1963

Pre-Steamboat Navigation on the Lower Mississippi River.

John Amos Johnson

Louisiana State University and Agricultural & Mechanical College

Follow this and additional works at: https://digitalcommons.lsu.edu/gradschool_disstheses

Recommended Citation


This Dissertation is brought to you for free and open access by the Graduate School at LSU Digital Commons. It has been accepted for inclusion in LSU Historical Dissertations and Theses by an authorized administrator of LSU Digital Commons. For more information, please contact gradetd@lsu.edu.
This dissertation has been microfilmed exactly as received

JOHNSON, John Amos, 1929—
PRE-STEAMBOAT NAVIGATION ON THE LOWER MISSISSIPPI RIVER.

Louisiana State University, Ph.D., 1963
Geography

University Microfilms, Inc., Ann Arbor, Michigan
PRE-STEAMBOAT NAVIGATION ON THE LOWER MISSISSIPPI RIVER

A Dissertation

Submitted to the Graduate Faculty of the Louisiana State University and Agricultural and Mechanical College in partial fulfillment of the requirements for the degree of Doctor of Philosophy

in

The Department of Geography and Anthropology

by

John Amos Johnson
B.S., Memphis State University, 1951
M.A., The University of Tennessee, 1953
August, 1963
ACKNOWLEDGMENTS

Grateful and sincere gratitude is acknowledged to Professor Fred B. Kniffen who directed this dissertation. Helpful advice was given by the critical readers Professors William G. Haag, James P. Morgan, John H. Vann, and Harley J. Walker. Knowledge gained in courses from Professors Robert C. West and Richard J. Russell was invaluable background. Without the aid and understanding of my wife, Sue Gibson Johnson, this dissertation would not have been possible.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>ii</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>vi</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>vii</td>
</tr>
<tr>
<td>LIST OF PLATES</td>
<td>ix</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>x</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>xiv</td>
</tr>
<tr>
<td>CHAPTER</td>
<td></td>
</tr>
<tr>
<td>I. NAVIGATION DURING THE EXPLORATION AND</td>
<td></td>
</tr>
<tr>
<td>EARLY SETTLEMENT PERIOD: THE PIROGUE AND BATEAU ERA</td>
<td></td>
</tr>
<tr>
<td>The American Indian Period</td>
<td>2</td>
</tr>
<tr>
<td>Background of European Settlement.</td>
<td>6</td>
</tr>
<tr>
<td>Boat Types and Navigation Techniques</td>
<td>10</td>
</tr>
<tr>
<td>Indian Boat Types</td>
<td>11</td>
</tr>
<tr>
<td>Birchbark canoe</td>
<td>11</td>
</tr>
<tr>
<td>Pirogues</td>
<td>20</td>
</tr>
<tr>
<td>Boat Types Introduced by the French</td>
<td>54</td>
</tr>
<tr>
<td>Ship’s boat</td>
<td>55</td>
</tr>
<tr>
<td>Canot.</td>
<td>56</td>
</tr>
<tr>
<td>Chaloupe</td>
<td>60</td>
</tr>
<tr>
<td>Bateau</td>
<td>63</td>
</tr>
<tr>
<td>Transportation by Pirogues and Bateaus.</td>
<td>103</td>
</tr>
<tr>
<td>II. THE FLATBOAT AND KEELBOAT ERA.</td>
<td>112</td>
</tr>
<tr>
<td>General Settlement Pattern</td>
<td>113</td>
</tr>
<tr>
<td>Flatboats</td>
<td>116</td>
</tr>
<tr>
<td>CHAPTER</td>
<td>PAGE</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>The Flatboat's Identifying</td>
<td>116</td>
</tr>
<tr>
<td>Characteristics of Size and Shape.</td>
<td></td>
</tr>
<tr>
<td>Method of Building the Flatboat.</td>
<td>121</td>
</tr>
<tr>
<td>Fittings of the Flatboat.</td>
<td>127</td>
</tr>
<tr>
<td>Other Terms for Flatboats.</td>
<td>130</td>
</tr>
<tr>
<td>Sub-Types of Flatboats.</td>
<td>134</td>
</tr>
<tr>
<td>Origin and Early Use of the Flatboat.</td>
<td>141</td>
</tr>
<tr>
<td>Later Use and Evolution of the Flatboat.</td>
<td>150</td>
</tr>
<tr>
<td>Keelboats.</td>
<td>152</td>
</tr>
<tr>
<td>Keelboat Description.</td>
<td>153</td>
</tr>
<tr>
<td>Barge.</td>
<td>162</td>
</tr>
<tr>
<td>Keelboat Origin.</td>
<td>170</td>
</tr>
<tr>
<td>Keelboat's Early Use and Later Evolution.</td>
<td>177</td>
</tr>
<tr>
<td>Trade in the Flatboat and Keelboat Era.</td>
<td>180</td>
</tr>
</tbody>
</table>

### III. NAVIGATION TECHNIQUES AND NATURAL AIDS AND HAZARDS

<p>| Physical Characteristics of the Lower Mississippi River | 191 |
| Downstream Navigation.                                  | 201 |
| Upstream Navigation.                                     | 214 |
| Speed and Travel Time.                                   | 215 |
| Seasons.                                                  | 218 |
| Boat Types.                                              | 220 |
| Meanders                                                 | 225 |
| Rowing and Paddling.                                     | 232 |
| Poling                                                    | 235 |
| Cordelling                                                | 243 |
| Warping                                                   | 251 |
| Bushwhacking                                             | 252 |
| Sailing                                                   | 253 |
| Eddies                                                    | 259 |
| Hazards.                                                  | 261 |
| Keeping in the Channel                                   | 263 |
| Bank Caving and Landings                                 | 269 |
| Snags, Planters, Sawyers, and Wooden Islands             | 276 |</p>
<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windstorms</td>
<td>283</td>
</tr>
<tr>
<td>Fog</td>
<td>285</td>
</tr>
<tr>
<td>Night Travel</td>
<td>286</td>
</tr>
<tr>
<td>Cramer's Guidebook</td>
<td>288</td>
</tr>
<tr>
<td>IV. SUMMARY AND CONCLUSIONS</td>
<td>304</td>
</tr>
<tr>
<td>BIBLIOGRAPHY</td>
<td>312</td>
</tr>
<tr>
<td>VITA</td>
<td>331</td>
</tr>
</tbody>
</table>
# LIST OF TABLES

<table>
<thead>
<tr>
<th>TABLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Flatboat Dimensions as Given in Early Source Accounts</td>
<td>119</td>
</tr>
<tr>
<td>II. Comparison of a Section of the Channel of the Early 1800's With Modern Conditions</td>
<td>291</td>
</tr>
</tbody>
</table>
LIST OF FIGURES

<table>
<thead>
<tr>
<th>FIGURE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Indian Method of Building Dugouts</td>
<td>31</td>
</tr>
<tr>
<td>2. Fur Trader's Pirogue.</td>
<td>42</td>
</tr>
<tr>
<td>3. Square Stern Pirogue.</td>
<td>48</td>
</tr>
<tr>
<td>4. Square Stern Pirogue.</td>
<td>48</td>
</tr>
<tr>
<td>5. Canot</td>
<td>57</td>
</tr>
<tr>
<td>6. Chaloupe.</td>
<td>61</td>
</tr>
<tr>
<td>7. Bateaux at Biloxi</td>
<td>68</td>
</tr>
<tr>
<td>8. Bateau</td>
<td>76</td>
</tr>
<tr>
<td>9. Description Plaque for Bateau</td>
<td>76</td>
</tr>
<tr>
<td>10. Bateau or Mackinaw Boat Being Used on the Missouri River in the 1830's</td>
<td>77</td>
</tr>
<tr>
<td>11. Bateau Still Being Used in West Virginia in 1878.</td>
<td>93</td>
</tr>
<tr>
<td>12. Flatboat at Baton Rouge</td>
<td>129</td>
</tr>
<tr>
<td>13. Sub-Types of Flatboats</td>
<td>136</td>
</tr>
<tr>
<td>14. Flatboats Docked at New Orleans</td>
<td>139</td>
</tr>
<tr>
<td>15. Family Boat or Kentucky Boat.</td>
<td>140</td>
</tr>
<tr>
<td>17. Keelboat.</td>
<td>159</td>
</tr>
<tr>
<td>FIGURE</td>
<td>PAGE</td>
</tr>
<tr>
<td>--------</td>
<td>------</td>
</tr>
<tr>
<td>18. Barge</td>
<td>168</td>
</tr>
<tr>
<td>20. Old Town Bend Below Helena, Arkansas</td>
<td>197</td>
</tr>
<tr>
<td>21. Cut-Off</td>
<td>200</td>
</tr>
<tr>
<td>22. Comparative Routes of Keelboat and Modern Tow</td>
<td>231</td>
</tr>
<tr>
<td>23. Banded Lines of Willows on the Lower Side of a Point Bar</td>
<td>246</td>
</tr>
<tr>
<td>24. Inundated Willows</td>
<td>274</td>
</tr>
</tbody>
</table>
# LIST OF PLATES

<table>
<thead>
<tr>
<th>PLATE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Canoe, Dugout, and Bateau Distribution</td>
<td>81</td>
</tr>
<tr>
<td>II. Diffusion of Boat Types During Flatboat and Keelboat Era</td>
<td>178</td>
</tr>
<tr>
<td>III. Selected Physical Features of a Mississippi River Meander</td>
<td>193</td>
</tr>
<tr>
<td>IV. Lower Mississippi River</td>
<td>292</td>
</tr>
</tbody>
</table>
ABSTRACT

It has been the purpose of this study to match the character of the unimproved Mississippi against the evolving boating skills of the Europeans who used it in pre-steamboat days.

The steamboat era was preceded by two earlier navigation eras—the pirogue and bateau era, from earliest French settlement until the 1790's, followed by the flatboat and keelboat era. The simple boats of these eras were not, as often believed, original types built merely through necessity and the stimulus of the river. They were borrowed from the Indians, introduced from the eastern seaboard, or brought directly from a European tradition. The river, however, had conditions to which certain types of boats were best fitted.

The Mississippi presented features which became aids to navigation when particular techniques were applied. Other river features proved to be hazards and, if not properly avoided, caused serious problems. Most of the boats and the techniques of propelling them were traditional, but the total milieu of navigation on the lower Mississippi was unique.
Frenchmen coming from Canada first used birchbark canoes. The Indian's dugout and their term, pirogue, were soon adopted. When modified, pirogues became one of the main vehicles of commerce. Ship's boats, canots and chaloupes, were tried. Their deep hulls were not suited to the river's current and shallows. Bateaus were long, narrow, flat-bottomed, and pointed at both ends. They were developed by the French on the St. Lawrence before being introduced to the Mississippi. Bateau, a general word in French, became a specific term with the British for this particular boat.

Greater settlement after the Revolutionary War stimulated the use of larger boats. Flatboats were introduced from the Atlantic seaboard where they were earlier introduced from Europe. They were built for one downstream trip then sold for lumber at New Orleans. On the Delaware River an internal keel was added to the bateau to form the Durham boat. On the Ohio and Mississippi Durham boats became keelboats when a cabin was added and the keel extended externally. Similar to the keelboat, but larger, was the barge. It had a different origin as it was introduced earlier by the French directly from Europe. Barges and keelboats were used both up and downstream.

Flatboats drifted downstream at the current's speed.
Other boats were hastened by rowing or paddling. The middle of the channel was followed. The preferred season was during spring floods. The main current had to be avoided in upstream travel, and the Mississippi's meanders were an advantage. On the lower inside of each bend is a long stretch of slack shallow water and sometimes an eddy. By crossing at each bend, boats avoided the channel most of the way. Boats were poled, cordelled, bushwhacked, sailed, rowed, and they drifted upstream with the eddy.

Greater speed made hazards more dangerous during downstream travel. If the channel was lost, boats often went aground. Tree-trunk snags—planters, sawyers, and wooden islands—filled the river. Boats often sank if they struck these snags. They made travel at night or during a fog hazardous. Travelers learned that certain localities were more hazardous than others. They avoided landing by steep banks because of the danger of cave-ins.

The two eras represent stages in an evolution which led to the present complex of river navigation. This evolution was not continuous. Similar boats and navigation methods were used for long periods, and were introduced in brief periods of rapid change. Evolution was not only by local
invention but also by successful outside introductions applied to the specific conditions of the lower Mississippi River.
INTRODUCTION

Of the various river systems of the world that have been used for inland navigation, the Mississippi River is one of the most important. Even though the period of use by civilized culture groups is shorter than for rivers of the Orient, the Near East, or Europe, all the stages of river transportation from native Indian boat types to the present are represented. The more dynamic development on the Mississippi River has taken place because of outside introductions. However, its development is more than the mere veneer of added modern techniques superimposed on primitive cultures, as has occurred on the Amazon or Congo. The introductions that began over two hundred fifty years ago, followed by others during about the next hundred years, were early enough to allow a complete evolution of boats to occur on the river. These outside introductions also give the Mississippi a very complex progression of navigational development.

Until the railroad became established, the entire Mississippi River system was the single most important
transportation network west of the Atlantic coast to the emerging new culture of North America. The lower Mississippi River from the Ohio to its mouth was the main trunk of this network. The navigation of the lower Mississippi River before the introduction of the steamboat was the greater part of this very significant development period. The introduction of steam power is the greatest technological break in navigation development, and it is the most logical point to terminate this present research with a planned companion investigation later to complete the development of navigation to the present.

This dissertation is concerned with the strict navigational factors of boat types and navigation techniques, and only very incidentally concerned with the broader aspects of trade and transportation. The first items of interest are the boat types used, their design, origin and distribution, early use, and the names applied to them. Four main boat types occur on the lower Mississippi River prior to the steamboat: the pirogue, bateau, flatboat, and keelboat. Of these four types the first two have an earlier importance and allow the pre-steamboat period to be readily divided into two eras—the pirogue and bateau era and the flatboat and keelboat era.
A chapter will then consider the different features of the boat types of each era. Also, some background material of the early settlement is necessary in order to establish a correct setting for each era.

Both the terminology of boat types and the boats themselves have many complexities of origin and description because three different culture groups—the Indians, the French, and the Anglo-Saxons—have contributed to the development of the Mississippi's navigation. Much of this complexity is due to the fact that French development began at the Mississippi's mouth while the Anglo-Saxon entrance was at the head of the Ohio River at Pittsburgh.

The second main items of interest are the various navigation techniques and hazards involved in using the boat types that were chosen. A final major chapter is concerned with these factors. Of significance were the methods used traveling downstream, the many techniques involved in getting the boats upstream against the current, and the great slowness of travel. Also especially important were the advantages taken of the natural features of the lower Mississippi and the various natural hazards that were dangers or caused delays to navigation.

Before beginning the major elaboration, it seems
appropriate to give a brief background of the development of boats by western culture in the Old World prior to the entrance of the Europeans onto the lower Mississippi River. Lakes and streams were a barrier and a danger to primitive man, but they were also a luring source of food and provided drinking water. Inevitably early man, fell into the river by accident, and the lucky one learned that a drifting log would buoy him up. From the accidental grasping to the purposeful launching of a log to cross a stream marks the beginning of the evolution of boats. The log is the main stem of all more advanced boat evolution. From a regular log, by some process, probably first using a natural hollow log, man learned that because of the hollowing, the log was much more suitable as a conveyance. Among primitive people the most general method of hollowing a log is with fire. Such simple log dugouts, which the French termed pirogues, developed very early in man's cultural evolution and have a world-wide distribution among primitive peoples who live in forest areas.¹

Possibly there were many intervening steps before the

dugout was adopted. Quirke feels that since the log is so easy to tip, a raft of several logs was first used for a boat, and Hornell feels that the bark canoe is an older type from which the dugout was copied. From a single dugout, side planks were added to give more freeboard along the boat's sides. From one tier of planks to heighten the dugout's sides, the boats were further enlarged to several tiers. Thus the dugout evolved into the plank-built boat. Eventually all that remained of the dugout was the central keel of the true plank boat.

The plank-built boat in western culture developed into two basic types. Around the Mediterranean, and thus probably the older type, the planks were attached to the boat's ribs, edge to edge, to give the hull a smooth surface, known as carvel construction. In north Europe the Vikings built their boats by placing each succeeding plank so as to overlap the

---


xviii
plank nearer the keel, which was known as clinker construction.5

The earliest river transportation developed on the Nile and Euphrates. There are archeological remains from the IV Dynasty, 2600-2500 B.C., of wooden boats 115 feet long used on the Nile.6 River navigation no doubt goes further into the past beyond the dawn of archeology. In Europe in 500 B.C., Strabo described wine barges on the Douro River of Portugal.7 It is the writer's opinion that in Roman times many of the features that this dissertation investigates in detail were being used on the riverboats of Europe. The old barge form still used in Europe as far apart as England and Italy is similar.8 Inland water transportation continued throughout the Middle Ages and into modern times with little change except for the building of artificial canals. With some changes and modifications techniques of construction and use


6Digby, loc. cit.


8Idem.
were introduced onto the Mississippi River by the French and the British.
CHAPTER I

NAVIGATION DURING THE EXPLORATION AND EARLY SETTLEMENT PERIOD: THE PIROGUE AND BATEAU ERA

The American Indians were the first people to use the Mississippi River. However, in tracing to the present the rapid evolutionary progress of navigation techniques along the lower Mississippi River, the first significant period of change in techniques began with the entrance of the French. Boat types patterned on those used by the Indians, principally the pirogue, were first adopted by the French. Soon other boat types following European patterns, principally the bateau, were introduced. The major concern of this chapter is the development and use of the pirogue, the bateau, and other minor boat types. In addition, to understand how this early period of navigation development influences and is in turn influenced by the over-all French colonization, something of the general settlement beginnings is also presented.

Three general topics are therefore considered: the American Indian period, the background of French settlement, and the boat types and navigation techniques used during the
pirogue and bateau era. This final topic consists of several major aspects. One of these is the Indian boat types, with the pirogue having major significance and the birchbark canoe a minor role. Another is the boat types introduced by the French, the bateau's major position and the significance of other minor types. A final aspect is the over-all picture of transportation during this era.

THE AMERICAN INDIAN PERIOD

When the first European explorers arrived upon the Mississippi River they found that the river was already being used for transportation to a limited extent by the native American Indians. The following comment from Colden indicates that as early as 1724 this fact was appreciated by the Europeans: "The Method of carrying Goods upon the Rivers of North-America . . . was learned from the Indians, and is the only Method practicable through such large Forests and Deserts as the Traders pass thro'. . ."¹ The Indian's culture was much simpler than the European's culture. It lacked the extent of trade and communication that would have led to

extensive use of the river. Tribes along the river, however, made use of the stream for the small amount of transportation involved in their primitive cultures. Gravier noted on his first journey down the Mississippi nearly to the Gulf in 1700: "... j'ay de la peine à croire que nos sauvages d'en haut et du Pais des Illinois viennent chercher icy des marchandises de si loin..."²

The Indians in the Mississippi Valley area used for their boat type the dugout. Marquette on being attacked by Indians on his trip down the Mississippi River observed the use of this dugout: "... un partie s'embarque dans de grand canoë de bois..."³

The dugout used by the Indians fits into the world pattern of dugout use mentioned in the Introduction. After the coming of the French onto the Mississippi River, the


³Père Jacques Marquette, "Le Premier Voïage qu'a fait Le P. Marquette vers le nouveau Mexique & Comment s'en est formé le defsein," Jesuit Relations, LIX, 150.
dugout, somewhat modified and termed a pirogue, became one of their important boat types. The Indian's dugout will be discussed in more detail later, along with the Frenchman's.

The most noted of American Indian boat types, the birchbark canoe, was used, no doubt, along the Mississippi River by the Indians to a limited extent. It was not native to this region since the birch tree, essential in its construction, is native only to the far northern extreme of the Mississippi Valley area. Birchbark canoes were probably used on the river by Indians who came via portage from areas further to the north. Contradictory observations by Marquette, however, indicate the complete absence of the birchbark canoe, at least on the Mississippi near the Illinois tribes. Prior to his trip on the Mississippi, Marquette noted: "... que les Ilinois que ne sçavent ce que c'est que de Canot ... "4 Again, when leaving the Illinois settlements while on his trip down the Mississippi, Marquette related that "nous nous embarquons à la veuë de tous ces peuples, qui admiroient nos petits Canots, n'en ayant jamais veu de semblables."5 Whether other Indians had seen birchbark


5Marquette, Jesuit Relations, LIX, 136. A later quote makes clear that the canots are specifically canots d'écorce.
canoes is not certain, but the statements do at least imply that if not absent, birchbark canoes along the Mississippi were rare. More significantly, the French explorers used birchbark canoes on the Mississippi. Birchbark canoes, therefore, have a role in the development of the Mississippi's navigation.

Finally, in this brief consideration of the American Indian in the development of navigation, besides the Indian's contribution of the dugout and the birchbark canoe with the techniques of handling them, the Indians also often served as guides for the early explorers: "Nous prîmes des sauvages avec nous pour nous guider." As guides the Indians must have pointed out to the explorers the facts of the river. Some of the knowledge that the Indians had gained of the river, such as the differences in current and the location of various danger points, was thereby passed on to the French.

---

BACKGROUND OF EUROPEAN SETTLEMENT

The Spanish explorer, De Soto, was the first European to travel on the Mississippi River, in 1541. No further explorations by Europeans were made for over one hundred years. For this reason De Soto's use of the river has really no bearing on navigation development. European development of navigation along the Mississippi is begun by the French. Their first entrance upon the Mississippi was by the Jesuit missionary expedition of Marquette and Joliet in 1673. Marquette and Joliet came to the Mississippi from the Great Lakes via the Fox River-Wisconsin River portage. They entered the Mississippi River at the mouth of the Wisconsin and journeyed down the river as far as the mouth of the Arkansas.

The news of the exploration by Marquette and Joliet much influenced another Frenchman, La Salle. In 1682 La Salle followed Marquette and Joliet's route and went down the Mississippi to its mouth. The great wealth of the interior of North America south of the Great Lakes at this time could be best summed up with one word—furs. La Salle was the first person to appreciate the fact that these furs could best be delivered to the world via the Mississippi River. An ocean port at the Gulf was a necessity for transshipment and to protect the
area against encroachment from other European nations. To maintain the French claim and to develop such a port, La Salle was determined to establish a settlement at the mouth of the Mississippi and to make use of the river as a trade route into the interior. With La Salle's death, on his unsuccessful later expedition to accomplish just such a plan, it was left to D'Iberville and Bienville to continue this work. In 1699 they came from France by ship to the Gulf Coast near the mouth of the Mississippi River with the intent of establishing a permanent settlement. From this time the use of the river becomes more pronounced.

However, settlements along the Mississippi were actually made in the interior around the present St. Louis area before they developed near the mouth of the river. Marquette had promised to return to the Illinois tribes to teach them the Christian religion. Leading from this interest the first permanent settlement in the Mississippi River area was begun with the Kaskaskia Indians in 1689. By 1703 they were located permanently as a town approximately eighty miles south of the present city of St. Louis. Various other settlements such as Cahokia in 1699, Fort Chartres in 1720, and St. Genevieve in 1735 developed in this same area.

The second major settlement in the Mississippi River
drainage area was not made along the Mississippi itself. It was established along the Wabash River, a tributary of the Ohio River, at Vincennes about 1700. During this early period these two areas are simply termed collectively the Illinois settlements.

French fur traders established themselves around the more peaceful mission Indians. Some of the French after a period of years gradually turned to farming. The most important group of fur traders were those associated with La Salle before his death. Later they were led by Tonti, La Salle's lieutenant. About 1703 this group left the Illinois area and brought a sizeable amount of furs down the Mississippi. This trip was the beginning of the commercial use of the river. By the early 1700's then, settlements in the interior of the Mississippi Valley led to the use of the river as an important navigation route.

Following the interior Illinois settlements, other colonization developed in the lower Mississippi River region. Mobile, Biloxi, Natchez, and Natchitoches on the Red River were settled first. Because of the many problems involved, New Orleans was not established until 1718. Within a few years an almost solid line of settlement extended along both sides of the river from just below New Orleans to as far
above New Orleans as Pointe Coupee, the False River area along the Mississippi River today. In addition to the Mississippi River, the river's distributaries and the numerous canals cut from the Mississippi to the bayous back from the river, formed a very complete network of waterways. Settlements grew up along most of these waterways, for example, Bayous Teche and La Fourche.

Two main systems of transportation using the river had developed. First was the more or less local transportation in the solidly settled areas along the lower Mississippi and adjacent bayous. An example of this local transportation would be nearby farmers carrying their produce into the New Orleans market. The second system was the long distance contact with other settled areas. Besides the Illinois area in the interior, contact was maintained with the center of New France in Quebec on the St. Lawrence River. Quebec was reached from the Mississippi by various portages across to the Great Lakes. In these two different systems of local and long distance transportation on the river, the pirogue, the bateau, and the various minor boat types had different roles. To explain further these various boat types and their functions, each is first discussed separately in detail. Finally, the general use of all types, along with some of the aspects
of the local and long distance trade, is explained.

BOAT TYPES AND NAVIGATION TECHNIQUES

With the first entry onto the river by the French there were immediately available three basic boat types. The first brought down from the Canadian area was the birchbark canoe. The second was the native dugout or pirogue used by the Indians in the lower Mississippi area. The various ship's boats carried aboard the sailing vessels that came to the Gulf Coast area were the third. Of these three types the birchbark canoe and the ship's boats, after the first exploration period, proved for differing reasons inadequate for use along the river. The pirogue, however, became important. The pirogue had the advantage of being locally available. It was stronger and more resistant than the birchbark canoe. Also, it was more easy to handle in the river's current than the ship's boats.

Quite soon after the first French settlement various additional plank-built boat types used on European rivers were introduced. These were collectively referred to by the French as bateaux. The bateaux were first brought over by ship from France, but soon were built along the river area. Within a short time one specific boat among these various
bateaux became the most important type and is termed simply bateau.

During the first settlement period there are several minor boat types, of which the birchbark canoe is the most significant, and two basic boat types, the pirogue and bateau, being used along the lower Mississippi River.

**Indian Boat Types**

It is not correct to assume there are only two American Indian boat types, but those other than the birchbark canoe and dugout are so unimportant to the Mississippi River as to need no mention at all. The birchbark canoe is the first boat type in chronological order to be used by the French, while the dugout is more significant. For these reasons the role of the birchbark canoe will be covered first, followed by a more complete study of the dugout.

**Birchbark Canoe.** The materials needed to build the birchbark canoe were not available along the Mississippi. In addition, for the wide and treacherous river, the birchbark canoe was somewhat fragile. However, the birchbark canoe was the first boat used by the French explorers since they ventured upon the Mississippi from areas where the canoe was the major boat type. When Marquette and Joliet made their
expedition down the Mississippi River they used two birchbark canoes: "... nous nous Embarquames sur 2 Canotz d'Écorce ... Mr. Jollyet et moy, avec 5 hommes ... ."

La Salle had first planned to use a plank-built boat to explore the Mississippi, but this plan was abandoned and several bark canoes were used. Some of these canoes were birchbark as Tonti mentioned: "... il nous fallut porter un canot d'escorce environ dix arpents." Specifically mentioned also are "les Sauvages firent des canots d'escorce d'orme," and "plusieurs de nos Sauvages furent obligez de faire plusieurs canots d'escorce d'orme ... ." La Salle was accompanied by a fairly large group of Indians. Because it was January, they had to substitute elm bark for birch bark in building canoes. Birchbark canoes cannot be built

---

7Marquette, Jesuit Relations, LIX, 90.


9Nicolas de La Salle, "Récit de Nicolas de La Salle, 1682," in Margry, I, 549.

10Henri de Tonty, "Relation de Henri de Tonty, Enterprises de M. de La Salle, de 1678 a 1683," in Margry, I, 595.
in the winter as the sap must be in the tree before it is possible to remove the bark in large enough sections to build a canoe.

Tonti attempted to join La Salle's group that was coming to the Gulf by ship from France by a second trip down the Mississippi. Although the reference is not specific, Tonti almost certainly again used the birchbark canoe: "J'envoyay un canot du costé du Mexique et un autre du costé de la Caroline pour voir s'ils ne descouvriroient rien."11 To further verify that these canots were indeed birchbark canoes, Tonti always used the term pirogue for the Indian's dugout: "... qui estoient embarquees dans des pyrogues de bois, les sauvages de la riviere ne se servant pas d'autres bastiments."12

These three early voyages down the Mississippi proved that the birchbark canoe could be successfully used. Its use was no doubt continued for many years by the fur traders journeying down the Mississippi from the northern areas where the canoe was available. If a canoe were available and in good shape, it was probably used to ascend the river. The

11 Tonti, in Margry, Inédits, p. 23.
12 Ibid., p. 17.
canoe's light weight must have been quite an advantage in ascending the current. At least on the very first trips on the river no attempts were made to acquire the dugouts that were observed on the lower portions of the Mississippi.

It is true that the birchbark canoe is a frail and very unstable craft and that as soon as larger more stable craft became common, a person was considered foolhardy to venture onto the river in such a boat. In this early period, however, these faults cannot be considered the birchbark canoe's shortcomings. If anything, the Mississippi was less dangerous than the rock-strewn and rapid-filled streams of the Canadian shield upon which the canoe had proved itself.

The chief problem of the birchbark canoe was the constant repair it required. Almost every day canoes had to be caulked with pine gum to keep them from leaking. For example, Peter Pond noted on reaching the Mississippi that they had "Gumd our Canoes fit to descend that River." Every time the canoe rubbed bottom or when the sides even nudged an object such as a snag, the thin bark was punctured and a patch of birchbark had to be plastered over the hole with pine gum. In its native area the materials for these tasks

---

13Peter Pond, "Journal of Peter Pond," Wisconsin Historical Collections, XVIII (1908), 325.
were constantly available along the sides of the streams. These materials, however, were not available on the lower Mississippi, and the earlier travelers soon learned they must carry repair materials with them. St. Cosme in an early trip down the Mississippi recorded that his group spent a day and a half gathering gum at Cape St. Antoine. This location is the present Cinq Homme Creek, about twenty miles below Kaskaskia. It was the only spot where pines were located along the river all the way to the Gulf. Peter Kalm advised anyone who used a canoe to carry resin and birchbark rolls along for patching.

No attempt will be made to describe in detail the birchbark canoe, or method of operation, as the grosser facts are commonly known. The use of the birchbark canoe is really of minor significance on the Mississippi River (see Plate I). Therefore, it is not in the scope of this work to investigate thoroughly this boat type. There are, however, two


15Pehr Kalm, The America of 1750; Peter Kalm's Travels in North America: the English version of 1770, revised from the original Swedish and edited by Adolph B. Benson ... with a translation of new material from Kalm's diary notes ... (New York: Wilson Erickson, Inc., 1937), II, 551.
features that seem worthy of mention. The first is the large size of some birchbark canoes, and the second is that very possibly these boats were actually sailed on the Mississippi.

Four general sizes of canoes were most common. The smallest, those less than eighteen feet long, were known as canots a lege or family canoes. This is probably the size used by Marquette and Joliet. The French used three larger types for freight canoes, or canots de charge. The canot du nord was about twenty-five feet long and could carry eight men and three thousand pounds of goods. Next largest was the canot du batard which had a ten-man crew. Finally the largest canoe, canot du maitre, was thirty-five to forty feet long, four feet wide, handled by fourteen men, and could hold five thousand pounds of freight.¹⁶ These canots de charge are mentioned because it is not generally appreciated that the birchbark canoe reached such proportions that would make it useful as a carrier of persons and freight on the Mississippi. There is no mention as to the size for canoes used on the Mississippi in early accounts. Most likely the canot du nord was the size used. Some historians, however,

think that even the largest of types, the canot du maître, was used on the Mississippi.\textsuperscript{17}

The second feature of significance for the birchbark canoe was the use of sails. There is only a slight hint in Marquette's writings that sails were used. From the following quote it is apparent that he was carrying sails with him: "Dans le même dessein nous fûmes contraincts de faire sur l'eau une espace de cabane avec nos voiles pour nous mettre à couvert et des maringouins . . ."\textsuperscript{18} Another reference indicated that "voiles" were made and fastened to upright masts probably placed in cross bars on the canoe: "Il y a un petit mât auquel on met une voile proportionné pour aller à la voile dans les Lacs . . ."\textsuperscript{19} It cannot with certainty be said that the canoes actually were sailed on the Mississippi. Sails were to be had and were used on the lakes. The writer will not be so bold with the slim facts as, for example, Humphrey's description of Marquette and Joliet's


\textsuperscript{18}Marquette, in Jesuit Relations, LIX, 146.

\textsuperscript{19}Antoine Simon Le Page du Pratz, Histoire de la Louisiane (Paris: De Bure, l'aîne, etc., 1758), II, 50.
entrance onto the Mississippi: "Hoisting the sails on their canoes . . ." 20

It must have indeed been a very delicate operation handling a birchbark canoe under sail. No stabilizing element such as an outrigger or keel was evidently used. Only the paddle was available to keep the canoe upright. Undoubtedly advantage could have been taken only of an almost completely following wind.

The birchbark canoe had one outstanding advantage for use on the river. Its speed was greater than that of any other craft. This greater speed was noted by Hennepin when Indians tried to attack them: "... ne pouvans nous attraper dans leurs Pirogues qui sont des Canots de bois beaucoup plus lourds que le nostre d'écorce qui alloit beaucoup plus viste que leurs Bastimens." 21 Again when Tonti chased a dugout: "Le lendemain nous apercusmes une pyrogue, M. de La Salle m'ordonna de luy donner la chasse, ce que je fis, et, comme j'estois pres de la prendre, plus de cent hommes parurent sur le bord de l'eau . . ." 22 This greater speed of


22 Tonti, in Margry, Inedits, p. 18.
the canoe could be even more enhanced by the fact that the canoe could be portaged. Although portaging was not absolutely necessary, a trip could be made even faster by portaging across the necks of some of the Mississippi's larger meanders. One of the most outstanding portages along the lower Mississippi was the Passage or Portage of the Cross. This was the portage that cut off both the Raccourci and Old River bends of the Mississippi. Du Poission mentioned its use as a portage, and D'Artaguiette in going the long way around mentioned that by going two leagues overland, ten leagues by water could be saved.

With its greater speed the birchbark canoe was probably used during much of the pirogue and bateau era as the fastest courier despatch between New Orleans and the Illinois country. Just how significant the birchbark canoe continued to be on the Mississippi can never be determined because of lack of definite terms. Canot in French records can be several types of craft, and in English journals the word "canoe" used on

---


the Mississippi most generally referred to a log dugout. Both terms could of course also mean a birchbark canoe.

Unfortunately only a very few observers bothered to be so detailed as to elaborate that particular boats were canot d'escorce or bark canoes. For example, as late as 1807 Cuming mentioned seeing a canoe coming up the Ohio with eleven persons in it. This, of course, could be a dugout. Throughout his journal, however, Cuming is always careful to use the term pirogue for boats of such size. Cuming uses the term canoe, other than this example, only for a small boat he carried with him. It seems likely that even at this late date travelers did on occasion use the birchbark canoe, especially if they were traveling through from upper regions.

Piroques. Dugouts in the Caribbean area were termed by the Carib Indians piraquas. This term was adopted by the Spanish in the West Indies. The French, on seeing the Indians of the Mississippi Valley area using dugouts, quickly

\[\text{25Fortesque Cuming, Sketches of a Tour to the Western Country (Pittsburgh, 1810), reprinted in Early Western Travels, 1748-1846 . . . , ed., Reuben Gold Thwaites (Cleveland: The A. H. Clark Co., 1904-1907), IV, 141.}\]

adopted the term learned from the Spanish for these boats. They gave the word a French sound and spelling to arrive at "pirogue." As has already been noted, Marquette did not know the term and referred to the Indian's dugouts as *canots de bois*. Hennepin, who accompanied La Salle for a time, was the first French writer to use the term: "... nous rencontrâmes sur nostre route plusieurs bandes d'Isinois qui revenoient à leur Village dans leurs Pirogues ou Gondolles charges de vian."27 Tonti, when writing of La Salle's exploration down the Mississippi, followed the same fashion in reporting the Indian's use of dugouts: "Ils s'embarquèrent dans une pirogue..."28 Membré, a priest in La Salle's expedition, followed the same usage: "Deux des nostres y furent envoyez et receus dans leurs pirogues..."29 These men thus established the use of the term pirogue for dugouts on the Mississippi at this very early date. The usage continued, as is shown by examples from subsequent writings such as in 1700: "... nous avons trouvé une pirogue de Taôgria,"30 or later in 1731: "Des natchitoches, tachér De faire coup

27Hennepin, *op. cit.*, p. 188.

28Tonty, in Margry, I, 598.


sur les francois on bien sur les pirogues qui Descendent Des islinois."31

The original French must be checked to find that right from the offset the term was pirogue just as it is today. In the early English translations of many French accounts, there was a great deal of reluctance to accept the term directly from the French. Some translators returned to the Spanish term piraquas. This practice can be seen by comparing the original quoted in the preceding paragraph to the following quote translated from Hennepin in Shea: "... we met on the way several parties of Islinois returning to their village in their periaguas."32 Others Anglicized the term to petti-augres. For example, compare the following different passages from Le Page du Pratz, one in French and the other the English translation: "Dans la Louisiane on nomme Pirogues ces voitures d'une seule pièce les Naturels les creusent avec le feu ..."33 "... nothing appeared so proper for this as

31Archives Nationales, Colonies, Paris Serce C13 Correspondance Générale, Louisiane 1679-1763. Transcript at Jackson, Mississippi; XX (1731), 82-84.


33Le Page du Pratz, op. cit., pp. 188-89.
some of their large trees hollowed; of these they accordingly made their petty-augres . . . ."\textsuperscript{34} Well into the nineteenth century the word had numerous spellings, as will be evident in some of the subsequent quotations, before it became adopted finally into the English language in its present form. It seems reasonable to assume that something of the same slow process of acceptance occurred in the spoken language for the everyday English users of the term along the river.

The use of the term pirogue has two ambiguities which cause confusion. First, the chief meaning of the word differed somewhat during the passage of time. Second, as has already been indicated in the coverage of the birchbark canoe, the two terms pirogue and canoe are often very unclear as to what they are distinguishing. Just how much of this confusion is due to the mingling of two cultures, the French and the Anglo-Saxon, in the use of the same boat types, and how much is simply the confusion of being definite with any terms that are so slimly described for these early periods, cannot be completely clarified. The fact that there was a gradual picking up of terms by the English-speaking group from the

French and then a later dominance of the French by the English certainly must add greatly to the confusion.

At first the term pirogue was used for all dugouts, but eventually it became in part a more specialized term for only certain modified dugouts. Finally, once again, after the end of the significant use of this type of craft on the Mississippi, it has come down to modern times adopted into the English language to mean any type of dugout. Presently pirogue is also an important term colloquially in Louisiana where it applies principally to a plywood-constructed boat built with the same general proportions as the earlier dugouts.

None of the secondary works concerned with the Mississippi that give some note of early boat types makes the distinction of the different shades of meaning of the term pirogue through the passage of time, especially its different meanings between the beginning and the end of the pirogue and bateau era. The majority do emphasize that the word pirogue had a more specialized meaning formerly than at present by stating that only certain modified dugouts were pirogues.35

35 For examples see Seymour Dunbar, History of Travel in America (Indianapolis: Bobbs-Merrill Co., 1915), p. 281; Herbert and Edward Quick, Mississippi Steamboatin' (New York: Henry Holt and Company, 1926), pp. 8-9; Robert Edgar Riegel,
This is in part, however, an over-simplification. It seems more than likely that a fur trader standing on the banks of the Mississippi during almost any part of the era would have referred to an Indian's dugout, a Frenchman's dugout, or one of the large modified dugouts, all as pirogues.

From the source accounts the idea of a limited meaning for pirogue is obviously not true until the close of the era. Possibly then it is only true for the American users of the river. Initially, the term pirogue was used for the Indian's dugout as it was the only type there was. The examples of the use of the word pirogue by Hennepin, Tonti, and Membre demonstrate this. Later, the term pirogue was used to indicate as well the dugouts built by the French. This fact is made clear by Le Page du Pratz and Dumont, who give separate descriptions for the making of dugouts by both the Indians and the French. Quotations by Le Page du Pratz and Dumont that demonstrate this fact are included with the subsequent description of the building of dugouts. For part of the era, or at least until 1721, the term continued to include the Indian dugouts: "... nous nous mettons dans une pirogue


36See pages 37-38.
sauvage." Only towards the end of the era and especially by the Americans were the terms dugout or canoe applied to the Indian's dugout and the smaller dugout of the Frenchman, while the word pirogue was more specifically limited to the large modified dugout.

The use of the terms canoe and pirogue during this period is quite ambiguous. Canoe could refer to a boat of birchbark. More commonly on the lower Mississippi, it referred to a small dugout: "Canoes are the most simple of all vessels, and consist of a log of wood shaped into a long boat, and excavated in the middle . . ." The terms were also interchangeable: Nuttall referred to the same craft as pirogue and canoe. Evidently canoe was not properly the term used to apply to the very large modified dugout, but even in some cases it occurred. Evans mentioned "very large wooden canoes" which were further described as thirty to

---

37Du Poission, op. cit., p. 298.


39Thomas Nuttall, Journals of Travels into Arkansas Territory 1819 (Philadelphia, 1821), reprinted in Thwaites, Early Western Travels, XIII, 108.
forty feet long.\textsuperscript{40} The term pirogue was probably at times still applied to the smaller Indian dugout after settlement became well established toward the close of the pirogue and bateau era. Especially as Americans came to use dugouts, the term pirogue was most properly applied to a larger modified dugout. For example, "The smallest kind of craft in use is simple log canoes; next follow perrogues, which are a larger kind of canoes . . ."\textsuperscript{41} or "the fairy pirogue of the French voyageur . . . and log skiffs, gondolas, and dug-outs of the pioneer without name or number."\textsuperscript{42} Further applications of the term pirogue to special types of modified dugouts will be apparent in the later description of these types.

The term pirogue then applied either especially to the large dugout or sometimes to the small dugout, but never to a birchbark canoe. The term canoe applied most often to a small dugout, secondarily to a birchbark canoe, and even rarely to a large dugout.


\textsuperscript{42}Edmund Flagg, \textit{The Far West 1836-1837} (New York, 1838), reprinted in Thwaites, \textit{Early Western Travels}, XXVI, 60.
The first use of a pirogue by the French was by the few survivors of La Salle's group that eventually reached the Arkansas River. La Salle's plan for establishing a colony on the Gulf Coast ended at Matagorda Bay on the Texas coast rather than near the mouth of the Mississippi River. La Salle was murdered during his attempt to make contact with Canada. Six survivors, among them La Salle's brother who was known by the proper family name of Cavelier, reached the Arkansas. The group bargained with the Indians in this area for a pirogue and Indian guides. With pirogue and guides they reached Ft. St. Louis on the Illinois River where Tonti and other fur trappers and traders had their headquarters. Joutel, one of the group, noted: "Les Akansas ont l'industrie de faire de très beaux canots, tout d'une pièce, avec un abre . . . Le chef nous montra alors le canot qu'il nous vouloit donner."\(^{43}\)

When Tonti learned of the plight of the settlers along the Texas coast, he set out on his third trip down the Mississippi. For the first time, with a choice between pirogue or birchbark canoe, he chose to use a pirogue: "J'achetay une

\(^{43}\)Henri Joutel, "Voyage de M. de La Salle dans l'Amérique septentrionale en l'année 1685, pour y faire un établissement dans la partie qu'il en avoit auparavent descouverte," in Margry, III, 442 and 463.
Tonti should be given credit as the individual who decided that the pirogues were most appropriate for the Mississippi. He actually had tried them out at various times on his first trip down the Mississippi with La Salle. Of the early explorers, Tonti had the highest opinion of the pirogue. He related: "... ils sont des pirogues qui vont aussi bien que des canots d'escorce." On Tonti's fifth and, almost certainly, last trip down the Mississippi he was accompanied by a large number of his fellow traders and trappers. This trip was the first commercial use of the river. The pirogue was most likely the chief boat used, although as will be later mentioned other types may have been included also. Other traders and trappers probably followed Tonti's example of using the pirogue. Tonti was, as far as an immediate on-the-scene influence is concerned, the most important person in the Mississippi Valley until Bienville.

The Indian's method of building a pirogue was very laborious. However, he was most ingenious in his method of

44Tonti, in Margry, Inédits, p. 28.

45Tonti, in Margry, I, 599.
overcoming his lack of metal cutting tools for handling a log from a full-sized tree. His chief tool was fire. The complete method is explained by Kalm, Penicaud, and Le Page du Pratz. Also, an early print by White (Figure 1) is helpful in understanding the technique of building the pirogue.

A suitable tree was chosen close to the stream. This location made it easier to get the finished pirogue to the water. The lower bark of the tree was splintered and smashed with a stone axe. A fire of sticks piled around the base was built. Long poles with wet skins on the end were used to keep the top of the trunk from catching fire. In this manner only the base of the tree was burned and thus felled. Another fire was then built under the felled log at the length the Indians wanted the pirogue to be. Mud was then placed on top of the log at each end and along the sides where the Indians wanted the walls for the pirogue to remain. A fire was built all along the top of the log. The fire was periodically pushed away and the burned remainder of the log scraped out with a large turtle carapace, shell, or stone scraper. The fire was pushed back over the log and built up again to

FIGURE 1

INDIAN METHOD OF BUILDING DUGOUTS

eat further into the log. Again it was pushed aside and the scraping process continued. After scraping, the progress was checked, and if the Indians judged the fire had eaten far enough into a certain spot, this area was covered with mud before more firing continued. If, during the process of actually firing, it was felt that the fire was eating too rapidly into a certain spot while it was burning, this spot was doused with water. In this fashion the pirogue was formed entirely. When finished, to make the surface more resistant, all bark was removed from the sides, soaked with water, and rubbed with ashes.

Just exactly what the shape of the Indian pirogue was is difficult to determine. There were various dugout designs used in North America that basically form two types. One resembles the canoe as it is pointed at both ends; the other has blunt ends, and the hollowed log is spread by soaking to give it a larger beam. The sides of the pirogue probably were not spread by the Indians near the Mississippi because Le Page du Pratz would have certainly noted such an interesting technique. Also, the general width of about three feet

---

does not imply they were spread. Very likely the pirogues of the Indians inland along the Mississippi were of the regular canoe shape; further north this is the shape of the Chippewa dugout. Near the coast the pirogues were not broadened but were blunt shaped. Le Page du Pratz notes that the bow was raised but had the same width as the body of the boat: "Le devant de ces Pirogues est fain en talut . . . ce devant est aussi large que le corps de la Pirogue." Brewington notes on the Chesapeake that the Indians built a "trough-shaped" dugout, and "The white man's superior knowledge of small craft soon indicated changes which would improve the canoe: sharp ends would make her easier to propel and more seaworthy . . . ."

Some of the Indian pirogues were extremely large. Marquette reported to Father Superior Dablon:

Aussy les sauvages s'en servent-ils pour faire des canots tout d'une pièce de cinquante pieds

---


49 Le Page du Pratz, Histoire de la Louisiane, II, 188.


51 Ibid.
de long et trois de large, dans lesquels trente hommes avec tout leur équipage perevent s'embarquer. Ils en out un si grand nombre qu'en seule bourgade on en vit jusques à 280 ensemble.52

Le Page du Pratz states that he saw large pirogues built by the Indians only slightly smaller than those reported by Marquette: "... j'en ai vu de quarante pieds de long, fur trois de large; elles ont environ trois pouces d'épaisseur, ce qui les rend très-pesantes. Des Pirogues peuvent porter douze personnes ..."53 Three feet in width must have been about the standard diameter of the trees the Indians chose to use for forming their pirogues, but generally the majority of the pirogues were shorter in length.

Kalm gives a length of thirty to forty feet for the Indian dugouts he viewed along the east coast.54 Penicaut's statement that pirogues were about twenty-five feet long55 seems possibly to be the most accurate single estimate for most of the Indian pirogues, rather than the larger dimensions which were probably for the more exceptional boats.

52Claude Dablon, "Relation de la descouverte de plu-siers pays situez au midi de la Nouvelle France, faite en 1673," in Jesuit Relations, LVIII, 96.


54Kalm, op. cit., II, 229-30.

55Penicaut, op. cit., p. 381.
Evidently one of the earliest adoptions of the Indians from the French was metal axes to build their pirogues. Le Page du Pratz's recording of the Indian's method of building pirogues mentions that the Indians "aussi dans ces tems ils étoient bien plus occupés qu'à présent qu'ils ont des haches que nous leur traitons . . ." 56

The pirogue had been used by the French, and its ability had been proved before any attempts were made to make it on their part. Undoubtedly, almost with the first French settlement on the Gulf, attempts were made to build pirogues. Not a part of the continuing sequence of settlement, but nevertheless an example of how soon after the first settlement a pirogue may have been made is related by Joutel. On La Salle's first landing at Matagorda Bay, he sent a group of men to try to build a pirogue from a large tree he had spied. 57 They gave up the attempt and instead stole several from the nearby Indians. 58 This second point is also very likely a good demonstration of what actually occurred on the Mississippi. That is, while some pirogues were built by the French

57 Joutel, op. cit., p. 149.
58 Ibid., p. 159.
right from the beginning, as long as pirogues could be procured from the Indians, they were mainly appropriated or traded for.

The French built the same form of pirogue as did the Indians, only altering the method used in construction. The French, of course, with sharper and stronger tools did not use the Indian method of burning a hollow in the log for a dugout. They built the pirogue entirely with cutting tools. A contradiction by Dumont, which does not seem really plausible, must be noted. He states that the French continued to use the Indian fire technique, and the use of the axe was an alternate method.  

Le Page du Pratz depicts the building of pirogues at a significantly early enough date, the 1770's. This description agrees sufficiently with the method of building pirogues still used in Louisiana by some old timers in the twentieth century and recorded by motion pictures to authenticate it as a folk art that has been changed very little since the earliest period of French settlement.

The pirogue was built with a good bit of craftsmanship. The finished product, basically because of superior tools, was

a far more complete and maneuverable craft than the pirogue built by the Indians.

Besides using better tools, the French proceeded to build the pirogue by a different method. Instead of initially hollowing out the log, the outside of the pirogue was formed. First the bark was removed from the log: "On commence par le dépouiller de son écorce."\(^{60}\) Following this procedure, "On met ensuite dessus le côté de l'arbre, qui doit faire le dessous de la Pirogue . . ."\(^{61}\) The outer side of the hull of the pirogue was measured and cut to a proportional shape. That is, the pirogue had an equal curve and dimensions on either side of a longitudinal centerline: "... on fait dans le milieu un trait de ligne, et un autre trait de chaque côté fur le bord à distance égale, après quoi on forme le dessous & les deux bouts de la Pirogue . . ."\(^{62}\) The shaping of the hull of the Frenchman's pirogue made it a far superior craft in maneuverability and balance than the dis-proportional hull of the Indian's pirogue.

The pirogue had the same basic shape as one type of

\(^{60}\)Ibid., p. 62.


\(^{62}\)Idem.
Indian pirogue. Dumont notes: "... on ne laisse pas de voir quelques [pirogues] ... qui se terminent équalemment en pointe par les deux bouts."63 Referring to the same boat type as a canoe or dugout, Kalm notes that both ends were pointed,64 and La Barge states, "The ends were given a regular canoe model ... ."65 This fact for what La Barge terms a canoe or dugout, along with others about modified pirogues, was described by Captain Joseph La Barge, in his last years, to Hiram Chittenden. La Barge recalls that these pirogues were still being built for use in the fur trade on the Missouri River into the 1830's. Although much later, the facts that Captain La Barge relates surely trace back to Le Page du Pratz's time and can be used to fill in the latter's basic description.

On the French pirogue holes were drilled through the log so that the uniform thickness of the sides could be accurately gauged. Therefore, the hull could be thinner than the three-inch thickness reported by Le Page du Pratz in his

63 Dumont, op. cit., p. 62.
64 Kalm, op. cit., p. 333.
description of the dimensions of the Indian's pirogue. La Barge relates that the pirogues were shaped to "leave a thin shell about two inches thick at the bottom and one at the rim." Although the French pirogue had a thinner hull, it was undoubtedly stronger because it could be kept to a uniform thickness. The Indian could not be as dexterous with fire as a Frenchman with metal tools. Hence, even with all the Indian's care, the fire would probably eat too far into the log in certain places and give the pirogue weak spots that could rot through or be pierced by a snag. Of more significance, a boat with lighter weight, because of this thinner hull, was easier to handle against the current of the river. Also, it was of advantage during the few portages that pirogues were carried or dragged across.

While the unfinished pirogue was still upside down after the outside had been shaped, a gimlet was used and "l'on fait encore dans le dessous des trous avec une vrille de la profondeur que la Pirogue doit avoir d'épaisseur." 68

66See page 34.
67Chittenden, loc. cit.
Existing pirogues generally show cross sections of three holes drilled in each cross section, one for each side and the third in the bottom, with the cross sections being a little more than a foot apart the entire length of the pirogue.

The pirogue was turned right side up and "The top was then hewn off, so as to leave about two-thirds of the log." The inside was chopped out. The axeman stood with his feet one on each gunwale and chopped into the log between his legs; this is the technique still demonstrated today. To chop out the interior, a special round-bladed adze, "le tille rounde," was used. The axeman cut down deepest at the points where he knew the "trous avec une vrille" to be so that "en prenant bien garde de n'ôter du bois que jusqu'aux trous de vrille qui marquent l'épaisseur du ford de la Pirogue ..." With all the drilled holes showing, the axeman smoothed out the area between, and did the final smoothing of the hull with a knife. Finally, using a sixth tool, a mallet, "ces trous se bouchent avec des chevilles, qui entrent por force." The "chevilles" were then whittled

---

69 Chittenden, loc. cit.  70 Ibid., p. 92.

72 Ibid.
off flush with the hull. The use of probably six or seven tools—an axe, adze, short-handled hatchet, knife, gimlet, and mallet—would imply that pirogue building was something of an art in which certain settlers excelled and became craftsmen.

Whether or not anything more was done to preserve the wood of the pirogue is not mentioned by Le Page du Pratz. On the Atlantic coast Kalm states that the dugouts, or as he referred to them, canoes, were tarred and painted as a preservative. Undoubtedly Le Page du Pratz was speaking of a pirogue built from a cypress log which was not available where Kalm visited, and which had different properties than other tree species used. Trees other than cypress were used, however, to build pirogues on the Mississippi, and attempts may have been made on some occasions to tar and paint them.

Thus was the standard pirogue built, and although it was more accurately proportioned, in general it resembled in pattern the type of Indian pirogue built inland on the Mississippi. That is, it was pointed at both ends and consisted of a simple hollow shell with no seats or any other modification whatever (see Figure 2). This was the fashion

73Kalm, op. cit., I, 333.
FIGURE 2

FUR TRADER'S PIROGUE

This pirogue was discovered in the bottom of Swan Pond, a bayou of the Wabash River, near Vincennes, Indiana, in 1962. It is 25 feet long, made of a walnut log, and may have been used by Toussaint Dubois, the most active trader in the area during French times. Information and photograph courtesy of George McCormack, Vincennes, Indiana.
in which pirogues were built into the twentieth century. The only difference was probably that the width and length were smaller for the average pirogue built in modern times than in the 1700's. A description of a pirogue used on the Ohio in 1805 that is referred to as a canoe is given by Michaux:

On the 18th of July in the morning we purchased a canoe, twenty-four feet long, eighteen inches wide, and about as many in depth. These canoes are always made with a single trunk of a tree ... we were exceedingly fatigued, not so much by continually paddling as by remaining constantly seated with our legs extended. Our canoe being very narrow at bottom, obliged us to keep that position; the least motion would have exposed us to being overset. However, in the course of a few days custom made these inconveniences disappear, and we attained the art of travelling comfortably.74

The length of this dugout equals almost exactly what Penicaut states much earlier as the average length of the Indian's pirogue. Kalm relates similar lengths of eighteen to twenty-four feet for the dugouts built by the colonists.75 Michaux also makes the important observation that he and his companion sat right in the bottom of the pirogue and that the pirogue was very easy to tip. Much larger pirogues than Michaux's were built in the same simple pattern which caused

75 Kalm, op. cit., I, 333.
the passengers to sit on the bottom, both for stability and because the boat was simply a hollowed shell. Kalm mentions a dugout used in Pennsylvania large enough for six people in which the passengers had to sit on the bottom.

Very large pirogues had been made by the Indians according to Marquette's report, and for trade the French also built pirogues of large size. Le Page du Pratz states that pirogues were made large enough to carry three or four thousand pounds. Schultz relates that some could carry twelve to fifteen barrels of salt. Evans reports that some on the Mississippi by 1755 were thirty to forty feet long, three to four feet broad, and drew ten to twelve inches of water empty, and eighteen inches of water loaded. Dumont gives the largest dimensions: "Il y a Pirogues faites de liars qui fur cinq pieds de large ont jusqu' à quarante-cinq & même cinquante pieds de longuer."

Evidently modifications were adopted rather quickly by the French to their large pirogues, differing them in

77Schultz, op. cit., I, 129.
78Evans, op. cit., p. 138.
79Dumont, op. cit., p. 64.
style from the Indian pirogues. As has been previously stated, there was confusion over the terminology for pirogues, which relates to the Anglo-Saxon attempt to restrict the term, especially to large or modified pirogues. This definition was reasonably clear for the modified pirogues, but for large pirogues of the regular pattern, it is not clear when they were too large to be referred to as canoes.

The Anglo-Saxons were familiar with regular dugouts along the Atlantic coast and referred to them as canoes. Modifications of dugouts at first evidently were particularly French. The Anglo-Saxons therefore viewed these modifications as something special. After a brief period of attempting to simply call them very large canoes, they adopted the French term pirogue for these modified types. The term canoe was retained for the more familiar dugouts. Some new woodsmen probably still called them large canoes, while the more traveled referred to all types of dugouts as pirogues. The terms then were somewhat random. For this one section only, to explain modified pirogues, let it be definite that canoes are the regular dugouts already described, while pirogues are those that have added modifications.

A large, long canoe built in the regular fashion would be structurally weak. To overcome this weakness
cross-sections or bulkheads were left in the natural wood. These cross-sections besides giving strength divided the pirogue into separate compartments. These compartments proved most useful for storing loose or liquid cargo in bulk. Bear's grease, wild honey, or salt, for example, were items carried this way and were significant articles of early trade. This method of carrying goods was so common that these commodities were measured in New Orleans as a "pirogue of bear's grease" or as "much honey as a pirogue will hold."®®

Le Page du Pratz gives the following description of building a pirogue with bulkheads to carry salt:

. . . ils choisissent un arbre propre pour faire une Pirogue que leur sent de saloir dans le milieu, que est fermé par les deux bouts, où il ne reste que le place d'un homme à chaque extrémité.®®

These pirogues were built broad enough of beam and when loaded had a low enough center of gravity that the paddlers were able to use the bulkheads as seats. Dumont states: "... ainsi que de bancs pour les rameurs; on posse aussi des traverse de distances in distance, pour soutenir

---


les deux côtés de cette voiture." On the Missouri River bulkheads were left in the pirogue every four to six feet. This certainly was the same system employed with earlier pirogues on the Mississippi. A thirty-foot pirogue then could have been divided by five or six bulkheads.

Although some of these pirogues continued to have both ends pointed, another feature distinguishing many pirogues from canoes was that the pirogue was built with a square stern: "A l'égard du derrière . . . il est ordinairement carré . . ." (See Figures 3 and 4.) A French soldier in 1754 noted that the pirogues on the Ohio were "hollowed like a trough, cut square at the stern, with a sharp point at the bow." La Barge states, in reference to the Missouri River pirogue, that sometimes these boats were made with a square stern and were then called pirogues.

Pirogues were fitted with masts and sails. A

82 Dumont, op. cit., p. 63.
83 Chittenden, op. cit., p. 92.
84 Dumont, op. cit., p. 62.
86 Chittenden, op. cit., pp. 92-93.
87 Ibid., p. 92.
FIGURE 3

SQUARE STERN PIROGUE

This pirogue is preserved at the Evangeline State Park Museum, St. Martinsville, Louisiana. It was taken from a farm in the area about 1936 where it was being used as a feed trough.

FIGURE 4

SQUARE STERN PIROGUE

This pirogue is 28 feet long by 3 feet wide. It is made of cypress and is judged to be about 150 years old. Notice the keel cut from the natural wood of the log.
bulkhead with a hole down through it would have made an excellent seat for a mast. Evidently the square stern development was coupled with sailing so that, "... sort avec un gouvernail fait de planches qu'on attache à la poupe ..." 88 A person would have more room to handle such a tiller in the stern. A pirogue under sail was probably more manageable than a birchbark canoe because its mast was more firmly attached and a pirogue sat more deeply in the water. Without a keel, however, they were probably just a little better. Only an almost completely following wind could be used to sail the pirogue.

One of the advantages of the pirogue was its fine maneuverability, but one of its great disadvantages was its extreme unstability. With all but the most experienced hands it had a tendency to turn over with the slightest movement, as was indicated by Michaux's comments. An attempt to remedy this instability, which evidently was only partially successful, was noted by J. C. B.: "They are rather flattened in the bottom and underneath, but very liable to tip when a foot is put on the side." 89

88 Dumont, op. cit., p. 63.
89 J. C. B., loc. cit.
From the bulkheads, squared stern, and flattened bottoms modifications became radical. Brackenridge notes:

... as high as Natchez, schooners of fifty tons often ascend. There are, besides, between the places just mentioned, a kind of boats of a peculiar construction, much in use, and carrying often eight or ten tons: they appear to be formed of a single tree, but in reality out of three of the largest size; two are hollowed in such a manner as to form the sides, and a third for the bottom: they are then joined together so as to make a very durable and strong boat, easily managed, and the most safe against hurricanes and violent winds.90

Hall confirms the modification of the split logs:

The earliest improvement upon the canoe, was the Pirogue, an invention of the whites. Like the canoe, this boat is hewed out of the solid log; the difference is, that the pirogue has greater width and capacity, and is composed of several pieces of timber — as if the canoe was sawed lengthwise into two equal sections, and a broad flat piece of timber inserted in the middle, so as to give greater breadth of beam to the vessel. This was probably the identical process, by which the Europeans, unable to procure planks to build boats, began in the first instance to enlarge canoes, to suit their purposes. They were often used as ferryboats, to transport horses across our rivers, and we have frequently seen them in operation, of a sufficient size, to effect their object in perfect safety.91

Chittenden additionally notes another type of pirogue:


two such boats were rigidly united in parallel position a few feet apart and completely floored over. On the floor was placed the cargo, which was protected from the weather by the use of skins. Oars were provided in the bow for rowing and a single oar in the stern between the boats for steering. Sails could be used with a quartering wind on these boats without danger of upsetting. Dube's ferry, on the Mississippi, one of the earliest ferries of St. Louis, used a boat of this kind.92

Although such elaborations did appear as these split and widened pirogues or double pirogues with decking between, which eliminated any problem of instability and greatly increased their capacity, it is the writer's view that secondary accounts have used the above source authorities to overemphasize the unusual. Probably during all the pirogue and bateau era, other than use as ferry boats or on the more calm stretches of the Mississippi below Natchez, a single log pirogue was most common. The main argument for this statement is that by these widening techniques a larger more stable craft with broader beam was produced which already existed in the bateau, and structurally when thinking of handling these craft in the current of a snag-filled river, the construction seems unsound. Pirogues possibly were fitted with some sort of cabin. Michaux mentioned a covering that was probably common: "...exposed to the heat of a

92Chittenden, op. cit., p. 63.
scorching sun, we covered our canoe a quarter of its length with a piece of cloth thrown upon two hoops." 93

A final comment about pirogues is related to the species of trees used to make them. One of the outstanding geographic advantages of the Mississippi River for the building of pirogues was the numerous gigantic trees of various species along its banks, observed by nearly every early traveler. Marquette notes to his superior, Dablon: "Les plus puissons des arbres qu'on y voit sont une espèce de cotonniers qui sont extraordinairement gros et hauts. Aussi les sauvages s'en servent-ils pour faire des canots . . . " 94

In addition to cottonwood, Penicaut said that cypress was used, 95 and Le Page du Pratz notes that the Indians of the Arkansas River used black walnut. 96 Cypress, because of its fine qualities of endurance and easy handling, was the choice species. One problem of using cypress was that it was not so regularly available north of the mouth of the Arkansas. Another was that with its swollen butt and often growing in

---

93Michaux, op. cit., p. 173.
94Dablon, loc. cit.
95Penicaut, in Margry, V, 381.
swamp water, it must have been a considerable chore to fell by burning. The cottonwood was undoubtedly easier to work and more common than the cypress north of the Arkansas. Pirogues built of it, however, could not have lasted as many years as one built of cypress.

When the French and later the Anglo-Saxons made pirogues they mentioned additional specific species used for the purpose. For example, Kalm notes along the east coast, "The best canoes, consisting of a single piece of wood, are made of red cedar; for they last longer than any others, and are very light." Kalm also states that white cedar "likewise makes good canoes," and that chestnut and oak were also used. J. C. B. states that pirogues were "made of the trunks of birch or whitewood trees from which the bark is stripped." Finally, Michaux relates: "These canoes are always made with a single trunk of a tree; the pine and tulip tree are preferred for that purpose, the wood being very soft." In addition, Baldwin as a secondary source,

97 Kalm, op. cit., I, 302.
98 Ibid., p. 299.
99 Ibid., p. 85.
100 J. C. B., op. cit., p. 55.
gives as another species, the sycamore. In all, eleven different species are mentioned. While each source implies that only certain species should be used, it seems safe to assume that almost any tree that grew especially large, straight, and tall could at some time have been used. These are the main features of all the trees mentioned, except that generally they are woods that work at least fairly well and do not split too easily. Ash or hickory, for example, are so tough that they would not have been worth the effort of all the chopping.

**Boat Types Introduced by the French**

During the same time that the pirogue was developed into one of the major boat types on the Mississippi the French also made use of boats built on the European pattern. The first available naturally were the ship's boats carried aboard the vessels that brought D'Iberville's expedition to the Gulf Coast. These boats and those from other ships that later came to the Gulf were used for the early explorations. Quite early the French realized that boats more suitable to river travel were needed and various types were introduced

---

from France. These boats are often simply referred to by the general term *bateau*. After a period of time, however, a specific type, which became of equal importance with the pirogue, was developed and as a specific type it also was referred to as a *bateau*. But first, different types of ship's boats may be briefly described.

**Ship's Boat.** On French sailing vessels of the late seventeenth and early eighteenth centuries, two types of ship's boats were evidently carried for all the various purposes for which smaller boats might be desired. These were carried stacked upon each other. A typical arrangement was for the largest boat carried by the ship to be filled by three or four smaller boats which were nested inside it. The largest boat was known as the *chaloupe*. This boat must be practically the same thing as a whale boat or long boat on English ships. The smaller boats were known as *canots*. They quite probably were somewhat similar to the yawl, pinnace, or dinghy carried on English ships.\(^{103}\) These ship's boats were small enough to be used on the river but lacked characteristics that made them easy to handle in the river's current. A ship's boat is built primarily with the idea of operating

\(^{103}\) *Jal, op. cit.*, p. 400.
on the open sea. It is constructed with a deep, rounded hull to give it stability to keep from being easily overturned in the ocean waves. Such large waves as would be encountered in the ocean were not a problem on the river. The deep, rounded hull would here prove to be a disadvantage as it would cause the boat to drag on the bottom in shallows. More important, the boat would offer much more resistance to the current when being rowed upstream. Much of the information on the ship's boats is based on Penicaut. Although his work has been criticized for its weakness on historical events, his discussion of boats is accurate. Significantly, Penicaut was employed for "le radoub des Chaloupes et des Canots." 104

**Canot**. (See Figure 5.) The use of this boat has been completely slighted by secondary works, very possibly because of the confusion of terms. The introduction of another boat type termed **canot** adds additional confusion to source description that already is somewhat ambiguous. The word standing alone can mean three different types of boats: a birchbark canoe, a dugout, and a small ship's boat. Of these three only the final one had a meaning of significance to

FIGURE 5

CANOT

Approximate appearance of the canot carried aboard French ships. It probably had double ends, a round bottom, and was built on a keel, with a rib frame.
Frenchmen outside the New World. An example of this confusion is shown by the following passages. In the translation of Le Page du Pratz's work the following appears:

"... now it is impossible for a shallop, or canoe, to come near to moor a vessel, in sight of a fort well guarded ..."). The original French version is "chaloupe et un canot." The reference certainly is to a canot from a ship as it is mentioned along with a chaloupe, rather than as an entirely different type of boat, a canoe, as it appears in the translation.

Several instances of the use of canots are noted prior to 1720, when the canot probably was gradually given up for river use because of the proved better ability of the pirogue and bateau.

In 1702, shortly after settlement had first got started, the carpenters "faire ... dix canots" which could "embarquer cinquante François avec nos officiers ... " In 1703, thirty-five trappers, who must have been Tonti's group, were

---

105 Jal, loc. cit.
108 Penicaut, op. cit., p. 430.
to bring their furs from the Wabash, and "six ouvriers pour luy construire des canots"\textsuperscript{109} were sent to them. There is some question as to how many\textit{ canots} would have been built, for surely the group on the Wabash would have mainly built pirogues or obtained them from the Indians.

When in 1714 St. Denis was sent to establish a base at Natchitoches,\textit{ canots} again were used. At the present site of Alexandria, Louisiana, they are mentioned as being carried around the rapids: "... porter nos marchandises et nos\textit{ canots} par terre."\textsuperscript{110} In 1718 Penicaut noted that in order to reach the Illinois country the French troops went "avec dix\textit{ canots}; il emmena avec luy cent soldats et plusieurs officiers."\textsuperscript{111} The fact that each boat was able to carry about eleven persons and their equipment gives some idea of the size of the\textit{ canot}. Evidently since the first\textit{ canots} had been built in 1702 there had been an increase in size to double the first capacity. This demand for larger boats is an indication that as size increased the French would have to use boats of a different style than the\textit{ canots} because of their lack of suitability for river travel.

\begin{itemize}
\item\textsuperscript{109}\textit{Ibid.}, p. 438.
\item\textsuperscript{110}\textit{Ibid.}, p. 498.
\item\textsuperscript{111}\textit{Ibid.}, p. 554.
\end{itemize}
Chaloupe. The chaloupe (see Figure 6) was the largest boat carried by a ship and it was also used as a small coasting boat to operate in the lower reaches of rivers.\textsuperscript{112} For these latter it was ideally suited to the Gulf Coast and the very lowest parts of the Mississippi where the French first settled. Evidently the chaloupe was of various types. Some were larger and known as a "double Chaloupe."\textsuperscript{113} Such vessels as a traversier\textsuperscript{114} and barque\textsuperscript{115} may have been very similar to this double Chaloupe. Besides its use in Louisiana, the chaloupe was a most common coaster along the Atlantic seaboard where its anglicized name was shallop: "All these Creeks which lead into Delaware will receive Shallop, but no larger vessels."\textsuperscript{116} Pownall additionally observed the use of the shallop on practically every other stream running into the Atlantic and on the Great Lakes.\textsuperscript{117} Pownall described shallops as "made for sailing and working to Windward,

\textsuperscript{112} Jal, op. cit., p. 453.
\textsuperscript{113} Gravier, op. cit., p. 166.
\textsuperscript{114} Penicaut, op. cit., pp. 61-62.
\textsuperscript{115} Archives Transcript, XI, 287-88.
\textsuperscript{116} Pownall, op. cit., p. 132.
\textsuperscript{117} Ibid., p. 121
This is more properly a shallop, as it is a scene from Narragansett Bay in 1637. Courtesy A. S. Barnes and Company; source John and Alice Durant, Pictorial History of American Ships.
they must have sharp Bottoms and deep keels; and though made broader than the Flats . . . they will not admit such great Lengths, and therefore not capable of so large Burdens."\(\text{118}\)

A sketch of a shallop shows it to be a small schooner-rigged sailboat with a pointed prow and a square stern but no deck or cabin. There is no reason to doubt that the chaloupe on the Mississippi was the same (see Figure 6). Chaloupes were used to enter Biloxi Bay as the bay was not deep enough for ships to come in all the way.\(\text{119}\) D'Iberville used a chaloupe on his first exploration to the Mississippi. Gravier notes that D'Iberville had found Bayou Manchac not to be deep enough to float a chaloupe.\(\text{120}\) This is probably why D'Iberville's party broke into two groups on the return trip. The chaloupe was undoubtedly a significant craft on the river, especially below Natchez, all during the French period. At least one time a chaloupe was used for a voyage all the way up the Mississippi to present-day Minnesota. This was the exploration expedition of Pierre le Sueur in search of minerals. Penicaut accompanied this expedition and he reported that it consisted of twenty-five people "avec une seule

\[\text{118}\text{Ibid.}, \ p. \ 141.\]
\[\text{119}\text{Gravier, op. cit.}, \ p. \ 164.\]
\[\text{120}\text{Ibid.}, \ p. \ 158.\]
chaloupe."¹²¹ This is an indication of how much larger a chaloupe was than the largest canot which could carry only eleven men. On arriving at the villages of the Illinois Indians, Penicaut notes that "Nous y abordasmes à la voile . . . et surtout [surpris] de voir nostre chaloupe, parce qu'ils n'ont que des petits canots faits d'escorce d'arbres qui leur viennent du Canada, et quelque pirogues . . ."¹²²

A significant fact about the chaloupe is it was the first plank-built boat used on the Mississippi with a keel. There is no direct descent from the chaloupe to the later keelboat. However, it is very possible that some advantages found in using the chaloupe with a keel could have stimulated in some manner the later development of the keelboat.

Bateau. The various bateaux differed from the pirogue in that they were more stable boats, with a broader beam, constructed of planks, and with a flat bottom. These bateaux could be built larger than a pirogue and those that were not had the advantage of being lighter in weight than a pirogue of the same load capacity. The pirogue was more maneuverable. With its narrower beam and stronger construction, it could go

¹²¹Penicaut, op. cit., p. 400.

¹²²Ibid., p. 408.
places a bateau could not. The pirogue could also be pro-
pelled faster due to this narrower beam. As a metaphor, the
pirogue could be considered the pack horse of the river,
while the bateau could be thought of as the freight wagon.

Within the broad lines of being built of planks and
having a flat bottom, boats referred to as bateaux must have
had a wide range of form. In defining the bateau, therefore,
there is first a problem of terminology. Bateau can have
two meanings, one general and the other quite specific. In
its general meaning, bateau is, of course, simply the French
word for boat. It is assuming too much to designate every
use of the term bateau in early French journals as evidence
of the use of the bateau as a specific type. In English,
among persons with a nautical background, boat is limited to
mean only small vessels that are either carried aboard ocean
ships or are used for river, lake, or coasts. Similarly, in
French bateau has the same restrictions. Bateau is defined
as "Nom générique d'une famille de petits navires" which are
used as coasters on rivers, or carried aboard ships.123

Bateau can mean then in early French accounts any type of
boat restricted enough in size to be used on the Mississippi

123Jal, op. cit., p. 270.
River. Significantly included within this general group of boats used on the river is a restricted design of craft which became known specifically as a bateau.

To give distinction between the two uses of the term, *bateau* when italicized is the use of the word in French and may mean various types of craft suitable to be used on rivers. *Bateau* without italics is a word adopted into the English language to mean a specific boat type.

The *bateau* mentioned by the French in Louisiana prior to about 1720 is designating only various small boats. Even after the introduction of the bateau as a specific type onto the Mississippi, as long as French was the dominant language, the term *bateau* still could be used on the river for various boat types. Surrey gives several references to *bateaux* from a very early period, and they must fit into this general group. Surrey, for example, found in the French archives that two *bateaux* were brought on the ship *La Dauphine* directly from France in 1717 for use in the Illinois trade.124

It is important to note that Penicaut who was for "vingt-deux années de service, en qualité de maistre

---

charpentier de vaisseau," and who wrote of his experiences in Louisiana up to 1720, never once refers to boats used on the Mississippi River simply as bateaux. He refers instead specifically to pirogues, chaloupes, and especially to canots. Penicaut's only use of bateaux was "bateaux-plats" and a "bastiment plat" of sixty tons. This boat evidently was a large lighter-type craft used to carry goods between Dauphin Island and the mainland.  

As early as the first explorations Hennepin observed that on the Mississippi River "il y a assés d'eau pour porter des Barques, & en tout temps les grands Basteaux plats y peuvent passer." Tonti also noted it would be possible to go "avec des pyrogues et bateaux plats depuis la riviere Quabache jusqu'a la mer." In 1700 D'Iberville proposed that the fur traders in Illinois could "construire ... des bateaux plat" to bring their beaver skins to the Gulf. The bateau plat to which Penicaut, Hennepin, Tonti, and

125 Penicaut, op. cit., p. 584.  
126 Ibid., p. 571.  
127 Ibid., p. 481.  
128 Hennepin, Description de la Louisiane, p. 194.  
129 Tonti, in Margry, Inedits, p. 19.  
130 "Ltr. dtd. 7 Sept 1700 D'Iberville au Ministre de la Marine," in Margry, IV, 376.
D'Iberville refer was perhaps the first boat introduced for specific coast and river use on the lower river. Bateau-plats possibly were fairly large and awkward scow-type boats and evidently were familiarly in use on French rivers (see Figure 7). The bateau-plat may be the bateau from which the modern-day Louisiana concept of a bateau stems, that is, a flat bottom boat slightly raked but with both bow and stern squared off. However, the bateau-plat was not the boat from which the bateau of this era developed.

Other types of boats used on the river are very loosely described as vessels: "... du nombre des bastimens que les proprietaires aurout fait,"\textsuperscript{131} or in the supply of Ft. Chartres "deux bastimens de transport charges de 160 hommes de troupe,"\textsuperscript{132} or again "arrivée de neigres dans les Battiments..."\textsuperscript{133} Whether bastimens, bastimens de transport, and Battiments were names for special types or simply derivations from bateau is not known. They possibly give an example of the varieties of bateaux in operation.

\textsuperscript{131}Archives Transcript, XIII, 65.


\textsuperscript{133}Archives Transcript, XXX, 158.
It is significant that this scene of 1720 does not show a true bateau. The boat in the foreground can be classified as a bateau-plat, or more specifically a chaland, while the boat being built with the keel and rib frame is a chaloupe. Courtesy of Ayer Collection, Newberry Library, Chicago, Illinois. Source: Inset of a wash drawing by Jean Baptiste Michel Le Bouteux, *Veue du camp de la concession de Monseigneur Law. Au nouveau Biloxy. Coste de la Louisiana.*
A boat included with the bateaux that causes much confusion in attempting to organize the evolution of types is the radeau. The term translates simply as raft, but it is described as a bateau with a flat bottom and oblong in shape. When the radeau became quite large, it evidently much resembled a flatboat of the ensuing period. More will be said of this resemblance in the next chapter.

To define a specific type of craft developed by the French by the term bateau is as general as referring to a specific type of craft developed by the English as boat. There is an important implication in the use of such a general term to apply to a specific type. This is that although the boat type is of one national origin, that is, French, the application of the word bateau to this type of boat as a specific nomenclature rather than a general term is by a foreign-speaking group, in this case the English colonists. To the French the term bateau is general, but for the English or American colonists adopting a certain type of boat from the French colonists, the application of the French term, bateau, designates a specific type. The name bateau definitely characterizes the origin of the craft as French. The

134 Surrey, op. cit., p. 61; and Saxon, op. cit., p. 137.
use of such a general term, however, to denote this particu-
lar craft indicates that bateau as a specific meaning first
originated with a non-French-speaking group.

Bateau among those using English then came to have the strict meaning of a specific boat type, and it is the
writer's contention that contrary to early French language accounts, bateau can be depended upon as being descriptive
of a specific boat type when found in early English language journals. Much of the foregoing is interpretative but is
rests on fairly solid facts.

The complete history of the origin of the bateau can possibly never be fully documented. Nevertheless, from the
evidence found, the above observations can be fairly well validated. A craft fitting the description of the bateau,
used on the Mississippi River by the French and Americans, first appeared as a significant boat type with the French
in the St. Lawrence River valley area. This first boat type along with several other types of small river boats were
referred to collectively simply as boats, that is, bateaux, by the French. Quite early the Dutch or British engaged in
the fur trade up the Hudson River, through Ft. Albany, and along the Mohawk, adopted a craft from the French and re-
ferred to it as a bateau.
The most important contribution of the American Indian to the French penetration of the North American continent was the birchbark canoe. The French used these canoes to travel all the great arc from the St. Lawrence to the mouth of the Mississippi. Their goal was to obtain the great wealth of furs from this region. The unparalleled system of waterways stretching inland from the St. Lawrence was their route. No other type of boat seemed to fit the necessity of portages between the streams of this route so admirably as the canoe. For a long period it was felt that no other type of craft could be used above Montreal on the St. Lawrence. The earliest travel accounts of traders and missionaries mention only the use of birchbark canoes. Dollier and Gallinee stated in 1669:

Le navigation au dessus de Montréal est toute différente de celle qui est au dessous ... immédiatement au dessus de Montréal, se rencontre un sault ou cheute d'eau parmi quantité de grosses roches qui ne permettent à aucun bateau de passer, de sorts qu'on ne peut se servir que de ... petits canots d'escorce de bouleau ... sans cela, il seroit impossible de naviguer au dessus de Montréal.135

The fur traders, after becoming established on the

135 Francois Dollier et De Gallinée, "Recit de ce qui s'est passé de plus remarquable dans le voyage de Mm. Dollier et Gallinée 1669-1670," in Margry, I, 118-19.
Great Lakes, however, felt that plank-built boats could be used to advantage there, especially to move soldiers from place to place to resist the warring Iroquois. It was very probably the military goal of being able to carry clumsy men not acquainted with a canoe and paddling, rather than a need for a larger freight carrier on the Great Lakes, which first stimulated the development of the plank-type boat for the areas beyond Montreal. Complaints of the need for boats were made by troop commanders on Lake Ontario prior to 1671: "... estant obligé pour cela de se servir de bateaux à la Françoise ..."\textsuperscript{136} In that same year De Courcelles demonstrated for the first time, "puisqu'il ne luy a pas esté impossible de faire monter jusques au lac Ontario un grand bateau de planches ..."\textsuperscript{137}

Whether this is a bateau is problematical, but it may very well be the beginning of the development of the bateau as a type. Surely some very important lessons were learned by dragging the bateau de planches through the rapids from Montreal to Lake Ontario. One thing for certain was learned:

\textsuperscript{136} Remy De Courcelles, "Voyage Au Lac Ontario, 1671," in Margry, I, 179.

\textsuperscript{137} Ibid., p. 180.
The flat bottom is one of the necessary features of the bateau's development. Kalm observed this important reason for the development of flat-bottomed bateaus:

"... there is a shallow place full of stones and very rapid water in the river, over which they can pass only in bateaux or flat vessels."\(^{139}\)

After De Courcelles' success in getting a flat-bottomed plank boat to Lake Ontario, further interest in a boat type other than the birchbark canoe for the area above Montreal was shown in 1685:

On arriving here I found neither bateaux or canoes for our troops . . . canoes cost too much, and require too much attention and repair; I thought I could not do better than to give orders for the preparation of plank for a hundred flat bottomed boats, which will carry twice as much as canoes, and be much cheaper, and need less repairs. Because a bateau capable of carrying two thousand pounds weight, will not cost more than a canoe which will carry only one.\(^{140}\)

\(^{138}\)Ibid., p. 173.  
\(^{139}\)Kalm, op. cit., II, 397.  
This is a translation from the French archives and therefore the term bateau is not definitive, although the translator chose to use it as such. De Denonville's comment gives new insights as to reasons for adopting the bateau over the canoe. The canoe probably always maintained itself as the best craft for the rapids and portages. However, its more complex construction, its constant need of being caulked, and very probably the increased scarcity of proper birch trees made the plank boat a less costly, if not quite so handy, craft to use.

Possibly the earliest use of the term bateau as a specific type is in the journal of Peter Kalm. Kalm in 1749, on visiting the Hudson River area, defined a bateau as follows:

Battoes are another kind of boats which are much in use in Albany . . . the bottom is flat, that they may row the better in shallow water. They are sharp at both ends, and somewhat higher towards the end than in the middle. They have seats in them, and are rowed as common boats. They are long, yet not all alike. Usually they are three and sometimes four fathoms long. The height from the bottom to the top of the board (for the sides stand almost perpendicular) is from twenty inches to two feet, and the breath in the middle about a yard and six inches. They are chiefly made use of for carrying goods along the river to the Indians, that is, when those rivers are open enough for the battoes to pass through, and when they need not be carried by land a great way. The boats made of the bark of trees break easily by knocking against a stone, and the canoes cannot carry a great cargo, and are easily upset; the battoes are
therefore preferable to them both. I saw no boats here like those in Sweden or other parts of Europe.141

With only slight modifications, Kalm's explanation describes a boat eventually used from the Hudson Bay on the north to the Gulf of Mexico on the south, and from the Atlantic to the Rockies. The three main identifying features of the bateau are: It is flat-bottomed, sharp at both ends, and has a fairly narrow beam. The variable points are the rise or shear towards the ends, the straightness of the sides, the size, and the degree of narrowness of the beam (see Figures 8, 9, 10, and 11).

Kalm wrote in Swedish, but his translator, Foster, kept the term bateau. It is obvious that Kalm meant the word to have the specific meaning of a name in Swedish just as it has in English. From the evidence of other translations of this same period, if Kalm had written in French, bateau would have simply been translated as boat, and a specific reference would have been lost. Kalm's relation of the bateau to uses similar to those of the Indian birchbark canoe and his reference to seeing no boats here like those in Europe present two knotty problems that will be further considered as they fit into the attempt to discover the origin of the bateau

141Kalm, op. cit., I, 333.
FIGURE 8

BATEAU

This bateau is still preserved at Solon Springs, Wisconsin. See photo below for details. Notice it is built with clinker joints. It is 30 feet long, 6½ feet wide, and 22 inches deep. Information and photo courtesy Bill Fuller.

FIGURE 9

DESCRIPTION PLAQUE FOR BATEAU

Courtesy Bill Fuller
FIGURE 10

BATEAU OR MACKINAW BOAT BEING USED ON THE MISSOURI RIVER IN THE 1830'S

Notice it has the clinker sides just as the bateau preserved at Solon Springs. If this were a general trait of bateaus, it is not known, as no other mention is made of it. Courtesy A. S. Barnes and Company. Source: John and Alice Durant, Pictorial History of American Ships.
in America.

Definitely the bateau appears on the Hudson by 1749, and even earlier on Lake Champlain: "... the boat in which we went to Saint Jean was the first that was built here, and employed on Lake Champlain, for formerly they made use of bateaux to send provisions over the lake."\(^{142}\) The bateau was used still earlier on the St. Lawrence, as it was introduced from there to Lake Champlain. Kalm noted when reaching Canada: "This morning I went from Prairie in a bateau to Montreal on the St. Lawrence River,"\(^{143}\) and "Early this morning we left Montreal and went in a bateau on our journey to Quebec ... ."\(^{144}\)

There are no exact dates earlier than 1749 for a bateau, but it is obvious from the previous statements that the bateau was used on the St. Lawrence many years earlier than this date. Very possibly, the comments by De Courcelles in 1671 and De Denonville in 1685 are points in its early development.

Because of the name bateau given to it by the British, it is contrary to reason to assume its spread in any other

\(^{142}\text{Ibid.}, \text{ p. 395.}\)

\(^{143}\text{Ibid.}, \text{ p. 402.}\)

\(^{144}\text{Ibid.}, \text{ p. 415.}\)
direction than from the French to the British. As to whether the bateau could have originally come from France, there is Kalm's statement, "I saw no boats here like those in Sweden or other parts of Europe." However, it no doubt is a modification of a boat of France. Because of the earliest authenticating date of 1749, there is the remote possibility that the bateau originated with the French on the Mississippi and was carried from there to the St. Lawrence. Two things bear against this idea. First, the St. Lawrence settlements are older, and migration was from them to Louisiana rather than the reverse. Second, the date 1749 is against the boat type spreading from Louisiana to the French on the St. Lawrence and thence to the Dutch or British on the Hudson. Although first settlement was made in Louisiana in 1699, a really firm base was not established until about 1720. Therefore, a matter of some thirty years is extremely brief for a type of boat to be developed, carried to an area where techniques have already had time to develop, be adopted, and then spread to a third area and have been there long enough to be an accepted fact of the landscape when Kalm observed and described them in 1749.

Eliminating France and Louisiana as sources of the bateau as a specific type indicates that the bateau must have
appeared first in North America in the St. Lawrence region (see Plate I). Although general types of small boats collectively termed bateau were introduced into the Mississippi River area directly from France with the first settlement, as already discussed, the specific boat type referred to on the Mississippi River as a bateau came from Canada. Possibly the idea was carried by the Canadian voyageurs who came to the Mississippi area. Such men, for example, as Tonti, D'Iberville, and Bienville had first lived in Canada. If the bateau were not used until actual examples were portaged across to the Mississippi area, its introduction must have been somewhat later, probably not until after Ft. Chartres was built and a Louisiana colony really got on its feet in the 1720's. The latter premise seems to be the most likely since, for example, the fact that the canot and chaloupe were used up until this time partially bears out this conclusion.

The bateau evolved then along the St. Lawrence after the 1670's as a cheaper, more rugged substitute for the birch-bark canoe. Bateaus and canoes are often almost equated as, for example, Pownall in the 1750's described a stream as being "passable with Bark Canoes, or little Batteaux." In

145 Pownall, op. cit., p. 141.
PLATE I

CANOE, DUGOUT, AND BATEAU DISTRIBUTION
1752 a convoy up the St. Lawrence River is defined as "200 large birch canoes and batteaux are gone up the river this spring." Proportions between the bateaux and a canot de maitre described by Kalm are strikingly similar. The bateau was "three and sometimes four fathoms long . . . and the breath in the middle about a yard and six inches"; the canoe was "five and a half fathoms long and about five and a half feet wide in the middle." In the same pattern as the canoe, the sides were nearly vertical, the ends slightly raised, and especially, the two ends were pointed.

In ascending the St. Lawrence to Lake Ontario, J. C. B. noted: "Finally the Long Sault rapids . . . are reached, where we again had to make a portage by dragging and pushing the bateaux with ropes and poles." The pointed ends were important for ease of handling through rapids, especially when being drawn up through them. The bow was pointed for better maneuverability, less drag against the current, and to be less apt to foul against a rock. The stern was pointed so

---

147 Kalm, op. cit., I, 333.
148 Ibid., II, 696.
149 J. C. B., op. cit., p. 25.
that a man poling could have more freedom to guide the boat than if the bateau had a square stern. Probably no source exists to verify these reasons for the pointed bow and stern, but G. V. Cousins in 1907 observed in describing the significance of the bateau in Canadian transportation: "Their sharp curved ends enabled them to be dragged up the rapids by oxen and windlasses aided by poles . . ." 150

Chapelle believes the bateau possibly traces to a boat type used earlier in Europe, or possibly, "The bateau of French Canada may have been a direct adaptation of one of the many French flat-bottomed small craft. Their use of 'plats' in fishing, at the mouth of the St. Lawrence in the seventeenth century, is an indication of this." 151 It is the writer's contention that the bateau that finally evolved in the late seventeenth and early eighteenth centuries on the upper St. Lawrence River is a unique boat type. The most authoritative evidence to corroborate this belief is Kalm's statement that no boats of this type existed in Europe. Further, it would seem that the long delay and belief that no

150 G. V. Cousins, "Early Transportation in Canada," McGill University Magazine (Montreal, Quebec, 1908), VIII, 619.

plank boat could be used above Montreal indicate that modifications were made on earlier types before one was found sufficiently capable to operate in the special conditions of the Laurentian Shield. Also, such rocky, rapid rivers and portages as those used in Canada did not have the same significance for transportation in a civilized Europe as they did in the newly discovered land.

The bateau was not a radical departure from previously built boat types. The bateau-plat certainly refers to various types of small flat-bottomed boats used in France at this time. Further, the pointed ends of the bateau were a very common feature of small boats. Early French prints show various small boats of this period built with pointed bow and stern; generally, however, they have a rounded hull for more stability in sea waves.

A type of boat, the dory, carried aboard fishing ships closely resembles the bateau as it is pointed at the prow, has only a very narrow V-shaped transom at the stern, and has a flat bottom. Chapelle notes an interesting comment on the dory:

The relation of the dory to the bateau is a speculative matter. The use of the plat by the early French fishermen in the Bay St. Lawrence allows the suggestion that the New England fishermen adapted the bateau in this form through their contact with these boats in their cod fisheries in this area, which were very active by 1700.
The hull of the dory is constructed in the same manner as the bateau and the French flat-bottomed boats. It seems highly probable, therefore, that there was some connection or relationship between them.\(^\text{152}\)

The dory may perhaps then be derived from the bateau. The bateau and dory are very similar. But most surely if the boatman of the late 1700's on the Mississippi River had been shown a dory alongside his bateau, he would not have considered them of the same type. Bateaus definitely were built larger than the dory, but some were of the same size. Early bateaus had nearly straight sides; whereas the dory had flared sides, but some later bateaus had this same feature. Bateaus generally had slightly higher sides than a dory. Early bateaus had a more narrow beam than their sea-going cousins, but later bateaus on the Mississippi especially were built with broader beams. Most important, the dory and bateau differed in the small V-shaped transom built into the dory's stern. Although similar in pattern, the dory cannot be considered the same type boat as the bateau. The dory is carried aboard a ship and designed for fishing, lifeboat, or harbor use. The bateau was designed to navigate, similar to a birchbark canoe, through shallow

\(^{152}\text{Ibid.}, pp. 35-36.\)
rocky rapids and was light enough to be carried over short portages.

The bateau, after being developed on the St. Lawrence, spread to a very broad area of use. The chief aid to its spread was its ability to be portaged. Kalm mentions its use up the Hudson through Lake Champlain to the St. Lawrence drainage. On the Mohawk River "all Goods & Batteaus also are carried over Land for about a mile,"153 and by this route with portages, bateaus reached the Great Lakes. One of the largest portages was at Niagara Falls where "Battoes [were] caread [sic] a Cross the Caring Place about Nine Miles."154 Another portage route to Canada was via the Kennebec River of Maine where "a certain Degree of Navigation for Bateaux takes Place."155

The bateau possibly first reached the Mississippi River drainage system via the portage between Lake Erie and the Allegheny River, sometime around the 1720's. In the build-up of troops just prior to the French and Indian War it is certain that this route was used by bateaus as it is

153Pownall, op. cit., p. 34.
154Pond, op. cit., p. 325.
155Pownall, op. cit., p. 77.
mentioned in a journal of 1753. 156

The bateau was worked in this manner via portage to
the Ohio and down to the Mississippi. Following the French
example, the British colonists by 1755 had adopted the bateau
to supply goods by portage route from the Potomac to the
Monongahela during the French and Indian War. 157 Its great
importance was first made familiar to the British colonists
for the Mississippi River area during the wars between the
French and the British. By the 1760's it had finally been
adopted by the British entering the Ohio and Mississippi
River system. After the British victory bateaus were used
by the Ohio Company of Virginia on the Ohio and Mississippi,
as Croghan noted in 1765: "I set off from fort Pitt with
two batteaux." 158

The French on the lower Mississippi, evidently finding
the bateau developed in the rocky, rapid streams of Canada
more suited to handling the fairly strong current and the
snags than the various bateaux, the chaloupe, and canot that
they had been using, adopted it. It became the chief boat,  


157 Pownall, op. cit., p. 134.

158 George Croghan, A Selection of George Croghan's
Journals and Letters . . . November 16, 1750-November, 1765,
in Thwaites, Early Western Travels, I, 126.
along with the pirogue, for use on the river.

Just when the bateau is first used on the Mississippi cannot be told since, as noted, the French use of the term bateau is not descriptive. English accounts do not appear until the British came to the lower Mississippi to accept the French surrender after the French and Indian War. Some of these accounts note the prior use of bateaus by the French. Coming to the Mississippi to take over Ft. Chartres in 1765, an officer noted that "Kaskaskias River was a Secure Place for their Batteau's . . ." 159 George Morgan, a member of the Ohio Company, explained that the French "asscent [sic] the Missisippi from New Orleans to kill Buffaloe Bears & which they salt up in large Perriogues & Batteaus & descend . . ." 160

Pittman was an officer who came to New Orleans to travel up the river to take the surrender of land north of the Isle of Orleans. He described the system of supplying the Illinois settlements of the French as follows: "The


merchandize necessary for the commerce to . . . the upper posts on or near the Mississippi is carried by Batteaus . . . "161 In 1753, Dumont, while describing the pirogue, also noted that "uns de ces espèces de bateaux, qui se terminent également en pointe par les deux bouts."162

From these observations it is certain that such accounts as Bossu's in 1751 are referring to the same craft: ". . . nous partîmes de la nouvelle orléans . . . pour le voyage des Illinois, avec six bateaux que montoient les quatre Compagnies . . . "163

Tracing backward earlier than this date in French accounts becomes unsound. Note of bateaus being brought by ship from France in 1717, previously mentioned, obviously refer to different craft, so that somewhere between these two dates bateaus appear on the Mississippi. Since the most important event to occur in the interior of the Mississippi Valley during this period was the building of Ft. Chartres


162 Dumont, op. cit., p. 62.

163 Jean Bernard Bossu, Nouveaux voyages dans l'Amérique Septentrionale . . . (Amsterdam: Chez Changuoin, 1777), I, 37.
in 1720, which was accompanied by large movements of troops, this date has been taken as a fairly logical point for the introduction of the bateau onto the Mississippi River.

After 1768 the Mississippi was increasingly used by the Americans and one of their first trips down the Mississippi was in that year. The use of the bateau was noted by John Jennings in his journal of the trip: "... they came on Board our Batteau," and again, they "... joined us with another Batteau."164 After the coming of the flatboat and keelboat era, the bateau continued to be used. Harris in his journal, written in 1805, gave this brief description: "A batteau is a flat-bottomed boat, widest in the middle, and tapering to a point at each end . . . ."165 About this time the small bateau began to be referred to, especially by the Anglo-Saxons, as a skiff. In 1807 Schultz noted: "Skiffs are built of all sizes, from five hundred to twenty thousand pounds weight burthen. Batteaux are the same as the


165Thaddeus Mason Harris, Journal of a Tour . . . Northwest of the Alleghany Mountains (Boston, 1805), reprinted in Thwaites, Early Western Travels, III, 341.
larger kind of skiffs, and indifferently known by either name . . ." 166 In the same year Cuming made the similar observation: "I departed from Pittsburgh, in a bateau, or flat bottomed skiff . . ." 167 By 1810 the use of the term bateau was beginning to be lost and surplanted by the term skiff: "Skiffs are well known. They are built of all sizes, are used with or without sails." 168

The use of the bateau continued well into the nineteenth century for smaller streams, or streams too rapid for other river craft. This special function of the bateau coupled with larger craft on larger or more manageable rivers was noted as early as the 1760's by Pownall for the Ohio and Mississippi:

Upon the Whole, the Navigation of this River may be divided into Four Parts: 1. From Canawagy [Conewango] to Chartier's Old Town, in Bateaux, capable of carrying about Three or Four Tons, and Drawing 12 Inches Water. 2. From Chartier's to the Big Bent, in Flats, like those used in Delaware, or larger; bearing 18 or 20 Tons. These Two Parts must be performed in long flat-bottomed Boats, as better fitted for Setting in shallow Water and rapid Streams. 3. From the Big Bent [Great Bend] to the Falls, in Shallops or Schooners of 10 or 15 Tons . . . . 4. From the Falls to Mississippi thence to the Sea is only fitted for light canoes or Batteaux against the Stream; but for any Vessels downwards,

166 Schultz, op. cit., I, 129.

167 Cuming, op. cit., p. 87.

168 Melish, op. cit., p. 334.
when the Floods are not so high as to overflow the adjoining wide extended Flats.\textsuperscript{169}

In 1817 Fordham noted that the Wabash "is navigable for keels nine and for batteaux and flats twelve months in the year."\textsuperscript{170} Even after the introduction of steamboats in the 1830's bateaus known as mackinaw boats were still used to carry furs downstream on the Missouri.\textsuperscript{171} In as late as 1874 bateaus were still being used in West Virginia as a main source of transportation on the Greenbrier and New River, small tributaries of the Ohio system, especially through the New River gorge.\textsuperscript{172} (See Figure 11.) In Canada the bateau had its last principal use where it was known as the york boat and was used on the rivers tributary to Hudson Bay.\textsuperscript{173} It was used on the Yukon until the 1920's.

Generally, in the later nineteenth century on the

\begin{flushright}
\textsuperscript{169}Pownall, op. cit., pp. 140-41.
\end{flushright}

\begin{flushright}
\end{flushright}

\begin{flushright}
\textsuperscript{171}Chittenden, op. cit., I, 95.
\end{flushright}

\begin{flushright}
\end{flushright}

\begin{flushright}
\end{flushright}
FIGURE 11

BATEAU STILL BEING USED IN WEST VIRGINIA IN 1878

Note both fore and aft steering oars. Source: Edward King, The Great South.
Mississippi River system record of the use of the bateau had been lost in the general term of skiff, but as late as 1905 a description of the clearing of tributaries of the Ohio for steamboats during low water shows that it was still being used:

... the work is done with tools and explosives carried on push-boats or bateaux. These boats are usually 10 to 15 feet in width, and 75 to 100 feet in length, and draw but a few inches of water. They are propelled by the crew by the use of poles. As they can move on a small depth of water, the low-water season is selected for the work, and it can then be done very effectively and economically, the snags all being in sight.\(^{174}\)

The Ohio Company's bateaus were built by "ship's carpenters"; for example, Nicholas Rambo and Abraham Beverly were hired in Philadelphia in 1766 and brought to Ft. Pitt to make "... for them strong and staunch Battoes—of the Model and Construction, which James Tull and Griff Vaughan are now making for the said Baynton, Wharton, and Morgan."\(^{175}\)

The bateaus were built in a regular boat yard: "... they have one on the Stocks ..."\(^{176}\) Kalm noted that bateaus at


\(^{176}\)Ibid., p. 167.
Albany "are made of boards of white pine . . ."\textsuperscript{177} For the bateaus at Lake Champlain "the bottom is made of red, but more commonly of white, oak which shows better resistance when it runs against a stone than other wood. The sides are made of white fir, because oak would make the bateau too heavy. They make plenty of tar and pitch here."\textsuperscript{178}

The different kinds of lumber show a craftsman's choice of particular woods to serve particular purposes. The reference to tar and pitch is a bit cryptic, but it might be assumed they were used in caulking the bateaus as they are mentioned with the bateau description. Fordham in 1817 mentioned that he "caulked the bateau . . . ."\textsuperscript{179}

The Ohio Company was not so selective in its choice of lumber: "Batteaus are all made of green Timber and will not last longer, than One Summer . . . after they have landed their Provisions at Fort Chartres, They are of no farther Use."\textsuperscript{180} At first the Ohio Company did not plan to use the bateaus more than once, but fairly soon their system

\begin{itemize}
\item \textsuperscript{177}Kalm, \textit{op. cit.}, I, 333.
\item \textsuperscript{178}Ibid., p. 381.
\item \textsuperscript{179}Fordham, \textit{op. cit.}, p. 139.
\end{itemize}
was altered. The bateaus were put into more permanent use, and probably more care was taken to choose seasoned timber.

The best description of the bateau that adds anything further to the early descriptions, especially Kalm's, is given by Captain La Barge for the Missouri River mackinaw boat:

The bottom . . . was made of boards about one and a half inches thick. On these rested cross-timbers, to which, and to the bottom, were fastened the inclined knees that supported the sides . . .

. . . before nails were carried up the river all the parts were fastened with wooden pins . . .

. . . the gunwale rose about two feet from the center of the boat toward both bow and stern. The keel showed a rake of about thirty inches from the bow or stern to the bottom. The hold had a depth of about five feet at the two ends of the boat, and about three and one half at the center.

The central portion of the boat was partitioned off from the bow and stern by two water-tight bulkheads or partitions. Between these the cargo was loaded, and piled up to a height of three or four feet above the gunwale and given a rounded form. Over the cargo lodge skins were drawn tight and fastened with cleats to the sides and gunwales of the boat, so as to make practically a water-tight compartment. In the bow were seats for the oarsmen, and in the stern an elevated perch for the steersman, from which he could see over the cargo in front, and give directions to the crew in the bow or study the river ahead.181

These facts surely were true also for the earlier bateaus of the Mississippi.

181Chittenden, op. cit., pp. 94-95.
Bateaus were of various sizes. At the falls of the Ohio it was observed that "a batteau of any size may come and go on each side without any risk."\textsuperscript{182} Evans speaks of "large batteaux" and "small batteaux."\textsuperscript{183} The mackinaws "were sometimes made as large as fifty feet long and twelve feet beam."\textsuperscript{184} Possibly the more standard size for bateaus was the thirty-three-foot length by seven-foot beam\textsuperscript{185} of the Ohio Company's bateaus that could carry "7 Tons Burthen."\textsuperscript{186}

These later bateaus had become larger and proportionally broader of beam than the eighteen to twenty-four-foot length by three-foot-six-inch beam described by Kalm. Kalm's notation of bateaus in 1749 being "somewhat higher towards the ends than in the middle," the height of the sides being "from twenty inches to two feet," and that "they have

\textsuperscript{182}Croghan, \textit{op. cit.}, p. 136.
\textsuperscript{183}Evans, \textit{op. cit.}, pp. 263-64.
\textsuperscript{184}Chittenden, \textit{op. cit.}, p. 94.
\textsuperscript{185}Pownall, \textit{op. cit.}, p. 161.
seats" agrees quite closely with the mackinaw of the 1830's.

Besides the dimensions and weight, the number of rowers is some indication of size. For the mackinaw "The crew of the boat ordinarily consisted of five men, four at the oars and one at the rudder." The bateaus of the Ohio Company used the same number of oarsmen, "five men to handle each." One man evidently was the steersman since their bateaus must also have had regular rudders. One of the members of the company mentioned having a blacksmith make some "rudder irons." Bateaus used in Canada are described in the same manner as having four men to row and one to steer.

The number of oarsmen can, however, be misleading in judging the size of the bateau. The number varied for the same craft, as the Ohio Company at least considered using

---

187 Kalm, op. cit., I, 333.

188 Chittenden, op. cit., p. 94.


three instead of the regular five men on their bateaus.\textsuperscript{192} These same bateaus when rowed upstream were calculated to need nine men to handle them with only half a load.\textsuperscript{193}

A smaller bateau was described by Cuming as, "... twenty feet long, very light. We had a pair of short oars, or rather long paddles, for one person to work both, and a broad paddle to steer with."\textsuperscript{194} A larger bateau described by Harris of "about 1500 weight burden ... is managed by two men with paddles and setting-poles."\textsuperscript{195} Schultz mentioned a bateau between these two sizes which "very easily carried twelve thousand weight."\textsuperscript{196}

The very large bateaus described by Pittman as being used by the French to carry trade between New Orleans and the Illinois country "are rowed by eighteen or twenty men, and contain about forty tons burthen ..."\textsuperscript{197}


\textsuperscript{194}Cuming, \textit{op. cit.}, pp. 87-88.

\textsuperscript{195}Harris, \textit{op. cit.}, p. 341.

\textsuperscript{196}Schultz, \textit{op. cit.}, I, 126-27.

\textsuperscript{197}Pittman, \textit{op. cit.}, p. 36.
Bateaus were sometimes fitted with sails. In 1723 D'Artaguiette coming up the Mississippi in some type of "bateau" stated we "hoisted our sail."\(^{198}\) In 1752 Stevens traveling in a bateau on Lake Erie stated we "hoisted sail."\(^{199}\) In 1806 Cuming described his bateau as having "a mast, and a lug or square sail to set when the wind should favour us . . ."\(^{200}\)

The standard bateaus were nearly always open without decks, but there were some attempts at modifications. One member of the Ohio Company had "given the carpenter directions to finish her with a cabin." However, another member's desires prevailed and they all remained open.\(^{201}\) On his bateau George Morgan, however, fitted "over the Stern . . . Hoops, & an Oil Cloth on them, with Curtains of the same to let down before & behind."\(^{202}\) When Wharton, one of the co-owners of the Ohio Company, planned an inspection trip, orders were given for a bateau "One of which we desire may be made

\(^{198}\) D'Artaguiette, \textit{op. cit.}, p. 61.

\(^{199}\) Stevens, \textit{op. cit.}, p. 307.

\(^{200}\) Cuming, \textit{op. cit.}, p. 88.

\(^{201}\) Clarkson, \textit{op. cit.}, p. 354.

\(^{202}\) Morgan, \textit{op. cit.}, p. 313.
with a small booby House in order for Him to be entirely secur'd from the Weather . . . In the doing of which we shall not mind if we loose half of what she might otherways Stowe." 203 In 1807 Cuming's bateau had

. . . the stern sheets roofed with very thin boards, high enough to sit under with ease, and long enough to shelter us when extended on the benches for repose, should we be benighted occasionally on the river, with a side curtain of tow cloth as a screen from either the sun or the night air. 204

The covered bateau very possibly is the same boat often referred to as a galley, and it was especially used as a patrol boat by the Spanish on the river. Nuttall made a somewhat paradoxical statement that may be referring to such covered bateaus: " . . . the river is crowded with the boats of French and Spanish pedlars, not much larger than perogues, but fitted up with a cabin, covered deck, and sails." 205 The covered bateau in its surface appearance would almost pass as a type of keelboat.

Finally, in the description of bateaus some of these craft were important enough to be given names: "You are to


204 Cuming, op. cit., pp. 87-88.

205 Nuttall, op. cit., p. 309.
leave this Place immediately & Proceed up the River Ohio with the Boat under your Command, untill you meet the Batteau Three Friends--Patrick Roberts Commander."206

The concept of the origin of the bateau on the St. Lawrence, its spread via portage to the Mississippi, and the confusion of tracing the early development of the boat because of the difference of meaning between the term bateau of old English-language journals and the bateau of early French-language accounts are the most original and controversial aspects of this entire dissertation. These concepts are counter to all known research touching on the use of boats on the Mississippi River. In works on the Mississippi River, the bateau is the least touched upon, if at all, of any of the major boat types used. Gephart, Riegel, and Carson, for example, skip from the significance of the birchbark canoe and pirogue directly to the flatboat and keelboat.207 Also,


in earlier first-hand accounts the bateau receives less notice than Indian canoes or pirogues. It is the problem of the all-too-obvious. Besides receiving only small attention, the bateau is given some confused descriptions even in the vein of what is generally written. Hulbert, for example, noted that a bateau "better known in the West as the barge, was a square box of any length, width and depth."\textsuperscript{208} Edwards feels that the bateau was a variation of the fundamental design of the flatboat and keelboat and does not see that it was an earlier type.\textsuperscript{209}

**Transportation by Pirogues and Bateaus**

Much of just how the pirogue and bateau were used and fitted into the total early development of the lower Mississippi region must be presumed. The total freight carried on the river is at its greatest today and is still increasing. Nevertheless, it is generally considered that the Mississippi reached its "heyday" with the steamboat. Use of the river

\textsuperscript{208} Archer Butler Hulbert, *Waterways of Westward Expansion* (Cleveland: Arthur H. Clark, 1903), pp. 102-103, Vol. IX of *Historic Highways of America*.

had increased in the later flatboat and keelboat era over that of the pirogue and bateau era. However, in the entire evolution of river development at no other time did the boats on the river have a greater relative significance to the total cultural development than during the pirogue and bateau era. The fur trade, the later establishment of agriculture, territorial expansion, colonial conquest, and subjugation of the Indians, all were based on the use of these boats. The land to develop was in the interior. The culture to develop it was on the coast. Only a man on foot, or struggling with a pack horse through forests, swamps, and crossing untold numbers of creeks and rivers could reach the interior unless he used the pirogue or bateau on the open rivers.

By all odds the heaviest use of the Mississippi was from Pointe Coupee to New Orleans. In 1811 Brackenridge, shortly after the close of the pirogue and bateau era, but nevertheless soon enough to be accurate for this period also, described the area as follows:

The Coast may be said to begin at Pointe Coupee. From this to La Fourche, two-thirds of the banks are perfectly cleared and highly cultivated; from thence to N. Orleans, distance of near 100 miles, the settlements continue without interruption on both sides, and present the appearance of a continued village. I was enchanted with the magnificance
of the scene, as I floated down the majestic river in Dec. 1811.\textsuperscript{210}

The Mississippi was the basic highway in the settled areas of the lower Louisiana region. Relatively, however, the boat types did not assume such a high position here as in the frontier areas further in the interior. The country was more open and the river road along the banks was an alternate route of travel. Nevertheless, much of the movement back and forth was by water, with the pirogue and bateau being mingled with various coaster types of sail boats such as the \textit{chaloupe}. The pirogue had much the same role as the horse in other areas. It was the means of a man alone or a group to visit from farm to farm or to go to town. The bateau was used for large loads, much as a wagon. For early New Orleans one of the chief sources of food supplies was those brought down by boat from the German coast area to the north of it. Bossu observed on passing this area on his trip up the Mississippi in 1751: "... les Allemands s'établissent à dix lieues au dessus de la nouvelle Orléans. Ces Peuples sont très-laborieux; on les regarde comme les pourvoyeurs de la Capitale."\textsuperscript{211}

\textsuperscript{210}Brackenridge, \textit{op. cit.}, p. 174.

\textsuperscript{211}Bossu, \textit{op. cit.}, I, 38-39.
Above Pointe Coupee use of the river decreased. Rela-
tively, it was more significant as the river was the only
method of contact with Natchez, the Red River settlements,
the settlements near the mouth of the Arkansas, New Madrid,
and finally with the Illinois country or all the way to
Quebec.

Furs were the main single reason for river transporta-
tion into the interior. La Salle first saw the value of the
river as a route to get furs to the sea. Tonti felt, "Pour
cé qui est de Mississipy, il pourroit produire tous les ans
pour 2000 escus de pelleterie . . ." 212 The first furs were
brought to the Gulf about 1703 by Tonti's group. The trade
continued from this time, and in 1769 General Gage observed
the situation at Kaskaskia: "... the Traders ... carry
their skins to New Orleans, being the cheapest and most
expeditious Route to the Sea." 213 The fur trade also expand-
ed north of the Illinois area. Each year a rendezvous was
established to obtain furs at the mouth of the Wisconsin
River at Prairie du Chien. In 1773 Peter Pond noted: "Hear

212 Tonti, in Margry, Inédits, p. 36.

213 General Thomas Gage, "Ltr. dtd. New York 3d Febru-
ary 1769 from General Gage to Earl of Hillsborough," in
Alvord, Trade and Politics, p. 489.
the Botes from New Orleans Cum. They are navigated by thirtey Six men who row as maney oarse. They Bring in a Boate Sixtey Hogseats of Wine on one . . ."214 The goods were traded for furs and carried back to New Orleans. Besides the fur trade from the Illinois area and beyond, missionaries such as Du Poission traveled the river to their missions. Hunters and trappers went out from New Orleans to the back country. Especially popular seemed to be the area along the St. Francis River. Detachments of troops came and went from the garrisons on the river, especially Fort Chartres. Occasionally a courier or other traveler went all the way through to Canada. The routes of Marquette and La Salle were generally abandoned for more direct contact across portages from the tributaries of the Ohio. Le Page du Pratz noted that travelers would go up the Wabash and portage to the Maumee: "... où l'on charge de voiture: c'est-à-dire, que l'on a remonté en Pirogues, & que l'on descend le Fleuve S. Laurent jusqu'à Quebec en Canots d'écorce de Bouleau."215 Sometimes travel was by a single pirogue. The pirogue was the choice of a small group if they wanted to make the best travel


Towards the end of the era as times were more settled, as Audubon observed, pirogues "were of little worth after reaching the market of New Orleans, and seldom reascended, the owners making their way home through the woods."216

Small convoys made up of both pirogues and bateaus were often used: "... nous partismes de compagnie avec M. de Bois-briand, qui montoit aux Illinois avec deux grands bateaux et trois pirogues."217

Most significant of all the voyages were convoys which brought besides furs other products of the land from the Illinois and returned for barter various finished goods to the area:

The merchandize necessary for the commerce to ... the upper posts on or near the Mississippi is carried by Batteaus, which are rowed by eighteen or twenty men, and contain about forty tons burthen; they are commonly three months going from New Orleans to the Illinois. They always go in convoys from New Orleans ... Two of these convoys, consisting of from [7] seven to twelve Batteaus, go from New Orleans twice a year, viz. in the spring and autumn.218

The significance of the Illinois country to Louisiana is

---


217 Bénard La Harpe, "Relation Du Voyage De Bénard De La Harpe," in Margry, VI, 244.

218 Pittman, op. cit., p. 36.
generally slighted. Even as it is today, the success of the coastal colony rested on its situation as the entrepôt of the interior. In 1765 Harry Gordon noted for New Orleans that "Its principal staple is the Trade of Furrs and Skins from the Illinois."219 Furs and hides were the most important commodities. However, as Tonti, the first person to feel the interior area of the Mississippi could be productive for other items, noted: "Pour ce qui est de Mississipy, il pourrait produire . . . quantité de plomb, des bois pour les navires."220 As Tonti predicted, timber was brought to the Gulf, lead was produced near St. Genevieve and carried to New Orleans. Of most significance, the Illinois settlements became agriculturally important. Pittman noted: "In the late wars, New Orleans and the lower parts of Louisiana were supplied with flour, beer, wines, hams, and other provisions from this country."221 In 1746 New Orleans was cut off from France by the war with the British. Le Page du Pratz states: "... dans la derniere Guerre les farines de France étoient rares, les Illinois en descendirent à la

219Gordon, op. cit., p. 55.
220Tonti, in Margry, Inedits, p. 36.
221Pittman, op. cit., p. 98.
Although not significantly studied as such, it should be remarked that from the time of the French beginnings of trade until the Americans finally took over with the advent of the flatboat and keelboat era, trade was constantly disrupted. The four intercolonial wars as they both stimulated or blocked river trade are significant. The constant harassment of the Indians was a great hindrance also.

Until all the area was finally taken over by the United States there was a great restraint of use of the river. The interior was held after 1763 by the British while the coast was held by the Spanish. An example of the political problems is demonstrated in the breakdown of plans for the Ohio Company. A most ingenuous scheme had been worked out to bring trade goods overland to Pittsburg "on the Ohio, & from thence have Water Carriage with the Stream to the Mississippi." 223 Then it was planned to travel upstream on the Mississippi to Fort Chartres and "transport the commodities

222 Le Page du Pratz, Histoire de la Louisiane, I, 331.

they received in return down the Mississippi to Mobile.\textsuperscript{224}

The reason the goods were to be carried to Mobile was that the Isle of Orleans was Spanish. Failing to get trade rights in New Orleans, the Ohio Company adopted the scheme to navigate the bateaus through the Bayou Manchac route to Lake Pontchartrain and thence to the Gulf. The bayou never was clear enough of fallen logs to make the scheme feasible and with the outbreak of the Revolutionary War the plan was abandoned.

All these political events must be taken into account to modify any idea of a gradual evolution of boat types. The flurry of flatboat and keelboat use that marked the change from one era to the next was more rapidly accelerated by the close of the American Revolution and the opening of the lands west of the Appalachians to settlement than if there had been a continually peaceful situation and no division of territorial control.

\textsuperscript{224}Ibid.
CHAPTER II

THE FLATBOAT AND KEELBOAT ERA

Following the period in which the pirogue and bateau were the dominant boat types, increased demand was met by two larger boats on the lower Mississippi River. This second era is termed after these two new types as the flatboat and keelboat era. Settlement had increased in the Mississippi River drainage basin. There was a role to be played by boats larger than the pirogue and bateau. The specialized craft, the flatboat and keelboat, filled this role. The flatboat was large and awkward, built to take advantage of the river's current and to carry a sizeable burden downstream. In order to haul heavy loads upstream with the least possible trouble, the keelboat, a craft with a fine nautical design, became important. It is somewhat of an oversimplification to limit the major boats of this era to these two. However, all the boats used can be classified with one or the other.

Of course it is not possible to mark a clearly defined
ending for the pirogue and the bateau era and a sharp beginning for the flatboat and keelboat era of navigation on the Mississippi River. The pirogue and bateau continued to be used as boats of lesser significance all through the flatboat and keelboat era. Also, the flatboat and keelboat were certainly first used while the pirogue and bateau were still the major boat types. There was to be sure a first time for the use of both the flatboat and keelboat, but it is almost certain that the events were not recorded.

GENERAL SETTLEMENT PATTERN

The decade between 1780 and 1790 is distinguished primarily by the fairly abrupt beginning of a large migration of people into the trans-Appalachian area. This migration caused a rapid development in the use of flatboats, and to a lesser extent of keelboats, on the Ohio and lower Mississippi rivers. Historians repeatedly stress the point that the Appalachians formed a barrier that held back migration. This idea, however, seems more apparent than real. For most of the eighteenth century the trans-Appalachian area was a battleground between the French and the British. This struggle, in which the Indians were incited to take sides, was because of the area's wealth in furs. In 1763 the British finally
overcame the French. To appease the Indians loyal to the British, especially the Iroquois, a Royal Proclamation Line was established along the crest of the Blue Ridge with settlement being outlawed to the west of the line. Along with the Proclamation Decree, Indian troubles continued after 1763. Pontiac's rebellion was the most known uprising. Shortly thereafter in the 1770's the colonists' attention turned mainly to the prelude to, and later the actual fighting of, the Revolutionary War with Britain.

Finally, with the coming of peace, the territory west of the Appalachians was opened to settlement by the new United States. A great tide of migration began across the Appalachians which marked the outset of the flatboat and keelboat era. The migration was enhanced by the practice of making land grants to Revolutionary veterans in the trans-Appalachian area. Some of the early migrants went all the way to areas along the lower Mississippi. Mainly the movement, however, was concentrated in the areas adjacent to the Ohio River. Once agriculture had emerged beyond a purely subsistence basis in the Ohio area, the farmers found that the best way to deliver their produce to market was by flatboat to New Orleans. An acute problem concerning the market lingered because the west bank and mouth of the Mississippi
were controlled by Spain. In 1803, with the Louisiana Pur-
chase, New Orleans became part of the United States. With
this purchase the conflicts between nations that had compli-
cated the development of the Mississippi Valley since the
earliest settlement finally ended. From this time on, settle-
ment was merely a matter of filling in the land and carrying
trade goods to market by river.

On the lower Mississippi only the very first beginnings
of settlement actually got underway on any of the river be-
tween the Ohio and Natchez. The river was basically a trade
route from the Ohio settlements to the Gulf. Almost all the
lower-Mississippi-area settlements above Natchez developed
after the introduction of the steamboat.

Some of the users of flatboats on the lower Mississippi
came to settle in the area from Natchez south to the French
settlements at Pointe Coupee. Most of the flatboatmen, how-
ever, were bringing goods produced in the interior to sell on
the world market at New Orleans. After selling their goods
and boats the flatboatmen returned to their homes by walking
or on horseback via the overland route of the Natchez Trace.
As soon as the steamboat appeared many of the flatboatmen
still used the flatboat to bring goods to New Orleans, but
they went back upriver on the steamboats.
The various features of the flatboat considered are the identifying characteristics of size and shape, method of building, fittings, terminology, sub-types, origin and introduction, and its later use and evolution. It is not correct to consider the flatboat as solely one unvarying type, but to avoid confusion in the first two sections, a general average form of flatboat is investigated before anything of the various sub-types is discussed.

The Flatboat's Identifying Characteristics of Size and Shape

Although given in many secondary works, the following identifying characteristics of the flatboat have been verified by material from eighteen different source accounts with each characteristic authenticated from several. The flatboat's most significant feature, obvious from its very name and described by five narrators, was, as for example reported by Hall, its "perfectly flat bottom."¹ Second in

¹Thomas Ashe, Travels in America Performed in 1806 (London: Richard Phillips, 1809), p. 66; Tilly Buttrick, Voyages, Travels, and Discoveries 1812-1819 (Boston, 1831), reprinted in Thwaites, Early Western Travels, VIII, 57; Georges Henri Collot, A Journey in North America in 1796
significance and the flatboat's most commonly observed characteristic was its shape, described as "oblong," by four writers,\(^2\) and less accurately as "square" by three others. It is very doubtful if flatboats ever were true squares. The three observers were no doubt using the term to characterize the ends of the flatboat rather than to describe its entire shape. For example, one of the three, Michaux, states, "They are of a square form, some longer than others."\(^3\) Latrobe spoke of the flatboats as being a "square or oblong box"; Maximilian defined flatboats as "large four-cornered chests," and Everest being least specific states that a flatboat is "shaped like a parallelogram."\(^4\) Following

\(^2\)Ashe, op. cit., p. 65; Collot, op. cit., p. 32; Schultz, op. cit., I, 128; James Stuart, Three Years in North America (Edinburgh: Robert Cadell, 1833), p. 290.


these first two features in significance and mentioned by ten sources, almost as often as the oblong shape, was the fact, as for example, stated by Flint, that flatboats were "roofed all over." To support the roof the flatboat had "planked up," "perpendicular sides," also noted by five other travelers.

The dimensions given for the flatboat differ greatly as illustrated in Table I compiled from eleven different sources. Flatboats measuring near the extremes in length shown in the table must have been rare. Lengths varying around twenty and sixty feet seem the more likely average maximum and minimum range. A length varying between forty and fifty feet was more common. The width of the flatboats extended nine feet at the narrowest to twenty-five feet at the widest. A width between fourteen and eighteen feet was more common. The forty-by-sixteen-foot flatboat used by

---

5Ashe, loc. cit.; Buttrick, loc. cit.; Evans, op. cit., p. 257; Fearon, loc. cit.; Flint, loc. cit.; Hall, op. cit., p. 222; Melish, op. cit., p. 334; Ogden, op. cit., p. 41; Schultz, op. cit., I, 129; Stuart, loc. cit.

6Ogden, loc. cit.

7Hall, loc. cit.

8Ashe, loc. cit.; Buttrick, loc. cit.; Evans, loc. cit.; Melish, loc. cit.; Michaux, op. cit., p. 166.
### TABLE I

FLATBOAT DIMENSIONS AS GIVEN IN EARLY SOURCE ACCOUNTS

<table>
<thead>
<tr>
<th>Length in Feet</th>
<th>Source</th>
<th>Width in Feet</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>Stuart</td>
<td>18</td>
<td>Stuart</td>
</tr>
<tr>
<td>60</td>
<td>Schultz, I</td>
<td>16</td>
<td>Ashe</td>
</tr>
<tr>
<td>40</td>
<td>Dewees</td>
<td>15</td>
<td>Michaux</td>
</tr>
<tr>
<td>40</td>
<td>Michaux</td>
<td>14</td>
<td>Schultz, II</td>
</tr>
<tr>
<td>40</td>
<td>Ashe</td>
<td>12-25</td>
<td>Fordham</td>
</tr>
<tr>
<td>36</td>
<td>Woods</td>
<td>12-20</td>
<td>Collot</td>
</tr>
<tr>
<td>30-90</td>
<td>Fordham</td>
<td>10-14</td>
<td>Schultz, I</td>
</tr>
<tr>
<td>30-50</td>
<td>Collot</td>
<td>10</td>
<td>Woods</td>
</tr>
<tr>
<td>20-50</td>
<td>Schultz</td>
<td>9-10</td>
<td>Flint</td>
</tr>
<tr>
<td>15-50</td>
<td>Michaux</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

Ashe or Michaux's forty-by-fifteen-foot flatboat seem to be good examples. Fewer figures are given for the flatboat's height. Melish relates that the sides were "about six or seven feet high";\(^{10}\) Schultz states that his flatboat had sides five feet high;\(^{11}\) Collot notes that the sides were "never less than four in depth,"\(^{12}\) and Michaux observed, "their sides are raised four feet and a half above the water."\(^{13}\)

Secondary sources draw in general similar conclusions for the flatboat's dimensions; however, King gives an extreme length of one hundred feet\(^ {14}\) and Baldwin gives a length of one hundred and twenty feet.\(^ {15}\) These dimensions, however, must be for the flatboats built fairly late into the 1860's, which evidently became somewhat larger. A height of the sides of eight feet is given by Quick and King,\(^ {16}\) and again,

\(^{10}\)Melish, loc. cit.  \(^{11}\)Schultz, op. cit., II, 73.

\(^{12}\)Collot, op. cit., p. 33.

\(^{13}\)Michaux, op. cit., p. 166.

\(^{14}\)Isaac King, "Flat Boating on the Ohio River," Ohio Archaeological and Historical Quarterly, XXVI (1917), 79.

\(^{15}\)Baldwin, op. cit., p. 48.

\(^{16}\)Quick, op. cit., p. 20; Isaac King, op. cit., p. 79.
Method of Building the Flatboat

The flatboat had very much the look of a floating house, and it was in fact built more in the fashion of a house than a boat. The flatboat was built on a basic oblong frame. The two side pieces or the gunwales were the most important members of the structure. Schultz remarked: "The gunwales are generally from twelve to twenty-four inches high, and from three to six inches thick . . ."17 Stacy elaborated on his method of obtaining the gunwales:

... for the gunwale I'd get one large, straight yellow poplar tree eighty or ninety feet long. I'd fell it, line it, score and hew it on both sides with a broad-ax to 18 inches thick. Then I'd shove it onto skids, line it through the centre and rip it in two with a whipsaw. This made each gunnel 9 inches thick and as wide as the tree would make them. These we hauled to the river (sometimes four or five miles through the woods) with a four-ox team. These gunnels were for the sides of the bottom of the boat.18

After the two gunwales were laid down parallel to each other and as far apart as the width the boat was to be built, the

---


other members were attached.

All the basic timbers were assembled by mortise and tenon joints. These were held together by oak pegs driven through drilled holes at the joints. Schultz notes for his flatboat that she had "not one pennyweight of iron, or other metal, in her whole construction." Collot further notes: "These boats are constructed without nails . . ." Evidently by 1817, however, some nails were used as Fordham relates: "Not a 100 nails are used in building one, but they are stuck together with wooden pins." The pegs were termed boat pins and Stacy gives the following description for them:

It took some two thousand boat-pins to hold a flatboat together . . . The pins were made of well-seasoned white oak, five inches long and a little over an inch square at the head, below this the corners were shared off and the rounded peg tapered a little toward the end.

Timbers of similar dimensions were mortised to the gunwales to form the bow and stern. Ashe, giving slightly different dimensions from those of Schultz and Stacy, notes:

19Schultz, op. cit., II, 73.
20Collot, op. cit., I, 32-33.
21Fordham, op. cit., p. 79.
22Stacy, op. cit., p. 20.
"The four pieces forming this frame are generally from fourteen to eighteen inches square . . ."23 The two gunwales were notched all along their length "to receive a number of bars across."24 These bars or "cross ties . . . were seven feet apart."25 On some flatboats, directly to the bars were "fastened thick planks with wooden pins--this forming the flat bottom."26 In other words the planks ran lengthwise the entire length of the flatboat or else they were spliced in. To give the flatboat more strength and also probably to avoid this lengthwise splicing, Stacy describes an additional step. On top of the cross ties "were placed 'stringers' two feet apart, running the length of the boat and pinned to the cross-ties with boat-pins . . . Planks 1½ inches thick were fastened to this frame work . . ."27 These planks were put on across the width and being shorter eliminated splicing. This technique must have made a more leak-proof boat. Both the stringers and cross ties acted as bracing and made the crosswise planking a stronger bottom.

Stacy states a fact regarding the construction of the

23 Ashe, op. cit., p. 65. 24 Idem.
26 Ashe, op. cit., p. 65. 27 Stacy, loc. cit.
flatboat so obviously logical that it was probably in standard practice, although no other writers mention it:

... this frame work ... so far was built wrong side up. One gunnel had been placed on skids, out over the bank ... the skids were knocked out and it slid into the river, bottom up. Upon this we now placed three or four wagon loads of stone. (Three or four boards were pinned along one side.) Then we floated the boat into deep water, placed it across the stream and began quickly throwing the stones onto the downstream side, until weight and the current together caused the boat to turn over. ... most of us would jump into the skiff we had alongside and get out of the way. But my brother Austin and Salathiel Ladd would stay on the boat, one on the bow the other on the stern, walk up these as the boat turned, swing over and walk down the other side. Sometimes others would try to do this, too, but weren't quick enough and got a ducking ... 28

After being turned upright, the boat was bailed free of water and the sides and top constructed. Upright "joists ... four or five inches thick" 29 were mortised and pinned three feet apart all the way around bow, stern, and gunwales of the boat. 30 "Onto these we spiked or pinned 2-inch planks, 18 inches wide for the first course around the boat and 1 1/2 inch plank as wide as we could get we placed above this, caulking the seams for when loaded our boat was half under water." 31

---

Evans relates: "The sides are of boards loosely put together, and the top is covered in the same way. The bottom of the boat, and so much of the sides as come in contact with the water, are caulked." Cramer noticed this practice of caulking the lower part of the boat and was critical of it:

Boats are seldom caulked above the gunnel joint. I think this a great error, and an unsafe finishing. The next joint at least, ought to be well caulked all around. And for fear of accident it would be well that every boat was furnished with a few pounds of oakum together with a mallet and caulking iron. These precautionary provisions, might sometimes be the means of saving in part, if not in whole, a loading worth many thousand dollars.

Either the greater part or else the entire flatboat was roofed over. The difference in whether the flatboats were or were not completely roofed over is one of the principal distinctions of two sub-types and will be further elaborated. The roof was sometimes flat and, as Schultz reported, this "roof . . . likewise answers the purpose of a main and quarter deck." Flatboats were also built with "an

32 Evans, *op. cit.*, p. 257.


34 Schultz, *loc. cit.*
arched roof," described by Stuart as "a roof of circular slope," or by Hulme as "bowed over at top." 

Flatboats varied in the quality of construction and Cramer cautioned:

. . . be careful that the boat be a good one; for many of the accidents that happen in navigating the Ohio are owing to the unpardonable carelessness and penuriousness of the boat builder, who will frequently slight their work, or make their boats of injured plank . . . it behooves every purchaser to get it narrowly examined before the embarkation, by persons who are well acquainted with the strength and form of a boat suitable to a voyage of this kind. 

Flatboats were "generally built of green oak planks, rudely fastened together." They would serve only for use of one season and even in this brief time there was some warping. As Hulme notes, the flatboat "may be compared to an orange-box . . . so badly made as to admit a boy's hand to steal

35 Melish, op. cit., p. 334.

36 Stuart, op. cit., p. 290.

37 Thomas Hulme, A Journal Made During a Tour in the Western Countries of America, September 30, 1818-August 8, 1819 . . . (London, 1828), reprinted in Thwaites, Early Western Travels, X, 38.

38 Cramer, op. cit., p. 60.

the oranges: it is proof against the river, but not against
the rain." 40

**Fittings of the Flatboat**

Several sources, for example Woods, 41 relate that flat­
boats had fireplaces. Of the various possible building
materials Flint notes that in at least one flatboat "a small
fire-place is built of brick." 42 The fireplaces were "suit­
able for cooking," 43 or, as Dewees observed, for heating, as
her boat was fitted "with a Comfortable fireplace." 44
Latrobe reported that on some flatboats "a small chimney
rises above," 45 which could have indicated the use of an iron
stove.

"There were no windows" 46 on the flatboat, and this
evidently was the standard construction. However, some
travelers preferred to have windows added, probably for light

---

40 Hulme, loc. cit.  
41 Woods, op. cit., p. 221.  
42 Flint, op. cit., p. 96.  
43 Buttrick, op. cit., p. 57.  
44 Dewees, op. cit., p. 188.  
45 Latrobe, op. cit., p. 113.  
46 Stacy, op. cit., p. 21.
and observation while below deck, as Ashe remarked, "I had...

four windows made."  

Latrobe notes: "They have generally a small window fore and aft, and a door in the middle, a peep into which will show you a goodly store of pots, pans, or flour-barrels." However, the boats he observed evidently were not quite the standard flatboat, as will be later noted.

A cable was regular equipment as "flat boats never carry an anchor. The method to run the boat ashore is, jump hastily out, and fasten a line or cable round a stump, tree, &; or hold on till a stake be cut and driven in the ground for the same purpose." Also for safety most flatboats probably carried a pump: "We found our ark had sprung a-leak from hitting on the rocks yesterday, so that we were obliged to be frequently pumping."

Protruding from the structure of the flatboat were large oars (see Figure 12): "On the deck... are two large oars, moving on pivots, and at the stern there is a large steering oar." "The oars on either side were called

---

47 Ashe, op. cit., p. 66.
48 Latrobe, op. cit., pp. 112-113.
49 Ashe, op. cit., p. 63.
50 Woods, op. cit., p. 245.
51 Evans, op. cit., p. 257.
This is a scene of the last days of the flatboat in the 1870's. The large sweeps are well displayed, and notice that the flatboat is drifting down the river at an angle to the current. This view is also excellent in portraying the long contemporaneous existence of the flatboat with the steamboat. The old state capitol in the center background exactly positions the location of the drawing. Source: Edward King, The Great South.
'sweeps.' These were 38 or 40 feet long and placed one-third of the way back from the bow."\(^{52}\) The steering oar at the stern was "65 or 70 feet long" and reached up "over one-third of the boat's length."\(^{53}\) Evidently the first boats prior to the 1830's had only three oars, as this is all that is mentioned by the writers consulted before this time. For later flatboats, "In front was a shorter oar called a 'gouger' about 30 feet long, also used in steering."\(^{54}\) The gouger is one of the most regularly referred-to features in secondary works, but it is never thought of as a later addition. On flatboats with a level roof the oars were attached and handled from the roof acting as a deck. On some flatboats, especially those with an arched roof, the oars protruded from the sides: "... nothing indicates the bow but the ... holes in the sides through which the oars work,"\(^{55}\) and "At the back end, a person steers with an oar, protruded through a hole ... ."\(^{56}\)

Other Terms for Flatboats

Several other names were just as commonly used as flatboat. Examples from source accounts are illustrated in the

---

\(^{52}\)Stacy, \textit{op. cit.}, p. 22.  \(^{53}\)\textit{Idem}.  \(^{54}\)\textit{Idem}.  
\(^{55}\)Ashe, \textit{op. cit.}, p. 66.  
\(^{56}\)Flint, \textit{op. cit.}, pp. 96-97.
following quotations. Berquin-Duvallon observed "large covered arks, in the shape of chests, which are used to descend the stream." Flint referred to flatboats as "The craft, called family boats ..." Collot notes that "flat-bottomed boats ... called Kentucky boats, have the form of a great oblong." Melish reported that "New Orleans boats are flats with sides boarded ..." This last term was often simplified as is given by Fordham to: "These flat boats or Orleans boats as they are called in Western Waters ..."  

These five names—ark, family boat, Kentucky boat, New Orleans boat, and Orleans boat—were the terms most commonly used in addition to flatboat. There were variations of the flatboat's design to which in part but not entirely these different names can be applied. This problem will be discussed later.

---


59 Collot, *op. cit.*, I, 32.

60 Melish, *op. cit.*, p. 334.

61 Fordham, *op. cit.*, p. 79.
Besides these common terms, in the very earliest period of flatboat use at least two other names had some usage. In 1790 Pope noted that he "came up with two large Pittsburg Boats at Anchor laden with Flour."\(^6^2\) The name obviously was derived from the place of the boat's origin, but this term evidently fairly soon thereafter was overshadowed by the names referring to the flatboat's destination. In the same year both Pope and Forman mentioned seeing a "tobacco boat" which Forman described as "flat-bottomed, and boarded over the top, and appeared like floating houses."\(^6^3\) Since Pope referred to both Pittsburgh and tobacco boats there could have been, but not necessarily, some difference between the types. The term tobacco boat definitely did not merely refer to the boat's cargo as Pope further mentioned: "One of Mr. Craig's Tobacco Boats, with Forty Hogsheads of Tobacco, and a large Quantity of Flour and Plank passed us . . ."\(^6^4\)

---


\(^6^4\)Pope, *op. cit.*, p. 23.
A final term for flatboats was "broadhorn"; however, this term very possibly was not used before the 1830's. In 1833 Latrobe, a literary man, traveling along the Mississippi observed "the broad-horn of an emigrant family, lying in some sheltered cove." In 1842 a Baton Rouge newspaper reported: "... a Broad-horn arrived at our landing ..." It seems most likely that broadhorn was not in the nomenclature of the actual flatboatmen of the early river, but it was more a journalistic and literary application of the time that has been magnified in importance in modern accounts.

Modern writers attribute the term to three possible sources. The first possibility relates to the practice of carrying a horn on the flatboats to blow for signaling. This practice could explain the last part of the term but gives no reason for "broad" in the first part of the name. The second possibility, as for example given by Hulbert, was the "custom of fixing the wide spreading horns of cattle on the

---

65 Latrobe, op. cit., p. 112.


The writer is very skeptical of this feature as he has read a great many source descriptions of flatboats and never once seen this alluded to. What seems most logical is the third possibility that flatboats were termed broadhorns because when viewed head on, the two side sweeps gave something of the impression of a pair of broad horns.

Sub-Types of Flatboats

Many modern discussions of flatboats, for example, Leahy, attempt to relate the different terms for flatboats to various types. Such correlations can only be valid in part. All the different terms at one time or another seem to have been diversely applied. There definitely were two variations of the flatboat, the New Orleans boat and the Kentucky boat. Most probably a third type was the ark or family boat.

Even these types are not always described in the same manner. James Flint notes, "The craft, called family boats, are square arks." These two terms were used mainly interchangeably for the same type. Evidently, however, arks and

---

68 Hulbert, Paths of Inland Commerce, p. 65.
69 Leahy, op. cit., pp. 43-45.
70 Flint, op. cit., p. 96.
family boats were not always interchangeable terms since Flint further observed: "The beach is lined with . . . large arks for carrying produce, family boats, and rafts of timber."\textsuperscript{71}

Ark and family boat on occasion referred to a boat built as a raft with a cabin on it (Figure 13). Latrobe mentioned: " . . . you still meet with many an ark . . . with a deck of two or three feet elevation above the level of the water . . . a narrow ledge runs round them for the convenience of polling."\textsuperscript{72} These are the same boats that were described earlier from Latrobe in which they were depicted as having windows and a door in the sides. Altogether the description appears to be of rafts with cabins on them instead of flatboats with sides built straight up from the bottom. In Dewees there is further indication of a difference in the ark. She mentioned being "on abord the Ark," and at the same time notes that she "saw a small Kentucky Boat."\textsuperscript{73} Wright, a secondary source, has this same concept for an ark or family boat.\textsuperscript{74} Definitely, however,

\textsuperscript{71}Ibid., p. 149. \textsuperscript{72}Latrobe, \textit{op. cit.}, pp. 112-13.

\textsuperscript{73}Dewees, \textit{op. cit.}, pp. 192-93.

\textsuperscript{74}Richardson Wright, \textit{Hawkers and Walkers in Early America} (Philadelphia: J. P. Lippincott, 1927), p. 3.
The flatboat with the recessed cabin, Type A, was not common. It was usually referred to as an ark or family boat. However, the Kentucky Boat, Type B, was also often referred to by these same terms. Source: Based on early prints and written descriptions as appear elsewhere in dissertation.
the terms ark and family boat did not solely refer to such a type. Harris reported that arks were built "with sides six feet deep"75 which seems to be the regular flatboat construction. Probably most of the time the terms ark and family boat referred to boats built on this regular flatboat pattern (Figure 13). When the names were used for a regular flatboat they became interchangeable with Kentucky boat. Even the term ark, sometimes at least, may have been used to describe the Orleans boat, for Flint relates: "The boat in which I proceeded is a flat ark, loaded with flour and pork, for New Orleans."76

Evidently, however, New Orleans or Orleans boats were terms reserved for a flatboat of a special character (Figure 13). Cramer states: "The boats intended for the Mississippi must be much stronger in their timbers, and more firmly built than those for the Ohio only. They ought to be caulked better and much higher all around; better roofed, and have longer and stronger cable . . ."77 Ashe declared "that a boat destined for the Mississippi requires to be . . . somewhat differently constructed, from one designed only to

75Harris, op. cit., p. 335.
76Flint, op. cit., p. 156.
77Cramer, op. cit., p. 171.
descend the Ohio."78 Schultz, describing the New Orleans boat, reported: "... they are generally much larger and stronger, with an arched roof fore and aft."79 An early sketch (see Figure 14) verifies that most of the flatboats to arrive at New Orleans had an arched roof and were roofed over their entire length.

The Kentucky boat (Figure 13) was built primarily to descend the Ohio. However, many of them were without doubt used farther down into the Mississippi, all the way to New Orleans. Ashe relates: "I purchased . . . a Kentucky boat . . . roofed over except a small space through which the hands can drop or enter . . . nothing indicates the bow but the small open space in the roof."80

Cramer speaking of a family boat observed that it was "roofed to within seven or eight feet of the bow."81 This description fits with an early illustration from Collot (see Figure 15). The main features to distinguish a Kentucky boat from an Orleans boat then were that the Kentucky boat was

78 Ashe, op. cit., p. 60.
81 Cramer, op. cit., p. 94.
FIGURE 14

FLATBOATS DOCKED AT NEW ORLEANS

This scene of the New Orleans levee was sketched in 1828 by Captain Basil Hall. The type of flatboats illustrated were those used to carry goods all the way to New Orleans and were entirely covered by an arched roof. They were called either New Orleans boats or Orleans boats. Courtesy Hastings House Publishing Company. Source: Samuel Huber, and Ogden, Tales of the Mississippi.
FIGURE 15

FAMILY BOAT OR KENTUCKY BOAT

The main difference between this boat and the New Orleans boat is that it was only partially roofed. To demonstrate that types were not standardized, notice that this boat has an arched roof. Source comments limit the arched roof to the New Orleans boat and portray a Kentucky boat as having a flat roof. On this boat the stern oar was manipulated from a hole at the stern instead of reaching up over the top, in which case the roof would become a deck. Courtesy Johns Hopkins Press. Source: Howard C. Rice, Barthelemi Tardiveau. Originally illustrated in Victor Collot, A Journey in North America in 1796.
somewhat smaller, the roof was often flat, and especially, the fore part or bow was left open (Figure 13). New Orleans boats and Kentucky boats were then sufficiently different to be separately identified, but at least one early observer, Melish, lumps them together as different names for the same boat: "Kentucky and New Orleans boats are flats . . . over which is an arched roof. They are of various sizes."^82

Origin and Early Use of the Flatboat

Flatboats evidently had been in long use in Europe before their introduction to America. The French geographer Robert Capot-Rey in his book Geographie de la Circulation sur les Continents notes the following facts of early navigation on European rivers that resemble the American flatboat techniques:

Sur les grands flueves de l'Europe, Volga, Vistule, Danube, Rhin, la navigation radelière a, jusqu'au xixe siècle, double la batellerie, au moins à la descente. Un gouvernail placé à l'avant permettait d'êzdiriger ces engins encombrants; parfois on hissait une voile pour accélérer la marche; arrivé à destination, le radeau était démonté et l'équipage regagnait son point de départ par ses propres moyens.®®

---

^82 Melish, op. cit., p. 334.
These radeaux evidently were simple log rafts. Capot-Rey, however, further notes:

Jusqu'au xviiie siècle la plupart des cours d'eau de plaine en Europe et dans les pays colonisés par les Européens ont servi couramment à la circulation... les bateaux transportaient... des marchandises lourdes... Ainsi le chaland de Loire portait au maximum 150 t. et comme il était à fond plat et relevé à l'avant, il pouvait naviguer avec des profondeurs de 1 m. et moins...

A chaland such as these used on the Loire is defined by Jal as "Nom d'un bateau de rivière, et d'une allége à fond plat et de forme quadrangulaire." With a fond plat able to carry 150 tons and most probably a quadrangulaire form, these chalands of the Loire must have been very similar to a Mississippi River flatboat. Finally, Capot-Rey observes this important parallel of their method of use, even comparing the Loire system to the navigation system on the Ohio:

Beaucoup de ces bateaux n'avaient qu'une existence éphémère. Comme il coûtait plus cher de les faire remonter que d'en construire des neufs, on préférait, à l'instar de ce qui se faisait pour les radeaux, les démolir à l'arrivée et les vendre comme bois à brûler; le batelier regagnait ensuite à pied son port d'attache. Ce système, aussi peu ménager du bois que de la peine des hommes, était encore employé au début de xixe siècle sur l'Ohio, le Rhin et même sur la Loire: 'Presque tous les bateaux qui descendent la Loire et

84 Ibid., p. 199.
85 Jal, op. cit., p. 452.
prennent le canal de Briare sont déchirés à Paris, le remontée de la Loire présentant trop de difficultés', écrit en 1811 le maire de Briare.  

On the lower Mississippi River, Bossu, when passing Pointe Coupee, noted: "... ces colons sont aussi le commerce des bois de construction qu'ils sont dériver à la nouvelle Orléans sur des radeaux." It would seem almost certain that the French would use the radeau to double la batellerie and take to New Orleans the various furs and agricultural goods they had for trade. This same technique may have been carried on all the way from the Illinois country. A form of flatboating was known then by the French, but possibly its use was not necessary, as the Illinois country needed almost as much goods brought in as it shipped out. As the bateaux and pirogues going downstream could be more heavily loaded than on the upstream return, the upstream and downstream demands for boats just about balanced out. The situation therefore was mainly favorable for permanently built boat types that could operate in both directions.

As the various French bateaux were built larger, they evidently were evolved into a barge. Some were very possibly fairly similar in form to the later Anglo-Saxon flatboat.

86 Capot-Rey, op. cit., p. 200.
87 Bossu, op. cit., I, 40.
The difference between these earlier barges and the later flatboat may not be one of dimensions, but there is a difference of genesis, method of use, numbers used, and in the quality of construction. The various bateaux or barges of the French were operated both up and downstream and, since they were to be used for a fairly long period, must have been better constructed than many of the later flatboats. In general use the barges are more closely related to keelboats and are discussed with them.

The flatboat, while being practically the same pattern as some earlier French models, was first used by the Anglo-Saxon immigrants in the general area of Pittsburgh to float with the current down the Ohio. If not on the first trip at least quite soon, they came down the Ohio and Mississippi to New Orleans. These flatboats were built for one-time use. They were broken up to be sold as lumber when New Orleans was reached. Such flatboats trace to the same origin on European rivers as the Frenchman's barge, radeau, or large chaland, if this last was ever used in America in the fashion that Capot-Rey has described for France. However, regardless of the early French use, flatboats were introduced onto the Ohio and Mississippi by the Anglo-Saxons from the eastern seaboard where they had already been employed for one-time downstream
trips on rivers that flow into the Atlantic.

Whether flatboats were introduced to the eastern seaboard from England is problematical. Ashe's remark in 1806 pretty well rules out any concurrent use: "... a Kentucky boat ... is no more like an English boat of any description than it is like a church." The canal age was well underway in England by the time most colonists came to America. On the much shorter and usually more placid British streams and canals, boats were not used that were built for only a one-time downstream trip. Perhaps there had been earlier use of flatboats and the memory of these remained, or the British colonists introduced them from the knowledge of their use on the continent. What seems most logical is that flatboats may have been first introduced on the east coast by colonists from areas other than Britain, especially by the Germans or the Dutch.

Pownall observed on the Delaware:

... long flat Boats [are] used in the Navigation of these Parts ... The Boats seldom come down but with Freshes ... These Boats are made like Troughs, square above, the Heads and Sterns sloping a little fore and aft; generally 40 or 50 Feet long, Six or Seven Feet wide, and Two Feet Nine Inches or Three Feet deep, and draw 20 or 22 Inches Water when laden.89

88 Ashe, op. cit., p. 65. 89 Pownall, op. cit., p. 128.
These boats were more narrow than a flatboat and were neither covered nor had high sides. Types more similar occurred; on the Ohio, as Schultz notes: "Arks are not much in use on these waters, what few I have noticed were similar to those you have seen on the Susquehanna."\(^{90}\)

There is a most confusing item related to the introduction of flatboats on the Ohio. Harris notes: "These boats are generally called 'Arks;' and are said to have been invented by Mr. Krudger, on the Juniata, about ten years ago."\(^{91}\) Harris wrote in 1805, so the introduction would have been in 1795. Ralph Brown in *Mirror for Americans* paraphrases a journal of 1794 as follows: "The Susquehanna ark, it is said, was invented in 1792 by a farmer on the Juniata (which joins the main stream above Harrisburg), and its popularity had led to its being copied for use on other northern streams."\(^{92}\)

The problem is, just what was "invented." In 1790 Pope had already observed a flat-bottomed tobacco boat boarded over at the top on the Mississippi and flatboats were used

\(^{90}\)Schultz, *op. cit.*, I, 129.

\(^{91}\)Harris, *op. cit.*, p. 335.

even earlier. It is possible that until Krudger's invention flatboats were rafts with or without cabins on them and that the single unit of construction was developed on the Juniata, or perhaps the only real "invention" was to call the boat an ark. If the date and fact of invention are not correct, certainly the remarks do verify that the flatboat had an earlier use along the east coast before it was introduced across the Appalachians. This same view is held by the historian Dunbar. 93

Very possibly the French used the first boat on the Mississippi built in the form of a flatboat. It is certain, however, that the flatboat that becomes the dominant boat of this era was introduced from the Atlantic coast. Both of these boats came from types already used in Europe. In addition to these major and minor elements in the origin of the flatboat, there is a third thread of evolution—the bateau. Bateaus were built larger and larger. As has been noted in the previous chapter, on the Ohio for a time in the 1760's bateaus were planned for one-time downstream use. Much later on the Missouri the mackinaw boat was used mainly downstream. On the east coast bateaus evidently grew even larger and

93 Dunbar, op. cit., pp. 277-79.
merged with the flatboat of European introduction into one form of ark. Ralph Brown, extracting from the same journal of 1794, gives the following description: "The arks in use on the Susquehanna River . . . are a kind of ferry boat with high sides, triangular in front and back, from twenty to thirty feet long and from fifteen to twenty feet in width . . . ."94

In 1806 on the Ohio the Burr expedition had a "flat bottom'd boat" built eleven-feet-eight-inches wide and fifty feet long which was described as being built "batteau fashion—sharp at both ends, to be rowed against the current in ascending Red River or any other stream . . . ."95 Evidently if arks with pointed bow and stern appeared on the Ohio, they were very infrequent. The above concept of a partial evolution of the bateau into the flatboat is not meant as the main theme of the flatboat's origin. At least though it is a minor evolutionary factor that can be woven to the other more important phases of the flatboat's emergence on the Ohio and Mississippi in the decade 1780 to 1790.

The year for the first flatboat to reach New Orleans

94Ralph H. Brown, loc. cit.

95Phillips, op. cit., p. 15.
is given by several secondary accounts as 1782. Hülbert states that this fact is written on the tombstone of Captain Jacob Yoder in Spencer County, Kentucky.\textsuperscript{96} There is no reason why this could not be the first flatboat trip to New Orleans. Also, there is no real reason to disallow an earlier unrecorded trip being made or the date of Yoder's trip being confused in later days. Earlier use of the flatboat no doubt was made on the Ohio. However, the date of Yoder's trip in 1782 is good enough to set the earliest beginning of the era at about 1780.

Flatboat use was limited in the first part of the decade, but began to be more important toward the close. In 1787 a soldier at a garrison on the Ohio noted in his diary, "the Kentucky boats pass continually ten or twelve a day."\textsuperscript{97} In 1787 and again the following year, General James Wilkinson led flotillas of twenty-five flatboats to New Orleans.\textsuperscript{98} The use of the flatboats continued to increase every year.

\textsuperscript{96}Hulbert, \textit{Waterways of Westward Expansion}, p. 124.

\textsuperscript{97}Phillips, \textit{op. cit.}, p. 12.

Later Use and Evolution of the Flatboat

Unlike the keelboat, the flatboat's importance did not cease with the steamboat's introduction in the west. Actually for a time the steamboat helped stimulate flatboat use. However, as noted in 1836 by Hall, its reason for use had changed: "These boats were formerly much used by emigrating families, to transport themselves down the Ohio, and are still built in great numbers on the various tributary streams, and floated out in high water, with produce for New Orleans." The number of flatboats continued to increase through the early part of the steamboat era until they reached a peak of almost 3,000 in 1846. After this time the numbers began to decline and generally they seem to have disappeared from the river as significant carriers by the 1870's.

Actually, although basically part of another research period, the flatboat has never really disappeared from the river. One of the later uses of flatboats was to float coal to New Orleans and the rest of the lower Mississippi area. Sometime in the 1840's, for greater speed the first tow of

---

99 Hall, op. cit., p. 222.

coal-laden flatboats was formed and pushed by a steamboat. In 1854 the *Crescent City* brought the first coal tow to New Orleans.\(^{101}\) This practice emerged into the towing trade of today. For a long period the flatboats, or it would be more proper to call them barges once they became part of a tow, were built in the same traditional flatboat fashion. Once they reached market they were broken up and sold for lumber.\(^{102}\) They were still recognized as flatboats in 1900: "Flatboats . . . reach New Orleans even to-day, but generally in tows."\(^{103}\) Eventually these barges were brought back upstream.

Finally, after several evolutionary steps, the wooden flatboat became the giant steel barge of today. There is no doubt but that the present-day barge used on the Mississippi is directly evolved from the flatboats introduced on the river in the 1780's.

---


KEELBOATS

In attempting to describe the keelboat it must first be stated that on the Mississippi River system keelboats were divided into two types—the regular keelboat, and a very large keelboat termed a barge. Unfortunately, some source descriptions evidently lump barges with keelboats, so that some of the statistics for large keelboats are probably for barges. The barge and keelboat were similarly used in upstream navigation. If they at first were somewhat differently constructed, eventually they came to resemble larger and smaller additions of each other. These boats, however, had different origins. The barge was first used by the French and comes straight from European types (see Plate II). There were true keelboats in Europe, but basically the keelboat seems to have an involved evolution along the rivers of the eastern coast of America before its introduction on the Ohio. Understanding that there were two different sizes of keelboats, then, it seems less confusing ordinarily to use the term keelboat for both these upriver craft. The term barge is used only when specific reference to this type is made. The discussion begins with the keelboat's description. The barge's different structure, origin, and use is presented as a contrast. Finally considered are the keelboat's origin,
early use, evolution, and later use.

**Keelboat Description**

The most important feature of the keelboat is obvious from its very name. Flint notes, "They are built on a keel," \(^{104}\) while Melish states, "Keelboats [are] so called from being built upon a small keel . . ." \(^{105}\) Woodbury evidently referring to the keel described them as "keelboats, which are formed in their bottom like a small schooner . . ." \(^{106}\) The keel was built with both internal and external portions (see Figure 16). This external feature of the keel was related to navigation and will be discussed further in the next chapter. The internal portion of the keel served two functions. First, it was the base upon which the boat was built. Second, it gave the boat firm structural strength. The keelboat was framed at three points with a generalized head-on profile of a triangle. The flatboat was framed at four points with a head-on profile of an oblong. This oblong form is not rigid, and a sharp blow to one of

---


\(^{105}\) Melish, *op. cit.*, p. 334.

FIGURE 16
CROSS SECTIONS OF DURHAM BOAT, KEELBOAT, AND FLATBOAT

The Durham boat had only an internal keel which was the basic timber upon which the boat was built and which gave it strength in its bottom. The external keel was an added feature of the keelboat; besides the two properties of the keel built only internally, this keel acted as a stabilizer in the current. Boats framed on a keel are jointed at only three points: A, B, and C in their transverse profile. They are, therefore, more rigid than the keelless flatboat which was framed at four points: A, B, C, and D; and if struck a sharp blow at C or D could be knocked out of line.
the four corners of the flatboat could throw the frame out of line (see Figure 16). In contrast, the keelboat's triangular form, based on the keel, is rigid. Just as important, the large timbered keel was located where the most shock or pressure would occur when the boat struck a snag or ran aground.

The keelboat had a more permanent existence than the flatboat and therefore as Fearon recorded: "... a keel is a substantial, well-built boat." The keelboat was not built as a floating house like the flatboat, but was ship-built upon its keel. A brief description of how the keelboat was constructed is given by Flint: "They are built on a keel with ribs, and covered with plank, as ships are. The gunwales are about a foot above water." Cuming observed that keelboats were built "sharp at both ends," and one of the rare contemporary sketches of a keelboat agrees with this description (see Figure 17). Although built on a keel, the boat was not "V" bottomed. The ribs evidently were deeply bowed, for, as Flint notes, "Keelboats are large

107 Fearon, op. cit., p. 267.
109 Cuming, op. cit., p. 91.
shallow vessels . . . very flat below . . ."¹¹⁰ Cuming writes of keelboats "drawing little water,"¹¹¹ and Melish elaborates: "Keel-boats . . . are constructed to draw but little water, so that they are remarkably well adapted to the navigation of these rivers, and as they are strongly manned, and ply both upward and downward they are getting into general use . . ."¹¹² Flint estimates that the keelboats would "draw only about two feet of water,"¹¹³ while Captain La Barge recalls, "Its ordinary draft was from twenty to thirty inches."¹¹⁴

Since the keelboat was used upstream against the current, it is only logical that to offer the current less resistance it was narrower than a flatboat. To make up for this narrowness, for greater cargo capacity keelboats were built "long."¹¹⁵ More will be said of these features as related to navigation.

In considering the keelboat's dimensions, Collot states: "The most convenient size for boats with keels . . .

¹¹⁰Flint, loc. cit.  ¹¹¹Cuming, loc. cit.
¹¹²Melish, op. cit., p. 334.  ¹¹³Flint, loc. cit.
¹¹⁴Chittenden, op. cit., p. 35.
¹¹⁵Fearon, op. cit., p. 267.
is from forty to forty-five feet long... Other sources give greater lengths. Keelboats are variously described as "fifty to seventy feet long," "sixty to seventy feet long," and Forman describes the one he used as "a seventy feet keel-boat." Sixty feet appears to be a good average figure for length. For width, Collot gives a beam of twelve feet, and La Barge, for a longer craft, describes a beam of "fifteen to eighteen feet." A keelboat sixty feet long averaged less than fifteen feet wide, while a flatboat of the same length averaged a width in excess of twenty feet. A hold about three feet in depth for the keelboat would be logical from the previous descriptions of a draft of about two feet and gunwales standing about a foot over the water. The two observations given of "three or four feet depth of hold" by La Barge and four-foot depth by Collot are in close agreement with such an estimate.

116 Collot, op. cit., I, 33.
117 Cuming, op. cit., p. 9.
118 Chittenden, op. cit., p. 35.
119 Forman, op. cit., p. 23.
120 Collot, loc. cit.
121 Chittenden, loc. cit.
123 Idem.
122 Collot, loc. cit.
Keelboats usually had coverings. They were "decked over."\textsuperscript{124} This practice evidently was not completely universal as Evans qualified his statement when he notes: "... keels have, frequently, covered decks..."\textsuperscript{125} As is illustrated in Figure 17, the keelboats had a cabin. This structure did not always serve the function of a cabin. Sometimes it was more a storage area protected from the weather and may have been lower and longer than in the keelboat illustrated. Flint notes: "Something like a large box is raised over the boat, which serves for a cover."\textsuperscript{126} Woodbury merely states that there was "a raised roof on deck in the centre, almost the whole length."\textsuperscript{127} La Barge's description is the most complete: "For carrying freight the keelboat was fitted with what was called a cargo box, which occupied the entire body of the boat excepting about twelve feet in each end. It rose some four or five feet above the deck."\textsuperscript{128} Keelboats were used also for carrying passengers.

\textsuperscript{124}Forman, \textit{op. cit.}, p. 23.

\textsuperscript{125}Evans, \textit{op. cit.}, p. 257.

\textsuperscript{126}Flint, \textit{op. cit.}, p. 109.

\textsuperscript{127}Woodbury, \textit{op. cit.}, III, 431.

\textsuperscript{128}Chittenden, \textit{op. cit.}, p. 35.
The cabin with smoking chimney is typical. Notice the steersman at the stern oar and the men poling the boat by walking along the side-boards. The only item lacking is that this keelboat has no mast for sail or cordelling. Courtesy A. S. Barnes and Company. Original illustration from Harper's Magazine, December, 1855. Source: John and Alice Durant, *Pictorial History*. . . .
Forman states that his keelboat had a "cabin for lodging purposes, but too low to stand up erect." Forman, loc. cit. Another description notes the "little six-by-ten feet cabin of the keel-boat."  

The cabin was built recessed from the gunwales "leaving a narrow footpath on the outside all around." Woodbury observed that the footpath was fitted "with small cleets or steps each side, the whole length where the boatman walk, and push the boat against the stream with their long poles . . ." The cleats obviously were for traction when the boatman was straining against the pole. La Barge notes: "Along each side of the cargo box was a narrow walk about fifteen inches wide called the passe avant . . ."  

The keelboat in the illustration (see Figure 17) shows no mast. However, two contemporary observers state that keelboats were equipped with "one mast." Audubon notes

---

129 Forman, loc. cit.


131 Flint, loc. cit. 132 Woodbury, loc. cit.

133 Chittenden, loc. cit.

134 Evans, loc. cit.; Woodbury, loc. cit.
that they carried a "square sail." The mast was without
doubt nearly universal as it had the important function of
anchoring a tow rope as well as carrying a sail. These uses
are discussed in more detail in the next chapter.

On some keelboats there evidently were benches for
rowers. Flint relates, "Four or six men row near the prow." This provision no doubt varied, as Woodbury states: "... no oar is used except by the helmsman." Flint agrees regarding the tiller: "... a steersman behind plies a long oar which serves for a rudder."

Being vessels used for a period of years and with
regular crews, all keelboats and barges undoubtedly were
named. Pope states that he "embarked in a Boat called the Smoke-House bound to New Orleans." Cuming notes that the barge Adventurer came past them on its way up the Missis-
sippi.

136 Flint, loc. cit.
137 Woodbury, loc. cit.
138 Flint, loc. cit.
139 Pope, op. cit., pp. 22-23.
140 Cuming, op. cit., p. 306.
Barge

Of the boat types used on the lower Mississippi River, the barge is one of the most difficult to classify or characterize. Evidently more than one type of boat was referred to as a barge in the period before steamboats. Of course today it has an entirely different meaning on the Mississippi. Some secondary writers consider the barge to be an improvement on the keelboat. Gephart has this opinion and states: "The first marked improvement in the character of the boats was the introduction of the barge."^141 Evans remarks: "When the keelboat was covered by a low house, lengthwise, between the gangways, it was called a barge."^142 Dick concurs with this statement.^143 These views do not seem to be borne out by the early sources. Evans and Dick simply are in error, as the descriptive sources already given use the term keelboat when referring to a cabin or closed cargo box. The early development of the barge can be differently interpreted. Latrobe, writing in 1835, gives the impression that barges were just as old a form if not older than the keelboat:

^141 Gephart, op. cit., p. 63.

^142 Evans, op. cit., p. 310.

^143 Dick, op. cit., p. 119.
"Of the large barge, upon which the greater part of the valuable goods in request on the river were formerly trans­ported, few are now seen in the lower waters . . . The lighter keel-boat is still in use."\(^{144}\) In 1790 Pope recorded: "I went on Board the Governor of \textit{Natchez}' Barge, his Name is Gayoso."\(^{145}\) Although this is the only evidence and not a very early date to verify the writer's viewpoint, it fits with the logical concept that the Spanish and French inhabitants of the lower Mississippi River area obviously had been using the barge earlier than this date. Monette has this same view of the early use of the barge by the French. Unfortunately he coupled it with the keelboat which, as will be shown later, was first introduced by the Anglo-Saxons to the Mississippi River from the Ohio:

As early as 1742 Keel-boats & barges had been intro­duced upon the Mississippi, and were plied in their long and toilsome, voyages from Mobile and New Orleans, to the Wabash and Illinois country; and Fort Chartres, Kaskaskia and Vincennes, military as well as trading expeditions . . .\(^{146}\)

\(^{144}\)Latrobe, \textit{op. cit.}, p. 113.

\(^{145}\)Pope, \textit{op. cit.}, p. 29.

Barge was a term used in French as well as in English for a large river boat. The French were concerned with carrying increasing amounts of freight on the lower river. Probably both through the gradual growth in size of the various bateaux and also of direct introduction from Europe, boats appeared for this purpose that were referred to as barges. The first barges were large awkward boats, some possibly oblong and much resembling the later Anglo-Saxon flatboat. Probably more common was a boat of about the same dimensions as a flatboat, but built on a keel and having both ends bluntly pointed. Unlike the bateau or keelboat the pointed ends of the barge swelled out quickly in a flattened circular arch. This same pattern is still followed by most barges in Europe. The design of barges became modified enough eventually to be basically a larger version of the keelboat.

In 1836 Hall noted in comparison: "... the barge was the largest, had the greatest breadth, and the best accommodations for passengers, the keel was longer, had less depth, and was better fitted to run in narrow and shallow channels ..."\(^{147}\) Whether or not keelboats were longer than barges seems questionable. Schultz observed a barge one

\[^{147}\text{Hall, op. cit., pp. 218-19.}\]
hundred feet long at Natchez. Buttrick saw a barge which must have been quite long as the steering oar alone was sixty feet long. What Hall likely meant was that keelboats were longer in relation to their own width than were barges.

Evidently at the time of Schultz's journey there was still some difference in the design between keelboats and barges, or else he referred to both as barges, because he defined as barges boats only seven-to-ten feet wide. These measurements were even narrower than the beams already given for keelboats. On viewing the barge at Natchez, however, Schultz states that it was wider and deeper than the ones used higher up the river. Early accounts give so little on barge dimensions that the best idea of size is obtained by comparing the barge's tonnage and number of crewmen to those of a keelboat. Bradbury observed a keelboat loaded with 30,000 pounds of lead, and Jennings noted from

149 Buttrick, op. cit., p. 60.
150 Schultz, op. cit., I, 131.
151 Ibid., II, 138.
early records that they could carry 20,000 to 30,000 pounds. Audubon recorded the larger estimate of twenty to thirty tons. Compared with the keelboat's range in capacity of between ten and thirty tons was the greater capacity of the barge. The first barge built by Henry Shreve in 1807 handled thirty-five tons. Audubon gives the barge's capacity as fifty to sixty tons. Buttrick describes a barge of "eighty tons burthen." Shreve's last barge was capable of carrying ninety-five tons. The largest size for a barge is given by Flagg as "sometimes of an hundred tons' burden" with which Latrobe's text that they "were frequently of one hundred tons burden" concurs. The keelboat described by Bradbury had a crew of six


155 Treat, op. cit., p. 164.

156 Audubon, loc. cit.

157 Buttrick, op. cit., p. 59.

158 Treat, loc. cit. 159 Flagg, op. cit., p. 60.

160 Latrobe, op. cit., p. 113.

161 Bradbury, loc. cit.
while Audubon states that a keelboat had ten hands. Flagg and Latrobe both note that the barge required twenty men to advance against the current. Hall's observation is: "The crew of a barge, consisting usually of thirty or forty hands." Audubon gives the almost hard-to-believe figure of forty to fifty men for handling a barge. It should be noted, in addition, that all early travelers were not universal in recognizing the subdivision of the two types, for Cuming states that he "met a large keelboat with 20 oars working . . .".

As can be seen from the illustration (Figure 18), the barge had many features of the keelboat, such as the passe avant, a cabin, and a mast. Many barges were rigged with a "square sail" in the same fashion as the keelboat. Obviously the fore-and-aft rigging of the illustrated barge was also used. Evidently the topsail in the drawing is also accurate as Brackenridge commented: "Mr. Lisa, who had been

162 Audubon, loc. cit.
163 Flagg, loc. cit.; Latrobe, loc. cit.
164 Hall, loc. cit.
165 Audubon, loc. cit.
166 Cuming, op. cit., p. 356.
The barge was larger than the keelboat. It was rowed similarly to the keelboat (note rowers at bow) and had the same long walkway along sides for poling. The fore-and-aft rig with topsail suggests that the barge sailed fairly efficiently. 

a sea-captain, took much pains in rigging his boat with a good mast, and a main and top sail . . . "168 Fordham observed "barges, some of which are schooner-rigged."169 Flugel wrote that he "Met a schooner barge going up under sail."170 These descriptions evidently were accurate as Buttrick reported that barges "are built with two masts, and sails."171

There never was a very large number of barges. In 1808 Audubon remarked that no more than twenty-five or thirty operated on the Mississippi.172 In 1836 Hall stated that only twenty barges were used on the Mississippi River in 1817.173 The barge was confined mainly to the lower river between New Orleans, Natchez, New Madrid, and as far up probably as St. Louis. Melish explains: "Barges are well known. They also sail up and down the river; but this species

168Brackenridge, op. cit., p. 31.
169Fordham, op. cit., p. 192.
171Buttrick, loc. cit.
173Hall, op. cit., p. 236.
of vessel is principally used below Cincinnati and the falls."¹⁷⁴ Latrobe's remark given earlier that barges were little known by the 1830's testifies that they lost out rather quickly to the faster and cheaper steamboats after the steamboats proved their fitness. Audubon commented: "... a Steam Boat Called the Mars passed us, a poor running Machine--apparently an Old Barge."¹⁷⁵ This remark may be a clue to what became of some of the few barges that were not too worn out to be of further use before the coming of the steam engine. Very slightly then, the barge fits into the evolutionary development of the steamboat. Basically, however, the steamboat's development is of separate origin.

Keelboat Origin

Keelboats no doubt were used on European rivers. A vessel in England on the Humber River was known as the Humber keel.¹⁷⁶ Bense, who is an authority for Low-Dutch terms used in America, states that boats with keels known as kiel-boots were used in the Netherlands. He believes: "... it is

¹⁷⁴Melish, op. cit., pp. 334-35.


¹⁷⁶Lethbridge, loc. cit.
very probable that the early Dutch settlers in America introduced the Dutch name there. In 1749 on the Hudson River, Kalm, after describing bateaus, gives the following different description which seems to verify Bense's idea: "The boats are quite large, and have a good cabin . . . Frequently the bottom consists of white oak, and the sides of red cedar . . . and the Hudson is in many places full of sand and rocks, against which the keel of the boat sometimes strikes."

Another view of the keelboat's origin is that it was an American invention. Probably elements of both these concepts are true, with greater importance being with the latter. Saxon states:

The keelboat was evolved from the bateau-plat type; it came into use as an upstream boat. The flat-bottomed boats persisted in hugging the bank and scraping, when propelled by a line drawn from the bank. A keel was found to check this lateral swing toward the shore.

Baldwin has a similar viewpoint:

Some person unknown, at an indeterminate time before 1800, nailed a long beam about four inches square lengthwise to the bottom of a bateau to

---

178 Kalm, op. cit., I, 332.
179 Saxon, op. cit., p. 137.
hold the boat on its course when it was being
towed and to absorb the shock of contact with
rocks and logs . . . these craft . . . were
called keelboats.\textsuperscript{180}

Baldwin and Saxon thus feel that the keelboat is a direct
outgrowth of the bateau. In a sense, and probably for the
greater part, this view is true. The keelboat's emergence
however was not so simple as nailing a strip of wood on the
bottom of a bateau. Also, the evolution did not occur on the
Ohio-Mississippi river system. There were important tran­
sitional steps in development on the Atlantic coastal rivers
before the bateau was transformed into the Mississippi River
keelboat.

Perhaps the technique of nailing a keel to the bottom
of a bateau was tried. However, as already discussed, a
keel was an integral part of the keelboat's construction.
The keel was not added as an afterthought. A keel merely
nailed on would not give the bateau structural strength or
even have been reliable as a stabilizer in the current. It
is only logical to assume that the first bateau, or those
very soon after, equipped with a keel was constructed with
the keel as the first element laid down. This fact of the
keelboat being built from the keel up is the main complication

\textsuperscript{180}\textsuperscript{180}Baldwin, \textit{op. cit.}, pp. 42,44.
in viewing the keelboat as evolving from the bateau.

As already stated, the principle of the use of the keel for river navigation was known from Europe and even introduced to American rivers. It seems, however, that the main evolutionary course of the keelboat's development is from the bateau with the structural innovation of a keel built into it. The bateau, as discussed in the previous chapter, was one of the principal boats used on the rivers of the eastern seaboard. On the Delaware River there was a problem of the bateaus having their bottoms stove in when grounding on the rocks in that river. For this reason bateaus on the Delaware were modified for greater strength by adding a small, basically internal keel. The boat that was thus formed was known as the Durham boat. It was named after Robert Durham who operated an iron works in Bucks County, Pennsylvania. It is said that he first used such a boat in 1750 to ship iron to Philadelphia, and that the boats continued in use on the Delaware until 1860. In most aspects the Durham boat resembled a bateau. The Durham boat differed from the bateau in that it had a keel and a walking board about a foot wide along each side for poling. The Durham boat, however, like the bateau, was open and double ended. The Durham boat's dimensions of about sixty to sixty-six feet
long by eight-feet wide and with nearly vertical sides three
and a half feet high\textsuperscript{181} were greater than those of the bateau,
but they had similar proportions.

The Durham boat evidently spread to nearly all the
eastern rivers. While not mentioning them by name, Pownall
repeatedly refers to boats used on other rivers as like those
on the Delaware. For example, on the Potomac, he states:
"Boats shaped like those of Delaware, and of something less
Dimensions, may go up to the North Mountain."\textsuperscript{182}

Several secondary sources mention boats used on the
rivers of the Atlantic coast that are similar to keelboats.
Hulbert, for example, states in relation to the Mississippi
River keelboatmen: ". . . the craft they handled were known
on the Atlantic Rivers."\textsuperscript{183} In addition to being called
Durham boats, these boats were also known as "pole boats."\textsuperscript{184}

\begin{flushright}
\textsuperscript{181}M. V. Brewington, "Washington's Boat at the Delaware
Crossing," \textit{The American Neptune}, II (April, 1942), 168-70.
\end{flushright}

\begin{flushright}
\textsuperscript{182}Pownall, \textit{op. cit.}, p. 132.
\end{flushright}

\begin{flushright}
\textsuperscript{183}Hulbert, \textit{Paths of Inland Commerce}, p. 36; Dunbar,
\textit{op. cit.}, I, 38-39; Ralph Brown, \textit{op. cit.}, p. 57; Ulrich
Bonnell Phillips, \textit{A History of Transportation in the Eastern
Cotton Belt to 1860} (New York: Columbia University Press,
1908), pp. 71, 101; Wright, \textit{op. cit.}, p. 2.
\end{flushright}

\begin{flushright}
\textsuperscript{184}Ulrich Phillips, \textit{op. cit.}, p. 71; Dunbar, \textit{loc. cit.};
Wright, \textit{loc. cit.}.
\end{flushright}
This probably was the more common term for a Durham boat once its use had spread to eastern rivers other than the Delaware. Dunbar states that the pole boat lacked a keel, but Phillips notes, "pole-boats, each of which had a keel." 185

Schultz notes on the Mohawk River a boat called the "Schenectady boat." This obviously was the local term for a Durham boat, as Schultz describes this boat as being poled, having walking boards, a mast, a large steering oar, but lacking a cabin. He further states that the Schenectady boat was built much like the "Long Island round-bottom skiffs," 186 which would imply they were built on a keel. Of more importance, when Schultz arrived on the Ohio River, he noted this relationship when he states that the term "Keelboats . . . Here, however . . . is given to a species of the Schenectady boats." 187

The Durham boat model, after spreading all along the Atlantic coast, was introduced onto the upper Ohio. At first the boat was still open, but the cabin was soon added. As mentioned in the previous chapter, bateaus had already been covered over on the Ohio, and the galley and barge of the

185 Ulrich Phillips, loc. cit.
186 Schultz, op. cit., I, 4-5. 187 Ibid., p. 131.
lower river were built covered over.

Evidently all the various adaptations of the Durham boat on eastern rivers, including the Schenectady boat, had a keel that was basically important only for structural strength. Schultz notes that the difference between the keelboat on the Ohio and the Schenectady boat was that the keelboat had an external keel (see Figure 16) "about three inches in depth and four or five in width." Very probably keels of even greater depth than that described by Schultz were eventually used. It is a logical assumption that the first keelboats introduced on the upper Ohio had only an internal keel like the Durham boat upon which the first introductions were patterned. The keelboatmen took these boats down to the lower Mississippi and made contact with the Frenchmen and their barges. The keelboatmen probably learned from the French that if the keel were extended to be external as well as internal, it would be a great help in navigating the long distance back to Pittsburgh. With the final addition of deck and cabin and the larger external keel, the regular keelboat reached its complete development.

The keelboat then, with some details conjectured by

188 Ibid.
the writer, had a very complex evolution, and although similar to the French barge, it had an entirely different origin. It basically evolved from the bateau to the Durham boat on eastern rivers, and from a form of Durham boat to the keelboat on the upper Ohio River (see Plate II). The keel first appeared on the Durham boat, but it was an application from other boats of more truly European design. On reaching the Ohio and Mississippi, the Anglo-Saxons, borrowing from earlier lessons learned by the French, extended the keel to function externally in stabilizing the boat in the current. From other earlier examples the cabin and decking were added.

Keelboat's Early Use and Later Evolution

One of the earliest recorded uses of the keelboat was to bring up the Mississippi and Ohio military supplies purchased from the Spanish for the Revolutionary War. This task was performed by Gibson and Tinn in 1777. In 1790 Pope referred to "Keel bottom'd boats" on the Mississippi. Hulbert states that keelboats were adopted by Berthoud and Company, a trading enterprise operating from Pittsburgh, in

189 Hall, op. cit., pp. 219-20.
190 Pope, op. cit., p. 27.
DIFFUSION OF BOAT TYPES DURING FLATBOAT AND KEELBOAT ERA
1792.\textsuperscript{191} From about this time on the keelboat is developed along with the barge as the upriver carriers on the Mississippi.

In the transition from the keelboat to steamboat, a unique experiment on the Mississippi River observed by Cuming seems worthy of mention:

A keel of forty tons came to the landing at the same time we did. She was worked by a horizontal wheel, kept in motion by six horses going round in a circle on a gallery above the boat, by which are turned two cog wheels fixed each to an axle which projects over both gunwales of the boat, one before and the other behind the horizontal wheel. Eight paddles are fixed on the projecting end of each axle, which impel the boat about five or six miles an hour, so that she can be forced against the current about twenty miles a day. One Brookfield, the owner, who conducts the boat, had her built last year about two miles above Louisville, in Kentucky, and then went in her to New Orleans, from whence he was now returning, disposing of a cargo of sugar from place to place in his ascent. He expected to get home and to commence a second voyage in about a month. Seven horses had died during the voyage, and he had only two remaining of the first set he had commenced with.\textsuperscript{192}

After the coming of the steamboat, the keelboat did not disappear so rapidly as the barge. Woodbury notes that keelboats "are sometimes towed up by the steamboats, but it

\textsuperscript{191}Hulbert, \textit{Waterways of Westward Expansion}, pp. 107-108.

\textsuperscript{192}Cuming, \textit{op. cit.}, p. 264.
is an unpopular innovation." Basically towing is more related to the flatboat than to the keelboat. The keelboat continued to be of use on the minor streams too small for steamboat operation. The keelboat was also used during low water on the main river. An early account quoted by Baldwin states: "... the keelboatmen have it their own way on the Allegheny again as it is entirely too low for steamboats." The keelboat was used additionally to cross such obstacles as the falls at Louisville or the rapids at Muscle Shoals on the Tennessee until canals were built around these barriers. A last survivor of the keelboat known as the push boat was used on some of the remote tributaries of the Ohio in Kentucky into the twentieth century.

TRADE IN THE FLATBOAT AND KEELBOAT ERA

At first the main function of the flatboat was to carry the migrating farmer to new lands. Flint notes: "Such boats are so formed as to carry all the necessaries of new

193 Woodbury, op. cit., III, 431.

194 Samuel Jones, Pittsburgh 1826, in Baldwin, op. cit., p. 194.

settlers. The plough, and the body of the waggon, are frequently to be seen lying on the roof; and the wheels hung over the sides." Michaux observed several flatboats with families "carrying with them their horses, cows, poultry, waggons, ploughs, harness, beds, instruments of agriculture, in fine, every thing necessary to cultivate the land, and also for domestic use." 

Once the farmers were established, their natural market was New Orleans. In 1818 Faux quaintly expressed the view of the time:

Kennedy, Esq. and the high sheriff, both highly intelligent men, deem the western country the best for the employment of capital, because, say they, we, if there, could send our surplus produce to New Orleans, at a less expense than the Hager's-town people can send theirs to Baltimore.

In 1817 Fordham when traveling the Mississippi stated: 

"... that great river must be as much the high road of commerce as Main Street is in Philadelphia, or Cheapside in London."

---

196 Flint, op. cit., pp. 96-97.

197 Michaux, op. cit., p. 166.


199 Fordham, op. cit., p. 106.
Flatboat use and trade constantly increased. In 1807
Schultz noted while on the lower Mississippi: "They likewise
informed us they had passed on that day twenty-three Kentucky
and New Orleans boats . . ." 200 Schultz saw eighty-three
flatboats tied up at Natchez. 201 When he arrived at New
Orleans, he guessed there were between one or two hundred
along the levee. 202 In 1827 Bullock noted at New Orleans:
". . . we calculated that there were from twelve to fifteen
hundred flat boats lying along the river. They would average
from forty to sixty tons burden." 203 In 1836 Hall recorded
that 4,000 flatboats were used on the Ohio and Mississippi
rivers in 1832. 204 Woodbury in 1833 said: "The Levee at
New Orleans . . . presents a dense mass of flat-boats of
many hundreds . . ." 205

While it was not the purpose of this study to attempt
any extensive search of source materials as to the amount of

200 Schultz, op. cit., II, 126.
203 William Bullock, Journey Through the Western States
of North America (London, 1827), reprinted in Thwaites,
Early Western Travels, XIX, 125.
204 Hall, op. cit., p. 247.
205 Woodbury, op. cit., III, 440.
trade, the following quotation from Baldwin gives an idea of the magnitude the flatboat trade reached:

From August, 1800, to August, 1801 . . . there were between 350 and 400 arrivals at New Orleans . . . 696 flats between January, 1801, and April 14, 1802. This number probably increased a little each year, for in 1807 . . . 755 arrived, and by 1813 the number had jumped to 1,306 . . . until 1846, the number of flatboat arrivals at New Orleans continued to grow until it reached a total of 2,792. After that a decline set in, and by the opening of the War between the States, probably not more than 500 were arriving.206

The difference between Hall's figure of four thousand and the largest total given by Baldwin, 2,792, may be judged to be the number of flatboats used on the river that never reached New Orleans. Some goods were still carried downriver in flatboats after the Civil War, as, for example, recorded by Devol in his diary of 1869.207

It is obvious from the figures just listed that the flatboat's use was stimulated rather than halted by the steamboat, until about the time of the Civil War. In 1830 Stuart estimated that of the goods arriving at New Orleans "three-fifths are carried down in the flats."208 A few years later


208Stuart, op. cit., p. 290.
in 1834 Shirreff observed:

The numerous steam-boats do not seem to have diminished this mode of conveying farm produce, and probably many of them are built on shallow streams in the interior of the country, where steam-vessels never can have access.\textsuperscript{209}

One of the most important items brought down the Mississippi was flour. This item was so common that several sources estimated the size of flatboats as being "large enough to carry 400 barrels of flour,"\textsuperscript{210} or "The largest boats of this kind will carry four hundred and fifty barrels of flour."\textsuperscript{211} Fordham wrote of flatboats that "will carry 700 barrels of flour . . . ."\textsuperscript{212}

Many other items basically farm commodities were shipped as well. In 1805 Harris stated:

In the spring and fall the river seems covered with [flatboats] . . . laden with flour, whiskey, peach-brandy, cider, bacon, iron, potters' ware, cabinet work, etc. all the produce or manufacture of the country are destined for Kentucky, and New Orleans, or the towns on the Spanish side of the Mississippi.\textsuperscript{213}

\begin{flushright}
\textsuperscript{209}Patrick Shirreff, \textit{A Tour through North America} (Edinburgh: Oliver & Boyd, 1835), pp. 271-72.
\end{flushright}

\begin{flushright}
\textsuperscript{210}Melish, \textit{op. cit.}, p. 334.
\end{flushright}

\begin{flushright}
\textsuperscript{211}Schultz, \textit{op. cit.}, I, 130-31.
\end{flushright}

\begin{flushright}
\textsuperscript{212}Fordham, \textit{op. cit.}, p. 79.
\end{flushright}

\begin{flushright}
\textsuperscript{213}Harris, \textit{op. cit.}, pp. 334-35.
\end{flushright}
The significance of these items is emphasized by a very similar listing by Ashe of the descent from Pittsburgh of:

... trading ... boats ... loaded with flour, whiskey, cider, apples, peach-brandy, bacon, iron, glass, earthen-ware, cabinet-work, & all being the produce and manufacture of the country, and destined for Kentucky and New Orleans.\(^{214}\)

A most unusual item of trade, displaying real enterprise, was observed by Cuming: "... one flatboat brought ice all the way from New York" which sold at "25¢ a lb." in New Orleans during May.\(^{215}\) Many sources agree that the flatboats "when they reach New Orleans are sold for lumber."\(^{216}\)

In addition to the flatboats that carried goods straight through to New Orleans for trade, other boats traded from one landing to the next all down the river. This practice was important well into the steamboat era as more settlement developed along the river. Such flatboats were known as coasters since the bends known as coasts on the Mississippi in French Louisiana are where the trade first got its start.

\(^{214}\)Ashe, \textit{op. cit.}, p. 30.

\(^{215}\)Schultz, \textit{op. cit.}, II, 200.

Coasters, to announce their willingness to trade, displayed the "Wabash Coat of Arms." This feature consisted of a large potato, an ear of corn, an apple, and a slab of bacon tied to the top of a pole at the bow of the flatboat, with a jug of whiskey sitting at the top.\(^{217}\) Cuming described one of these coasters as "a large square flat, roofed and fitted with shelves and counter, and containing a various assortment of merchandize. The store had two owners, who acted both as boatmen and merchants."\(^{218}\) The coaster's trade was recorded by Woodbury in the following statement:

> At every village are 10-20 flat-bottomed boats with goods—corn, pork, bacon, flour, & notions from Cincinnati . . . Boats remain at place till sold out if demand is brisk, if not move further down river. When all sold, dispose of boat and ride steamers back home.\(^{219}\)

In addition to grocers all other types of merchants such as those who dealt in dry goods or hardware, and the tinsmith, toolmaker, and blacksmith coasted the river.\(^{220}\)

The keelboat and barge were the chief vessels for

---


\(^{219}\) Woodbury, *op. cit.*, III, 435.

\(^{220}\) Baldwin, *op. cit.*, pp. 186-87.
bringing goods upstream along the Mississippi. The techniques of propulsion were the same as those used earlier with upstream travel of bateaus. Barges evidently were first used by the French to supply the Illinois area, especially the west-bank settlement of St. Louis. As the Americans came to dominate the trade on these rivers, the actual keelboat labor was still basically performed by Frenchmen.

Just how vital the trade of the keelboat was is open to controversy. The most general observation, as stated by Baldwin, is: "From all accounts, goods could be transported to any of the upriver cities (except possibly Pittsburgh) more cheaply from New Orleans than from Philadelphia." Some source accounts, however, indicate that the keelboat could not compete anywhere above the mouth of the Ohio with goods hauled by wagon from the Atlantic to Pittsburgh, and then carried by flatboat down the Ohio. Schultz and Evans were of the opinion that it was an advantage to ship from New Orleans only to the lower Ohio by keelboat, but that the upper Ohio was more cheaply and quickly supplied by goods brought from the Atlantic. Ashe's description of the

221Ibid., p. 185.
trade technique on the upper Ohio verifies this idea:

The store-keepers make two annual collections of these commodities; send them on the rivers to New Orleans . . . They then purchase British and West Indian goods of all kinds; send them by waggons, over the mountains, to their stores in the western country . . . 223

From these statements opposing the more common idea of trade both up and downstream on the Mississippi, Taylor proposes that basically a counter-clockwise trade—down the river, around by sea to Philadelphia, across the mountains by wagon—was the dominant pattern. 224

Nevertheless, some keelboats were used all the way from New Orleans to Pittsburgh. Possibly they made up something of their lack in upstream competition with goods hauled overland by the fact that keelboats were the choice method of downstream use. Keelboats traveling downstream got a slightly higher rate for freight than flatboats because they were faster and especially because they were safer. 225

Keelboat trade never reached the size of the flatboat trade. There were never many barges. Mercer's comment in

223Ashe, op. cit., p. 43.


1816 that he "passed today two or three barges"²²⁶ must have been heavy traffic for this type of vessel. Hulbert estimates that altogether there never were more than three or four hundred keelboats and barges on the entire Mississippi River system.²²⁷ However, the flatboat and keelboat together provided the best means known at the time for up and downstream carriage on the Mississippi.


²²⁷Hulbert, Waterways of Westward Expansion, p. 110.
The four main boat types—pirogue, bateau, flatboat, and keelboat—in the two navigation eras prior to the advent of the steamboat were operated with basically similar methods. Manpower applied through various techniques was the principal propelling force. The greatest difference in the application of techniques was that between upstream and downstream travel. The current was the chief propelling force with the former, while it was the obstacle to be overcome with the latter. Throughout both eras the same natural features operated generally as hazards. Various other natural features were used as aids, some with elaborate craftsmanship, to navigate the river.

The natural features that were either hazards or used as aids in navigation are here examined in conjunction with the techniques of navigation with which they are most closely concerned. However, in order to understand the relationship of these natural features, one to the other, a brief view of the Mississippi River's character is deemed necessary.
Discussions of downstream navigation techniques, primarily concerned with flatboats, and upstream navigation techniques, primarily concerned with keelboats, follow. Finally, the description, avoidance of, and the misfortunes resulting from the various natural features that affected navigation as hazards are considered.

PHYSICAL CHARACTERISTICS OF THE LOWER MISSISSIPPI RIVER

This general survey of the Mississippi's character is designed to describe the river's features that were hazards or aids to navigation. More detailed study of each feature is given later to relate it to the particular navigational technique with which it is mainly associated.

Pertinent to the study are several facts regarding the Mississippi. First, the lower river has a gradual gradient. Second, the river in practically all of its course from the Ohio to the Gulf of Mexico flows over land formed by its own alluvial deposits. Generally speaking, specific points of highly resistant material that can hold the river rigidly in place are rare. Third, the Mississippi carries run-off from areas that have a winter snow cover; thus a spring thaw coupled with heavy spring rains bring the river
to flood stage at this season. On the lower river, the rich alluvial soils and warm humid subtropical climate combine to produce the fourth main feature—a forest of giant hardwoods and cypress. This forest often grows right to the very banks of the stream. These four factors—low gradient, alluvial soils, a humid climate with a cycle which produces floods, and luxuriant forest—are those which unite to form the specific features of the river with which this chapter is concerned.

Rivers with low gradients develop a characteristic pattern of alternate bends. Two of these bends together have the very general appearance of a regular or reverse "S" and are termed a meander (Plate III). In rivers that meander the main body of current, and consequently the thalweg, which is the deepest part of the river bed, alternately shifts from the outside of the bend on one side of the river to the outside of the bend on the opposite side of the river.

Rivers that meander on lands which are nearly uniformly alluvial are constantly altering their position. One of the principal factors that allows this shifting is bank caving along the outside of bends. This bank caving is caused by the deep scour pools which are formed in the thalweg near the outside of each bend. The times of greatest scour
PLATE III

SELECTED PHYSICAL FEATURES OF A MISSISSIPPI RIVER MEANDER

and consequently greatest deepening in these pools occur during floods or high water when there is a maximum turbulence. For this reason, during these periods the bank and the river adjacent to the scour pool along the outside of the bend become oversteepened. As the high water recedes, its pressure, which helps to hold up the oversteepened bank, is released. Especially at this time huge sections of the oversteepened bank and river bed on the outside of the bend slip down into the scour pool by slump block action (see Figure 19). Contrary to popular textbook notions, lateral corrosion has no major role in this migration of the river meanders.

Often masses of mature trees are carried into the stream when the bank caving occurs. Each season as the scour pool deepens, more of the bank caves away, and more full-grown trees fall into the river. In this manner a tangle of tree snags can be imbedded all the way across the river's channel as the channel moves into the area where the bank formerly stood.

A much different situation occurs on the inside of the bend. Here there is little current, the river is shallow, sand bars are often formed, and new land, termed a point bar, is deposited. The point bar has lower banks than the outside of the bend and the deposits which form it continue to advance
BANK CAVING BY SLUMP BLOCK ACTION

Source: Harold N. Fisk, Geological Investigation of the Alluvial Valley of the Lower Mississippi (United States Army Corps of Engineers, 1944), from Plate 24.
while the opposite bank caves away. Actually, it is this very depositing on the point bar that confines the river in the bend and causes the deep scour pool to form on the outside of the bend.

With each season that the point bar advances, new willows sprout on its low banks during low water. The older willows during even moderately high water are sometimes as much as twenty feet below the river level with only their crowns showing.

As can be seen by the map (Plate III), the river's maximum current and channel generally stay on the same side of the river until they cross over at the top of the bend. They then stay on the opposite side until they cross back at the top of the next bend. For this reason the characteristics of the outside of the bend continue all the way to the top of the point bar next lower down on the same side of the river. Similarly the point bar's characteristics extend from just below the head of the point well into the next lower outside bend on the same side of the river. The change in character occurs where the current crosses from the opposite side of the river because of the bend. In other words, the upper and lower portions of the bank formed by the point bar are quite dissimilar (see Figure 20). There is some lessening of the
FIGURE 20

OLD TOWN BEND BELOW HELENA, ARKANSAS

Source: United States Army Corps of Engineers, 1962
Survey, 73/795, Exp. 177.
height of the bank from the outside of the bend to the head of the point. The oldest and largest trees will be found at the outside of the bend and become younger toward the point. The sharpest change in the character of the river bank, however, is just at the head of the point where the current breaks away and crosses to the opposite side.

At the point where the current first reaches the bank of the river on the outside of the bend a small portion, which is called an eddy, is deflected and flows counter to the main stream (Plate III). Some well developed eddies, especially at high water when there is a greater current, continue all the way up the lower side of the point bar for two or three miles to the head of the point. Generally the eddies are only weakly developed and continue only a portion of this distance. In a few spots, especially at high water, very strong whirlpools are formed between the main current and a strong eddy.

As the outsides of the bends continue to erode, the meanders become greatly extended and only narrow necks remain between the river at the top and bottom of a bend. Erosion continues to take place at this neck until a bend of ten or twenty miles may be separated by a neck less than a mile wide. If during a flood the river overflows its banks on the upper
side of this neck, a crevasse, or break in the natural levee, can be formed (Figure 21). In some cases one flood will open the crevasse into a cut-off and carry the main channel across the bend. More commonly, only after several floods will the crevasse become enlarged sufficiently to form the main channel. A portion of the river where sufficient cut-offs have eliminated the meanders to form a long straight stretch is known as a reach.

For a time after a cut-off, the river's channel may almost equally divide its volume on the two sides of the large island thus formed. Besides the large islands formed by cut-offs, numerous smaller islands termed towheads are formed (Plate III).

From this brief discussion it is obvious that the river is constantly changing, and no particular spot today is the same as during the pre-steamboat era. Additionally, the river has been greatly changed by the United States Army Corps of Engineers in their program of control. The river today does not have nearly so many meanders as before the engineers developed their program of artificial cut-offs. However, the Mississippi has not changed so much as to completely hide its former course. As is discussed later with the treatment of navigation hazards, Cramer's navigator's
FIGURE 21

CUT-OFF

A natural cut-off that occurred on the river about 1900, exact location not known. The steep banks are the type that cave in. The forest in the background is an old growth, while there is not a gradual enough slope of new bank deposits for young willows to grow on. Source: Hiram Martin Chittenden, *The Fur Trade of the Far West*. 
handbook of the early 1800's can be intelligibly transferred to the present river and modern maps.

DOWNSTREAM NAVIGATION

The flatboat was the primary vehicle involved with downstream navigation. Of the various boats it was the most clumsy and difficult to handle. The other boat types differed from the flatboat in downstream navigation only to the degree that they were less a problem since they were more manageable. For this reason, in downstream navigation, techniques used for the flatboat are considered primarily, but the observations generally would apply to the other boat types.

The best time for flatboats to descend the river was during high water. The boats therefore came down the Mississippi and its tributaries in periodic waves on the crest of recurring high-water periods. The chief high water occurred early in the spring. Since it was preceded by a long period of low water, and on the upper Ohio by the river being frozen over, the heaviest traffic descended with the first spring floods. Buttrick observed that as soon as the ice broke up at Pittsburgh in 1812, "By ten o'clock the whole river for
one mile appeared to be one solid body of boats and rafts.\(^1\)

High water gave distinct advantages for navigating the flatboats. During the high-water period the river had greater depth and the flatboats avoided grounding. Also, the greater speed of the current at this time moved the flatboats along at a faster rate. More importantly, as Flint observed: "The boatmen are not obliged to row in the present moderately high stage of the water. It is sufficient to make a few pulls occasionally to keep off the shore."\(^2\) The previous statement is confirmed in Evans's observation: "The progress of the ark is principally in floating with the current; and the oars are seldom used excepting for the purpose of rowing ashore."\(^3\) Nuttall noted that other specific conditions when rowing were required: "We continued at the same rate, floating along without any labour, except that of occasionally rowing out from the shore, or avoiding submerged trunks of trees, called snags or sawyers . . ."\(^4\) The simplest and safest procedure for carrying out this drifting navigation

\(^1\) Buttrick, \textit{op. cit.}, p. 58.


\(^3\) Estwick Evans, \textit{op. cit.}, p. 257.

\(^4\) Nuttall, \textit{op. cit.}, pp. 67-68.
was as Schultz advised, "generally keep to the middle of the river."\(^5\)

The idle floating with the current in mid-stream gives the impression that little effort in rowing was needed. From early accounts, sometimes because of the travelers' ignorance of the river, much labor at the oars was occasionally required. Cuming writes:

\[\ldots\text{after floating six miles we had to use our oars with the utmost exertion, to avoid some broken and hanging trees, with a whirling eddy just below them, occasioned by a point on the left projecting far into a bend on the right, and being rendered rapid by the channel above being narrowed by island 101.}^6\]

Schultz notes that they "rowed for one-half of an hour to avoid going into wrong channel."\(^7\) Nuttall states: "\ldots with considerable labour we rowed our unmanageable flat to the opposite shore . . ."\(^8\) This maneuver was necessary when it was desired to stop and tie up the flatboat, since the current and channel usually were on one side of the river, while the safest place to land the flatboat was on the opposite shore which had no current.

---


\(^6\)Cuming, *op. cit.*, p. 304.

\(^7\)Schultz, *op. cit.*, II, p. 106.

\(^8\)Nuttall, *op. cit.*, p. 69.
The flatboat, as previously described, was steered by a long oar rather than a rudder. Ashe observed that the oar "is preferred to a tiller, which, by sinking too deep in the water, would risk being carried off by logs and shoals."\(^9\) Ashe's statement is true, but the more important fact is that a tiller or rudder would be absolutely useless in a boat drifting at the same speed as the current. The total effect would be the same as turning a rudder to the side to guide a boat sitting in a pond. Forman descended the Ohio and Mississippi with a keelboat that at first was equipped only with a regular tiller; he complained of its inadequacy and later stated: "... we obtained a large steering oar for the keel-boat, as the strong current kept the rudder from acting, without the application of great strength."\(^10\)

The steering oar had to be sculled back and forth with a strong effort to turn the flatboat. Even when turned the flatboat would drift in the same direction no matter if it was at a forty-five degree angle, sideways, or turned completely backward in relation to the stream flow. Once a new heading was accomplished the stern oar still had to be

---

\(^9\)Ashe, \textit{op. cit.}, p. 66.

\(^{10}\)Forman, \textit{op. cit.}, p. 26.
sculled and, more importantly, the side sweeps rowed with a mighty effort before the actual position of the flatboat was changed in its relation to the portion of the current in which it was drifting.

Just what effort is needed to change a boat's position in the current when floating downstream and how far in advance of a point a turn aside must be started is learned only after becoming an experienced hand. From personal knowledge gained using rowboats in a current, it is safe to assume that many of the less experienced operators of flatboats learned similarly, sometimes to their horror, that a boat turned aside from an obstacle or to reach a desired point continued resolutely forward in its original path. The boat had to be rowed to get steerageway long before it could be swung to the side. It took considerably more experience, once steerageway was gained, however, before the imagined curve of a turn approximated the true turn. Some idea of just how far ahead a turn in navigating downstream had to be planned can be judged from modern river-boat pilots. They start a turn with their long tows a half mile ahead of the point they wish to turn into or away from.

Since the working of the stern sweep basically turned the flatboat only on its axis, later flatboats adopted the
bow oar or gouger. Working these two in opposite directions allowed the flatboat's heading to be changed more quickly so that the full force of the side sweeps could be put into play. Also, the flatboat could be rowed sideways, working the stern sweep and gouger like the side sweeps with almost as much effect as the normal forward rowing. Ashe attempted to handle a flatboat with three men but added an additional helper and concluded, "four hands are always necessary and sometimes more . . ."11

The heading of the flatboat evidently was not too great a concern. Michaux, for example, relates: "I could not conceive what these great square boxes were, which, left to the stream, presented alternately their ends, sides, and even their angles."12 Actually a common practice for the flatboat may have been as Flint recorded: "... put about with the broadside to the stream."13 The flatboat pictured in Figure 13 was also drifting in this sideways position. This technique was no doubt used at times because the operators believed that if the boat presented a greater surface to the

11Ashe, loc. cit.
12Michaux, op. cit., p. 166.
current it would be carried along better. Also, when traveling sideways, the flatboat could be moved immediately to either side of the current with the side sweeps.

From the earliest times both up and downstream travel was generally in convoys. This system was used basically for protection against the Indians and for mutual assistance in difficulties. Downstream travel had the added reason for moving in convoys of the periodic high water during which most boats set out simultaneously. Also, since downstream navigation required nothing like the amount of work of upstream navigation, there was time for sociability and visiting among boats in a convoy. The "sight of a fleet of eleven Kentucky boats" noted by Schultz was one of these convoys. Whether the flatboats were in large convoys or only two traveling together, there was a very common practice noted by Nuttall: "We accompanied another vessel of the same kind, and, for mutual convenience, our boats, according to custom, were lashed together side by side, thus also facilitating our progress by obtaining a greater scope of the current."  

\[14\]
Schultz, *op. cit.*, II, 135.

\[15\]
Nuttall, *op. cit.*, pp. 67-68.
Flint's observation was slightly varied, for he states: "Two large family boats (tied end to end) were about to leave . . . ." Forman reported: "Mr. Baynard's and my boat were frequently fastened together while descending the Ohio, but on the Mississippi, from the turbulence of the stream, it was impossible to do so." No doubt the practice was more common on the Ohio, but in the more open stretches of the Mississippi it was probably practiced to some extent, as other travelers do not confirm Forman's failure.

In descending, the flatboat had the slowest speed of the four major boat types, drifting no faster than the speed of the current. Keelboat, canoe, and bateau were fairly constantly rowed or paddled to hasten the voyage. Bradbury notes that the keelboat on which he was traveling downstream passed thirteen Kentucky boats, his boat being rowed while those they passed were only floating. Bateaus were rowed in the same manner as the keelboats. Pirogues, however, were principally paddled, following the Indian custom, and

16 Cuming, op. cit., p. 304; Fordham, op. cit., p. 80.

17 Flint, op. cit., p. 147.

18 Forman, op. cit., p. 45.

also because their narrow beam made them more difficult to row. Le Page du Pratz mentioned that the Indians used little paddles termed paqaies. A definite advantage in paddling the pirogue was that the paddlers faced the bow instead of having their backs to the direction of movement as was true of rowers on bateaus or keelboats. For this reason, one man could handle a small pirogue through the worst of hazards by paddling. The larger pirogues could be handled by as few as two men, one at the bow and the other in the stern. Some of the larger modified pirogues that were wide enough were fitted with oars and rowed. Dumont noted on the pirogues: "... on la garnet après cela d'autant de tacquets qu'on le juge à propos pour tenir les rames en état ... ."

Tacquets, although not so used in modern French, were obviously wooden pins placed along the gunwale of the pirogue to act as oarlocks for the oars to be worked against. When the pirogue was fitted with oars, a steersman sat facing forward in the stern as on bateaus and keelboats. Using the oars, the pirogue was not as maneuverable as with paddles.

However, when a man applies the strength of his arms, back,

---


and even legs in one direction, as he does with an oar, instead of using only his arms, as with a paddle, much more strength is applied.

The speed of downstream travel was based primarily on the speed of the river's current. Gravier noted: "... nous trouvè le Mississipi moins rapide qu'au dessus de Ouabachi." 22 Stuart made a similar observation in stating that the Mississippi's current was "faster above the Ohio," but the lower "Mississippi has a faster current than the Ohio." 23 When Everest reached the lower Mississippi from the Ohio, he stated that "From Cairo, at the mouth of the Ohio, the current of the river becomes more rapid." 24 Schultz, also coming onto the Mississippi from the Ohio, noted "an increased velocity of current." 25

Current speeds on the lower Mississippi differed according to location and the stage of the river. Early estimates of the river's velocity vary from "eight miles an hour" 26 to "less than two miles an hour . . ." 27

---

22 Gravier, op. cit., p. 108.
24 Everest, op. cit., p. 94.
26 Fordham, op. cit., p. 79.
27 Stuart, op. cit., p. 282.
these estimates are unusual for the main body of the current. Buckingham observed: "... the current running at the rate of three miles an hour ...." Gordon on his trip in 1765 stated: "... round you is the Stream, running from 3 to 5 knots an Hour ...." Cuming had much the same remark: "... the current runs never or in no place slower than three miles an hour, and mostly four or five." Ashe felt: "The mean velocity of its current may be computed to be four miles an hour." Some of the most accurate early estimates were made by Schultz who measured the current with a "regular log and line," and concluded: "... three miles per hour is normal ... greatest strength did not exceed four miles an hour ... not over five miles per hour at any stage." Flint and Trollope both state that the flatboats descended at four miles an hour, which agrees with the speed of the current.

---

28 Buckingham, op. cit., p. 398.
29 Gordon, op. cit., p. 51.
30 Cuming, op. cit., p. 290.
31 Ashe, op. cit., p. 254.
32 Schultz, op. cit., II, 166.
Travelers on flatboats were not concerned with the length of time for the trip; practically no mention is made of the total trip time. A trip by flatboat from Pittsburgh to New Orleans required five to six weeks. Traveling straight through, a flatboat would probably have needed between three and four weeks to drift from the Ohio to New Orleans. Most trips, however, were much longer, as the journeys were almost always interrupted by misfortunes and by breaks for visiting or selling goods. Maximilian states that the flatboats were "many months on the voyage to New Orleans."35

More frequent references are made to the length of trip for other boat types, since these boats were used when speed was a matter of concern. Michaux states that keelboats were forty to fifty days descending from Pittsburgh to New Orleans,36 while Hall writes: "A month was usually consumed in the passage from Pittsburgh to New Orleans . . ."37 Berquin-Duvallon observed that a keelboat trip "from . . .

---

34 Cramer, op. cit., p. 154.
35 Maximilian, op. cit., p. 151.
36 Michaux, op. cit., p. 160.
37 Hall, op. cit., p. 221.
the Illinois . . . to New-Orleans . . . is made in these boats . . . from fifteen days to a month . . ." 38

Bateaus "in Time of Floods, which happen only in May & June, go down to N. Orleans from the Illinois in 14 and 16 Days." 39 Morgan took twenty-five days to reach New Orleans from the Ohio on his bateau trip. 40 Ashe, however, reported: "A bateaux passes from the mouth of the Ohio to the mouth of the Mississippi in three weeks . . ." 41

Pirogues were the fastest boats principally because of their long narrow design and smaller size. Michaux compared the keelboat travel time from Pittsburgh to New Orleans of forty to fifty days to the much faster time of twenty-five days for a pirogue. 42 Le Page du Pratz gives as one of the advantages of the pirogue that it was faster than the bateau. 43 Some of the fastest early trips made must have been by these pirogues or possibly by birchbark canoes.

38 Berquin-Duvalon, op. cit., p. 10.
39 Gordon, op. cit., p. 52.
40 Morgan, op. cit., pp. 440, 447.
41 Ashe, op. cit., p. 254.
42 Michaux, loc. cit.
Without telling which type of boat was used, Brackenridge mentions the following almost unbelievable travel time for boats without mechanical power:

There have been instances of persons descending from St. Louis to New Orleans, in ten days; the distance however, is much shortened by being able to cut off points, and go through channels impracticable in low water. The usual time in low water is from four to six weeks. 44

The distance on the river that these boats traveled in ten days was about twelve hundred miles. Modern tows traveling day and night usually make this same trip in no less than five days.

UPSTREAM NAVIGATION

Practically the only physical fact that Marquette recorded of the Mississippi River was that after deciding to continue no farther downstream: "Nous remontons donc a Missisipi qui nous donne bien de le peine a refouler ses Courans . . ." 45 Marquette thus first recorded the boatman's main problem of overcoming the river's current in upstream travel, and his birchbark canoe was the easiest to propel against the current of any of the early craft because of its

---

44 Brackenridge, op. cit., p. 43.

45 Marquette, in Jesuit Relations, LIX, 160.
lightness. The boatmen that followed Marquette, first in their heavier pirogues and larger bateaus and later in the much larger keelboats and huge barges, had even greater reason to feel that the current donne bien de le peine a refouler.

There are several aspects of upstream navigation. Three brief topics—speed and travel time, difference between boat types, and season—are first covered, so that these topics may be compared to the similar material just given for downstream navigation. Since the meander is the major physical feature associated with upstream navigation, a detailed view of it is given. The keelboat was the most characteristic boat of upstream travel, just as the flatboat was for downstream travel. The keelboat was propelled upstream by rowing, poling, cordelling or towing, warping, bushwacking, sailing, and drifting with an eddy.

**Speed and Travel Time**

Du Poission left New Orleans in a pirogue May 25, 1725, and reached the mouth of the Arkansas on July 7.\(^{46}\) This distance of about five hundred miles took forty-three days to cover. For one of his very best days he recorded: "Le

---

\(^{46}\)Du Poission, *op. cit.*, pp. 278, 316.
lendemain nous fîmes six lieues; on n'en fit guère davantage en remontant ce fleuve . . . " 47 Usually less than this eighteen miles or six leagues was made in a day. Gravier notes: "La Pirogue . . . rencontrée ne faisoit pas plus de 3 ou 4 lieues par jour." 48

Ashe observed that from New Orleans to the mouth of the Ohio a bateau "takes three months . . . with the help of the wind and the constant labour of sixteen oars," 49 the "current not allowing a boat to gain more than twelve or sixteen miles a day." 50 Brackenridge gives a slightly faster time for the same distance: "In ascending, fifty days to the mouth of the Ohio is considered a good voyage, but two months is the most usual time . . . " 51

According to Berquin-Duvallon, "the passage back from New-Orleans to the . . . Illinois, demands from six weeks to three months" 52 for a keelboat. Bullock notes that from New Orleans to Cincinnati, a distance of 1,600 miles, a keelboat took ninety days. To portray the dramatic change that had

49 Ashe, op. cit., p. 254. 50 Ibid., p. 276.
51 Brackenridge, op. cit., p. 43.
52 Berquin-Duvallon, op. cit., p. 10.
occurred even by 1827, Bullock compared this to the upstream travel time by a steamboat of from ten to eleven days. The best time ever made to Cincinnati before the steamboat was a seventy-eight-day trip made in 1811. Hall estimated that the upstream trip from New Orleans all the way to Pittsburgh for the keelboat "was not effected in less than four months . . ." For the keelboat's daily mileage Audubon observed: "Perhaps, from dawn to sunset, the boat may have advanced fifteen miles. If so, it has done well."56

Evans states that a barge of eighty to one-hundred tons pulled by sixty to seventy men could reach the mouth of the Cumberland River from New Orleans in ninety days. Schultz hailed a barge near the mouth of the St. Francis River forty-eight days out of New Orleans, and Cuming hailed the barge Adventurer near Vicksburg, twenty-nine days out of New Orleans, bound for Nashville. Evidently the

53 Bullock, op. cit., p. 129.
54 Baldwin, op. cit., p. 67.
55 Hall, op. cit., p. 221.
57 Estwick Evans, op. cit., p. 314.
58 Schultz, op. cit., II, 119.
59 Cuming, op. cit., p. 306.
hailing of a barge or keelboat to discover port of origin, days out, and port of destination was a river custom borrowed directly from the sea.

One further account of travel time to impress firmly the extreme slowness of the upstream trip is cited: At Memphis, Cuming met "Mr. Foy, who owns a small barge which he sends occasionally for goods to New Orleans, from whence she returns generally in forty days, and did so once in thirty." One of the basic reasons for the variance in time of travel was the custom of breaking the trip for rest and frolic at ports on the river, especially at Natchez, New Madrid, and Shawneetown.

Seasons

The two best times for upstream travel were at the opposite extremes of the river's stage. Collot states: "With respect to ascending the Mississippi, the most favorable season . . . is when the river is very high or quite low." Gordon in 1765 said that the bateaus were "brought . . . to the Illinois . . . from New Orleans when the River

---

60Ibid., p. 292.
61Baldwin, op. cit., p. 102.
62Collot, op. cit., II, 139.
is low."\textsuperscript{63} Pittman at about the same time observed that during the low water of fall the current was only two miles an hour. He also states that navigation "above the Arkansas [was] slowed by islands, shoals, sandbanks" which made "the voyage more dangerous, longer, and less expeditious, than in the spring . . ."\textsuperscript{64} Imlay in the 1790's had a similar view of conditions:

The inundations of the Mississippi commence something later than those of the Ohio, but it is very certain they begin in March, and subside in July. This is the most proper time to ascend the river, as you avoid the shoals, have finer weather, but above all, when the water is high, you have stronger eddies . . .\textsuperscript{65}

Although the high water season oddly enough may have been the most favorable for upstream travel, probably travel was just as common during low water. Also, with the various upstream navigation techniques, it is significant that some were used mainly at high water, while others were more commonly practiced at low water.

\textsuperscript{63}Gordon, \textit{op. cit.}, p. 52.

\textsuperscript{64}Pittman, \textit{op. cit.}, p. 37.

\textsuperscript{65}Gilbert Imlay, \textit{A Topographical Description of the Western Territory of North America} (London: J. Debrett, 1797), pp. 110-11.
The flatboat at times was used for upstream navigation. Nuttall had his flatboat towed a short way upstream on the Arkansas to the military post not far from the river's junction with the Mississippi. Nuttall observed also another group "ascending the Ohio in a flat-boat." Nevertheless, the practice of using flatboats upstream was rare. Although a few flatboats may have been pulled upstream great distances, more than likely they were used upstream for only short distances. The flatboat's design was a complete disadvantage in working against the current. Flatboats were built too large for manpower alone to handle them properly against the stream. Even worse, their oblong shape with a flat bow and fairly broad beam was the design most resistant to the current.

The pirogue, bateau, and keelboat, with designs much different from the flatboats, were far more favorably suited for upstream navigation. Evans notes that the pirogue was "made of great Length better fitted to steer against a rapid stream." The extreme narrowness of the pirogue was even

67 Ibid., p. 50.
68 Lewis Evans, op. cit., p. 138.
more important as it gave this boat a shape that offered little resistance to the current. The pirogue's only drawback was that it was heavy and sat fairly deeply in the water for its size. It thus offered greater resistance against the water than shallower boats. The bateau was not proportionally so narrow as the pirogue. It was, however, of lighter construction and flat-bottomed so that the resistance against the water of its slightly greater width was made up for by sitting less deeply in the water. The keelboat had nearly the same proportions as the bateau. It developed more resistance against the water only because it was larger and carried a keel. All three types had, of course, a sharp pointed bow to divide the water rather than a square bow like the flatboat which pushed against the water.

The drafts of the various craft were of great significance. All the types were loaded so as to have only a shallow displacement. Draft was also emphasized by the fact that the boats were built with flat bottoms. Of the various types the flatboat could be loaded to the greatest draft. Since it was used only for downstream travel, the main concern was to keep the flatboat's depth shallow enough so that the boat would not ground in the shallower parts of the river.
Flatboats probably had drafts of four or five feet. Besides the concern of the shallowness of the river, draft was kept to a minimum on the craft that were propelled upstream in order to keep the boat's resistance to the water's current as low as possible. Small pirogues and bateaus had less than a foot draft while the largest probably never drew over two feet. The keelboat, because of the keel, had a greater draft, but probably the draft never exceeded three feet.

In recording facts concerning early boats, cargo capacities are usually given. Tonnages impress the reader with the labor expended in pulling such loads upstream by manpower. The figures are so frequently used to make this point that the writer suspects that a simple fact is overlooked. A boat and the burden it carries displace water to equal their weight and are therefore weightless. No weight is pulled in water. Resistance is developed by the relative current set up by moving the boat through the water. When traveling upstream in a river this relative current is augmented by whatever is the river's actual current. The amount of forward surface area of a boat below the water line, the angle this surface area presents against the water, and the speed with which this surface and the water strike each other are the chief elements that determine the amount of force the
boatman must develop to propel his boat against the water's resistance. This fact can be easily demonstrated by the difference between the resistance that a paddle develops when the flat surface of its blade is drawn against the water compared with the resistance when the narrow side of the same blade is drawn through the water. In both cases the weight and water displacement of the paddle are the same. It is the different shapes the paddle presents when pulled against the water that cause the difference in resistance. For this reason, for example, a pirogue three feet wide by thirty feet long would develop only slightly more drag than a smaller one loaded to the same draft but three feet wide by ten feet long. However, a plank boat nine feet wide by ten feet long would have a tremendously greater drag than the smaller plank boat loaded to the same draft that was only three feet wide by ten feet long. The comparison of size between the smaller and larger plank boat is the same as that for the pirogues, but because of the different shapes the comparison of effort is not. The larger plank boat takes much more effort to propel than the smaller plank boat when compared to the difference in effort needed to propel the large and small pirogues. A long, narrow boat with a sharp bow was then the optimum design. The bateau and keelboat were only broadened
enough to remove the instability that the extreme narrowness gave the pirogue. Added weight, of course, meant greater displacement and therefore more forward surface area to resist the current. For this reason, as Morgan observed, the bateaus going upstream, while using twice as many men, were only half loaded.  

Another aspect of overcoming resistance against a current as compared with pulling weight on land was the constant variance of the force. The boatmen had always to be ready for the little extra force beyond that of the moment. They had always to be alert, especially since instant correction of a new stress was so much simpler than getting the boat back into control if control was once lost. As soon as a boat yawed, the area against which the current struck was increased to the entire length of its side. An advantage of handling a boat as compared to a load on land is that the resistance greatly decreases with a decrease in speed. If the boat could not be got past a particular point at two miles per hour, it could at a speed ten or twenty times slower, with much less resistance. This fact allowed the keelboat to operate with a fairly small crew. On land, actual weight is

pulled up a grade. For example, wagons often were either half unloaded and carried twice over rough grades or extra teams were hitched to them. Reducing the speed to a crawl was an advantage also, but the actual weight of the load had to be pulled at any speed.

Meanders

Joutel was the first observer to record the lower Mississippi River's most striking navigational characteristic when he states: "Il serpente beaucoup." Gravier on his journey was much impressed by this same fact:

... a la Riviere Oüabachi; cette riviere gorde assez som run de vent du Nord au Sud; mais à 3 or 4 lieues de Oüabachi, elle commence a tourner au Nord, Nordoïest, et ne fait que serpenter ...

Somewhat later Gravier again reported:

... en 3 heures de marche nous aouons Fait tout le tour du Compas, Et apres aouoir coura un peu de temps a l'est Sud est, nous aouons Fait encore de demi tour de la boussole dans une Anse de plus de 2 Lieues que lon coupe quand les eaux sont hautes ...

Evans notes that the Mississippi "frequently changes its course" and that its "course is very serpentine ..."
Stuart observed: "... the curves are described with equal precision, as if they had been formed by the sweep of a compass."⁷⁴ Everest wrote that the river "winds so that we appear sometimes to be going round in a circle. The same things perpetually recur."⁷⁵ One of the earliest writers to attempt an explanation of the features was Ellicott, in 1802. His concepts were fairly accurate, but rather difficultly worded.⁷⁶ In 1811 Brackenridge was possibly the first writer to use the actual term meander for the Mississippi River:

There are the most evident proofs that the Mississippi has at different periods meandered in a thousand channels, still visible, in the valley between the primitive ground on either hand. There are lakes of considerable extent which have much the appearance of the river ...⁷⁷

Nuttall in 1819 gave the best of the early descriptions and explanations of the meanders:

"... the river appears singularly meandering, sweeping along in vast elliptic curves, some of them from six to eight miles round, and constantly presenting themselves in opposite directions. The principal current pressing against the centre of the bend, at the rate of about five miles

---

⁷⁴Stuart, op. cit., p. 287.
⁷⁵Everest, op. cit., p. 94.
⁷⁷Brackenridge, op. cit., p. 38.
per hour, gradually diminishes in force as it approaches the extremity of the curve. Having attained the point or promontory, the current proceeds with accumulating velocity to the opposite bank, leaving, consequently, to the eddy water, an extensive deposition in the form of a vast bed of sand, nearly destitute of vegetation, but flanked commonly by an island or peninsula of willows. These beds of sand for the most part of the year under water, are what the boatmen term bars.

The encroachments in the centre of the curves of the meanders, proceeding to a certain extent, at length break through and form islands, in time the islands also disappear, and so the river continually augmenting its uncontrollable dominion over the friable soil, alternately fills up one channel, and more deeply excavates or forms another, in proportion to the caprice of the current.

The constant meanders of the Mississippi greatly increased distances on the river compared to straight overland travel. The meanders by constantly shifting also created most of the dangerous hazards to navigation. However, the meanders also offered the main advantage for upstream travel. The increased length of the stream caused by the meanders reduced the Mississippi's over-all gradient and thus the speed of its current. More importantly, the area of the river below each point bar had practically no current or even presented reverse-flowing eddies.

---

78 Nuttall, op. cit., pp. 92-94.

The method of avoiding the current when traveling upstream by crossing the river and traveling the side opposite to the current was learned from the Indians. The return of Cavelier and his small group to the Illinois country was guided by Indians; Joutel recorded their method of travel as follows: "Nous estions obligez de traverser le dit fleuve plusieurs fois pour éviter les grands courants qui sont ordinairement où est le fort de l'eau, lequel se trouve lantost d'un bord et tantost de l'autre."\(^80\) Going up the Mississippi from New Orleans in 1727, Du Poission, although not correctly understanding the reason for the crossings, noted that at each bend "il faut le traverser pour prendre le plus court."\(^81\) In 1765 Gordon observed when the French brought their bateaus up to the Illinois: ". . . there are many large Bends; along the inward Side of These the Boats get on, as there the Current is not at all strong."\(^82\) Collot recorded that "the concave parts must here be avoided by keeping close to the points, because on this side the stream is less rapid . . ."\(^83\)

---

\(^81\)Du Poission, *op. cit.*, p. 290.
\(^82\)Gordon, *op. cit.*, p. 52.
\(^83\)Collot, *op. cit.*, II, 139.
In navigating with their boats along the Mississippi, the boatmen always had to be cognizant of the thread of current, especially when traveling upstream. The thread of current is the line along the stream's surface of maximum downstream velocity. It varies from hour to hour and from day to day; especially, it changes with different stages of the river. R. J. Russell notes the relation it has to seasons and to navigation techniques:

Floods increase the hydraulic gradient and straighten out threads of maximum velocity. Captains of river boats are keenly aware of this. For the sake of fuel economy boats headed upstream are routed as close as possible to bars, but during floods they hug concave banks.

As rivers straighten during floods they commonly shunt across bars and are likely to develop chute cut-offs.84

In high water, then, the thread of current would vary enough from the general position of the thread of current in low water to cause the boatman to make his crossings at different points. In low water the crossing would not be made until the very top of the point bar because here would be where the thread of current would be met first, but in high water that crossing would be made at the bottom of the point

bar because the thread of current would be cutting across it.

The accompanying diagram (Figure 22) generally demonstrates the typical routes of upstream travel. All the boats before the steamboat followed the same course. In general the same techniques of propelling them were used. It was important for the boats to be built flat-bottomed or nearly flat-bottomed so as to have limited draft. The boats were operated most of the time in the shallower parts of the river where grounding would have forced vessels of deeper draft back to the channel with its swifter current.

Here apparently is a clear example of nature's control over man. Actually it is not that at all. One of the major themes of this dissertation is that a neutral physical setting is being acted upon dynamically by man, rather than man being forced into a certain pattern by a dictating nature. This concept is demonstrated by the upstream travel techniques. Prior to the advent of the steamboat, lack of power to overcome the river's current was man's chief technical problem. In solving this problem, he worked his boat up the river following a route that avoided the current (Figure 22). By the 1820's, when the steamboat had proved itself on the Mississippi, this upstream course during low water was almost completely reversed by new technology. Sufficient power was
FIGURE 22

COMPARATIVE ROUTES OF KEELBOAT AND MODERN TOW
developed by the steamboat to go against the margins of the river's main current at low water. The dangers of running aground at low water in the larger and faster steamboats made it more logical to stay at least in the margin of the channel and make crossings as the channel switched from the outside of one bend to the next. Modern tows follow this practice more completely. Towboats with several powerful diesel engines if necessary can breast the river's swiftest current at any stage. The barges that these towboats push have drafts up to nine feet. Therefore, at least the margin of the channel is followed now at all seasons to avoid grounding. These tows then follow a route upstream on the Mississippi River that the boats of the early periods nearly always avoided (Figure 22).

Rowing and Paddling

The different methods employed to propel boats upstream were of varying importance. Each method, however, best applied to special conditions. Rowing and paddling were not the most important methods, but they were the most common method of propelling boats by manpower. Also, they were the only ones of the various techniques used as well in downstream travel.

Paddling was important for pirogues, but other techniques were also used. Rowing was more important with
bateaus than on the later keelboats. Gordon states that bateaus used twenty men at the oars coming up the Mississippi.\textsuperscript{85} Ashe says the bateaus came up the river with the "constant labour of sixteen oars."\textsuperscript{86} Rowing may have been the main form of locomotion for bateaus, but other techniques were used also.

As already mentioned, rowing benches at the prow of the keelboat provided places for six to ten rowers. Barges, while rowed by many more men, were equipped with only about the same number of oars as the keelboat. Latrobe observed that they were "propelled by six oars in each barge,"\textsuperscript{87} evidently with several men to an oar. The keelboat and barge were too large to be rowed upstream. Rowing was used only as an auxiliary force to guide the boat, or to add extra forward propulsion to other techniques. The one time that the oars were employed as the principal method of power was at the crossings. The banks and the shallow water below the point bar were left, and rowing was the only technique that could be used to reach the opposite shore. No attempt was made to

\textsuperscript{85}Gordon, \textit{op. cit.}, p. 52.

\textsuperscript{86}Ashe, \textit{op. cit.}, p. 254.

\textsuperscript{87}Latrobe, \textit{op. cit.}, II, 318.
make any headway upstream, but only to row across the river on the shortest route possible. Audubon describes the maneuver:

But the boat has reached the point, and there the current is to all appearance of double strength, and right against it. The men, who have all rested a few minutes, are ordered to take their stations, and lay hold of their oars, for the river must be crossed, it being seldom possible to double such a point and proceed along the same shore. The boat is crossing, its head slanting to the current, which is however too strong for the rowers, and when the other side of the river has been reached, it has drifted perhaps a quarter of a mile. The men are by this time exhausted, and, as we shall suppose it to be twelve o'clock, fasten the boat to the shore or to a tree. A small glass of whiskey is given to each, when they cook and eat their dinner, and after repairing their fatigue by an hour's repose, recommence their labours. 88

The crossing was probably the hardest chore of handling the keelboat. As Audubon notes, this was the usual spot for the mid-day break. Two crossings were usually all that were made in a day's work. After a late afternoon crossing, camp was made for the night. During the day additional breaks each hour were customary. 89 At the breaks, after a particularly hard task, each crew member took his "fillée," a cup of whiskey and a cup of river water. 90 Probably more than any other factor this custom explains the keelboatman's ability

88 Audubon, Delineations of American Scenery, pp. 24-25.

89 Baldwin, op. cit., p. 65.

90 Ibid., p. 87.
to cope freely with the extreme physical labor involved in drawing his boat up the river.

Poling

Poling was the most important means of propelling the keelboat and barge. It probably was just as important for the bateau as rowing. Poling was used to some degree also with pirogues. On the Mississippi poling, as well as all the other techniques to be discussed later, was used only in upstream navigation. The Indians knew the use of poles for propelling pirogues. Joutel describes the Indians poling a pirogue up the Mississippi as follows: "Les Sauvages perchoient les uns après les autres, le long du bordage, avec de grandes perches longues de quinze à vingt pieds."\(^9\) Le Page du Pratz, however, traveling with Indians, gave another view regarding the use of poles. At the Red River rapids he observed that the Indians landed and portaged their boats. Le Page du Pratz thought it could have been poled through more easily.\(^9\) It is possible that cultural traits for tribes as close as the Arkansas River and the Red River were diverse enough that poles were customary with one group while

\(^9\)Joutel, op. cit., p. 457.

not accepted by the others. In discussing the Indians' non-use of poles, Le Page du Pratz made a classic observation regarding the reluctance of the French colony to accept new introductions and its preference for following established customs: "... dans cette Colonie on n'est point dans le goût d'inventer ce qui peut soulager dans les travaus; on est seulement dans l'usage de suivre la routine donnée par les premiers Habitans qui n'étoient pas assurément d'habiles Artistes."  

In 1766 Morris described his Indian captors' method of using a pole for their canoes on the Maumee River:

... the chief, who steered my canoe with a setting-pole (no oars being used the whole way), whenever he saw a fish used to strike it through with his pole, though the end had been blunted and made as flat and broad as a shilling.

The shape of the pole's end logically was blunted to keep the pole from sticking in the bottom of the stream and thus being difficult to retrieve.

The French and British both used poling in their homelands and did not need the Indian's example. However, the

93Idem.

example was there for a stimulus. No doubt the areas of the river that were best for poling were learned of directly from the Indians. Before the French reached the Mississippi they were using poles to get through rapids with their canoes. Coming up the Fox River from Green Bay, Alloüez reported: "Nos Matelots monterent les Rapides à la perche, pendant deux lieuës . . ." 95 Kalm observed that the French poled their bateaus on the St. Lawrence. 96 Pownall in the 1760's stated the logical reason for the use of poles when the stream was shallow enough for the bottom to be reached:

> By the known Laws of Mechanics, a Man Setting a Boat over a firm hard Bottom has twice the Advantage of the like Strength employed in Rowing. In Rowing, the Water being moveable, receives Half the Motion; While in Setting, the Boat receives the Whole. 97

Several writers recorded the use of poles with the keelboat for the Mississippi. Fordham, noting the various techniques of upstream navigation, says: "... keelboats are used which are impelled by sails, oars, and poles." 98

---


96 Kalm, op. cit., II, 407.

97 Pownall, op. cit., p. 140.

98 Fordham, op. cit., p. 106.
Brackenridge in the same vein reported: "... oars and poles are always used for the purpose of navigating boats, but the cordelle, and sails, are also of great importance."\(^{99}\) Hall remarked: "The heavily laden boats were propelled against the strong current by poles ..."\(^{100}\) Woods's observation was: "We met several keelboats going up the river, drawn by eight or ten men to one boat; sometimes they push them up the river with long poles ..."\(^{101}\) Cuming's statement that a "large keel boat ... had nine men—one steering, six poling, and two resting"\(^{102}\) gives a better description of the actual routine.

Evans writes: "The poles are about eight feet in length, and the bottom of them enters a socket of iron, which causes the point of the pole to sink immediately."\(^{103}\) La Barge further elaborated that the poles were fashioned with a ball or knob to place against the shoulder at the top and a wooden shoe or socket at the other end. These poles were

---

\(^{99}\) Brackenridge, op. cit., pp. 43-44.

\(^{100}\) Hall, op. cit., p. 221.

\(^{101}\) Woods, op. cit., p. 224.

\(^{102}\) Cuming, op. cit., p. 97.

\(^{103}\) Evans, op. cit., p. 245.
regularly manufactured in St. Louis and were made of ash-
wood. Ash obviously was chosen to give them the needed
strength. Peck described the poles as having a greater
length than that given by Evans: "The setting-pole was ten
or twelve feet long, the lower end shod with iron, and the
upper end terminating in a knob, which was pressed against
the shoulder." Poling pirogues and bateaus was accomplished by the
boatmen thrusting their poles against the stream bed while
standing in one place and facing the boat's prow in a
fashion somewhat resembling paddling. This same method was
probably used sometimes on the larger keelboats, but the
greater length and stability of the keelboat with the passe
avant built along each side allowed for a more effective
technique. The boatman set his pole against the stream
bottom at the boat's bow, put the knob of the pole against
his shoulder, and, leaning his weight into the pole, walked
toward the stern. The cleats along the walkway were impor-
tant for greater traction as he pushed against the pole. La
Barge states that the boatman sometimes bent so far over he

104 Chittenden, op. cit., I, 105.
105 Peck, op. cit., p. 83.
could pull on these cleats with his hands for greater power.106 The boatmen literally walked the boat forward out from under them while they stayed in one place in relation to the stream bottom.

Three different techniques were used when walking the boat forward with poles from the passe avant. La Barge notes the use of poles in unison; that is, all the men gathered at the bow equally divided between the sides and at the command a bas les perches set their poles and walked to the stern. When they reached the stern, at the command levez les perches they all took up their poles, ran back to the bow, and started over again.107 This technique had the advantage of being rhythmically efficient. Also, the boat had more freedom to maneuver, in slack water where headway was not too quickly lost, when all the poles were up. Steering was not so easy, and to some extent hampered the polers, while the poles were set.108 The disadvantage of this technique was that it could not be used in any current of strength where constant traction had to be kept against the bottom.

Two different techniques, operating somewhat like

106 Chittenden, loc. cit.
107 Idem.
108 Idem.
endless chains, kept some men pushing their poles against the bottom at all times. Peck described the first of these systems as follows:

In using this where the water was of sufficient depth, the men placed themselves on the narrow gunwale, with their faces toward the stern, their heads bent low, and as the boat moved ahead they walked toward the stern. The one in front would turn about, pass the others, and take his station in the rear.\textsuperscript{109}

One disadvantage of this method was that when the boatmen passed back to the bow along the walkway at the same time that others were pushing toward the stern with their poles there could be crowding and confusion. Audubon described a third technique:

The boat is again seen slowly advancing against the stream. It has reached the lower end of a large sand-bar, along the edge of which it is propelled by means of long poles, if the bottom be hard. Two men called bowsmen remain at the prow, to assist, in concert with the steers-man, in managing the boat, and keeping its head right against the current. The rest place themselves on the land side of the footway of the vessel, put one end of their poles on the ground, the other against their shoulders, and push with all their might. As each of the men reaches the stern, he crosses to the other side, runs along it, and comes forward again to the landward side of the bow, when he recommences operations. The barge in the mean time is ascending at a rate not exceeding one mile in the hour.\textsuperscript{110}

\textsuperscript{109}Peck, \textit{loc. cit.}

\textsuperscript{110}Audubon, \textit{Delineations of American Scenery}, p. 25.
This system allowed the poling to operate smoothly and continuously. An advantage also was that the two bowsmen positions, as already noted by Cuming, were occasionally switched off to give each man poling a brief break. It probably often happened that the bottom of the stream sloped off rapidly so that poles could be used effectively only from the bank side of the boat. This was a problem because all the power was applied to one side. To keep the boat close enough to the shore, the two bowsmen occasionally had to row the boat closer in.

When using the pole set against the shoulder there could be only a slight compensation in angle for different stream depths. The pole could not be grasped at greater or lesser distances from its end as the Indians no doubt did with twenty-five-foot poles in propelling their pirogues. It is very likely that the keelboatmen had at least two sets of different-length poles. This fact would explain the different lengths noted by Peck and Evans.

The long, fairly calm, and especially shallow stretches below the point bars were favorable for poling. Poling was not the most preferred technique. If natural conditions were such that the shore could be reached, other methods were employed. This evidently was not the case the majority of the
time so that poling was the common method with which most of
the boat's forward propulsion was accomplished.

Cordelling.

Peck writes: "The cordelle (French for little rope)
was a long rope fastened to the bow of the boat and drawn
over the shoulders of the men, who walked in a stooping posi-
tion along the shore."111 Christian Wilt ordered "cordelles
of good quality—one-half inch thick and tarred."112 The
term cordelle was used for both the rope and the actual prac-
tice of towing. From the name it was obviously introduced
onto the Mississippi by the French. However, towing was
universal on the canals of Europe, including England. It is
more than likely that the Indians did not use this method.
Cordelling was used only to a minor extent for pirogues113
and bateaus.114 The French developed the technique mainly
for the great barges, and the later keelboats were handled by
the same method.

111 Peck, op. cit., p. 83.
112 Christian Wilt, "Letter written to James Rankin,
113 Lewis Evans, op. cit., p. 139.
114 Audubon, America, p. 145.
Of the technique Audubon reported only: "Both these kinds of vessels were provided with ... coils of cordage, known by the name of cordelles."\textsuperscript{115} Brackenridge notes simply that the cordelle was "also of great importance."\textsuperscript{116} Peck, besides his definition of the cordelle, earlier in his narrative recalled that "all the hands were on the shore tugging with all their force at the cordelle."\textsuperscript{117} Hall gives a detailed description of the difficulties of cordelling:

... where the stream was too deep to admit the use of ... [poles, the keelboat was] drawn by ropes. The former process required the exertion of great strength and activity, but the latter was even more difficult and discouraging—as the laborer, obliged by the heat of the climate to throw aside his clothing, and exposed to the burning rays of the sun, was forced to travel on the heated sand, to wade through mire, to climb precipitous banks, to push his way through brush, and often to tread along the undermined shore, which giving way under his feet precipitated him into the eddying torrent of the Mississippi.\textsuperscript{118}

Some of Hall's statements, which form the basis for the views of other writers,\textsuperscript{119} are questionable. First, the

\textsuperscript{116}Brackenridge, \textit{op. cit.}, pp. 43–44.
\textsuperscript{117}Peck, \textit{op. cit.}, p. 82.
\textsuperscript{118}Hall, \textit{op. cit.}, p. 221.
\textsuperscript{119}Hugh Murray, \textit{The United States of America} (Edinburgh: Oliver & Boyd, 1844), II, 305; Baldwin, \textit{op. cit.}, 64.
cordelle could be used, it is true, in stretches where the river was too deep for poles. The nature of the Mississippi River is such, however, that the part of the stream traveled along the lower side of the point bars was almost always shallow enough for poling. At high water when it was not shallow enough to pole there was no bank on the point-bar side of the stream, so that cordelling would have been impossible as an alternative method. Also, another means of propulsion, bushwacking, answered the problem at this time.

Secondly, while not trying to depreciate the boatman's labors in cordelling, Hall's description of the boatman's plight in wading, stumbling, falling, and pushing through bushes does not fit the natural situation. There was never any attempt to do anything in the way of improving towpaths along the river's side. The annual floods would have made these towpaths useless anyway. The floods themselves, nevertheless, produce a regime which during all the medium and low water seasons causes the lower sides of the point bars to have long, open, gradually sloping banks.

The willow can grow with a great amount of inundation. There is, however, an ecological interrelationship which causes the willow forest to have a very sharp, almost straight-line break (Figure 23). There is past this line an open,
When new land is deposited on point bars, willows establish themselves. Long linear bandings separate the younger from the older willows. The same situation is shown in the aerial photograph (Figure 20). The river is low in this photograph and a long open shore extends beyond the willow growth. It is significant that the exposed sand bar does not reach shore. It suggests that an eddy occurs between the bar and the shore. Photograph courtesy of James Coleman.
practically vegetationless width extending to the medium-to-
low-water shore line. The factors which cause this sharp
break are the total time the different levels of the river's
bank are under water, the age of these banks, and the fact
that the current in high water can sweep away new isolated
seedlings. Nuttall's observation fairly well describes this
situation:

On the opposite side of all the bends there are what
are called bars, being platforms of sand formed by
the deposition of the siliceous matter washed out of
the opposite banks by the force of the current.
These sand flats, sometimes near a mile in width,
are uniformly flanked by thick groves of willows
and poplars, the only kind of trees which survive
the effects of the inundation to which these bars
are perpetually subject.120

The shore is impassable after the water has first
dropped as it is then a muddy quagmire that can trap a person
and render him incapable of movement. However, as soon as
the land has had a chance to dry out, it forms a long smooth
area which can easily be traversed. As the season continues,
slight periodic changes in the river's level and wave erosion
form completely open hard-packed strands immediately along
the shore line for the entire length of the point bar side of
the river. Collot supported this observation when he states:

120Nuttall, op. cit., p. 298.
"... these points sometimes offer convenient banks four or five miles in extent, where the towing line may be used."  

Another advantage of the banks as towpaths is the few tributaries which would interrupt the cordelling. These tributaries are limited by the river's natural-levee system.

Cordelling was used then only when the bank was open and favorable. On the lower Mississippi this time was during the river's lower stages. At this time it can be assumed that cordelling was used because it was preferred to poling. When cordelling, the boatmen were able to continually and with greater freedom of movement apply their full strength in towing the boat. When poling, the boatmen had constantly to break off their effective labor and run to the bow of the boat to take a new pole setting. Some men were resting and others retrieving their poles so that the men whose poles were actually set had a greater strain than when all the crew walked the cordelle along the shore. However, in other areas than the lower Mississippi the cordelle was often used as a last resort to tow boats through rapids too swift for poles.  

---

121 Collot, op. cit., II, 139.

122 Henry Marie Brackenridge, Journal of a Voyage Up the River Missouri; Performed in Eighteen Hundred and Eleven (Baltimore, 1816), reprinted in Thwaites, Early Western Travels, VI, 44.
La Barge gives a detailed description of the rigging of the cordelle:

This consisted of a line nearly a thousand feet long, fastened to the top of a mast which rose from the center of the boat to a height of about thirty feet. The boat was pulled along with this line by men on shore. In order to hold the boat from swinging around the mast, the line was connected with the bow by means of a "bridle," a short auxiliary line fastened to a loop in the bow and to a ring through which the cordelle passed. The bridle prevented the boat from swinging under the force of the wind or current when the speed was not great enough to accomplish this purpose by means of the rudder. The object in having so long a line was to lessen the tendency to draw the boat toward the shore; and the object in having it fastened to the top of the mast was to keep it from dragging, and to enable it to clear the brush along the bank.123

One of the very important functions of the external keel was to keep the keelboat out away from the bank instead of its being constantly drawn into the shore as it would be without a keel. Source accounts do not explain this function of the keel. However, as previously observed, both Saxon and Baldwin believe this use was the chief reason for the keel. Chambers, writing in 1922, shares their attitude.124

From the description that La Barge gives, it can be seen just how the keel was used effectively. In addition to La Barge's explanation of attaching the cordelle high enough

---

123 Chittenden, op. cit., I, 103.
124 Chambers, op. cit., p. 452.
on the mast to clear snags, it was necessary to fasten the cordelle near the keelboat's center to allow it freedom to maneuver while being towed. If the cordelle were attached to the keelboat at its prow, the keel could not have been made to function so as to keep the keelboat off the shore. With the cordelle attached at the mast, the stern oar was worked so as to turn the prow of the keelboat at an angle away from the bank. The distance the keelboat could yaw in this direction was limited by the bridle which was looped to the cordelle from the prow.

With the keelboat at an angle from the shore, as it was towed along, the water would push the keel and cause the boat to veer out away from the shore. If the keelboat got either too close or too far out from the shore for good handling with the cordelle, this distance could be changed by increasing or diminishing the yaw of the boat with the stern oar. If this technique was not the reason for the invention of the keel, it very definitely did become its most important function. To further keep the boat moving upstream, a man called the bosseman stood with a pole at the bow to push off from snags. For some reason, when he pushed his pole against a

125Chittenden, loc. cit.
snag, it was known as a "reverend" set. 126

Warping

Very closely related to cordelling was warping. This technique was completely described by Stuart:

They had two yawls, one in advance of the other, carrying out a warp some hundred yards in length, making it fast to a tree, and then drawing the barge up to that tree by the warp, when that warp was coiled; the yawl in advance had another laid, and so on the labour proceeded. 127

The warps were the same rope as used for cordelling. Stuart describes this method as if it were continually used. More logical was La Barge's impression that it was more of a last resort:

In some places, where it was impossible to walk and work at the same time, a few men would carry the end of the line beyond the obstruction and make it fast, while the rest would get on board and pull the boat up by drawing in the line. This operation was called warping. 128

Possibly one of the chief situations utilizing warping was in crossing the lower end of a chute to a towhead. The warp was rowed across the chute, attached on the towhead and

---

126 Timothy Flint, Recollections of the Last Ten Years (Boston, 1826), reprinted (New York: Alfred A. Knopf, 1932), p. 16.

127 Stuart, op. cit., p. 290.

128 Chittenden, loc. cit.
the keelboat warped across.

**Bushwhacking**

Poling was the most common technique used to work upstream along the lower side of the point bar. During lower stages of the river when the banks were open, cordelling was preferred. At high water in places where the stream bed was too deep to be reached by poles, the almost straight line of willows, at this time of year covered by several feet of water, could be reached. Peck notes: "When the hands on the gunwale dropped their setting-poles, and caught the limbs and brush along shore, and thus dragged the boat ahead, it was called 'bushwhacking.'"\(^{129}\) Brackenridge further describing bushwhacking states:

> Where the bank has not been washed steep, which is most usually the case, and the ground newly formed, the young tree, of the willow, cottonwood, &c., which overhang the stream, afford much assistance in pulling the boat along with the hands.\(^{130}\)

Audubon observed how bushwhacking was used in conjunction with rowing: ". . . the men equally divided, those on the river side take to their oars, whilst those on the land side

\(^{129}\)Peck, *op. cit.*, p. 83.

\(^{130}\)Brackenridge, *Journal of a Voyage up the River Missouri*, p. 38.
lay hold of the branches of willows, or other trees, and thus slowly propel the boat."

**Sailing**

The only technique used for propelling the boats upstream not dependent on manpower was sailing. Both the birch-bark canoe and the log pirogue were sailed. Anything but a wind directly from the stern would have tipped these boats over, and it was rare that wind and river direction were the same.

D'Artaguiette mentions using sails with his bateau. On January 23, 1723, his group was aided by a south wind, and on the following day they were able to make a league under sail. Considering that three leagues was a hard day's work by other methods, a league gained by sail was precious. The bateau being wider and more stable than a pirogue was better adapted for working with the wind. D'Artaguiette states that he was sailing with a south-by-southeast wind, which suddenly changed to southwest. With the first direction he was evidently sailing near the east bank, which

---


132 D'Artaguiette, *op. cit.*, pp. 50, 60.

133 Ibid., p. 65.
would have been a foolhardy course to maintain with a southwest wind blowing the bateau into the shore. D'Artaguiette related that the crew undertook to cross, but that they were unsuccessful and had to take down the sail and cross with oars. The significance of this act is that if they attempted to cross under sail, it must have been possible to accomplish the feat at times. Such a maneuver would have been completely impossible with canoe or pirogue.

Sailing was more important on the barge and keelboat. Fordham states that along with the other techniques already mentioned, "keelboats are used which are impelled by sails." Woods observed: "... keelboats going up the river ... when the wind is favourable, make use of a sail." Latrobe, in comparison with rowing, states that the barge was "propelled ... when the wind served, by the yet more powerful aid of square sails ... ." Peck states: "When the wind is favorable the sail is used ... ." When passing the third Chickasaw bluff on the Mississippi, Cuming

---

134 Idem. 135 Fordham, op. cit., p. 106.
137 Latrobe, op. cit., II, 318.
138 Peck, op. cit., p. 79.
notes: "We met a barge under sail, bound up the river." Cuming further made the following positive observation in regard to sailing: "I would recommend it to navigators ascending the Mississippi and the Ohio in the summer season, to be provided with a sail, as it will accelerate their voyage very much, besides saving them a great deal of labour."  

Woods states that winds are generally out of the south, slowing the boats going downstream but aiding them in going upstream. Of course, the main problem in sailing up the river on a south wind is the constant meanders. Berquin-Duvallon states the situation accurately: "... the same wind may be both favourable and contrary in the same hour, in consequence of the serpentine progress of the stream." D'Artaguiette, evidently on one of the more circuitous bends of the Mississippi, verifies how curiously the wind could be put to use when he observed that a good northwest wind allowed them to sail up the river without rowing.  

---

139 Cuming, op. cit., p. 290.  
140 Ibid., p. 126.  
141 Woods, op. cit., p. 248.  
142 Berquin-Duvallon, op. cit., pp. 10-11.  
143 D'Artaguiette, op. cit., p. 61.
Because of the meanders, sailing could be considered only as a welcome relief. Imlay's description seems a gross exaggeration of the value of sails:

\[\ldots\ \text{with the advantage the wind affords (which blowing the greater part of the year from the south-west, and directly up the windings of the river \ldots\ ) is sufficient with sails, keeping as much as possible in the eddy water, to carry a boat 50 miles a day up the stream \ldots\ \text{it is a circumstance notorious from the testimony of voygers in the Mississippi and the Ohio}}.\]

Audubon verifies that if the wind is favorable the boat may sail thirty or even sixty miles in one day.\(^{145}\) Brackenridge's statement, however, puts the distances covered into the proper context of occurring only on rare good days:

\[\text{In the course of a voyage it is rare that there are not six or eight days of sailing, which is a great relief to the hands, as the boat is then propelled against the current without their assistance, sometimes, thirty miles a day. In very light winds, the sails are hoisted and although not sufficient alone to cause the boat to ascend, yet afford considerable help}.\]

\[\text{One of the main limiting factors to sailing is that over the continents, unlike the sea, good strong, constant sailing winds occur exceptionally instead of regularly.}\]

\[^{144}\text{Imlay, op. cit., pp. 101-102.}\]

\[^{145}\text{Audubon, Delineations of American Scenery, p. 26.}\]

\[^{146}\text{Brackenridge, Views of Louisiana, p. 44.}\]
Pope gives an idea of just how handily the boats came upstream under good conditions:

... descried a keel bottom'd Boat with a square Sail, bound to New Madrid—Her Progress under a fair Wind was at the Rate of two and a half Miles per Hour, which might have been accelerated by the Addition of Oars ...\(^{147}\)

An additional reason for the keelboats to be provided with sails was that they were a good deal more usable on the Ohio which has less current. Often the wind came up the Ohio so strongly that it stopped the downstream progress of flatboats. For example, Flint states: "A strong contrary wind blew. No boat could move downward. But we saw several keel boats carrying sail, that enabled them to stem the ripples without manual labour."\(^{148}\) Melish also comments on this situation:

... judging from the state of the winds since we left Pittsburg, I was satisfied we could have sailed up to Pittsburg in little more than half the time we took to come down. The keel boats sail up at the rate of about 20 miles a day ... The wind continued to blow up the stream so strong, that we could have sailed eight miles upwards in the time we took to row one downwards.\(^{149}\)

A final comment from early travelers, this by Cramer, which

\(^{147}\)Pope, \textit{op. cit.}, p. 27.

\(^{148}\)James Flint, \textit{op. cit.}, p. 112.

\(^{149}\)Melish, \textit{op. cit.}, pp. 374, 367.
while extreme in comparison to all the foregoing remarks, nevertheless has much truth to it:

The part the most indifferently managed about a barge, are the sails. Few of the bargemen are sailors, and without one aboard, the sail had better be thrown overboard. A fine barge was upset in the river opposite Natchez in a gale of wind and hail, on the 17th March 1813, owing, it is presumed, to a failure in the proper and timely management of the sails, which were all spread to drive her up stream . . . Any strong ablebodied man, can soon learn to pull an oar or heave at a pole, and if he make a mistake with either it is of little consequence; not so with sails; the elements operate upon them, and much care and knowledge are required to manage them with safety and benefit.\textsuperscript{150}

An important feature of sailing, about which the writer has found no comment in either primary or secondary sources, is that there obviously was some skilled sailing done on the Mississippi. Some management of the wind could have been accomplished with the square sails. The schooner-type rig (Figure 18) that some of the barges carried was capable of utilizing winds that came from more than one quarter.

More importantly, the writer has found no recognition of the obvious importance of the exterior keel. A good sailor with the aid of a keel and a schooner rig could get

\begin{footnote}
\textsuperscript{150}Cramer, \textit{op. cit.}, p. 154.
\end{footnote}
far more use from the wind in negotiating the Mississippi River's meanders than without them. The problem in sailing the bateau would have been that as soon as the wind was anything more than strictly following, the bateau, having a flat bottom, would sideslip toward one of the banks. Besides making it much harder to turn over, the main significance of a keel is to build up side pressure against sideslip so that a boat may keep a course even with cross winds. There may even have been some tacking against a nearly opposing wind. Discounting this possibility, a boat with a keel could still be sailed almost completely around the river's meanders if the wind was anywhere from southeast to southwest. The crossings would have had to be made so that the keelboat was nearest the lee shore when it started up the portion of a bend with a cross wind. This position would give the boat the entire width of the river for sailing room. It is the writer's opinion, considering these possibilities, that the second most important function of the keel was for a stabilizer in sailing.

Eddies

The seventh and final method for ascending the river was drifting with the eddy. Using the eddy was not a separate technique in the manner of the other methods described. It
was used mainly in conjunction with the other systems. Possibly in high water some eddies were well enough developed that the keelboatmen rested and allowed the eddy to carry them along with no aid.

Imlay notes: "... the frequent turnings in the Mississippi produce in every bend eddy water ..."\textsuperscript{151} Schultz observed that a few eddies carry the current for a mile or two, but that at low water eddies are few and small.\textsuperscript{152} Ellet measured an eddy current at two miles an hour.\textsuperscript{153} Nuttall recorded the advantage of the eddy as follows:

\begin{quote}
... eddy or silent water is constantly to be found beyond the point of the bends, or curves of the river ... In such situations, the counter current, though inconsiderable, affords ... a singular facility to vessels which are ascending.\textsuperscript{154}
\end{quote}

In summary, the meanders give the Mississippi a special character to be coped with. The boatmen took advantage of this character in developing a definite course to be followed in traveling upstream. In following this course different techniques of propulsion—rowing, poling, cordelling, warping,

\begin{footnotes}
\item[151]Imlay, \textit{op. cit.}, pp. 101-102.
\item[152]Schultz, \textit{op. cit.}, II, 175.
\item[154]Nuttall, \textit{op. cit.}, p. 94.
\end{footnotes}
bushwhacking, sailing, and riding an eddy—were used. The most logical technique which could provide locomotion with the least difficulty was chosen. In making this choice, due regard was given to the varying conditions of the river in the different sections of its meanders. Also significant were the different conditions the river presented in its high and low stages.

HAZARDS

Once well-suited boat types had been adopted, and the system for navigating them worked out, the greatest ever-present problems were the physical hazards associated with navigating the lower Mississippi River. Schultz points out that the hazards were rarely serious when going upstream because only when sailing did boats go fast enough for hazards to be dangerous. The main risk came when boats were traveling fairly rapidly downstream in the power of the current.155

The danger of descending the river was often compounded because most of those who operated flatboats downstream were amateurs. It is estimated that between one-fifth to one-fourth of all flatboats that went down the Mississippi were

wrecked. Because of this high accident rate, keelboats were preferred for travel and shipping downstream. Cramer makes the following observation on this fact:

... [keelboats] seem to be more at immediate command in navigating the river; and as they are always strongly manned, they go with greater expedition. They draw little water, and require but a narrow channel. Merchants are beginning to prefer this method for safety and expedition. And instead of purchasing boats and taking charge of them themselves, they get their goods freighted down from Pittsburgh in keel boats by the persons who make them, and who make it their business to be prepared with good boats and experienced hands, for such engagements.

This method is safest, if not cheapest, for this special reason: The cargo is consigned to the care of an experienced and careful man, who perhaps descends and ascends the river twice or thrice in the course of one season, and of course must be well acquainted with all the difficulties in navigating it.157

It should be added that in the latter days of the flatboats, after the coming of the steamboat, "flatboats evolved into freight carriers with trained river-wise crews."158

A number of natural conditions constituted hazards. There were the general problems of staying in the correct channel, keeping out of lesser channels and eddies, or being

156Baldwin, op. cit., p. 83.
157Cramer, op. cit., p. 95.
caught by distributary currents. The landing was dangerous principally because of caving banks, swift current, and falling water level; therefore, only certain spots were safe for landings. The greatest hazards were the snags, sub-divided into planters, sawyers, and wooden islands. Other hazards caused inconvenience, but the snags were mainly responsible for disaster. Because of the dangers of the river, night travel itself was a hazard. Two climatic factors acted as hazards—windstorms and fog. Experience in safely navigating the river was learned from Indian guides and by trial and error. After the 1800's the main aid the inexperienced hand had for warning of hazards was the guidebook by Zadok Cramer.

**Keeping in the Channel**

In the times before the Mississippi's channel became artificially restricted, just knowing the main channel's position was a problem. The river was continually divided by islands. Often, if on the wrong side of the island, the traveler became trapped by shoals. In other spots, if the channel was inadvertently lost, the voyager might be caught by a distributary or delayed by circling around in an eddy.

When Evans came onto the Mississippi from the Ohio he made the following observation of the over-all situation on the river:
there are here many bends, points, and sand bars, which cause the current to set in a great variety of directions, and render necessary, not only constant watchfulness, but much practical knowledge.\textsuperscript{159}

Schultz made a similar general comment:

\.\. the rapidity of the stream, obstructed with endless islands, sandbars, snags, sawyers, and planters, occupies so much of your care, that you scarce have time for reflection, except in the evening after landing.\textsuperscript{160}

In going with the current, Collot advised boatmen to "take care at every bend to \ldots avoid carefully the points as well as the channels formed by the islands."\textsuperscript{161} In addition, Collot states that the advantage in staying to the outside of the bends was that the "current is stronger \ldots and there is also a much greater depth of water."\textsuperscript{162} In giving these directions Collot added that "if doubtfull what channel ought to be taken \ldots leave the boat to the current."\textsuperscript{163}

The main spot where a decision had to be made as to the direction of the channel was at the head of an island. Ashe agrees with Collot:

\textsuperscript{159}Estwick Evans, \textit{op. cit.}, p. 311.

\textsuperscript{160}Schultz, \textit{op. cit.}, II, 164.

\textsuperscript{161}Collot, \textit{op. cit.}, p. 137.

\textsuperscript{162}\textit{Idem.} \hspace{1cm} \textsuperscript{163}\textit{Idem.}
By trusting to the current there is no danger to be feared in passing the islands . . . On the other hand, if persons row . . . on approaching an island, there is great danger of being thrown on the upper point of it before they are aware . . . 164

It sometimes occurs that a part of the channel is divided by an island. Ashe later had to change his attitude as follows:

The attention is also kept awake by the necessity of looking out for islands, in order to choose the proper channel, and to pull for it in time, or before the boat falls into the race of a wrong one. Numbers of boats are lost annually on account of not paying attention to this important point. 165

Forman gives this same warning: "The boats would follow the current, except when passing islands, when the men must all beat their oars." 166

When boats operated at lower water either up or downstream there was the problem of grounding in shallow spots. Gordon observed that the bateaus "often get a Ground in ascending, chiefly when endeavouring to avoid the rapid current." 167 The problem of grounding was usually greater, however, for downstream travel as at that time boats went on a bar or shoal with greater force. Flint commented on this as follows:

164 Ashe, op. cit., p. 61. 165 Ibid., p. 269.

166 Forman, op. cit., p. 43.

167 Gordon, op. cit., p. 46.
Between the mouth of the Ohio and the St. Francis there are various shoal places, where pilots are often perplexed to find a sufficient depth of water, when the river is low. Below that point, there is no difficulty for vessels of any draught, except to find the right channel.168

Michaux relates the incident of a flatboat running aground:

We were on the point of leaving them about two in the morning, when the boat ran aground. Under these circumstances we could not desert our hosts, who had entertained us with their best. . . We got into the water with the boatmen, and by the help of large sticks that we made use of as oars succeeded in pushing the vessel afloat, after two hours' painful efforts.169

The most dangerous time to go aground was on a falling river. Schultz states that two boats had gone aground and every effort for three days, including cutting rollers to push them on, had failed. The crews of eleven flatboats were finally enough to push the flatboats off.170

Devol's flatboat went aground. The crew worked all night unloading it to lessen the boat's draft, but the river went down as fast as they could lighten the boat. Devol's group was fortunate in that the next day it rained, the river


rose, and they were freed. The procedure in freeing a boat advanced in several steps. First, everyone went over the side, including paying passengers on keelboats, to push. If pushing was not enough, hand spikes and levering were used. If the boat still was not freed, a channel was dug around it. If this resort failed, horses and oxen were brought from nearby farms, when they were available. As a last resort everything was unloaded.

A minor problem was avoiding eddies and whirlpools. Whirlpools possibly were dangerous for canoes and pirogues. For the larger boats, however, they were not perilous, even if, as Evans states, they "appear formidable." Some of the encounters with eddies were more humorous than deadly, as Pope records in the following:

March 17th. 1791. The Irishman in Honour of St. Patrick, purloined all our Brandy, Sugar and Eggs to make a Tub of Egg-Nog, of which he drank so copiously, that whilst at the Helm, he insensibly run the Vessel into a strong Eddy, to get her out of which, employed all Hands in hard Labour the Balance of the Day.

172Baldwin, op. cit., pp. 72-73.
173Estwick Evans, op. cit., p. 302.
174Pope, op. cit., p. 25.
Schultz at the eddy at Fort Adams had a similar experience: "We had the 'pleasure' of coasting it up and down for nearly two hours . . . had ascended the stream twice for the distance of nearly a mile, before we could regain the true current." As Schultz further explains, the only danger was the loss of time and very possibly the embarrassment of being heckled by the five or six boats that passed them while they were in their predicament.

Cuming's party had a bad time with eddies and whirlpools, oddly enough near Bayou Manchac, which generally was considered so far down the river as to be free of hazards:

At 4, we got into a whirlpool, in which we were detained a considerable time; this eddy was two miles in circumference, and the quantity of drift wood in it was astonishing. After much difficulty we extricated ourselves and regained the current. As we had now a very quick point to turn, called Judas's point, we forced to the opposite shore, and dashed against a heap of drift wood. Mr. E. jumped out on the logs, fixed his shoulder against the boat, and with the hardness of pushing and thrusting, the blood flew from his nose; by these efforts however we got her off, but no sooner were we out of this difficulty than we were drawn into a second eddy; after taking a round in it we got out into the current again, and proceeded. During these disasters, it rained, thundered, and lightened prodigiously. A few miles lower down, we got into another eddy, and were actually floating round in it without having observed our awkward situation,

175Schultz, op. cit., II, 152.
until called to and informed of it by a person on shore, who advised us to land until the next morning, which we did. 176

A final hazard of the channel was to avoid being literally sucked out of the river by crevasses during floods, or in the lower parts of the river to be pulled into distributary streams by the current. Ashe commented that the flood was

... supplying streams called bayeaus with a body of water, which issuing from the main river with astonishing rapidity, causes a violent vortex, whose actions extends a considerable way into the river. Boats once dragged into a bayeau are next to lost, it being almost impossible to force so unwieldy a machine as a flat bottomed boat against so powerful a current. 177

At the "Chaffalaia," the main distributary of the Mississippi, Schultz observed: "... it would be absolutely impossible for a New-Orleans or Kentucky boat to get out unassisted." 178

Bank Caving and Landings

The earliest observations of bank caving were made by Gravier. He commented as follows in reference to the cross that La Salle had erected as a symbol of French sovereignty and which Tonti had relocated at Bayou Goula:

176 Cuming, op. cit., p. 360.

177 Ashe, op. cit., p. 266.

178 Schultz, op. cit., II, 156.
When going down the river in 1765, Gordon reported: "... on one side, is a bank, from 25 to 30 feet high, whence very often you see and hear great pieces of mud or clay, on which are growing trees, tumbling into the torrent."\textsuperscript{180} Flugel recorded his actual observation of bank caving:

\begin{quote}
Not far from the bank where I was sitting a tree fell on the opposite bank with tremendous noise—as it fell a large body of sand spread itself around like a cloud. The bank continued to fall nearly the whole afternoon.\textsuperscript{181}
\end{quote}

At New Madrid Collot wrote: "Every annual revolution carries off from one to two hundred yards of this bank."\textsuperscript{182} Milfort in 1790 reported seeing an area twenty to thirty fathoms wide and a league long submerge in a minute.\textsuperscript{183} This is between forty and fifty acres of land and seems to be

\textsuperscript{179}Gravier, \textit{op. cit.}, p. 156.
\textsuperscript{180}Gordon, \textit{op. cit.}, p. 51.
\textsuperscript{181}Flugel, \textit{op. cit.}, p. 414.
\textsuperscript{182}Collot, \textit{op. cit.}, II, 17.
\textsuperscript{183}General Le Clerc Milfort, \textit{Memoirs or A Quick Glance at my Various Travels and my Sojourn in the Creek Nation (1802)}, translated and edited by Ben C. McCary, (Kennesaw, Georgia: Continental Book Co., 1959), p. 52.
extraordinarily large. Audubon, however, states that the banks were "falling and sinking in the muddy stream, by acres at a time." Audubon, however, states that the banks were "falling and sinking in the muddy stream, by acres at a time." Evans, Nuttall, and Schultz estimated that a single acre at a time fell into the river; this seems to be more usual. Flint observed: "... immediately upon the subsiding of the river within its banks, is the time, when they are most apt to fall in." Milfort had made a similar comment in 1790. Bank caving occurred only at the outside of the bends; as Audubon notes, the "alluvial shores . . . at every deep curve or bend were seen giving way . . ." Schultz made an even more important statement confirming the restriction to the outside of bends: "I do not recollect a single instance of meeting with falling banks on both sides of the river at the same time." The danger to navigation would seem obvious, but evidently many inexperienced travelers were caught unaware by

184Audubon, Delineations of American Scenery, p. 23.
186Timothy Flint, A Condensed Geography . . . , p. 102.
187Milfort, loc. cit.
188Audubon, Delineations of American Scenery, p. 23.
189Schultz, op. cit., II, 31-32.
bank caverns. Ellicott warned travelers to "avoid the con-
cave banks or shores," and recorded, "many losses have been
sustained from this cause."  
Schultz cautioned to "Avoid
banks in bends of river," and also notes that boats had been
"totally lost by cave-ins."  
Evans and Brackenridge re-
ferred to boats being "crushed" or "overwhelmed" by the
caving banks.

The safe locations for landing were at the foot of
islands or in the eddies below points where young willows
and cottonwoods grow. Several of the important landings
along the river were at eddies. For example, Schultz states
that Natchez was "situated in a bend of the river, where the
projecting point above causes a very extensive eddy along
the shore below, and makes it very convenient for a landing-
place."  
Cramer gives the following advice for landings:

... navigators have made it a rule never to land
at or near a point, but always in the sinuosity or
cove below it, which is generally lined with small
willows ... whence some call them,--willow points,

---

190 Ellicott, op. cit., p. 122.

191 Schultz, op. cit., II, 171.

192 Estwick Evans, op. cit., p. 302; Brackenridge,
Views of Louisiana, pp. 42-43.

193 Schultz, loc. cit.  
194 Ibid., p. 135.
and which being generally clear of logs and planters, the landing is easily effected by running directly into them, the resistance of the willows destroying a part of the boats velocity ... 195

Flint confirms Cramer's advice: "If there be wind or storm, the descending flat and keel boats immediately make for these groves," and he further states that the boats would plunge directly into the willows which might be covered by fifteen feet of water and let them act as brakes. 196 Since the water level might fall, the safest of harbors was the one in fairly deep water held by the willows (Figure 24). Experienced boatmen surely learned if the willows were not available to run their boats back out into deep enough water once they had been tied to shore, so that they would not go aground if the river fell during the night. Witness poor Nuttall's tribulations during his first night on the Mississippi:

About half an hour before sun-set, our company came to alongside a breaking sand-bar, where lay also two other boats; governed by their example we attempted to land, but floated by the current to a distance below, and here, unfortunately, attempting to make a landing, and trusting too confidently to the lightness of our boat, we were instantly carried upon a shallow and miry bar. I was sensible of the dilemma into which we had fallen, and lost no time to plunge into the water, though at the point of freezing, attempting, but in vain, to float off the

195Cramer, op. cit., p. 171.

196Timothy Flint, A Condensed Geography ..., p. 97.
Willows such as these, when inundated, were used to pull boats upstream by "bushwhacking." From the channel the willows signaled a safe place to land. The inundated willows acted as a brake for the clumsy flatboat when it was rowed to shore, and further held it in place once it was brought into their shelter.
the boat by a lever. The effort was beyond my strength, and after remaining in the water nearly an hour, I had reluctantly to submit to our situation. At length, two boatmen offered their assistance, for the consideration of five dollars, with which I complied, and in a few moments we again floated. They took us in the dark about 100 yards further down, and there made a landing. I still felt suspicious of our situation, notwithstanding their assurances of safety; and at day-light, we found ourselves (in consequence of the rapid falling of the river) as far as ever grounded upon the bar; to obviate which, all our strength and ingenuity availed nothing. The boatmen also, who had assisted us the preceding night, and put us off our guard by false assurances, now passed us with indifference, and denied us the assistance which they had promised. We immediately commenced unloading, and had proceeded pretty far in our labour, when we were visited by the owner of a neighbouring boat, who, pretending to commiserate our situation, offered to assist us gratuitously; and hearing how we had been cheated out of five dollars, expressed his dislike at any boatman having acted with such want of fellow-feeling. We had scarcely time to breakfast, before our yankees arrived with two skiffs; and one of them now assured us that we should never be able to get off until the rise of the river; though, as appeared in the sequel, merely with the friendly view of putting a good price upon his services. The other, instead of the gratuitous assistance which he had offered, made a tender of his services at three dollars. At length, like genuine Arabs, they demanded the value of eight dollars, with which I was reluctantly obliged to comply. After about ten minutes further unloading, a lever placed under the bow, set us readily afloat in one minute; so much had these kind gentlemen deceived us, as to our real situation. They now also refused to fulfil the bargain of assisting us to reload, until brought to some sense of duty by
Snags, Planters, Sawyers, and Wooden Islands

Early writers noted that when the banks caved many trees fell into the river as well, but Bradbury was possibly the earliest writer to note that this was the chief cause of snags. He observed that the trees had a large amount of earth attached to their roots which caused them to sink with the tops of the trees rising to the surface.\(^{198}\)

The huge size of the trees was significant in creating snags large enough to be of great danger. The only comment that Marquette made about the Mississippi, other than that the river had a current difficult to ascend, was in regard to the trees along the banks: "... les 2 Costéz de La riviere sont bordéz de hauts bois. Les cottonnier, Les ormes, et les bois blanc y sont admirables pour Leur hautteur, et Leur grosseur."\(^{199}\) In 1790 Milfort said that the banks had "trees of prodigious size."\(^{200}\) Brackenridge notes: "The banks are covered with cotton wood trees, of enormous size..."

\(^{197}\)Nuttall, *op. cit.*, pp. 74-76.

\(^{198}\)Bradbury, *op. cit.*, pp. 200-201.


\(^{200}\)Milfort, *op. cit.*, p. 52.
Scarcely any other tree grows on the island.\textsuperscript{201} Cypress occurred occasionally above the mouth of the Arkansas, but below it "soon becomes the principal tree of the forests."\textsuperscript{202} The first thick stand evidently was at Cypress Bend just below the Arkansas' mouth where Evans reported: "Here grow considerable forests of this interesting tree."\textsuperscript{203}

One of the earliest descriptions of snags was made in 1765 by Gordon in his statement that there were "huge Trees in the Current, fast to the Bottom but bent by the impetuous Stream, and some of them only bobbing up their Heads, when their own Elasticity gets the better of the Strength with which the Water bends them down."\textsuperscript{204} Nearly every other early traveler that followed gave a description of snags.\textsuperscript{205} Gordon did not use the term snag, however. The French called

\begin{itemize}
  \item \textsuperscript{201}Brackenridge, \textit{Views of Louisiana}, p. 42.
  \item \textsuperscript{202}Schultz, \textit{op. cit.}, II, 123.
  \item \textsuperscript{203}Estwick Evans, \textit{op. cit.}, p. 317.
  \item \textsuperscript{204}Gordon, \textit{op. cit.}, p. 51.
  \item \textsuperscript{205}Bradbury, \textit{loc. cit.}; Brackenridge, \textit{Views of Louisiana}, p. 43; Collot, \textit{op. cit.}, II, 137-38; Ellicott, \textit{op. cit.}, p. 123; Forman, \textit{op. cit.}, p. 44; Fordham, \textit{op. cit.}, pp. 81-82; Schultz, \textit{op. cit.}, II, 30-31; Stuart, \textit{op. cit.}, pp. 287-88.
\end{itemize}
snags "chicots," and in 1802 Berquin-Duvallon stated: "... they are called stumps by the inhabitants." Evidently the standard usage of the terms snag, planter, and sawyer did not appear until after this date.

Bradbury notes: "... fixed and immovable [snags]... are called planters." Brackenridge explained: "... planters ... are the trunks of trees of sufficient size to resist [the current]." Schultz states that planters either stood "perpendicular" or were inclined. Bradbury further notes that when inclined they generally pointed downstream. La Barge reported that if they were entirely submerged they were called "breaks." This term probably refers to breaks in the water when the current flowed over the submerged snag.

The best description of sawyers is given by Schultz.

---

206 Collot, loc. cit.
207 Berquin-Duvallon, op. cit., pp. 9-10.
208 Bradbury, op. cit., p. 200.
209 Brackenridge, Views of Louisiana, p. 43.
211 Bradbury, loc. cit.
212 Chittenden, op. cit., I, 81.
He explained that the timbers had a "regular vibrating motion, some . . . very quick . . . others . . . slower . . . one to twenty minutes, and then elevating their monstrous shafts from one to ten feet above the surface . . . "213 Schultz states that there is additionally a type known as "Sleeping Sawyers" whose "motion is entirely under water."214 Stuart also notes this special type.215

Wooden or floating islands were masses of driftwood and snags which usually collected at the upper end of true islands.216 Du Poission probably gave the earliest description of wooden islands that accumulated along the Mississippi:

... on appelle *embarras* un amas d'arbres flattans que le fleuve a déracinés, que sont courant entraîné continuellement, et se trouvant arrêtés par un arbre qui a la racine en terre, ou por une langue de terre, s'accumulent les uns sur les autres, et forment des piles énormes . . .217

Du Poission further states that one *embarras* was large enough to supply the entire French city of Tours with fire wood for three winters.218

Except during very high river stages when most snags

214Idem.  
216Brackenridge, *Views of Louisiana*, p. 43.  
218Idem.
were buried by a great depth of water, \textsuperscript{219} they were a great menace to navigation. Schultz very accurately states the dangers as follows:

The navigation of the Mississippi must always be attended with difficulties and dangers, as long as twelve or fifteen hundred miles of its banks remain covered with enormous trees, which are continually tumbling into the river, and forming a succession of snags, sawyers, and planters.\textsuperscript{220}

Sawyers, since they were out of sight until they reared up, gave less warning and were more dangerous than planters.\textsuperscript{221} Sleeping sawyers, since they never broke the surface at all, were the most dangerous.\textsuperscript{222} Schultz reported his experience with a sawyer in the following manner: "[We] had another very narrow escape from a sawyer, which all of a sudden showed itself so near as to touch the side of the boat as it arose."\textsuperscript{223} Brackenridge pointed out that wooden islands "are amongst the most dangerous places in the course of the navigation. The current rushes towards them with amazing velocity, and it is with great difficulty and the exertion of skill,

\textsuperscript{219} Schultz, \textit{op. cit.}, II, 174.

\textsuperscript{220} \textit{Ibid.}, pp. 166-67.

\textsuperscript{221} Bradbury, \textit{op. cit.}, pp. 200-201.

\textsuperscript{222} Schultz, \textit{op. cit.}, II, 30-31.

\textsuperscript{223} \textit{Ibid.}, p. 101.
that they were avoided."224

Schultz gives detailed advice for avoiding snags. Generally the snags occur only a third of the way out from the bank so "keep the middle of the river." At bends the boat must be worked to keep the current from sweeping it too close to the shore. When a snag is sighted, line it up with a spot behind it; if this spot does not drift away to either side from behind the snag, the boat will strike it. It should be determined at least one-half mile upstream on which side the snag will be passed. In a band it is easier to pass a snag by going toward the outside of the bend because this is the direction of the force of the current. If the snag cannot be avoided, try to set the boat at an angle so that the upstream side of the bow will hit the snag only a glance and the current will immediately swing the boat away from it.225

The earliest record of an accident from a snag probably was that of de Limoges' wrecking his canoe. Gravier reported the incident: "Il m'a raconté son naufrage, ou il a tout perdu ... ce fut en se laissant deriver la nuit au

224Brackenridge, Views of Louisiana, p. 43.
225Schultz, op. cit., II, 169.
Courant que leur Canot hurta Contre un arbre qui étroit
arresté dans le milieu de Courant . . . "226 Forman relates
his problem in getting free from a snag as follows:

. . . evidently aground, or fast on something below
the surface. I gave notice to the boats behind to
come on, and take position between my boat and shore,
hoping, by this means, to raise a temporary swell in
the river, and by fastening a rope to my boat, and
extending along besides the others, and making the
other end fast to a tree on shore, be enabled to get
loose.227

This procedure did not work, and Forman finally had to have
the planter chopped and sawed into pieces before he was
freed. Nuttall observed the sad result of a boat impaled on
a snag at the head of Island 62: "This was a large flat-boat,
which hung upon the trunk of an implanted tree, by which it
had been perforated and instantly sunk."228 Schultz wit-
nessed one of the many tragedies of the river that resulted
from sawyers. Another flatboat was some distance behind when
his boat pulled into shore for the night. He observed a
sawyer about two hundred yards distant that stayed from sight
for long periods. The boat following floated toward the spot
where Schultz and his group knew the Sawyer would rise. They

226 Gravier, op. cit., p. 152.

227 Forman, op. cit., p. 44.

228 Nuttall, op. cit., p. 92.
made all sorts of frantic gestures to warn the boat, but were not understood:

... the first notice they had of their misfortune was the crash of their boat against a heavy sawyer, which stove in the greatest part of her broadside, and threw her immediately into the trough of the sea, when being deep by [sic] loaded with lead and beaver, she filled and disappeared almost instantly. 229

Windstorms

It was altogether too dangerous to continue on the river during a high wind. Partially this was because of the danger of being swamped. Mainly, however, the danger was as Ashe observed: "... when a contrary wind contends with a strong current, it is attended with considerable inconvenience, and requires careful ... management, otherwise the boats must be driven on shore in spite of all the efforts of their crews." 230 In ascending the Mississippi by bateau, D'Artaguiette in his journal of 1723 indicates how often these winds could be a problem:

Mar 14 . . . violent . . . wind . . .
... didn't travel . . .
Mar 17 . . . violent N.W. wind forced to go ashore . . .
Mar 18 . . . violent wind . . . stayed camped . . .

229Schultz, op. cit., II, 150.
230Ashe, op. cit., p. 62.
Mar 19 . . . stopped by snow . . .
Mar 24 . . . rained all day didn't travel . . .
Mar 27 . . . rained forced go ashore . . .231

In February, 1796, Ellicott had much the same experience in his flatboat:

6th . . . on account of a strong gale of wind,
      had to make a harbour . . .
14th . . . had to come ashore . . . in consequence of a violent headwind.
17 . . . put to shore for wind.
21 . . . driven ashore by wind.232

Woods observed when a thunder storm came up that the crew anchored "as do most of the flat boats or arks, for fear of being driven on shore."233 Peck notes the following technique of safely mooring their boat: "The wind began to rise . . . until it blew a gale. It was found necessary to moor both head and stern of our boat, which was done by fixing strong ropes to small trees and saplings."234 Practically every other traveler who kept a journal reported the same experiences.235

232Ellicott, op. cit., p. 34.
233Woods, op. cit., p. 228.
234Peck, op. cit., p. 78.
235Estwick Evans, op. cit., pp. 300-301; Flugel, op. cit., pp. 416-18; Forman, op. cit., p. 45; Gordon, op. cit., p. 54; Pope, op. cit., p. 25; Schultz, op. cit., II, 125.
Morgan when descending the Mississippi by bateau in 1766 had eighteen straight days in which he was delayed by fog before he experienced the "first Day the Sun has has [sic] shone clear."\(^\text{236}\) Soon thereafter Morgan explained: ". . . the Fog still continues & was so thick the Whole Day as almost to deter me from proceeding on Acct of the Danger in running foul of the many Logs which stand up on End in the River."\(^\text{237}\) Pope confirms the danger of the fog: ". . . an impervious Fog arose, so as to prevent a Discovery of Sawyers and other Obstacles not more than ten Feet from us."\(^\text{238}\) Evans said the fog was "so thick that one cannot see an object at the distance of fifty feet."\(^\text{239}\) Nuttall correctly interpreted the manner of the fog's formation:

\[\ldots\text{ a fog sprung up, so very dense as to render our situation amidst almost unseen obstacles extremely dangerous. We had no alternative but rowing over to the bar of the island on our left . . . On exposing the thermometer to the air, it rose and remained at 62°. In the water it fell to 42°; the difference being 20°, which readily accounted for the dense fog that exclusively enveloped the river . . . the vapours of the moist and warm air were perpetually precipitated over it.}\(^\text{240}\)


\(^{237}\)Ibid., p. 443.

\(^{238}\)Pope, op. cit., p. 30.

\(^{239}\)Estwick Evans, op. cit., p. 302.

\(^{240}\)Nuttall, op. cit., p. 95.
This condition frequently occurs in winter since the Mississippi flowing from the north brings waters colder than normal to its lower areas. The fog hugged the river very closely. Schultz states that on the river he could not see a hundred feet, but when he climbed to the top of a tree he could see blue sky.\(^{241}\) Collot observed: "The fogs also, which are very thick on the river from the southern winds, disappear as soon as the wind veers to the north."\(^{242}\) Howells states that in a fog the keelboat and flatboat operators blew tin horns to let the various boats in a group know where the other boats were.\(^{243}\)

Night Travel

Night travel was not so dangerous as travel in a fog,\(^{244}\) but it nevertheless was to be avoided. Morgan stopped every night of his trip except one and "As the Moon shone tolerably clear last Night I embark'd about 11 Oclock but it grew cloudy

\(^{241}\)Schultz, op. cit., II, 166.

\(^{242}\)Collot, op. cit., II, 16.

\(^{243}\)William Cooper Howells, Recollections of Life in Ohio, From 1813 to 1840 (Cincinnati: The Robert Clarke Company, 1895), p. 84.

\(^{244}\)Ashe, op. cit., p. 102.
One of the differences between flatboating on the Ohio and on the Mississippi was as Fearon reported: "... they can be allowed to float at night in the Ohio. In the Mississippi this would not be safe ..." Michaux verifies this statement. Ellicott felt it safe to travel at night below Walnut Hills, present-day Vicksburg, but Cramer was more cautious:

... it must be evident, how imprudent it is attempting to go after night, even when assisted by a clear moon: but after you arrive at Natchez, you may safely proceed day and night, the river from that place to its mouth being clear, with but a few eddies into which you may occasionally be drawn and detained for a short time.

Traveling at night where the river permitted it, the distance from the shore could be learned by listening to echoes. Ashe's boatman used this technique:

... giving [the roof] a sudden stroke with an oar, listened to the returning sound. The left shore first repeated the stroke; and next, after a small interval the right. 'The left shore... is but

246 Fearon, op. cit., pp. 453-54.
247 Michaux, op. cit., p. 165.
248 Ellicott, op. cit., p. 123.
249 Cramer, op. cit., p. 171.
three hundred yards; and the right a mile from us.' He was perfectly correct. . . .

Cramer's Guidebook

The importance of Zadoc Cramer's Navigator to the novice flatboatmen in avoiding hazards was especially well attested to by Flint's accolade of it while still on the Ohio:

We had with us that famous book 'The Navigator,' as it is called . . . The boat . . . soon after . . . gave a violent bounce against a rock on one side . . . Instead of running to the oar, we ran to look in the 'Navigator.'

The Navigator was first printed in 1801 and went through twelve editions. Besides many commentaries about river travel, of which several have already been cited, detailed instructions were given on passing down the Ohio and lower Mississippi. Basically these instructions on the lower Mississippi pointed out dangerous accumulations of snags, and especially reported which side of each island had the better passage.

Cramer determined that there were 125 islands in the

250Ashe, op. cit., p. 104.

251Timothy Flint, Recollections of the Last Ten Years, p. 22.

lower Mississippi, and he numbered them consecutively going downstream from the Ohio. 253 Several of these islands also had names. Little effort was made to rename or renumber the islands after the earliest period, as the river constantly changed. Of Cramer's 125 islands, 77 numbered "islands" still appear as numbered features associated with the present-day river. 254 However, an unusual factor associated with the naming and numbering of the islands of the lower Mississippi is that as the river has naturally shifted or been modified by the engineers in recent times, only seven features that meet the geographic description of islands are presently termed islands on the river. These are Islands Number 6, 8, 34, 63, 82, Montgomery Island, and Profit Island. Of course, there are numerous other islands on the river. Most of these islands still are named as either bars or towheads, while some are neither named nor numbered. Many of these islands no longer fit the classifications by which they were once descriptively named, and today they relate to the bar or towhead that is part of their name only in the generic sense.


On the other hand, practically all the named or numbered islands that still appear on present-day maps have become connected with the mainland and are no longer true islands. For example, Wolf Island is still a named feature along the river. However, it is no longer an island. A feature that is a true island and no longer merely a bar, in the same area of the river, is still named Wolf Island Bar.

The names of former islands on maps, along with various back bayous and cut-off lakes, make it still quite easy to collate the navigation route of Cramer with present conditions. Generally the river has had its least change below Baton Rouge, and the next least amount from the Ohio to about the Missouri-Arkansas state line. The accompanying table (Table II), for example, compares Cramer's directions for passing the first ten islands on the Mississippi with the present situation.

The following examples illustrate the hazards as they marked the Mississippi of 1800, in progressive order below the mouth of the Ohio. The Iron Banks just above Wolf Island (Plate IV) was one of the high prominent bluffs that the Mississippi periodically abuts against along its eastern side. At this point Cramer cautioned that the boat "Must not go too near Iron Banks, there being an eddy near the
### TABLE II

COMPARISON OF A SECTION OF THE CHANNEL OF THE EARLY 1800’S WITH MODERN CONDITIONS

<table>
<thead>
<tr>
<th>Island Number</th>
<th>Side of Island for Main Channel</th>
<th>Cramer</th>
<th>Engineer Maps</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2, 3, 4</td>
<td>West</td>
<td></td>
<td>East—no longer islands</td>
</tr>
<tr>
<td>5 (Wolf)</td>
<td>East</td>
<td></td>
<td>East—but Wolf Island Bar, a new feature has been built up between present channel and old island</td>
</tr>
<tr>
<td>6</td>
<td>East</td>
<td></td>
<td>East—still island today</td>
</tr>
<tr>
<td>7</td>
<td>East</td>
<td></td>
<td>East—no longer island</td>
</tr>
<tr>
<td>8</td>
<td>West</td>
<td></td>
<td>East—still island</td>
</tr>
<tr>
<td></td>
<td>East minor passable channel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>West</td>
<td></td>
<td>West—no longer island</td>
</tr>
<tr>
<td>10</td>
<td>West</td>
<td></td>
<td>East—no longer island</td>
</tr>
</tbody>
</table>

PLATE IV
LOWER MISSISSIPPI RIVER
A short distance beyond Island Number 10, in one of the most distinctive bends of the Mississippi, lies New Madrid. Nuttall gives the following description of the river at this location:

... arrived before noon at New Madrid. We found both sides of the river unusually lined with sunken logs, some stationary and others in motion, and we narrowly avoided several of considerable magnitude.257

Stuart observed: "... there are only three reaches... between the mouth of the Ohio and the Gulf of Mexico,"258 and with this Flagg concurred.259 The first of these reaches occurred about half way down the state of Tennessee. It was called the Canadian Reach and was about ten miles long.260 Interestingly, the reach was later broken up by Ashport Bend, but in modern times this bend has become so straight that a reach occupies what is presently termed Ashport Bend. It is not the rebirth of the Canadian Reach, however, because the Canadian Reach today is a backwater behind Islands 26 and 27.

256 Cramer, op. cit., p. 176.
257 Nuttall, op. cit., p. 77.
258 Stuart, op. cit., p. 387.
259 Flagg, op. cit., p. 111.
For the foot of the Canadian reach Nuttall states:

... the river contracted within a narrow space by a spreading sand-bar (or island), and planted almost across with large and dangerous trunks, some with tops, and others with the roots uppermost, in a perpendicular posture. The water broke upon them with a noise which I had heard distinctly for two miles, like the cascade of a mill-race, in consequence of the velocity of the current; with all our caution to avoid them, the boat grazed on one, which was almost entirely submerged, and we received a terrific jar ... [Several miles further down the river] I counted, in the space of a minute, about 100 huge trees fixed in all postures, nearly across the whole river, so as scarcely to leave room for a passage.261

Cramer has the following comment on this difficult area below the Canadian Reach:

... at the low end a difficult bar in the middle of the river, the pass is difficult, the river being filled with snags.—Best channel on right of the bar 2/3s over from the right shore. This is one of the most dangerous places between New Orleans and the Ohio. It appears that a new sand bar has been formed between Nos. 25 and 26, to avoid which take the right hand side of No. 25, keeping right until you pass 26.262

In this same difficult area is one of the most interestingly named features of the Mississippi. This is Flour Island, which is also Island Number 33. Cuming said it was "so named from the number of flour loaded boats which formerly were

261Nuttall, op. cit., p. 80.
262Cramer, loc. cit.
thrown on it by the current and lost."\textsuperscript{263} The same reason for its name was given by Schultz in his statement that from the "number of boats loaded with flower [sic] that have been wrecked upon it, has acquired the name of the Flower Island."\textsuperscript{264}

The river changed so rapidly that Cramer's guide did not remain always accurate; at Island 34, between the first and second Chickasaw Bluffs, Nuttall illustrated such a discrepancy:

On approaching the 34th island from the mouth of the Ohio . . . we had at first determined to take the left-hand side, set down by the Navigator as the channel . . . It was soon observable, that we drifted towards the right-hand channel, though much the narrowest, and my companion advised that we should keep the left . . . However, on finding still that the current drew to the right . . . I determined, at all events, to keep to the right. At length, after considerable labour, we landed at a neighbouring cabin, and were informed that the left channel had not in places more than 12 inches of water, being nearly dry, and almost destitute of current. Here, again, we made a fortunate escape. We also learnt, that not more than two days ago, a flat boat was sunk by the snags, which filled the right-hand channel of Flour island. We continued our voyage as usual at daylight, and floating with a brisk current down the right side of the 34th island, had nearly cleared ourselves of a host of snags and sawyers, when at last, puzzled on which side of one of these terrific objects to steer, we unfortunately

\textsuperscript{263}Cuming, \textit{op. cit.}, p. 287.

\textsuperscript{264}Schultz, \textit{op. cit.}, II, 109.
struck it with considerable force, and the young man who accompanied us (the son of Mr. G.), an amiable youth of 16, was precipitated headlong into the river, together with the steering oar, which was suddenly jerked off by the snag; our boat was at the same instant careened over so far, as at first to appear overturning, but I instantly had the satisfaction to see that she was free, had received no injury, and that Edwin on this emergency could swim, though much alarmed, had come within our reach, and got safely on board.265

Slightly above Memphis were several vividly named hazardous locations. The Mississippi abutted against the third Chickasaw Bluff and the "river begins to turn to the left . . . until it has formed one of the greatest bends we have yet met with."266 At the beginning of this bend was the Devil's Race-ground. Cuming described the situation as follows:

Rowing into the right hand channel of No. 36, we entered the Devil's Race-ground, as the sound is called between the island and the main, from the number of snags and sawyers in it, and the current setting strongly on the island, which renders it necessary to use the oars with continued exertion, by dint of which we got safely through this dangerous passage of three miles . . . 267

Of the same spot Schultz notes: "... when there is no wind

265Nuttall, op. cit., pp. 82-84.
266Schultz, op. cit., II, 110.
267Cuming, op. cit., p. 289.
to set you to leeward, by prudent management it may be passed
in safety."  

Evans felt that this was one of the two most
dangerous spots on the entire lower river.  

Downstream from the Devil's Race-ground in the same bend of the Missis-
sippi, Schultz described the next hazardous area:

Nine miles from the Devil's Race-ground, we came
to the Devil's Elbow, which is a low point on the
left, round which the river turns suddenly, from
S.W. to S. and from that to E. an island being in
front to the southward, which intercepts the drifts,
and fills the river above half channel over with
snags and sawyers.

Nuttall gives a somewhat different picture of these two
ferociously named passages:

On the 2d, we passed the "Devil's Race-ground," as it
has been very formidably termed, but observed no
obstructions in the river equal to that at Plumb
point, where we saw the wrecked boats. We observe,
however, every day, wrecks of flat boats, drifted
along the shores. We continued to the lower end of
the "Devil's Elbow," and again found the difficulty
greatly exaggerated.

Today a quiet bayou five miles from the river still has the
name Devil's Elbow. Finally, at Memphis the bend returned
to the bluff and was broken into numerous islands which had

269 Estwick Evans, op. cit., p. 301.
270 Cuming, op. cit., p. 290.
271 Nuttall, op. cit., p. 87.
probably the oddest names on the entire river--Paddies Hens and Chickens.\footnote{Cramer, \textit{op. cit.}, p. 180.}

About fifty miles south of Memphis occurred one of the larger bends of the Mississippi. Flint gives this description of "Tunica bend, where you move round a curve of thirty miles, and come back to the point, where you see through the trees, and at the distance of three quarters of a mile, the point, whence you departed."\footnote{Timothy Flint, \textit{A Condensed Geography} . . . p. 101.} This bend remained relatively the same until it was cut off by the engineers in 1942.

A short distance below Greenville at what is now Lake Lee was Picket-Island passage which Evans compared to Devil's Race-ground as one of the two worst spots on the river.\footnote{Estwick Evans, \textit{op. cit.}, p. 301.} At Lake Providence, Louisiana, occurred the second reach, known as Nine Mile Reach;\footnote{Cramer, \textit{op. cit.}, p. 189.} undoubtedly there have been changes, but a reach of about nine miles still appears in the river at this point today.

Generally the river was much less hazardous below Memphis. Collot made the following observation:

\footnotesize
\begin{itemize}
  \item \footnote{Cramer, \textit{op. cit.}, p. 180.}
  \item \footnote{Timothy Flint, \textit{A Condensed Geography} . . . p. 101.}
  \item \footnote{Estwick Evans, \textit{op. cit.}, p. 301.}
  \item \footnote{Cramer, \textit{op. cit.}, p. 189.}
\end{itemize}
From the river of the Arkansas to that of the Yazoo . . . In this distance, excepting two passages, one called the Island a la Tete de Mort and the other the Island aux Chicots, which are encumbered with drift-wood, heaped up sixty feet high, and narrowing the channel, the whole of the navigation is good.276

Schultz notes: "Immediately opposite the mouth of Yazoo River, on each side of the Mississippi, are two very strong eddies, which it is necessary to avoid as they will twist and whirl a boat around like a top."277

Between Vicksburg and Natchez were two of the most renowned and hazardous spots on the Mississippi. Penicaut referred to them as "Le Grand Gouffre" and "Le Petit Gouffre."278 Today the names remain Grand Gulf and Petit Gulf. Grand Gulf is the further upstream and was the greater hazard. Ashe said that Grand Gulf "is by far the most dangerous part of the Mississippi."279 Cuming described the situation as follows:

A quarter of a mile below Big Black, a ridge of hills called the Grand Gulph hills, terminates abruptly at a bluff on the left bank.

__________________________
276Collot, op. cit., II, 43.
277Schultz, op. cit., II, 127.
278Penicaut, in Margry, V, 397.
279Ashe, op. cit., p. 286.
These hills form a barrier which turns the river suddenly from the eastern course it had held for a few miles above, to a S.W. direction, and it is at the same time narrowed by a projecting point on the right, called Trent's point, to about a quarter of a mile wide. The acute angle and the sudden compression of the waters of the river, form what is called the Grand Gulph, immediately below the narrows, making two great eddies, between which the true current runs in so narrow a limit for about half a mile, that some skill and dexterity are necessary to keep a boat in it, and to prevent her being sucked into one or the other eddy, in which case, particularly in that on the left, she will be carried round in a circle of a mile or two, and require the greatest exertions of the oars to extricate her. Delay is the only inconvenience attending the getting engulphed, as there is no whirlpool of sufficient suction to draw down even a skiff. 280

Cramer had the same opinion that there was little danger at this point. 281  Schultz states: "Grand Gulf which is nothing more than two considerable eddies on each side of the river, occasioned by its taking a sudden turn to the right, in consequence of the resistance of a high rocky shore against the current." 282  The Petit Gulf was a repetition of the preceding, with the river abutting against the bluff and forming two strong eddies on either side of the river. 283

280 Cuming, op. cit., pp. 308-309.
282 Schultz, op. cit., II, 129.
283 Ibid., pp. 129-30.
Many travelers commented on the river's improvement once Natchez was passed; for example, Ashe notes: "I had not left Natchez many hours before I found a sensible improvement in the river: the current preserving the centre and the sides free of snags, sawyers, and rocks." Schultz states: "From Natchez the navigation of the Mississippi is much safer than above." Audubon says: "... the river since Natchez is much deeper, and free of Sawers and Snaggs ... " Cuming and Buttrick have the same opinion.

The last great reach was in what is one of the most changed areas of the river today. Ashe depicts the situation as follows:

... espied the Long Reach, where the Eye may take in an uninterrupted Water Prospect of Twenty-three Miles. At our Entrance into the Long Reach we viewed the Red River, about a Quarter of a Mile wide, on the Western Side of the Mississippi, and three Miles below it the Bayoue Chappaliere.

Just how the reach fitted into this part of the river is

---

284 Ashe, op. cit., p. 292.
286 Audubon, America, p. 155.
287 Cuming, op. cit., p. 356; Buttrick, op. cit., p. 61.
288 Pope, op. cit., p. 35.
somewhat hard to visualize. At the earlier time the lower portion of the Old River Bend and the upper part of Raccourci Bend must have had a straight line relationship to each other. These two bends, especially the latter, doubled back in the greatest meander of the Mississippi River. Schultz observed the following:

About five miles below the [Louisiana] line you are shown a narrow neck of land six miles across to the Mississippi again; but to the same place by water . . . it is no less than fifty-two miles.\footnote{289}

This was the location of the famed Portage or Passage of the Cross which eliminated the long detour mentioned in an earlier chapter. Both the bends have since been eliminated. Old River Bend was cut off by Shreve in 1831, and Raccourci Bend was cut off in 1848.\footnote{290}

The Atchafalaya, a distributary which now carries off a third of the Mississippi River's volume, was the last major hazard. Ashe described it as

one of the most dangerous bayeaus on the Mississippi; it is called Chaffalia, and to avoid being sucked into its vortex, it is absolutely necessary to keep the middle of the river, and to row with great force.\footnote{291}

\footnote{289}Schultz, \textit{op. cit.}, II, 153.\footnote{290}U. S. Engineer Corps Map 42.\footnote{291}Ashe, \textit{op. cit.}, p. 294.
Another great bend occurred at Pointe Coupee. Penicaut wrote that D'Iberville had their boats dragged across the neck of this bend to save time, as it was no more than a gunshot wide.²⁹² Generally, however, this bend disappeared before much use of the river was made as it was cut off in 1722.²⁹³ As Brackenridge reported, few problems in navigation were involved in the last miles to New Orleans:

At Pointe Coupee [the Mississippi] assumes a more majestic appearance, and from this point continues a course uninterrupted by islands and sand bars, with a current gradually diminishing.²⁹⁴

²⁹² Penicaut, op. cit., p. 395.
²⁹³ U. S. Engineer Corps Map 44.
²⁹⁴ Brackenridge, Views of Louisiana, p. 42.
CHAPTER IV

SUMMARY AND CONCLUSIONS

The dugout of the Indian was the first boat used on the lower Mississippi River. The French initially used the birchbark canoe when they traveled the Mississippi since they came onto the river from Canada. Soon the French adopted the Indian dugout and also their term for it, pirogue. To supplement the pirogue, the French introduced simple plank boats. Of these, the bateau became the most significant.

As more settlers entered the Mississippi Valley with the expansion of the Anglo-Saxons from the Atlantic coast, the large oblong flatboat became important for onetime downstream use. For the increased upstream trade which resulted from this greater settlement, the keelboat and barge were adopted.

Upstream travel was extremely slow and arduous. A great many techniques based on manpower were used to haul the boats upstream. Poling and cordelling were the two most important techniques. An important physical feature of the Mississippi River, most significant in allowing boats
traveling upstream to avoid the main current much of the time; is its meanders. Various hazards were a great problem in navigating the river; especially when traveling downstream, the worst hazards were the multitude of snags which filled the stream. Other hazards such as caving banks, falling river stage, shallows, eddies, windstorms, and fog were present also.

Before the time of mass production, each individual boat built varied somewhat, and there is some fallacy in strict classification of boats by type, especially as investigation becomes more detailed. However, when reassessing the validity of classification, the four main types of the two eras covered still stand. Research into these boat types is often confused because the same boat can have different names, or else the same name can be applied to different types of boats. One example is the different uses of the terms pirogue and canoe. Another example is the difference between the early meaning of bateau as a French term and the English use for bateau. Study of times past can be made even more difficult because the worker is once removed from the object with which he is actually concerned. It must be allowed that various sources may reveal different statements for the same thing, or the same statement for different things.
Basically this work has been an objective description of the major boat types and how they were navigated on the lower Mississippi River. The origin and spread of these craft to the Mississippi have been determined as well as possible. Also, some minor attention was given to the boats' over-all importance in trade. From these facts the following broad conclusions have been drawn.

The types of boats and the various methods of navigating them on the lower Mississippi River demonstrate an element of man's evolutionary capacity to develop techniques and equipment to dominate the earth upon which he lives. For the development of navigation on the Mississippi this evolutionary progress is usually conceived of as a gradual continuing ability to achieve better methods for traveling the river. Also, this advancement of technique is thought generally to be a succession of locally invented elaborations or sophistications added to basic original simple boat types. In other words, the development from the very limited dominance of the primitive Indians to the massive dominance in the middle twentieth century is a constant addition of invention and improvement from the dugout or bark canoe to the diesel towboat. Closer examination shows that these general notions must be modified.
Instead of a gradual growth there are long periods of nearly static use of accepted boats and techniques before some new introduction or innovation causes a rather rapid growth to new methods. The development is one of stair-step advancement rather than a gradual curve. The shift from native dugout to the modified pirogue and bateau of the French, and later from the pirogue and bateau to the flatboat and keelboat is an example. An even more dramatic example is the change which occurred following the period covered by this study when the flatboat and keelboat gave way to the steamboat.

The sequence of boats used on the Mississippi before the coming of the steamboat appears evolutionary, but actually it is a sequence of boats adopted from other areas which successfully fitted the conditions of the Mississippi. Some boats were rejected; the canot and chaloupe, for example, had only a small amount of use because they were small ocean craft with hull shapes not well suited for the river. Various bateaux, introduced directly from France, served better. The most successful introduction was the bateau developed on the St. Lawrence. This boat was a modification of existing European types to fit the rapid rock-filled streams of the North. Once it had spread by waterway and
portage and was introduced on the Mississippi River, it served very well.

Later, along the east coast the bateau evolved into the Durham boat. The Durham boat when introduced onto the Ohio became the keelboat. Part of the evolutionary development of the keelboat did occur on the Mississippi River system when a closed cabin and external keel were added. The barge was a boat similar to the keelboat but larger in size. However, the barge did not derive from the keelboat at all. It was an earlier introduction to the lower Mississippi directly from France. These two similar boats with completely different routes of introduction from original European designs are an excellent example of convergent evolution.

Within a cultural system man will develop tools and techniques that appear logical to his total outlook. To be sure, in the development of navigation on the lower Mississippi River, taste and the over-all resistance of culture to change are a part of this outlook. Transportation, however, especially in America, has been much concerned with practical benefits. Cultural distinctiveness prevails, but almost never at the cost of sound nautical lines. That is, the main concern in choosing boats has been to travel the route
easiest with the type that is either fastest or can carry the most freight at the cheapest rate. Also, the materials to build the craft must be common and available.

In the practical development of tools and techniques to dominate the earth, man is concerned generally in coping with particular aspects of nature. In the case of this study, these were the particular characteristics of the Mississippi River. The system that will produce the over-all most favorable results, barring cultural distaste or tabu, will prevail eventually. An example of this principle is the choice of the dugout over the birchbark canoe by the French. The birchbark canoe had won out as the best vehicle of travel in the first areas settled by the French, and its use was continued in the first explorations of the Mississippi. There is no doubt that the birchbark canoe is a better boat type to use on the river than the dugout or pirogue. However, without local birch trees for bark to make new boats and even more important, without birchbark and pine gum to make the constant repairs necessary to maintain a birchbark canoe, it became impractical to use. The pirogue had no maintenance problem and was built of local timber; therefore, it became the more practical choice. Another example is the choice of the bateau. With flat bottom, fairly narrow beam, and
pointed ends, this boat handled very well in the current. Still another example is the keelboat which was similar to the bateau but had an added external keel which made it more maneuverable in traveling against the current. The use of the huge awkward flatboat solely as a downstream craft again is an example of an introduction of a boat type best suited to meet a particular situation.

As new methods develop, older techniques continue as marginal survivors in smaller areas where they still have special value, or where there is simply cultural resistance to change. The pirogue, which lasted into the twentieth century on the bayous of Louisiana, is an excellent example of cultural tenacity. The bateau found a lesser amount of use well into the steamboat period because it could navigate the smaller tributaries. The keelboat had this same marginal survival. Also, the keelboat found a continued special use operating during low water, or at especially hazardous spots, such as the rapids at Louisville, on the main rivers. Marginal survival had an important frontier significance. The bateau and keelboat continued longer on the Missouri River; they lingered still later in Canada, and were used on the Yukon into the first few decades of the twentieth century.

The upstream navigation of the keelboat represents
almost a perfection of techniques within the particular cultural framework of a non-motorized civilization. Every technique that seemed possible in aiding the boat along against the current was used. Each of the various techniques --rowing, poling, cordelling, warping, bushwhacking, sailing, and drifting with an eddy--had special conditions in which they best fitted. A significant plateau of equilibrium between development of navigation and the natural river had been reached by the end of the flatboat and keelboat era. This equilibrium could have been broken only by some dramatic introduction. The invention of the steamboat and the improvement of the river channel by the removal of snags provided this dramatic break.

In one closing statement, the theme of the geography of pre-steamboat navigation on the lower Mississippi River might be summed up as the origin, development, and description of the major boat types, how they were navigated, and the hazards that confronted them. As a final comment, might the writer be excused this one flight of fancy? What has occurred is now history, but it would indeed be pleasant to be able to round a river bend and once more see the keelboat-men bent to their poles, or hear how a boatman's horn really sounds through an early morning fog.
BIBLIOGRAPHY

COMPILATIONS CONTAINING SOURCE MATERIAL


**SOURCES**


Bossu, Jean Bernard. **Nouveaux voyages dans l'Amérique Septentrionale** ... Amsterdam: Chez Changuoin, 1777. Pp. xvi + 392.

______. **Travels Through that part of North America Formerly Called Louisiane.** Translated by John Reinhold Forster. London: T. Davies, 1771. 2 Vols.


Dewees, Mrs. Mary. "Mrs. Mary Dewees's Journal from Philadelphia to Kentucky, 1787-1788," *Pennsylvania Magazine Historical Biography,* XXVIII (1904), 182-98.


________. *Premier Établissements de la Foy dans la Nouvelle France.* Paris: Chretien le Clereq, compiler, 1691, in *Shea, Discovery and Exploration of the Mississippi Valley*, pp. 147-63.


______. "Relation de Henri de Tonty, Enterprises de M. de La Salle, de 1678 a 1683," in Margry, Découvertes, I, 573-616.


SECONDARY SOURCES


VITA

John Amos Johnson was born September 11, 1929, in Shreveport, Louisiana. From 1930 until 1939 he lived in St. Louis, Missouri; from 1940 to 1942 in Memphis, Tennessee. During World War II, he moved with his father, Leslie Leroy Johnson, who was on military duty, to South Dakota, Kansas, Nebraska, and Wyoming, attending five different high schools. Seeing a large segment of the country at this age, along with Boy Scout activities in the western mountains, stimulated a strong geographic interest. Returning to Memphis, he graduated from Messick High in 1947. He entered Memphis State University in 1947, and received a B.S. degree with a major in geography in 1951. He entered the University of Tennessee in 1952, and received an M.A. in geography in 1953. From 1953 to 1955 he was a private in the United States Army, stationed in Germany, and traveled throughout Europe. In 1955-56 he worked for the United States Air Force at Gadsden, Alabama. In the fall of 1956 he entered Louisiana State University and completed course work for the Ph.D. program in geography in 1958. From 1958 to 1959 he was a part-time instructor on the Baton Rouge campus. From 1959 to 1962 he was an instructor on the branch campus at New Orleans. In
August, 1963, he received his Ph.D. in geography from Louisiana State University, and in September began work as an assistant professor at Oregon State University.
EXAMINATION AND THESIS REPORT

Candidate: John Amos Johnson
Major Field: Geography
Title of Thesis: Pre-Steamboat Navigation on the Lower Mississippi

Approved:

[Signatures of committee members]

Dean of the Graduate School

EXAMINING COMMITTEE:

[Signatures of committee members]

Date of Examination: May 28, 1963