



High Seas to High Shoals

THE 2003 NORTH CAROLINA HUMANITIES COUNCIL ESSAYS

Edited by
Barbara H. Brose and David S. Brose

Digitized by the Internet Archive
in 2012 with funding from
University of North Carolina at Chapel Hill



<http://archive.org/details/highseastohighsh00bros>

High Seas to High Shoals

THE 2003 NORTH CAROLINA HUMANITIES COUNCIL ESSAYS

Edited by
Barbara H. Brose and David S. Brose



Schiele Museum
Gaston County Museum
Gastonia and Dallas, North Carolina

Cover: Collage by Dave Shurbutt. The image of Charles Wilkes as a young man is from the Thomas Sully painting, and is used through the courtesy of the US Naval Academy Museum. The figure placed in the background is King Kamehameha III, ruler of Hawaii in 1840. The ship is a sloop of war such as Wilkes' Exploring Expedition flagship the *Vincennes*. The Smithsonian building was designed by Wilkes' nephew, James Renwick. Its first public exhibition featured ExEx artifacts and specimens. The parrots were drawn by T.R. Peale for the Expedition's *Ornithology and Mammalogy Atlas*. From 1848-1853 Charles Wilkes ran the family's St. Catherine's gold mine in Charlotte NC. The coin was minted with gold from Wilkes' mine.

Title Page: Ship and compass logo by Dave Shurbutt

Footer: *Narrative*, Volume I

Copyright ©
2004

Trustees of the Schiele Museum of Natural History, Inc.
1500 East Garrison Boulevard
Gastonia, North Carolina 28054

ISBN 0-9712913-6-5

Printed in USA
International Minute Press
Charlotte, North Carolina

High Seas to High Shoals

Exhibition, Concert, Programs, and Publications
Made possible through the generous support of the following:

Akers Foundation

American Composers Forum

American Schlafhorst Foundation

City of Gastonia

County of Gaston

David and Barbara Brose

Earl Tyndol Ford

Gaston County Department of Travel and Tourism

Gaston County Museum Board of Trustees

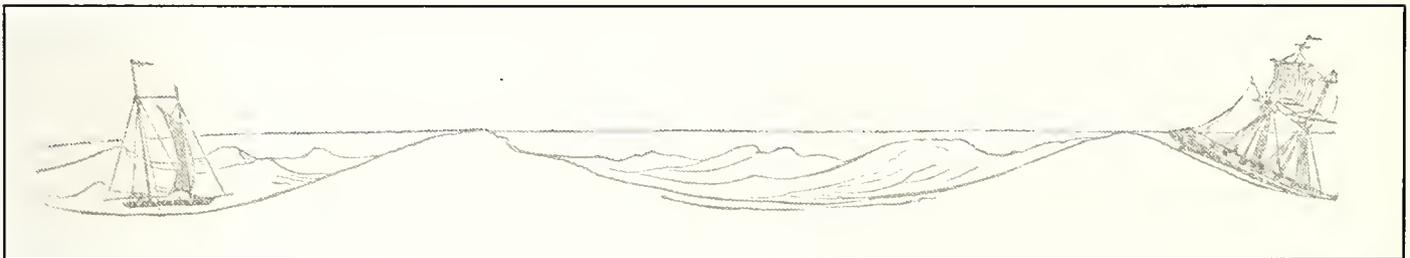
Museum Loan Network

North Carolina Arts Council

North Carolina Grassroots Science Museums Collaborative

North Carolina Humanities Council

Schiele Museum Board of Trustees



Contents

Introduction	9
Discovering Charles Wilkes in the Carolinas and Washington DC	11
The U.S. Navy and the U.S. Exploring Expedition	17
American Science in the Age of Sail	21
The Artistics	31
The Art of the South Pacific Islands, Material Culture in Ritual and Daily Life	37
Leaders of Industry and Reconstruction in the Southern Piedmont	41
Charles Wilkes & the 1842 – 1875 High Shoals Iron Manufacturing Company	47
References	51

High Seas to High Shoals



Charles M. ...

High Seas to High Shoals

Introduction

All during 2003, the Schiele Museum and the Gaston County Museum presented *High Seas to High Shoals*. This year-long joint exhibition was created by the local museums featuring great works of art, historic artifacts, and rare scientific specimens borrowed from the Smithsonian and other major American museums.

High Seas to High Shoals presented many opportunities to offer special programs linking the international context of the exhibit with humanities themes. Over the course of the year, with the generous support of the North Carolina Humanities Council, acknowledged scholars and researchers presented a series of free scholarly lectures and discussions. Published through generous support of the Akers Foundation, this book presents to the reader the topics covered in the joint-exhibitions and the lecture/discussion series.

The series opened at the Schiele Museum in March. Daniel Barefoot, former member of the North Carolina Legislature, author, and noted local historian, inaugurated the lecture series. He profiled local industrial and economic leadership during federal Reconstruction in his talk, *Leaders of Industry and Reconstruction in the Southern Piedmont*.

In April Dr. Timothy Runyan, Professor of Maritime History, East Carolina University discussed the role of the nineteenth century navy in shaping American culture as it expanded American influence and interest through sea power. His talk, titled *Confederate Raiders and Yankee Whalers in the South Pacific*, illuminated both federal and Confederate Navy actions across the globe.

Next, Dr. Lily Bezner, Associate Professor of Art, University of North Carolina-Charlotte, presented a lavishly illustrated talk, *Seeing the World's Wonders: Titian Ramsay Peale and the Art of Nature* in May. Placing the work of T.R. Peale and his colleagues in the tradition of Catesby and Audubon, as well as the luminaries of the Hudson River Valley school, Dr. Bezner placed "natural history art" and the art of the great Exploring Expedition of 1838-1842 in its historical perspective as "art for art's sake." In her May presentation she also discussed the political and financial factors involved in promotion of artistic styles in the 18th and 19th centuries; and (to the audience's delight) she demonstrated the optical technology that aided the perspective and realism of landscape painting.

Gaston County Museum's Director, Barbara Brose, presented *Finding Charles Wilkes in Washington, DC. and North Carolina*. She described the serendipity and historical sleuthing that made known Gaston County NC as the home of a world-famous explorer and Civil War figure to the two local museums. She described the vast numbers of documents and letters that revealed how Charles Wilkes was able to give American science international credibility; his financial failures; and his family legacy of local philanthropy; and she described how the many archives, museums, and libraries that are repositories of these works continue to recognize and promote his legacy.

High Seas to High Shoals

After a summer break, the series resumed with *American Science in the Age of Sail* presented by Dr. David Brose, Director, Schiele Museum of Natural History. Dr. Brose's synoptic illustration of *ante-bellum* scientific instruments complemented a discussion of the vicissitudes Wilkes encountered in his efforts to have the scientific results of the expedition promulgated and preserved. Dr. Brose highlighted how the development of the natural and social sciences during the ante-bellum period structured the purposes and methods of Wilkes' 1838-1842 Exploring Expedition; and he also discussed changing technology and the growth of academic research after the Civil War.

Cheryl Moore, Assistant Professor of Anthropology, Gaston College, presented *The Art of the South Pacific Islands, Material Culture in Ritual and Daily Life*. Professor Moore described the Polynesian societies visited by Charles Wilkes, and she provided an exciting demonstration of how those various cultures made and decorated tapa, their beaten mulberry bark cloth. Members of the audience were able to examine the artifacts and raw materials that Professor Moore provided to enhance their understanding of traditional crafts and the historical relationships between economy, technology, and cultural patterning.

The final lecture/discussion series presentation took place in conjunction with a tour of the iron-working sites which Charles Wilkes had once operated. Dr. J. Alan May, Curator of Archaeology at the Schiele Museum, presented *Historical Archaeology of the Nineteenth Century Southern Piedmont* in which he discussed the results and interpretation of recent investigations of the early iron manufacturing industry in the region, specifically focusing on the High Shoals Iron Works and Charles Wilkes. Dr. May provided an opportunity for hands-on examination of artifacts from excavations at Madison Furnace, along with discussion of the human, political, and environmental aspects of iron production.

During this period, the Robinson-Spangler Special Collections Room of the Public Library of Charlotte/Mecklenburg County also participated in the project by exhibiting a series of posters, historical documents and memorabilia under the title *From Outcast to Social Elite: Wilkes Family Records in the Carolinas*. At the University of North Carolina-Charlotte Library, the *Wilkes Family Papers* were displayed. Later directors Barbara Brose and David Brose were invited to speak on *High Seas to High Shoals* at the US Botanic Garden in Washington DC (April, 2004), and they have been asked to expand on their research at the *Maritime Heritage Conference* at Norfolk VA (October 2004).

The original presentation of the following essays reflected the schedules of the speakers. In this publication, however the essays are presented in an order that -- in the absence of the exhibits -- the editors believe flows most comfortably from topic to topic.

Discovering Charles Wilkes in the Carolinas and Washington DC

Barbara Brose

The *High Seas to High Shoals* exhibitions at Gaston County Museum and the Schiele Museum presented to the public information and related original objects and artifacts from the Smithsonian's Core Collections, as well as scientific instruments, works of art and historic artifacts from the Peabody Essex Museum, the American Museum of Natural History, the National Museum of American History, the Naval Historical Center, and from the host museums' collections.

The inspiration for the exhibit came by serendipity. Prior to relocating to Gaston County, the (future) directors of the two museums first encountered Charles Wilkes in the Spring of 1985. Following an elegant lunch and the opening of *Ancient Art of the American Woodland Indians* at the National Gallery of Art in Washington DC, visiting dignitaries were invited down the National Mall to attend another reception, this one a 75th anniversary party at the National Museum of Natural History.

At the NMNH, the signature exhibition -- *Magnificent Voyagers* -- featured Charles Wilkes and the great Exploring Expedition of 1838-1842. All of us were astounded by the accomplishments of both Wilkes and the “scientifics” who accompanied him. During ensuing years we would discover that almost every curator, designer, and researcher who knew of them was equally fascinated. And sometimes exasperated! Clearly, Wilkes is not an easy hero. As we soon discovered, he was autocratic, stubborn, difficult, devout, and brilliant.

The exhibit catalog was added to our library, and traveled with us as we moved from Ohio to Toronto, Canada, and then to Gastonia NC. One day, shortly after moving to Gastonia, while unpacking books we discovered that like us, Charles Wilkes had once moved to Gaston County. We wondered why, especially as this is a place where “you’re not from here” is a constant refrain.

Answering that question has taken us and our some of our museums’ staff into back rooms and collections at the National Museum of American History, the Navy Yard, the Peabody Essex Museum, six different departments at the National Museum of Natural History, the American Museum of Natural History, the University of North Carolina-Charlotte Library, and the Public Library of Charlotte/Mecklenburg County. It has resulted in acquaintance with Wilkes experts such as Herman Viola and Jane Walsh, and with exhibits mastermind Carolyn Margolis. It has led to the delightfully helpful Barbara Bair at the Library of Congress, and to all the excellent staff at the Dibner Library and Smithsonian Archives – where we first held an actual ExEx artifact!

The thrill of “discovering” an un-catalogued Titian Ramsey Peale folio in the American Museum of Natural History collections will never be forgotten. Nor will the sheer numbers and variety of birds we viewed in the NMNH collections, all with the original hand-written ExEx labels still attached to their legs. Or the day Richard Vari entered ichthyology’s collections of 500,000 jars of

preserved fish and walked directly to an ExEx specimen! There isn't enough room to thank the dozens of wonderful people who worked with us and helped with our discovery.

Thanks to the incredible foresight and dedication of Charles Wilkes himself, and the continuing care and attention of scores of researchers, collections technicians, scholars, curators, and the donors and funding agencies who make their work possible, these incredible collections are still illuminating the world we live in and inspiring new discoveries.

Why We Remember

He collected thousands of artifacts and objects for science, discovered a continent, drew maps of the South Pacific, and helped open the Pacific northwest! Yet most of us have never heard of Charles Wilkes. For the first time, the complete story of Rear Admiral Charles Wilkes was presented in special year-long exhibits at both Gaston County Museum and the Schiele. Great works of art, historic artifacts and rare scientific specimens on loan from the Smithsonian and other major American museums, helped tell the story of Wilkes from his early days gold-mining in Charlotte, sailing around the world for exploration, Civil War exploits, and final years in Gaston County.

Gold

Charles Wilkes' connection to the Carolinas begins in the early 1840s. Owners of the McComb mine in Charlotte discover they are running an unprofitable gold-mining operation, and call on "absent minded" professor James Renwick to help remedy the situation. Hired as a consultant, James brings the gold mines of the North Carolina piedmont to the attention of his father William, a New York banker. Between 1835 and 1842 William invests in the gold-mining ventures. After William's death in 1842, the Renwicks ask son-in-law Charles Wilkes to run the mining operations. Wilkes, has just returned from an epic around-the-world sailing expedition

In Charlotte Charles is in and out of courts as he consolidates and pays off claims of all his father-in-laws' partners. He is often accompanied by his son John. At the same time Charles is writing his *Narrative* of the Exploring Expedition, and organizing the objects and artifacts collected by the ExEx to put together a national museum. It is a happy and busy time -- until the death of Charles' beloved wife, Jane.

The Great ExEx

Charles' great contribution to modern science began much earlier. He is brilliant, difficult, and ambitious. His love of the sea, and of discovery and navigation make him an eager candidate for command of America's first international Exploring Expedition (the ExEx). Its six ships set sail in 1838 with Charles in command. The journey will take four years, and will cover over 87,000 miles.

"Instructions" from the Navy Department emphasize the importance of the ExEx's charting and mapping. In addition to seeking scientific information, the ExEx is expected to seek safe harbors

for the American whaling fleet, and to secure treaties assuring access to those harbors. This is a period of increasing energy consumption, and whale oil is the energy of choice. Many American whalers have left the depleted waters of the Atlantic, for richer prospects in the Pacific. One hundred years later, (WWII) Wilkes' zeal in carrying out his assignments will continue to provide the Navy with some of its best information about many of the oceans, islands, and reefs of the South Pacific.

His zeal will also provide the Smithsonian's National Herbarium and the National Museum of Natural History with some of their Core Collections. Thousands of specimens are collected by the ExEx "Scientifics" and "Artistics." They collect carved pipes; clubs and boxes; study skins; feather capes; musical instruments; tools and cooking ware; masks; mats and jewelry. (Much later, the world's view of such objects changes. By the 1920s artists such as Brancusi, Picasso, and Giacometti become fascinated with "primitive art" and bring it to the attention of the modern art world.)

The men of the ExEx identify 600 new species of plants and ship back 1300 specimens for the herbarium. They also collect, record, and ship back thousands of birds, fish, mammals, reptiles, and invertebrates, including many of the first specimens of coral, seashells, and deep sea creatures ever seen by Americans. Any object that strikes someone's fancy or is considered a "curiosity" is packed up and shipped home.

In the 30 years after their return, the "Scientifics" complete illustrations and descriptions that document ExEx discoveries. They are published in a series of over 20 volumes, many of which are edited by Wilkes. James D. Dana, the ExEx mineralogist, publishes reports which demonstrate that many ancient fossils from South American and Australia are identical. In addition, he documents the formation of volcanic island arcs and coral atolls. In the 1970s Dana's data will be used by scientists working on theories of plate tectonics. And 100 years after he publishes his theories, the work of the ExEx's linguist Horatio Hale will be proved by archaeologists fascinated by his theories of Polynesian migrations (based on his study of their languages).

For years American and European navies had wondered if there was a southern continent. During the ExEx's first attempt to find out, the tender *Sea-Gull* is lost and all aboard perish in a furious gale. But two years later, the honor of discovering Antarctica will be won by the ExEx's sloop of war *Peacock*. Wilkes' efforts have placed America in the vanguard of international science. He is awarded the *Founders Medal* by the Royal Geographic Society, and eventually the shores of Antarctica are named *Wilkes Land* in his honor.

Wilkes maintains strict discipline, and some of his men begin to resent his methods and question his leadership. When they arrive home in 1842, several of the company press charges. Wilkes appears before his first Court Martial. He is found guilty of one of eleven charges and sentenced to a public reprimand by the Secretary of the Navy.

Civil War Years

The secession of seven southern states in early 1861 prompts a series of informal dealings regarding the disposition of federal forts and facilities located within the Confederacy. However, before the ships at Norfolk can be removed to Baltimore, the state of Virginia joins the Confederacy – along with every ship's officer in Norfolk.

US Navy Captain Charles Wilkes, serving with Admiral DuPont's squadron, is sent to sail the ships to safety. He arrives to find the ships being deliberately sunk into the yard's muddy bottom. DuPont orders Wilkes to burn the ships, and blow-up the yard's stone dry-dock; but only the ships' sails and rigging catch fire, and the Virginia militia seizes town, yard, and dry-dock. By the Spring of 1862 the Confederacy abandons the blockaded Navy Yard; and its ordnance-making machinery is shipped by rail to Charlotte NC. There the new Confederate Navy Yard is supervised by former mining engineer and naval officer, John Wilkes. He is Charles Wilkes' eldest son.

In the summer of 1861, now-Commander Charles Wilkes' South Atlantic squadron, cruising between the Caribbean and West Africa, learns that Confederate emissaries to Great Britain are passengers on the British mail packet the *Trent*. Wilkes fires shots over the *Trent*, and has emissaries James Mason and John Slidell and their wives removed to the *San Jacinto*. Although many proclaim him a hero, Wilkes soon discovers that fear of war with Great Britain has propelled the federal government and Navy Secretary Welles into repudiating his actions. Mason and Slidell are released, and Great Britain remains officially neutral.

Wilkes, sometimes gallant and ever-confident, is the cause of several international incidents during the Civil War. As Confederate raiders -- built in British yards -- regularly capture and sink Union merchant ships, Secretary of the Navy Gideon Welles and Wilkes engage in continuing disagreement over Wilkes' prosecution of his orders in regard to Britain's "neutrality." Wilkes' letter in a New York paper, criticizing Welles, finally results in Wilkes' Court Martial and retirement from active duty in 1864.

High Shoals

In 1866, Charles Wilkes moves back to North Carolina to property at High Shoals. Anticipating construction of a railroad across his High Shoals Iron Company property, he invests in a complex series of business partnership, based on mills, mines, lumber, and a farm, spread over 14,000 acres. With millions of dollars at stake, Wilkes is no match for the duties of management or for his many scheming partners. In spite of high hopes and great ambition -- and often acting against his son's business advice -- his entrepreneurial efforts fail.

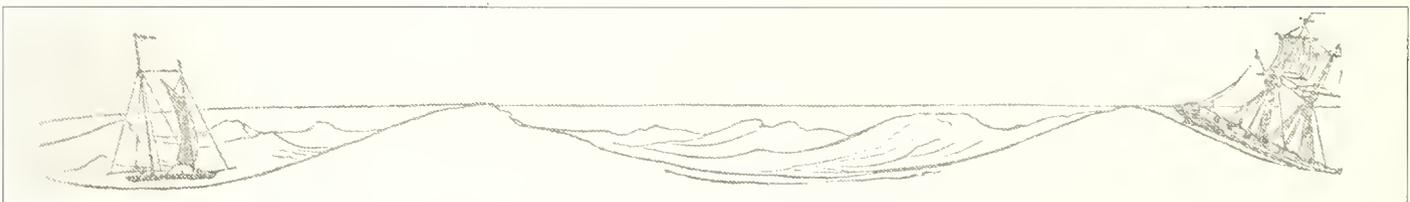
From the beginning he is unable to repay his loans. In the Wilkes family papers, preserved at the Library of Congress, one finds an array of dismaying warrants, deeds, and foreclosure threats. And in Gaston County, Deed Book #5 lists outstanding debts in 1873 in the amounts of \$30,000, \$4,000, and \$25,000 – all due in sixty days!

By the end, Wilkes is able to sign over only the High Shoals house and contents to his wife and adult daughters before he and Mrs. Wilkes move back to Washington DC.

The High Shoals site is now an archaeological site, and Charles Wilkes' public legacy in Gaston County is a scale model of the *USS Peacock* -- the ship that discovered Antarctica -- displayed at Gaston County Museum, and the large painting created for *Magnificent Voyagers* loaned to the museum and displayed at the Gaston County Courthouse.



The 7' x 10' painting exhibited in the lobby of the Gaston County Courthouse depicts Charles Wilkes, leader of America's first international scientific expedition. Artifacts and specimens collected by the Exploring Expedition are shown being unpacked and inventoried. The setting is the US Patent Office in 1849. The painting was created in 1985 by artist Hugh McKay for the Smithsonian Institution. The painting is on loan to the Gaston County Museum.



The U.S. Navy and the U.S. Exploring Expedition

Timothy Runyan, Ph.D.

A *New York Times* reporter asked in 1860, “American Science: is there such a thing?” The answer was “yes.” The point made was that scientific research is influenced by national concerns and that America contributed to world science. European science played a major role in forming American science but national identity did not favor collaboration. Though popular scientists such as Franklin achieved international recognition, America was not a major contributor to research. This changed with Lt. Charles Wilkes’ small fleet from Norfolk, Virginia: the U.S. Exploring Expedition.

Wilkes (1798-1877) determined at age fifteen to seek a career in the U.S. Navy. At the time he was preparing for entry into Columbia College in New York City. His father, a successful businessman, opposed this decision. Young Charles pressed the issue, doubtless aided by strong national feelings: the War of 1812 was sparked by the British interception of American ships to seize British “citizens.” This second war for American independence aroused patriotic emotions. Wilkes’ father relented and found him a place on the merchant vessel *Hibernia* to gain experience to help qualify him for a naval appointment. Young Charles survived the tough conditions to rise from ship’s boy to second mate by age seventeen. His father’s influence helped secure him an appointment as midshipman in the U.S. Navy. Assigned to the *Guerriere*, he cruised to Europe and Africa where he contracted malaria. During his recuperation, he studied science and mathematics in New York. In 1821 he joined the *Franklin* for a cruise to South America. He met the famous liberator of Latin America, General Simon Bolivar, while in Ecuador. On the voyage home, he was master of a merchant vessel from Chile to New York.

Once ashore, Wilkes returned to New York, and in 1826 he married Jane Renwick. His promotion to lieutenant followed the wedding by a few days and provided a source of income. But during peacetime in the America navy, it was customary to be ashore on leave and awaiting orders. The next years were spent studying hydrography, cartography, surveying and related maritime matters.

Opportunity for Wilkes to use his experience and scientific knowledge appeared in a proposal for an oceanic exploring expedition approved by Congress in 1828 (he signed up but the project stalled until 1836). With his skill in navigation and geodesy (measuring the size and shape of the earth and its magnetic field) Wilkes was sent Washington, DC, and put in charge of the Department of Charts and Instruments (today’s Navy Oceanographic Office) and helped create the observatory that later became the National Observatory. His special attention to testing chronometers was important to keep accurate time aboard ships to calculate longitude.

Wilkes was assigned to purchase instruments for the U.S. Exploring Expedition and traveled to Europe to meet leading instrument makers and scientists. When support in Congress again lagged, the expedition was shelved and Wilkes went on a surveying expedition at sea and when the project regained support, Wilkes was given command after ranking officers refused the assignment.

What was important to the U.S. Navy, were opportunities scientific investigations could offer shore-bound officers and if the navy was involved, it expected to control the enterprise. Since many of the leading scientists in America were civilians, under what terms could they be involved? Should federal sponsorship of astronomy, meteorology, natural sciences and hydrography be controlled by the navy? These questions dominated federally sponsored science before the Civil War.

The fledgling scientific community did not consider the Navy or Army sympathetic to a quest for scientific knowledge. The army was often more accommodating than the navy, permitting the collection of data on various military operations. One civilian scientist stated that the only good that came out of the Mexican War of 1846-48 was the benefit it did to botany. Many new plant species were collected, during the conflict and following the annexation of territory. The army was interested in occupation of the land and science could be of assistance. The navy focused on the benefits of science to maritime commerce and the whaling industry. Only oceanography was of immediate relevance but the navy raised America's position in the world of science although, ironically, few naval officers had formal scientific training.

Charles Wilkes was representative of the thinking that gave the navy dominance in ocean science at the expense of civilians. To his credit, Wilkes invited civilian scientists to participate in the *ExEx* he commanded from 1838-42. Their accounts record the abuse they received at sea where naval officers treated them as idlers of little account. Pure science and the careful attention to data collection were not revered by pragmatic naval men.

The navy's interest in practical sciences was complemented by the shipping industry. The American merchant marine quadrupled between 1815 and 1860, but could not keep up with the demands of trade. Better navigational and meteorological information could save time, generate profits, and promote safety at sea. To address this issue The U.S. Coast Survey was founded in 1807 as the first scientific agency of the federal government. President Thomas Jefferson appointed the Swiss civilian Ferdinand Rudolph Hassler as director. But Congress intervened in 1818, placing the Coast Survey under the U.S. Navy; a setback for American Science as was the failure to fund a national observatory. Civilian leadership in the Coast Survey came after 1843 when Alexander Dallas Bache was appointed superintendent. He feuded with Lt. Matthew F. Maury, then head of the Department of Charts and Instruments and of the National Observatory (completed in 1844 under the direction of Lt. James Gilliss). Maury continued to push for Navy control of federal science. He authored the practical *Wind and Current Charts* in 1847 based on ships' logs and in 1855, published the hugely popular *The Physical Geography of the Sea*. The scientific community's criticism of the book did not diminish its sales.

The U.S. Navy was more a "school of hard knocks" than a community of scholars for scientists. Naval officers challenged each other for control of agencies and projects, using service, business and political connections to gain appointments or awards. Wilkes and Maury quarreled over

appointments or favors throughout their careers but both made important contributions in this competitive Navy environment.

Lt. Charles Wilkes led America's first scientific expedition by sea. The 1838-1842 *Ex Ex* acquired the great collections that became the core of the Smithsonian Institution when it was created in 1846. After lengthy delays, thirteen large volumes of reports were printed by a Joint Library Committee of Congress. These were initially limited to one hundred copies of each volume but they won America the respect of Europe science and the Navy claimed credit for the accomplishment.

Wilkes' reputation includes his 1840 discovery of Antarctica. Facing heavy ice and poor weather, he pushed his weary crews along 1500 miles of what is known as Wilkes Land. His painting of the lead vessel *Vincennes* is a visual testament to his accomplishments as a sailor and artist. His return across the Pacific in 1841 ended with a comprehensive survey of America's northwest coast. The expedition returned home by rounding Africa, arriving in New York in June of 1842.

The U.S. Exploring Expedition Surveys proved of great value to an expanding America. The charts and surveys completed by Wilkes helped open the Pacific waters of North America. Other naval expeditions followed, including Commodore Matthew Perry's 1852-1855 expedition that succeeded in opening Japan to trade: Science continued to be a minor part, of naval expeditions and Perry recruited scientists and published a three-volume report of his voyage. But America's interests changed in 1861 when officers who sailed together as Americans chose sides in the Civil War. . The age of steam-powered vessels sheathed in iron and armed with more powerful cannon arrived when the USS *Monitor* faced the CSS *Virginia* at Hampton Roads in 1862. And once the drums stopped in 1865, the U.S. Navy was dramatically altered not only in leadership and purpose, but in mission.

What did nineteenth century Americans think about these seagoing scientific expeditions? Americans looked for the practical applications of scientific discoveries. Congress funded the Wilkes expedition and successive ones, but these expeditions had multiple purposes. Wilkes collected scientific data and took civilian scientists in his fleet but he was charged to negotiate diplomatic treaties and explore opportunities for American economic development. Business interests in Congress pressed for economic opportunities, especially for the whaling industry in the Pacific. Later expeditions often carried no civilians, restricting science to naval officers for whom surveying and charting for navigational purposes was the major focus.

But Americans were also impressed with the novelty of foreign peoples and places, and reveled at their public display. Wilkes attempted to bring home to America Vendovi, a Fiji chieftan, who admitted killing ten American sailors in 1834. He was kept prisoner aboard ship for two years, but died soon after arrival in New York. He would doubtless have made a popular spectacle as a living artifact recovered by the expedition. This loss was unfortunate for Wilkes because the spotlight

was diverted from the achievements of their heroic four-year voyage by several courts martial. Wilkes was charged by junior officers for numerous offenses during the expedition but all save one charge was dismissed save one – that he ordered more lashes to crewmen than allowed by navy regulations.

The immediate beneficiaries of the ExEx were American whalers in the Pacific. So profitable was this industry that the voyage from New England around Cape Horn was worth the effort of the men and the price of their ships. Whalers ranged from Micronesia to Alaska to find whales whose oil brought high prices. During the Civil War, the South suffered from restrictions imposed by the Northern blockade. Southern cotton could not be exported to England or English rifle imported to Virginia unless Confederate vessels could pass the blockading fleet. To press the Union to lift the blockade, the armed steamship *CSS Shenandoah* was secretly sent to the Pacific to destroy unarmed northern whaling ships. In the first nine months of 1865 she arrested or destroyed 24 whalers, 14 merchant vessels, and took over 1,000 prisoners. But the blockade held and the Confederacy surrendered (although the captain of the *Shenandoah*, claiming he had not received news of surrender, continued to attack merchant shipping and later sought asylum in England).



The *CSS Shenandoah*

American Science in the Age of Sail

David S. Brose, Ph.D.

Introduction and Definitions

This paper will put Wilkes' Expedition, its causes and its results, on a broad national stage. For this paper, the American Age of Sail begins in 1783 with recognition of the independent United States (called America by nearly everyone, then and now). And while both sides in the Civil War used ships still carrying sails, the Age of Sail ended with the steam-powered U.S.S. Monitor, launched in 1861 with never a yard or sail (Bradford *n.d.*). Between these years (largely during the life of Charles Wilkes: 1798 – 1877), America and science both changed profoundly (Poole 1999; Pursell 1995).

Much science done in America during the 18th and early 19th centuries was done by Europeans (Catesby, Kalm, the Bartrams, *et al.*) Learned journals of London, Paris, Berlin, Geneva, Edinburgh and Stockholm are filled with their reports. Few of these colonists would have called themselves scientist, and many did not think of themselves as American: Benjamin Franklin conducted his experiments, made inventions and wrote all of his “scientific” papers before the Revolution, so American science too, is post-1783.

The Economic Background 1783-1861

Agriculture and commerce were the sources of economic growth in the 13 (of 16) English North American colonies that would form the United States (Kornblith 1998). By mid-19th century the northern states were developing a market economy marked by inter-regional dependence. Between 1815 and 1825 canals opened the trans-Appalachian region whose population in 1815 was barely 1,000,000 and by 1845 had exceeded 15,000,000. Canals gave way to railroads and in 1830 there were 130 miles of iron railroad in the country. By the Civil War there were 13,000 miles, with over 75% in the north (Licht 1995; Poole 1999).

The South remained predominantly agricultural. Most southern farms continued to resemble self-sufficient frontier settlements but with less sexual division of labor because southern women often ran large plantations (DeCunzo and Herman 1996). As Charles Wilkes would write in his *Autobiography*, southern society welcomed few and less diverse immigrants and offered less opportunity for the social mobility that promoted independent thought in the north. Planters' sons might dabble in science beyond agronomy but knowledge of science was foreign to most middle class overseers, farmers or merchants; was ignored by almost all poor tenant farmers; and was forbidden to slaves (Scott n.d).

While the South created the same amount of domestic manufactures as the North in 1810, by 1860 only a sixth of the nation's manufactured goods came from the southern two-thirds of the country. Through the late 1850s southern reformers argued for increasing economic diversity and diverting

agricultural profit to industry but cotton had become King after the invention of the Cotton Gin. In 1812 the south had exported 150,000 bales of cotton; in 1860 it exported 3,800,000 bales. Cotton spread westward just as the 1808 non-importation act took effect. As the price of slaves increased, only the wealthy could afford to buy them. By 1860, fewer than a quarter of southern families owned any slaves but an increasing proportion of southern assets were tied up in slaves, leaving little capital to invest in manufacturing (Wright 1980; Kornblith 1998).

In short, before the Civil War the development of American industry, primarily in the north, encouraged technological invention and the application of science. Neither before the Civil War nor during the bitter days of Reconstruction did science flourish as either an acceptable profession, an academic subject or an industrial application in the south. Naturally, this would effect how well Charles Wilkes could promote American science on an international stage while trying to succeed as a North Carolina entrepreneur.

The Social Contexts

Clark Elliott (1970) has called the antebellum period critical in the development of American science. He recognized that study of 19th century American science would be an exercise in sociology. It needs to be an exercise in political economy, as well (Brose 1998; Licht 1995; www.si.edu). From 1790 to 1850 most large-scale endeavors were undertaken by the Federal government (Daniels 1968). Exploration and survey by land or sea; wars, treaties and trade with American Indians; banking, road and canal building; and inland or coastal navigational improvements, were relegated to governmental agents. The role of the national government in stimulating natural sciences, anthropology and geography had centuries-old roots in British and French quasi-military reports of strategic places and their native occupants' political and economic relationships. The exploratory science of the new United States began with the 1787 surveys of the present states of Ohio, Indiana, Illinois, Michigan, Wisconsin and Minnesota, and the 1795 surveys of military roads through the present states of Kentucky, Tennessee, Alabama, and eastern Mississippi to Spanish settlements at Natchitoches and French settlements at New Orleans.

Cass and Schoolcraft were studying Indians and geology of the Upper Great Lakes for the government when the Louisiana purchase was made; and within 3 years Lewis and Clark had started to the Pacific on the first of many U.S. Exploring Expeditions that would study the Great Plains and Front Ranges (Pike in 1810), Florida (Gaines in 1811); the sources of the Mississippi River (Long in 1822); the Santa Fe Trail and southern plains (Carson in 1824); the Rocky Mountains and California (Fremont from 1841-45), the Pacific and Northwest Coast (Wilkes from 1838-1842); and through the Davis Straits to find the lost Franklin Expedition at the North Pole (Kane in 1856).

In 1857 the U.S. Navy had recognized the need for a national foundry and ordered Charles Wilkes to survey the mineral and fuel reserves of this region of North Carolina (Ponko 1974; Wilkes 1859)

but growing sectionalism engendered by the question of extending slavery into the newly acquired territories initiated put an end to American science as a normal task of the U.S. military. Indeed, Kane had to fund much of his second journey to the Greenland Ice Cap through shameless promotion of his privately published 3-volume report (Bolles 1999); by then an accepted strategy but considered ungentlemanly when Wilkes had done in it 1847.

After the Civil War, America adopted European models of industrial technological and physical studies and by the late 1870s industrial technology was incorporated into the academic curriculum (Brose 1998). The re-introduction of the federal government to create today's complex system was to wait until World War II. To a large extent, the career of Charles Wilkes and the vicissitudes of the collections made on the Exploring Expedition of 1838 –1842, are illustrative of American science during the Age of Sail.

The Profession Of Science

The provisional nature of modern scientific hypotheses was unknown to American Science in the age of sail. To the extent it had a philosophy of science, 19th century America looked to 17th century England's Royal Society. Yet despite Bacon's 16th century proclamation that experimental science was to serve the improvement of humanity, not until the mid-19th century was there any systematic attempt to derive new technologies from scientific knowledge (Brose: 1998:2-29). Many practitioners believed Americans supported science not merely from patriotism but because they believed that science could improve their lives. Yet, among others, Elliott (1970; Kornblith 1998) noted the utility of science (including technology, agriculture, and invention) was an ideal of the early American Philosophical Society and the American Academy of Arts and Sciences, with John Adams reportedly said that he studied war and politics so that his children could study science and technology so that his grandchildren could study art and poetry.

Discoveries in the natural, astronomical and social sciences had resulted from government explorations, although some observations and many important syntheses were done by gentlemen of independent means (as was much experimental "science" in physics and chemistry). And through the 1820s American science saw the growth of dozens of new amateur and increasingly professional societies, most with an accompanying scientific journal (some of which are still in publication).

In America a relatively non-utilitarian democratic role for science was established by such early botanical, zoological, antiquarian and meteorological studies relying on widely scattered amateur reporters. Still, a few individual men of political influence such as Alexander Bache who ran the U.S. Coast Survey after 1843 could alter even democratized scientific progress (Elliott 1970). The years from 1822 to 1860 saw more of such gentlemen housed in and later given teaching positions at academies, colleges and (later) technical institutes (Licht 1995; Poole 1999). Elliot estimated that fewer than 300 Americans were involved in "science" in 1790 while by 1850 more than 4500

made science their vocation or avocation. Antebellum science, where it was not mechanics' tinkering, was considered a literary activity, as it was in Europe, and in colleges and societies it concentrated in generalized "Natural" rather than in increasingly technical "Physical" sciences.

Yet through the antebellum period few paying roles for those soon to be named "scientists" existed outside of the government or the academy. That was true of Charles Wilkes' brother-in-law James Renwick, a Columbia University Professor who from 1825 to 1848 taught Natural Philosophy and Natural Theology intimately bound up in the Transcendental philosophy then sweeping New England. At Yale, Timothy Dwight, after whom his father named James Dwight Dana who succeeded him, was another clergyman who brought sciences into academic respectability before 1825. West Point added technology and science between 1817 and 1833 and Rensselaer Polytechnic offered the first engineering degree in 1824. Generally, agronomy was widely taught (even in the south) and organic chemistry was the science that supported it although the chemistry of metallurgy remained an industrial secret. And not until after the Civil War were many professors were fully paid for teaching science and fewer were paid to conduct research. Even the eminent professor and scientific editor Benjamin Silliman had to support his family and his work by entrepreneurial weekend work (patenting and marketing various types of "soda pop") while teaching at Yale (Brown 2002).

Charles Wilkes And American Science In The Age Of Sail

Two years after Darwin's voyage in the British ship, *Beagle*, the U.S. Navy commissioned another four-year diplomatic, survey and scientific Exploring Expedition (Ex Ex) to increase American prestige by discovering and describing unknown plants and animals in remote parts of the world. Although it cost more than \$900,000 by 1842 (over \$18,800,000 in 2004 dollars <http://www.eh.net/hmit/ppowerusd/>) the belief in America's manifest destiny justified the expedition's expenses.

Lt. Charles Wilkes, commander of the ExEx entered the U.S. Navy in 1822. An expert navigator and surveyor, he had bought the scientific instruments for the U. S. Naval Observatory in 1828, and he served as its second commander through 1837. From 1828 to 1838 Wilkes charted and surveyed many New England's fishing grounds and the South Carolina and Georgia islands and sounds. With his background and skills (and his persistent requests), Wilkes was chosen over senior officers to command the 1838-1842 ExEx.

Wilkes' orders read, "Although the primary object of the Expedition is the promotion of the great interests of commerce and navigation, yet you will take all occasions not incompatible with the great purposes of your undertaking to extend the bounds of science and promote the acquisition of knowledge." While preparing charts of oceans, and maps of islands and coasts, Wilkes planned to carry out the kinds of oceanographic and meteorological studies for which the Swiss scholar, Alexander von Humbolt, had been praised. Throughout the voyage, measurements of ocean

temperature and salinity, of the speed and direction of winds, and of barometric pressure and gravitational pull of every mountain and volcano were made by Wilkes and the midshipmen under his command. The Ex Ex's 35 new maps and naval charts proved useful for military and commercial ventures for more than a century. Wilkes' contributions to meteorology and oceanography earned scientific praise, but the volume he planned to write on [geo] physics was never completed.

In 1786 James Cook had reported ice south of Australia but no one knew if it shrouded a continent or floated on an empty ocean. Wilkes sailed south from Chile in March, 1839, but in heavy seas the *Sea Gull* was lost with all hands. The remaining ExEx ships crossed the Pacific to study Polynesia and map Australia then once more sailed south. On January 16th, 1841, midshipmen in the *Peacock* sighted mountains beyond the southern ice and two days later land was also sighted from the *Vincennes*. Wilkes spent the next six weeks charting 1500 miles of the coast of the new continent he named Antarctica. Wilkes' claim was disputed by d'Urville, whose French ship recorded a different coastline on January 20, and months later Captain James Ross of the Royal Navy claimed to sail through seas where Wilkes mapped a continent. But d'Urville acknowledged America's earlier discovery and in 1848, after review of Ross' questionable assertion, the Royal Geographic Society awarded a medal to Charles Wilkes for first discovering and mapping Antarctica.



Vincennes in Disappointment Bay, Antarctica. After a sketch by C. Wilkes. Narrative, Volume II.

The ExEx “gentlemen of the scientific corps” were given a nearly free hand to collect and describe thousands of species new to science. These “scientifics” brought home hundreds of new and un-described minerals, plants, and animals. There were also weapons, tools, ornaments, costumes and carvings from California and the Northwest Coast, from South America, Hawaii, Fiji,



Narrative, Volume IV

Samoa, New Zealand and Australia. Journals, drawings and paintings documented the voyage, recorded perishable specimens and those which could not be brought back, such as the California redwoods. These helped produce engraved plates to accompany the scientific reports.

Expedition members even annotated the music of ethnic groups they encountered across the Pacific. During the cruise and at its end, Wilkes reminded them their collections belonged to the U.S. government and they were forbidden to publish anything without Navy permission. Most of the “scientifics” ignored the first order, and Wilkes disobeyed the second.

After returning to the United States the work of preserving and displaying the artifacts and specimens began and then came the long period of scientific study. When the studies were done, the new descriptions and the carefully engraved plates for the final reports had to be reviewed. The process could take years and disaster could strike: a Philadelphia warehouse fire in 1845 burned many original drawings; another in 1853 destroyed dozens of engraved plates all of which had to be redone. Charles Wilkes was ardent, but few members of the scientific corps were anxious to study the ExEx collections immediately upon their return and many specimens were mounted for display rather than prepared for scientific study.

When not attending his first Court-Martial, Wilkes spent 1844 and 1845 turning ships’ logs and officers’ journals into a five volume *Narrative of the United States Exploring Expedition During the Years 1838, 1839, 1840, 1841, 1842*. A review in the 1845 *Southern Register* noted that Wilkes wrote in an engaging style, but the U.S. Government had only printed and had quickly distributed 200 copies of the five folio-sized Narrative volumes and the one-volume Atlas of maps. Wilkes, himself, commissioned the extensive publication of a second, smaller-sized *Narrative* edition, earning public praise and government displeasure. Before and after the Civil War, Wilkes spent many weeks in

Washington, arguing to the Congressional Library Committee to continue paying for the publications. The first volumes were issued only 2 years after the Ex Ex returned but the last official report was not published until 30 years later. And with Charles Wilkes' death, in 1877, Congress ended the program of publishing scientific reports of the U.S. Exploring Expedition, so many important reports were not published at all.

It was Wilkes who persisted in having the novel specimens and curious artifacts collected by the Ex Ex made public at the U.S. Patent Building in an 1848 - 1858 exposition designed by Titian Ramsey Peale to satisfy aspects of late Victorian sensibility in an American setting. Among its first systematic collections, the Ex Ex objects were for decades thereafter exhibited in the new Smithsonian Institution Building designed by James Renwick, Jr., Charles Wilkes' nephew. The collections made by the Ex Ex suffered different fates (Viola and Margolis 1985). The fish were nearly all previously unknown but not until 1860 could Wilkes persuade Louis Agassiz founder of Harvard's Museum of Comparative Zoology, to report on them. Agassiz worked for a decade, wrote several short papers and produced 2000 pages of analysis and illustration --- but died in 1873 without having turned anything over to the Congressional Library Committee to publish. Peale had collected insects in the Pacific, but those he had not drawn were lost in 1841 when the Peacock wrecked at the mouth of the Oregon [modern Columbia] River and his fine illustrations of birds and mammals were used to illustrate the report Wilkes asked Cassin write over Peale's objections.

Rich and Brackenridge brought back pressed leaves and flowers of plants from around the world for comparative identification, and Brackenridge returned with seeds and cuttings of 1300 plants, among which were over 600 new species. From these grew the U.S. Botanical Garden and the National Herbarium. After the Civil War, Wilkes wrote a particularly angry note when he discovered that politicians had been given Norfolk Island Pines, grown from the seeds the Ex Ex brought back.

Wilkes hired Augustus Gould to describe the more popular shells and, with the fine colored drawings Drayton and Agate made in the field, new species were documented. Although Dana produced the plates for two volumes on the collected crabs, lobsters, shrimp and other sea creatures, the detailed descriptions were lost when the collection was sent to a scholar in Chicago whose laboratory was destroyed (along with most of the city) in the great 1871 fire.

Anthropology was not yet a science but the Ex Ex did far more than repeat the curious observations of mariners, merchants or missionaries. The scientifics and many officers collected thousands of artifacts while they explored South America, the South Pacific, and the northwest coast of North America and east Africa, assembling the largest ethnographic collection ever made by a single expedition. By lifting the horizon of American cultural studies beyond the country's shoreline, this would turn out to be the most important 19th ethnographic century collection that could have been made.

Wilkes' Scientific Legacy

Given the circumstances described, it is especially unfortunate that in his popular recounting of the 1838-1842 U.S. Exploring Expedition, Nathaniel Philbrick (2003) attempts to place the entire blame for our current ignorance of Wilkes' historical accomplishments on Wilkes' management style as the expedition's commander. Anyone reading Wilkes' *Narrative* and his *Autobiography*, and midshipman William Reynolds' journal, should know that, as Viola (1985:11) noted, no one had ever considered that the expedition's mandate for science or commercial diplomacy would dominate the Navy's need for costal surveys or the customs of naval discipline ... no one except three members of the scientific corps who were able to influence a few junior officers. The former frequently saw the scope of their investigations restricted by the needs of cartography and the standards of traditional naval discipline. The latter, jealous of promotion, felt that Wilkes' insistence on customary prerogatives of rank demeaned them. Upon the return of the *Ex Ex* in 1842, disaffected members of both groups enlisted their political allies to challenge Wilkes' authority in a court martial.

As Wilkes' idiosyncratic autobiography reveals, he felt himself often wronged but seldom wrong. But Philbrick's use of 19th century sources seems only to show that Wilkes was as complex as many of his contemporaries. Yet, as one reviewer (Harris 2003) recognized, Philbrick polemically would claim that "For more than a century, Wilkes has stood astride the legacy of the *Ex Ex* like a colossus, a forbidding impediment to all who would want to know more." Historical documents reveal the original colossus was a welcoming navigational aid, not an impediment and historical documents also reveal that while his headstrong pride and acerbic manners clouded Wilkes' personal life and his military reputation, neither these unfortunate traits nor his court[s] martial affected contemporary appreciation for his diplomatic, cartographic and scientific accomplishments (and they do not affect a persistent appreciation by modern diplomats, cartographers and scientists). In fact, his contemporaries' discussions show the public thoroughly approved of Wilkes' discoveries (Jenkins 1850: 274-286), his adventures (Brooks 1996) and even his 'engaging' literary style (Southern Messenger 1845).

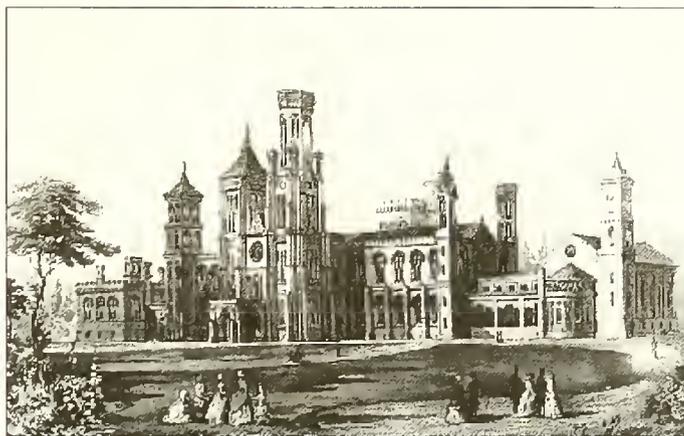
That today's casual reader is unaware of the accomplishments of Wilkes' 1838-1842 Exploring Expedition is hardly surprising considering that most Americans believe Thomas Edison invented electricity; do not recognize the names of such 19th century explorers as Pike, Long or Frémont; are uncertain about the dates of the Civil War; and cannot identify Florida on an outline map of the U.S.

As Lloyd has noted (1947:13-15), during the early 19th century even the most successful young commander in the Royal Navy "...too tactless, too impatient of etiquette, too wise in his own conceit to get on with men he saw no reason to admire," could be brought before a court martial by a junior officer willing to ruin his commander's future career by accusing him of disrespect. A generation beyond the Navy of 1812-1815, heavy drinking, dueling, autocratic ships' captains and

corporeal punishment were no longer considered very acceptable (Tyng 1870). Nevertheless, all were still officially sanctioned (Dana 1843) and Wilkes was merely reprimanded, leaving his challengers bitter and frustrated. It would appear that their personal histories have enlisted modern author Nathaniel Philbrick in their cause.

Nor was Wilkes' court martial the most bitter to arise from the difficulties of indifferent seamanship. Even in the middle of the voyage Acting Master George Sinclair pressed charges against Passed Midshipman George M. Harrison for his "insulting tone" and "improper language" as the schooner *Sea Gull* and the brig *Porpoise* tried to leave the harbor at Pago Pago in poor weather (Harrison v Sinclair 1840). An unbiased historical scholar might well have considered the even more troublesome relations between the expedition's commander and its chief scientist aboard the coeval voyage of the *Beagle* (Darwin 1839) which hardly diminished the legacy of its scientific discoveries (Darwin 1846, 1851, 1859).

Charles Wilkes and the U.S. Ex Ex initiated America's role in the Pacific, but his legacy equally reflects significant changes in science in the century following the American Revolution. Eighteenth century, art, religion and "Natural Philosophy") regarded the world as a manifestation of God's creation. Revealing the amazing diversity creation contained was often undertaken with missionary-like zeal. But the United States rated behind other nations in this glorious effort. Wilkes' Expedition collected more than 130,000 specimens of plants, animals and minerals, naming over 2000 new species. They studied hundreds of societies and cultures and brought their tools, weapons and ornaments back to amaze the people of the United States. The value of preserving this vast trove from places and cultures little-known in the 1840s was recognized in Washington through Wilkes' effort and led to a national museum first located in the National Gallery of the Patent Office, and later configured as the first Smithsonian Institution museum. Finally, describing and illustrating the ExEx collections stimulated the interest of numerous great university departments in the sciences and the 23 illustrated volumes resulting from their scientific research (including seven by Charles Wilkes himself) became America's first true contribution to world science.



The Smithsonian "Castle" 1858



The “Artistics”

Lili Corbus Bezner, Ph.D.

The history of “visual culture” goes beyond the realms of prestigious and costly paintings and sculpture -- it can include those chronicling scientific and anthropological adventures through a variety of media. And sometimes the functions of images that seem merely descriptive merge with those that are considered highly interpretive.

When Charles Wilkes assembled the 1838-1842 U.S. Exploring Expedition (ExEx) he hired three scientific artists: Titian Ramsay Peale (1799-1885), Alfred Agate (1812-1846), and Joseph Drayton (1795-1856). In addition other crew members made sketches of plants, animals, land, events, and people encountered during their travel. Each image is a clue, however small or large, to things that captured the explorers’ attention. Surrounded by today’s travel and animal channels on television, it may be difficult to understand the enormous curiosity parrots or shells, but to early explorers such wonders demanded extensive study, to document and ultimately classify nature’s stunning diversity.

Trained artists were crucial members of any scientific expedition (as photographers were later). The diligent ExEx artists produced extensive notes of specimens’ characteristics and habitats and made hundreds of drawings, watercolors, and oil paintings of distant cultures, foreign landscapes, exotic animals and plants from America’s west coast, South America, Australia, the South Pacific, and the Antarctic. Their images were published for the public and other scientists to see. Congress authorized the publication of a five-volume *Narrative* (reprinted repeatedly by Wilkes) but the expedition yielded nineteen other volumes of reports and atlases, including the first widely circulated images of the northwest.

The remote landscapes of the American wilderness fascinated nineteenth century artists and viewers. There was an increasing demand for dramatic images of uniquely American landscapes, especially in the northeast where the wilderness was already disappearing under the stress of ever-encroaching industry and rising populations. American landscapes were in their infancy when Wilkes set out in 1838. In the early 1800s, Thomas Cole was one of the first American painters to bring profound metaphorical associations to landscapes by blending scrupulously documented nature with imaginative symbolism. Such work inspired the Hudson River School of painters from 1825 through the end of the century.

Scenes of nature in American art moved beyond topographical realism largely through the influence of Romanticism. European Romantic painters such as Caspar David Friedrich or Edwin Landseer were influenced by the explorations of their day and attempted works combining zoological accuracy with symbolic and psychological drama. Tales of mysterious new lands fired imaginations and yielded interpretations devoured by hungry publics. Friedrich monumentalized polar explorations in *Shipwreck* (1822; now lost) and *Arctic Shipwreck* or *The Sea of Ice* (1824) based

on his observation of ice in the Elbe River. Landseer painted *Man Proposes, God Disposes* (1863-64) after the 1857 Franklin Northwest Passage expedition. Such canvases visualized the triumph of sublime wilderness over human aspiration; in Landseer's painting a wreck is discovered by polar bears who maul the "pathetic vestiges of man's ambitious intrusion into nature's no-man's-land." (Rosenblum 1984)

Many images from the ExEx parallel Romantic ideals concerning Nature's violent beauty. Echoing the tempestuous 1840s seascapes by J.M.W. Turner, we see ships tossed like toy boats, vulnerable and small against giant waves and icebergs off Antarctica. Set against such dark skies and chaos, they become heroic in their efforts to stay afloat. Similarly, in Agate's watercolor landscape of Mt. Shasta (1841), two natives are dwarfed and humbled, literally overwhelmed, by grandiose trees and mountain peaks.

Wilkes' expedition created public fervor for published images descriptive of dramatic events in far-away, exotic places. Mark Twain observed in his *Autobiography* that as a boy, "the name of Charles Wilkes the explorer was as famous as Theodore Roosevelt's later. He was regarded as another Columbus who had discovered another world" (Brooks 1947). ExEx pictures acted as surrogate adventures for eager spectators like Twain by going beyond mere empirical description -- they could evoke otherworldly, symbolic, and transcendental realms. The ExEx artists gave visual form to written accounts, providing inspiring and exciting illustrations for a competitive and proud young nation. Wilkes even demanded that any subsequent publications "...be monuments to American science, worked up by Americans in America ... to demonstrate the priority of American discoveries" (Watson 1985). The reports which helped bring America to par with European science would not have been complete without sketches and notes from Peale, Agate, and Drayton. While the scientific artist's duty was to render forms as exactly as possible, all observation involves interpretation. As historian William Goetzmann puts it, "the artist's feelings of awe or wonder at the moment of viewing inevitably allowed his emotions to give form and character to the pictures" (Goetzman 1986). Such work is not easy. The artist must enlarge small objects, or reduce large ones; proportions must be correct; field drawings must record minute observations.

The ExEx artists were hardly mere fact-finders documenting the data of hard science: all were highly skilled. As Pamela Henson explains, scientific illustration "is the art of producing accurate, precise, and clear representations of specimens and environments important to science." Scientific illustrator must have strong visual skills, observe carefully, analyze patterns and forms, recognize shapes, and, ultimately, interpret what they see with exacting discipline. They often used the *camera lucida* to record nature accurately, especially when mapping landforms. Among the Ex Ex's equipment, the *camera lucida* reflected a traceable image of landscape or specimen through a lens onto paper.

Given the world's eagerness for discoveries of new species, artists were needed to portray specimens to then be classified in the grand *Systema Natura*, an issue which haunted Peale after the

ExEx returned. As some naturalists criticized Peale's taxonomic classifications, his volume (*Mammalia* and *Ornithology*, 1848) was suppressed shortly after publication, although the illustrations were used in a reissued study by Cassin. While Peale's taxonomies were flawed, he is praised today for making "some remarkably astute biological observations in the field." (Watson 1985) and many of Peale's other plates survived in other reports and in the *Narrative*.

ExEx artists' working conditions were hard. Peale complained that the "cheerless swash of water on the floor of my stateroom made me feel the comfortlessness of a ship in a storm." The staterooms were dark and wet, completely inadequate for preparing specimens and drawing. Imagine the artist's task: specimens deemed significant were turned over to the artist who had to represent them before decay or destruction. Most of the thousands of dead specimens collected were sent back quickly (many to the Peale Museum) to be sorted out later by the artists and scientists. It was easy, over the months and years, to misinterpret field observations or confuse data. Eventually Peale would lose his insect collection and his valuable research library when the *Peacock* wrecked.

The artists faced these daunting conditions as professionals. Alfred Agate came from Washington, D.C. with a background in the exacting art of painting miniatures. He learned to paint from his brother and Thomas Seir Cummings, and later exhibited oil paintings at the National Academy of Design in New York, the National Museum of National History, and the New York Historical Society. By 1838, when Agate joined the expedition on the *Peacock*, he was working as an official U.S. government portrait and botany artist. Agate contributed 173 out of 342 sketches and paintings reproduced as illustrations for the five volumes of *Narratives* and earned the reputation the first recorded portraits of Hawaiian royalty and the first views of the Antarctic continent.

Agate's adventures in Fiji included meeting and capturing "the notorious" chief Vendovi, who asked the artist to make "his likeness." The life drawing Agate made of the chief, with his strong profile in contrasts of dark and light, which was then made into an engraving (and which demonstrates a loss of nuance and sensitivity as drawing became print, through a copy made by another artist). Joseph Drayton, who sailed on the *Vincennes*, was an experienced engraver from Philadelphia. He produced hundreds of quick field sketches capturing the living colors and shapes of species. The expedition's invertebrate collection was largely Drayton's responsibility but this job was difficult; his dead specimens from the sea smelled so badly he was forbidden to bring them below deck. He had to watercolor each specimen fully in the field so that later engravers and colorists would have accurate records in their preparations of final plates for publication in the official reports. His detailed sketches and notes were so useful that John H. Richard used them to make plates for the Expedition's *Herpetology*. Even today, his accurate drawings of specimens that no longer exist make it possible for scientists to retrieve invertebrates "from oblivion. Drayton drew more than mollusks and sea cucumbers; he used the *camera lucida* to draw volcanic landscapes in the northwest and Hawaii. While accurate images of volcanoes were rare for this time, the

distant natives at its base Drayton added to the scene were a common convention in landscape painting. Figures added to panoramic landscapes not only created a sense of scale and proportion, they offered additional narrative and visual interest to viewers.

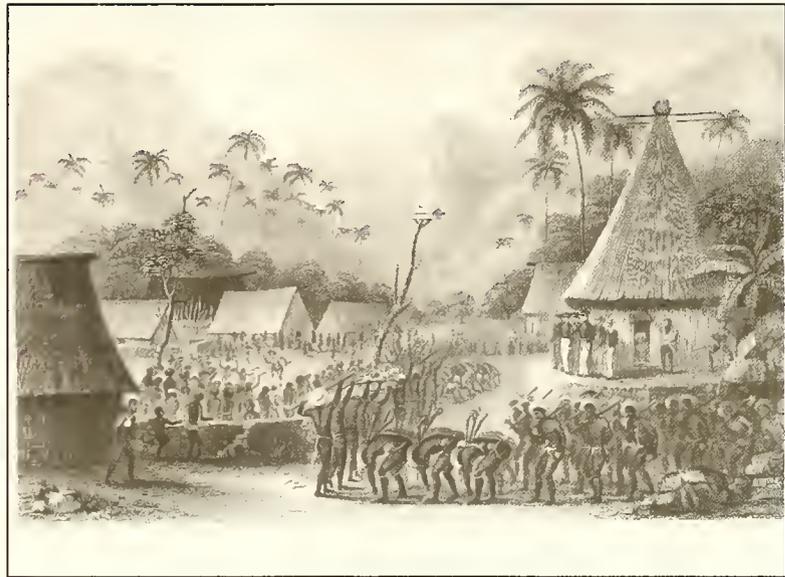
The most well known of the ExEx, Titian Ramsay Peale, belonged to the first dynastic family of American artists. By the 1830s Titian held the title of head curator and naturalist at this American Museum of Arts and Sciences in Philadelphia, founded in 1806 by his father Charles. The museum combined the elder Peale's love of nature, including paintings and mounted animals and even the mastodon he helped dig up in New York (Lindbeck and Nichols n.d.). Trained and inspired by his father, Titian combined the life of the artist with the life of the scientist. He studied anatomy at the University of Pennsylvania; his drawings were published in Thomas Say's *American Entomology*; he was elected to the Academy of Natural Sciences at the age of 18. Many of his collections are preserved today due to his effective and meticulous methods of preservation.

Titian Peale was also a seasoned traveler by the time he joined Wilkes as chief naturalist. He served four months in Florida with naturalist George Ord (1817-18) and as the zoological artist on a topographical expedition to the Rocky Mountains (1819-20), where he formulated early visualizations of the West with his views of animals, Indians, and landscapes (Goetzmann). He had made several trips to South America before returning with Wilkes in 1838. An admired illustrator and naturalist, Peale provided many of the plates in Charles Lucien Bonaparte's *American Ornithology* (1825) and exhibited watercolor drawings of animals at the Pennsylvania Academy of Fine Arts. Credited with being the first artist to paint volcanic landscapes, Peale's unpublished "Folio" of South American vignettes demonstrates his skill and sensitivity in portraying indigenous peoples.

We cannot treat all of Peale's visual images from the ExEx as strict facsimiles. Some landscapes combine scientific detail and accuracy with an idealized mood and setting. His oils (completed after returning to Philadelphia) added romantic touches and moral messages to panoramic compositions. Peale's plates of birds and mammals often included backgrounds with soaring mountains, dancing waterfalls, and indigenous plants or figures; his watercolors of Hawaiian volcanoes similarly include small, distant figures of indigenous folk or sailors. Ultimately, Peale composed many complex landscapes that combined observed reality with imagination and memory. Later, into the 1870s, Peale painted his visions of the far west over and over again; in each rendition, Goetzmann writes, "science gave way more and more to art."

Drayton, too, left numerous illustrations depicting people and their material culture. His Club Dance, engraved for the *Narrative*, shows a Polynesian ritual including expedition members observing from a segregated distance. Similarly, many of Agate's drawings and oils also include figures or groupings of native peoples he encountered. His portrait of the Chief Toarimaroa, from the Drummond Islands, shows an imposing man confronting our gaze, strongly frontal, in elaborate dress. In another drawing Agate depicted the Chief of Bau, Tanoa, wearing an impressive, and increasingly rare, ivory and shell breast plate. While such visual observations are

useful to those studying aboriginal artifacts, they are often suspect as factual indicators of behaviors or customs. By 1838 Polynesia had been influenced by sixty years of colonizing forces. Drayton's drawings of Polynesian women beating bark cloth and engaging in other tasks show foreign influence in dress, indicating the artist's sensitivity to observed reality.



Narrative, Volume III

Readers of Wilkes' *Narrative* were intrigued by indigenous peoples and sought images that showed how they looked and behaved. Such information was in the hands of those observing, not the native peoples themselves. As David Andrew Roberts notes, the information was inherently deficient and biased. While such images of indigenous peoples offer little that meets contemporary standards of ethnography, they provide some of the earliest views of tribal cultures and 19th-century Eurocentric interpretations. For instance, Agate and ethnologist Horatio Emmons Hale journeyed to Australia's Lake Macquarie, meeting Reverend L.E. Threlkeld at his mission. An overview of this tour in the *Narrative*, with detailed accounts of aboriginal implements, tools, and personalities, included Agate's portrait of Birabahn, later published in Threlkeld's book on Aboriginal language (1850). While Wilkes was instructed to "neither interfere, nor permit any wanton interference with the customs, habits, manners, or prejudices of the natives," their interests, ultimately, paralleled those of American government and industry, not native populations. (Stann 1985)

Explorers were not neutral, nor were the artists of their time. Wilkes hoped to extend "the blessings of civilization and Christianity" while "widening and strengthening the fraternity of the human family." The expedition occurred during an expansionist phase in American history -- between 1820 and 1860 the population increased from about 9.5 million to 31 million and the states increased from 22 to 33. The "banner of freedom," as one observer from the earlier Stephen Long expedition put it, "which waves over the whole [and] proclaims the character and protective power of the United States." (Goetzman 1986)

This fascination with things American," Craven points out, "[was] but another form of nationalism, as Americans discovered themselves and their land" Even Agate's pressed plant watercolors were meant to bring the young Republic "its rightful intellectual place among nations." (Craven 1994, Eyde 1985). National pride even extended to published reports: "Nothing has been used in its

preparation that is not STRICTLY AMERICAN, and the design of the author and Publishers has been to produce a book worthy of the country.” (www.siskiyous.edu/shasta/art/e40.htm).

Two images point to such nationalistic concerns. An anonymous painting of the *Porpoise* displays a prominent American flag as the ship forges into tumultuous seas; however, a hint of sun light in the upper right corner shoots some light, figuratively hope and promise, into the stormy skies. In Agate’s panorama of a Columbia River settlement in the Oregon Territory a huge American flag dominates minute settlers and dwellings. The term, “Manifest Destiny”, coined by *Democratic Review* editor John L. O’Sullivan in 1845 but widely understood earlier, advocated progress across the continent as Americans’ God-given duty to flourish and make use of the land.

Artists anthropomorphized manifest destiny as a goddess of liberty wafting through the skies, leading the march of progress with the light of civilization but as civilization progressed, wilderness waned. Writers such as James Fenimore Cooper in his *Leatherstocking Tales* (1823-1827) lamented its loss while fulfilling demands to hear stories and see pictures of nature in the wild. While such Transcendentalist writers as Henry David Thoreau felt the land symbolized profound religious, moral, and poetic ideals, deserving preservation (Craven 1994), most saw land as something to be improved and exploited. But all Americans were interested in experiencing worlds beyond their immediate environments and the artist-explorers of the ExEx helped satisfy that longing. Their art, and its countless reproductions, inspired new generations of American viewers, artists, and scientists.



Narrative, Volume V

The Art of the South Pacific Islands Material Culture in Ritual and Daily Life

Cheryl Moore

When the U. S. Exploring Expedition (ExEx) sailed in 1838 anthropology was in its infancy. Ethnography, the subfield which documents the cultures of living people, was barely recognized as a social science. While not widely practiced in institutions, many ExEx members recorded observations about the customs, clothing, objects, and ways of life of the societies they visited. Their journals and diaries, albeit biased and ethnocentric, served as the basis for much published by Charles Wilkes, in his five-volume *Narrative*. It is an important document of societies which have changed dramatically.

Although these observations continue valuable for understanding societies around the world sixty years after the first contact with Europeans, the material collected speaks more clearly of the cultural values and traditions of these societies. The ExEx collected over four thousand ethnographic objects during their five-year journey, the largest collection ever made by one expedition. Over twenty-five hundred artifacts from Oceania, Australia, and North and South America were collected mostly as curiosities and have become the Smithsonian Institution's "official" collection. The largest and most important collections are from Fiji and Polynesia. If their motives would not meet today's standards in cultural anthropology, the ExEx acquired daily and ritual objects with deep cultural significance to the people who created them. These were objects with *meaning*, objects with *power*.

From bark cloth with special stories passed down through families for generations, to skillfully crafted weapons and fishing tools, Pacific Island material culture has a central theme: the belief that objects acquire, retain, and transmit *mana*. Mana is a diffuse supernatural power residing in objects or persons that accounts for their extraordinary qualities or effectiveness. In prehistoric Hawai'i, a fishing hook made of human bone can possess mana, making it more effective in the hands of a fisherman. In Fiji, Samoa, and Tonga, a piece of decorated bark cloth, safely stored for decades to increase its mana, can provide protection during trial for a person accused of committing an offense. For the Maori of New Zealand, an adze made of nephrite can accumulate mana as it passes through time from chief to chief.

The Art of Tapa

The art of *tapa*, cloth produced from the inner bark of the paper mulberry tree, *Broussonetia papyrifera*, was widely practiced in the Pacific Islands at the time of the ExEx. Cultivation of the paper mulberry tree began in East Asia at least 2000 years ago. As people migrated to islands across the Pacific, they brought the tree which flourishes in all of Polynesia save New Zealand. At the 18th century European contact, bark cloth was found on virtually every Polynesian island. The ceremonial and utilitarian importance of tapa in marriages, births, deaths, formal exchange and conflict resolution could be seen throughout Pacific Island culture. Eventually, purchasing

European cloth replaced bark cloth production in most island cultures. Today, the art is practiced continuously only in Samoa, Fiji, and Tonga where it is required and preferred for many ceremonies.

Tapu, a Polynesian word used to refer to bark cloth from almost any area of the world, is actually not the correct term for the finished product. In the Hawai'ian language the correct term is *kapa*, in Fijian: *masi*, Samoan: *siapo*, Tahitian: *abu*, and Tongan: *ngatu*. Since the 18th century, Pacific Islanders have become accustomed to Europeans and others coming ashore asking for souvenir “*tapas*” and seem to overlook foreigners’ mistakes. In Tongan, for example, *tapu* refers to the undecorated edge of *ngatu*.

The preparation of bark cloth is similar world-wide. Traditionally, preparation was the work of women, but finished bark cloth was used by all. The female head of the household was responsible for planting, caring for, and harvesting the trees. She planned the work and organized the other female family members in bark cloth production from start to finish. In recent times, particularly in Samoa, it is more socially acceptable for men to take a more active role in the production.

According to oral histories bark cloth production observable today in Samoa, Tonga, and Fiji is largely unchanged since pre-contact times. Trees are typically planted in orchards owned by small kinship groups. The paper mulberry tree takes ten to fourteen months to mature for harvesting. In Samoa, the trees are stripped of their bark, but left to continue growing for up to three harvesting seasons but in the Soloman Islands, the trees are felled using an axe or (more traditionally) with clam-shell adzes. The bark is removed in long continuous strips, which are rolled inside out and set aside until production begins.

The inner bark, called bast, is separated from the bark strip, and the outer bark is discarded. The bast is then rolled inside out and soaked in water to retain moisture and flexibility. Scraping is next, which removes remaining pieces of outer bark and softens the bast fibers. The strips of bast are scraped with shells against a wooden board. Then, using carved hardwood beaters, women sit along side each other while they repeatedly beat the bast over a log used as an anvil to produce long, soft fibers. The finished cloth is many times wider than the original bast, and is then ready for stretching, drying, and decorating.

Although women and girls work together talking, socializing and sometimes singing, in none of the Pacific Islands do they beat in unison or to a rhythm of a song. Bark cloth beating was the most



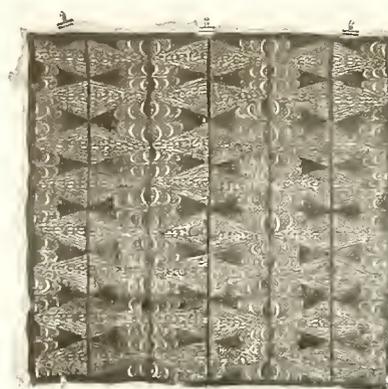
Narrative, Volume II

characteristic occupation of women and the common ringing sound was often described in the journals and diaries of visitors, including those of the ExEx. The final step of cloth production is stretching and drying. The cloth is gently pulled and weighted at the sides with rocks as it dries.

Thorough drying of the cloth takes a full day. The dried bark cloth can be folded or rolled and stored for many months before decoration.

To decorate the cloth, brown, yellow, red and black dyes are made from a variety of barks, roots, and clay including turmeric root, terra cotta, mangrove trees, and candlenut trees. The most typical dye color for bark cloth is brown. Dyes are applied by hand, using brushes or by rubbing the cloth over a carved wooden design board coated with dye. Historic and recent design elements often include symbols from the environment. Trochus shells, banana pods and pandanus blooms are typical elements found in Pacific bark cloth.

For over a thousand years, decorated bark cloth has had utilitarian and ceremonial uses in Pacific Island cultures. In Tikopia, as in Polynesia, the cloth was used for men's and women's clothing, blankets and sleeping wraps, straps for tying loads on women's backs, and even as caulking for the joints in canoe planks. Births, deaths, marriages, and initiations often called for large quantities of bark cloth. A goal of most female heads of household was to accumulate a stock of bark cloth in order to be prepared for any occasion. Therefore, production tended to be a constant, but leisurely activity of women.



Typical tapa design

This ceremonial use of bark cloth that illustrates the Pacific Island cultural belief in the power, or *mana*, of the objects themselves. Bark cloth was the principal item in ceremonial bundles given as compensation for services, such as payment to a healer for curing a sick person. Offerings to gods and spirits, initiation ceremonies for children, or inauguration ceremonies of chiefs, always included vast quantities of bark cloth. Men and women of high social status were often buried with cloth that had been safely stored for generations by their families. Formal presentations of gifts to a visitor or honored guest always included bark cloth.

The cloth fibers themselves were thought to accumulate religious and spiritual powers that could benefit society through successful leadership of chiefs, conflict resolution between families and communities, eternal rest for the deceased, and food and wealth for the community. In Hawai'i bark cloth was used to wrap figures of gods and ancestors in temples in order to attract the ancestor or god into the figure. They believed that without the cloth, the figures would have no power at all. In Samoa, bark cloth is second in importance only to fine mats, the most sacred objects for all Samoan rituals.

In New Zealand, where the paper mulberry tree does not flourish, the Maori use the fibers of the flax plant to produce sacred cloaks. In the Maori belief system, the existence of *mana* in flax cloaks is accompanied by *hau*, the life force energy that connects people to objects and allows objects to

possess *mana* and the power of personification. Often the cloak or cloth of a deceased person was mourned over, just as if it were the body of the person. It is important to note that bark cloth and flax cloaks are not just symbols of powerful forces, but are thought to be active agents in transferring powerful *mana* to those who hold them. In Maori culture, the cloaks of a high ranking chief were so heavily embedded with *mana* that no one else would dare touch them.

Beneficial *mana* is increased by passing cloth from person to person. The history of the cloth, its maker and to whom and on what occasion it was passed, was carefully recorded for the next receiver. The concept of ownership for Pacific Islanders, however, was different from Western ideas of ownership. The cloth and its *mana* remained valuable only if it continued to circulate, as people gave and received the cloth under special circumstances, contributing to the accumulation of its *mana*. To most Polynesians, bark cloth remained attached to the original owner even as it circulated among others. For this reason, the original owners expected bark cloth gifts to be returned, even if this occurred generations later. In this sense, bark cloth was inalienable wealth that could not be detached from its origin.

Few 18th or 19th century European or American visitors (such as those on the ExEx) understood this form of giving. They may have unknowingly (or knowingly) taken sacred objects out of circulation by placing them in museum collections. Yet the most sacred and powerful bark cloth would probably not have been offered to visitors. And as Pacific Islanders became accustomed to foreigners, some cultures, such as Samoa and Fiji, began to produce bark cloth specifically for the tourist.

Leaders of Industry and Reconstruction in the Southern Piedmont

Daniel W. Barefoot

In recent years, national and international factors have led to the decline of the Southern textile industry. The retreat of this longtime industrial base is nowhere more evident than in the Piedmont of North Carolina. Mills, factories and warehouses that brought the area thousands of jobs and great prosperity for decades now stand idle. Even as this essay is written, the grounds of the Spindle Center Fair” in Gastonia (once a world center for textile manufacturing) are being leveled.

Less than two hundred years ago, the Southern textile industry was born in this very region with construction of the Schenck-Warlick Mill by Michael Schenck and Absalom Warlick in Lincolnton in 1817. This small cotton mill, the first south of the Potomac, was followed by the South’s first cotton factory opened on the South Fork River below Lincolnton by Schenck, John Hoke, and James Bivens. Although the Civil War brought economic ruin and chaos to the southern states, after the war a few gifted, far-sighted, and determined men gave birth to the modern textile industry in the South. Through the leadership of these extraordinary individuals, the Southern Piedmont became the heart and soul of the textile industry. To chronicle these leaders’ accomplishments would require a volume. What follows are biographical sketches of five of these prominent native sons.

Rufus Yancey McAden

On March 4, 1833, Rufus Yancey McAden was born in Caswell County, North Carolina into a distinguished North Carolina family. His great grandfathers were Reverend Hugh McAden, the Revolutionary War Presbyterian firebrand, and Dr. Archibald Murphey, a respected legislator, jurist, and historian. On the eve of the Civil War, Rufus McAden settled in Alamance County to practice law. Elected to the General Assembly in 1862, he served in the legislature until 1867 when Reconstruction politics brought an end to his tenure. During 1866 McAden was Speaker of the House. When his political career ended, McAden moved to Charlotte to become president of First National Bank of Charlotte. Through banking and other business enterprises, including railroad construction, McAden amassed a fortune.

In 1881, the potential of cotton manufacturing enticed McAden to embark upon a great business venture in Gaston County. On the picturesque site of the old Adam Springs’ homestead overlooking the South Fork River, McAden, his two sons, and Jasper Stowe constructed McAden Mills in what was named McAdenville. The mill came to employ five hundred workers.

McAden was a distinguished, handsome man with blue eyes and a medium build. A colorful personality, the talented businessman was not without controversy throughout his life. Just after the Civil War, McAden found himself embroiled in a land dispute with Calvin Wiley, the first superintendent of the state’s public schools and a close friend of Reconstruction governor William

W. Holden. As a result, Holden prevailed upon President Andrew Johnson to delay McAden's post-war pardon. In 1885, a railroad dispute found McAden at odds with Richmond Pearson, a prominent member of the state legislature. After a heated exchange with the lieutenant governor on the floor of the House, Pearson stormed out of the State Capitol where he was assaulted by McAden on the streets of Raleigh. A year later McAden refused Pearson's challenge to a duel, which was illegal in North Carolina. When Rufus McAden died at his home in Charlotte on January 29, 1889, he left an estate valued at more than one million dollars: then the largest estate recorded in Mecklenburg County.

Robert Calvin Grier Love

Born near Crowders Creek on December 15, 1840, Robert C. G. Love became one of the great pioneers of the modern textile industry in his native county. His father, Andrew, was a member of the commission that established the 1846 boundary between Lincoln and Gaston counties. In the Civil War, R. C. G. Love served as a captain in the Gaston Home Guard and operated Fairview, a farm two miles west of Gastonia. Following the war, the mercantile business attracted Love and for twenty years, his stores, cotton gins, and grist mills could be found in Gaston County.

In 1887, Love entered the textile manufacturing industry on which he would leave an indelible mark. He joined with George Gray and others to build the Gastonia Cotton Manufacturing Company, the first textile mill in Gastonia and the first steam-driven mill in the County. Until his death on January 23, 1907, Love was president and manager of the company known locally as the "Old Mill." Love's complex was the foundation of a flourishing industry that would make Gaston County "the Spun Cotton Capital of the World." Under Love's expertise, the "Old Mill" paid for itself in three years and its owners established other mills with their tidy profits.

An astute businessman, Love was president of Love Trust Company, an early Gastonia bank and the predecessor of Citizens National Bank. His dedication to civic, religious and charitable causes benefited many people. He donated the building to house the first public high school in Gaston County and was a founder of First Presbyterian Church in Gastonia. An avowed opponent of the liquor industry, Love publicly advocated replacing every distillery in Gaston County with a cotton mill. Before his death, his wish became reality.

Three of Love's sons joined their father in the textile industry and worked to acquire and build additional mills in the region. Edgar Love served in the state legislature and as mayor of Lincolnton. His leadership led to the construction of the impressive courthouse which graces downtown Lincolnton and to the development of much of that city's modern infrastructure. James Lee Love was a distinguished professor of mathematics at Harvard University. And in 1952, James Spencer Love, the grandson of R. C. G. Love, transferred equipment from the Gastonia Cotton Manufacturing Company to Burlington to begin Burlington Industries, which would become the largest textile manufacturer in the world.

George Alexander Gray

Born in Mecklenburg County on September 28, 1851 into a family with Piedmont roots predating the American Revolution, George Gray's scientific genius introduced technology to the Southern textile industry. Largely self-trained and self-educated, Gray molded his outstanding character and developed his matchless work ethic during the Civil War and Reconstruction.

In 1861, the nine-year-old lad went to work at a cotton factory near his home. Shortly thereafter, the facility closed and Gray's father died. With the Civil War raging, his mother moved her nine children across the Catawba to Gaston County where as sweeper at the Woodlawn Mill he received

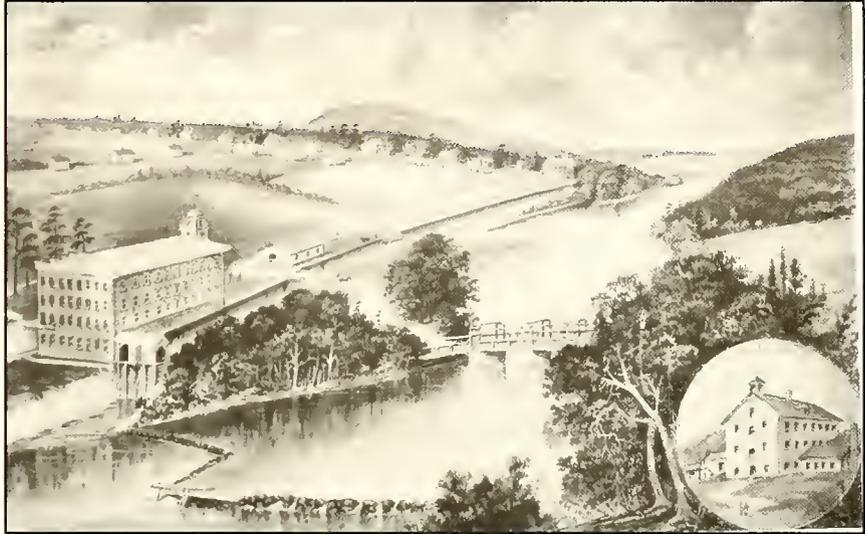


Image: courtesy of Gaston County Museum

ten cents for a ten-to-twelve hour day. At nineteen, he was the acting superintendent of the Woodlawn Mill and had become a master of textile machinery. As a result, the founders of the Charlotte Cotton Mills (the first in that city) selected Gray to equip, start, and operate their facility in 1878 and when McAden opened his mill later, he tapped Gray to start the plant at which Gray masterminded installation of the first electric lights in any southern mill.

As the 1880s closed, Gray saw great potential in Gastonia, then a quiet, sleepy village of three hundred inhabitants possessed of good transportation; a plentiful supply of labor; bounteous raw materials; and abundant sources of fuel. With R. C. G. Love, Gray was a principal in the organization of the Gastonia Cotton Manufacturing Company which his mechanical expertise made one of the first steam-operated plants in North Carolina. From that "old Mill," George Gray went on to found nine of the first eleven textile mills in Gaston County. His Loray Mill (a combination of Love and Gray) was acclaimed as the largest cotton mill under a single roof. Among his many technological innovations was the first electrically-powered mill in the Southern Piedmont.

Highly respected for his forthright, straightforward manner, George Gray was a person of few words. Rather, he was a hard-working man of vision and action whose respect for the opinions of others and sense of humor won friends and admirers. He died in Gastonia on February 8, 1912.

Daniel Efirid Rhyne

A legendary textile manufacturer, businessman, and philanthropist, Daniel Rhyne was born on February 8, 1852 on a farm near Mount Holly to descendants of early German settlers. By the time he was twenty-one years old, Dan Rhyne and his brother constructed a cotton mill near the point where Dutchman's Creek empties into the Catawba River. Over the next sixty years, more than twenty textile plants in Gaston and Lincoln counties were controlled by Rhyne, regarded by his contemporaries as a genius in cotton mill management.

Shrewd in business matters, Rhyne practiced diversification of assets. In addition to his enormous textile empire, the stocky lifelong bachelor owned 15,000 acres in Gaston, Lincoln, Catawba, and neighboring counties. He owned the Piedmont Wagon Company, one of the oldest industries in Catawba County, and he served as president of several banks in Cherryville and Lincolnton.

Known for his philanthropic spirit, Rhyne made significant donations for construction of Lutheran churches in the Piedmont. Due to his generosity, to the name of Lenoir College in Hickory was changed to Lenoir Rhyne College in 1923. Dan Rhyne maintained a great fascination with new inventions throughout life. A local newspaper reported in November 1899 that he was the first person to own an automobile in North Carolina. In 1887, he moved to a large home near one of his mills at Laboratory, just south of Lincolnton. There he died on February 25, 1933.

Robert Frederick Hoke

If any man were destined for greatness based on family roots, then it was Robert Frederick Hoke. Born in Lincolnton on May 27, 1837, Hoke was the son of Michael Hoke, a distinguished attorney and statesman who came within 3,000 votes of being elected governor of North Carolina in 1844. Robert's grandfather, John Hoke, was a principal in the first cotton factory south of the Potomac River, and one great grandfather served as an officer in the Continental Army and another was a member of the Continental Congress who dispatched Daniel Boone to explore the frontier.

At the outbreak of the Civil War, Hoke, then twenty-three years old, volunteered for military duty and was elected a second lieutenant in Company K of the 1st North Carolina. He rendered conspicuous service in the first Confederate victory at Bethel, Virginia, and began a rapid rise in Robert E. Lee's Army of Northern Virginia. A talented and hard-hitting young officer, Hoke was promoted to brigadier general in January 1863. A year later, he led 7,000 men in an attack on the Union stronghold at Plymouth, North Carolina; the most complete, most competent victory that the Confederacy would earn in the Tar Heel state. As a reward, Jefferson Davis promoted Hoke to major general, making the twenty-six-year-old the youngest man to hold that rank in the Confederate army. That battlefield promotion was the only one of its kind conferred by Jefferson Davis.

For the remainder of 1864, Major General Hoke skillfully led his division in the fierce battles that raged in Virginia. During the last five months of the war, he defended his native state at Fort Fisher, Kinston, and Bentonville (the largest battle fought in North Carolina). Hoke and his forces surrendered to General William T. Sherman in early May 1865 at Bennett Place near Durham. As a consequence, Robert Hoke was one of only a small handful of Americans who were involved in both the first battle of the war and in the last major surrender.

When the war was over, it was over forever for Hoke. He rode his big black warhorse, "Old Joe," home to Lincolnton in the spring of 1865, promptly hitched it to a plow, and set about making a crop to feed his family. To the revered Southern hero, it was simply "the duty of the moment." For the rest of his life, Robert Hoke went about rebuilding his state which he had seen ravaged by war. First, he turned his attention to the mineral resources in western and central North Carolina. After reopening the Cranberry Iron Mine, the young "retired" general and his associates developed the East Tennessee and Western North Carolina Railroad to transport ore across the mountains to Johnson City, Tennessee. Hoke then built the railroad from Monroe, North Carolina to Atlanta, Georgia (the basis for the Seaboard Coast Line). Hoke's reconstruction of southern railroads provided modern transportation for the textile industry in the late nineteenth and early twentieth centuries.

Among Hoke's children was Dr. Michael Hoke, the father of modern orthopedic surgery in the United States, the founder of the Shriners' Hospitals for crippled and burned children, and President Franklin Roosevelt's personal physician. In 1911, the state legislature created North Carolina's 99th county and named it for a living legend, Robert F. Hoke, called "North Carolina's most distinguished soldier" by noted historian Samuel A. Ashe. General Robert Frederick Hoke died on July 3, 1912 in Lincolnton.

Epilogue

At the onset of the twenty-first century, as our nation faces the enormous challenges of an ever-changing world economy, may the dedication and the vision of our past captains of industry in the North Carolina Piedmont, inspire our citizens to new heights of success.

The region's industrial history is documented by *The Carolinas Textile Exhibit; The Ties That Bind*, a permanent gallery in the Gaston County Museum at the original county seat in Dallas, North Carolina. This exhibit tells the story of the people and communities, the economy and the technology of cotton textile manufacturing that transformed the entire region, and changed American life.



Blast furnace used by Wilkes' High Shoals Iron Company, 1867-1874

Charles Wilkes & the 1842 – 1875 High Shoals Iron Manufacturing Company

J. Alan May, Ph.D. and David S. Brose, Ph.D.

Mid-18th century Euro-American moving to this region of the southern Piedmont for agriculture, lumbering and manufacturing found iron ore, limestone and abundant hardwood forests for charcoal production. Its fast-flowing streams and rivers were harnessed to run grist and sawmills and help manufacture common iron tools.

Early iron furnaces were pyramidal stacks of stone built into or near a hill. Fillers carried iron ore, charcoal and limestone across a bridge, to the stack's upper opening. They dumped this charge into the burning furnace where forced blasts of air melted the ore and limestone, smelting out iron.

The trees that hampered farming were needed by this burgeoning industry. For example (<http://www.nps.gov/cato/culthist/char-iron.htm>), between 1859 and 1885 charcoal production at the Catoctin Iron Furnace near Fredrick, Maryland employed 300 woodcutters and consumed timber from 11,000 acres of company land. At Carolina's Madison Iron Furnace, every ton of iron manufactured used 80 bushels of charcoal (a cord of wood yielded 6 bushels of charcoal). Colliers built a chimney in the center of a flat area and stacked 30 to 50 cords or four-foot logs in concentric circles around it. The finished stack, 30-feet in diameter, was covered with leaves and dirt to control air reaching the fire. The collier lived in a simple hut and tended up to seven hearths that smoldered for two weeks until charring was complete.

The Fulenwider family noted iron ore near the High Shoals on the South Fork of the Catawba River and by 1810 dammed that stream to turn the machinery for iron manufacturing. More ironworks were built along Long Creek in Gaston County and Leepers Creek in Lincoln County by 1825. Then, in 1840, a High Shoals Manufacturing Company (HSMC) was chartered with Andrew and John Motz, Eli Hoyle, and Samuel P. Simpson as Directors. Henry Fulenwider was directing agent and superintendent, and John Webster and Alfred Ramsour were clerks at the Forge.

In Lincolnton, in September 1840, title to the forge, furnace, rolling mill, etc. was conveyed to the HSMC and Fulenwider's bond for his half of the land was accepted. Also a bill of sale for 20 Negroes and six wagons and teams with the necessary harness was tendered by the Board, and accepted as part payment of the stock by those subscribed.

In December, 1840, by-laws were accepted, a survey of the land holdings was set for January 1841 and the Board resolved to work forty-five hands for the year 1841: 20 from the company along with H. Fulenwider's 10; A. Motz's 4; J. Motz's 2; S.P. Simpson's 2, Eli Hoyle's 2, and 5 newly hired hands. By January 1841, two books were designed as Stock Holders and Directors Journals and the Board agreed that a exhibit should be prepared by the superintendent and laid before the

Board of Directors as often as they may require. But as the corporation was to discover, problems with these policies arose regarding the 1854 sale to P. W. Groot of High Shoals Manufacturing by A. Hoyle for Hoyle died on the 24th day of February 1854, without taking a mortgage from Groot, and Groot failed to make the payments. W.P. Bynum and Thomas Grier, as the executors of Andrew Hoyle, had to enter on the premises to resell them.

As of mid-19th century Emmons' *Geological Survey of North Carolina* said, "...near the High Shoals, or upon the property known by this name, there are three locations called banks, from which the ore has been obtained....The Ellis ore bank lies in the direction of Kings Mountain. It is a black ore, and the vein is 18 feet wide. Its direction is N. 20 deg. East." (1856:116-117). But Lesley's description, a short time later, noted that the "High Shoals Forge, Puddling Furnace, and Rolling Mill, six miles north of Gaston, Gaston county North Carolina, owned by the High Shoals Mining and Manufacturing Company, has been disused since 1854 and is in ruin" (Lesley 1859:188). The property was sold at public auction 1 January 1859 to A.E. Hervey for \$40,000 and it was then bought by William Sloan for \$43,200 in April 1860.

Iron production was temporarily halted in 1861 by the start of the Civil War. Like other southern economies, the use of slave labor in the iron furnaces and ore deposits had allowed landowners to make tremendous profits. So for \$65,000 Confederate dollars Bynum and Grier sold the HSMC (again) in March 1862 to Robert R. and J. L. Bridgers, two planters and railroad executives from Tarboro who were willing to move their slaves to High Shoals to prevent them from being freed by Union forces operating in coastal Carolina.

By the beginning of 1865 local demand for iron had disappeared and the company went out of operation. R.R. Bridgers was looking to recoup his costs from losing his slaves and he wanted to get back to the railroad business. Bridgers saw Charles Wilkes as a source of capital to fund his return to prosperity, and Wilkes saw the iron business as a means of securing his personal fortune and support for his family.

Upon his return from the 1838-1842 U. S. Exploring Expedition, Wilkes had become involved in the purchase and operation of Mecklenburg County North Carolina gold mines and mill manufacturing owned by his Renwick in-laws. The gold mines included the Maxwell, the McComb (also known as the Charlotte and the St. Catherine), the Catawba, and the Capps mines. During this period Wilkes first met some of the legal problems that would dog him in the region: J. Humphrey Bissell claimed 5/4th of the property Wilkes inherited from his father-in-law; and had to be bought off with 1853 stock certificates for the St. Catherine's Gold Mining Co.

Through the 1850s Charles Wilkes and his sons John and Edmund ran the mining and manufacturing operations in Charlotte. As part of an 1857-58 survey of iron and coal resources for the U.S. Navy, Charles Wilkes had visited the High Shoals property in Gaston County, and in the spring of 1866, F. Winter, a U.S. Geologist, reported to him that, "... the works at the principal

falls or High Shoals proper consist at present of a rolling mill, two refining furnaces, four bloomeries, a puddling furnace, a re-heating furnace, a stamping mill, a nail factory of nine nail and four tack machines and besides these there are at this place four dwelling houses, houses for operatives, blacksmiths and wheelwrights shops, cooperies, outhouses, *etc., etc.*

During the Civil War, Charles Wilkes left North Carolina for Washington to fight with the Union Navy. John and Edmund Wilkes remained in Charlotte, the former running a Naval ordnance yard and the latter serving as occasional construction engineer for R.R. Bridgers' Weldon and Chatham Railroad. After the Civil War, former Union Admiral, Charles Wilkes moved to Gaston County to be with John, the owner and operator of the St. Catherines Mine and the renamed Mecklenburg Iron Works. John cautioned his father, but Charles ultimately made his own financial decisions concerning the High Shoals operation and in 1866 he leased (and tried to purchase and secure legal title to) the High Shoals Iron Works in Gaston and Lincoln counties, N.C.



North Carolina Collection, University of N.C. Library at Chapel Hill

Charles worked closely with John's newly chartered bank to promote investing in the High Shoals Iron Works Company and with advice from a New York promoter put together a million-dollar public stock prospectus (Fleury 1866: Figure 5) but found few takers. Nonetheless, before the end of the year Wilkes with his wife and daughters arrived at High Shoals to begin to pay off the debts he had incurred by reestablishing the iron-making operations, this time with free black labor.

But in October 1867, the Corporate Board of the existing HSMC met to clear up a decade-long series of highly questionable internal transactions. They admitted that many records of the HSMC company since 1854 were lost or destroyed and they formally renounced the earlier sales made by A. Hoyle, as President or Bynum and Grier as trustees. They then directed W.P. Bynum, as "new" President, to sell the High Shoals Manufacturing Company to R.R. and J.L. Bridgers and their associates and assigns and they repealed all other agreements, including those made with Wilkes.

Wilkes believed he had leased the property from Bynum and Grier and so from 1867 through 1871 he worked to restart the collieries and mines and to refurbish the blast furnaces spread over 14,000 acres as well as to build new wooden railroads and milling equipment at High Shoals. But in January 1869, Bynum and Grier were reelected Chairman and Treasurer respectively and without informing Wilkes, the corporation from which Wilkes had mortgaged the High Shoals property transferred its legal ownership and his debt back to the Bridgers, its former operators.

Despite his careful plans and constant lobbying, detailed in his journals and diaries from 1867 through 1870 (Wilkes Papers, Library of Congress), the railroads that Wilkes hoped would carry his newly produced iron goods failed to come to High Shoals. Rather, they served his competitors and his former customers and by the end of 1870 they were bringing the Carolina piedmont manufactories iron from the Great Lakes and the quickly rebuilt Tredegar Works in Richmond at a lower cost than Wilkes could produce it in High shoals. Wilkes shifted High Shoals from producing finished goods to a contract to deliver a season's worth of cast pig iron to Tredegar for reworking (Coulter 1980). Unfortunately, his younger son, Edmund, misappropriated the bank draft that Tredegar sent to pay for it and Wilkes was unable to pay his debts. Between 1868 and 1871, unable to pay the mounting interest on his debts, Wilkes lost to his creditors all but the High Shoals iron works property itself. By 1873, unable to meet tax bills from the money he could earn at the remaining operations on 1086 acres, Wilkes transferred the crops and the house in which he was living to his wife and daughters. Then, with the collapse of the railroad boom and the deepening financial crisis of 1873, Wilkes was forced to close even those operations and leave High Shoals for his former family home in Washington, D.C.

By January 1874 the HSMC and his other creditors began to file claims in the local U. S. Circuit Court against Charles Wilkes. In the fall of that year Bynum sent John Wilkes a final offer to redeem his father's affairs but Charles Wilkes was ill and bankrupt and John's partners in Charlotte forced him to renounce his bank's role in the High Shoals business.

In November 1874 a meeting was held to liquidate the HSMC holdings. After months during which no one offered to buy or lease the High Shoals iron works, the remaining principal agents, Bynum and Grier, sold parcels at 5 to 14 dollars an acre to a list of buyers. Finally, after selling the last 1555 lb lot of old castings for \$17.49 they ended the organization and holdings of the High Shoals Manufacturing Company on August 10, 1876.

In a final ironic note, when it was completed to Lincolnton in 1880 the Chester and Lenoir Railroad came through High Shoals (Separk 1949:164-65). A new High Shoals [Textile] Manufacturing Company was chartered in April 1893 and its mill and dam were built on the ruins of the High Shoals Iron Company (Cope and Wellman 1961:135). Today, even that building is gone leaving only the foundations of Wilkes' house overlooking the dam on the South Fork River.

Comprehensive References

ARCHIVES

Wilkes Family Papers, 1818-1947. Manuscript Collection No. 38, University Of North Carolina – Charlotte NC

Wilkes Family Papers, Manuscript Department; Duke University Library. Durham, NC

Family Papers of John and Jane Wilkes. Robinson-Spangler Room, Public Library of Charlotte/ Mecklenburg County. Charlotte, NC

Charles Wilkes Papers, 1841-1875. Manuscript Division, Library Of Congress, Washington DC

Papers and Workbooks Relating to the Collections of the U.S. Exploring Expedition, the National Museum, the U.S. Museum of Natural History, and the Magnificent Voyagers Exhibition: 1979-1986. Smithsonian Institution Archives, Washington DC

PUBLICATIONS

Adams, Charles Francis, Jr. 1912. The Trent Affair. *American Historical Review: July*.

Allen, Melinda. 1996. Style and function in East Polynesian fish-hooks. *Antiquity* 70:97-116.

Anderson, B. 1991. "Census, Map, Museum" in *Imagined Communities: Reflections on the Origins and Spread of Nationalism*, 2nd edition. London: Verso.

Anonymous. 1845. Review and Offer for Captain Wilkes' Narrarative. *The Southern Literary Messenger*. Richmond

Anonymous. 1909. *High Shoals, North Carolina*. n.p.

Ashe, Samuel A. et al, Editors. *Biographical History of North Carolina*. 8 vols. Raleigh.

Baigell, Matthew. 1984. *A Concise History of American Painting and Sculpture*. New York: Harper Collins.

Barefoot, Daniel W. 1996. *General Robert F. Hoke: Lee's Modest Warrior*. J. F. Blair Co.: Winston-Salem.

Barnard, Noel, ed. 1972. *Early Chinese Art and its Possible Influence in the Pacific Basin*. Vol. 3. New York: Intercultural Arts Press.

Bellwood, Peter. 1975. The Prehistory of Oceania. *Current Anthropology* 16:9-28.

Bolles, Edmund B. 1999. *The Ice Finders: How a Poet, a Professor and a Politician Discovered the Ice Age*. Washington: Counterpoint.

Boswell, D., and J. Evans. 1999. *Representing the Nation: A Reader: Histories, Heritage and Museums*. London: Routledge.

References

- Bradford, James C. [Editor] *Captains of the old Steam Navy: Makers of the American Naval Tradition: 1840-1880*. Annapolis: The Naval Institute Press
- Branson, Louis. 1880. *Branson's North Carolina Business Directory*. Raleigh: privately printed.
- Brengel, Kathrine W. 1982. *The Architectural Heritage of Gaston County, North Carolina*. Gastonia: Commercial Printers, Inc.
- Brooks, Van Wyck. 1947. *The Times of Melville and Whitman*. Boston: E.P. Dutton.
- Brose, David, S. Barbara H. Brose, Kay Moss, Cheryl Moore, Suzanne Simmons and Phillip Reid 1999. *Spring Tonic Guide to the Exhibitions, 19th Century Patent Medicines in America at the Gaston County Museum of Art and History, and Tradition and Treatment 1750-1820 at the Schiele Museum of Natural History*. Gastonia and Dallas
- Brose, Eric Dorn. 1998. *Technology and Science in the Industrializing Nations, 1500-1914*. Atlantic Highlands [NJ]: The Humanities Press.
- Brown, Chandos Michael. 2002. *Benjamin Silliman: A Life in the Young Republic*. Princeton: Princeton University Press.
- Bruce, Kathleen. 1930 *Virginia Iron Manufacture in the Slave Era*. The Century Co., New York.
- Burstyn, Harold. 1999 Seafaring and the Emergence of American Science, in *The Atlantic World of Robert G. Albion*. Edited by Benjamin Larabee. Annapolis: Proceedings of the U.S. Naval Academy.
- Bruse, V. Robert. 1987 *The Launching of Modern American Science*. New York: Knopff.
- Cappon, Lester J. 1932. Iron-Making--A Forgotten Industry of North Carolina. *The North Carolina Historical Review* 9:331-348.
- Cope, Robert F. and Manly W. Wellman. 1961 *The County of Gaston: Two Centuries of A North Carolina Region*. Gastonia: the Gaston Historical Society.
- Coulter, Frank John, Jr. 1980. Reactions to Freedom and Failure: Charles Wilkes and the Workers of High Shoals, North Carolina 1865-1874. Unpublished Masters Thesis in History. University of Maryland, College Park.
- Craven, Wayne. 1994. *American Art: History and Culture*. New York: Brown and Benchmark.
- Dana, James D. 1837. *A System of Mineralogy*. New Haven: Durie & Peck and Hurry & Noyes.
- 1849. *Geology: U.S. Exploring Expedition Volume 10*. Philadelphia: C. Sherman with Atlas, New York: G. Putnam.
- 1872. *Corals and Coral Islands*. New York: Dodd, Mead and Company.

- 1890. *Characteristics of Volcanoes*. New York: Dodd, Mead and Company.
- Dana, James [composer] and James Palmer [Librettist]. 1840. *The Arctic Mariner's Song and The Happy Old Peacock*. Unpublished musical scores. Washington: The Smithsonian Archives
- 1842. *My Tent Beside the Oregon*. Unpublished musical score. Washington: The Smithsonian Archives
- Dana, Richard Henry. 1833. *Two Years Before the Mast*
- Daniels, George H. 1968. *American Science in the Age of Jackson*. New York: Columbia university Press.
- Darwin, Charles. 1839. *Narrative of the surveying Voyages of His Majesty's Ships Adventure and Beagle between the years 1826 and 1836*. [3 Volumes]. New York : 2002 AMX Facsimile Edition.
- 1846. *Geological Observations on South America* . London: Smith, Elder and Co.
- 1851. *Geological Observations on Coral Reefs, Volcanic Islands and on South America*. London: Smith, Elder and Co.
- 1859. *On the Origin of Species*. London: Smith, Elder and Co.
- De Cunzo, LuAnn, and Bernard L. Herman (Editors). 1996. *Historical Archaeology and the Study of American Culture*. Winterthur: The Henry Francis duPont Winterthur Museum
- Dew, Charles. 1974. David Ross and the Oxford Iron Works: A Study of Industrial Slavery in the Early Nineteenth-Century South. *The William and Mary Quarterly* 3:189-224.
- Elliot, Clark A. 1970. *Antebellum American Science: A Thematic and (somenbat bibliographic) Review*.
<http://home.earthlink.net/~claelloit/antebellumsciencereview.htm>
- Emmons, Ebenezer. 1858. A National Foundry in North Carolina. *DeBow's Review* 4:403-409.
- Firth, Raymond. 1947. Bark-Cloth in Tikopia, Solomon Islands. *Man*, 47:69-72.
- Fleury, A. L. 1866. *Report of an Examination of the High Shoals Property of Gaston County, North Carolina: Its iron mines, gold mines, water power, works now on the ground, etc. etc.: what it has already produced and how much more it could produce*. Privately Printed: Pittsburgh.
- Genth, Friedrich A. and W. C. Kerr. 1881. *Geology of North Carolina*. North Carolina Department of Natural Resources, Raleigh.
- Glass, Brent D. 1980. King Midas and Old Rip: The Gold Hill Mining District of North Carolina. Unpublished Ph.D. Dissertation in History. University of North Carolina, Chapel Hill
- Goetzmann, William H. 1972. *Exploration and Empire: The Explorer and Scientist in the Winning of the American West*. New York: Vintage Books.
- 1986. *The West as Imagination*. New York: W. W. Norton

References

- Hahn, S. and J. Prude (Editors). 1985. *The Countryside in the Age of Capitalist Transformation: Essays in the Social History of Rural America*. Chapel Hill: University of North Carolina Press.
- Robert Harris. 2004. Review of "Sea of Glory: America's Voyage of Discovery, the U.S. Exploring Expedition, 1838-1842". by Nathaniel Philbrick. New York Times Sunday Book Review.
- Harrison v Sinclair. 1840. Court Martial held in the case of Passed Midshipman George M. Harrison. Oct 28 – Nov 3, 1840: charges pressed against him by Acting Master George Sinclair, Counsel for the Accused, Asst. Lawyer Silas Holines. Transcription in the Smithsonian Archives of Court Martial Record No 736:1-8. Wilkes Naval Papers, U. S. National Archives.
- Hartley, Edward Neal. 1957. *Ironworks on the Saugus: the Lynn and Braintree Ventures of the Company of Undertakers of the Ironworks in New England*. University of Oklahoma Press, Norman.
- Haskell, Daniel. 1942. *The United States Exploring Expedition, 1838-1842 and its Publications, 1844-1874*. New York Public Library. New York: Greenwood Press.
- Henson, Pamela M. 1996. *Art for Art's Sake* <http://www.fonz.org/zoogoer/zg1996/zgartsci.htm>
- Herman, Jan K. n.d. *Vendoni: Cannibal and Curio*. Department of the Navy, Bureau of Medicine and Surgery. NAVMEDCOM Archives <http://www.navymedicine.med.navy.mil>
- Hill, James D. 1931. Charles Wilkes – Turbulent Scholar of the Old Navy. *United States Naval Institute Proceedings*.
- Hunter, C. L. 1877. *Sketches of Western North Carolina*. Raleigh: The Raleigh News Steam Job Print
- Jenkins, John Stilwell. 1850. *United States Exploring Expeditions. Voyages of the U.S. exploring squadron, commanded by Captain Charles Wilkes of the United States navy, in 1838, 1839, 1840, 1841 and 1842; together with explorations and discoveries made by Admiral D'Urville, Captain Ross, and other navigators and travelers; and an account of the Dead Sea under Lieutenant Lynch*. J.M. Alden: Auburn.
- Kerr, W.C., and George B. Hanna. 1888. *Geology of North Carolina*. North Carolina Department of Natural Resources. Raleigh.
- Kirch, Patrick Vinton. 1985. *Feathered Gods and Fishbooks*. Honolulu: University of Hawaii Press.
- Kornblith, Gary J. 1998. American History to 1877: A Multimedia Approach. <http://www.oberlin.edu/history/GJK/H103syl/Default.html>
- Lesley, J. P. 1859. *Iron Manufacturer's Guide to the Furnaces, Forge's, and Rolling Mills of the United States, with Discussions of Iron as a Chemical Element, an American Ore, and a Manufactured Article in Commerce and in Industry*. J. Wiley, New York..
- Lewis, David. 1982. *The Maori: Heirs of Tane*. London: Orbis Publishing Limited.

- Licht, Walter. 1995. *Industrializing America: The Nineteenth Century*. Baltimore: The Johns Hopkins University Press.
- Lindbeck, Jennifer and Ashton Nichols. n.d. Titian Peale II (1799-1885)
<http://www.dickinson.edu/~nicholsa/Romnat/tpeale.htm>
- Linnekin, Jocelyn. 1991. Fine mats and money: Contending exchange paradigms in colonial Samoa. *Anthropological Quarterly*, 64:1-15.
- Love, James Lee. 1949 *R. C. G. Love: A Builder of the New South*. n.p.
- Lloyd, Christopher 1947. *Lord Cochrane, Seaman, Radical, Liberator: A Life of Thomas Lord Cochrane, 10th Earl of Dundonald, 1775-1860*. New York: Henry Holt and Co., Inc [1998 Edition].
- Moore, Albert C. 1995. *Arts in the Religions of the Pacific*. London: Cassell.
- Morgan, William J., David B. Tyler, Joye L. Leonhart and Mary F. Loughlin. 1978. *Autobiography of Rear Admiral Charles Wilkes U. S. Navy 1798-1877* Washington: Naval History Division, Department of the Navy
- Musicant, Ivan. 1995. *Divided Waters: The Naval History of the Civil War*. New York: Harper Collins.
- Palmer, James. 1843. *Thulia: A Tale of the Antarctic*. New York: Samuel Colman.
- Philbrick, Nathaniel. 2003. *Sea of Glory: America's Voyage of Discovery, the U.S. Exploring Expedition, 1838-1842*. New York: Viking Press.
- Pinner, M. 1866. *Programme for the Development of the High Shoals Property of Gaston County, North Carolina*. Privately Printed Prospectus: Pittsburgh.
- Poesch, Jessie. 1961. *Titian Ramsey Peale, 1779-1885, and his Journals of the Wilkes Expedition*. Philadelphia: The American Philosophical Society.
- Ponko, V. Jr. 1974. *Ships, Seas and Scientists*. Annapolis; The Naval Academy Press.
- Poole, Keith T. 1999. American Economic History; Graduate School of Industrial Administration, Carnegie-Mellon University. <http://voteview.uh.edu/aeh.htm>
- Pool, J. Lawrence. 1982. *America's Valley Forges and Valley*. The Studley Press, Inc., Dalton.
- Powell, William S. 1979-96. *Dictionary of North Carolina Biography*. . 6 vol University of North Carolina: Chapel Hill.
- Pursell, Carroll. 1995. *The Machine in America: A Social History of Technology*. Baltimore: The Johns Hopkins University Press.
- Pritchard, Mary J. 1984. *Siapo: Bark Cloth Art of Samoa*. American Samoa: Council on Culture, Arts and Humanities.

References

- Ransom, Robert and Richard Sutch. 1979. The Impact of Emancipation of Southern Agrioculture. *Explorations in Economic History*. 12:1-28.
- Rinder, Lawrence. 1998. Painting around the fire: Maisin culture and collectivity. *Art Journal*, 57:60-68.
- Rogers, Mary-Alice (Editor). 1987. *American Paradise: The World of the Hudson River School*. The Metropolitan Museum of Art: New York
- Rosenblum, Robert. 1984. *Nineteenth Century Art*. New York: Prentice Hall and Harry Ahrhms.
- Schneider, Jane and Annette B. Weiner. 1986. Cloth and the Organization Human Experience. *Current Anthropology*. 27: 178-184.
- Scott, Carole E. *American Economic History: A Study of Technology to 1920*. <http://freepages.history.rootsweb.com/~cescott/economics.html>
- Separk, Joseph H. 1949. *Gastonia and Gaston County: 1846-1949*. Joseph H. Separk, Gastonia, NC.
- Sherrill, William L. 1972. *The Annals of Lincoln County*. Lincolnton: Lincoln County Historical Society
- Siers, James. 1985. *Fiji Celebration*. New York: St. Martins Press.
- Silverberg, Robert. 1968. *Stormy Voyager: The Story of Charles Wilkes*. New York: J. B. Lippencott Co.
- Smithsonian Institution. 1854-58. *Annual Report of the Board of Regents*. Washington. Smithsonian Institution.
- Stein, Roger B. 1986. Artifact as Ideology. pp 23-51 in *In Pursuit of Beauty: Americans and the Aesthetic Movement*. New York: The Metropolitan Museum of Art.
- Stuckey, Jasper L. 1965. *North Carolina: Its Geology and Mineral Resources*. State University Print Shop, Raleigh.
- Thomas, Nicholas. 1989. Material Culture and Colonial Power: Ethnological Collecting and the Establishment of Colonial Rule in Fiji. *Man*, 24:41-56.
- 1991. *Entangled Objects: Exchange, Material Culture, and Colonialism in the Pacific*. Cambridge: Harvard University Press.
- Tolstoy, Paul. 1991. Paper Route: Were the manufacture and use of bark cloth introduced into Mesoamerica from Asia? *Natural History*, 6:6-14.
- Tyng, Charles. 1870. *Before the Wind: The Memoir of an American Sea Captain 1808-1833*. Susan Fels, Editor. New York: Viking Penguin.
- Viola, Herman and Carolyn Margolis, Editors. 1985. *Magnificent Voyagers: The U.S. Exploring Expedition 1838-1842*. Washington: The Smithsonian Institution Press.

- Walker, Joseph E. 1966 *Hoperell Village: A Social and Economic History of an Iron Making Community*. University of Pennsylvania Press, Philadelphia.
- Walsh, K. 1992. *The representation of the past: museums and heritage in the post-modern world*. London & New York: Routledge.
- Weiner, Annette. 1994. Cultural Difference and the Density of Objects. *American Ethnologist*, 21:391-403.
- Weiner, Annette. 1985. Inalienable Wealth. *American Ethnologist*, 12:210-227.
- Weiner, Annette B. and Jane Schneider, Editors. 1989. *Cloth and the Human Experience*. Washington D.C: Smithsonian Institution Press.
- Wilford, J. N. 1999. *Some Observations on the Role of Science in Natural History Museums*. Joint Annual Meeting of the Association for Systematic Collections and the Association of Science Museum Directors. AAM Annual Meeting, April 1999 Cleveland, Ohio.
- Wilkes, Charles. 1845. *Narrative of the United States Exploring Expedition in the Years 1838, 1839, 1840, 1841 and 1842*. Philadelphia: Lea and Blanchard. 5 vols.
- 1849 *Western America: Oregon Before Emigration*. Philadelphia: Lea and Blanchard.
 - 1851 *Meteorology* Philadelphia: C. Sherman.
 - 1857 *Theory of Zodiacal Light*. Philadelphia: C. Sherman & Son, Printers.
 - 1858 *Hydrography*. Philadelphia: C. Sherman.
 - 1859 *On the Circulation of the Oceans*. Philadelphia: C. Sherman.
 - 1859 *Report on the Examination of the Deep River District, North Carolina*. Department of the Navy, Washington DC
- Williams, Robert L. 1998. *Gaston County: A Pictorial History*. Virginia Beach: The Donning Company.
- Winter, Fredrick. 1865. *Report to Admiral Wilkes on the High Shoals Property in Gaston County, North Carolina*. Original handwritten report in the Wilkes Papers, Library of Congress Manuscript Division.
- Wright, Gavin. 1980. *The Political Economy of the Cotton South*. New York: W. W. Norton.
- WORLD WIDE WEB
- American Social and Economic History <http://www.si.edu/resource/faq/nmah/start.htm>
- American History to 1877: A Multimedia Approach. Gary J. Kornblith. 1998 <http://ww.oberlin.edu/history/GJK/H103syl/Default.html>
- Charcoal/Iron Industry <http://www.nps.gov/cato/culthist/char-iron.htm>

References

Catoctin Iron Furnace <http://www.thurmontmd.net/cotin.htm>

African American Influence in the Iron Industry <http://www.nps.gov/cato/culthist/african.htm>

Mount Shasta as a visual resource <http://www.siskiyou.edu/shasta/art/e40.htm>

Antarctic image chronology <http://www.antarctic-circle.orgg/fox.htm>

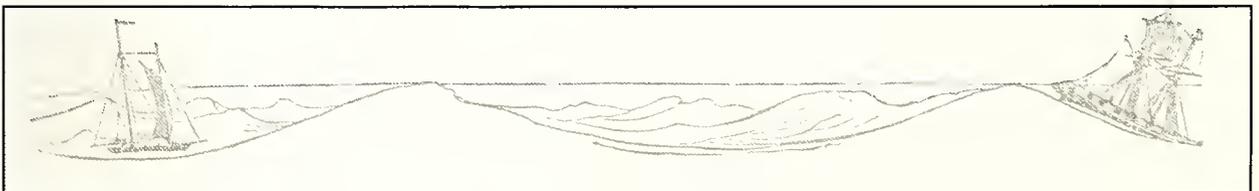
Agate and Drayton botanical drawings <http://www.huh.harvard.edu/libraries/expinv/Wilkes.htm>

Full text of Wilkes' *Narrative* and illustrations and descriptions of Ex Ex: scientific Atlases published by the U. S. government:

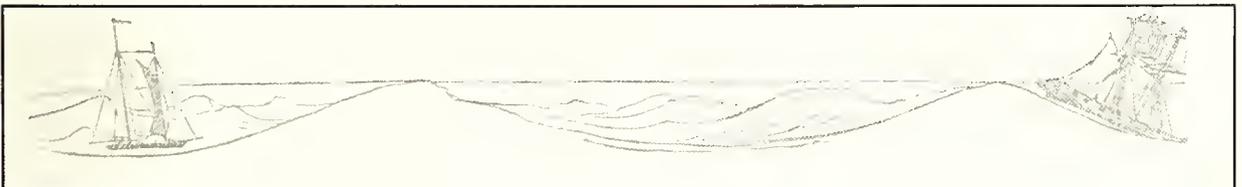
<http://www.sil.si.edu/digitalcollections/usexex/>



North Carolina Humanities Council
Weaving Cultures and Communities



notes



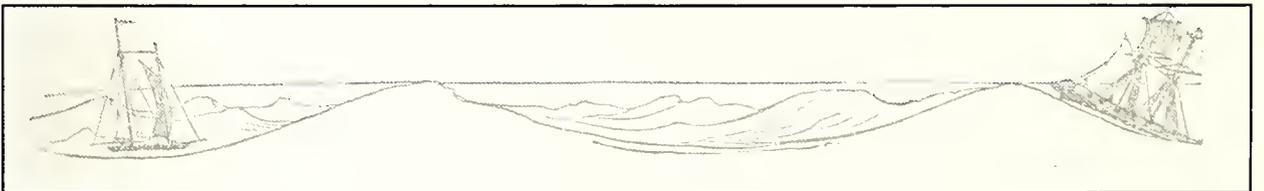




Image: Courtesy Dibner Library, National Museum of American History, Smithsonian Institution.

Wilkes Atlas - *Mammalogy and Ornithology*, Volume VIII.

