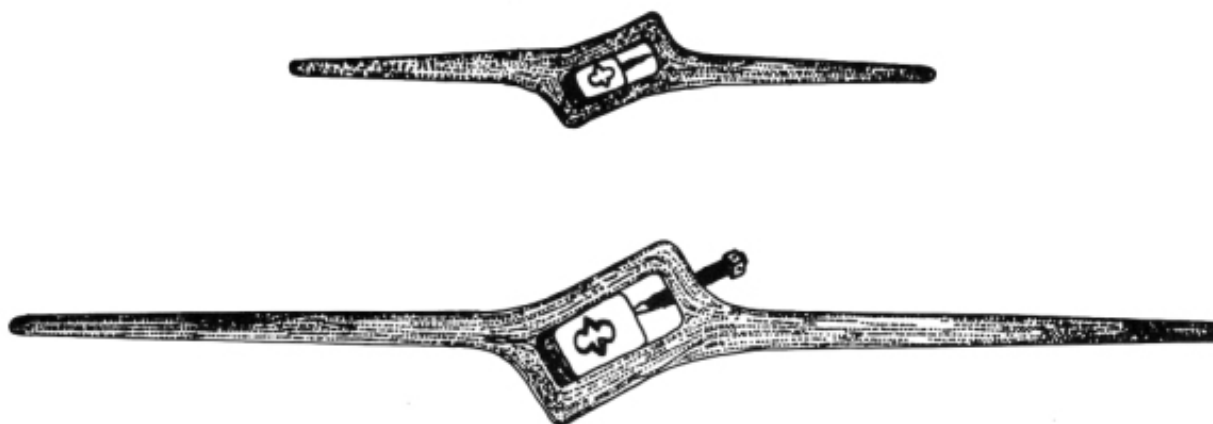
Figure 99. Taps, pipe
Full scale



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Article: Threaders, pipe (MG-N)
Recovered: 4
Size: Length range 18" to 38"
Markings: None
Description: The cast steel threaders have an adjusting screw for holding the die in place under the proper tension. Various sizes of dies could be used in each threader.
Condition: Fair. The moving parts are frozen with corrosion.

Figure 100. Threaders, pipe
Scale: 1/6



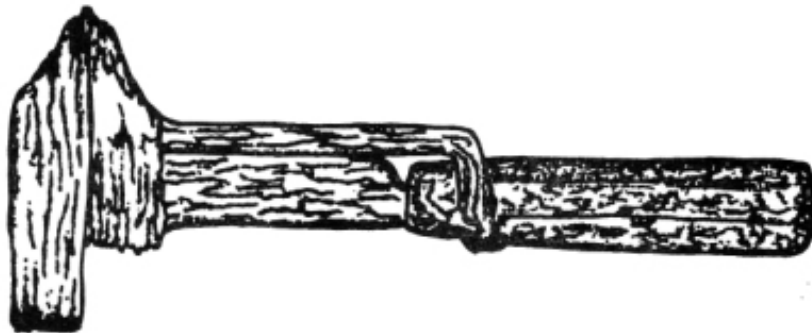
Article: Wrenches, crescent (MG-4N)
Recovered: 8
Size: Length range 12" to 18"
Markings: None
Description: The wrench is metal, and the adjusting screw is very similar to that on modern day wrenches.
Condition: Good. Deterioration has produced a grainy effect in the metal. The jaws and adjuster are inoperable due to corrosion.

Figure 101. Wrench, crescent
Scale: 1/3



Article: Wrench, hammer (MG-U)
Recovered: 1
Size: Length (overall) 8 1/8"
Width (of head) 3 1/4"
Markings: None
Condition: Deterioration has produced a grainy effect in the metal. The wrench is inoperable due to corrosion.

Figure 102. Wrench, hammer
Scale: 1/3



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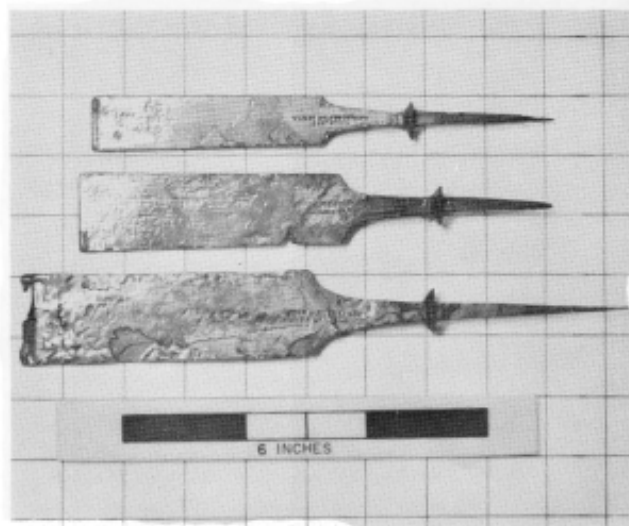
Article: Wrenches, monkey (MG-U)
Recovered: 13
Size: Length range 8" to 18"
Markings: Register Lock is on the fixed jaw.
Description: These adjustable metal wrenches have a thumb pressure release that would allow for the adjustment of the wrench and would hold the lower jaw in position.
Condition: Good. Deterioration has produced a furrowed effect in the metal. The jaws and adjuster are inoperable.

Figure 103. Wrench, monkey
Scale: 1/3





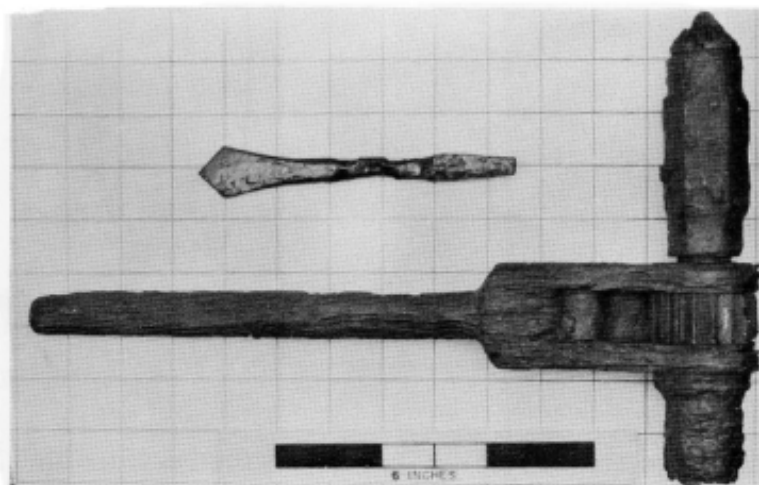
A. Figs. 69 and 88 Ax and hatchet



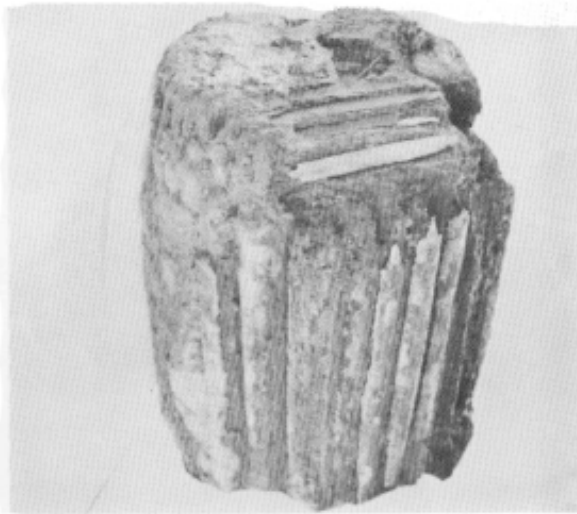
B. Figs. 72, 73, and 74 Chisels



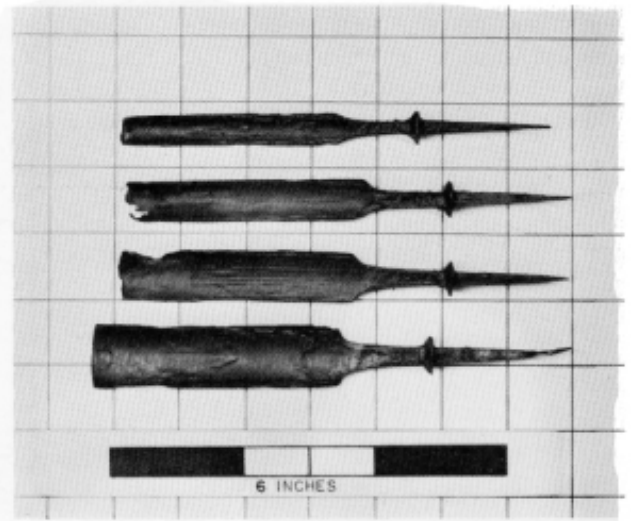
C. Figs. 76 and 99 Dies, pipe and taps, pipe



D. Fig. 77 Drill, ratchet



A. Fig. 78 Keg of files



B. Fig. 83 Wood gouges



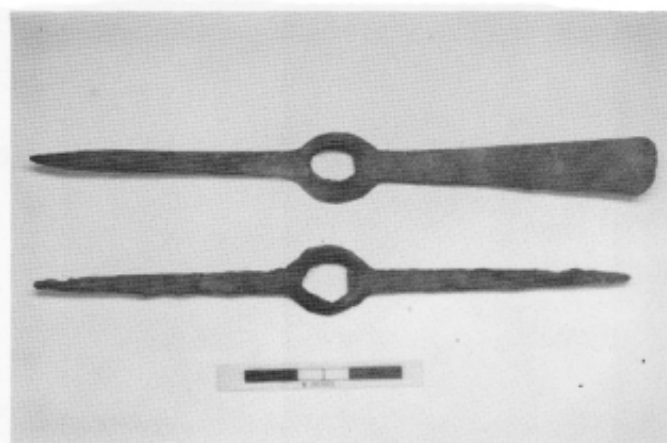
C. Fig. 85 and 86 Handles, awl and rasp



D. Fig. 93 Hoe



A. Fig. 94 Farrier's knife



B. Fig. 96 Picks



C. Fig. 97 Screwdriver



D. Figs. 101, 102, and 103 Wrenches (Three types)

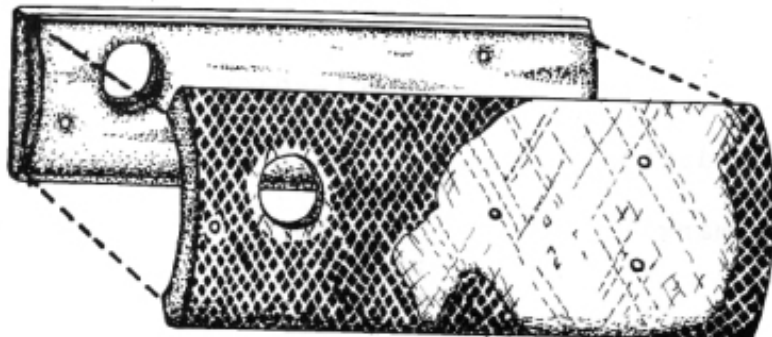
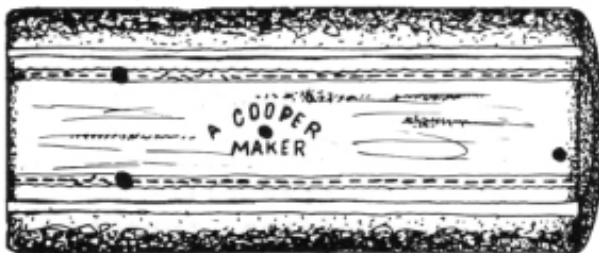
EDGED WEAPONS AND POCKETKNIVES

Article:	Bayonets, Enfield saber (MG-B)
Recovered:	55 complete 49 fragments
Size:	Length 28" Width (at guard) 4 1/2" Width (of blade at hilt) 1 1/4"
Markings:	<u>Cooper Maker</u> is stamped on the inside of the hilt on the leather portion.
Description:	The hilts are made of gutta-percha and leather. There is a deep tapering fuller on both sides of the metal blade.
Condition:	Blades are in fair condition; handles and markings are in poorer condition.
Remarks:	When the saber bayonet is affixed to the Enfield carbine, the overall length is about the same as the Enfield rifle affixed with the triangular bayonet.

Figure 104. Bayonet, Enfield saber
Scale: 1/4



Figure 105. Bayonet hilt detail
Full scale



110 Edged Weapons and Pocketknives

Article: Bayonets, Enfield triangular (MG-F)
Recovered: 93 complete
 9 fragments
Size: Length 20 1/2"
 Width 2 1/4" tapering to 1/4"
Markings: None
Description: To date no sheaths fitting these metal
 bayonets have been recovered.
Condition: The mount is more deteriorated than the
 blade.

Figure 106. Enfield triangular bayonet
Scale: 1/4

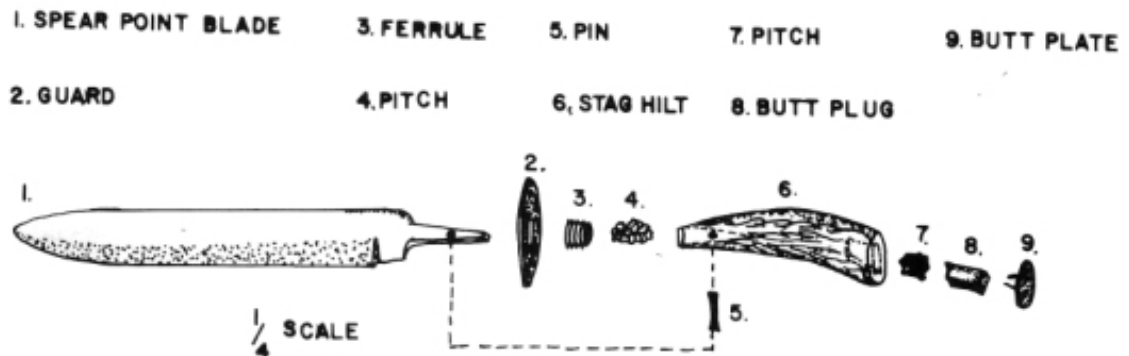


Article: Knives, bowie (MG-D)
Recovered: 107 complete
 84 blade fragments
 94 handle fragments
This information combined with the 202
sheath throats and 206 sheath tips indi-
cates that at least 200 bowie knives
were on board the MODERN GREECE.
Size: The knives vary considerably in size.
For an indication of the dimensions see
the descriptions accompanying the illus-
trated samples.
Markings: Several of the knives have maker's marks
(See Figures 112 and 131), but the major-
ity of the knives show no markings due
to deterioration.
Description: The majority of the bowie knives have
clipped points and solid stag hilts with
various designs of butt plates, ferrules,
and guards. Many knives were found
concreted with sand and shell. Several
very thin brass u-shaped ribs were found
in cleaning, which had apparently fallen
off the backs of some of the blades.
Condition: Varies from very good to poor and frag-
 mentary.
Remarks: Samples of all the various characteristics
occurring in the bowie knives are illus-
trated. The knives are divided into two
groups: (1) those with solid hilts and
(2) those with two piece hilts.

I. Bowie knives with solid hilts.

Knives with solid hilts were usually of stag horn and were held together with the blade tang being pressed into the hollowed horn which had been filled with either pine pitch or resin. A single steel pin was inserted through the hilt and tang to hold them together. Butt plates were assembled by placing a piece of wood into the hollowed out rear of the hilt. This was held in place by more pitch or resin. Finally, the butt plate containing at least two brass pins was pressed into the wood and secured flush against the hilt (Unless otherwise noted, all bowie knife illustrations are 1/2 scale).

Figure 107. Reconstructed assembly of a spear point bowie knife with one piece handle.
Scale: 1/4



Examples of bowie knives with solid hilts.

Figure 108. Solid stag hilt. The spear is badly deteriorated and was probably 2" longer than its present 6 1/8". The extreme width of the blade is 1 1/8".

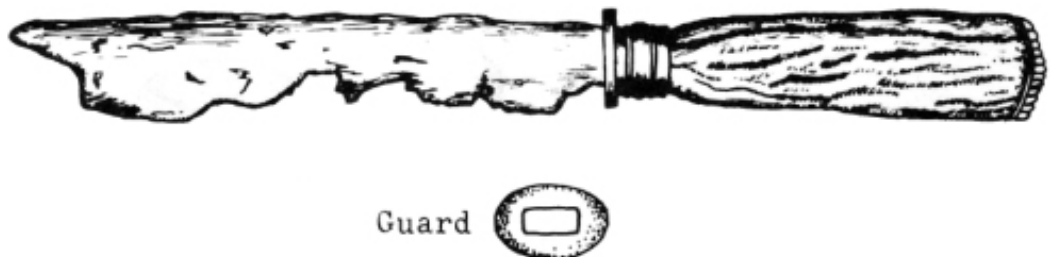


Figure 109.

This bowie knife has a swirl designed hard gutta-percha hilt. The rear of the hilt has very fine screw threads; whereby, the now missing butt plate was probably fitted. The guard and ferrule are brass, and the clipped point blade is $8 \frac{9}{16}$ " long and $1 \frac{3}{16}$ " wide.

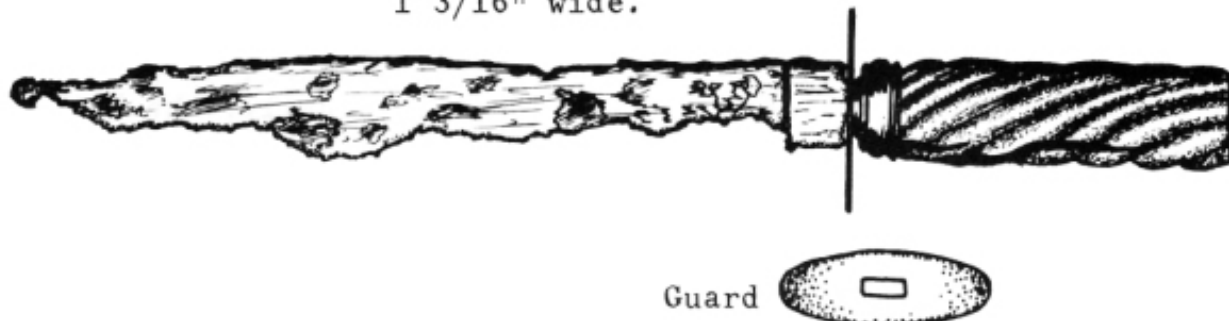


Figure 110.

Only one bowie knife with this type of decorative German silver hilt and brass guard was recovered. The clipped point blade is $6 \frac{3}{8}$ " long and $1 \frac{1}{8}$ " wide.

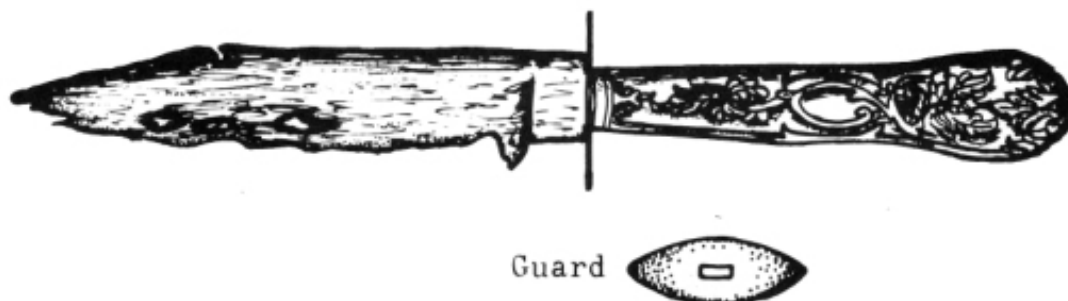


Figure 111.

Only one knife with this type of raised decorative German silver hilt and guard was recovered. The clipped point blade is 6" long and $1 \frac{1}{8}$ " wide.

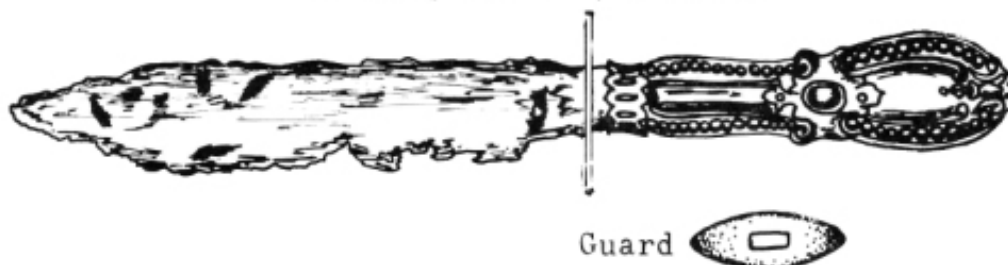


Figure 112.

Solid stag hilt. Guard, ferrule, and butt plate are brass. Clipped point blade is 7" long and 1 1/4" wide. Only part of the marking, which now reads Fabr/De/Angostura, is visible.



Guard



Figure 113.

Solid stag hilt. The oval butt plate, guard, and ferrule are brass. The clipped point blade measures 6" long and 1" wide.

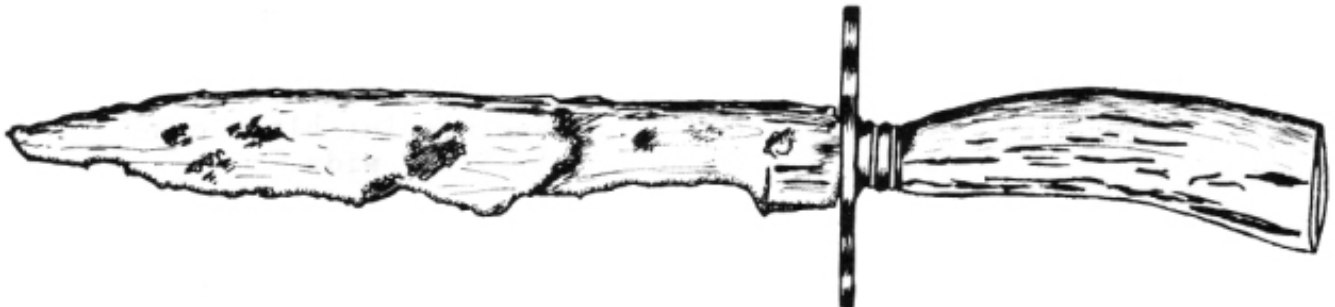


Guard



Figure 114.

Solid stag hilt. Guard, butt plate, and ferrule are brass. Spear point blade measures 8 1/4" long and 1" wide.



Guard



Figure 115.

Five knives of this type with decorative scroll work on the German silver hilt and guard were recovered. The hilt was cast in one piece in a rosin or pitch cored two piece mold. The clipped point blade is now $5 \frac{9}{16}$ " long and 1" wide, but it may originally have been $1 \frac{1}{2}$ " longer.



Guard



Figure 116.

Solid stag hilt. Butt plate, guard, and ferrule are brass. Spear point blade measures $7 \frac{5}{16}$ " long and 1" wide.



Guard



Figure 117.

Solid stag hilt. Butt plate, guard, and ferrule are brass. Spear point blade measures $7 \frac{3}{8}$ " long and $\frac{15}{16}$ " wide.



Guard



Figure 118. Solid stag hilt. Butt plate, guard, and ferrule are brass. Spear point blade measures $7 \frac{1}{4}$ " long and $\frac{15}{16}$ " wide.

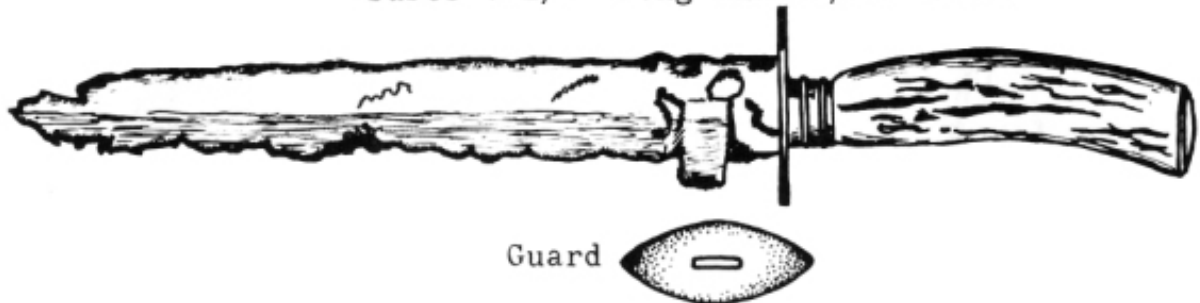
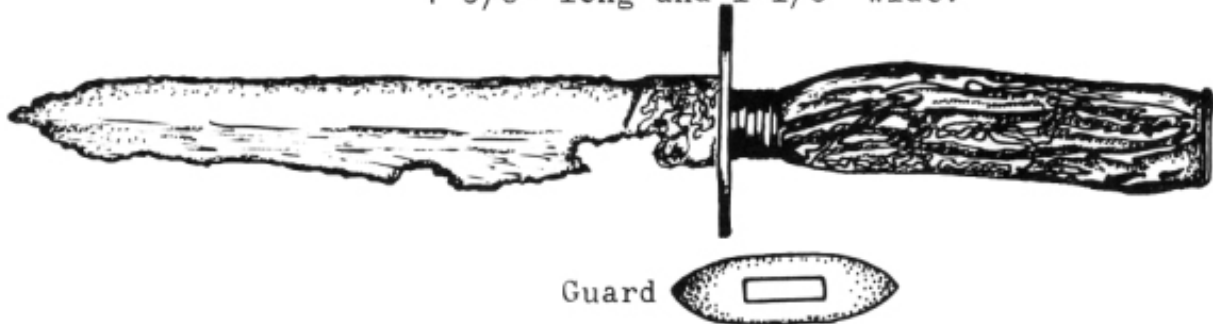


Figure 119. Solid stag hilt. Butt plate, guard, and ferrule are brass. Spear blade measures $7 \frac{5}{8}$ " long and $1 \frac{1}{8}$ " wide.



Remarks: Because of their large size, the next three knives are illustrated vertically on the following page.

Figure 120. Bowie knife with a solid stag hilt. The guard, ferrule, and butt plate are brass. The spear point blade measures $10 \frac{1}{4}$ " long and $1 \frac{3}{8}$ " wide.

Figure 121. Solid stag hilt. The guard, ferrule, and butt plate are brass. The clipped point blade is $10 \frac{7}{16}$ " long and $1 \frac{3}{8}$ " wide.

Figure 122. Bowie knife with a half horse-half dragon motif partially encircled by a floral design all in relief on the German silver pommel. Traces of mother-of-pearl were originally observed forward of the motif on the hilt. However, these were lost during cleaning. The spear point blade which is double edged to the guard is $9 \frac{3}{4}$ " long and $1 \frac{9}{16}$ " wide.

Figure 120.



Figure 121.

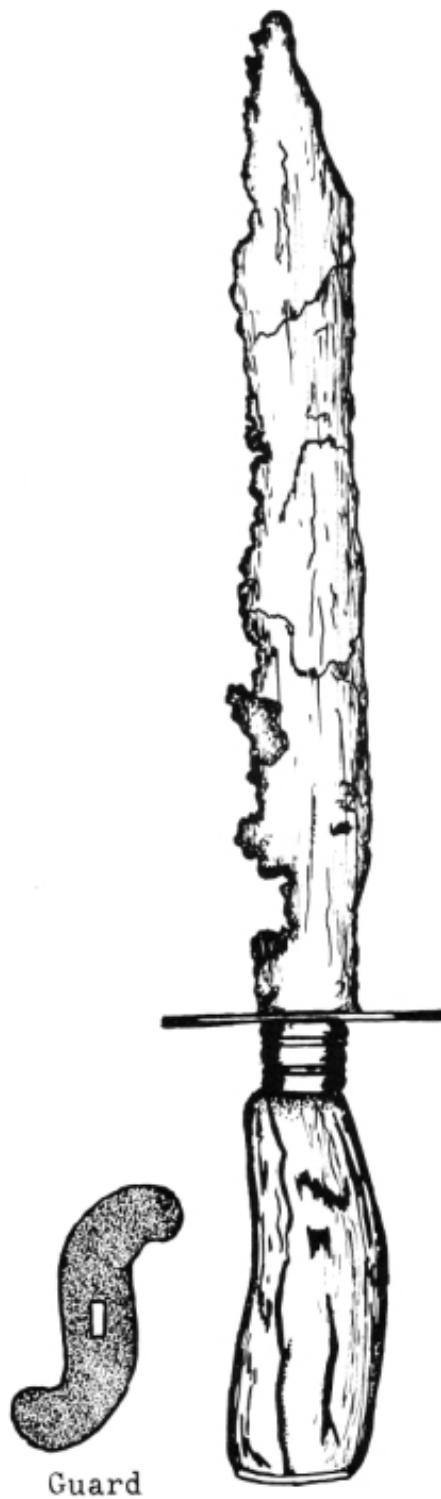


Figure 122.



II. Bowie knives with two piece hilts.
The two piece hilts were held together only
by steel or brass pins.

Figure 123. Reconstructed assembly of a clipped point
bowie knife with a two piece hilt.
Scale: $\frac{1}{4}$

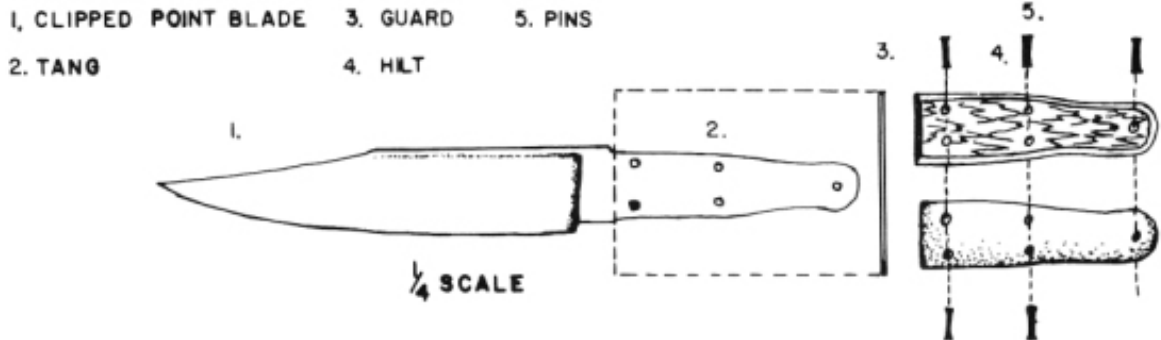


Figure 124. Stag hilt. The guard and five tang pins
are brass. The clipped point blade mea-
sures $8 \frac{1}{4}$ " long and $1 \frac{3}{8}$ " wide.

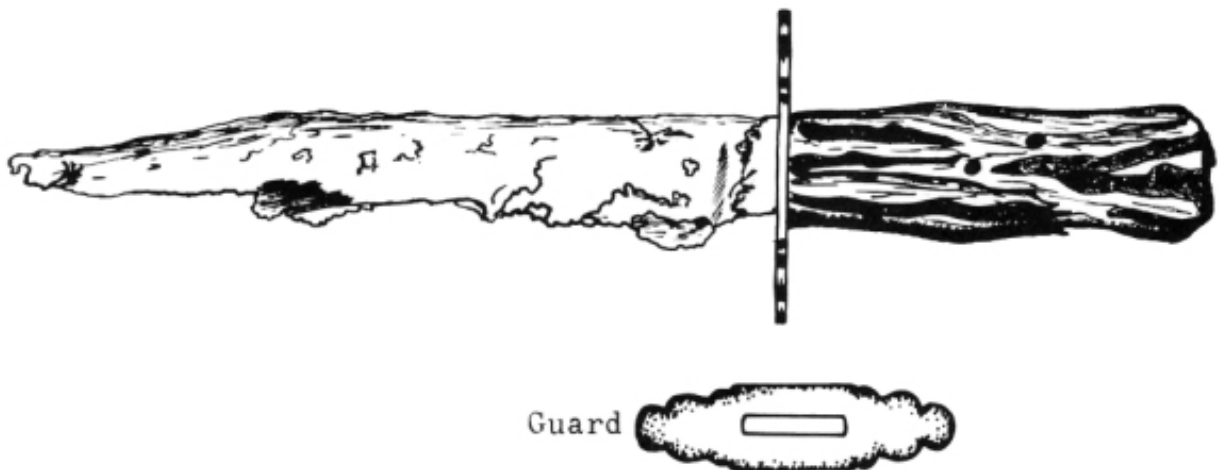


Figure 125. Stag hilt. Guard and escutcheon plate are
brass. Five tang pins secure the $7 \frac{3}{16}$ "
long and $1 \frac{1}{16}$ " wide spear point blade.

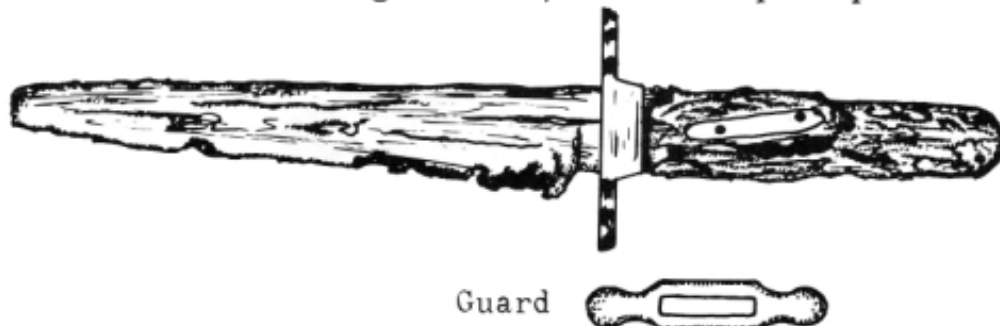


Figure 126. Stag hilt. Guard and escutcheon plate are brass. Four tang pins secure the $7 \frac{3}{16}$ " long and $\frac{1}{16}$ " wide clipped point blade.

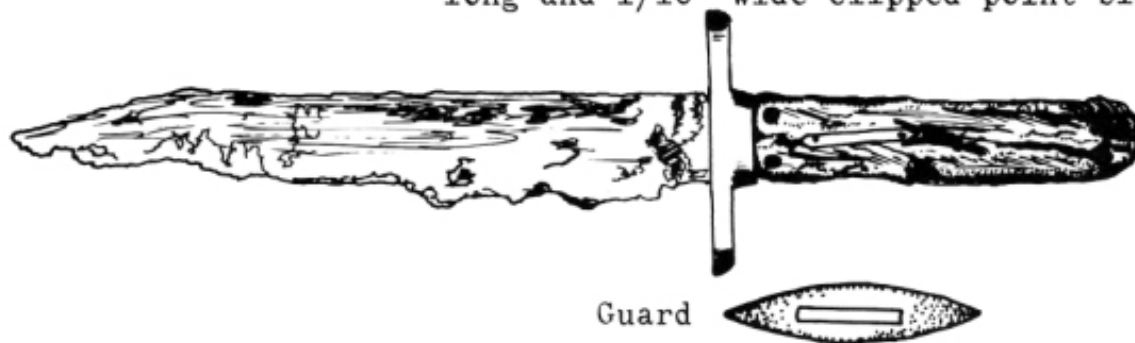


Figure 127. Stag hilt. Guard and escutcheon plate are brass. Five tang pins secure the $8 \frac{7}{8}$ " long and $\frac{1}{16}$ " wide spear point blade.

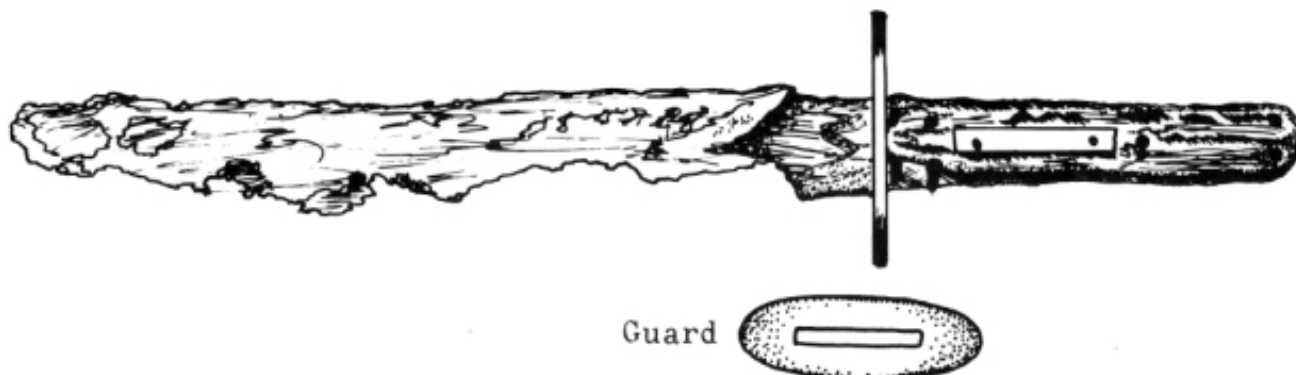


Figure 128. Stag hilt. Guard and escutcheon plate are brass. Five tang pins secure the $8 \frac{3}{16}$ " long and $1 \frac{1}{4}$ " wide clipped point blade.

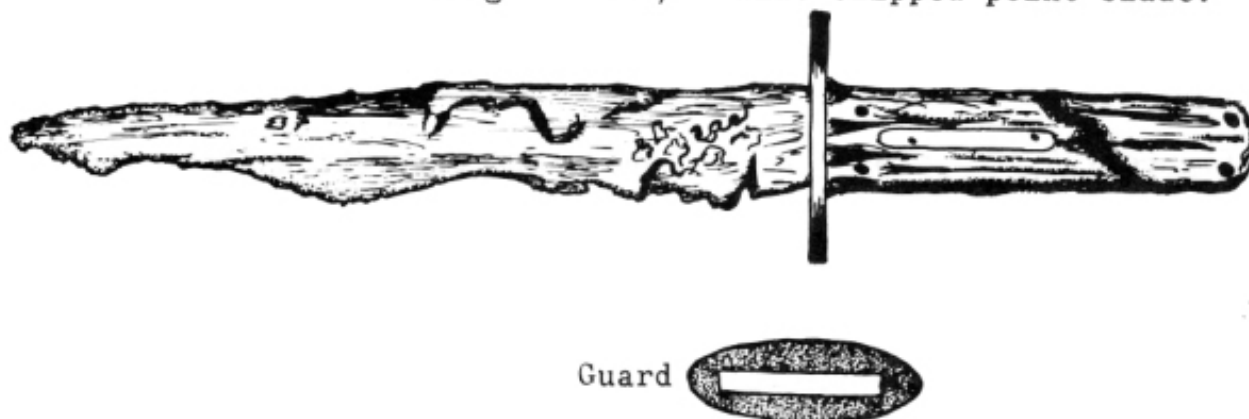


Figure 129.

Stag hilt. Guard and escutcheon plate are brass. Five tang pins secure the $8 \frac{1}{8}$ " long and $1 \frac{1}{2}$ " wide spear point blade.



Guard

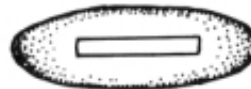


Figure 130.

Stag hilt. Butt plate, guard, and ferrule are brass. Five tang pins secure the $8 \frac{1}{8}$ " long and $1 \frac{5}{16}$ " wide clipped point blade.



Guard

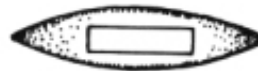


Figure 131.

The hilt is missing on this clipped point bowie knife made without a guard. Overall it is $13 \frac{3}{8}$ " long and $1 \frac{1}{4}$ " wide. The letters Llode Non are visible in the middle of the knife. These appear to be part of a maker's mark.



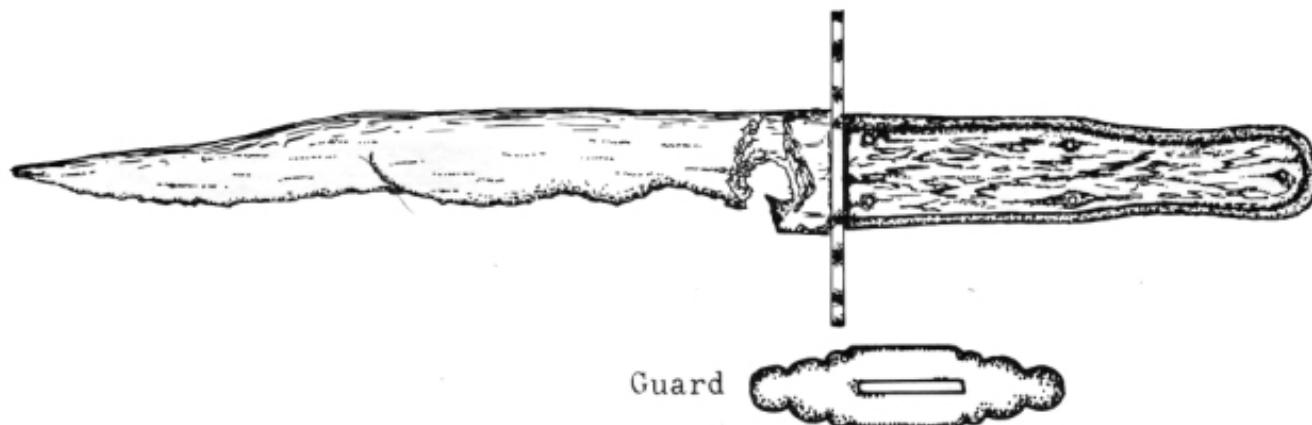
Figure 132.

The wooden hilt with no guard is secured to the tang with four pins, two of which have brass washers on them. The clipped point blade is $8 \frac{5}{16}$ " long and $1 \frac{7}{8}$ " wide.



Figure 133.

There are nine bowie knives from the MODERN GREECE with ebony hilts, decoratively shaped brass guards, and clipped point blades 9" long and $1 \frac{1}{16}$ " wide. The detail shows a reconstruction of the blade outline.



Reconstruction of blade outline

Article:	Pikes (MG-L)
Recovered:	4
Size:	Length 14"
	Maximum width (of blade) 2"
	Maximum width (of handle) 1 1/2"
Markings:	None
Description:	A thin sheet of leather was wrapped around the front end of the wooden handle, and then it was twisted into the tapered head socket of the spear shaped double-edged blade (See Figure 134 for details of the assembly). This handle and blade arrangement allowed for interchangeable handles. Equipped with the short hand sized handle, it formed an excellent throwing knife; with a long shaft it formed a pike or lance.
Condition:	Good. The metal blade has deteriorated somewhat.

Figure 134. Reconstruction of pike assembly
Scale: 1/4

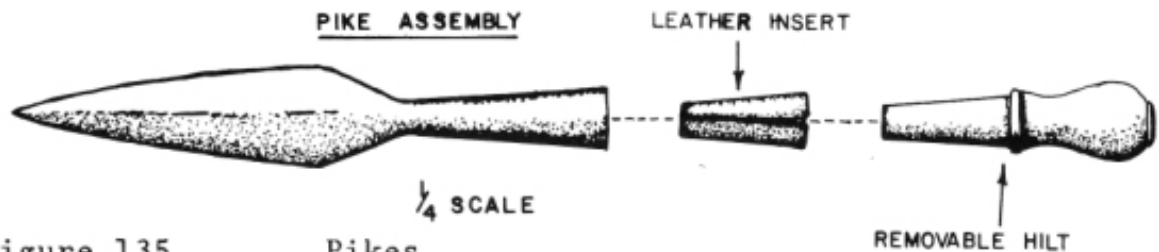
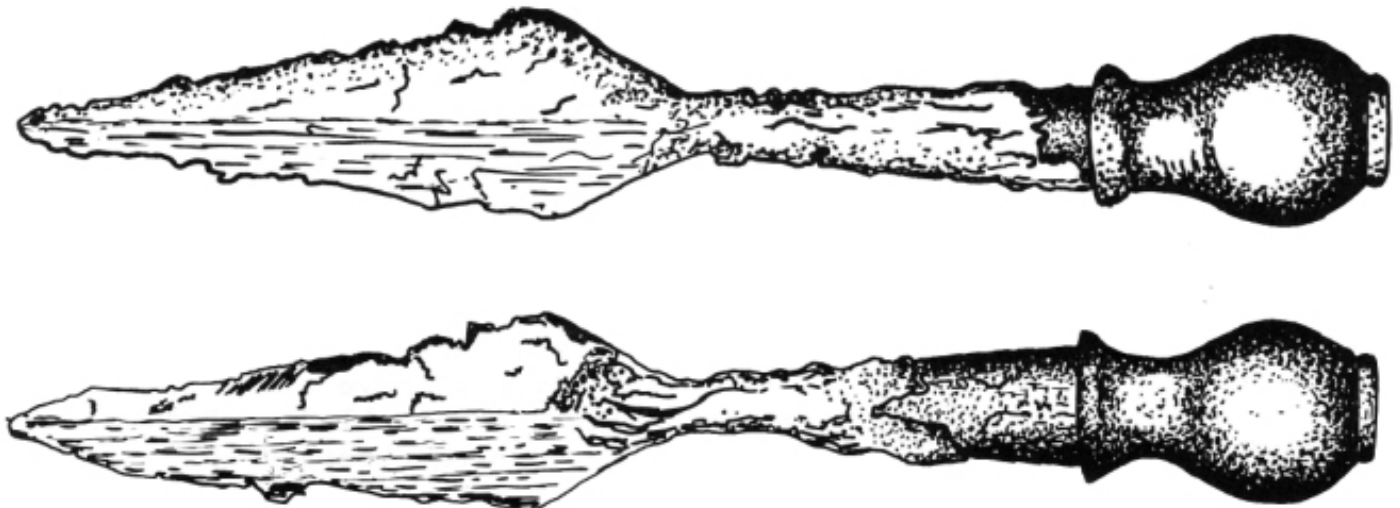


Figure 135. Pikes
Scale: 1/2



122 Edged Weapons and Pocketknives

Article: Pocketknives (MG-4V)

Recovered: 732 total arranged as follows:

39 Type I
 25 Type II
 35 Type III
 63 Type IV
 18 Type V
 20 Type VI
 8 Type VII
 36 Type VIII
 85 Type IX
 252 Type X
 146 Type XI
 1 Type XII (handle only)
 4 too deteriorated to ascertain type.

Size:

Type I	Length	4 "
	Width	15/16"
Type II	Length	4 3/8 "
	Width	15/16"
Type III	Length	3 1/2 "
	Width	7/8 "
Type IV	Length	3 1/4 "
	Width	7/8 "
Type V	Length	4 7/16"
	Width	11/16"
Type VI	Length	4 5/8 "
	Width	11/16"
Type VII	Length	3 1/2 "
	Width	1/2 "
Type VIII	Length	3 9/16"
	Width	9/16"
Type IX	Length	4 3/4 "
	Width	3/4 "
Type X	Length	4 3/4 "
	Width	5/8 "
Type XI	Length	3 3/4 "
	Width	1/2 "
Type XII	Length	3 "
	Width	3 9/16"

Markings:

Four different maker's marks appear on the knives. Types II and III have J.K. Turner and Co., Sheffield on the small blades. Types IX, X, and XI have the words Strike Fire on the blade. Type VI have either Cast Steel or Warrantd on the blade. Both kinds of markings have been observed on this one type of knife.

Description:

Twelve different types of pocketknives have been recovered from the MODERN GREECE. Originally these pocketknives were packed in groups of 6 or 12, two rows with three knives in each or three rows with four knives in each (See Figure 136), and then wrapped in paper. The knives were found concreted in bundles which show how they were packed. All the knives are similar in design with either one or two blades. The two bladed knives, Types I, II, III, VII, and VIII have a large blade combined with a small thin sharp blade. Types IV, V, VI, IX, X, and XI have simply a single large blade. No blade has been recovered which fits with the Type XII handle. Types I, II, and III have antler hilts; all others are gutta-percha. For the most part the knives are unadorned. Types I, II, III, IV, and VIII are decorated with simple brass escutcheon plates. The brass ends on the Type VI knife are more ornate than on any of the others.

Condition: Fair. The handles have deteriorated, but will hold together when left undisturbed. The brass parts of the knives are in excellent condition.

Figure 136.

Bundle of pocketknives
Full scale

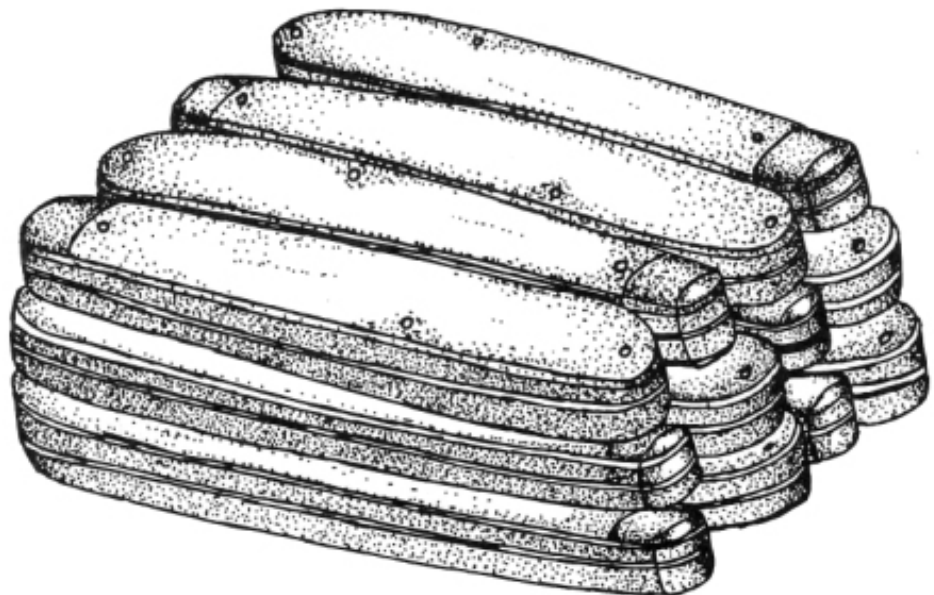


Figure 137. Pocketknives
Full scale

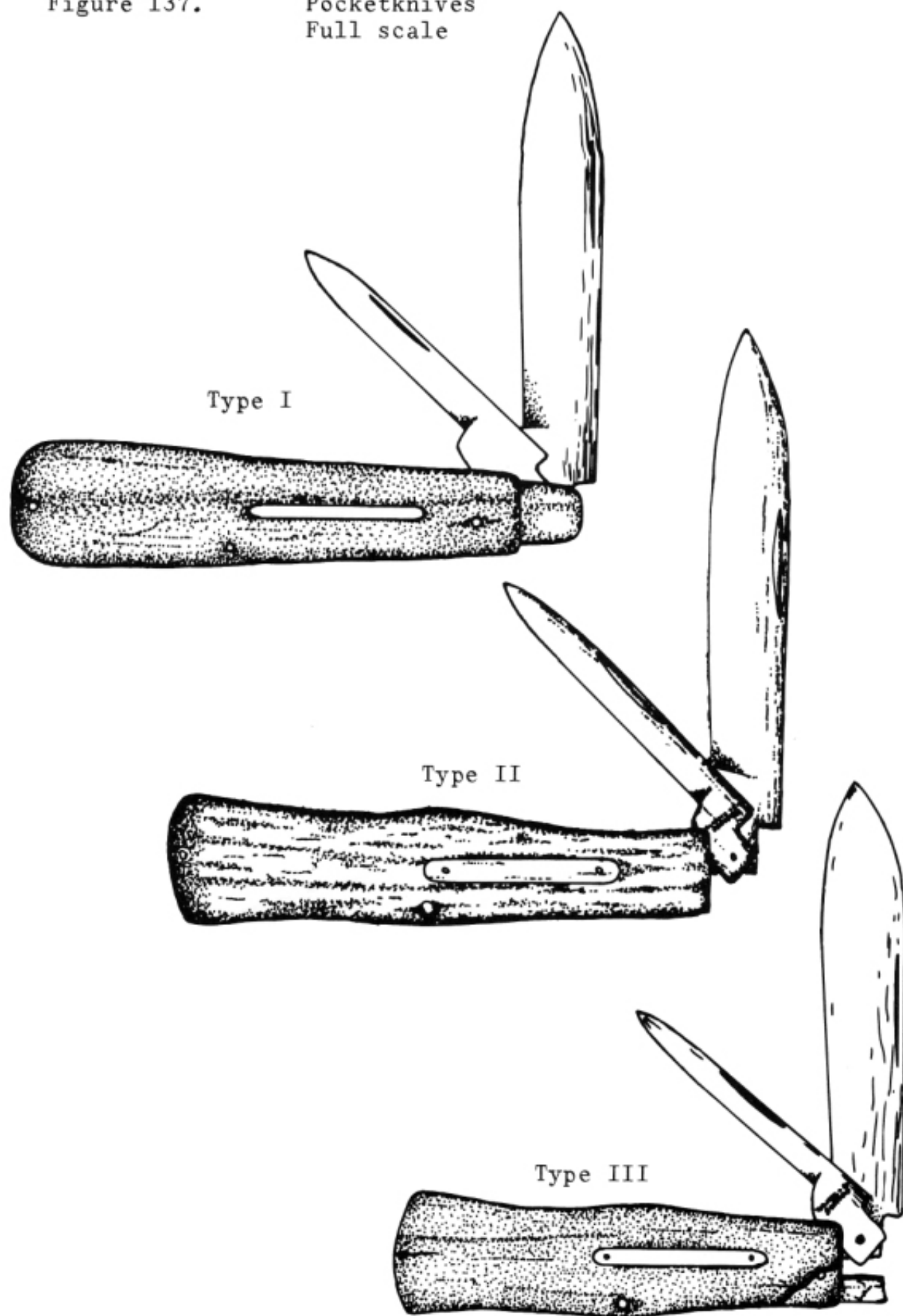


Figure 137. (continued)

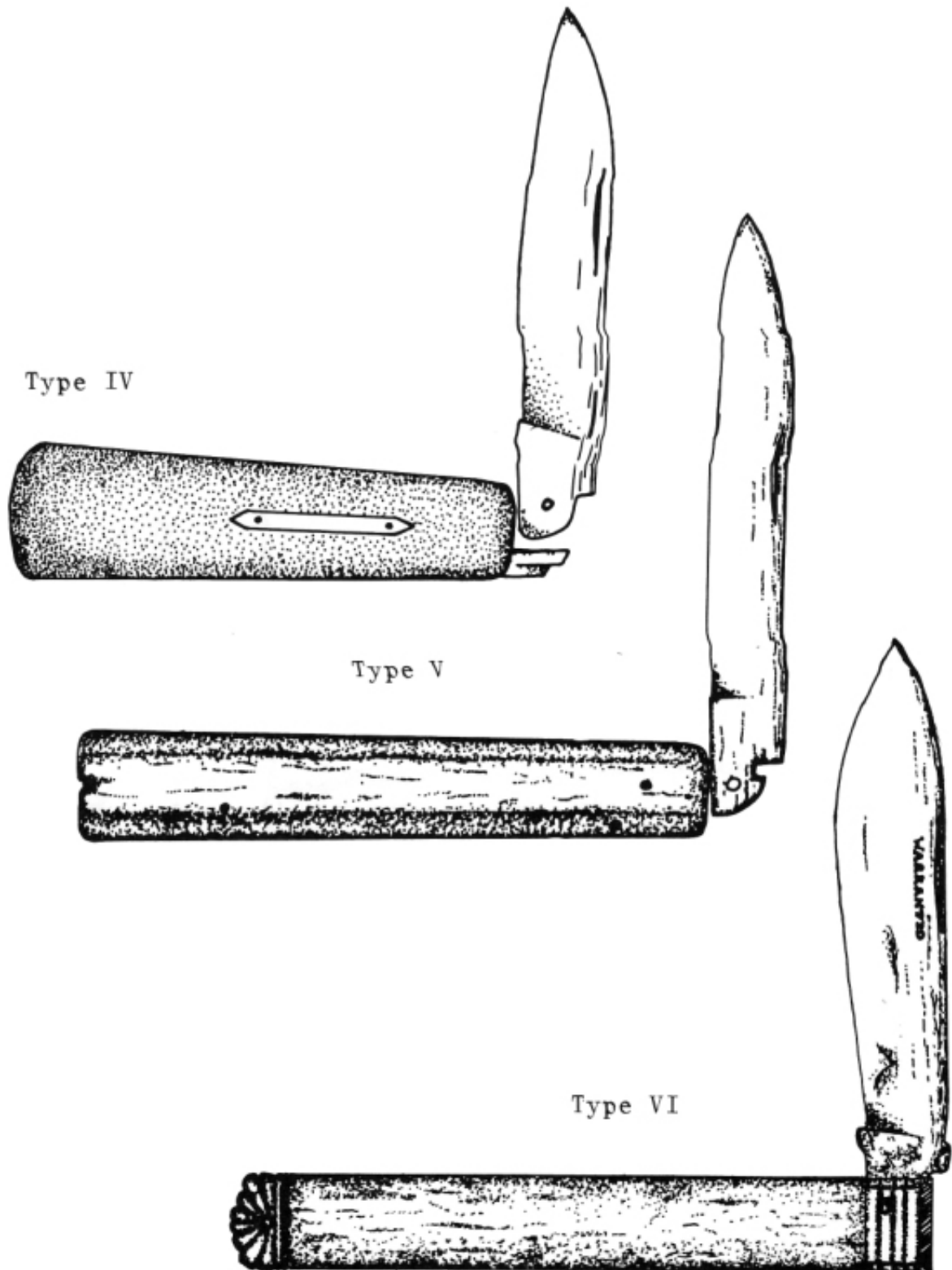


Figure 137. (continued)

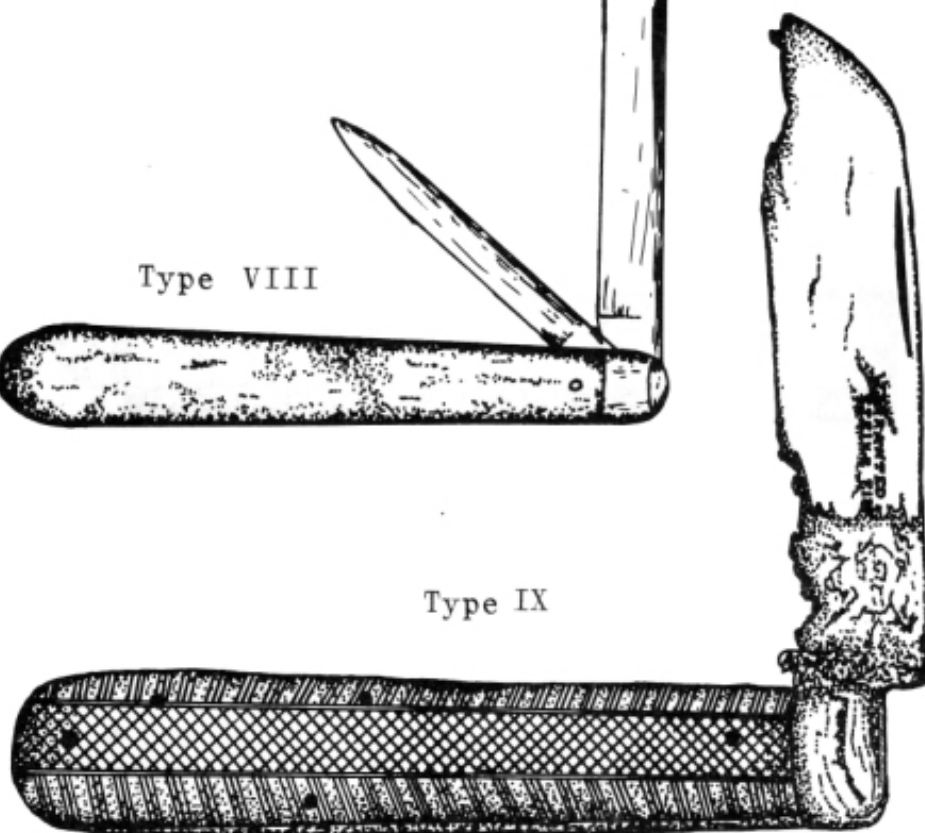
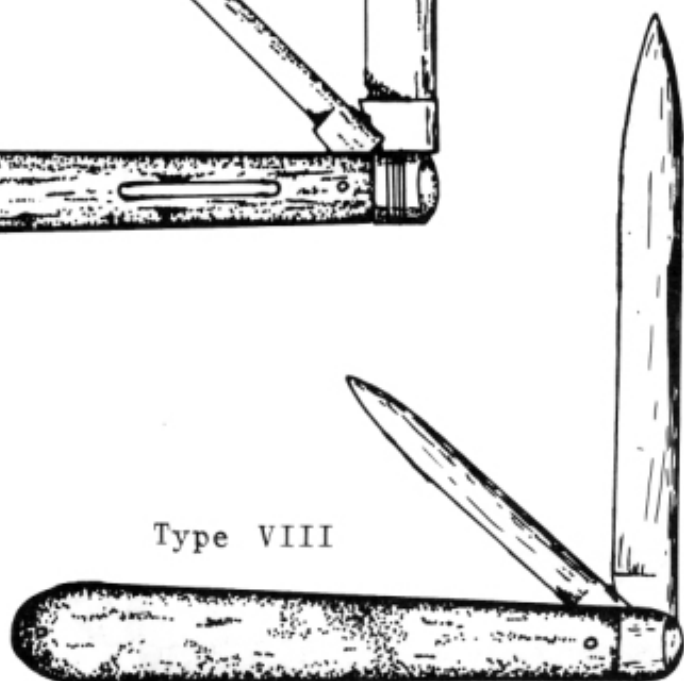
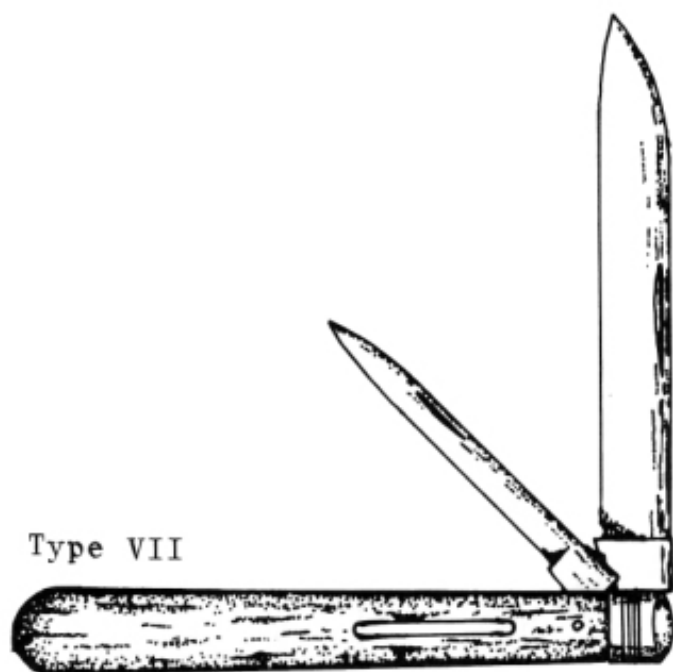
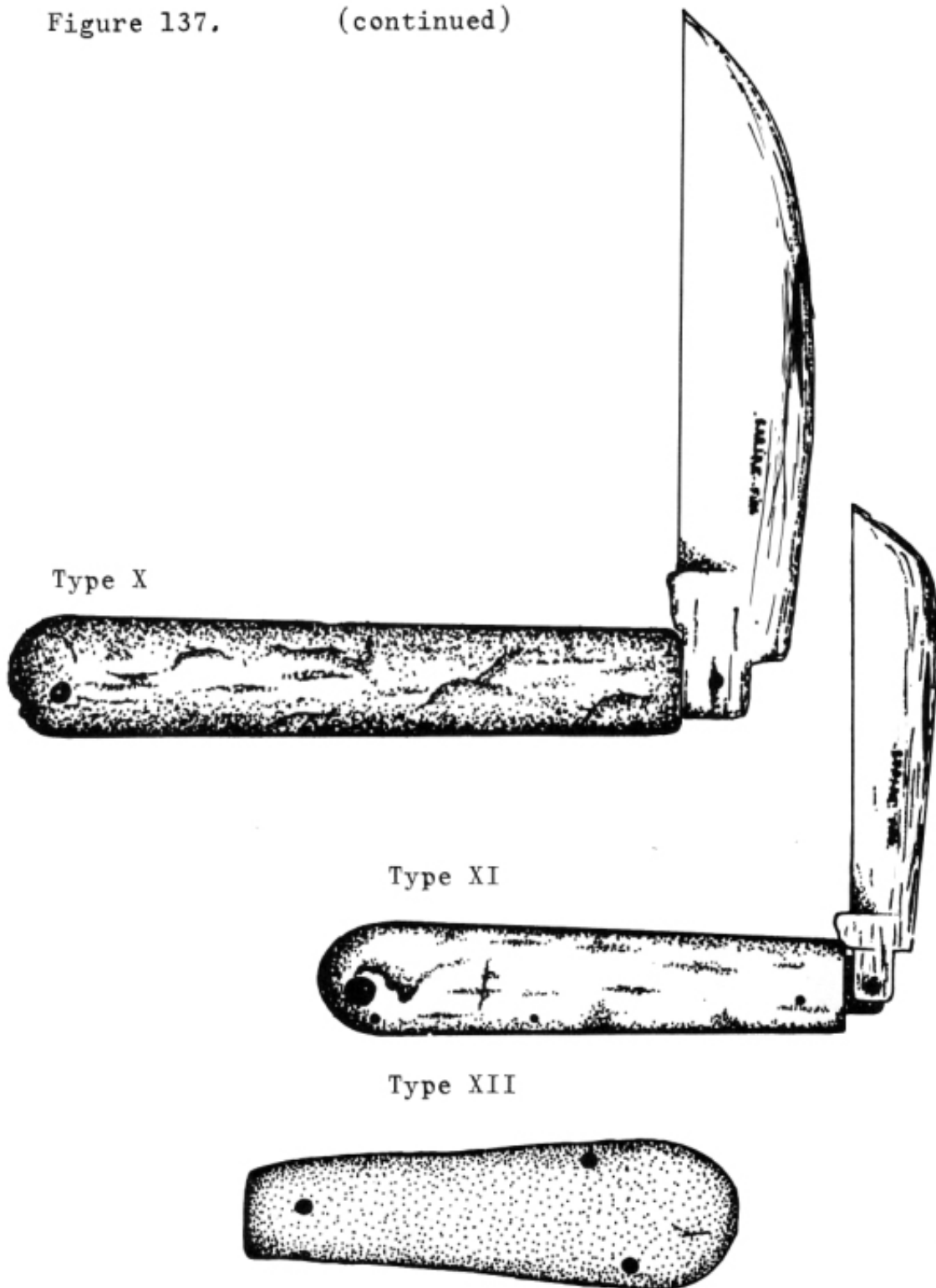


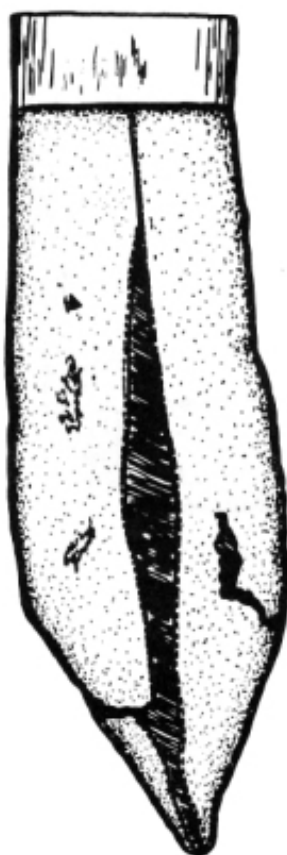
Figure 137. (continued)



128 Edged Weapons and Pocketknives

Article: Sheath, bowie knife (MG-E)
Recovered: 1 intact. Numerous others were lost due to decomposition of the leather.
Size: Length 9"
Maximum width 2 1/2"
Markings: None
Description: The leather sheath has a seam sewn the entire length on one side. No tip was found on this sheath. Other sheath tips and throats have small traces of leather remaining in them.
Condition: Good

Figure 138. Sheath, bowie knife
Scale: 1/2



Front



Back

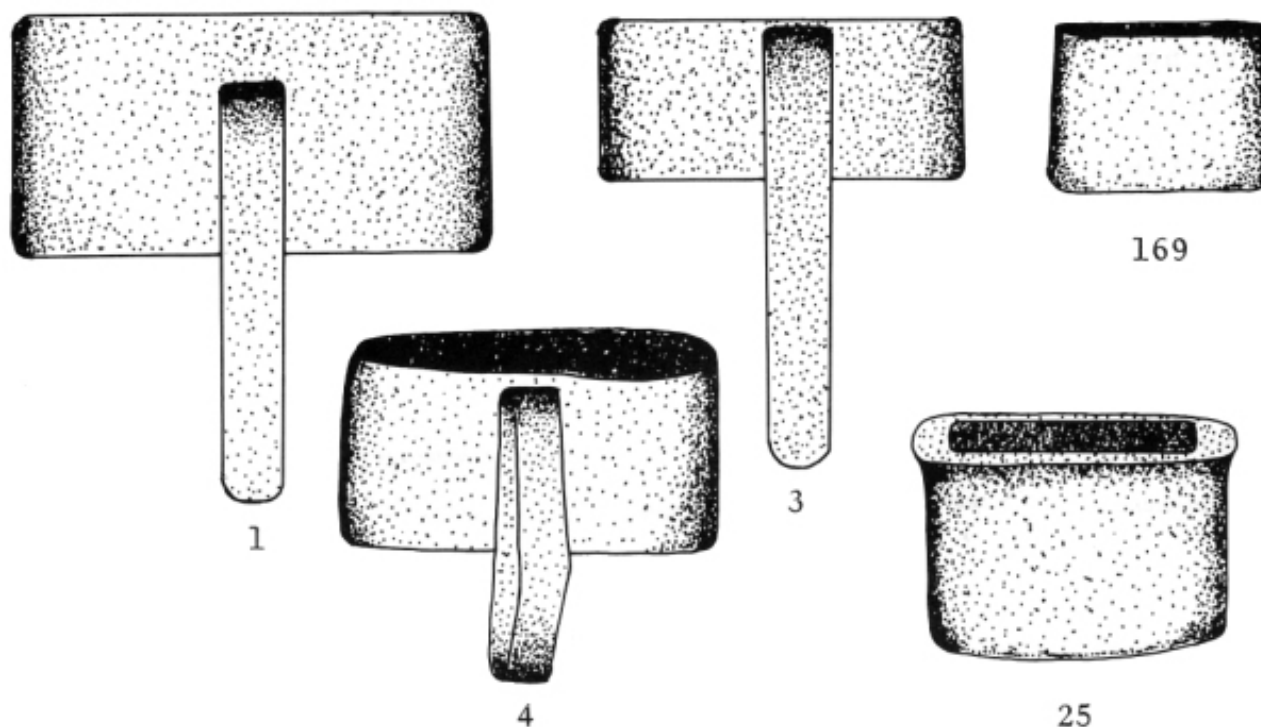
Article: Sheath, Enfield saber bayonet (MG-C)
 Recovered: 74
 Size: Length 24"
 Width 1 1/2" tapering to 7/8"
 Markings: None
 Description: Leather sheaths have ferrous throats and tips.
 Condition: Good

Figure 139. Sheath, Enfield saber bayonet
 Scale: 1/4



Article: Throats, bowie knife sheath (MG-D)
 Recovered: 202
 Size: Individual measurements vary slightly; therefore, rather than give 202 different sets of specifications the types of throats found in the cargo of the MODERN GREECE are illustrated below. The numbers accompanying the illustrations indicate how many of each type were recovered (See Figure 140).
 Markings: None
 Description: The composition of the sheath tips and throats was analyzed, and they were found to be German silver. See Appendix II for full details of the findings.
 Condition: Good. Several of the throats still have leather in them.

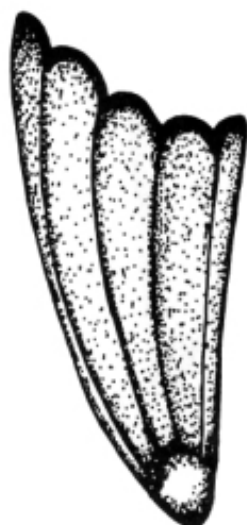
Figure 140. Throats, bowie knife sheath



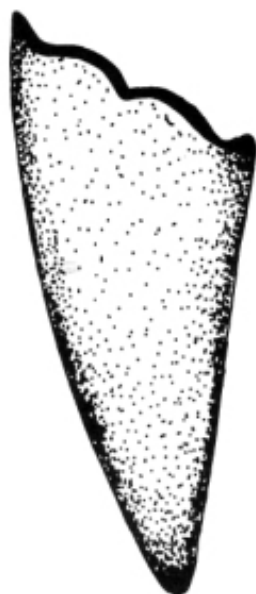
Article:	Tips, bowie knife sheath (MG-D)
Recovered:	206
Size:	Measurements vary according to the type of tip. The 17 different types of sheath tips that were found in the cargo of the MODERN GREECE are illustrated below. Each is illustrated full scale, and the numbers alongside indicate how many of each type were recovered (See Figure 141).
Markings:	None
Description:	The composition of the sheath tips and throats was analyzed, and they were found to be German silver. See Appendix II for full details of the findings.
Condition:	Good. Several of the tips still have leather in them.

Figure 141.

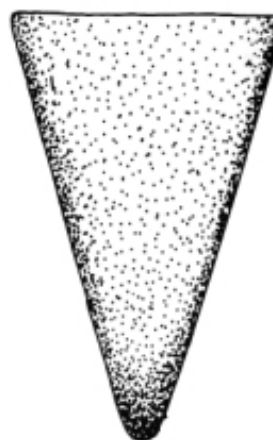
Tips, bowie knife sheath
Full scale



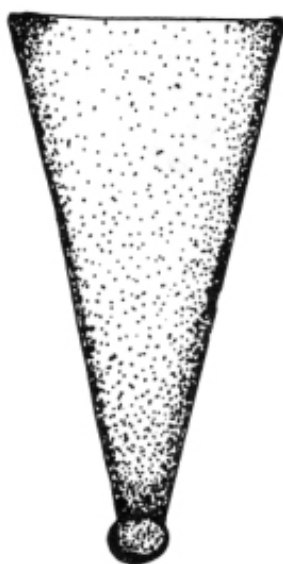
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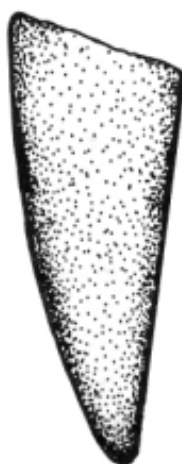
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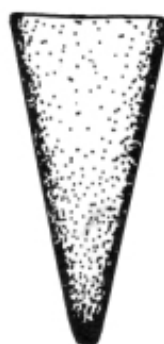
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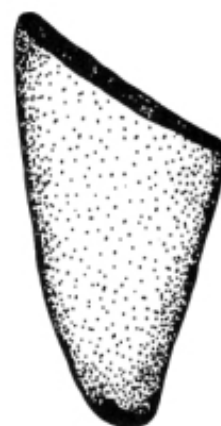
2



4

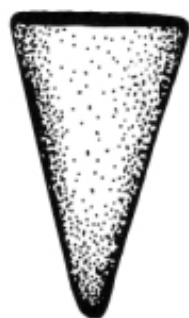


6

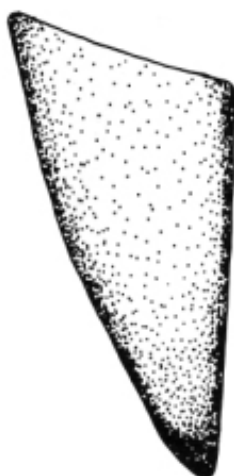


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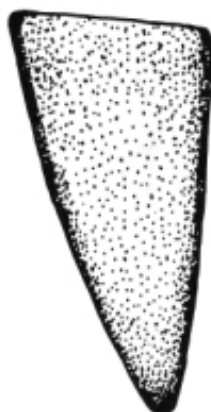
Figure 141. (continued)



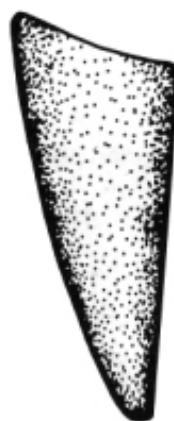
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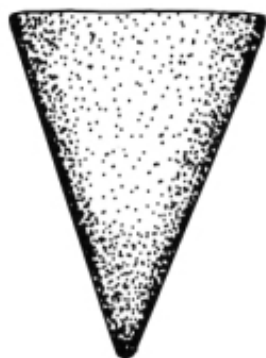
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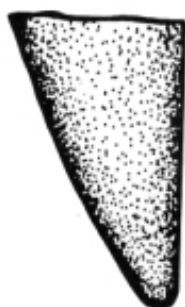
13



13



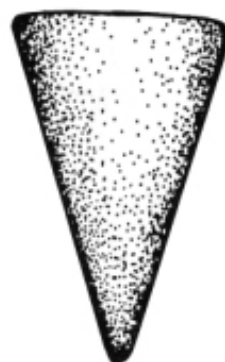
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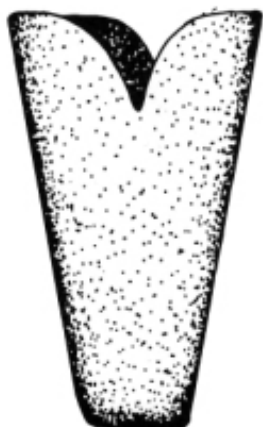
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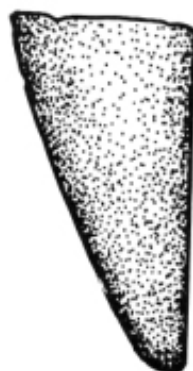
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23



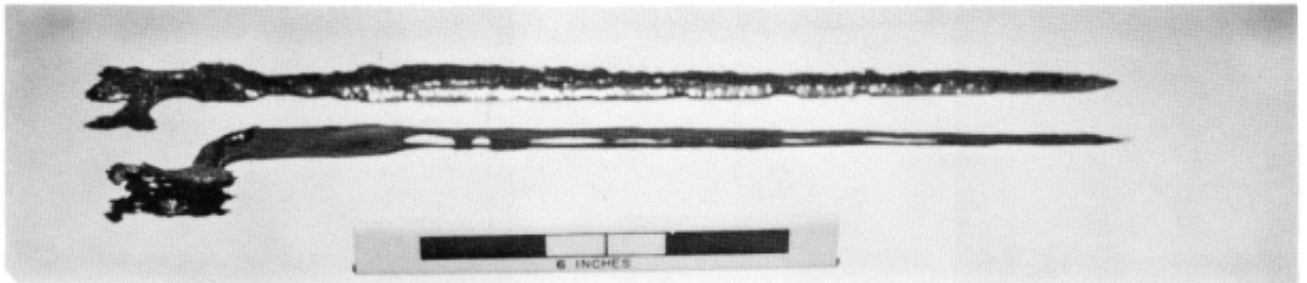
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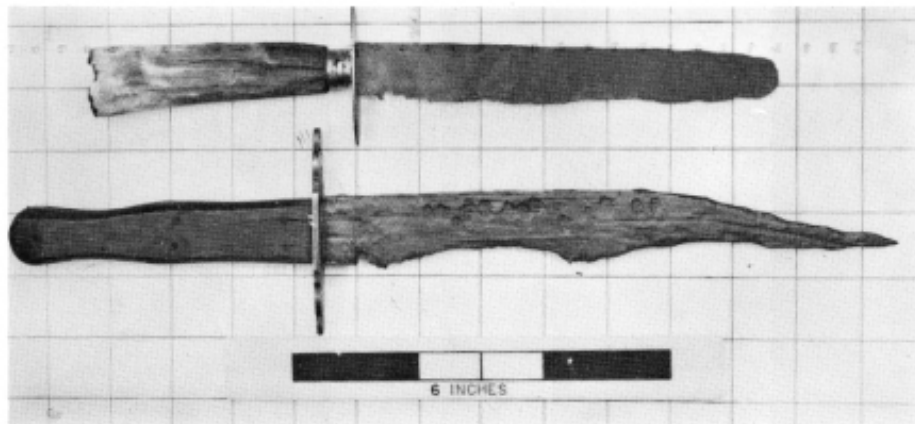
36



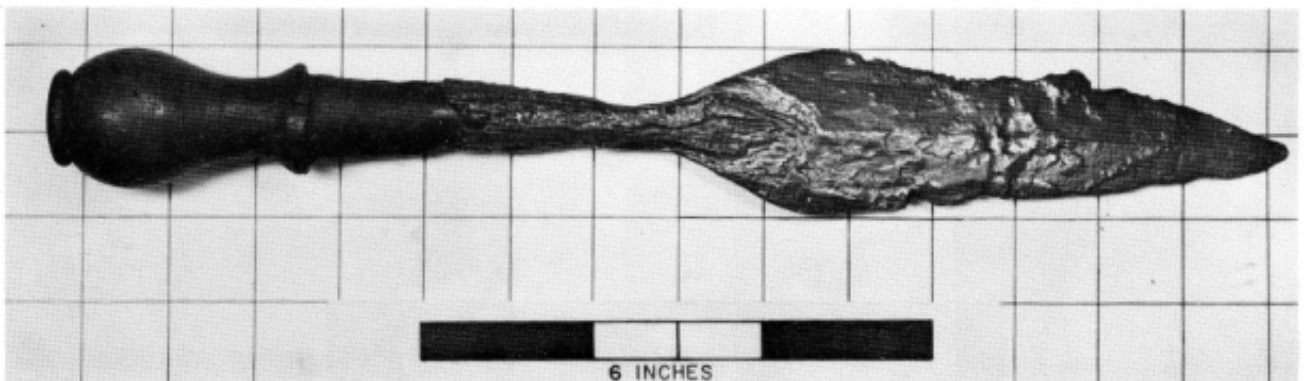
A. Figs. 104 and 139 Bayonet, Enfield saber and sheath



B. Fig. 106 Enfield triangular bayonets



C. Figs. 119 and 133 Bowie knives



D. Fig. 135 Pike



A. Fig. 137 Pocketknives



B. Figs. 132 and 138 Bowie knife with sheath

HOUSEWARES

Article: Flatirons (MG-7A)
 Recovered: 86
 85 Type I
 1 Type II
 Size: (of illustrated flatirons)
 Type I -- Length 5 3/4 "
 Width 3 11/16 "
 Type II -- Length 6 3/8 "
 Width 4 1/4 "
 The irons range in length from 5 1/2" to 6 5/8" and in width from 3 1/4" to 4 1/2". The irons marked with higher numbers are larger than the ones marked with smaller numbers.
 Weight: (of illustrated irons)
 Type I -- 4 pounds
 Type II -- 5 1/2 pounds
 Weights range from approximately 2 1/2 pounds to 5 1/2 pounds.
 Markings: All flatirons have a manufacturer's marking. Two manufacturers are represented.
 Type I -- Tho. Green is stamped in the upper side of the iron in a circle surrounding large numbers ranging from 3 to 10. Several of the irons show a small s instead of a period at the end of the Tho. (See Figure 142 for a comparison of these markings).
 Type II -- W. Lees & Sons is stamped on one iron on the upper side in a circle surrounding the number 10.
 Description: The cast iron flatirons, which vary slightly in size and weight, originally came with attached handles that have now deteriorated (See Figure 145 for a reconstruction of the iron with its handle).
 Condition: Fair. The irons themselves are in good condition, but the handles have deteriorated. Only one handle remains intact.

Figure 142. Manufacturer's markings from Type I flatirons. Full scale



Figure 143. Flatiron (Type I)
Full scale

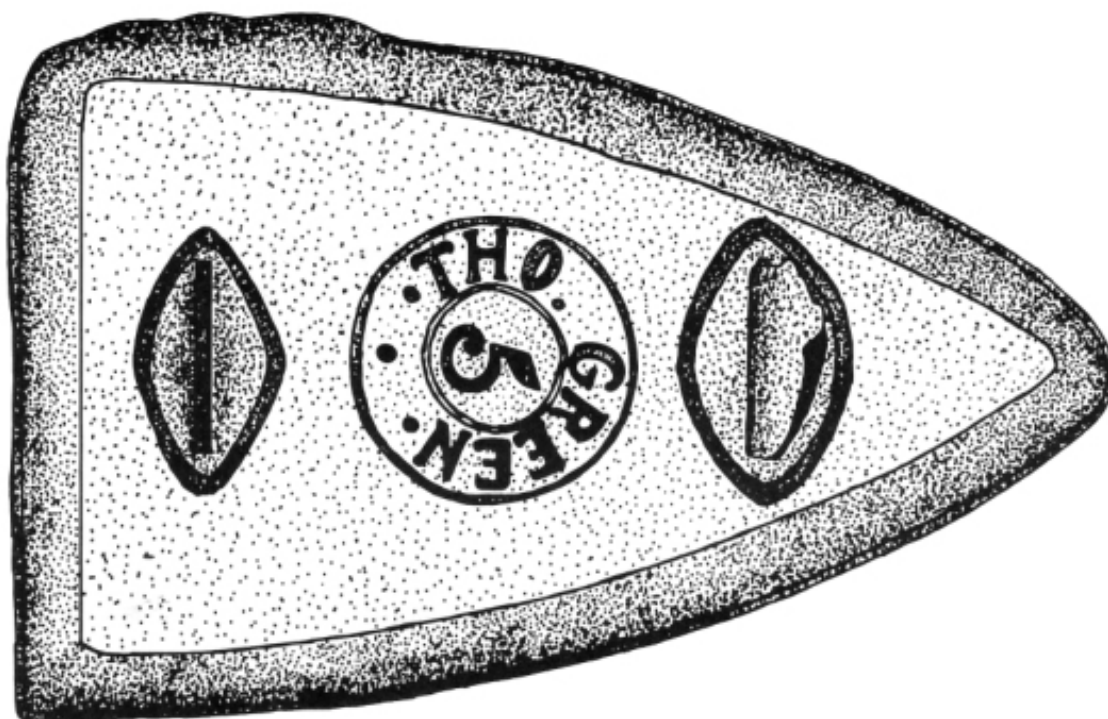


Figure 144. Flatiron (Type II)
Full scale

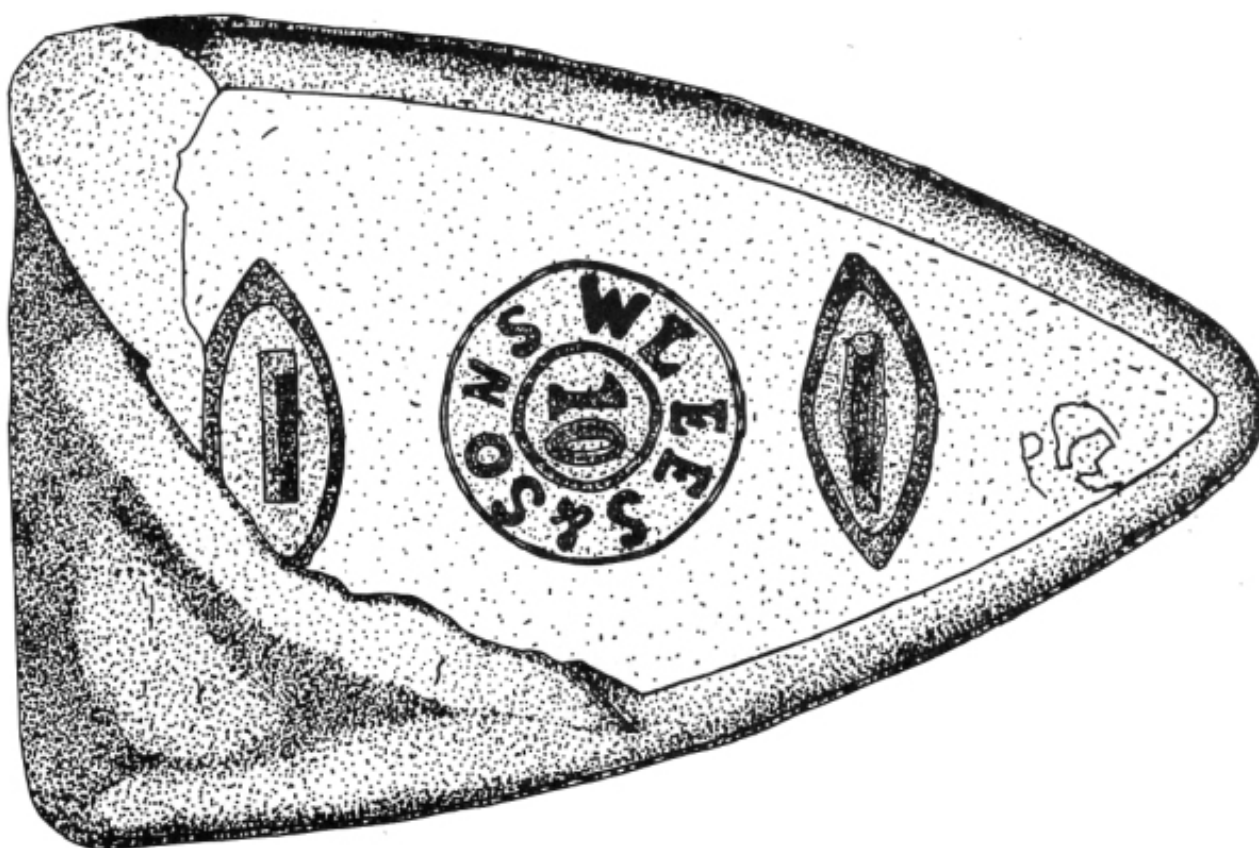
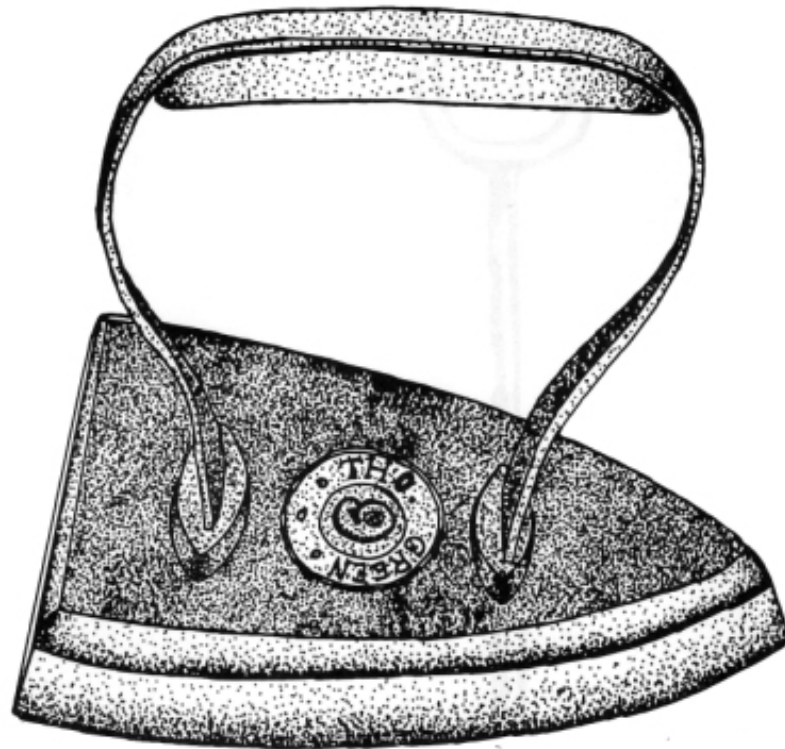


Figure 145. Flatiron (Type I) with handle intact
Not to scale



Article:	Forks, serving (MG-5A)
Recovered:	4
Size:	Length range 15 1/2" to 18"
	Maximum width 5/8"
	Space (between tines) 1 3/4"
Markings:	None
Description:	The forks are made of steel alloy.
Condition:	Fair. They are quite fragile and have broken along the shaft.

Figure 146.

Fork, serving
Scale: 1/2



Article: Forks, table (MG-4R)
 Recovered: 111 preserved. Approximately 1,000 forks and knives were packed together, but it is now impossible to ascertain the exact number of each due to the heavy concretion on the bundles (See Figure 148).

Size: Type I

	Length	(of handle)	3 1/4 "
	Width	(of handle)	5/8 "

Type II

Size A	Length	(overall)	7 1/2 "
	Width	(of shaft)	5/16 "
	Width	(of tine end)	7/8 "

Type II

Size B	Length	(overall)	7 7/8 "
	Width	(of shaft)	1/4 "
	Width	(of tine end)	7/8 "

Markings: None

Description: There are two types of fork. Type I forks are ebony handled and now have their tines missing due to corrosion. Type II forks are all metal. There are two sizes of this type fork. Size A is a short thick shafted salad type fork, and Size B is a longer slender dinner type fork.

Condition: Overall the Type I forks are in poor condition, for the tines have completely deteriorated. The ebony handles themselves are in good condition. Type II forks are in good to fair condition with some deterioration at the tine and handle ends.

Figure 147. Table fork (type I)
 Full scale



Figure 148. Concreted bundle of forks and table knives (Type I)
 Scale: 1/2



Figure 149. Table forks (Type II), two sizes
Full scale



A



B

Article: Knives, table (MG-4U)

Recovered: Approximately 1,000 intact and 234 handles without blades. Knives and forks were packed together and are now concreted. It is now impossible to ascertain the exact number of each due to the heavy concretion.

Size: There are three types of knives. All the Type II knives are in a single concreted bundle (See Figure 150).

Type I

Length	(overall)	10	1/4 "
Length	(of handle)	3	1/2 "
Length	(of blade)	6	3/4 "
Width	(of blade)	1	"

Type II

Length	(overall)	8	13/16 "
Length	(of handle)	3	5/16 "
Length	(of blade)	5	1/2 "
Width	(of blade)		3/4 "

Type III

Length	(overall)	9	1/4 "
Length	(of handle)	3	1/4 "
Length	(of blade)	6	"
Width	(of blade)	1	"

Markings: Three manufacturers are represented.

Type I -- C. Walters & Co., Globe Works, Sheffield with the word Super arched around the edge is stamped near the neck (See Figures 151 and 152).

Type II - John K. Turner, Sheffield is stamped on the blade near the neck (See Figure 152).

Type III- A crown set between V and R with Shear Steel underneath is stamped on the blade near the neck (See Figures 151 and 152).

Description: The knives were packed in bundles with the ebony handled forks (See Figure 149) in an arrangement that cannot be exactly determined at this time. A bundle possibly consisted of 12 forks and 12 knives. The bundles were wrapped in some type of paper (possibly tar paper). Type I knives have ebony handles; whereas, Types II and III have gutta-percha handles. There are no preserved Type II knives and only one bundle shows blades with the John K. Turner, Sheffield markings.

Condition: Overall condition of the knives is fair. The wooden handles are in good condition, but the metal blades are badly deteriorated.

Figure 150. Concreted bundle table knives (Type II)
Scale: 1/2



Figure 151. Table knives
Scale: 1/2



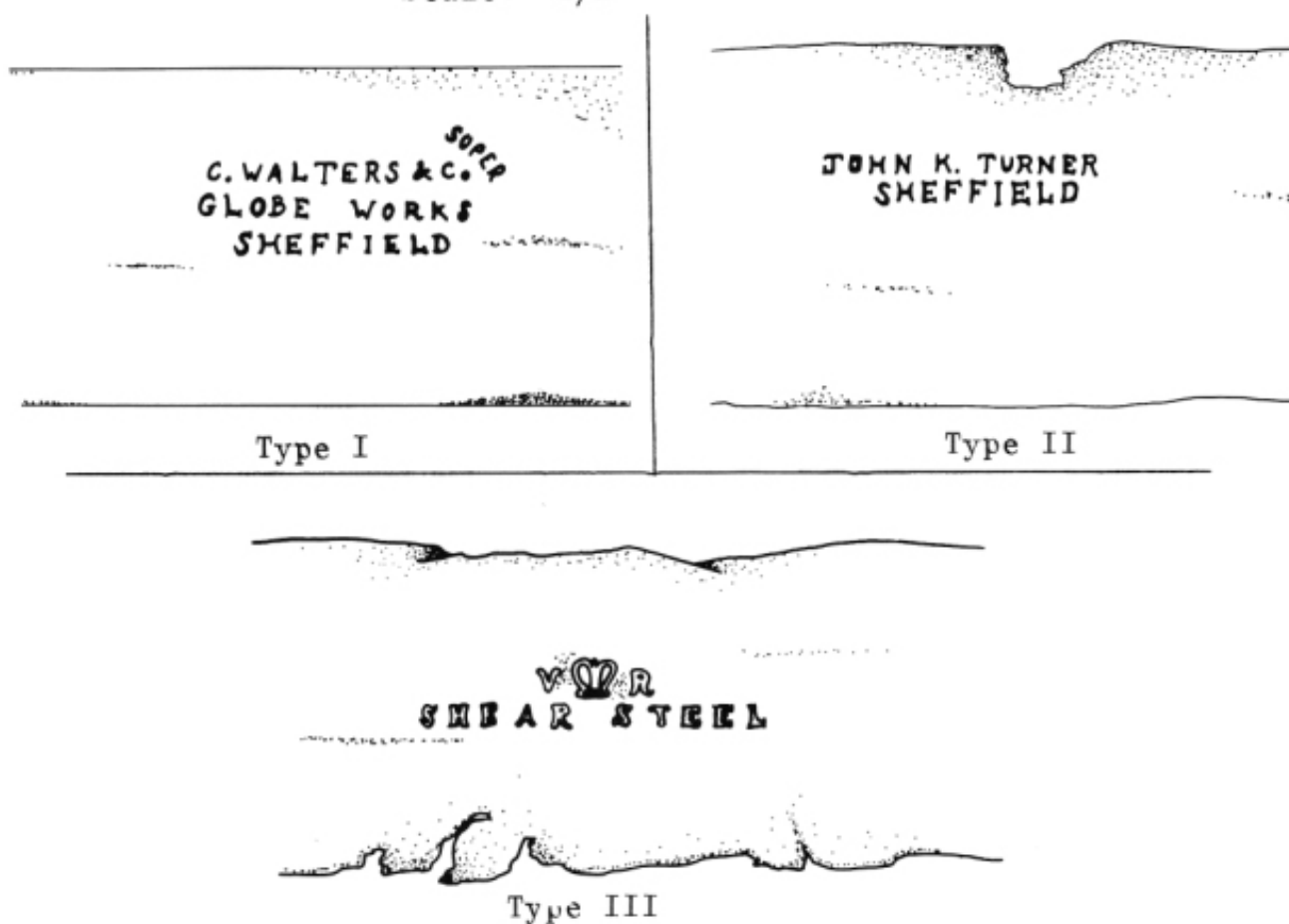
Type I



Type III

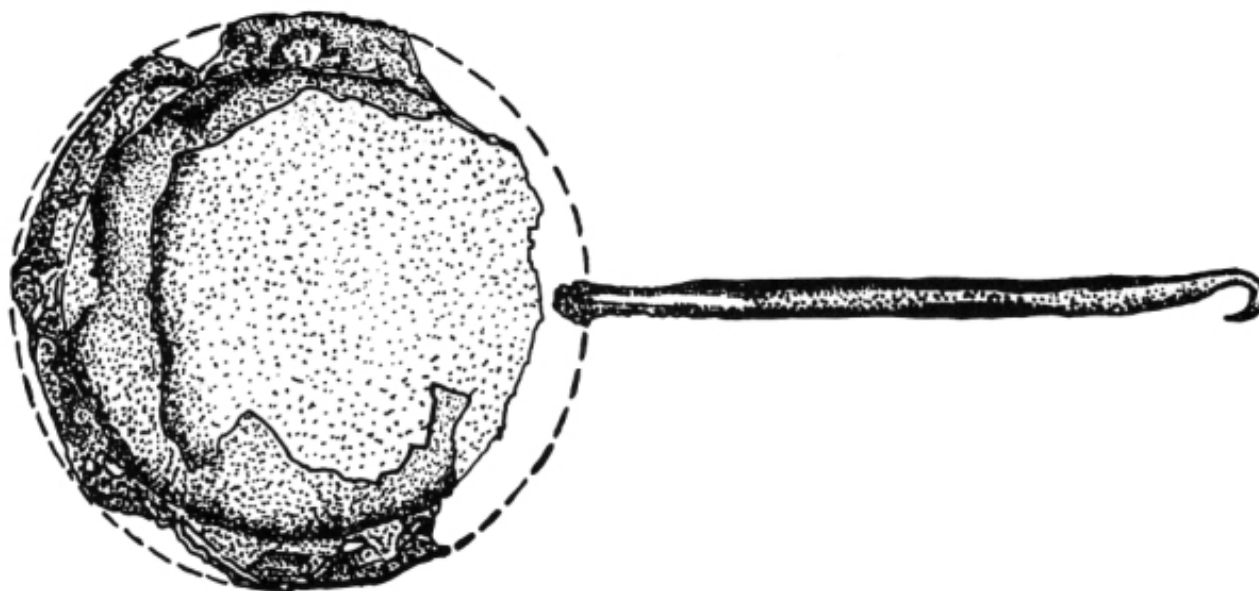
Figure 152.

Makers' markings on table knives
Scale: 2/1



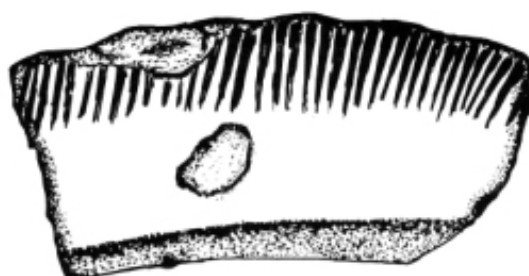
Article:	Pans, frying (MG-4G)															
Recovered:	3															
Size:	<table border="0"> <tbody> <tr> <td>Diameter (outer)</td> <td>10</td> <td>"</td> </tr> <tr> <td>Diameter (of bottom)</td> <td>7 1/2</td> <td>"</td> </tr> <tr> <td>Depth (of pan)</td> <td>2</td> <td>"</td> </tr> <tr> <td>Length (of handle)</td> <td>15</td> <td>"</td> </tr> <tr> <td>Width (of handle)</td> <td>3/4</td> <td>"</td> </tr> </tbody> </table>	Diameter (outer)	10	"	Diameter (of bottom)	7 1/2	"	Depth (of pan)	2	"	Length (of handle)	15	"	Width (of handle)	3/4	"
Diameter (outer)	10	"														
Diameter (of bottom)	7 1/2	"														
Depth (of pan)	2	"														
Length (of handle)	15	"														
Width (of handle)	3/4	"														
Markings:	None															
Description:	The iron pans are flat bottomed with sides tapering outward.															
Condition:	Poor															

Figure 153. Pan, frying
Scale: 1/4



Article:	Plate, earthenware
Recovered:	1 fragment
Size:	Length (of fragment) 2 5/8"
	Width (of fragment) 1 1/4"
Markings:	None
Description:	Part of the rim of a blue edged pearlware plate (circa 1780-1830). This type of earthenware was quite common during the Civil War.
Condition:	Good. Glaze is intact and not badly crazed.

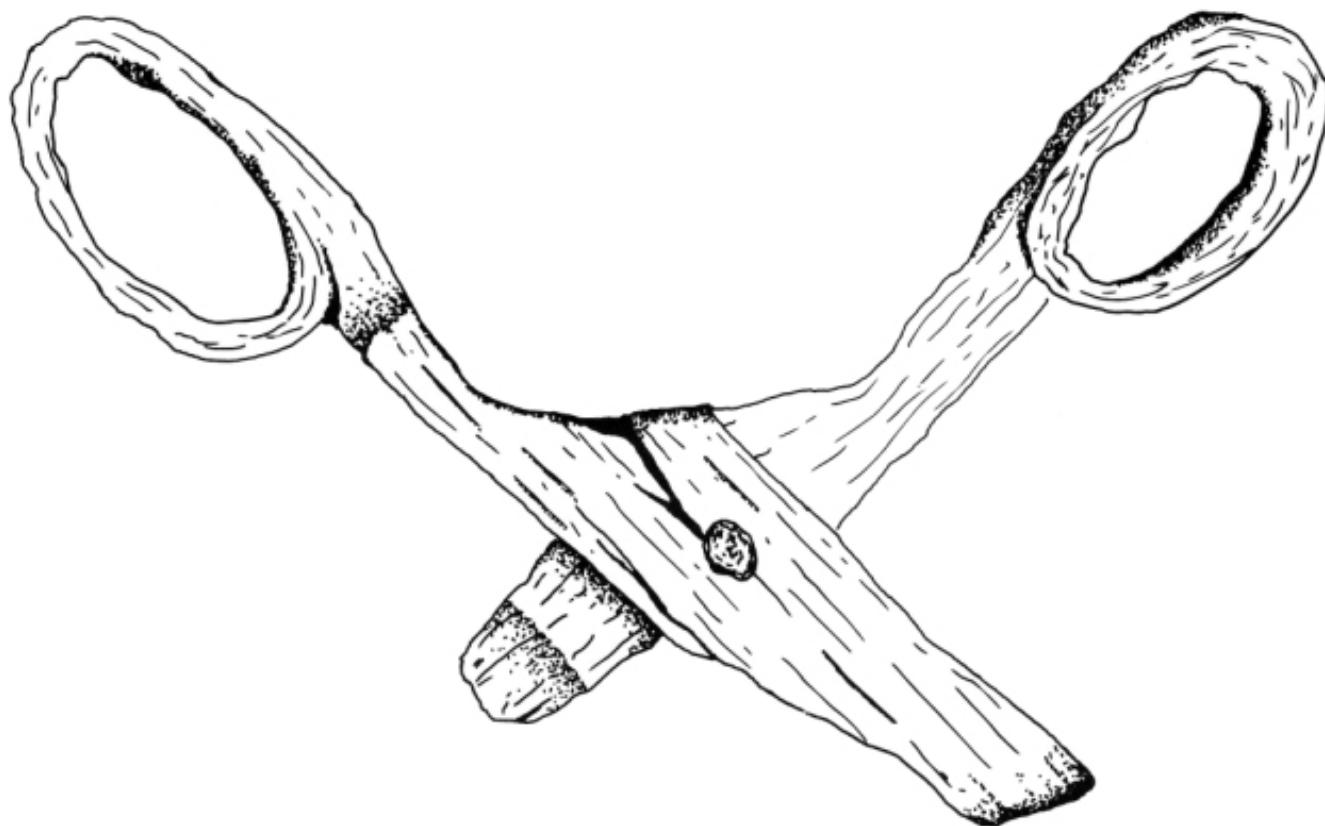
Figure 154. Plate, earthenware
Full scale



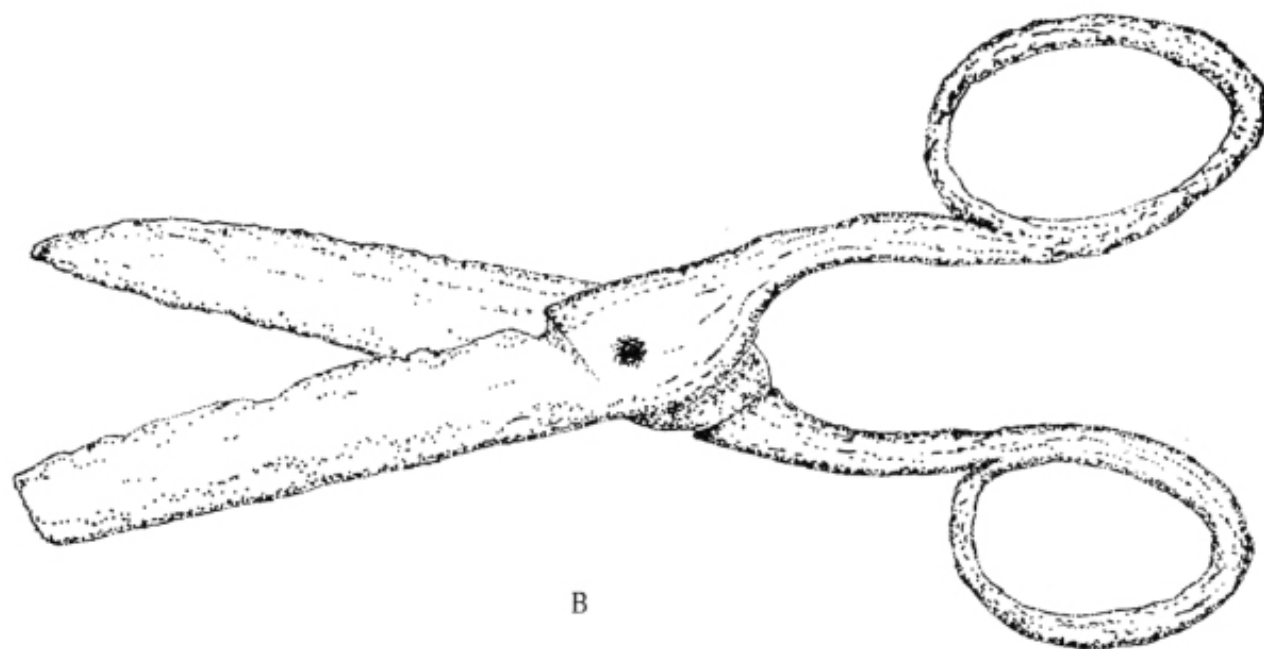
Article:	Scissors (MG-5B)
Recovered:	Approximately 190-200 pairs. The exact number is impossible to ascertain because of the concretion on the bundles of scissors.
Size:	(of illustrated scissors)
	A -- Length (of body) 7"
	Width (of blades) 1" and 3/4"
	B -- Length (of body) 6 1/2"
	Width (of blade) 5/8"
Markings:	None
Description:	There are four different types of scissors varying in design and size (See Figure 156).
Condition:	Poor. Due to the fragility of the scissors themselves, they are badly deteriorated.
Remarks:	They may have been packed with or next to wood gouges, for one bundle of scissors had wood gouges concreted to it.

Figure 155.

Scissors
Full scale

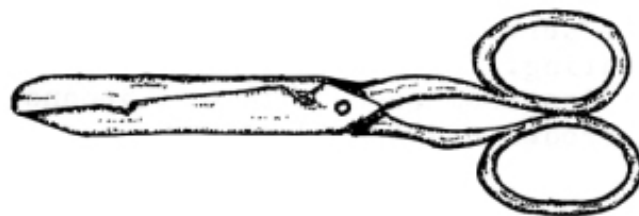


A

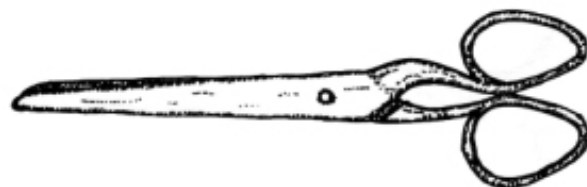


B

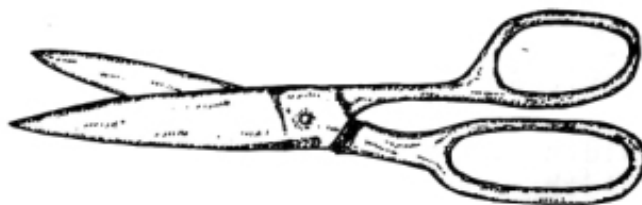
Figure 156. Types of scissors
Scale: 1/2



I



II



III



IV

146 Housewares

Article: Spoons, serving (MG-J)
 Recovered: 11
 Size: Length range 11 3/4" to 18"
 Average width (of bowl) 2 1/4"
 Average width (of handle) 1 "
 Markings: None
 Description: The serving spoons are steel with silver plating.
 Condition: Varies from good to poor. Spoons are very corroded and fragile.

Figure 157. Spoon, serving
 Scale: 1/2



Article: Tablespoons (MG-2Y)
 Recovered: 72
 Size: Style A
 Length overall 7 "
 Width (of shaft at neck) 5/16"
 Width (of bowl) 1 7/16"
 Style B
 Length overall 8 1/16"
 Width (of shaft) 5/16"
 Width (of bowl) 1 7/8 "
 Markings: None
 Description: There are two styles of tablespoon. Style A is unadorned at the handle; whereas, Style B has a more decorative handle. The exact metallic composition of these spoons is uncertain; however, they are silver plated. The plating remains in spotted areas on many of the spoons.
 Condition: Good. Corrosion is worst on the edges of the bowls and the tips of the handles.

Figure 158. Tablespoons
Full scale



Style A



Style B

148 Housewares

Article: Teaspoons (MG-2H)
Recovered: 65
Size: All were uniform in size before corrosion.
Approximate length 5 3/4"
Approximate width (of bowl) 1 1/4"
Approximate width (of handle) 5/8"
Markings: None
Description: Made of silver plated steel. The handles are shaped like Style B of the tablespoon (See Figure 158).
Condition: Good. Corrosion is severest at the handle and bowl ends.

Figure 159. Teaspoon
Full scale

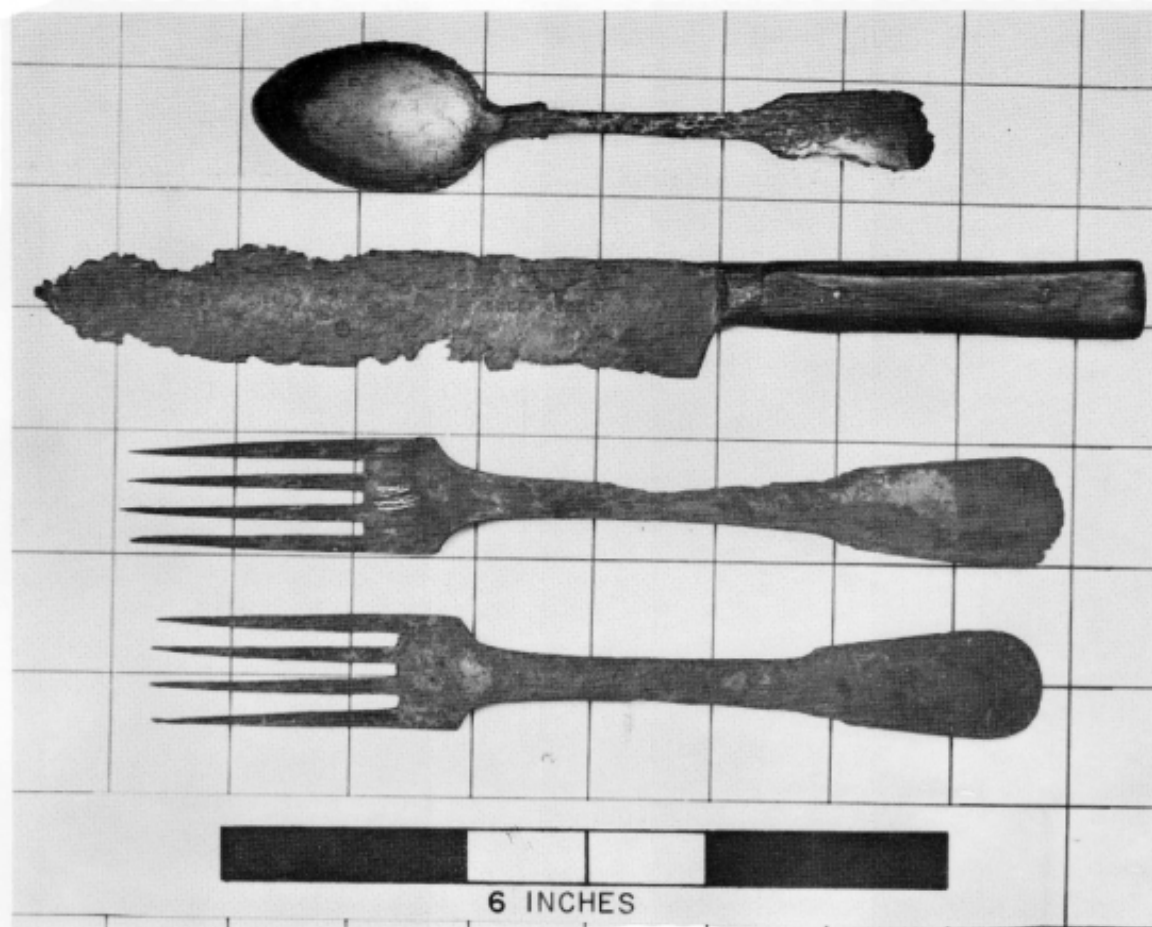




A. Fig. 145 Type I flatiron (With handle)



B. Figs. 146 and 157 Fork and spoon, serving



A. Figs. 149, 151, and 159 Type II table forks, table knife, and teaspoons



B. Fig. 155 Scissors

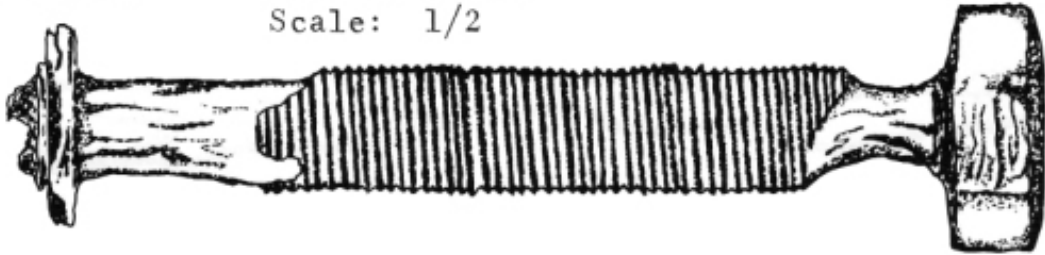


C. Fig. 158 Tablespoons

HARDWARE

Article: Bolt with nut (MG-3W)
 Recovered: 1
 Size: Threads (per inch) 8 "
 Length (of bolt) 10 3/8"
 Diameter (of bolt) 7/8"
 Diameter (of head) 2 3/8"
 Diameter (of nut) 2 1/4"
 Markings: None
 Description: Nut and bolt combination is composed of cast steel. The bolt is threaded the length of the shaft, although this is only visible after careful inspection.
 Condition: Good

Figure 160. Bolt with nut
 Scale: 1/2



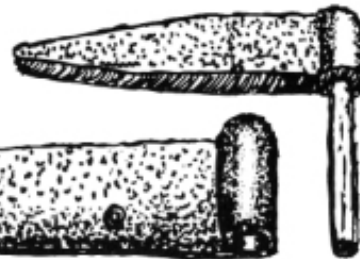
Article: Hinges (MG-3E)
 Recovered: 4, total arranged as follows:
 3 pin hinges
 1 HL hinge
 Size: A -- Length 7 3/4"
 Width 1 7/8"
 B -- Length 10 1/2"
 Width 1 1/2"
 C -- Length 14 "
 Width 1 7/8"
 D -- Length 7 3/4"
 Width 5 1/2"
 Markings: None
 Description: All the hinges are ferrous. Type A is a strap hinge. It is not possible to ascertain the hole pattern on this hinge due to deterioration. Type B is a strap and pintle type hinge with a four hole pattern. Type C is a strap hinge with a four hole pattern still visible. Type D is an HL hinge with ten countersunk screw holes that are clearly visible.
 Condition: Good

Figure 161.

Hinges
Scale: 1/2



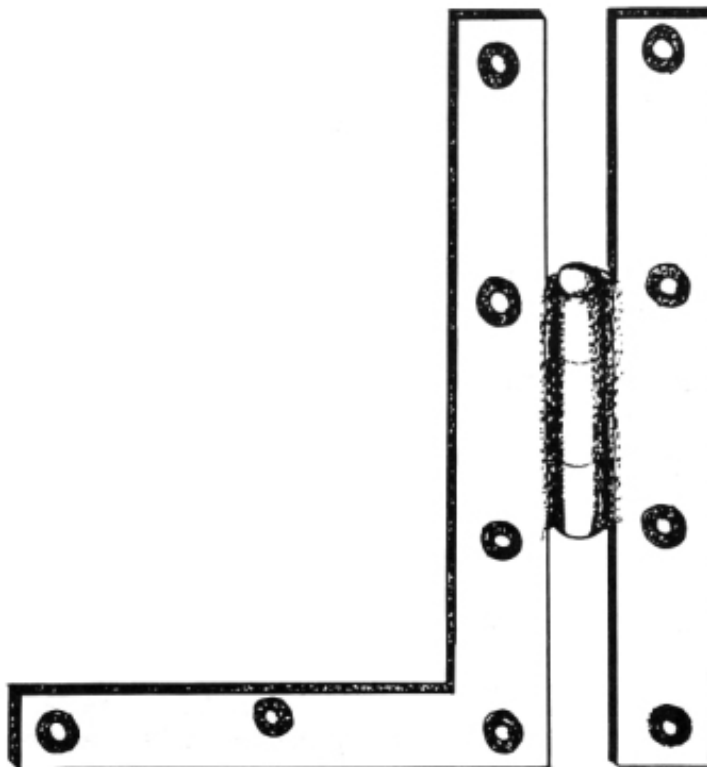
A. Strap hinge



B. Strap and pintle



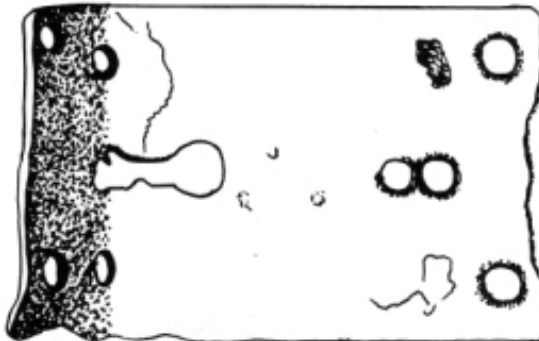
C. Strap hinge



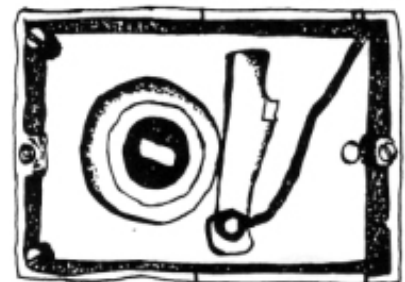
D. HL

Article: Lock, chest (MG-3C)
 Recovered: 1
 Size: Length 2 3/4"
 Width 1 3/4"
 Markings: None
 Description: Lock is entirely brass. It is now broken into two pieces. One piece, the cover with keyhole, is bent. The other is the internal mechanism. A post sticks up from the center of the mechanism and fits through the cover.
 Condition: Although the lock is in two pieces, it is in good condition.

Figure 162. Lock, chest
Full scale



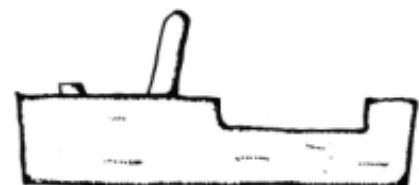
Top view of cover with keyhole.



Internal mechanism



Side view of bent cover



Side view of internal mechanism showing post

152 Hardware

Article: Nails, horseshoe (MG-5H)
Recovered: 2 kegs, approximately 200 pounds (See Figure 164), from which the three nails illustrated below are a sample.
Size: (of illustrated nails)
A -- Length 2
Width (of head) $3/8$ "
Width (of shaft) $3/16$ "
B -- Length $2\ 1/4$ "
Width (of head) $1/4$ "
Width (of shaft) $3/16$ "
C -- Length $2\ 5/16$ "
Width (of head) $5/16$ "
Width (of shaft) $3/16$ "
Markings: None
Description: The ferrous horseshoe nails vary slightly in size.
Condition: Fair. The metal is deteriorated, and the nails are mostly concreted together.

Figure 163. Nails, horseshoe
Full scale

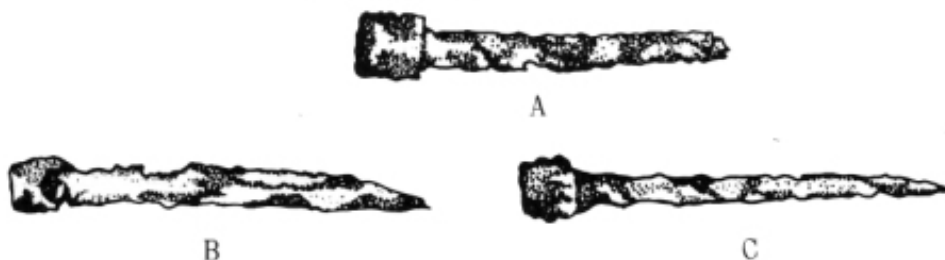
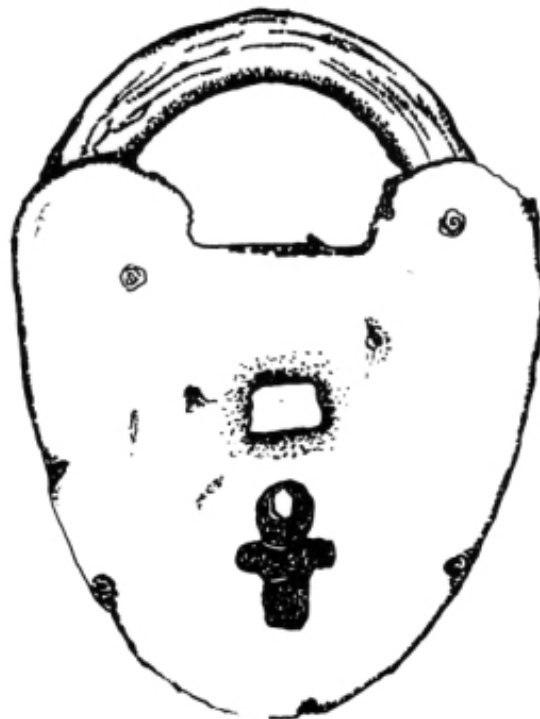


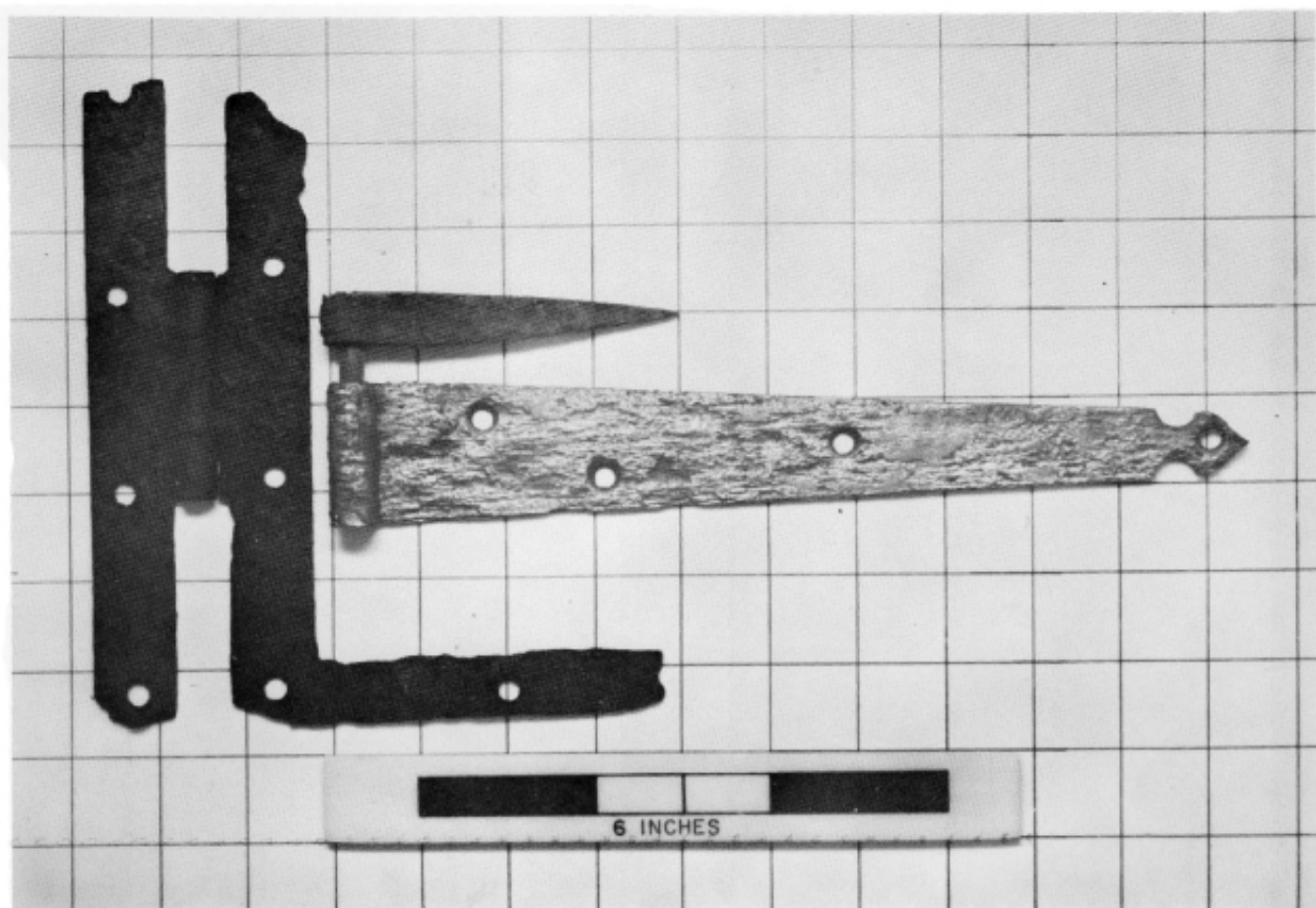
Figure 164. Keg of horseshoe nails
Scale: 1/10



Article: Padlock (MG-3C)
Recovered: 1
Size: Width 2 3/4"
Length (top to bottom) 2 3/4"
Thickness 5/8"
Thickness (of shackle) 3/8"
Markings: None
Description: Lock is made of cast steel. The mounting for the now missing escutcheon plate is brass. The sides of the lock are perforated. Eleven rivets are visible on the front. The interior mechanism is intact but inoperable.
Condition: Good. The mechanism does not operate.

Figure 165. Padlock
Full scale

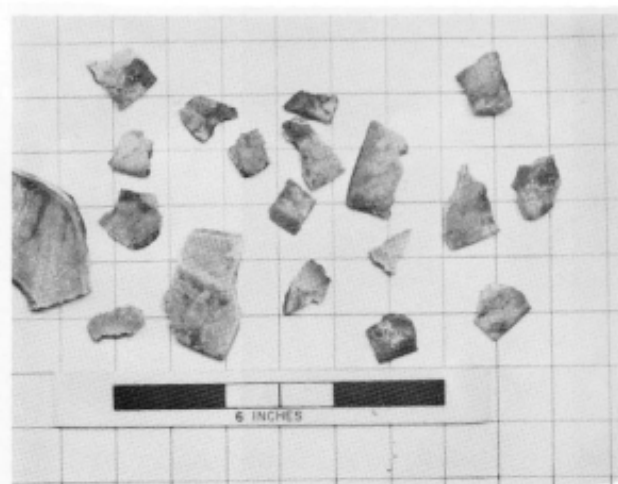




A. Fig. 161 Hinges



B. Fig. 168 Ceramic fragments
(ironstone)



C. Fig. 168 Ceramic fragments
(stoneware)

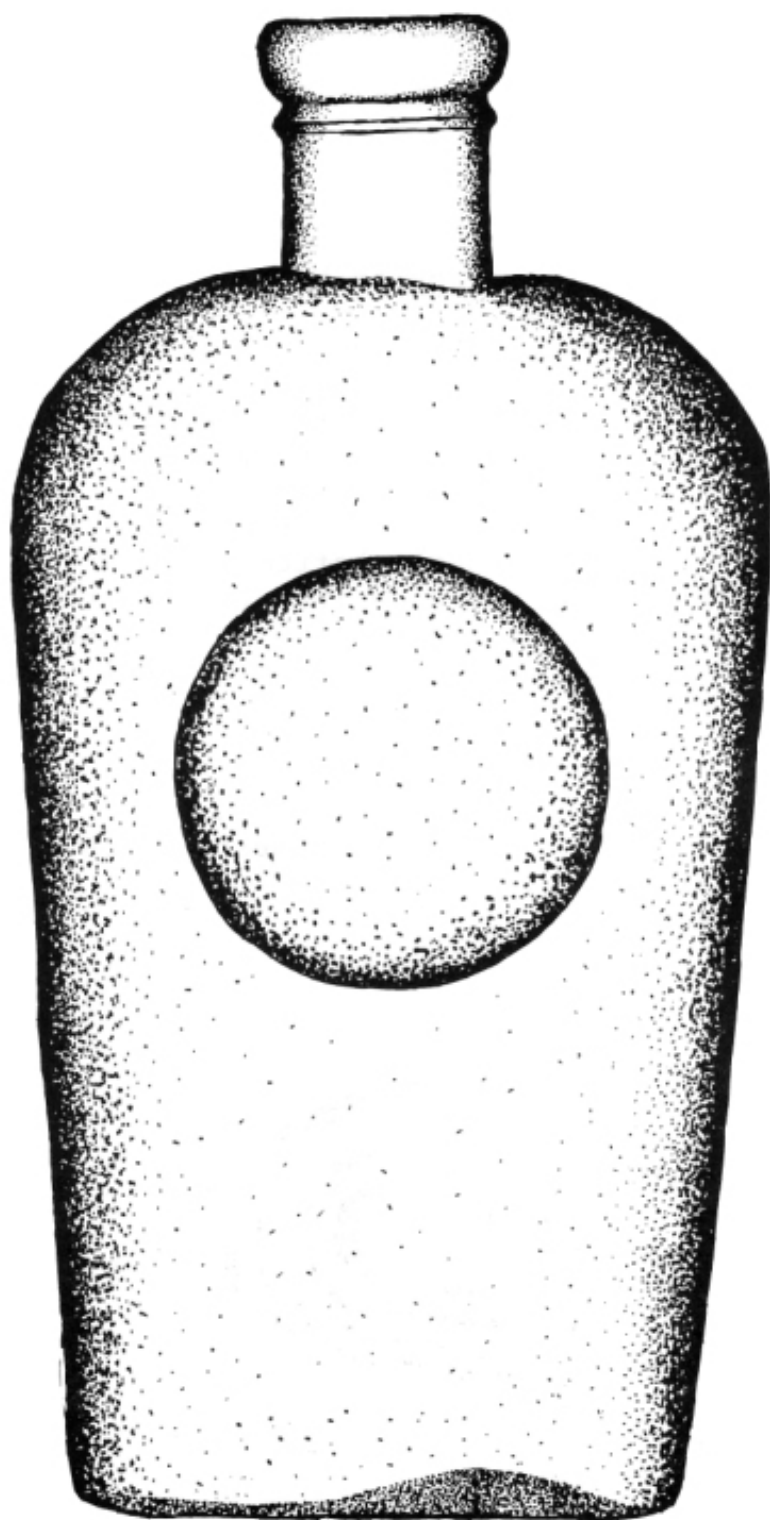
CONTAINERS

Article:	Bottle, glass whiskey (MG-4X)	
Recovered:	1	
Size:	Height	7 3/4"
	Width (at widest point)	3 5/8"
	Width (at base)	3 1/8"
	Width (of label area)	2 1/4"
	Width (of neck)	1 "
	Width (of opening)	1 1/8"
	Depth (front to back at base)	1 1/2"
	Width (of seam)	1/2"
Markings:	A raised and molded-in numeral <u>20</u> is on the bottom (See Figure 166).	
Description:	The poured mold bottle with an applied lip is a light pink-purplish color. The glass itself has many small bubbles throughout with one large one at the bottom. The glass in the bottom is irregular and thicker on one side than the other. There is a round indentation in the center front of the bottle where a label was probably affixed.	
Condition:	Good	

Figure 166. Detail showing molded-in numeral 20 on base of bottle.
Full scale



Figure 167. Bottle, glass whiskey
Full scale



Front



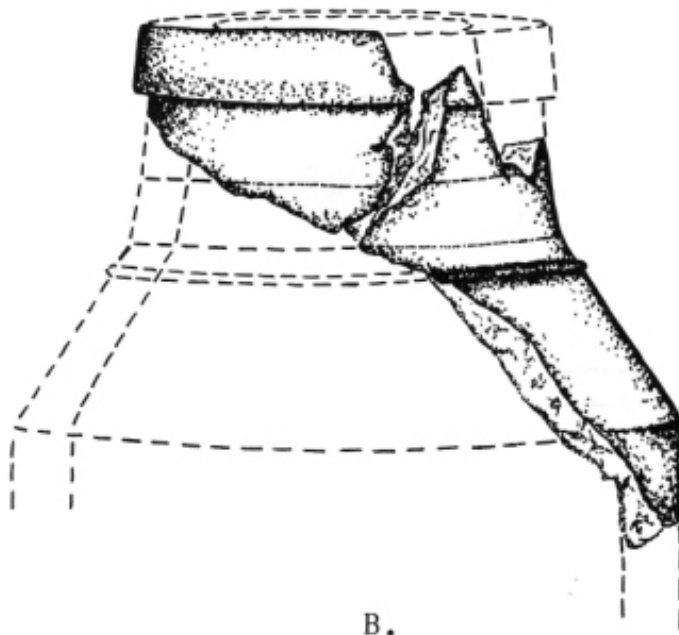
Side

Article: Ceramic, fragments (MG-5J)
 Recovered: 21 fragments
 19 ironstone fragments
 2 stoneware fragments
 Size: (of illustrated fragments)
 A -- Length 3 3/8 "
 Width 1 1/4 "
 B -- Outside diameter (of lip) 2 1/8 "
 Inside diameter (of lip) 1 5/16 "
 Diameter (of jar) 3 1/2 "
 Markings: None
 Description: The 19 fragments of grey ironstone (granite china), of which the largest is illustrated, may originally have been part of a plate. The pieces now cannot be fitted together. The stoneware is a yellowish brown. When the fragments were pieced together, they formed part of the lip and neck of a jar.
 Condition: Good

Figure 168. Ceramic, fragments
 Full scale



Ironstone

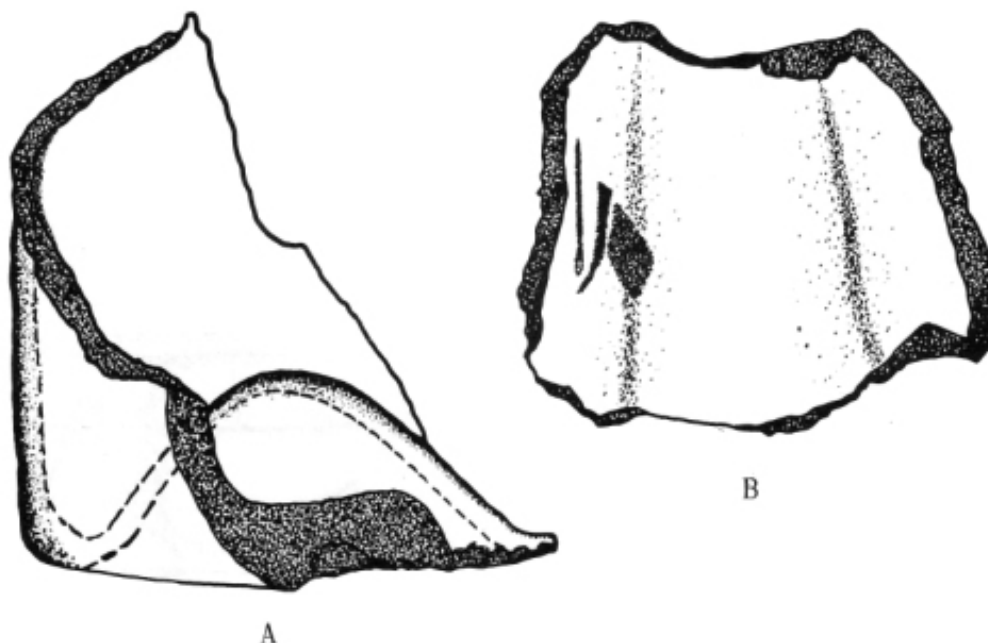


Stoneware

158 Containers

Article: Glass fragments (MG-6Q)
 Recovered: 2 fragments
 Size: A -- Height 2 3/4"
 Diameter (of base) 2 3/4"
 B -- Height 2 1/8"
 Diameter 2 7/16"
 Markings: None
 Description: The fragments are from a dark green glass whiskey bottle. Fragment A is the base, and B is from the body of the bottle. They were probably mold blown and are of a type common during the Civil War period.
 Condition: Good

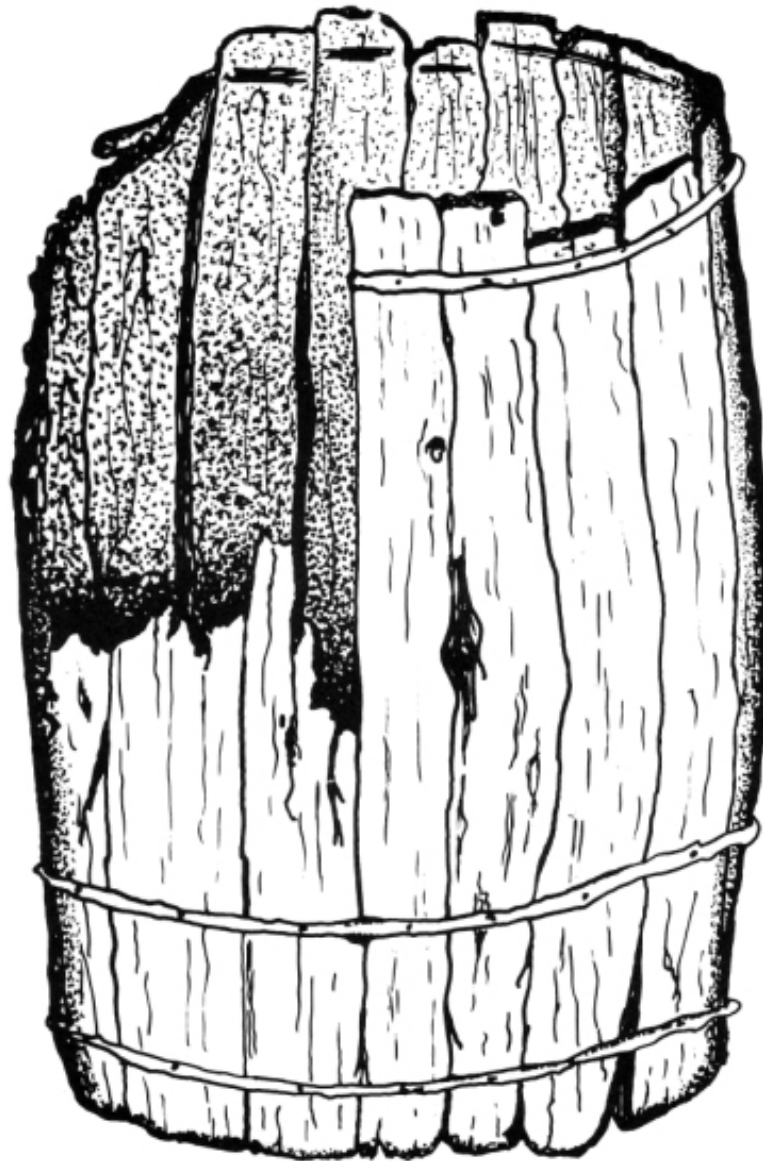
Figure 169. Glass fragments
 Full scale



Article: Keg, 10 gallon (MG-5M)
 Recovered: 1
 Size: Height 19 3/4"
 Diameter 14
 Markings: None
 Description: This wooden keg originally held either powder or foodstuffs, which have now deteriorated. One-third of one side is gone. The wooden hoops are not original but were added to hold the keg together.
 Condition: Fair to good

Figure 170.

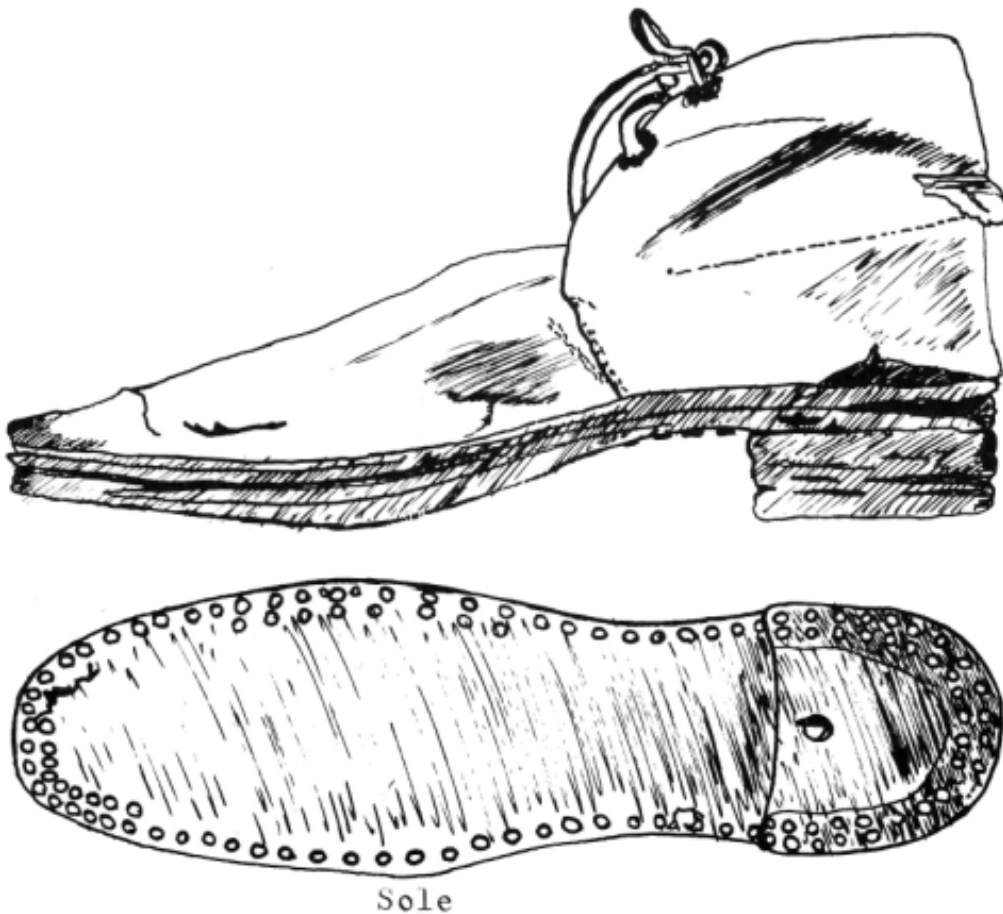
Keg, 10 gallon
Scale: 1/4



MISCELLANEOUS

Article:	Shoes (MG-3U)
Recovered:	2 (1 pair) and several fragments
Size:	Length 10 3/16"
	Width 3 "
	Height (at heel) 5 "
Markings:	None
Description:	These leather men's shoes were made without a last so that they could be worn on either foot. They are double soled with one inch heels and brass tacks. The stitching is still visible.
Condition:	Good. The leather has dried and is cracked in places.

Figure 171. Shoes
Scale: 1/2



THE PRESERVATION



A SUMMARY OF THE METHODS USED IN PRESERVING THE ARTIFACTS RECOVERED FROM THE MODERN GREECE

The preservation of marine artifacts from a wreck such as the MODERN GREECE is an integral part of the recovery process. The preservation must begin the moment the artifact is located, for unless proper precautions are taken the artifact will be irrevocably damaged. Organic, ferrous, and nonferrous substances react differently to long periods of submersion in salt water. Preservation techniques take these differences into account.

Organic materials which have become waterlogged must be protected from rapid drying. When uncontrolled drying occurs, the outer surfaces dry faster than the interior. The resultant warping, shrinking, and cracking distorts the appearance and shortens the life of the artifact. To prevent rapid drying, organic artifacts must be kept wet from the moment they are recovered until they can undergo treatment.

Ferrous artifacts in salt water continue their natural oxidation process; however, as this happens the artifact picks up bits and pieces of sand, coral, and shell. These become cemented to the surface of the artifact and form a protective layer that reduces the oxidation rate. The ferrous artifact ultimately reaches an equilibrium with the marine environment, and the corrosion process slows. As soon as the artifact is removed from this environment, the delicate equilibrium is upset, and the oxidation rapidly accelerates causing the artifact to quickly deteriorate. This deterioration is especially rapid if the protective cementation is broken or if the artifact is exposed to air. To prevent deterioration the ferrous artifact must be carefully returned to a wet environment as soon as it is recovered.

Nonferrous artifacts, unlike organic and ferrous items, do not necessarily require the maintenance of a wet environment to prevent their deterioration; however, it is recommended since calcareous materials may become more hardened upon drying. Nonferrous artifacts must be handled with care to prevent breakage, since nonferrous metals are soft and fragile by nature. Ultimately each type is cleaned in accordance with its special needs.

164 Summary of Preservation

In 1962 when the State of North Carolina and the United States Navy first began recovering the artifacts from the MODERN GREECE, strict precautions were not taken; and many of the artifacts, especially organic ones, were damaged. They were left too long on the decks of the recovery vessels and dried out. As soon as this mistake was recognized, the materials from the MODERN GREECE were cared for according to the principles outlined above to prevent further damage. As the 11,500 artifacts were recovered, they were placed in wet storage at the Fort Fisher Air Force Station. This make-do arrangement lasted until the State of North Carolina was able to build its own facility, the Fort Fisher Preservation Laboratory, located on the nearby Fort Fisher State Historic Site. The preservation of the artifacts from the MODERN GREECE has continued at this facility since 1962.

Over the years approximately fifty-five different methods of preservation have been used. The large number of duplicate artifacts in the MODERN GREECE collection allows for the testing of many new preservation techniques.

Before the MODERN GREECE artifacts undergo preservation, they must be cleaned and analyzed to determine their composition and condition so that the correct preservative treatment may be employed. First, the conservator collects photographs of the material before it is cleaned. From photographs it is often possible to reconstruct the packing arrangement of crated items or the placement of loose articles that have become totally obscured by the encrustation. In some cases where delicate artifacts are suspected of lying within a heavy concretion, X-rays are taken to determine their position and condition within the concretion. During cleaning a photographic record is kept of any markings or other unusual features that appear as encrustations and rust are removed.

During cleaning the artifacts are handled as carefully as possible so as not to damage any fine details. Brushes, wooden picks, and fine tools are used to remove the surface debris. After this the artifact is reexamined. At this time its composition and condition are analyzed to determine the most suitable preservative treatment.

Although most materials pass through similar phases of treatment, the particular preservation process used is determined primarily by the artifact's material composition, size, and condition. The balance of this chapter outlines the special processes found most suitable for use on organic, nonferrous, and ferrous artifacts.

ORGANIC

Because of the great variety of materials and the varying stages of decomposition in which marine organic artifacts are recovered, there is no set method whereby these materials are treated. Although the procedures may vary slightly in accordance with special needs, the treatment is generally done in three stages: (1) cleaning, (2) impregnation or freeze drying, and (3) preparation for exhibition or storage. The majority of the organic artifacts from the MODERN GREECE are treated by impregnation; however, in some cases small fragile items are freeze dried. Both methods are described below.

Treatment by impregnation

(1) Cleaning - Special care is taken with organic artifacts to insure that all living organisms attacking the artifact are removed. A fresh water wash and soak usually kills the the marine borers and worms residing in the artifact. The water should be changed regularly to wash away putrefied material from the decaying organisms. The cleaning is usually completed when there is no longer a foul odor. Small amounts of fungicide and algicide are used to control plant growth. Bulky or sturdy items will tolerate pressure washing, picking, chipping, brushing, or chemical baths. A 5% solution of phosphoric acid is used for a chemical cleaning bath, since this does not readily attack organic material. It will, however, remove concreted material and any iron oxide picked up from adjacent materials. After the acid bath the artifact is thoroughly washed to remove any residual traces of acid. When a litmus paper test is negative, the artifact is ready for impregnation. When ferrous or nonferrous materials are combined with the organic, the artifact must be treated as if it was completely organic. These artifacts will not tolerate electrolytic reduction, since the evolution on the surface of the ferrous material causes pressure which will split the organic parts. In rare cases very delicate items suffering from extensive decay are left uncleaned to prevent further damage. These are simply stored and exhibited in water.

(2) Impregnation - To prevent warping, shrinking, and cracking during the drying process, the moisture in the waterlogged marine artifact must be replaced with a material which does not readily evaporate or leach out. Polyethylene-glycol, beeswax, paraffin wax, linseed oil, and turpentine may be used as impregnants; however, in most cases polyethylene-glycol is preferable. Polyethylene-glycol, also known as carbowax, is available in 200, 300, 400, 600, 1000, 1540, 4000 and 6000 weights, which roughly represent their average molecular weight. At 77°F the 200 through 600 weights are clear liquids, and the 1000 to 6000 weights are white, waxy solids. Polyethylene-glycol dissolves in water without hydrolyzing or deteriorating. When an artifact is soaked in polyethylene-glycol, the water from the artifact goes into the solution. As evaporation of the water from the polyethylene-glycol occurs, the waxy substance replaces the water leaving the wood fibers pliable and eliminating shrinkage. This process takes several weeks with the length of time varying according to the density and size of the artifact.

(3) Preparation for Exhibition - After the artifact is removed from the impregnant, it is rinsed in cold water or wiped dry to prevent excess impregnant from solidifying on the surface. The articles are then allowed to dry at normal room temperature, until the impregnant is set or solidified within the item. This process sometimes takes several weeks. Fungicides and insecticides are applied to items which might be attacked by fungus or insects. Coatings are only applied to organic artifacts if a particular finish is desired.

Treatment by freeze-drying

(1) Cleaning - Artifacts for freeze-drying are cleaned in exactly the same manner as those which are impregnated.

(2) Freeze-drying - Once the artifact is cleaned and washed sufficiently to remove any residual traces of acid, it is ready for freeze-drying. Before the artifact enters the freeze-drying chamber, it is mounted in the desired position by wire supports. It is then pre-frozen either in the chamber itself or in another type of freezer. If all the water in the artifact is not in

a solid state before the actual drying process begins, the artifact will grossly distort. The drying process takes place in a specially designed two chambered apparatus. The artifact is placed in a refrigeration chamber which is connected to an insulated condenser chamber. A vacuum pump is hooked up to the condenser chamber which is set at a colder temperature than the refrigeration chamber containing the artifact. The temperatures used vary from 21°F to -40°F. As a vacuum of approximately 100 microns is applied, the moisture is extracted from the artifact by sublimation. This causes the frozen water molecules to vaporize and collect on the colder surface of the condenser chamber. When the artifact temperature is equal to that of the condensing chamber, the artifact is dry.

(3) Preparation for exhibition - Once the freeze-dried artifact is removed from the drying chamber it is virtually ready for exhibition. Fungicides and insecticides are applied to items which might be attacked by fungus or insects. Coatings are only applied if a particular finish is required.

NONFERROUS

Usually the nonferrous items recovered from the MODERN GREECE have required little or no preservative treatment beyond cleaning and neutralization. All artifacts, however, are handled carefully since improper care and mistreatment of fine items can cause more damage than years of submersion in salt water. The various types of nonferrous materials require slightly different care as outlined below.

Fine copper and copper alloys

(1) Cleaning - The artifacts are manually cleaned using wooden picks and soft vegetable brushes. If stubborn encrustations persist, the artifacts are soaked in a 5% phosphoric acid solution for a short interval, or a mild electrolytic reduction treatment is applied to loosen the calcareous materials. (The electrolytic reduction process is described fully under FERROUS, for it is used more extensively in treating that type of material.)

(2) Neutralization - After the removal of encrusted materials the artifacts are bathed in 20-minute alternating hot and cold distilled water baths until they test negative for salts. This test is done by adding several drops of silver nitrate and several drops of diluted nitric acid to a sample of wash water. If salts are present, the wash water will become milky white.

(3) Polishing - The artifacts are then polished with a soft cloth, extra fine steel wool, or metal polish. All polish residue is thoroughly removed with solvent or soap and water.

(4) Preparation for coating - The artifacts must be completely dry before a protective coating is applied. To thoroughly dry the artifact, it is placed in an oven set at approximately 200°F for eight to twelve hours or in a four-hour alcohol followed by a four-hour ether bath.

(5) Coating - The condition of the artifact, the exhibition site, the content of the exhibition, and the original appearance are considered in deciding what surface finish suits the artifact. If a dull finish is desired, the item is coated with clear flat vinyl or a semi-gloss enamel. Gloss vinyl, plastic resin, gloss varnish or a similar material are applied for a glossy finish. Coatings are always applied in a dust free area.

Bulky or rough cast copper and copper alloys

(1) Cleaning - The copper artifacts are soaked in a 5% phosphoric acid solution and brushed periodically with a strong bristle brush until the calcareous materials come off. On rare occasions large items are sand-blasted with fine grit to remove the encrustations.

(2) Neutralization - After being thoroughly cleaned, the artifact, unless it is exceedingly large, is bathed in alternate hot and cold distilled water baths until it tests negative for salts.

(3) Drying - The artifacts are then dried in a 212°F. oven for eight or more hours depending on their size and density.

(4) Coating - The items are finally either coated with a clear flat coating or left to weather naturally.

Lead, tin and pewter

(1) Cleaning - These artifacts are carefully cleaned by chipping, picking, and brushing under running water. To remove stubborn calcareous material, the artifacts are soaked in a 5% phosphoric acid solution and brushed frequently with a soft vegetable brush to remove the loosened material.

(2) Neutralization - Once cleaned the artifacts are rinsed in heated distilled water until they test negative for acid. All traces of the phosphoric acid used in cleaning are removed.

(3) Drying - Since coatings are not normally required, these items are simply allowed to dry at room temperature before they are ready for exhibition.

FERROUS

The numerous iron and steel artifacts are the most difficult ones from the MODERN GREECE to preserve. Many are badly deteriorated and fragile due to their long exposure to salt water. Two basic methods used in treating the ferrous artifacts are described in detail below: (1) electrochemical reduction and (2) electrolytic reduction. Fragile or very large items are best treated with electrolytic reduction. This method does not jostle a fragile item during the process. Also, large items do not require inordinately large amounts of chemical for electrolytic treatment. Several other methods are sometimes used for preserving ferrous artifacts. These include plastic embedding, sandblasting, and sonic cleaning. Very delicate ferrous, nonferrous, and organic items which will not withstand excessive handling are embedded in clear plastic. Tiny, fine items of all types of material may be cleaned with sonic waves. Sandblasting is only used on very large metal artifacts in good condition without markings or fine details that might be injured by this treatment.

Electrochemical reduction

(1) Reduction - This process uses an electrochemical reaction to cause oxidation and reduction to remove concreted material and iron oxide. For the reduction process the artifact is buried under a heap of

170 Summary of Preservation

granulated zinc in an iron or enamel basin. Then it is covered with a 10 to 20% solution of sodium hydroxide dissolved in water. This mixture is then boiled for an hour or more. The level of the fluid is maintained by the addition of distilled water. This process produces noxious fumes and must be carried out in a well ventilated area. The zinc can be regranulated and used again, but the sodium hydroxide has to be replaced. This makes the process relatively expensive in terms of time and chemicals. An additional disadvantage is that the artifact is buried and the process is difficult to visually monitor.

(2) Neutralization - After the chemical action has ceased, the artifact is brushed clean under running water. It is then bathed in alternating hot and cold distilled water baths, until it tests negative for salts and acids.

(3) Drying - After the artifact is thoroughly neutralized, it is dried in an oven at vapor point (approximately 200°F.) for a period of eight to twelve hours. To prevent surface rusting during drying, the artifact is coated with manganese phospholene #7 before it is placed in the oven. Particularly fragile items may be dried with alcohol and ether baths.

(4) Coating - Depending on the item and its condition, the dried artifact is coated with a plastic epoxy, vinyl, or spray fixative. In general a final coating with flat vinyl is used to cut down surface gloss and to give the artifact a pleasing appearance.

Electrolytic reduction

(1) Reduction - This process involves setting up an electrolytic cell; wherein, the artifact to be cleaned is the cathode. The cell itself consists of a vat with two electrodes, the anode, and the cathode, suspended in an electrically conductive solution called the electrolyte. A 5% sodium hydroxide solution or about 45 grams per gallon of distilled water is usually used for the electrolyte. Electrical current is applied from an external direct current source such as a rectifier to cause oxidation and reduction which results in the removal of the encrustation and iron oxide. The amount of current used varies according to the composition and condition of the artifact; however, approximately 10 amperes per square foot of surface area is

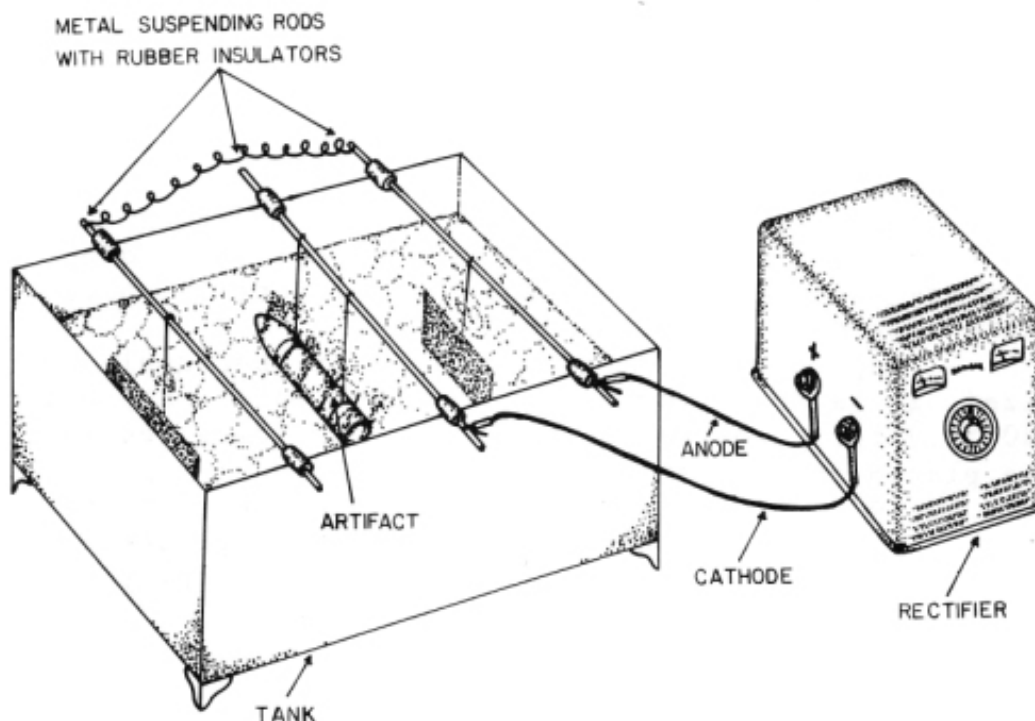
generally used. The anode is the positive terminal of the electrolytic cell, to which negatively charged ions, electrons, and particles travel when the electric charge is applied. Oxidation occurs at the anode and oxygen is evolved. At the cathode, reduction occurs and hydrogen evolves. During the process the salts are transferred from the artifact to the anode by electrolytic attraction. This system is relatively inexpensive to set up and offers a variety of uses since the amount of the current can be changed to suit the artifact being cleaned.

(2) Neutralization - After the artifact is removed from the electrolyte, it is brushed under water and then bathed in alternating baths of hot and cold distilled water until it tests negative for salts.

(3) Drying - When the artifact is neutralized, it is dried in an oven at vapor point (approximately 200°F.) for eight to twelve hours. To prevent surface rusting during drying, the artifact is coated with manganese phospholene #7 before it is placed in the oven.

(4) Coatings - Depending on the item and its condition, the dried artifact is coated with plastic, epoxy, vinyl, or spray fixative. In general a final coating with flat vinyl is used to cut down the surface gloss and to give the artifact a pleasing appearance.

Figure 172. Equipment for electrolytic reduction.



Plastic embedding

(1) Cleaning - The small artifact to be embedded in plastic is cleaned by whatever method best suits its composition and condition.

(2) Neutralization - The metal item, unless it is too fragile, is bathed in alternating hot and cold distilled water baths, until it tests negative for salts and acids. Ordinarily organic materials do not require neutralization before embedding.

(3) Drying - After the artifact is thoroughly neutralized, it is simply blotted dry or dried in alcohol or ether baths.

(4) Embedding - A smooth plastic mold of an appropriate size for the artifact is filled one-third full of clear plastic resin. As this layer starts to harden, the artifact is positioned in the semi-hard plastic. If the artifact starts to float, a small amount of resin is poured over it. When the plastic starts to set with the artifact firmly in place, the mold is completely filled. When the plastic resin has fully hardened, the artifact is removed from the mold. Once any rough surfaces are polished smooth, the artifact is ready for exhibition.

Sandblasting

(1) Blasting - Bulky items are sandblasted to bare metal using a standard sandblasting apparatus and fine grit. The jet of sand and air under pressure simply erodes away the outer deteriorated layer leaving the metal bare. This method quickly removes concreted materials from large metal items.

(2) Neutralization - Before it is dried the artifact is steam cleaned to remove any residue. To prevent surface rusting during drying the artifact is coated with manganese phospholene #7.

(3) Drying - After the item is thoroughly neutralized, it is dried in an oven at vapor point (approximately 200°F.) for eight to twelve hours. Articles too large to be placed in an oven are left to air dry.

(4) Coating - Depending on the item and its condition, the dried artifact is coated with plastic epoxy or vinyl. Exceedingly bulky items to be displayed

outside are primed with inorganic zinc silicate coating to prevent deterioration from exposure to the elements.

Sonic cleaning

(1) Cleaning - This is a specialized process requiring ultra-sonic equipment. It is rarely used and only on very small and exceptionally fragile ferrous and nonferrous materials. The scale and debris on the artifact is removed by the vibration caused by the high frequency sound waves bouncing off the object.

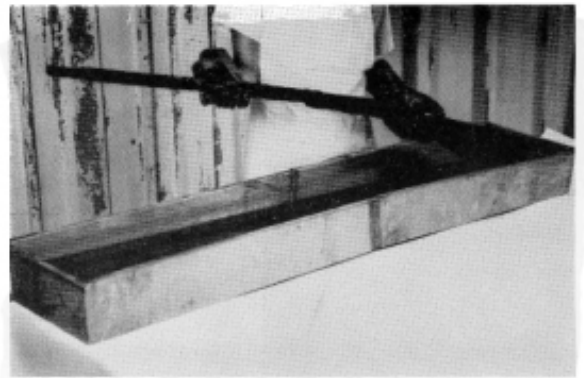
(2) Neutralization - Once the artifact is thoroughly cleaned, it is bathed in alternating hot and cold distilled water baths until it tests negative for salts and acids. This step is sometimes left out on very delicate items which cannot tolerate such treatment.

(3) Drying - After it tests negative for salts and acids, the artifact may be dried either in the oven or with alcohol or ether baths.

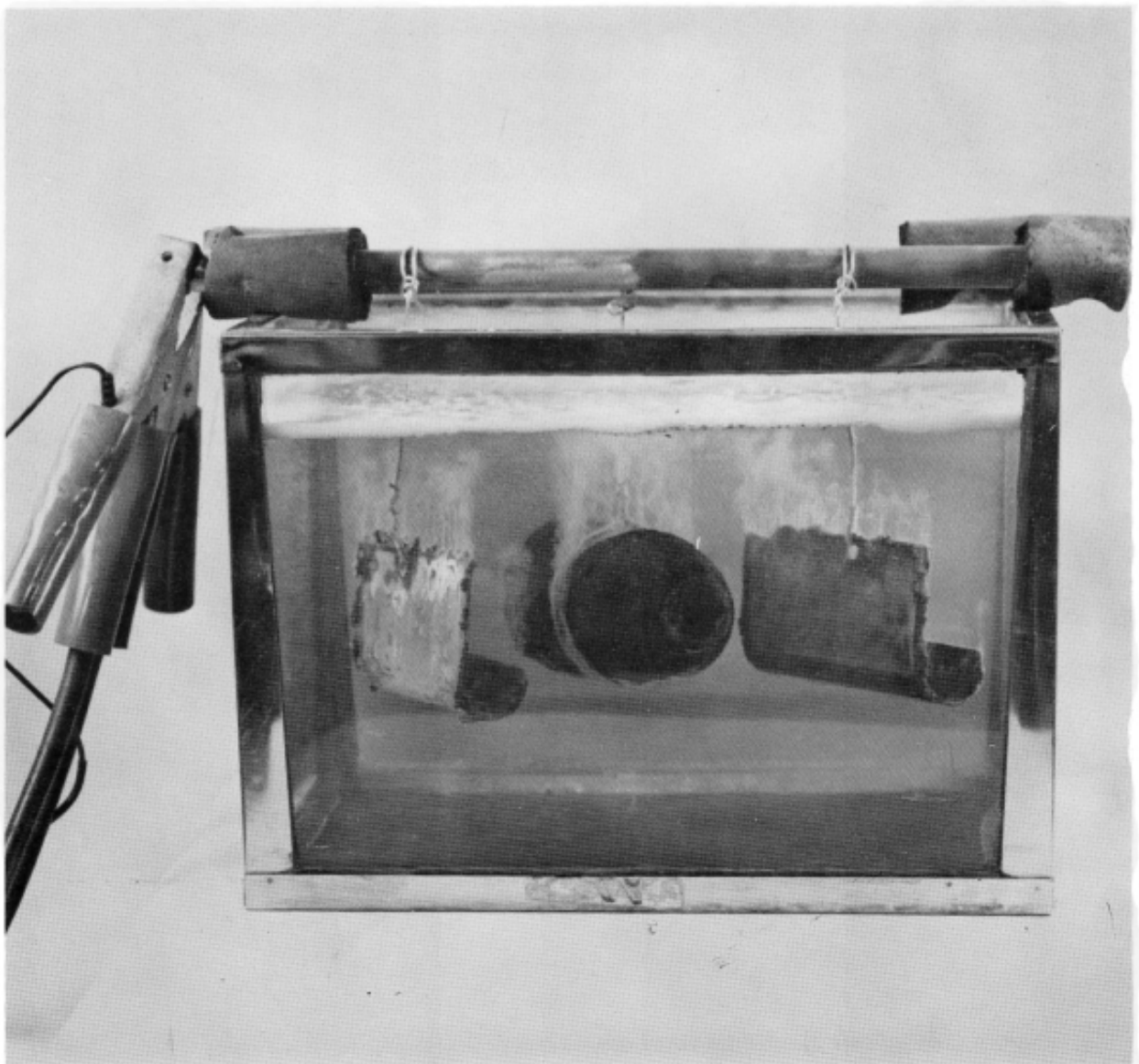
(4) Coating - As with other ferrous artifacts, those cleaned by ultra sound may be coated, if they require it.



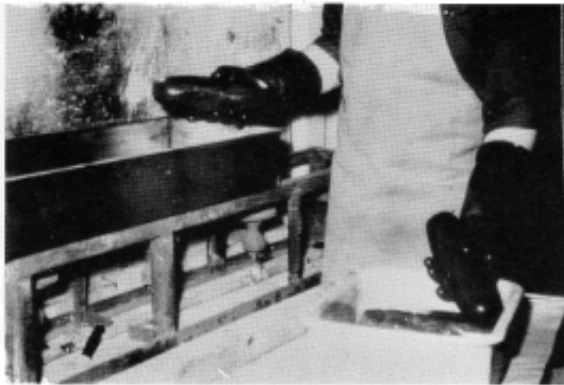
A. Manual cleaning



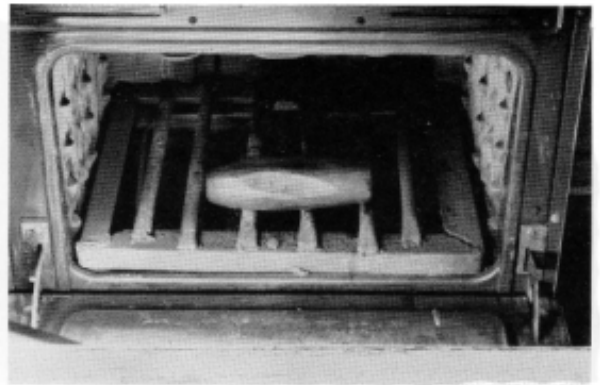
B. Impregnation



C. Electrolysis



A. Neutralization



B. Drying.



C. Coating



D. Storage

SUPPLEMENTARY
MATERIAL



APPENDIX I

STATISTICAL ANALYSIS OF .577 CALIBER ENFIELD BULLET MEASUREMENTS

A statistical analysis was done on 100 Enfield bullets by Joe Stephen Davis, a student at Cape Fear Technical Institute, to compute standard deviations in their specific measurements. Davis was trying to show how consistent individual bullet molds were with each other. The following are excerpts from this report:

<u>Length (mm)</u>	<u>#Bullets</u>	<u>Diameter (mm)</u>	<u>#Bullets</u>
2.56 to 2.60	2	1.41 to	7
2.61 to 2.65	1	1.42 to	16
2.66 to 2.70	21	1.43 to	34
2.71 to 2.75	53	1.44 to	28
2.76 to 2.80	12	1.45 to	9
2.81 to 2.85	7	1.46 to	4
2.86 to 2.90	4	1.47	1
Average - 2.71195		Average - 1.42474	

<u>Cavity Depth (mm)</u>	<u>#Bullets</u>	<u>Weight (grams)</u>	<u>#Bullets</u>
.99 to	1	31.5000 to 31.9999	1
1.00 to	14	32.0000 to 32.4999	1
1.01 to	19	32.5000 to 32.9999	0
1.02 to	10	33.0000 to 33.4999	3
1.03 to	18	33.5000 to 33.9999	20
1.04 to	21	34.0000 to 34.4999	48
1.05 to	14	34.5000 to 34.9999	24
1.06	3	35.0000 to 35.4999	0
		35.5000 to 35.9999	2
Average - 1.02115		Average - 34.1664	

<u>Cavity Opening Diameter (mm)</u>	<u>#Bullets</u>
.96 to	1
.99 to	2
1.02 to	10
1.05 to	32
1.08 to	37
1.11 to	16
1.14	2
Average - 1.0822	

APPENDIX II

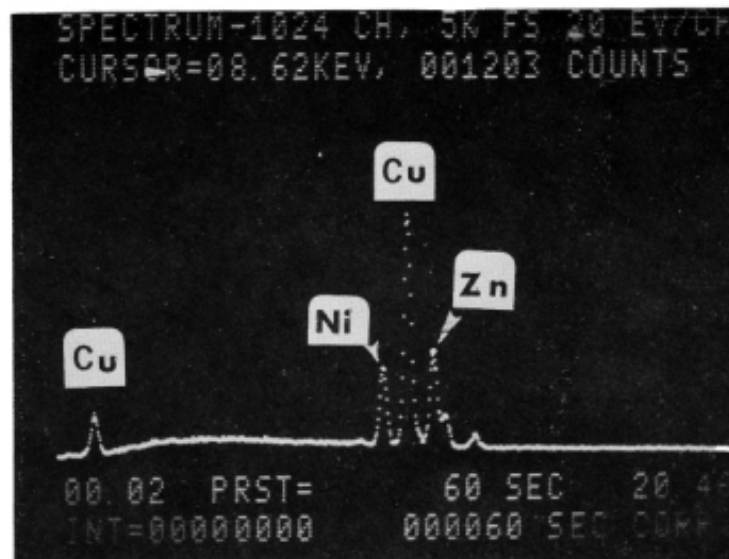
ANALYSIS OF COMPOSITION OF SHEATH TIPS AND THROATS

The composition of the sheath tips and throats has been determined by SEM-EDX, X-ray fluorescence, and electron microprobe analysis.

The accompanying photographs show the energy dispersive analysis of the tip and the throat (labeled "guard" on the photograph) in the scanning electron microscope (See Plate XXI). The X-ray fluorescence analysis of the throat and tip yield more quantitative results as follows:

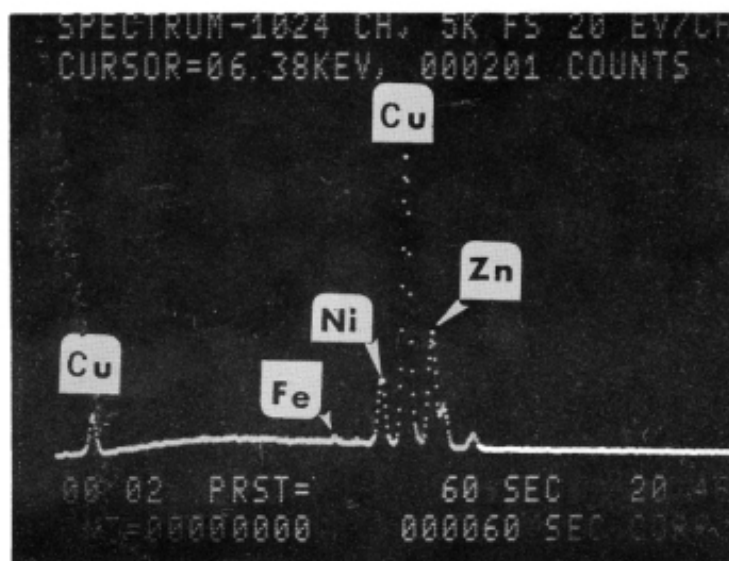
	<u>Ni</u>	<u>Cu</u>	<u>Zn</u>	<u>Fe</u>
Throat	25.0	55-60	20.0	<.1%
Tip	20.0	55-60	25.0	<.1%

These analyses were performed without destroying the pieces. The geometrics lead to some uncertainty in the analysis.



Tip

- A. Energy dispersive analysis of sheath tip



Guard

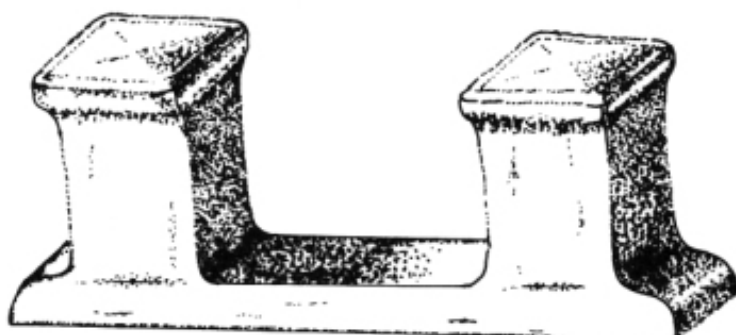
- B. Energy dispersive analysis of the throat (labeled guard on photograph)

APPENDIX III

ARTIFACTS SUPPOSEDLY RECOVERED FROM THE MODERN GREECE BUT OF QUESTIONABLE ORIGINS

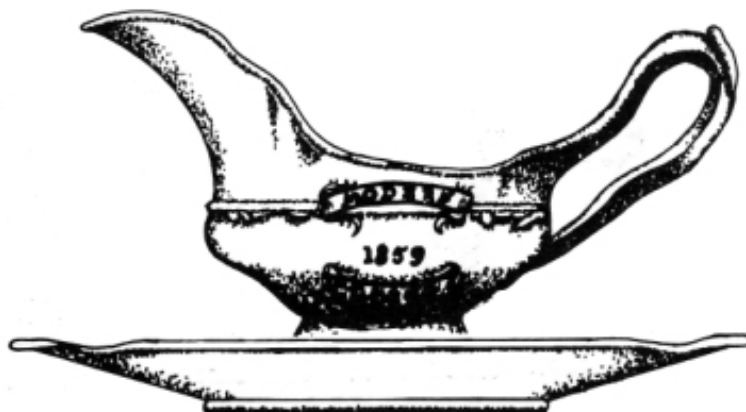
The following artifacts are not included in the inventory itself, because they either were not recovered directly from the site by the State of North Carolina and the United States Navy divers, or they were possibly not aboard the vessel at the time of the sinking. The gravy bowl, although it bears the vessel's name and construction date, is not included in the inventory because the history of its recovery is unknown. The staff at the Blockade Runner Museum, Carolina Beach, North Carolina claims that the bollard, hawse and vent pipes were recovered from the MODERN GREECE. The commode, gearbox, grapple hooks, and flanged pipe may have fallen into the site from boats fishing in the area or from the fishing pier that once jutted out over the site.

Article:	Bollard
Recovered:	1
Size:	Width (of base) 7 "
	Width (of bitt) 5 "
	Width (at top of bitt) 7 1/4"
	Length (of outer edge) 30 "
Markings:	None
Description:	A double posted ship's bollard, This is currently displayed at the Blockade Runner Museum, Carolina Beach, North Carolina.
Condition:	Fair
Figure 173.	Bollard
	Scale: 1/8



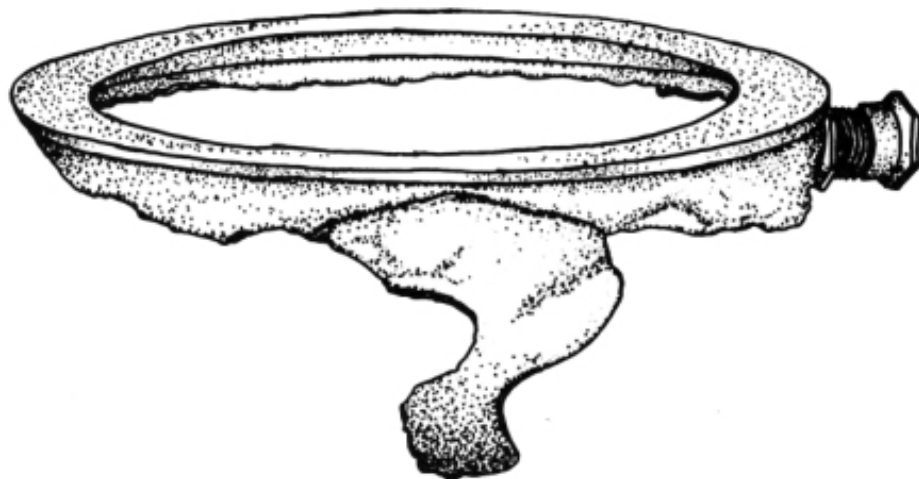
Article: Bowl, gravy
 Recovered: 1
 Size: Height (overall) 4 3/4"
 Width (from handle to pour spout) 7 1/2"
 Markings: The name MODERN GREECE frames the date 1859 in a decorative display on the side.
 Description: This pearlware gravy bowl is in one piece; the pitcher and saucer are attached. The black lettering on the side is probably two decals. These appear to have been poorly applied, for their edges do not exactly meet making the design appear skewed. It presumably is from the MODERN GREECE as the decoration on the side suggests. The gravy bowl came to the Fort Fisher Museum from a local family who found it in their attic in among a batch of goods sent to them from western North Carolina. No information is available as to its recovery from the vessel, although its condition suggests that it may have been recovered either at the sinking or soon afterward.
 Condition: Good. The surface of the gravy boat is badly crazed.

Figure 174. Bowl, gravy
 Scale: 1/2



Article: Commode, porcelain
 Recovered: 1
 Size: Diameter 13 1/2"
 Markings: None
 Description: A porcelain commode of questionable origin was recovered from the MODERN GREECE site. It may have come from the vessel or the fishing pier. The latter option is more probable.
 Condition: Poor. All that remains are fragments that cannot be completely pieced together.

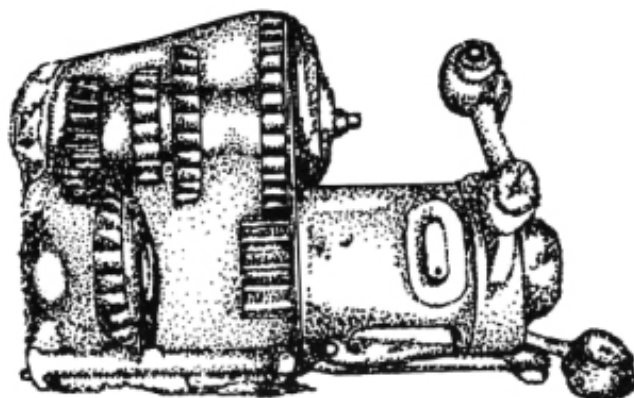
Figure 175. Commode, porcelain
 Scale: 1/4



Article: Gearbox
 Recovered: 1
 Size: Length (overall) 17"
 Width (overall) 10"
 Markings: None
 Description: A gear box was recovered from the MODERN GREECE site; however, it is doubtful that it came off the vessel itself. It may have fallen from the fishing pier. It may also have been lost from a fishing boat that was using it as a snag anchor while fishing over the wreck.
 Condition: Good

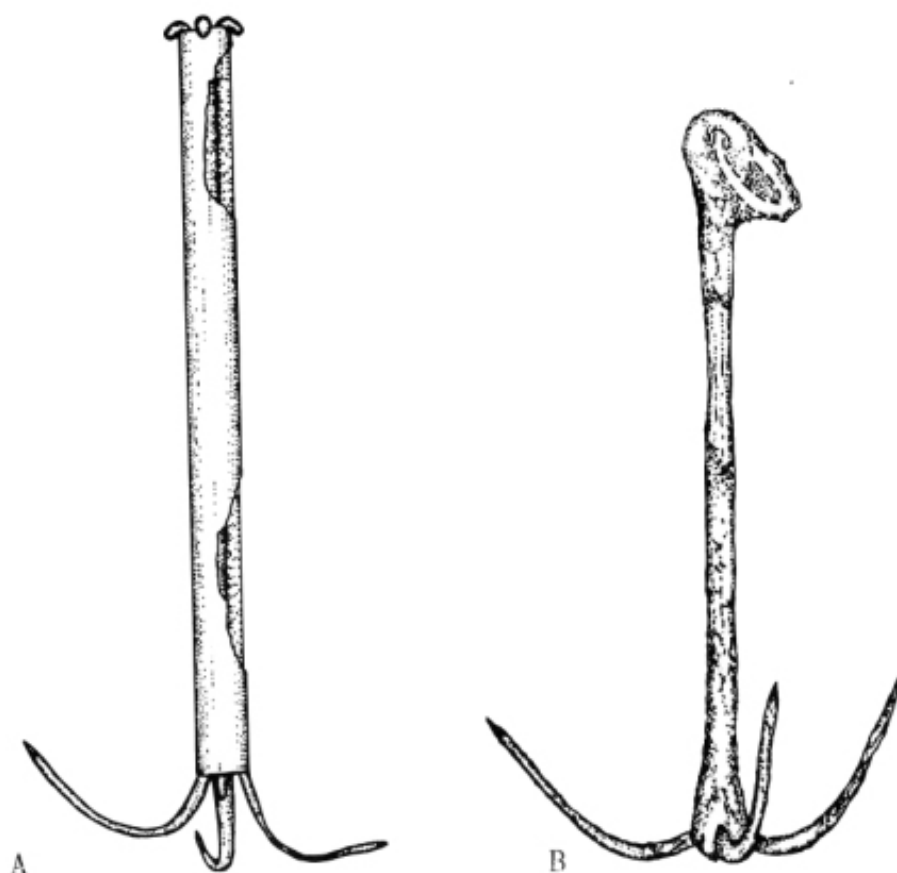
Figure 176.

Gearbox
Scale: 1/5



Article:	Hooks, grapple			
Recovered:	2			
Size:	A --	Length	23	"
		Width (from fluke tip to fluke tip)	12	"
		Diameter (of shaft)	1 3/4"	
	B --	Length	22	"
		Width (from fluke tip to fluke tip)	15	"
		Diameter (of shaft at middle)	1 1/8"	
		Diameter (of ring)	3	"
Markings:	None			
Description:	The longer metal hook (A) has thin flukes which run through the inside of a hollow pipe to the top where they overlap to form a shaft. The means whereby a rope would attach is no longer visible. The shorter metal hook (B) has longer and wider flukes attached to a solid shaft topped by an eye and a ring.			
Condition:	Fair. Both hooks are heavily concreted.			

Figure 177.

Hooks, grapple
Scale: 1/6

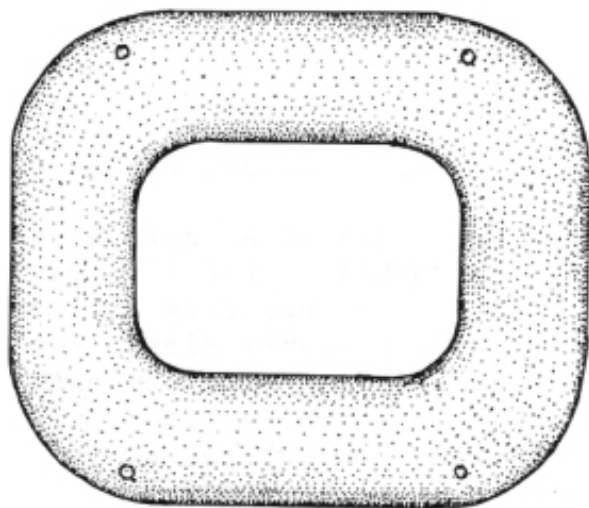
Article:	Pipe, flanged		
Recovered:	1		
Size:	Length	(outer)	78"
	Diameter	(inner)	12"
	Diameter	(inner)	9"
	Width	(base of U-shaped flange)	16"
Markings:	None		
Description:	This metal pipe flanged at both ends recovered from the MODERN GREECE site may originally have come either from the vessel itself or from the nearby pier. The flange at one end is round; whereas, the other is U-shaped. There are no visible mountings showing how, where, or to what it might have been attached.		
Condition:	Fair. It is heavily concreted, and there are several holes completely through the metal.		

Figure 178. Pipe, flanged
Scale: 1/12

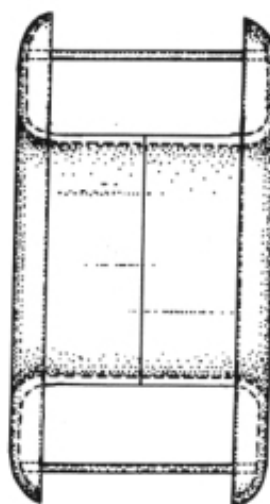


Article:	Pipe, hawse
Recovered:	1
Size:	Length (overall) 15 "
	Width (overall) 13 "
	Height (overall) 7 1/2 "
	Width (of flange at top) 3 "
Markings:	None
Description:	The Blockade Runner Museum, Carolina Beach, North Carolina, displays a brass hawse pipe purportedly from the MODERN GREECE. It is constructed of two identical oval flanged pipes seamed together back to back and supported at the four corners with tubular braces.
Condition:	Good

Figure 179. Pipe, hawse
Scale: 1/5



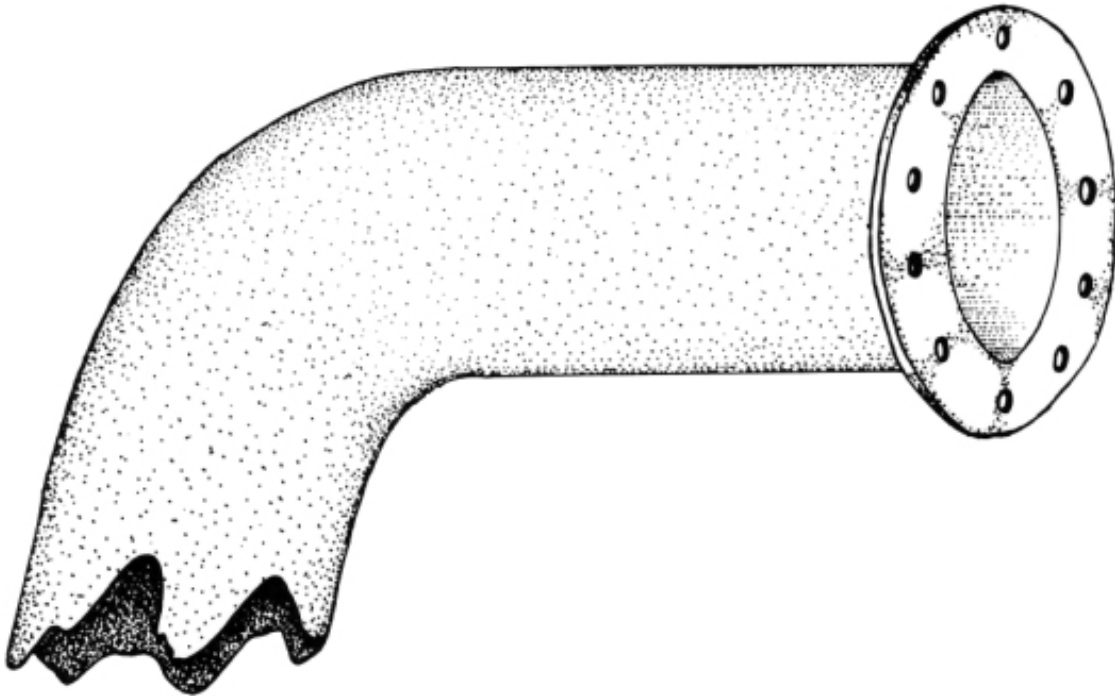
Top



Side

Article:	Pipe, vent
Recovered:	1
Size:	Length 48 "
	Diameter (of pipe at outside) 12 3/4"
	Diameter (of pipe at inside) 12 "
	Diameter (of flange) 18 "
Markings:	None
Description:	A brass vent pipe jagged at one end and with ten bolt holes at the other flanged end is displayed as purportedly from the MODERN GREECE by the Blockade Runner Museum, Carolina Beach, North Carolina.
Condition:	Good

Figure 180. Pipe, vent
Scale: 1/8



ADDENDUM

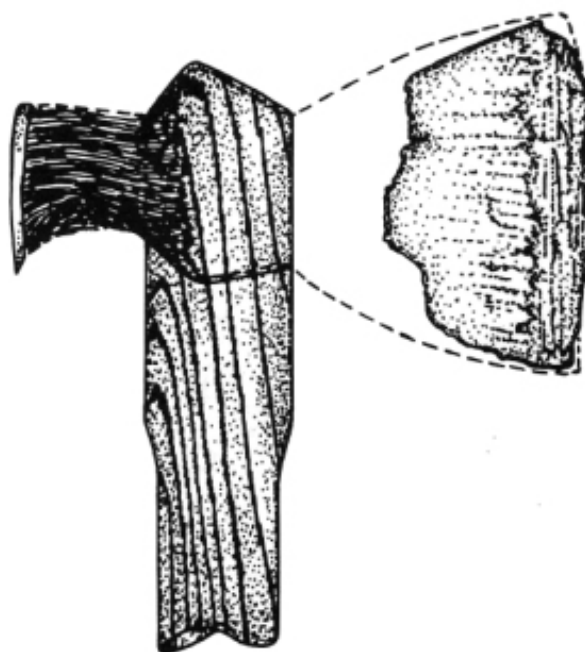
Since the preservation of the cargo from the MODERN GREECE is a continuing project; new items, markings, and details appear from time to time. The following two artifacts which would have appeared with the other tools and implements have come to light since that section was readied for publication. They are described and illustrated below in the interest of thoroughness.

Article:	Hatchet, claw (MG-K)
Recovered:	Several fragments and basic outline in a concretion.
Size:	Length (reconstructed) 6 "
	Width (reconstructed of blade) 3 3/4"
	Width (reconstructed of claw) 1 3/4"
	Thickness (reconstructed of claw) 7/8"
Markings:	None
Description:	Fragments of a claw hatchet with its handle were recently found while cleaning a concreted bundle of hardware. The entire hatchet does not remain; however, the fragments are enough to allow a reconstruction to be made.
Condition:	Poor. The majority of the artifact has been lost in cleaning, and it remains only in a very fragmentary state.

Figure 181. Hatchet, claw
Scale: 1/2



Claw



188 Addendum

Article: Rasp, wood (MG-3I)
Recovered: 1
Size: Length 12 1/4"
Width 1 "
Markings: Peace with a horizontally placed P before the trademark.
Description: A steel wood rasp with four sets of teeth. This rasp was found in a cluster of files.
Condition: Good
Remarks: For an explanation of this marking see information on C. HENRY, SHEFFIELD.

Figure 182. Rasp, wood
Scale: 1/2



Side A



Side B

Figure 183. Detail maker's mark on rasp
Scale: 2/1



GLOSSARY OF MANUFACTURER'S MARKINGS

The majority of the information appearing in this section was gained from correspondence with various libraries in England. Efforts to trace the unidentified maker's markings are continuing at this time. Only significant markings denoting makers or methods or time of manufacture are dealt with here. Numbers and individual letters stamped on some metal objects are not identified.

J. ABBOTT & CO., GATESHEAD-ON-TYNE.

This firm located at Gateshead-on-Tyne, England was involved in iron manufacturing, steam, gas, water and air engineering, brass and copper founding, plumbing, tin plate working, as well as in the manufacture of anchors, chains, and cables.

BAGILLT WORKS, NEWTON KEATES & CO., LIVERPOOL.

The firm of Newton Keates & Co. was involved in copper and lead manufacturing at 3 Coopers Row and 28 King Street, Liverpool, England from 1847 until the end of the nineteenth century. After 1878 they also functioned as agents for Daubuz and Co., tin smelters, Truro, Cornwall, England.

BAGILLT WORKS, NEWTON LYON & CO., LIVERPOOL.

The firm of Newton Lyon & Co., located at 1A Coopers Row and 28 King Street, Liverpool, England was involved in copper and lead molting during the first half of the nineteenth century.

T. BOLITHO & SONS, PENZANCE, CHYANDOUR.

At this time the manufacturer denoted by this marking is unidentifiable.

CAST STEEL.

This signifies that the metal was cast and does not denote a specific manufacturer.

COOPER MAKER.

At this time this marking is unidentifiable.

FABR DE ANGOSTURA.

A marking similar to this, FABR DE TOLEDO, is used to indicate knives made in Toledo, Spain. Research identifies no town of Angostura in Spain; however, there are towns so named in both Mexico and Venezuela. It seems unlikely that the metal for the bowie knife on which this appears was made in South America. If Angostura indicates as is suggested a town, it is possibly too small to appear on nineteenth century maps of Spain.

THO. GREEN.

At this time this marking is unidentifiable.

C. HENRY, SHEFFIELD.

A trade-mark directory of 1919 gives the name around the letters "CP" which are separated by a Maltese Cross. It is identified as the mark of Charles Henry, a joiners' tool maker, of Rutland Road, Sheffield. In the same directory a very similar mark is given with only the name "C. Parkin" replacing that of "Chas. Henry", and this second mark is that of Joseph Henry Peace, cutlers and edgetool manufacturers, of Button Lane, Sheffield. Charles Henry himself is not listed individually in the street directories of the period. From this evidence it seems possible that he had some connection with the firm of J.H. Peace which was in business from c. 1890 to c. 1950. A similarly named firm, J. Peace and Co. Ltd., saw manufacturers, were in business from c. 1850-1959, and for part of the time were at Rutland Road; however, no other connection between the firms is evidenced.

WRIGHT HOLDSWORTH & CO.

A partnership of this name did business during the 1860s. They were merchants and manufacturers of crinoline steel, busks, graining combs, antigraphollos springs, etc., cane knives, saws, engineers' tools, etc. After 1862 the two partners appear to have gone into business individually.

W. & H. HUTCHINSON, SHEFFIELD.

This firm was a manufacturer of surgical, dental, and veterinary instruments, scissors, lancets, stomach pumps, syringes, pill machines, etc. The firm was founded by William Hutchinson probably early in the nineteenth century. The name changed from William Hutchinson and Son to William and Henry Hutchinson during the mid-1830s; therefore, the medical tools from the MODERN GREECE were definitely produced after this date. The firm is still in business at 43 Allen Street, Sheffield, England.

W. LEES & SONS.

At this time the manufacturer denoted by this marking is unidentifiable.

LLODE NON.

This marking is partially obliterated and cannot be identified from the remaining portion given here.

M & C.

At this time the manufacturer denoted by this marking is unidentifiable.

NON*XLL.

This trade mark was assigned to William Broadhurst of Sheffield, England, by the Cutlers' Company of Hallamshire on December 7, 1838, and was used by him until well after the Civil War. The NON*XLL mark was eventually obtained by

the firm of Joseph Allen and Sons, cutlery manufacturers, who used it on their products. The mark is most often seen on these. The mark itself translates to "None Excel" and should not be confused with Wostenholm mark I*XL which translates to "I Excell".

REGISTER LOCK.

This is not a manufacturer's trade-mark but refers to the manner in which the jaws lock when set anywhere along the shaft.

SHEAR STEEL.

This denotes a steel produced by heating blister steel that has been sheared into short lengths to a high heat. It also refers to a steel making process whereby it is welded by hammering or rolling. It also refers to hammer finishing of steel under high heat.

STRIKE FIRE.

This denotes that the metal in the blade is of a superior quality and that the knife could be used with a flint to start a fire.

JOHN K. TURNER & CO., SHEFFIELD.

An edgetool manufacturer of this name conducted business in Sheffield, England from about 1830 to 1850; and a firm, Turner Brothers (John and Edward), tool manufacturers existed from 1860 to c. 1865. This marking possibly also refers specifically to John Kent Turner, who was a merchant and manufacturer from 1879 on as agent for the iron founders E. Pearson and Co.

V (crown) R.

This marking is not a manufacturer's marking but denotes that these knives were made during the reign of Queen Victoria (1837-1901).

C. WALTERS & CO., GLOBE WORKS, SHEFFIELD.

At this time the manufacturer denoted by this marking is unidentifiable.

WARD & SONS, MAKERS, BIRMN.

This marking appears on guns made by the Birmingham, England firm of Ward and Sons before and after 1925 to 1929.

WARRANTD.

This denotes that the metal in the blade is superior quality.

YATES & CO., ASTON MANOR.

This firm located at Aston Manor, England still manufactures hoes with a design and markings similar to those recovered from the MODERN GREECE.

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