Abstract

William H. Thiesen. POLICY, TECHNOLOGY, AND CHANGE: THE ABCD WARSHIP PROGRAM AND THE TRANSFORMATION OF AMERICAN NAVAL POLICY IN THE 1880S. (Under the direction of Dr. William N. Still, Jr.) Program in Maritime History and Nautical Archaeology, July 1993.

The purpose of this thesis is to examine America's naval transformation of the 1880s, a decade of naval history largely neglected by historians. Using the ABCD warship program as a benchmark of changing American naval traditions, the author examines the various forces at work on naval policy after the Civil War. The struggle between political factions within and without the navy and competing philosophies over the role of technology caused American naval decline in the years immediately following the Civil War. By the 1890s, however, chaos had turned to consensus, as naval personnel and politicians agreed upon the new direction for a U. S. Navy preparing to enter the twentieth century.

The author discusses the complex forces influencing naval policy between the Civil War and the 1880s and the transformation of these disparate elements into a unified movement behind the naval policy of the 1890s. To do this, he uses the ABCD warships as a metaphor for transformation of the Navy Department and navy-related industry. He employs various methodologies to present a framework for this transformation. These include the theories of historians Elting E. Morison as well as Robert L. Beisner, whose paradigm-based formula of American policy shift is based on the Thomas S. Kuhn's philosophy of "scientific revolution."

Whereas most authors and naval historians of the late-nineteenth century have lumped the ABCD ships and the 1880s into the "new navy" and the period of growth experienced by the navy in the 1890s, the author finds such conclusions too simplistic. The ABCDs and the 1880s represented a rapid transition between America's old navy and the new navy. The author concludes that the 1880s was a pivotal decade in American naval development that cannot be categorized within the context of the old navy or the new, but deserves to stand alone as a transitional period for the U. S. Navy.

POLICY, TECHNOLOGY, AND CHANGE: THE ABCD WARSHIP PROGRAM AND THE TRANSFORMATION OF AMERICAN NAVAL POLICY IN THE 1880S

A Thesis
Presented to
the Faculty of the Department of History
East Carolina University

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts in History

by
William H. Thiesen
July 1993

ACKNOWLEDGEMENTS

I would like to thank Dr. William N. Still, Jr. Director of the Program in Maritime History and Nautical Archaeology for his help and guidance throughout my stay at East Carolina University. I would also like to thank Drs. Michael A. Palmer and Charles W. Calhoun of the Department of History, East Carolina University, and Dr. Alex Roland of Duke University, for their patience in assisting me with this manuscript. Drs. Carl E. Swanson and Donald H. Parkerson of the Department of History, East Carolina University, have also been of great help in my academic pursuits. Ms. Pat Guyette and the Interlibrary Loan staff as well as the Microforms staff at Joyner Library, East Carolina University, have provided me with numerous invaluable resources. Last, but most importantly, I am grateful to my wife, Mary, for her patience and help while I researched this topic.

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Introduction

The late-nineteenth century was an era of reformation and transition in the United States. Immediately following the Civil War, America busied itself with reconstruction and settling its western frontier. This self-absorption was encouraged by the lack of any foreign military threat. In a few years, the strength of the U. S. Navy declined from its impressive wartime levels to that of a third-rate "peacetime" navy. By the 1890s, the United States had shed its isolationism and embraced a mildly expansionist, outward-looking foreign policy. The United States gradually assumed a role as a world naval power as a result of this new sense of forcefulness. The combination of various forces in the 1880s provided the catalyst for this rapid change in foreign and naval policy.

This thesis examines the development of the modern American navy during the 1880s. In the course of that decade, the U. S. Navy embraced new trends, such as the professionalization of its personnel, mechanization of the fleet, transition to a new naval strategy, and closer ties between the navy and steelmakers, thereby laying the groundwork for the phenomenal growth of the navy in the 1890s. Without the basis of reforms that occurred during the 1880s, America's "new navy" could not have emerged in the 1890s

The development of the ABCD warships, so designated for their names *Atlanta, Boston, Chicago*, and *Dolphin*, marked the transition from old to new that occurred during the 1880s. Constructed at the nadir of America's post-Civil War naval decline, the ABCDs began the

rebuilding process that led to the new navy of the 1890s. Through their design, the ABCD warships symbolized the forces of tradition and progressivism struggling for control over naval policy shortly before America entered the twentieth century. More than symbols of an age, the ABCDs fostered technological change in the navy and an interdependent relationship between the navy and American industry.

The 1880s was a period of struggle between two schools of naval thinking: the "marlinspike school" and that of the "Young Turks."

The marlinspike school believed a sailor acquired command ability through battle experience and developed character by sailing a ship, not operating a coal steamship. For years, adherents to the marlinspike school supported a commerce-raiding strategy, citing the success of the Confederate raider *Alabama*, choosing to ignore the fact that Northern merchant fleet losses were insignificant when compared to the damage caused by the Union blockade and occupation of the littoral South. Nevertheless, developing a fleet large enough to enforce a blockade invited extraordinary cost, which the postwar Congress wished to avoid.[1]

The second school, the "Young Turks," comprised engineers and young naval officers who argued for the complete retirement of sail power in favor of steam propulsion and the introduction of the latest naval technology. These individuals realized that mechanization evolved continuously despite the naval establishment's emotional

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[1] Harold Sprout and Margaret Sprout, *The Rise of American Naval Power* (Princeton: Princeton University Press, 1939), 195-196.

attachment to familiar, older technologies. The U. S. Navy had to adapt to a world of rapid industrialization or content itself with a third-rate fleet. Through a gradual process of attrition and a growing awareness of the rapidity of technological change, the point of view of these younger officers and engineers ultimately prevailed.

During the immediate post-Civil War era, members of the marlinspike school, such as Admiral David Dixon Porter, prevented the adoption of new naval technology at a rate comparable to that of foreign fleets. While historian Kenneth J. Hagan disputes the charge that Porter opposed technological change by pointing out minor contributions he made to the Naval Academy's engineering curriculum, such contributions pale when compared to the short-sighted naval policy Porter and his followers supported after the Civil War.[2]

Under the direction of aging line officers such as Porter and Rear Admiral Louis M. Goldsborough, American naval policy reverted to that of the pre-Civil War period. For example, in September 1868, the Goldsborough Board, a panel of line officers charged by the navy with the task of assessing the capabilities of the commerce raider *Wampanoag*, condemned the swift vessel, despite the fact that she held the world's speed record for over a decade and posed the only American threat to foreign merchant fleets in the late-nineteenth

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2 Kenneth J. Hagan, "Admiral David Dixon Porter, Strategist for a Navy in Transition," United States Naval Institute *Proceedings* 94 (July 1968), 140-143.

century.[3] Porter established a naval policy, justified in part as an economy measure, whereby captains paid for coal burned when steaming under anything but emergency conditions. Navigating under sail rather than steam became the rule in the years following the war. Porter stripped the engineers of their rank and reduced their pay. Unfortunately, they were the naval personnel best suited to modernize the fleet. In establishing these negativist policies, Porter delayed the modernization of the navy for nearly two decades.

The marlinspike school could not halt modernization forever. Even Porter came to recognize that foreign navies vastly outclassed the navy's wooden sailing fleet. His philosophy that sailors could only develop command skills on a tall ship did not justify an obsolete navy. Gradually, forces favorable to new technology prevailed, while the ranks of "old salts" lost their influence over naval policy.

Young line officers, steeped in the latest naval technology, supplanted the older officers. These "Young Turks" grew up during a period of rapid technological change. Consequently, when they joined the officer ranks they actively promoted development to bring the navy up to modern standards.[4]

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[3] Frank M. Bennett, *The Steam Navy of the United States: A History of the Growth of the Steam Vessel of War in the U. S. Navy, and of the Naval Engineer Corps* (Pittsburgh: W. T. Nicholson, 1891), 577-78; and Lance C. Buhl, "Mariners and Machines: Resistance to Technological Change in the American Navy, 1865-1869," *The Journal of American History* 61, no. 3 (December 1974), 703.

These younger officers saw the future of naval technology more clearly than did their elders. Moral force or not, sailing men-of-war did not pave the way to the future. Moreover, the new line officers, unlike their predecessors, cooperated with the engineers. Working together, the Young Turks and engineers gradually gained the upper hand over the marlinspike school and new technology could evolve unimpeded.

The ABCD warships represented the struggle between traditionalists and progressives taking place in the 1880s. The ABCDs combined the old American naval strategy of *guerre de course* with the latest technology. Due to pressure from the marlinspike school, the ABCDs were required to carry a full set of sails. The influence of engineers and the Young Turks succeeded in getting state of the art materials and weapons incorporated into their designs. As a consequence of these contending influences, the ABCDs were a product of two different schools of thought and an initial experiment in modern American warship production.

Several historians have incorporated aspects of the ABCD warship program into their works, but they have all neglected the importance of these vessels on American naval development. Leonard Swann devotes a chapter to the ABCDs in his biography of John Roach, the famous shipbuilder. Benjamin F. Cooling includes the ABCDs briefly in his book, *Gray Steel and Blue Water Navy*, which documents the

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[4] Peter Karsten, *The Naval Aristocracy: The Golden Age of Annapolis and the Emergence of Modern American Navalism* (New York: Free Press, 1972), 293-298.

birth of America's naval-industrial complex, the relationship between the navy and private industry. Books written by Norman Friedman and Ivan Musicant concerning American cruisers also touch briefly on these ships in passing on the way to more famous cruisers laid down in later years. Even Elting E. Morison, historian of naval technology in the late-nineteenth century, neglected to study the ABCDs. Walter R. Herrick has touched only briefly on the ABCD warships in his book, *The American Naval Revolution.* While historians have hinted at the ABCD's significance, none has examined them in detail.[5]

The ABCDs sparked changes in five different civilian- and service-related areas. The ABCD program provided the initial demand that started America's rolled-steel industry; offered a much-needed opportunity to experiment with new technology and tactics, such as fleet tactics; renewed civilian and service interest in the navy and helped swing public support behind future naval expansion; and led indirectly to the growth of America's naval-industrial complex.

The *Dolphin,* the first ABCD ship to be constructed, probably set the record for first-time employment of new designs in an American

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5 Leonard Alexander Swann, *John Roach: Maritime Entrepreneur* (Annapolis: United States Naval Institute Press, 1965); Benjamin Franklin Cooling, *Gray Steel and Blue Water Navy: The Formative Years of America's Military-Industrial Complex, 1881-1917* (Hamden, Conn.: Archon Books, 1979); Norman Friedman, *U. S. Cruisers* (Annapolis: United States Naval Institute Press, 1984); Ivan Musicant, *U. S. Armored Cruisers: A Design and Operational History* (Annapolis: United States Naval Institute Press, 1985); Elting E. Morison, *Men, Machines and Modern Times* (Cambridge, Mass.: The M. I. T. Press, 1966); and Walter R. Herrick, Jr., *The American Naval Revolution* (Baton Rouge: Louisiana State University Press, 1966).

warship. Indeed, like many first attempts, construction methods had to be adapted from past experience to construct the *Dolphin*. With the introduction of exotic materials and new technology, she began a whole new genre of warship construction. The navy had to discard its previous design methods and construction techniques and adopt new ones to solve construction problems. The ABCD warships taught naval engineers lessons that greatly improved later shipbuilding methods.

The ABCDs were indirectly responsible for the emergence of the naval-industrial complex. To improve warship design and construction methods, an interdependent relationship developed between the navy and private industry.

Reminiscent of Thomas S. Kuhn's theory of "scientific revolution" and the emergence of new paradigms, the forces supporting new technology gradually gained overpowering support.[6] Older officers opposed the transition to a new technology until the reasoning against the old school became undeniable. Fears of foreign naval threats in the Western Hemisphere grew in the early 1880s with the War in the Pacific between Chile and Peru, French attempts to build the Panama Canal, and the Berlin West African Conference, where imperialist European nations established the ground rules for dividing the world. The course of events supported those who argued that the United States could no longer hide behind the

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[6] Thomas S. Kuhn, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1962), 204.

protection of the oceans; America required a modern naval force. The late-nineteenth-century imperial explosion became a catalyst, diverting support away from one paradigm to another, that of a powerless peace-time navy to one worthy of a world power. By 1890, civilian and service opinion had changed from antinavalist to navalist and naval technology had evolved from wood and sail to steel and steam.

Kuhn's colleague at MIT, Elting Morison, whose own theory of technology and society resembles that of the former's "scientific revolution," overlooked the significance of the ABCD warship program and the 1880s to American naval development. Instead, Morison studied the influence of Mahanian policy on naval technology. He agrees that change results from a gradual escalation of tension between two entrenched forces, one resistant to change and one advocating it, but in Morison's view, an outside force intervenes to cause the shift because institutions such as the military cannot reform themselves from within. This outside factor, such as political influence or a new naval policy, forces the establishment to adapt to new circumstances. In the 1880s, the outside factor that supported the growing civilian and service consensus in favor of naval renewal was the increasing threat of international imperialism.

The 1880s marked the beginning of the transition from wooden sailing warships to steel, steam-powered cruisers. Since the navy had hesitated for years, and built few iron oceangoing warships, this change occurred within a decade. In 1885, the navy had one small

steel dispatch vessel, but by 1898 it had amassed a fleet of steel warships powerful enough to defeat the Spanish navy.

The 1880s were a transitional stage for the U. S. Navy. As an inward-looking America began to look outward, the political partisanship of an antinavalist, parsimonious Congress concerned only with questions of whose supporters gained from naval shipbuilding, gave way to a new navalist national consensus that would soon make of the navy the nation's first line of defense. A new era of naval expansion and innovation began, a period of uninterrupted growth that would last through the First World War. The ABCD program marked the point of transition between the old navy and the new..

Chapter One

WHAT HAPPENED TO THE NAVY?: AN EXAMINATION OF THE "DARK AGES," 1865-1885

> His gaze was meditative, reminiscent, perhaps sentimental. "Où sont les neiges d'antan?" Whatever their present merits as fighting machines, he saw before him an historical memento, sweeping gently, doubtless, the chords of youthful memories. "Oui, oui!" he said at last; "l'ancien systême. Nous l'avons eu." It was a summary of American naval policy during the twenty years following 1865; we "had" things which other nations "had had."[1]

In his autobiography *From Sail to Steam,* Alfred Thayer Mahan recounted how a French naval officer was moved to nostalgic recollection of his youth in the service after observing the obsolete weapons on board the USS *Wachusett* in 1884. Mahan's observations underscore the challenges that faced America's post-Civil War navy.

Throughout the twenty-year period from 1865 to 1885, American naval policy lacked direction. Divided opinion on the strategic role of the navy, lack of public support for naval expansion, and an isolationist attitude toward foreign policy contributed to this state of affairs. In order to understand how technology became, in Lance Buhl's words, "a pawn in the grand chess game of social conflict," one must have some knowledge of how various forces influenced naval policy during the postwar period.[2]

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1 A. T. Mahan, *From Sail to Steam: Recollections of Naval Life* (New York: Harper and Brothers Publishers, 1907), 197.

2 Lance C. Buhl, "Mariners and Machines: Resistance to Technological Change in the American Navy, 1865-1869," *Journal of American History* 61, no. 3 (December 1974), 727.

What caused such dissention and lack of consensus during the years intervening between the Civil War and construction of the first ABCD warship, USS *Dolphin*? What political, military, and diplomatic trends influenced American naval policy during a period referred to by Robert G. Albion as the navy's "Dark Ages?"[3] What forces were responsible for the postwar naval decline? This chapter will attempt to answer these questions and identify the origins of naval renewal, such as an increased consensus on naval policy within the officer ranks and bipartisan support for naval development that led to the American naval renaissance of the 1890s.

The most important individuals responsible for the direction of the navy in the 1880s were the navy secretaries. Historians have disagreed on which secretary presided over the transition from old to new. For example, Livingston Hunt supported his ancestor William H. Hunt's claim to the title in a United States Naval Institute *Proceedings* article in March 1905:

> When such intelligent newspapers as the New York Sun, the Baltimore Sun, and the Washington Post publish editorials, as they have within the past year, referring to ex-Secretary Wm. E. Chandler or to the late Mr. Whitney as the founder of our modern steel navy, it is time to set them and their readers right, lest the man to whom the credit is really due should not receive the universal recognition to which he is entitled.[4]

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[3] Robert G. Albion, *Makers of Naval Policy, 1798-1947*, ed. Rowena Reed (Annapolis: United States Naval Institute Press, 1980), 200.

[4] Pay Inspector Livingston Hunt, "Founder of the New Navy," United States Naval Institute *Proceedings* 31, no. 113 (March 1905), 173.

The spirit of American naval renewal emerged gradually from the political ferment of the 1870s. A consensus began to form among Republicans, pushing for naval expansion, and Democrats, paying closer attention to the navy's books because of alleged Republican fraud. While the drive for America's naval rejuvenation developed slowly, by the middle 1880s, the navy quickly gained public support. Any group could use the sobriquet "antinavalist" to denounce political opponents. On the other hand, policy makers prized the label "father" of America's "new navy." Officers and historians have bestowed this honor on three different navy secretaries involved with the ABCD program by officers and historians.

Accepting the navy secretaryship in March 1881 from James A. Garfield, William H. Hunt initiated the rejuvenation of the U. S. Navy. A man of "high character and ability" with a legal background and a son serving as a lieutenant in the navy, Judge Hunt was the right man for the job of reformer.[5] Hunt began the drive for naval reforms, even though the brevity of his tenure prevented him from pushing them to completion. He established the Office of Naval Intelligence, a branch of the department that later became an effective tool for monitoring naval developments occurring in foreign countries. The first Naval Advisory Board, however, was Hunt's most important contribution to the U. S. Navy.

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5 Bradley A. Fiske, *From Midshipman to Rear-Admiral* (New York: The Century Company, 1919), 80.

In June 1881, shortly after gaining office, Hunt formed the Naval Advisory Board, without any authority from Congress. Composed of fourteen members from both the line officer and engineer ranks, the board proved unwieldy and divisive. The board's proposal for the construction of $29,507,000 worth of ironclads, steel cruisers, wooden gunboats, and torpedo boats, justified by the navy's rotting wooden fleet, met with little enthusiasm in the parsimonious Congress. The proposal, however, motivated legislators to pass the Act of 5 August 1882, which provided for the building of America's first two steel warships and the establishment of a second Naval Advisory Board to oversee their construction.[6] Even though the first Naval Advisory Board failed to move lawmakers to authorize its own construction proposal, it laid the groundwork for the authorization and planning of the ABCD warships.

By 1882, both the first board and Hunt were gone. Hunt's term in office was cut short by the assassination of James A. Garfield in July 1881. Garfield's successor, Chester A. Arthur, dismissed Hunt for allegedly rejecting a request by a group of Virginia congressmen seeking assurances of repair work for the Norfolk Navy Yard. To retain the loyalty of Senator William Mahone's Independent Republicans, or "readjusters," and fulfill an obligation to James G. Blaine's Republican faction, Arthur used this incident as an excuse to replace Hunt with the influential William E. Chandler (Figure 1).

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6 47 Cong., 1 sess., REPORT OF THE BOARD, "Report of the Secretary of the Navy," *House Exec. Doc. 1, Part 3,* 1881, 27-38; United States *Statutes at Large,* vol. XXII, 291-93.

After only thirteen months of faithful service as navy secretary, Hunt reluctantly accepted the post of minister to Russia, believing his treatment tantamount to dismissal. He died in February 1884, in St. Petersburg, from weather-induced illness.[7]

Hunt's successor, William E. Chandler, was a loyal and powerful Republican party organizer whom Democrats loathed and distrusted. What Democrats feared most was the power of a large budget and great political influence in the hands of an astute Republican party organizer such as Chandler. Making his start as a Washington lobbyist, Chandler quickly rose in the Republican party organization. Elected as Secretary of the Republican National Committee in 1868, he served for twelve years and played a leading role in the compromise that gave Rutherford B. Hayes the election over Democrat Samuel J. Tilden in 1876. Chandler secured crucial electoral votes in Louisiana and South Carolina, and insured Republican control of the Florida board of electors under suspicious circumstances.[8] In 1880 it was also Chandler who clinched the presidential nomination for Garfield by swinging Blaine's votes behind Garfield. Chester A. Arthur needed a cabinet member with

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[7] New York *World*, April 7, 1882; Thomas Hunt, *The Life of William H. Hunt* (Battleboro, Vt.: E. L. Hildreth and Company, 1922), 253-257; and William Scott Peterson, "The Navy in the Doldrums: The Influence of Politics and Technology on the Decline and Rejuvenation of the American Fleet, 1866-1886" (Ph.D. diss., University of Illinois, 1986), 184.

[8] Leon Burr Richardson, *William E. Chandler: Republican* (New York: Dodd, Meade and Company, 1940).51-200; Peterson, "The Navy in the Doldrums," 185; and Walter R. Herrick, "William E. Chandler, 17 April 1882-6 March 1885," *American Secretaries of the Navy*, ed. Paolo Coletta (Annapolis: Naval Institute Press, 1980), 398.

important connections, such as Chandler's, to improve his own party standing.

Throughout his tenure as secretary, Democratic congressmen suspected and accused Chandler of graft and corruption. Representative and industrialist Abram S. Hewitt, who had served as Executive Chairman of the Democratic National Committee during the 1876 presidential campaign, retained a particular dislike of Chandler. Hewitt accused Chandler of withholding proceeds from the sale of condemned navy ships for Republican campaign purposes. Chandler submitted evidence that he had turned over the cash to the Treasury and Hewitt had to withdraw his accusation.[9]

Many naval officers such as Bradley Fiske felt Chandler had been unfairly accused, believing that he "was entirely free from any suspicion of financial dishonesty and was an energetic and forceful man."[10] Even the typically anti-Chandler *Harper's Weekly* agreed:

> . . . there has been no authentic charge or evidence of a wasteful or corrupt use of public money in the Secretary's management of the navy, and to say that the United States shall not have a proper navy because 'BILL CHANDLER' [sic] is Secretary is a saying so inexpressively foolish that no capable member of Congress would repeat it.[11]

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9 47 Cong., 1 sess., *Congressional Record,* 5458-68; Peterson, "The Navy in the Doldrums," 185-187; Richardson, *William E. Chandler,* 300-301; and Leonard Alexander Swann, Jr., *John Roach: Maritime Entrepreneur* (Annapolis: United States Naval Institute, 1965), 168-169.

10 Fiske, *Midshipman to Rear-Admiral,* 81.

11 *Harper's Weekly,* April 26, 1884.

Any assessment of Chandler's administration is incomplete without first examining the forces opposing his reforms. Initially, Chandler failed to gain the cooperation of the Democratic House, navy bureaus, and naval officers. These factions were quite at odds with each other as well as with the secretary. The Democrats refused to cooperate because of partisan politics and their mistrust of Chandler. Within the navy, the bureaus jealously guarded their administrative turf. Since the Civil War, officers had generally enjoyed a great deal of political autonomy and influence concerning the establishment of naval policy. Some officers, such as Lieutenant Commander Henry H. Gorringe and Commander Robley D. Evans, chose not to submit to Chandler's authority and resigned or were put on waiting orders.[12]

Eager to gain the prestige that naval construction would bring to his political party, Chandler pushed hard to implement what little construction Congress authorized. He planned to bolster Republican political prospects by completing, in time for the 1884 presidential campaign, the four modern warships designed by the second Naval Advisory Board. The low gross figure of only 12,000 tons authorized during Chandler's term for these ABCD warships failed to reflect his ambition. Ever distrustful of Chandler, the Democrats had curbed his construction and spending power.[13]

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12 Harold Sprout and Margaret Sprout, *The Rise of American Naval Power* (Princeton: Princeton University Press, 1939), 187; and Thomas C. Reeves, *Gentleman Boss: The Life of Chester Alan Arthur* (New York: Alfred A. Knopf, 1975), 345-48.

13 Pulsifer, "Navy Yearbook," 764.

Despite Chandler's ambition, partisan politics had an even greater influence over naval spending than the administration of the Navy Department. House Democrats reduced federal spending as an economy measure and to minimize funds available to Republican administrations such as Ulysses S. Grant's, which was notoriously corrupt. Furthermore, the Democrats were still smarting from the Compromise of 1877. Consequently, the Democrats curbed the executive's ability to mete out work to the navy yards, long suspected preserves of Republican patronage, and private yards such as John Roach's, commonly favored with Republican naval contracts. In the Democrats' eyes, a percentage of each contract's value had essentially been contributed to the G. O. P. by Congress.

In 1876, Democratic mistrust of the Grant administration had peaked with the investigation of alleged frauds and corruption in the Navy Department under Secretary George M. Robeson. Democratic Representative Washington C. Whitthorne headed a House Naval Affairs Committee investigation of the department referred to by Albion as "probably the most thoroughgoing investigation to which the Naval Establishment was ever subjected." Resulting in "three solid volumes" of evidence, these hearings focused on the condition of the fleet, navy yards, and Secretary Robeson's administration, with an eye to fraud, patronage, and political influence.

Whitthorne's investigation continued for three years, focusing the public's attention on the humiliating state of the navy. The committee reports split along party lines. In the majority report, the

Democrats found the ships, yards, and administration antiquated and inefficient and levelled serious corruption charges at Secretary Robeson. All but one Republican congressman defended Robeson's record in a minority report and even the one siding with the Democratic majority did so with reservations. Despite their partisan intent, the hearings inspired an increased awareness of the ailing navy and a need for bipartisan support in civilian and service ranks for American naval renewal.[14]

Gaining the secretaryship in April 1882, William E. Chandler became the next target of Democratic suspicions. Chandler was already notorious for his alleged complicity in the Whiskey Ring and the "stolen election" of 1876. His close ties to Republican shipbuilder John Roach, an associate of Secretary Robeson, further tainted him. According to the Democrats, the navy yards had become preserves of Republican patronage and the repair of navy ships fraudulent.[15] The only way House Democrats would agree with Republicans to authorize the mere 12,000 tons of warship construction approved during Chandler's tenure was to require that the bidding go to private shipbuilders and that a naval advisory board oversee construction and certify all bills before payment by the secretary.[16]

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[14] Robert G. Albion, "The Naval Affairs Committees, 1816-1947," United States Naval Institute *Proceedings* 78, no. 11 (November 1952), 1228; Albion, *Makers of Naval Policy*, 108-110; Peterson, "The Navy in the Doldrums," 123-48; Paullin, *Naval Administration*, 347-49; and Davis, *Navy Second to None*, 20.

[15] Richardson, *William E. Chandler*, 298-302, 309-14.

In 1884, Congress procrastinated further by awaiting the results of the ABCD warship program currently underway. Realizing that a successful presidential campaign rested in part on a solid naval record for the Republicans and strict economy for the Democrats, the House refrained from authorizing any new ships beyond the ABCDs during the administration of Chester A. Arthur.[17] This tactic prompted an attack in a *Harper's Weekly* editorial:

> This mischief, which might easily become fatal mischief, of turning all legislation into effective campaign material, is shown by the conduct of the Democrats in Congress toward the Naval Appropriation Bill. The Democrats wish to raise a cry of economy, and show how much they have reduced appropriations, and to do this they are willing to leave the country unprotected by its most effective arm of defense against a foreign foe – the navy.[18]

In this age of congressional dominance over national policy and Democratic resistance to naval development, Republican administrations failed to provide naval leadership. Throughout the post-Civil War period until March 1885, the Republicans controlled the executive branch. These administrations had no clear-cut diplomatic policy except to keep foreign influence out of the Western Hemisphere. Taming the West and lowering the national debt were the highest priorities immediately following the war. Business interests supplied the needs of America's own colonial region: the

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16 United States *Statutes at Large*, vol. XXII, 291; and Swann, *John Roach*, 169-70.

17 Donal James Sexton, "Forging the Sword: Congress and the American Naval Renaissance, 1880-1890" (Ph.D. diss., University of Tennessee, 1976), 118-19.

18 "Foul Play toward the Navy," *Harper's Weekly* 28, no. 1427 (April 26, 1884), 262.

frontier. The dismantling of America's powerful Civil War military began in earnest at the conclusion of hostilities. American international prestige waned during this era when Jesse James, Wyatt Earp, Billy the Kid, of the Indian Wars stood a better chance of capturing the public's attention than the navy's leaders.

During the Dark Ages, the navy had become secondary in importance to the task of rebuilding the nation economically and politically. The House of Representatives was increasingly economy-minded, especially when the Democrats gained control in 1875 (Appendix A). Naval appropriations decreased enough that the navy's mission changed from an arm of the military to an unofficial branch of the state department. In its construction proposal submitted to Congress in 1881, the first Naval Advisory Board summarized the reduced role to which the navy had been relegated by Congress's small appropriations:

> . . . the requirements of the different squadrons for surveying, deep-sea sounding, the protection and advancement of American commerce, exploration, the protection of American life and property endangered by wars between foreign countries, and service in support of American policy in matters where foreign governments are concerned.[19]

The United States fell behind other naval powers in the aftermath of the Civil War, failing to remain a leading innovator of naval technology because saving money became Congress's most pressing concern. After 1865, many of the Union navy's over 650 vessels

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[19] Ibid., 29.

were eventually scrapped, sold, or mothballed, and any advantage the United States had had in warship design and construction fell to the Europeans, in particular Great Britain.[20] For example, between 1865 and 1884 the United States spent less than $5,000,000 for new naval construction while France, Great Britain, and Russia spent $121,000,000, $91,000,000, and nearly $84,000,000, respectively.[21] The prevalent attitude in Congress was to allow other countries to fund costly naval development until such a time that the United States chose to adopt proven technology.[22] This state of affairs led Admiral David D. Porter to state in 1879:

> What few ships we have built since the late civil war [sic] were of small size and of little importance one way or the other. Most of them would be considered in the British navy as dispatch vessels, forming but a small part of a navy strength.[23]

As Paul Kennedy has demonstrated, all other things being equal, nations with a mastery of science and citizens of inventive genius prevail over those lacking these qualities.[24] The United States had

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[20] 38 Cong., 2 sess., "Report of the Secretary of the Navy," *House Exec. Doc. 1, Part 6*, 1864, xxiii; and Michael E. Vlahos, "The Making of an American Style," *Naval Engineering and American Sea Power* ed. Rear Admiral R. W. King (Baltimore: Nautical & Aviation Publishing Co., 1989), 23.

[21] 49 Cong., 1 sess., Report of the Admiral of the Navy, "Report of the Secretary of the Navy," *House Exec. Doc. 1, Part 3*, 1885, 290; and Donal James Sexton, "Forging the Sword: Congress and the American Naval Renaissance, 1880-1890" (Ph.D diss., University of Tennessee, 1976), 176.

[22] Lance C. Buhl, "Maintaining 'An American Navy,' 1865-1889," *In Peace and War: Interpretations of American Naval History, 1775-1978*, ed. Kenneth Hagan (Westport, Conn.: Greenwood Press, 1978), 148.

[23] David D. Porter, "Our Navy," *The United Service* 1 (January 1879), 5.

these necessary ingredients, but it failed to capitalize on them. Instead, American advances in weaponry and technology were sold to other nations seeking naval supremacy. For example, ordnance innovator Benjamin Hotchkiss established his first weapons factory in France after Americans rejected his rapid-fire cannon and naval genius John Ericsson turned to European markets when American money ran dry.[25]

Because of its obsolete technology and dilapidated condition, the navy had become an ineffective military force by the 1880s, if not sooner. During the 1874 naval maneuvers off Key West, the "United Fleets" of the navy could maintain a maximum speed of only four-and-a-half knots. Commodore Foxhall Parker complained:

> . . . what could be more lamentable . . . than to see a fleet armed with smoothbore guns, requiring close quarters for their development, moving at the rate of four and a half knots an hour [sic]? What inferior force could it overtake, or what superior one escape from of any of the great naval powers of the earth?[26]

Before returning to the United States in 1877, the commander of the USS *Yantic* sent home the gunboat's cannons from the Cape of Good Hope because of the ship's poor seaworthiness. In 1880, the navy

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24 Paul Kennedy, *The Rise and Fall of the Great Powers: Economic Change and Military Conflict from 1500 to 2000* (New York: Random House, 1987), 196.

25 Benjamin Franklin Cooling, *Gray Steel and Blue Water Navy: The Formative Years of America's Military-Industrial Complex, 1881-1917* (Hamden, Conn.: Archon Books, 1979), 61; and Walter R. Herrick, Jr., *The American Naval Revolution* (Baton Rouge: Louisiana State University Press, 1966), 29.

26 Commodore Foxhall Parker, "Our Fleet Maneuvers in the Bay of Florida, and the Navy of the Future," United States Naval Institute *Proceedings* 1, no. 8 (1874), 168-169.

had maintained a fleet of 142 vessels on the books, but 50 of those were tugboats and old sailing vessels. Of the remainder, only a dozen met the requirements of America's *guerre de course*.[27] In 1884, the USS *Tallapoosa* gained notoriety for being sunk by a runaway coal barge and a 100-pound Civil-War cannon exploded on board the USS *Standish*, prompting the New York *Times* to write about American naval "vessels and guns capable of doing injury to an enemy in case they are captured."[28] In 1885, Mahan referred to the fleet as a "quaker navy" because it reminded him of "quaker guns" that the Union navy improvised with wooden cylinders blackened to simulate cannons on undergunned Civil War vessels.[29] A year later, the House Naval Affairs Committee openly acknowledged the navy was inferior to those of the European powers as well as Brazil, Argentina, and Chile.[30] Clearly, where the Monroe Doctrine was concerned, the threat of the U. S. Navy was simply that of a paper tiger.

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27 Lieutenant Charles Belknap, "Prize Essay of 1880: 'The Naval Policy of the United States'," United States Naval Institute *Proceedings* 6, no. 14 (1880), 382.

28 Robert Seager II, "Ten Years Before Mahan: The Unofficial Case for the Navy," *The Mississippi Valley Historical Review* 40 (December 1953), 497; *Dictionary of American Naval Fighting Ships*, vol. III, s.v. "*Tallapoosa*" (Washington: Navy Department, 1981), 24; Sexton, "Forging the Sword," 8; Mark Russell Shulman, "The Emergence of American Sea Power: Politics and the Creation of a U. S. Naval Strategy, 1882-1893" (Ph.D. diss., University of California, 1990), 251; and Canney, *Old Steam Navy*, 146.

29 A. T. Mahan, *From Sail to Steam: Recollections of Naval Life* (New York: Harper and Brothers Publishers, 1907), 197.

30 49 Cong., 1 sess., "Increase of the Naval Establishment," *House Report 993*, 1886, 7.

After the Civil War, the United States continued to see itself as protector of the Western Hemisphere despite its naval vulnerability and foreign incursions that challenged this role. The United States nearly went to war twice during the navy's Dark Ages, once in 1867 and again in 1873. In 1862, during America's war-torn vulnerability, Napoleon III sent troops to occupy Mexico. With help from the British and Spanish, he installed Austrian Archduke Ferdinand Maximilian as emperor in 1864. This brazen act by the French increased American sensitivities about European intervention in the Western Hemisphere. Intimidated by Prussia's drive to unify Germany, the French began to withdraw in 1866, when the United States invoked the Monroe Doctrine and over 50,000 battle-hardened troops gathered on Mexico's northern border.[31]

With American sentiments favoring Cuban independence from Spain, war appeared likely when the *Virginius* affair erupted in 1873. As President Grant stated to Congress in his annual message of 1873:

> . . . the capture upon the high seas of a vessel sailing under the United States flag and bearing United States registry have culminated in an outburst of indignation that has seemed for a time to threaten war. Pending negotiations between the United States and the Government of Spain on the subject of this capture, I have authorized the Secretary of the Navy to put our Navy on a war footing.[32]

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[31] Robert L. Beisner, *From the Old Diplomacy to the New, 1865-1900* (New York: Thomas Y. Crowell, 1975), 4, 42-44.

[32] James D. Richardson, ed., *Messages and Papers of the Presidents, 1789-1897*, vol. VII, 1869-1881 (Washington: Government Printing Office, 1898), 242.

The *Virginius* was captured by the Spanish while running guns and Cuban guerillas and flying the American flag. Many of the crew, including a number of Americans, were executed as pirates. The decrepit condition of the navy and Spain's seven ironclad frigates played a major role in the decision to accept a diplomatic settlement and avoid military confrontation.[33] In the equation described by Daniel Headrick, where action equals the sum of means and motives, the United States lacked the means. Over twenty years later, when motivation for war with Spain became stronger, the United States would have the means for action.[34] In the meantime, the *Virginius* affair stood as a glaring example of American naval inferiority.

By the middle 1880s, the United States found itself at a crossroads. It had to decide what role it would play in the game of global *Monopoly* currently taking place. The United States faced stiff competition from Britain in Latin America and the Pacific. Other factors increased competition in these regions, including the loss of French prestige in the Franco-Prussian War and the ambitious, newly-emerging Germany. Geopolitical theories developed in the middle 1800s, such as Realpolitik and Social Darwinism, encouraged forceful, emphatic foreign policy and rationalized colonialism. Capping years of uncontrolled imperialism and an international

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[33] Belknap, "Naval Policy of the U. S.," 375; Herrick, *American Naval Revolution*, 19; and *Conway's All the World's Fighting Ships, 1860-1905* (London: Conway Maritime Press, 1979), 380-381.

[34] Daniel R. Headrick, *Tools of Empire: Technology and European Imperialism in the Nineteenth Century* (New York: Oxford University Press, 1981), 9.

struggle for control of the Congo, the Berlin West African Conference of 1884-1885 established ground rules for Western control of colonial territory and increased sensitivities over foreign colonialism.

The late-nineteenth century colonialist frenzy, or "new imperialism," found its basis of support not only in European competition for influence, prestige, and added revenues, but also from the technological means at their disposal. The motivation to imitate Britain's great overseas empire had long existed among its covetous neighbors, but the means to build such an empire without a huge financial outlay had eluded these potential imperialist powers. The convergence of various new technologies during the late-nineteenth century made colonial ventures economically feasible, nurturing the imperialist aspirations of the European powers. Perfection of the steamship, quinine prophylaxis, breechloading rifle, machine gun, submarine cable, and construction of the Suez Canal, all added fuel to the fire. Technology also proved to Westerners the superiority of their culture, giving rise to "new imperialism" and justifying their dominance of other cultures.[35]

Despite its naval weakness, American foreign policy within the Western Hemisphere and Pacific Basin also became mildly expansionist during this period. Increased productivity, economic growth, and the frontier's decreasing needs gradually increased support from big business for this expansionist foreign policy. American steel production increased markedly from 1865 to 1890,

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35 Ibid., 205-209.

surpassing that of England by 1882. The number of patents issued per year by the federal government increased four-fold during the same period, from just over 6,300 to nearly 23,300. Wage earners saw their wages double between 1860 and 1890. Exports increased 200 percent between 1871 and 1881, sparking renewed interest in overseas trade and granting the United States a trade surplus by the 1870s.[36] The nation's Civil War debt steadily decreased, while the Treasury surplus averaged over $100,000,000 during the 1880s (Appendix B).

The consolidation of Western territory into the United States encouraged American financial interests to focus on Asian and Latin American markets. Americans settled more territory between 1870 and 1890 than all the preceding 300 years combined.[37] Eight additional states were admitted to the Union between 1865 and 1890. The lure of natural resources, such as precious metals, fish, arable land, and timber, encouraged the growth of a vast railroad network, which transported manufactured goods and raw materials. In 1869, the Union Pacific Railroad had linked the Pacific Coast with the East and within twenty-five years four more transcontinental

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36 U. S. Bureau of the Census, *Historical Statistics of the United States, Colonial Times to 1957* (Washington: Government Printing Office, 1960), 607-608; Herrick, *American Naval Revolution*, 389; Robert Seager II, "Ten Years Before Mahan: The Unofficial Case for the Navy," *The Mississippi Valley Historical Review* 40 (December 1953), 494; Sexton, "Forging the Sword," 59; LaFeber, *The New Empire*, 14-18; and Michael E. Vlahos, "The Making of an American Style," *Naval Engineering and American Sea Power* ed. Rear Admiral R. W. King (Baltimore: Nautical & Aviation Publishing Co., 1989), 226.

37 LaFeber, *The New Empire*, 12.

lines followed. The "golden age" of railroads, from 1865 to 1890, saw the amount of railroad miles increase from 35,085 to 166,703. From 1868 to 1878 alone, the total figure for American railroad mileage increased an average of nearly 4,000 miles per year.[38]

The United States looked upon the postwar Caribbean as its own private preserve despite its inability to enforce the Monroe Doctrine. With the increase of water traffic headed toward the Isthmus of Panama by 1846, a treaty signed with the Republic of New Granada (Columbia) allowed the United States the right to protect traffic across the isthmus. In 1867, Secretary of State William H. Seward negotiated an ill-fated treaty of cession with Denmark for the island of St. Thomas and an abortive treaty to annex Samaná Bay in the Dominican Republic in 1869. In 1870 and 1874, the navy conducted two separate surveys of the Isthmus of Panama to find a canal route. In 1884, Robert E. Peary, later the first to reach the North Pole, made a preliminary expedition to trace a canal route through Nicaragua and Rear Admiral Daniel Ammen established the Maritime Canal Company in the early 1880s to construct the canal. And in 1885, the United States landed 750 sailors and marines on the isthmus when rebellions threatened local American interests. By the middle 1880s, the Caribbean had experienced a long history of American adventurism and meddling.

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[38] Bureau of the Census, *Historical Statistics of the United States, Colonial Times to 1957*, 427-428.

The United States also tried to develop the Pacific into a commercial and political sphere of influence. It established trade agreements with China in 1844, Japan in 1854, Hawaii and Samoa in 1875, and Korea in 1882. In 1867, the purchase of Alaska from Russia, and the acquisition of Midway Island, gave the Americans more territory and increased American influence in the region. By 1880 the United States had increased its presence in the Pacific Basin with coaling stations in Peru, Samoa, Midway Island, Hawaii, and lower California.[39]

The United States, however, failed to enjoy a controlling influence over the Pacific region as the War in the Pacific demonstrated in 1881. American sentiments rested with underdog Peru, but the navy's wooden warships could not intervene against superior Chilean ironclads. America's chief rival in the Pacific, however, was Great Britain. The British successfully pushed their way into Samoa, where the United States had first negotiated rights to a coaling station in 1872. The British had vied for control of Hawaii ever since 1843, when they tried to acquire it. The Americans preempted this plan by invoking the Tyler Doctrine, an extension of the Monroe Doctrine to the Hawaiian Islands. Hawaii had held great promise for Britain's growing network of overseas navy bases. It provided a direct link between its base in the Fiji Islands and the navy yard established

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39 Kenneth J. Hagan, *American Gunboat Diplomacy and the Old Navy, 1877-1889* (Westport, Conn.: Greenwood Press, 1973), 43; and Lance C. Buhl, "Maintaining 'An American Navy,' 1865-1889," *In Peace and War: Interpretations of American Naval History, 1775-1978*, ed. Kenneth Hagan (Westport, Conn.: Greenwood Press, 1978), 166.

during the Crimean War at Esquimalt, near Vancouver. Americans had realized the value of Hawaii as an important commercial and strategic location as early as 1823, when Secretary of State John Quincy Adams stressed its importance.[40] The reciprocal trade agreement in 1875 finally established American preeminence in Hawaii.

America required a powerful modern naval force. Along with efforts to build the Panama Canal and link the West Coast with the East by rail, came heightened expectations of overseas trade. Fears of foreign naval threats in the Western Hemisphere grew in the early 1880s with the War in the Pacific between Chile and Peru, and the Berlin West African Conference, where imperialist European nations established the ground rules for dividing the world. These events demonstrated that the United States could no longer hide behind the protection of the oceans. Consequently, a new mission for the navy gradually emerged from the political and diplomatic ferment of the 1880s.

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40 Kenneth J. Hagan, "Admiral David Dixon Porter, Strategist for a Navy in Transition," United States Naval Institute *Proceedings* 94, no. 785 (July 1968), 142; and Sexton, "Forging the Sword," 172-74.

Chapter Two

THE 1880S: THE TRANSITIONAL "PARADIGM"

> Conceive then a high-powered steamer with minimum of canvas, built of steel, armed with modern steel artillery and secondary battery of Hotchkiss guns, fitted for launching movable torpedoes, with protective deck over boilers and engines, divided into many watertight compartments, giving protection to buoyancy, and compare such a ship with the type of United States cruiser which we now possess, and an idea may be formed of the violence of the transition through which we are to pass. And there is nothing intermediate to break the suddenness of the change; there is no connecting link. The structure of today is placed in direct contrast with that of 25 years ago. This is the position in which we stand, and we can but accept the situation, from which there is no escape.[1]

Perhaps no other individual judged so perceptively the transition through which the navy would pass in the 1880s as Rear Admiral Edward Simpson as this quote from 1886 indicates. Politically a Democrat, Simpson served in Washington under Republican and Democratic administrations alike. During the 1880s he chaired two influential advisory bodies instrumental in America's late-nineteenth century naval renaissance: the Gun Foundry Board and the second Naval Advisory Board. In the 1870s, however, before efforts to revive the navy had begun in earnest, no one gauged the degree of suddenness with which this transition would occur.

Considered a period of transition for the navy, the "Gilded Age" embraced what Robert L. Beisner describes as two different

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[1] Rear-Admiral Edward Simpson, "The United States Navy in Transition," *Harper's Magazine* 73, no. 433 (June 1886), 14.

"paradigms" of national policy. For the U. S. Navy, the first, or old paradigm, embraced the "old navy" of obsolete technology and tactics, which persisted through the 1880s. The second, or new paradigm, required the development of a "new navy" complete with capital ships, Mahanian strategy, and the policy of concentrated naval force.

Beisner analyzed the shift from one paradigm to the other through adaptation of Thomas S. Kuhn's theory of "scientific revolution." According to this interpretation, the forces supporting new policy gradually gained control over those wedded to the older policy.[2] Older officers and politicians resisted the transition until the reasoning against the old school became undeniable. By 1890, international events, Mahanian-style naval policy, and the Tracy administration provided the catalyst that shifted civilian and service support from the antinavalists to navalists. By the early 1890s, public opinion supported naval expansion and naval warships had taken the final step from wood and sails to steel and steam.

In the old paradigm, veteran sailors of the Civil War ran the navy based on the age-old American strategy of *guerre de course*. These old salts waged war by closing with the enemy, using traditional naval technology of sails and smoothbore cannon. The new paradigm embraced big-navy concepts of fleet tactics and concentration of

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2 Beisner, *Old Diplomacy to the New*, 32-38; and Thomas S. Kuhn, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1962); Cooling, *Gray Steel and Blue Water Navy*, 16; and Donal James Sexton, "Forging the Sword: Congress and the American Naval Renaissance, 1880-1890" (Ph.D. diss., University of Tennessee, 1976), 2.

force composed of modern capital ships. Naval personnel of all types, from the shipbuilder to naval officer, were professionally and technically educated, and warfare became an impersonal, mechanized conflict, rather than a struggle on a human level.

Unfortunately, Kuhn's doctrine leaves no allowance for a transition period between the two paradigms. But the 1880s provide just such a transition between the old navy and the new. Described by Robert Seager as "a period of gradual preparation for the expansionism of the 1890s," the 1880s embraced a time of true transition and change that cannot be lumped together with either paradigm.[3] Kuhn's theory of scientific revolution may deserve revision because the period of transition between the old and new paradigms has received little attention from historians.

During Albion's so-called "Dark Ages," the navy relied primarily on wind power rather than steam propulsion, largely because of the influence exerted by senior line officers.[4] While foreign navies prepared for a new world order, which embraced new technology and tactics, the navy scaled back the fleet from its powerful Civil War level to a much smaller postwar level. This reduction was also caused in part by an internal conflict between the navy's line and staff officers. Their differences centered on the rank and pay of staff officers and the adoption of new naval technology.

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[3] Robert Seager II, "Ten Years Before Mahan: The Unofficial Case for the Navy," *The Mississippi Valley Historical Review* 40 (December 1953), 491.

[4] Robert G. Albion, *Makers of Naval Policy, 1798-1947*, ed. Rowena Reed (Annapolis: United States Naval Institute Press, 1980), 200.

The long-standing rivalry between staff and line officers began in 1842, when the bureau system supplanted the obsolete Board of Navy Commissioners, which was normally staffed by three high-ranking line officers. The rivalry subsided temporarily during the Civil War, but returned to haunt the navy when hostilities ceased. It was similar to a dispute that raged concurrently in the post-Civil War army between line officers, who commanded in the field, and staff officers, such as engineers, paymasters, and medical personnel. In both branches of the military, line officers resisted the elevation of staff officers' rank, pay, and benefits to line officer levels. Naval line officers argued that combat experience was the true test of a sailor, not engineering ability. Staff officers believed they deserved the same rank and benefits of any other officer instead of the inferior status they had traditionally experienced. With senior officers heading the line contingent and engineers the staff contingent, the conflict remained deadlocked for decades.[5]

The marlinspike, a tool used to unravel a ship's lines, symbolized the generation of veteran sailors who served as line officers during the Civil War and became leaders of the line officer faction. Leaders of the "marlinspike school" included influential officers such as David

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[5] Merritt Roe Smith, ed., "Military Arsenals and Industry before World War I," *War, Business, and American Society: Historical Perspectives on the Military-Industrial Complex* (Cambridge, Mass.: The M. I. T. Press, 1987), 40; Buhl, "Mariners and Machines," 719; Peter Karsten, *The Naval Aristocracy: The Golden Age of Annapolis and the Emergence of Modern American Navalism* (New York: The Free Press, 1972), 327; and Allan R. Millett and Peter Maslowski, *For the Common Defense: A Military History of the United States of America* (New York: The Free Press, 1984), 235.

Dixon Porter, Louis M. Goldsborough, Daniel Ammen, and Robley D. Evans. From 1871 to 1877, Ammen held the post of Chief of the Bureau of Navigation, which controlled the assignments of all officers. Following the Civil War, Goldsborough headed the Board on Steam Machinery, a body that assessed the fitness of the vessels on the navy's postwar rosters. Porter became *de facto* navy secretary during Adolph E. Borie's brief term as department head, an arrangement that ended when George M. Robeson took over the Navy Department in June 1869. Porter also influenced naval policy as admiral, the highest officer in the navy from 1870 until 1891.

The "old salts" who composed this group generally held certain traditional views about American naval policy. These officers favored *guerre de course*, that is, commerce raiding, and the use of sails as primary propulsion rather than steam. Adherents also believed that sailing a tall ship instilled moral fiber, while true command ability stemmed from combat experience, not operating a steamer. Commander Robley Evans summed up these views in February 1881 before the House Naval Affairs Committee, when it considered the best method to reform the navy:

> When a man is brought up as a sailor his faculties are all developed. He gains quickness of thought and action; nerve, activity, muscle, everything is trained and brought into play and the man is thoroughly developed, and when you get your man developed you can put him at any work you please, handling a gun or shoveling coal or any other work, and he will excel in it.[6]

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[6] 48 Cong., 1 sess., "Reconstruction of the Navy," *House Exec. Doc. 127*, 1884, 63.

Consistent with these principles was age-old technology such as full-sail rigs, wooden hulls, and muzzleloading smoothbore guns.

The marlinspike school's advocacy of *guerre de course* was based on the record of the Confederate raider CSS *Alabama*. As Porter stated their case:

> The attack of cruising vessels on the commerce of an enemy would be disastrous, and the fear of such an event would be very efficacious in preserving the peace. All nations, our own excepted, have learned a lesson from the career of the Alabama [sic], which, singly, drove a great part of our commerce from the ocean, notwithstanding all the efforts of our government to suppress her.[7]

Despite the *Alabama*'s psychological effect, however, its actual impact on the war was minimal. The marlinspike school ignored the fact that the Union's blockade and the capture of Southern coastal areas prevailed over the Confederacy's *guerre de course*.[8] Furthermore, commerce raiding steamers required great quantities of coal. They also had to remain at sea for long periods of time without replenishing their fuel supply. For the United States, and other nations lacking coaling stations, this meant refueling in neutral ports and risking identification as the CSS *Alabama* had experienced at Cherbourg, France, in June 1864.

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[7] 47 Cong., 1 sess., Report of the Admiral of the Navy, "Report of the Secretary of the Navy," *House Exec. Doc. 1, Part 3*, 1881, 103.

[8] Harold Sprout and Margaret Sprout, *The Rise of American Naval Power* (Princeton: Princeton University Press, 1939), 164; and Kenneth J. Hagan, *American Gunboat Diplomacy and the Old Navy, 1877-1889* (Westport, Conn.: Greenwood Press, 1973), 47.

The rapid development of late-nineteenth century technology had made America's age-old *guerre de course* obsolete. With the invention of the submarine cable, rapid communication had shrunk the world dramatically relative to the days of sail. The telegraph accelerated overseas communication from months to minutes. In addition, faster merchant steamers dotted the oceans, accelerating worldwide communication and easing detection of foreign commerce raiders.

In an age of improved steam power and more accurate, destructive shell ordnance, *guerre de course* based on America's slow, easily detected fleet of coal-burning ships had obvious defects. Faster communications and the lack of coaling stations had indirectly supported the introduction of new tactics and the retirement of old ones. Commenting on an article by Rear Admiral Stephen B. Luce, Captain Mahan noted in 1889:

> If I am right in my opinion, which I understand to be that of Admiral Luce as well, that a war against an enemy's commerce is an utterly insufficient instrument, regarded as the main operation of war, though doubtless valuable as a secondary operation, the United States and its people are committed to an erroneous and disastrous policy.[9]

Articles proposing a replacement for *guerre de course* began to appear over a decade before Mahan published *The Influence of Sea Power upon History*, and the navy had the means to carry out such a

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[9] "Discussion: 'Our Future Navy'," United States Naval Institute *Proceedings* 15, no. 51 (1889), 554.

policy. Foreshadowing Mahan's book, Commodore Foxhall A. Parker admonished his colleagues in 1874 to

> . . . read diligently the naval history of the past and the present, and to imitate Nelson in his close study of naval tactics; for depend upon it that in future naval battles, other things being equal, victory will belong to that fleet which is most skillfully maneuvered.[10]

Opposite the veteran line officers stood the bureaus of Ordnance, Construction and Repair, Steam Engineering, Provisions and Clothing, and Medicine and Surgery became strongholds of staff officers' political power. Men such as Chief Engineer Benjamin F. Isherwood and Chief of Construction and Repair John Lenthall led their movement. Much against the will of the marlinspike school, these men supported the application of proven Civil-War technology such as rifled ordnance, iron construction materials, the turret, steam power, and improved armor.[11]

Porter fired the opening salvo of the line-staff conflict in 1869. Taking advantage of the weak leadership of Navy Secretary Borie, Porter began implementing new naval policies. By executive order, he demoted engineers while line officers retained their rank. He reversed gains in pay and benefits made by staff officers during the Civil War. He removed Isherwood as chief of the Bureau of Steam Engineering. Porter forbade all steaming by American warships

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[10] Commodore Foxhall A. Parker, "Our Fleet Maneuvers in the Bay of Florida, and the Navy of the Future," United States Naval Institute *Proceedings* 1, no. 8 (1874), 176.

[11] Buhl, "Mariners and Machines," 703-727.

unless during an emergency. Sailing exercises were instituted on all ships to encourage character and maintain seamanship. Sailors were trained in the art of boarding and repelling boarders with pikestaffs until the early 1880s, when ordnance improvements eliminated the need for the tactic.[12]

The blame for postwar naval intransigence passed back and forth between the line officers and the engineers. Each group saw the other as an obstacle to its own agenda. Rear Admiral Stephen B. Luce and ex-Lieutenant Commander Henry C. Gorringe placed the blame for the navy's obsolescence on the bureaus, and called for a reorganization of the Navy Department. Opposing views included those of Passed Assistant Engineers Frank M. Bennett and John C. Kafer, who defended the bureau system and levelled the blame for backward naval policy and technological reverses on the line officer ranks in general, and Porter in particular.[13] In a letter written to Captain R. B. Forbes in September of 1883, Naval Constructor S. H. Pook remarked:

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12 Elting E. Morison, *From Know-How to Nowhere* (New York: Basic Books, 1974), 156; and Robert L. O'Connel, *Sacred Vessels: The Cult of the Battleship and the Rise of the U. S. Navy* (San Francisco: Westview Press, 1991), 43.

13 Rear Admiral S. B. Luce, "Annual Address, 1888," United States Naval Institute *Proceedings* 14, no. 44 (1888), 1-8; Henry H. Gorringe, "The Navy," *North American Review* 134, no. 306 (May 1882), 486-506; Frank M. Bennett, *The Steam Navy of the United States: A History of the Growth of the Steam Vessel of War in the U. S. Navy, and of the Naval Engineer Corps* (Pittsburgh: W. T. Nicholson, 1891); and "Discussion on the Prize Essay of 1880: 'The Naval Policy of the United States'," United States Naval Institute *Proceedings* 7, no. 16 (1881), 157-160.

> I do not expect you to agree with me, neither would Admiral Porter & many others when I have heard [them] say within a year, when standing and looking at the old Portsmouth [sic] sailing sloop – " [sic] he was sorry that steam was ever applied to a ship of war, and he recalled the comfortable days of the ship without steam.[14]

With the exception of Kenneth J. Hagan, most American maritime historians believe that Porter and the veteran line officers directed the postwar navy into its decline by opposing the engineer ranks and resisting the adoption of new technology, in particular steam power.[15] One naval historian has even described Porter as an "inverted visionary."[16]

In order to gain the upper hand over the bureaus, line officers called for the formation of an naval advisory board. The use of advisory boards to influence naval policy became especially popular

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14 Naval Constructor S. H. Pook to Captain R. B. Forbes, September 20, 1883, Robert W. Shufeldt Papers, Library of Congress.

15 Charles Oscar Paullin, *Paullin's History of Naval Administration, 1775-1911* (Annapolis: United States Naval Institute Press, 1968), 323; Walter R. Herrick, Jr., *The American Naval Revolution* (Baton Rouge: Louisiana State University Press, 1966), 16; Albion, *Makers of Naval Policy*, 200; Donald C. Canney, *The Old Steam Navy: Frigates, Sloops, and Gunboats, 1815-1885* (Annapolis: United States Naval Institute Press, 1990), 145; John D. Alden, "Growth of the New American Navy," *Naval Engineering and American Sea Power*, ed., Rear Adm. R. W. King (Baltimore: The Nautical and Aviation Publishing Company, 1989), 40; Sprout, *American Naval Power*, 165-182; Elting E. Morison, *Men, Machines, and Modern Times* (Cambridge, Mass.: The M. I. T. Press, 1966), 38-44, 116-22; Kenneth J. Hagan, "Admiral David Dixon Porter, Strategist for a Navy in Transition," United States Naval Institute *Proceedings* 94 (July 1968), 240; Buhl, "Mariners and Machines," 704-706; and Stephen Howarth, *To Shining Sea: A History of the United States Navy, 1775-1991* (New York: Random House, 1991), 234.

16 Canney, *Old Steam Navy*, 145.

with line officers by the late 1870s. In the opinion of the line, proper naval administration required centralized authority and line officers were properly qualified to hold this responsibility. Luce hinted that a reversion to the Board of Naval Commissioners established in 1814 would be preferable to the bureau system. Rear Admiral Caspar Goodrich recounted in the pages of the *Proceedings* how his colleague, Rear Admiral Bancroft Gherardi, advised Secretary William H. Hunt to establish the first Naval Advisory Board in 1881 to convince Congress of the need for a modern navy. Admiral Porter called for the establishment of a naval advisory board as early as 1879, in an article in the United States Naval Institute *Proceedings*. He also confronted Hunt face-to-face on the need to establish a naval advisory board as well. Similar advisory bodies were advocated by Henry Gorringe in the *North American Review*. The author of the *Proceedings'* prize essay of 1880 also supported the establishment of such a board as did others.[17]

Clamor for an advisory board led Secretary Hunt to establish the first Naval Advisory Board of 1881 without sanction from Congress. Although this board was originally staffed largely by line officers, later advisory boards tended to include men with technical

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17 Luce, "Annual Address," 8; Caspar F. Goodrich, "The Founding of the New Navy," United States Naval Institute *Proceedings* 44, no. 6 (June 1918), 1267-1268; David Dixon Porter, "Our Navy," *The United Service* 1, no. 1 (January 1879), 1-9; Walter R. Herrick, "William H, Hunt, 7 March 1881-16 April 1882," *American Secretaries of the Navy*, ed. Paolo Coletta (Annapolis: United States Naval Institute Press, 1980), 391; Gorringe, "The Navy," 486-506; Lieutenant Charles Belknap, "Prize Essay of 1880: 'The Naval Policy of the United States'," United States Naval Institute *Proceedings* 6, no. 14 (1880), 385; and "Discussion of Prize Essay of 1880," 156-162.

backgrounds such as engineers and even civilians. Consequently, the attempt by line officers to gain control of the department's decision-making through advisory boards back-fired.

Between 1865 and 1885, the naval establishment faced another serious crisis within its ranks. By the 1870s, billets for naval officers had become scarce. While the federal government sold or scrapped the postwar fleet, the proportion of officers relative to naval vessels grew, resulting in a total of 1,817 officers for thirty-one ships or a ratio of fifty-nine officers per ship by 1882. The twelve top graduates of the Naval Academy's class of 1868 remained lieutenants for twenty-one years. Congress created the rank of "cadet midshipman" in 1870 to unsnarl the mess. This measure had the effect of lowering entering officers' pay while adding another rank and increasing the time before they could climb to the top. Consequently, some midshipmen failed to be promoted for eleven years.[18]

Officers searched for solutions to their clogged ranks. In 1876, senior officers recommended restricting the number of academy graduates, but Congress procrastinated until 1882, by which time the ratio of officers to enlisted men had ballooned to a level of one to four. A provision in the Act of August 5 attempted to regulate the flow of officers through the ranks by quotas for each level, increasing academy terms from four years to six, and commissioning only the

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[18] Karsten, *The Naval Aristocracy*, 280-285; and Sexton, "Forging the Sword," 94-97.

top 25% of each graduating class.[19] In the early 1880s some officers proposed that the navy absorb the maritime-oriented branches of other departments, such as the revenue marine, coast survey, life-saving service, and light-house service, to free up more billets for navy officers. Congress never acted on this suggestion, however, and poor promotion prospects continued to plague the navy throughout the rest of the century.[20]

Motivated by the burden of their swollen ranks, younger naval officers came to see modernization and new naval construction as their only salvation. They lobbied policy makers for naval expansion and prompted Congress to initiate reform of the navy.[21] In his autobiography, *From Midshipman to Rear-Admiral,* Bradley Fiske argued "*Nobody was the father of the new navy* [italics Fiske's]. The new navy was the child of public opinion created by navy officers." Later he writes that "both [Navy Secretaries William E. Chandler and William H. Hunt] were only instrumentalities for influencing Congress and the President to do what naval officers like Luce, Walker, Sicard, and others urged them to do."[22]

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19 United States *Statues at Large*, vol. XXII, 284-287.

20 Captain W. T. Truxton, "Reform in the Navy," *The United Service* 1 (July 1879), 381-382; Lieutenant Carlos G. Calkin, USN, "Prize Essay: 'How May the Sphere of Usefulness of Naval Officers be extended in Time of Peace with Advantage to the Country and the Naval Service?'" United States Naval Institute *Proceedings* 9, no. 24 (1883), 155-221; and Karsten, *The Naval Aristocracy*, 280-285.

21 Sexton, "Forging the Sword," 70.

In the 1870s the movement began to stir in the naval ranks to settle the long-standing differences between the line officers and engineers, melding the two groups into a cohesive force behind naval development. Two trends occurred at this time to account for the nascent movement toward navalism. First, the marlinspike school gradually diminished after the Civil War. Attrition took its toll through retirement, pensioning, and death.[23]

Secondly, a new generation of line officers, referred to by Peter Karsten as the "Young Turks," graduated from the academy in the 1870s and 1880s. These young officers gradually supplanted the veteran line officers of the Civil War. As John Stuart Mill postulated, change comes with each new generation and these Young Turks came to realize that the navy's best interests were served by new technology. This group had little investment in maintaining the traditions of the marlinspike school and joined ranks with the Engineer Corps, which had advocated modernization since the Civil War.[24] Meanwhile, realizing their options for promotion in a small peace-time navy were limited, many of the remaining senior officers such as Captain William T. Sampson, and Commanders Caspar F. Goodrich and Bowman H. McCalla, joined the Young Turks and

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22 Bradley A. Fiske, *From Midshipman to Rear-Admiral* (New York: The Century Company, 1919), 88; and Karsten, *Naval Aristocracy*, 341.

23 Frederick S. Harrod, *Manning the New Navy* (Westport, Conn.: Greenwood Press, 1978), 174; Karsten, *Naval Aristocracy*, 359.

24 Harold G. Bowen, *Ships, Machinery, and Mossbacks: The Autobiography of a Naval Engineer* (Princeton: Princeton University Press, 1954), 16; and Karsten, *Naval Aristocracy*, 327.

engineers in a call for naval renewal. Commenting on an article written by Commodore Edward Simpson, an anonymous author pen-named "A Junior Officer" said in 1880 that "it is a hopeful sign of better days for the navy when an officer of his rank and experience is willing to calmly and fairly discuss the wants of the service."[25]

Officers and engineers had various means at their disposal to influence public opinion in favor of naval development. Warrant officers, engineers who had only practical experience rather than theoretical training, maintained an effective lobby in Congress to increase their rank and pay relative to line officers.[26] The navy secretary regularly formed boards and commissions such as naval advisory boards or the gun foundry board. Board members put policy into motion or consulted on the best possible policy and frequently testified before Congress as expert witnesses. After meeting with just such a board, Representative Benjamin W. Harris commented that "We . . . listened to the advice of naval officers and our bill was changed in obedience to their views."[27] Some officers were even related to important government officials, such as the sons of Navy Secretaries William Hunt and William Chandler. Others, such as Daniel Ammen, Robley Evans, A. T. Mahan, and David D.

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25 A Junior Officer, "Naval Reorganization," *The United Service* 2 (April 1880), 460; and Karsten, *Naval Aristocracy*, 291, 327.

26 Bowen, *Ships, Machinery, and Mossbacks*, 18.

27 Walter LaFeber, *The New Empire: An Interpretation of American Expansion, 1860-1898* (Ithaca, N. Y.: Cornell University Press, 1963), 59.

Porter nurtured friendships with congressmen, senators, and even presidents.[28]

David D. Porter provides a prime example of the sort of influence senior officers could wield in naval affairs. He founded the United States Naval Association in 1867, a group composed of line officers that lobbied Congress on behalf of line officers' interests. Porter was also founding president of the United States Naval Institute. As admiral, he influenced naval policy from 1870 until his death in 1891 through his articles in *The United Service* and the *Proceedings* as well as the Report of the Admiral in the "Annual Report of the Secretary of the Navy." Porter was often quoted in congressional oratory and the press, and consulted before new legislation was introduced to Congress. Much of the contemporary decision-making over naval policy took place behind the scenes at Porter's Washington residence, referred to by one historian as "a mecca for politicians and naval officers."[29]

While the nascent movement for naval renewal developed, much political clout remained in the hands of senior line officers. Consequently, the first Naval Advisory Board, established in June

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28 Allan Nevins, *Grover Cleveland: A Study in Courage* (New York: Dodd, Meade and Company, 1932), 613, 728; Hagan, *American Gunboat Diplomacy*, 18; Herrick, *American Naval Revolution*, 21; Thomas C. Reeves, *Gentleman Boss: The Life of Chester Alan Arthur* (New York: Alfred A. Knopf, 1975), 348; and Edwin A. Falk, *Fighting Bob Evans* (New York: Jonathan Cape and Harrison Smith, 1931), 360.

29 Leon Burr Richardson, *William E. Chandler: Republican* (New York: Dodd, Meade and Company, 1940), 299; and Hagan, *American Gunboat Diplomacy*, 18.

1881, failed to reach a consensus because of differences between line officers and engineers over technology to be incorporated in any new warships. The board's fifteen members favored various warship types and construction materials and disagreed on the use of sail or steam power.[30] James Russell Soley, professor of international law at the Naval Academy, A. T. Mahan's fellow instructor at the Naval War College, and later assistant secretary of the navy, stated in an article for *Scribner's Magazine* that

> No Congress will vote money to carry out the recommendations of a board, when their ears are stunned by a chorus of dissentient voices proceeding from the service itself. The first Advisory Board made majority and minority reports, which was enough of itself to kill any project.[31]

The board's recommendation to authorize sixty-eight vessels at a cost of over twenty-nine million dollars met with little favor in the House, especially since unanimity eluded the board.[32]

Although a few historians might dispute the charge that Porter and the line officers successfully opposed the development of American naval technology and policy, most appear to share the opinion that the miserly Democratic House stifled funding for the floundering navy during the Dark Ages. While the verdict is nearly

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30 Leonard Alexander Swann, Jr., *John Roach: Maritime Entrepreneur* (Annapolis: United States Naval Institute, 1965), 155-56.

31 James Russell Soley, "Our Naval Policy–A Lesson from 1861," *Scribner's Magazine* 1, no. 2 (February 1887), 234.

32 47 Cong., 1 sess., REPORT OF THE BOARD, "Report of the Secretary of the Navy," *House Exec. Doc. 1, Part 3*, 1881, 37.

unanimous, opinions vary on the justification for congressional budgetary cutbacks. Some credit Porter's negativist influence, while others cite the wasteful and obstructionist naval bureau system and successful efforts by repair lobbying groups to oppose Democratic rearmament legislation. The lack of consensus between the line officers and engineers over technology and naval policy, however, confused legislators and had the greatest influence over House naval appropriations.[33] In an article written for the San Francisco *Chronicle*, Rear Admiral Shufeldt stated that

> The antagonism of the line and staff is responsible to a very great extent for this unhappy condition of things. Without realizing it, the officers of the navy have, for the last twenty years, been digging their own graves. "A house divided against itself cannot stand."[34]

Upon examining the influence of divided naval opinion on Congressional spending, James R. Soley concurred with Shufeldt as did many other navalists. Soley said that

> Until this freedom of speech, always irresponsible and sometimes unreflecting, can be curbed by the self-restraint of officers, which

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33 Canney, *Old Steam Navy*, 146; Gorringe, "The Navy," 490-92; Benjamin Franklin Cooling, *Gray Steel and Blue Water Navy: The Formative Years of America's Military-Industrial Complex, 1881-1917* (Hamden, Conn.: Archon Books, 1979), 27; John M. Dobson, "The Forty-Seventh Congress and the Birth of the New American Navy," *Capitol Studies* 2 (Spring 1973), 11, 17; and Sprout, *American Naval Power*, 193-96; Swann, *John Roach*, 153-4, 161; George T. Davis, *A Navy Second to None: The Development of Modern American Naval Policy* (Westport, Conn.: Greenwood Press, 1940), 53-54; and William Scott Peterson, "The Navy in the Doldrums: The Influence of Politics and Technology on the Decline and Rejuvenation of the American Fleet, 1866-1886" (Ph.D. diss., University of Illinois, 1986)," 121-24.

34 Rear Admiral Robert W. Shufeldt, "The American Navy," San Francisco *Chronicle*, November 6, 1887.

> is the only way of curbing it, the efforts of the Department will be neutralized, and the acquisition of a modern navy will be indefinitely postponed.[35]

Historians have differed on the question of how contesting American political and naval factions began to reach a consensus in the early 1880s. One theory has been presented by Elting E. Morison. According to Morison, change results from a gradual escalation of tension between two entrenched forces; one that resists change and one that supports it. He believes that an outside force has to intervene to cause the shift, because an institution such as the military cannot reform itself from within.[36] This outside factor forces the establishment to adapt to a new reality.

There were several outside factors, however, that broke the postwar deadlock between line and staff officers and House Democrats and Republican administrations. These forces were manifold, including the affects of an overgrown naval officer corps and the rise of an influential new generation of naval personnel. After trying to pressure Congress to solve their problems with overcrowded officer ranks, line officers finally concluded that the solution lay in naval expansion. To accomplish this they had to settle their differences with the staff officers and present a united front to Congress in favor of developing a modern American navy.

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35 Belknap, "Naval Policy of the U. S.," 384; and Soley, "A Lesson from 1861," 234.

36 Morison, *Men, Machines, and Modern Times*, 38-39.

Whereas Beisner's old and new paradigms had differing strategic objectives and associated naval technology, the transitional period of the 1880s lacked the confidence and direction of either. Instead, it combined attributes of both the old paradigm and the new. For instance, the navy continued to adhere to a policy of *guerre de course* and coastal defense. At the same time, the technology associated with such a policy was supplanted by more modern technology. Within a ten-year period, wood, sails, and muzzleloading smoothbore guns were being phased-out by steel, steam, and modern breechloading and rapid-firing guns. As a result, scientists and engineers supplanted shipwrights and artisans, who had built American warships in the past.

By 1882, new naval construction had the approval of most all naval personnel despite differences over what type of warship to construct. In the brief period between 1881 and 1883, political consensus was also reached for authorizing new warships by the simple fact that the pro-navy Republicans controlled the House and the executive, and had an equal standing with the Democrats in the Senate (Appendix A). As a result, Congress authorized the ABCD warship program and one of the most famous naval construction scandals erupted over the USS *Dolphin*.

Chapter Three

CURSE OF THE *DOLPHIN*

> . . . a newspaper is not a rubber band, to be stretched indefinitely to include less or more; and there are other demands upon us than those growing out of the *Dolphin* controversy, which has become national as well as nautical.
>
> It is a controversy which would result in great good to the Navy if it could be kept within professional limits, but there is danger that we may be compelled to change the classification in our list of naval vessels in commission, from first and second, third and fourth rates into democratic and republican ships, each of which will have its champion and its critics.[1]

In the summer of 1883 the United States' newest naval building program was making unusual progress. Designed to have an overall length of 256 feet and a complement of 115 men, the USS *Dolphin* was the lead ship of the ABCD program, so designated for the *Atlanta, Boston, Chicago,* and *Dolphin* (Figures 2 and 3).[2] Harbingers of naval progress, these ships incorporated steel construction and steam as the primary means of propulsion for the first time in an American warship. Profoundly influencing the naval establishment, they were also objects of enormous contention that pitted not only Democrat against Republican, but Congress against the executive, the press against contractor, bureau against advisory board, and line officer against engineer. First to go to sea trials, the diminutive *Dolphin*

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1 "The Dolphin Again," *United States Army and Navy Journal and Gazette of the Regular and Volunteer Forces* 23, no. 1146 (August 8, 1885), 30.

2 *Army and Navy Journal* 21, no. 1013 (August 18, 1883), 53; and K. Jack Bauer and Stephen S. Roberts, *Register of Ships of the U. S. Navy, 1775-1990* (New York: Greenwood Press, 1991), 161.

brought about the financial failure of America's largest shipbuilder, stigmatized two able navy secretaries, and may even have destroyed the presidential aspirations of two prominent politicians.[3]

While contemporaries, and most historians, have portrayed the *Dolphin* debacle as little more than an intensified version of the usual political struggles over naval policy, budgets, and issues of technical competence, the factor that so highly charged the debate was the rapid technological change embodied in the design of the *Dolphin*. With steel warships replacing the predominantly obsolescent wooden fleet came increased support for naval development. Unfortunately, in the rapid transition from wood and canvas to steel and steam, American naval planners' towering ambitions were matched only by the heights of their ignorance. The inability of individuals and groups within political circles to capitalize politically on, or recognize the experimental value of, the *Dolphin* is the theme of this chapter.

On 6 July 1882, the House passed the Naval Appropriations Act that set aside surplus cash to build two steel cruisers and established the second Naval Advisory Board to oversee their construction. By this time, domestic warship design had become a popular cause for chauvinistic American naval planners. Policy makers in the House and Senate had steered the bill through Congress. Naval Affairs Committee Chairman Benjamin W. Harris tried to allay Democratic suspicions of corruption by preventing a direct remunerative

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[3] Mark D. Hirsch, *William C. Whitney: Modern Warwick* (New York: Dodd, Meade and Company, 1948); and Leon Burr Richardson, *William E. Chandler: Republican* (New York: Dodd, Meade and Company, 1940).

relationship between the navy secretary and private contractors.[4] Ever distrustful of Navy Secretary William E. Chandler, because of his supposed fraud in the 1876 presidential campaign and with fresh memories of former Republican Navy Secretary George M. Robeson's financial abuses, Democratic Representatives Washington C. Whitthorne and Abram Hewitt amended the construction bill to insure that the new board oversaw construction, set the maximum acceptable cost for each ship, and validated all bills before the secretary paid them. As Harris noted in a report to the House:

> The sole object in creating this board is to throw around this civilian Secretary of the Navy safeguards which may protect him from errors and mistakes which he, from want of technical and professional knowledge, may fall into, and from the mistakes or dangers of others. It will, moreover, fix responsibilities.[5]

The bill passed by a narrow margin with the support of all 112 Republicans, but only 7 out of 83 Democrats, and 95 Congressmen abstaining.[6] Senator Eugene Hale navigated the bill through the Senate, altering the board's name from the original Naval Board of Advice and Survey to the Naval Advisory Board, proclaiming that the secretary "cannot move in the direction of spending one dollar, or of deciding a plan to spend one dollar, or of deciding that he will decide

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4 47 Cong., 1 sess., *Congressional Record,* 5569.

5 47 Cong., 1 sess., "Construction of Vessels of War for the Navy," *House Report 653,* 1882, xxviii.

6 47 Cong., 1 sess., *Congressional Record,* 5458-68, 5659-5662, 5691-5698; United States *Statutes at Large,* vol. XXII, 291-292; and Richardson, *William E. Chandler,* 289-290.

a plan upon which he shall spend one dollar, until the naval advisory board has considered it and approved it."[7]

With Senate passage of the bill on July 31 and final enactment on August 5, Secretary Chandler began appointing members to the board. To avoid the problems of the first Naval Advisory Board and streamline the decision-making process, Chandler appointed fewer members. Though little evidence of corruption ever surfaced from Chandler's administration, few doubted his ability to employ patronage. Appointing the chairman of the Naval Advisory Board proved no exception to his reputation. Despite a background heavily involved with world-wide diplomatic missions and little experience in warship construction, Commodore Robert W. Shufeldt became Chandler's appointee to chair the board. Shufeldt's friend, former Republican Senator and Naval Affairs Committee chairman Aaron A. Sargent from California, had released to a San Francisco newspaper one of Shufeldt's private letters from the Korean diplomatic mission that contained derogatory racial statements about the Chinese. The disclosure proved to be embarrassing for the navy and resulted in Shufeldt's recall from Korea. Because of his culpability in the scandal, Sargent interceded on Shufeldt's behalf, prompting Chandler to offer Shufeldt the position of chairman. With only his diplomatic skills to recommend him, Shufeldt reluctantly accepted the position.[8]

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[7] Ibid., 6631.

[8] Donal James Sexton, "Forging the Sword: Congress and the American Naval Renaissance, 1880-1890" (Ph.D. diss., University of Tennessee, 1976), 83-85; and Swann, *John Roach,* 171-172.

Inexperience with warship design proved to be a problem for the second Naval Advisory Board, whose sole purpose was to design America's first modern warships. Of the five naval personnel assigned to the board, only Lieutenant Edward Very had served on the previous Naval Advisory Board, limiting any reserves of experience gained from the first Naval Advisory Board. Assistant Naval Constructor Francis T. Bowles had studied naval design at the Royal Naval College in England, but lacked practical experience with ship construction. None of the naval personnel on the board could boast of distinguished careers in naval architecture or marine engineering. In addition, the navy had specialized in constructing wooden warships through the 1880s (Appendix C). Consequently, most navy engineers had experience with wood, but few if any with steel.

Shufeldt recommended Henry Steers and Herman Winter to sit as the board's civilian experts. Shipbuilders Charles Cramp and John Roach classified Winter as a second-rate engineer, so Shufeldt dropped Winter and changed the recommendation to Henry Steers and Miers Coryell—a substitution that returned to haunt the board later. The addition of Steers, a naval architect, and Coryell, a marine engineer, brought much-needed design and engineering experience to the board, but neither man had any expertise in warship design.[9]

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[9] Walter I. Brandt, "Steel and the New Navy" (Ph.D. diss., University of Wisconsin, 1920), 18-19; Paullin, *Paullin's History of Naval Administration*, 392-393; Peterson, "The Navy in the Doldrums," 192-193; Sexton, "Forging the Sword," 82-83; and Swann, *John Roach*, 171-173.

Various critics put added stress on the board, which lacked the proper experience necessary to design successful warships. The board had to prove itself to men such as Commander William C. Wise, who felt it "did not represent the best talent and patriotism of the Navy." Abram Hewitt claimed the board lacked the expertise to produce a true fighting ship.[10]

The complexity of planning increased as the number of experts consulted grew. In order to increase support for the warships, Chandler submitted unfinished plans to twenty-three major shipbuilders and his own naval bureau chiefs. The shipbuilders did not reply, claiming the navy had warship design skills superior to their own.[11]

Products of an earlier era, bureau chiefs such as Chief Constructor Theodore D. Wilson, argued against innovation, voicing support for more conservative, antiquated designs. Chandler had played into the hands of the bureau, which he had hoped to circumvent through the Naval Advisory Board. Chief Constructor Wilson and the bureaus slowed the board's progress considerably through criticism, bickering, and delaying tactics. In so doing they diminished the supervisory power of the board.[12]

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[10] Sexton, "Forging the Sword," 84.

[11] 48 Cong., 1 sess., "Report of the Secretary of the Navy," *House Exec. Doc. 1, Part 3*, 1883, 52.

[12] Peterson, "The Navy in the Doldrums," 203; Richardson, *William E. Chandler*, 297-298; and Swann, *John Roach*, 176-177.

Despite Wilson's objections, the board pursued its original design plans. Had the *Dolphin* incorporated Wilson's recommendations, her speed, seaworthiness, and overall fighting efficiency would have suffered. An increase to full sail rig would decrease much-needed space available on board the vessel and add to the ship's instability. A forecastle and poop would lessen the range of motion of the guns. The bilge keels proved successful in stabilizing the ship as a gun platform. Wood and copper sheathing would have diminished the speed and efficiency necessary in a "dispatch vessel" because the vessel's displacement would be enlarged by the wooden planking and copper sheets.

Chandler pushed the pace of planning, eager to produce results before the 1884 presidential campaign.[13] On the last day of April 1883, after five months of work, he judged the specifications for the ABCD ships to be far enough along to advertise for public bids in five major papers in New York, Boston, and Philadelphia. Maximum prices for the ships and the bid-opening date of July 2 were included in the published announcements, but the blueprints on file for examination remained incomplete until the final day. The *Dolphin*'s hull design was finally approved one hour before bid-opening while plans for the rest of the vessels remained incomplete until early 1884. Charles Cramp of the Cramp shipyard and J. Taylor Gause of Harlan and Hollingsworth requested a postponement of the bidding

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13 Howe, *Chester A. Arthur*, 239; Peterson, "The Navy in the Doldrums," 202; and Reeves, *Gentleman Boss*, 342-343.

until the plans could be completed. In dire need of results to bolster Republican campaign prospects and encouraged by John Roach to stick with his accelerated schedule, Chandler pressed on.[14]

Claims of collusion were levelled almost immediately at Chandler after all four of the ABCD contracts were awarded to Chandler's long-time friend John Roach (Figure 4). Chandler followed standard government procedure by awarding the contracts to the lowest bidder (Appendix D). Charges of corruption came mostly from unsuccessful bidders and suspicious Democrats, but they never went beyond innuendo nor prompted an investigation.[15] In fact, J. Taylor Gause, an unsuccessful ABCD bidder and president of Harlan and Hollingsworth Company wrote to Chandler in July 1883 stating:

> Your whole course in asking for bids, and opening the same, was most fair & honorable, and I do not see how you could have done differently from what you did, and certainly there was not a bidder there who had cause to object to your action, or complain of Mr. Roach because he determined to bid very low."[16]

Those who claimed collusion between Roach and Chandler argued that Roach had bid so low so that he could charge back future profits from "extras." The representative from Harlan and Hollingsworth

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[14] Roach to Chandler, June 15, 1883, Chandler Papers, Library of Congress; New York *Times*, April 30, 1883; Cooling, *Gray Steel and Blue Water Navy*, 37-39; Peterson, "The Navy in the Doldrums," 204, 206-207; and Swann, *John Roach*, 177-178.

[15] New York *Sun*, July 26, 1883 (transcribed from Baltimore *American* articles of July 17); and Richardson, *William E. Chandler*, 295-296.

[16] Gause to Chandler, July 19, 1883, Chandler Papers.

doubted this charge.[17] After the bidding Roach scrawled a letter to Chandler:

> I Pledge my Selfe to you that the work shall be equal to the Best in the world of its class. I also Pledge my Selfe to you that every Precaution in my Power to see that there is no Extra Bills."[18]

Records show the total cost for design changes on the *Dolphin*, which were normally undertaken at the request of the Naval Advisory Board, to be $25,897.68. Even when the design changes are totaled with the contract price of the vessel, Roach still saved the public almost $35,000 over the next lowest bidder and $60,000 over the maximum cost estimated by the Naval Advisory Board.[19]

Roach did not bid lowest for the ABCDs because of collusion with Chandler, but for two other reasons. First, Roach felt secure in maintaining a low profit margin because, unlike other shipbuilders, he had integrated his facility so that it could build a steel ship from raw material to finished product. Roach thereby saved the government the costs incurred by an additional steel contractor. Second, Roach had been intimidated by the threat of lower bids by Henry H. Gorringe.

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17 David B. Tyler, *The American Clyde: A History of Iron and Steel Shipbuilding on the Delaware from 1840 to World War I* (Newark, Del.: University of Delaware Press, 1958), 56

18 Roach to Chandler, July 5, 1883, Chandler Papers.

19 "Extra Bills on the Cruisers," Letters Sent by the Naval Advisory Board, vol. 7, R. G. 80, The National Archives; and New York *Times*, April 30 and June 8, 1883.

An engineering officer, Gorringe had won great public acclaim for acquiring from Egypt the obelisk in Central Park, which he delivered to New York in 1880. Outspoken by nature, Gorringe penned articles criticizing the conclusions of the first Naval Advisory Board and the navy's decision to abandon the Brooklyn Navy Yard. In the *North American Review* he claimed that the naval bureaus were

> . . . subject to the log-rolling, wire-pulling, time-serving influences of civil and naval politicians of the worst type, who hang about the department and Congress and persistently seek their own advancement, or thrust themselves by force of cheek into positions they are not competent to occupy and do not deserve.[20]

Chandler became justifiably perturbed by these accusations and reprimanded Gorringe. Later, when the New York *Post* published an interview where Gorringe advocated "free ships," Chandler could contain himself no longer. A staunch supporter of ship subsidies, Chandler accused Gorringe of being in British pay, prompting Gorringe to resign and provoking anti-Chandler criticism from the Democratic press.[21]

Chandler's sworn enemy and friend to his successor, Navy Secretary William C. Whitney, Gorringe resigned from the navy and formed the American Shipbuilding Company on 5 March 1883. Borrowing money from the Vanderbilts to buy the Philadelphia and

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[20] Gorringe, "The Navy," 493.

[21] Hirsch, *William C. Whitney*, 260-261; Thomas C. Reeves, *Gentleman Boss: The Life of Chester Alan Arthur* (New York: Alfred A. Knopf, 1975), 347-348; and Richardson, *William E. Chandler*, 317.

Reading Railroad Company's Port Richmond shipyard in Philadelphia, Gorringe acquired two orders from former Roach clients and claimed he would increase production to 80,000 tons per year. He enticed skilled workers away from Roach's yard and boasted of quadrupling his work force in time for the ABCD contracts. Next, Gorringe spread rumors that he would bid recklessly low to insure getting the contracts. To prevent further labor defection and guarantee the award of the ABCD contracts, Roach bid even lower than he might otherwise. As it turned out Gorringe never submitted a bid and his shipbuilding enterprise went bankrupt.[22]

After the construction process began, the Naval Advisory Board continued to make changes to the *Dolphin*'s design. Many changes altered the ship's basic design while others rectified admitted mistakes in planning. John Roach suggested many of the alterations.[23] Changes to both hull and machinery amounted to sixty-four in all, totalling an added cost of $18,466.76; almost half of them required ripping out finished work, further stalling production. Alterations included changing the steam steering gear, raising the deckhouses, shifting the location of the guntowers, adding extra braces and stanchions, and improving the forced draft system.[24]

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22 George Robeson to Chandler, July 1, 1883, Chandler Papers; New York *Herald*, May 9, 1883; Gorringe to Whitney, March 6, 1885, Whitney Papers; New York *Times*, March 6, 17, 1883; Swann, *John Roach*, 182; and Tyler, *American Clyde*, 59.

23 Edward Simpson to Chandler, October 13, 1884, and Roach to Chandler, December 18, 1884, Chandler Papers.

The most controversial design change involved the replacement of a defective steel propeller shaft with one made of iron. This reversal provided tremendous fodder for the critical Democratic press. Roach believed that the Nashua Steel and Iron Works of New Hampshire provided the highest quality steel forgings in the United States, even though the technology necessary for large forgings such as propeller shafts was still in its infancy. Convinced of the steelmaker's ability to supply superior forgings, the Naval Advisory Board initially neglected to assign a permanent naval inspector to the plant. The iron works delivered a defective shaft, which remained in Roach's yard for nearly three months, easily accessible to shipyard naval inspectors. Since Chief Engineer B. B. H. Wharton had rated the shaft as "excellent" while it was in transit to the Chester shipyard, Roach assumed the shaft met contract specifications.[25]

The propeller shaft was installed in the *Dolphin* and no question raised as to its quality until six days before the ship's launching, when a navy inspector finally found defects in it (Figure 5). After the discovery, the Naval Advisory Board required Roach to guarantee the shaft's quality even though its defects were common knowledge. Because of poor timing and the inadvisability of cutting out the shaft, test trials went on as scheduled.[26] Roach agreed to guarantee the

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24 49 Cong., 1 sess., "Ships Chicago, Boston, Atlanta and Dolphin," *Senate Exec. Doc. 153*, 1886, 15-20, 26-27.

25 Ibid., 343-369; and Roach to Rear Admiral Edward Simpson, December 3, 1884, and Chief Engineer Alexander Henderson to Roach, December 5, 1884, "Report of the Naval Advisory Board, 1882-1884," box 6, R. G. 45, The National Archives.

shaft to expedite the commissioning process and because he was held liable for the overall quality of the vessel according to the contract. The true responsibility for installing the defective shaft, however, lay with the Naval Advisory Board and its negligent inspectors.[27]

The shaft broke under pressure on the *Dolphin*'s first sea trial. The story eventually leaked to the press despite Roach's efforts to keep it under wraps. The broken shaft appeared to bear out Democratic suspicions of Roach's poor workmanship, but Chandler correctly noted that America's primitive steel forging technology was still incapable of producing top quality steel forgings of great size.[28] Trying to save face, the Naval Advisory Board urged Roach to retain as much of the original steel shafting in the *Dolphin* as possible by replacing only the defective section. Roach argued that they should circumvent the problem by replacing the entire shaft with one of his own wrought iron shafts. Roach's record with iron shafts was excellent and, when the remaining steel shafts proved equally defective, the board complied with Roach's demand.[29]

Bickering over the shaft replacement produced the greatest of all delays by holding back cash installments, or "reservations," paid to Roach upon completion of various stages of construction. These cash

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26 Roach to Chandler, December 18, 1884, Chandler Papers; and "Ships Chicago, Boston, Atlanta and Dolphin," 354-356.

27 Roach to Chandler, December 10, 1884, Chandler Papers.

28 Hirsch, *William C. Whitney*, 277.

29 Roach to Chandler, December 18, 1884, Chandler Papers; and "Ships Chicago, Boston, Atlanta and Dolphin," 348-49, 384-386, 391.

flow problems caused Roach great financial hardship, and ultimately led to his business failure. A steel worker who lost his job at Nashua wrote to future Navy Secretary Whitney that he had informed Roach of the poor quality of the shaft after production, but Roach had no reason to mistrust the navy's inspectors initially and he certainly derived no advantage from installing the poor quality shaft.[30] As with the rest of the sixty-four alterations made to the *Dolphin*, the shaft debacle taught American industry and navy planners important lessons.

With the 1884 presidential elections looming in the distance, the Republicans needed results from the ABCD program. Despite the intrinsic value of teaching American engineers how to build modern steel warships and accommodate technological innovation, the *Dolphin*'s reputation as a long-delayed, flawed project reflected poorly on the Republicans. The accusations of corruption levelled at Chandler appeared to be confirmed by the *Dolphin*'s failure. To those following the progress of the ABCDs, the charges of graft and collusion began to ring true. The original plan of displaying fine new Republican warships for the 1884 campaign backfired.

The *Dolphin* had taken her first victim. Instead of portraying the Republicans as the initiators of naval renewal, the *Dolphin* had tainted them with a reputation of incompetence and fraud. After the failed Republican campaign, Chandler retired in March 1885. That same year he campaigned for a senatorial seat in his home state of

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[30] Shattuck to Whitney, April 3, 1885, Whitney Papers.

New Hampshire. Stigmatized by the perceived failure of the *Dolphin* and charges of corruption, Chandler lost the race.[31] Dedicated to defending his record as navy secretary full time both in the press and to the public, he managed to win a senatorial seat two years later. Chandler's reputation, however, had been tarnished; he continued to be viewed as a corrupt and sinister politician.

President Grover Cleveland's platform included slogans such as "Honest Government by an Honest Man" and "Turn the Rascals Out." Democratic periodicals expressed opinions such as: "What the Navy needs now is an unsparing investigation. We do not believe a Democratic secretary could do a better thing than to devote himself for the first year of his term to investigation solely, without any attempt at construction." Wayne McVeagh in *Century Magazine* called for the incoming navy secretary to cleanse the department.[32] With sentiments such as these in mind, incoming Secretary Whitney swooped in like an avenging angel to uncover Chandler's alleged corruption (Figure 6). He reversed some of his predecessor's orders, such as Chandler's unpopular Order 309 that disallowed officers' families to be transhipped to convenient points of call at the navy's expense.[33]

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31 Nevins, *Grover Cleveland,* 219-220; Reeves, *Gentleman Boss,* 350; and Richardson, *William E. Chandler,* 367-368.

32 *The Nation,* November 27, 1884; Reeves, *Gentleman Boss,* 350; Richardson, *William E. Chandler,* 259; and Tyler, *American Clyde,* 60.

33 Ibid., 264.

A partisan politician and skillful manipulator of the press, Whitney tried to find as much Republican mismanagement as possible. Under the impression that corruption lay hidden within the records of his predecessor, Whitney instituted a full-scale financial investigation of the Chandler administration by bringing in an outside accountant to study Chandler's books. After careful financial scrutiny of Chandler's department, no proof of graft or financial corruption could be found. Whitney's private accountant located only four examples of budgetary excess, including the purchase of $61,000 worth of canvas, the redundant purchase of coal by different paymasters, and the costly repairs of the USS *Omaha* and the USS *Mohican*. In all cases Whitney blamed the bureaucratic system for overexpenditure and absolved Chandler, stating: "It is the system that is vicious." He later stated: "I feel certain that a similar record of mismanagement, or wasteful expenditure, of injudicious and ill-advised disposition of public moneys might be made by any Secretary under the present system." No less a suspicious critic of Chandler than Abram Hewitt also criticized the naval bureaucracy, stating: "The irresponsible bureau system has been tried and has utterly failed."[34]

Having uncovered little evidence of Chandler's supposed criminal activities in the department's books, Whitney turned to the next

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[34] 49 Cong., 1 sess., "Report of the Secretary of the Navy," *House Exec. Doc. 1, Part 3*, 1885, xxvii-xli; 47 Cong., 1 sess., *Congressional Record*, 5514-5515, Peterson, "The Navy in the Doldrums," 237, 245; and Richardson, *William E. Chandler*, 370.

source of criminal suspicion: the ABCD warships. The *Dolphin* had received criticism from such notables as former Chief Engineer Benjamin Isherwood, Admiral David Dixon Porter, Chief Constructor Theodore Wilson, other bureau chiefs, and the Democratic press (Figures 7 and 8). Even though Isherwood levelled valid criticism at design problems in the ships, most fault-finding with the *Dolphin* was politically motivated. In the case of Porter and the bureau chiefs, inflated egos and attempts to reestablish lost bureaucratic and policy-making power prompted calls for a rejection of innovative designs for more conservative plans. As far as the Democratic press was concerned, the Republican administration could do no right.

The investigation of the *Dolphin* resulted from a combination of good intentions and partisan politics.[35] To accept the *Dolphin* for service, as the Naval Advisory Board recommended on 17 March 1885, would invite bad publicity for passing what appeared to be an inferior product.[36] A satisfactory warship would also vindicate Chandler, Roach, and the Republicans—an outcome that Whitney hoped to avoid. After justly concluding that Chandler and the Naval Advisory Board had poorly planned and executed the ABCD warship program, Whitney tried to prove poor workmanship on the

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35 48 Cong., 1 sess., "Additional Steel Vessels," *Senate Report 161*, 1884, 20, 97; "Report of the Secretary of the Navy," 1885, 288-290; Paullin, *Paullin's History of Naval Administration*, 394; and Peterson, "The Navy in the Doldrums," 244-245.

36 "REPORT ON SECOND PRELIMINARY TRIAL OF THE DOLPHIN," Report of the Secretary of the Navy, 1885, 291-294.

contractor's part through examination of the *Dolphin*'s construction.[37] Finding little evidence of poor workmanship, though, the investigation degenerated into a legal debate over Roach's responsibility for contract-specified speed and power. As Roach prophesied to Chandler during the 1884 presidential campaign:

> When the ships are finished, no matter how good they are, there will be a disposition to find fault and if the Democratic Party should succeed, which I hope they will not, in order to vindicate their own charges, they would actually aid in destroying the Character of the vessels and they would find plenty of men in the Construction and Engineers Corps to aid them.[38]

In order to begin his inquisition, Whitney formed a board of his own hand-picked "experts," exclusive of the Naval Advisory Board. As Bradley Fiske described it, Whitney "packed" the board with three men who had an interest in seeing the *Dolphin* fail. The first board member, Herman Winter, had good reason to hate Roach. Since Winter lacked any formal training in naval architecture, Roach had him replaced as chief constructor of Morgan Iron Works with Marine Engineer Edward Faron. Commodore Shufeldt had passed over Winter for Miers Coryell on Roach's advice when selecting a civilian marine engineer for the Naval Advisory Board. Furthermore, Winter served as chief constructor in Whitney's Metropolitan Steamship Company, as superintendent for the Morgan shipping line, a competitor of Roach's Mallory line, and he owned patents on

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37 "Report of the Secretary of the Navy," 1885, xix.

38 Roach to Chandler, July 3, 1884, Chandler Papers.

numerous inventions he wished to introduce to the new navy in any way possible. Winter was also known to associate with Roach's business rivals and personal enemies, such as the Cramps of Cramps Shipyard, located in Philadelphia. Even Henry Dimock, Whitney's brother-in-law, manager of the Metropolitan line, and Roach's sworn enemy, mentioned in a letter to Whitney that Winter "feels that the [ABCD] ships are bound to be very unsatisfactory."[39]

Whitney also appointed Commander Robley D. Evans, a man extremely prejudiced against Chandler and interested in redeeming himself by discrediting Chandler. Commander Evans's story involved even more controversy than the Gorringe episode. In July 1884, Chandler removed Evans from his post as naval inspector of the Fifth Lighthouse District, which extended from Havre de Grace, Maryland, to Beaufort, North Carolina. According to Evans, Chandler placed him on waiting orders for rejecting a convention delegate who had been appointed lightkeeper in return for his political favor.[40] In time, claims were levelled in the press that Evans had run afoul of the Treasury Department to which he was assigned by rejecting Senator William Mahone's appointee in Virginia.[41] Months later, in a New

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39 Henry Steers to Chandler, April 28, 1886, Chandler Papers; Dimock to Whitney, April 5, 1885, Whitney Papers; Fiske, *Midshipman to Rear-Admiral*, 87; Peterson, "The Navy in the Doldrums," 238; Richardson, *William E. Chandler*, 374; Sexton, "Forging the Sword," 134-135; and Swann, *John Roach*, 214-217.

40 Robley D. Evans, *A Sailor's Log: Recollections of Forty Years of Naval Life* (New York: D. Appleton and Company, 1908), 232; Hirsch, *William C. Whitney*, 261-262; Reeves, *Gentleman Boss*, 348-349; and Richardson, *William E. Chandler*, 317-321.

York *Tribune* interview, Mahone denied the allegations, claiming he had no knowledge of the affair.[42] For his part Chandler claimed that

> . . . he [Evans] had used profane and indecent language toward members of Congress; that he indulged too freely in drink; that he was harsh and unduly severe in his treatment of his subordinates, and that he was in the habit of using the Government steamer under his command for the entertainment of junketing parties composed of Congressmen and other friends.[43]

While Evans did admit to much extradepartmental activity while on duty, neither side of the story was substantiated definitively.[44] Nonetheless, Chandler received a great deal of favorable mail over his handling of the Evans affair.[45] Subsequently, Evans became an inspector of material for the Baltimore and Ohio Railroad and still held his commission. Referred to by Evans as the "prince of secretaries," Whitney reinstated Evans as inspector of the Fifth Lighthouse District soon after becoming navy secretary.[46] Later Evans admitted in his memoirs of his "healthy hatred of him [Chandler] that never flagged." He even departed the ship under his

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41 *The Nation*, July 24, 1884; Hirsch, *William C. Whitney*, 261-262; and Richardson, *William E. Chandler*, 318.

42 New York *Tribune*, April 9, 1885.

43 Ibid., April 10, 1885.

44 Evans, *A Sailor's Log*, 231.

45 Stephen B. Luce to Chandler, March 15, 1887, Chandler Papers, Library of Congress; Reeves, *Gentleman Boss*, 349; and Richardson, *William E. Chandler*, 320.

46 Hirsch, *William C. Whitney*, 261, and Evans, *A Sailor's Log*, 234.

command to avoid contact with Chandler, who paid visits to his son, an officer on board the vessel.[47] His opportunity to exact revenge arose as Whitney's appointee assigned to observe the *Dolphin*'s commissioning trials and as an accomplice to Representative John R. Thomas in attempting to close Chandler's Naval War College some years later.

Captain George E. Belknap, third member and chair of Whitney's board, and a faithful Democrat from Chandler's home state, was due for promotion to the rank of commander. Neither Evans nor Belknap had any formal background in naval architecture or marine engineering. With Gorringe harrying Roach, and Belknap, Evans, and Winter scrutinizing the *Dolphin,* Chandler's worst nightmare had become reality.

Whitney ordered his newly-formed board to run the *Dolphin* through trials to ascertain if she met contract standards. Accordingly, the board conducted trials on 12, 18, and 28 May 1885, to form the basis of their report. The board scheduled these trials frequently enough that when asked by a reporter whether the trial would be held on a Monday, Roach drily answered: "No, the day has been changed. Hereafter the *Dolphin*'s regular weekly trials will take place on Thursdays instead of Mondays as heretofore."[48] In the first two tests the ship was plagued by overheating parts in the crankshaft, causing Whitney to question the ability of the hull's

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[47] Falk, *Fighting Bob Evans,* 137-138.

[48] Tyler, *American Clyde,* 61.

stiffness to hold the propeller shaft in line. The report admitted that the *Dolphin* had made 15 knots on her second trial, while developing 2,300 horsepower, but discredited this result because the trial took place in a smooth sea; the board redefined 15 knots "sea speed," specified in the congressional authorization, to equal 17 knots on a smooth sea. On the third test, however, the *Dolphin* achieved an average speed of 15.5 knots with a horsepower of 2,240 and a speed of 15.9 knots during one two-hour period according to Belknap's own telegram to Whitney.[49] The Belknap Board inexplicably reduced this entirely satisfactory result to 14.93 knots and 2,169 horsepower in its formal report. The board further reduced the speed to 14.6 knots, reasoning that tidal current increased the ship's apparent speed.[50] In addition, as if straining for any evidence of poor workmanship, the rest of the fourteen-page report listed hundreds of minor points such as scratches in the paint, splinters in the deck planking, incomplete filling of cracks with iron putty, and other details. Three main criticisms in the report related to the hawsepipe stopper and steam steering gear, items on which Herman Winter had patents that he hoped to promote.[51]

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49 "Ships Chicago, Boston, Atlanta and Dolphin," 48; and "The Dolphin Trial," *Army and Navy Journal* 23, no. 1189 (June 5, 1886), 916.

50 "*Report of the Examining Board on the trial and construction of the Dolphin.*" Report of the Secretary of the Navy, 1885, 310-311.

51 Ibid., 307; *Board of Examiners to the Secretary of the Navy*, "Report of the Secretary of the Navy," 1885, 358; "Ships Chicago, Boston, Atlanta and Dolphin," 47-48; Peterson, "The Navy in the Doldrums," 239; Richardson, *William E. Chandler*, 372-373; and Swann, *John Roach*, 217-222.

The Naval Advisory Board produced a scathing, thirty-page rebuttal, disputing the Belknap report point for point. The report showed that the *Dolphin*'s scantlings surpassed measurements prescribed by Lloyd's of London for awarding the highest classification of insurance of 100A.[52] In response to the Belknap trial results the Naval Advisory Board responded:

> Now, we have reason to believe that the log actually read 15.5 knots for the 6 hours. It then appears that this has, by some corrections not stated, been reduced to 14.93, and then, having presumably obtained the proper speed through the water, or the true speed, it is further reduced by a tidal correction of 33-100ths knots. We hesitate to say it was intended to mislead, but it is certainly an entire novelty in navigation.[53]

The Naval Advisory Board report was further supported by an additional statement of confidence from five captains on board the *Dolphin* during her sea trials. Roach even raised his own committee, consisting of nine respected marine engineers and naval architects from steamship companies and shipbuilding firms, to investigate the Belknap Board's conclusions. In an article published by the New York *Times*, the committee opposed the results of the Belknap Board on virtually every point, stating:

> We examined the floors, frames, engines, shafting, supports to boilers, the machinery, and the construction of the vessel generally, as far as we could do so by taking up the flooring in all accessible places, and we are of the opinion that the workmanship and materials used are of the best quality; and

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52 *Statement of Naval Advisory Board concerning criticisms on the U. S. S. Dolphin*, "Report of the Secretary of the Navy," 1885, 323-353.

53 Ibid., 337.

> there is not the slightest evidence to be observed in any part of the vessel that she is 'structurally weak' in any particular.[54]

The damage, however, had been done. A month after the Naval Advisory Board report was finished the board's chairman, Rear Admiral Edward Simpson, admitted in a letter to ex-Secretary Chandler that ". . . there is no chance of a fair hearing before the people to which tribunal Mr. Whitney has referred the matter."[55] Captain Belknap received a promotion to commodore in June 1885, just before submission of the critical report to the secretary.[56] Whitney circulated the unfavorable results of the Belknap Board to the press while forbidding any publication of the Naval Advisory Board's response.[57] Later in his letter to Chandler, Rear Admiral Simpson remarked:

> . . . the last year of my official life has been embittered by this effort at humiliation, but I know my reputation is on a solid basis (not won by cruises at Washington) and I await the prevailing spirit of justice which will assert itself only when politics (improperly so called) is banished from the Navy Department. The rage of party [italics Simpson's] now blinds men to the consequences of their acts.[58]

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54 New York *Times*, July 14, 1885.

55 Simpson to Chandler, August 10, 1885, Chandler Papers.

56 *Statement of Naval Advisory Board concerning criticisms on the U. S. S. Dolphin*, "Report of the Secretary of the Navy," 1885, 323-353; "Ships Chicago, Boston, Atlanta and Dolphin," 49-52, where Belknap's title changes from Captain to Commodore just before the report's submission; and Swann, *John Roach*, 214

57 *Army and Navy Journal* 23, no. 1170 (January 23, 1886), 509.

58 Simpson to Chandler, August 10, 1885, Chandler Papers.

Beyond the Belknap Board's nit-picking defects found in workmanship, the crux of the debate lay in Roach's responsibility for the *Dolphin*'s ability to maintain contract speed and horsepower. In reference to Whitney's struggle with the *Dolphin,* Bradley Fiske wrote that "The navy as a whole sided with John Roach, without whose organization, which he himself had built up, the ships could not have been built so quickly." To this statement, Mark Hirsch, Whitney's biographer, has replied: "Fiske, however, overlooked the fact that the *Dolphin* could not sail quickly enough, raid commerce, or escape enemy vessels of war."[59]

This dispute captures the essence of the legal debate over John Roach's contractual obligations. In the recommendation of 3 January 1882 to the House Naval Affairs Committee, the Naval Advisory Board specified: "Also one dispatch vessel or "clipper," to have a sea speed of fifteen knots, to be built of iron, and be armed with one 6-inch breech-loading rifle and four revolving guns."[60] The *Dolphin* was also required by contract to maintain an average horsepower of 2,300, unless a deficiency "was due neither to defective workmanship nor materials."[61] These are the terms under which the Naval Advisory Board recommended acceptance of the *Dolphin* to Secretary Whitney after a trial in which the vessel made an average

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59 Fiske, *From Midshipman to Rear-Admiral,* 87; and Hirsch, *William C. Whitney,* 287.

60 47 Cong., 2 sess., "Recommendations of the Naval Advisory Board Concerning Unarmored Naval Vessels," *House Exec. Doc. 32,* 3.

61 "Ships Chicago, Boston, Atlanta and Dolphin," 20-24.

speed of 15.16 knots and an average horsepower of 2,118.[62] Instead, Whitney declined to accept the vessel and asked for a legal ruling by Attorney General Augustus H. Garland.

Whitney had been known to manipulate the law for personal profit in New York, in the case of the Metropolitan Street Railway.[63] He now asked Garland to find whether the government's contract was legal and binding and if Roach could be held liable for the speed and horsepower of the *Dolphin*. In his six-page ruling Garland concluded that

> . . . no contract exists between Mr. Roach and the United States, and that the large sums of money which have been paid Mr. Roach have passed into his hands without authority of law, and are held by him as so much money had and received to the use of the United States, and may be recovered from him.[64]

Garland claimed that the act of signing the contract was tacit acknowledgement that the plans were correct, that Roach took responsibility for the speed and horsepower even though the Naval Advisory Board had designed the vessel, and that the agreement was not a valid contract in the first place. Garland was not consistent in his claim, however, or Roach would have been liable for building the

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62 REPORT ON SECOND PRELIMINARY TRIAL OF THE DOLPHIN, "Report of the Secretary of the Navy," 1885, 291-294.

63 Garret Roach to Chandler, March 3 and March 25, 1886; and Allan Nevins, *Abraham S. Hewitt* (New York: Harper and Brothers, 1935), 534-535.

64 *Statement of Naval Advisory Board concerning criticisms on the U. S. S. Dolphin*, "Report of the Secretary of the Navy," 1885, 323.

Dolphin of steel rather than iron, which the congressional authorization had originally specified.

Garland essentially argued that the federal government had no obligation to honor the terms of its own contract with Roach. The congressionally established Naval Advisory Board had certified all bills and authorized all installments that Secretary Chandler had paid to Roach. Roach had constructed the *Dolphin* according to naval inspectors recommendations, within the guidelines and specifications of the Naval Advisory Board. The Naval Advisory Board accepted the *Dolphin* as fulfilling the terms of the contract. Roach had offered to correct any faulty workmanship Whitney's examiners might find, regardless of the expense. And Whitney had even stated in the "Annual Report" of 1885 that "if the ship is the Government's design, the contractor should be held to correct construction, but not for the performance of the ship."[65]

John Roach had worked in good faith to the letter of the law, a law which Whitney had no intention of fulfilling. Garland concluded that "nothing short of an act of Congress" could allow the *Dolphin*'s acceptance.[66] In response to Garland's judgment, the *Army and Navy Journal* commented:

> The opinion of the Attorney-General which we publish seems to be a straining of the law against the contractor . . . if anything is

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65 *Report of the Examining Board on the trial and construction of the Dolphin.* "Report of the Secretary of the Navy," 1885, 311; and "Report of the Secretary of the Navy," 1885, xxiv.

66 Tyler, *American Clyde*, 63.

> notorious it is the unlimited capacity of these legal gentlemen to differ in their interpretation of the law . . . what builder will be likely to contract for work if after inspection and acceptance by an officer appointed by the Department for this express purpose, the completed structure is liable to be rejected by the secretary?[67]

Throughout this period, delays caused by design changes, trials, and bickering pushed Roach's financial situation closer to the brink of collapse. Cash payments, due Roach upon progressive stages of completion were interrupted by construction setbacks created by the Naval Advisory Board's design flaws and inferior materials, such as steel plates that failed to meet the board's high ductility standards. Roach had invested $556,910 of his own cash in the ABCD ships by December 1884, but the department held back over $200,000 in reserves.[68] By taking the ABCD contract, Roach had imprudently allowed himself such a low profit margin that there was no room for error in the scheduled completion and payment of cash installments. He also misjudged the ability of the department's engineers to plan and administer warship construction. Roach might have been saved the numerous time-consuming mistakes had the board been staffed with designers experienced with modern warship construction, but no American naval architects were so qualified. Congress had also contributed to Roach's predicament by decentralizing financial authority among several parties, preventing a direct financial

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67 *Army and Navy Journal* 22, no. 1143 (July 18, 1885), 1036.

68 Roach to Chandler, December 18, 1884, Chandler Papers.

relationship between the secretary and the shipbuilder. Consequently Roach presented bills for materials and labor to the naval inspectors, who certified them and passed the bills along to the board, which authorized them and sent them along to the secretary for final payment. This circuitous financial management caused Roach increased delays.[69]

In the end, Roach fell victim to the *Dolphin,* having misjudged the cost that the navy's first steel ship would exact. Because of a series of business set-backs, failing health, Whitney's bad faith, and lack of funds, Roach declared bankruptcy soon after the Garland ruling repudiated the *Dolphin*'s contract. Two shipwrecks in 1884 contributed to Roach's deteriorating solvency. The wreck of the *Reliance*, a steamer for the United States and Brazil Steamship Line, devalued Roach's stock in a company that had provided collateral for his loans. Insurance payment delays forced Roach to wait more than a year for reimbursement of his partial ownership of the wrecked *Guadalupe*, forcing him to dip further into his financial reserves.[70] The punch shop at the shipyard burned down in early August 1884, damaging equipment worth $200,000, taking two weeks to repair, and costing Roach $75,000 of his own money to supplement the insurance settlement. By autumn, insurance, interest on inventory, and wages for watchmen had already totaled more than the profit and costs of extras on the *Dolphin*. Payroll for Roach's labor force

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69 Roach to Chandler, January 17, 1885, Chandler Papers.

70 Swann, *John Roach,* 204.

alone had reached nearly $30,000 per week by July 1884.[71] Delay of government payments on the work reduced Roach's liquid assets and delay in the work tied up his yard, which would normally be producing merchant steamers at a more profitable rate. Roach already experienced financial trouble by 18 December 1884 as this letter to Chandler indicates:

> I will now give you some facts which are very embarrassing to me, causing me sleepless nights and keeping my credit on the very verge of ruin, that credit I hold next to my life. Yet much of this trouble is caused by changes and delays. The wharfage, watchmen and insurance costs me nearly as much as I get from the Government for doing this extra work. The Government has the benefit of those improvements at my expense.[72]

The Garland ruling proved the last straw, because no lender would grant funds for a ship the government would likely reject. On 18 July 1885, Roach gave up the fight with $4,631,478.23 in assets, $2,262,877.81 in liabilities, and only $22,475.19 in cash, less than one week's payroll for the shipyard.[73]

After months of inconclusive trials and drawn-out legal wrangling with Roach's assignees, the *Dolphin* had also become a political liability to Whitney. The nation's largest shipbuilder was bankrupt and the Republicans placed the blame squarely in his lap. In October of 1885, George E. Weed, one of the assignees, wrote to

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[71] Roach to Chandler, July 3, and December 18, 1884, Chandler Papers; and Swann, *John Roach*, 193.

[72] Roach to Chandler, December 18, 1884, Chandler Papers.

[73] George Weed to Chandler, May 14, 1886, Chandler Papers; and Swann, *John Roach*, 227.

Chandler that "from the interview we have had with Whitney . . . he appreciates the hole which both he and the Attorney Genl. [sic] are in and would like to get out as quietly and easily as possible."[74]

The strongest charges levelled against the ship were an inability to maintain contract speed and inherent structural weakness, which the Belknap Board believed could be tested ". . . only in one of two ways - tear her to pieces or send her to sea in heavy weather."[75] Captain Richard W. Meade, III, famed for negotiating the abortive treaty of 1872 with Samoa for American use of Pago Pago, volunteered to supervise the board's trial. Captain Meade, who had disclosed to Congress Roach's past reuse of a sound propeller shaft from the scrapped *Nevada* in the USS *Trenton,* stated to Whitney: "I will take the *Dolphin* out to sea, we will hunt for a storm and if the *Dolphin* does not come back, you may conclude that she was structurally weak. If we do come back, it will be a different story."[76] In an effort to settle the matter once and for all, Whitney sent the necessary orders to Meade, who began the trial on 17 December 1885, running from New York to Rhode Island to Norfolk, Virginia. With word of a storm brewing off Cape Hatteras, Meade took on a Board of Experts hand-picked by Whitney and headed into the eye of

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74 Weed to Chandler, October 10, 1885, Chandler Papers; and William F. Durand, *Adventures–In the Navy, in Education, Science, Engineering, and in War: A Life Story* (New York: McGraw-Hill Book Company, 1953), 28.

75 *Board of Examiners to the Secretary of the Navy*, "Report of the Secretary of the Navy," 1885, 354.

76 Durand, *Adventures*, 28; and Swann, *John Roach,* 140.

the storm.[77] Meade described the weather conditions during the trial as a "moderate gale" while other sources reported winds of up to seventy miles per hour.[78] Eyewitness to the event, Assistant Engineer Durand recounted the trial:

> For most of the next two hours the forward part of the ship was pretty well under water. Great waves broke over the bow and surged aft over the deck. I recall that a full headed-up barrel of pork standing on the deck forward was picked up and hurled aft along the deck like a missile out of a siege gun. Luckily no one was in its path.[79]

Satisfied with the little ship's structural integrity and fearing the immense weight of water might swamp the *Dolphin*, Captain Meade ordered the ship around and steamed away from the storm at three-quarters speed.[80]

The examiner's report to Whitney focused on design flaws in the vessel, but they found only one defect in the *Dolphin*'s workmanship: a leaky boiler seam.[81] In summing up his report, Captain Meade observed:

> During this time neither myself or [sic] officers observed any lack of strength in hull or machinery, and through the voice-tube from the pilot-house I was in constant communication with the engine-room. If any structural weakness exists it did not exhibit

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77 Ibid., 29.

78 "Ships Chicago, Boston, Atlanta and Dolphin," 71; and New York *Tribune*, March 16, 1886.

79 Durand, *Adventures*, 30.

80 "Ships Chicago, Boston, Atlanta and Dolphin," 70-72.

81 Ibid., 67-68.

> itself; and the engines ran smoothly, and were only stopped once in sixty-four hours, and then merely to sound. There was but slight tendency to heat reported, and no unusual amount of oil or water, for a new ship, used on bearings or journals. The ship arrived at Hampton Roads the next morning.
>
> To sum up, I consider the Dolphin [sic] reasonably strong, and her machinery reliable.[82]

Durand seconded these remarks, stating that "During the entire run in the Hatteras storm there was no sign or indication whatever of structural weakness in the ship. Not a rivet started, no leak developed, no crack gave warning of incipient failure. So far as the seaworthiness of the ship was concerned, the score was perfect."[83] And the *Harper's Weekly* of January 16 reported that "Her seamen came back with profound respect for her sailing qualities and very little has been said by the Board of Experts about her structural weakness."[84] Proving structurally sound under the very conditions prescribed by the Belknap Board, the *Dolphin* was finally vindicated.

In an effort to shield himself from criticism, Whitney suppressed the favorable results of the Hatteras test, as he did with the Belknap Board's results. Meade did not forward the favorable report of the *Dolphin*'s Chief Engineer John Lowe to the department, as was customary for an officer's report. In addition, Meade moderated the tone of his report for Whitney's sake, but spoke far more favorably of the *Dolphin*'s performance in public, prompting Henry Steers to

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82 Ibid., 72.

83 Durand, *Adventures*, 31.

84 *Harper's Weekly*, January 16, 1886.

write Chandler, "They did not break down & Mead [sic] is very emphatic in the statement that she did not show any signs of weakness."[85] Whitney even countered his own officers, issuing a statement to the press denying the favorable reports of the *Dolphin*'s performance that had circulated upon her return. In the *Army and Navy Journal* of 23 January 1886, Whitney was quoted as stating that:

> It is proper to say that most of the statements that have been circulated were erroneous. She did not encounter any very unusual weather. The reports about her being in a gale of wind blowing 70 miles an hour are not true. No such gale occurred during the trip.[86]

The *Dolphin* had become a curse to Whitney as she had to Chandler and Roach. Whitney's attempt to turn the *Dolphin* scandal to political advantage against the Republicans backfired. Whitney deducted only $28,161 from the final payments on the *Dolphin* because of the vessel's supposed failure to meet specifications. Having been diagnosed with cancer when the *Dolphin* scandal broke, Roach finally died on 10 January 1887. Later, his heirs took legal action against the federal government to recover the deduction and the cost the government incurred by taking control of bankrupt Morgan Iron Works to finish the other cruisers. The heirs gained a

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85 George E. Weed to Chandler, May 1, 1886, and Steers to Chandler, January 4, 1886, Chandler Papers.

86 New York *Times*, January 16, 1886.

favorable verdict in August 1890, with the final settlement of nearly $360,000 being granted in April 1898.[87]

Meanwhile, much of Roach's assets were sold at auction, although the shipyard at Chester continued to produce for a number of years. After the *Dolphin* proved structurally sound, despite her alleged design faults blamed on the Naval Advisory Board, Whitney found no legal basis for rejecting the dispatch vessel. This provided political fodder for the Republicans, proving in their minds that the secretary was bent on ruining Chandler and Roach. Politically, the effect of the Roach failure on the Democrats is difficult to gauge, although the bankruptcy of the nation's largest shipbuilder and resulting 2,400 layoffs must not have been well-received by big business or labor.[88] No matter how the *Dolphin* affair affected the Democrats' popularity, the next presidential election brought in the Republicans once again.

After a test cruise around the world from late 1888 to September 1889, the *Dolphin* finally dispelled any doubt about her construction. In an effort to vindicate the preceding Republican administration, Republican Navy Secretary Benjamin F. Tracy noted in his annual report for 1889 that the vessel had run 58,000 miles for 9,000 hours with only two hours down time for service. During this cruise the *Dolphin* maintained an average speed of fourteen knots with a top

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87 52 Cong., 1 sess., "Report of the Committee on Claims," *Senate Report 745*, 1890; 54 Cong., 1 sess., "Claims of Roach's Heirs," *Senate Report 754*, 1898; United States *Statutes at Large*, vol. XXX, 1409, 1450; and Brandt, "Steel and the New Navy," 25-26.

88 "Political Shipbuilding," *The Nation*, 41, no. 1047 (1885), 106.

speed of sixteen knots under favorable conditions. On 2 October 1889, after the world cruise and three years and nine months in service, a board of inspectors reported only slight repairs necessary to the vessel's bearings. Such evidence convinced Tracy that "in view of the confident predictions with which, at the onset of her career, the official condemnation of the vessel was somewhat prematurely pronounced by expert and inexpert judges alike."[89] President Benjamin Harrison concurred, stating that ". . . it is gratifying to be able to state that a cruise around the world, from which she has recently returned, has demonstrated that she is a first-class vessel of her rate."[90]

During the Spanish-American War the *Dolphin* served as dispatch vessel for the blockading squadron off of Cuba, relaying messages between Admiral William T. Sampson off Santiago, Cuba, and Key West, Florida. The vessel also served as pleasure boat to Presidents Theodore Roosevelt and Woodrow Wilson and as a navy promotional device for congressional cruises. The *Dolphin* was decommissioned on 8 December 1921, after exactly thirty-six years of service. In February 1922 she was sold to Mexico and served in the Mexican navy until 1927 as the *Plan de Guadalupe*.[91]

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89 51 Cong., 1 sess., "Report of the Secretary of the Navy," *House Exec. Doc. 1, Part 3*, 1889, 6-7.

90 James D. Richardson, ed., *Messages and Papers of the Presidents, 1789-1897*, vol. IX, 1889-1897 (Washington: Government Printing Office, 1898), 44.

91 *Dictionary of American Naval Fighting Ships*, vol. II, s.v. "*Dolphin*," (Washington: Navy Department, 1963), 286; Swann, *John Roach*, 234; and Bauer, *Register of Ships of the U. S. Navy*, 161.

How could the needs of the country and the navy have been better served by policy makers? Unfortunately, technology does not answer to the whims of partisan politics. Instead it requires planning, preparation, sound organization, and close attention to detail—matters paid little attention in the case of the *Dolphin*. Mistake heaped upon mistake by succeeding administrations inevitably led to the *Dolphin* scandal, from which neither party emerged untainted. Blame for the problems associated with the *Dolphin*, typically credited to corruption should be directed at political infighting, mismanagement, and inexperience. These political and administrative blunders resulted in a warship that was over budget and overdue.

For their part, men such as William E. Chandler, John Roach, and William C. Whitney could only see as far as their own political or economic interests. Secretary Chandler relied on an inexperienced board of advisors and compounded mistakes by rushing the design process. Roach underbid the vessel, accepting a prohibitively small profit margin. In the interest of partisan politics, Secretary Whitney rejected the ship's workmanship and contractual legality, placing his own actions in question. Had these men allowed the designers and engineers to do their work and kept politics out of the construction and trial process, they might have avoided the curse of the *Dolphin*.

Chapter Four

THE ABCDS: INVENTING A MODERN AMERICAN NAVY

> When warships were built of wood and propelled by the wind . . . when the slow and uncertain movements of a ship and the insignificant injury produced by her projectiles prolonged wars and gave time to build fleets, then it was not proper to measure the naval power of a nation by the number of ships afloat. But her wealth and resources and ability to add to her fleet were important factors in the problem. Now, when a modern man-of-war has become the most complicated machine that the brain of man ever devised; when careful training and much experience are necessary in those who man the ship; when years are required for her construction; when her powers of destruction have been increased many-fold; when the celerity of her movements has reached the certainty and speed of a railroad train, we have reached a point when naval warfare will be of short duration, and it will be impossible to add materially to the fighting fleet after hostilities have commenced.[1]

Few were prepared for the rapid technological change in American naval warships initiated by the ABCD program, a step in American naval terms that has been compared to the space program.[2] To demonstrate this rapid transition in American naval technology, this chapter will compare the America's "old navy" to the navy's first steel warships—the protected cruisers *Atlanta*, *Boston*, and *Chicago*. The design of these ships demonstrates the competing demands of different tactics, technologies, political factions, and

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[1] W. T. Sampson, "Outline of a Scheme for the Naval Defense of the Coast," United States Naval Institute *Proceedings* 15, no. 2 (1889), 178.

[2] John M. Dobson, "The Forty-Seventh Congress and the Birth of the New American Navy," *Capitol Studies* 2 (Spring 1973), 20.

individuals. They introduced a number of revolutionary technologies to the U. S. Navy that ended the use of wood and iron, smoothbore cannon, full-sail rigs, and other obsolete naval technology.

To begin this examination the chapter will provide a brief history of the navy between the Civil War and the 1880s as a basis for comparison. Following this, the chapter will document the early stages of construction of the *Atlanta*, and *Boston*, both of over 3,100 tons displacement, and *Chicago* of 4500 tons displacement (Figures 9 and 10). To do this it will follow the debates that raged between conservative and progressive elements over their design. In conclusion, it will document these three ships' navy service records to demonstrate their workmanship and design.

In many respects, America's modern navy began with the Civil War, when America became one of the world's leading innovators of naval technology. The Confederate States Navy battle-tested the effectiveness of the blockade runner. The CSS *Virginia* also introduced the world to the harbor ram, the inclined-iron casemate, and citadel-style warship design. The Union navy perfected the double-ended gunboat, large-caliber shell guns of fifteen to twenty inches, iron construction material and armor, and steam propulsion, especially the use of forced draft. It constructed the USS *New Ironsides* and USS *Monitor* upon the recommendation of the Ironclad Board of 1861. The *New Ironsides* proved to be the first, and only, practical oceangoing ironclad in the navy, while the *Monitor* provided the first practical application of the centerline turret in time of war.

The Union navy also sponsored the USS *Wampanoag*, a heavily armed commerce raider, which held the world's speed record for a ship for over a decade and posed the greatest threat to potential foreign enemies during the late 1860s.[3]

American post-Civil War warship technology evolved very little. With the end of the war came a return to the tradition of wooden sailing warships with steam auxiliary. In the interests of economy, steam was reserved for maneuvering in battle, or in port, while sails continued to be used for primary propulsion. Racks of cutlasses adorned the decks and fighting tops graced the masts of American warships into the middle 1880s. Congress cut back naval construction and reliance on pre-Civil War cruisers prevailed.

With the navy ignoring improvements in naval technology, obsolete weapons systems such as muzzleloading smoothbore cannon outlived their usefulness on board American cruisers. The muzzleloading cannon remained the navy's ordnance mainstay until the 1880s, despite the fact that the navy had developed a "slotted screw"-breechloading system in 1849. This superior system was rejected in favor of the muzzleloading gun designed by John A. Dahlgren in 1850. Subsequently, the French adopted the American design and developed it into their own breechloading rifle.[4]

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3 48 Cong., 1 sess., "Additional Steel Vessels," *Senate Report 161*, 1884, 67.

4 Commander S. D. Ames, "Our Rifled Ordnance," United States Naval Institute *Proceedings* 6, no. 11 (1880), 9; and Donald C. Canney, *The Old Steam Navy: Frigates, Sloops, and Gunboats, 1815-1885* (Annapolis: United States Naval Institute Press, 1990), 45.

Although the smoothbore could be lethal at close range, many naval powers had recognized its inferiority to rifled cannon by the beginning of the Civil War. American warships could not close with vessels equipped with rifles, because of their great penetrating power and long-range accuracy (Appendix E).[5] The limited effective range of the smoothbores underscored the fact that American vessels posed little threat to modern warships. American warships still retained their museum pieces through the 1880s, despite the fact that they had little hope of defending themselves against a modern warship.

For years the navy also ignored the threat that improved ordnance posed for its collection of predominantly wooden cruisers. The United States relied on wooden oceangoing warships until the 1880s, twenty years after the British had begun converting their fleet to iron.[6] Even though the navy had experimented with iron-warship construction, it had few iron ocean-going warships speak of by the 1880s. A large number of monitors were built during the Civil War, but these shallow-draught ironclads were not built by the navy, but by private contractors. Furthermore, these monitors were not designed for cruising the high seas, but for coastal and riverine

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5 Harold Sprout and Margaret Sprout, *The Rise of American Naval Power* (Princeton: Princeton University Press, 1939), 145; and Basil Greenhill and Ann Giffard, *The British Assault on Finland* (Annapolis: United States Naval Institute Press, 1988), 81-2, 301-2.

6 Henry H. Gorringe, "The Navy," *North American Review* 134, no. 306 (May 1882), 505; Hugh Lyon, "Relations between the Admiralty and Private Industry," *Technical Change and British Naval Policy, 1860-1939*, ed. Bryan Ranft (London: Hodder and Stoughton, 1977), 44.

duty. Of twenty-two seagoing warships constructed between 1867 and 1883, sixteen were built of wood, twelve of which were launched from navy yards (Appendix C). The USS *Alert* class of gunboats, authorized in 1873, were the only cruising ships built of iron. The last wooden warship constructed was the USS *Trenton,* completed in 1877.[7] In their report to Navy Secretary William H. Hunt of 1881, the first Naval Advisory Board argued that the United States should continue to build wooden warships

> . . . owing to the large supply of suitable timber at present on hand in Navy Yards, which the interests of economy demand should be utilized, the familiarity of our eastern workmen with wooden ship-building, and their dependence on it for a livelihood, the resources of the country with respect to this material, and the possibility of building wooden vessels of a limited size that shall be staunch, efficient and economical.[8]

This despite the fact that the heat of steam machinery accelerated dry rot and the vibration of propeller shafts shook apart wooden vessels.[9]

The ram bow, a design dating back to antiquity, found a niche in late-nineteenth century American warship construction because of the success of Confederate rams in the Civil War and the 1866 Austro-Hungarian victory over the Italians at Lissa, where the

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7 Frank M. Bennett, *The Steam Navy of the United States: A History of the Growth of the Steam Vessel of War in the U. S. Navy, and of the Naval Engineer Corps* (Pittsburgh: W. T. Nicholson, 1891), Appendix B.

8 REPORT OF THE BOARD, "Report of the Secretary of the Navy," *House Exec. Doc. 1, Part 3,* 1881, 30-31.

9 A Junior Officer, "Naval Reorganization," *The United Service* 2 (April 1880), 460-461.

Erzherzog Ferdinand Maximilian rammed and sank the *Re d'Italia.* American cruiser designs began to incorporate the ram bow in 1877 with the USS *Trenton.* In most cases, ramming victims had been stationary or struck by friendly forces and the ramming vessel usually damaged itself in the process. Despite these drawbacks, ramming remained a standard naval tactic along with closing with the enemy for boarding. In 1882, an officer testifying before the House Naval Affairs Committee on the best method to reconstruct the navy spoke of how an American warship had to "lie alongside" an enemy ship to fight it[10] These tactics finally changed when improvements in ordnance and self-propelled torpedoes made close action too risky.

The pre- Civil War fleet of American cruisers was incapable of meeting the postwar challenge of hunting enemy commerce during hostilities. Like the *Alabama,* they were designed to prey on sailing vessels, the most common means of ocean commerce through the Civil War. As Commander Raphael Semmes had admitted, "with the exception of half a dozen prizes, all my captures were made with my screw hoisted, and my ship under sail."[11] Sailing ships continued to

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10 48 Cong., 1 sess., "Reconstruction of the Navy," *House Exec. Doc. 127,* 1884, 24; Bernard Brodie, *Sea Power in the Machine Age* (Princeton: Princeton University Press, 1941), 85-87; Dean C. Allard, "Naval Technology During the American Civil War," *The American Neptune* (Spring 1989), 116; and Elting E. Morison, "The War of Ideas: The United States Navy, 1870-1890," *Harmon Memorial Lectures in Military History,* no. 11 (Colorado: United States Air Force Academy, 1969), 5.

11 Gorringe, "The Navy," 500; and Leonard Alexander Swann, Jr., *John Roach: Maritime Entrepreneur* (Annapolis: United States Naval Institute, 1965), 189.

dominate the carrying trade through 1875 with seventy-two percent of the world's commercial tonnage, but by the 1880s steamers had become the dominant form of merchantman on the trade routes.[12] By 1882, Great Britain, America's likeliest enemy in case of war, boasted a merchant fleet that could attain an average speed exceeding thirteen knots. On the other hand, of the fourteen American cruisers operational that year, the swiftest could achieve a top speed of 12.9 knots while the slowest made about 7.6 knots.[13]

During this period of decline, line officers such as David D. Porter and Louis M. Goldsborough failed to associate changing technology with progress. As was true of Harpers Ferry Armory in the early-nineteenth century, the navy remained aloof from technological change. Consequently, it resisted the interdependence between man and machine rapidly evolving in contemporary naval warfare.[14] These "old salts" were vestiges of an older generation that may have opposed new technology because of the security of traditional doctrine and the fear of experimentation, or the reluctance to enslave proud sailors to the steam engine and the perceived degradation of dependence on a machine. They may have simply been too proud to give up an age-old American naval tradition whose existence was

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12 Gerald S. Graham, "The Ascendancy of the Sailing Ship, 1850-1885," *Economic History Review* 9 (1956), 86-87.

13 REPORT OF THE BOARD, "Report of the Secretary of the Navy," 1881, 51; and Gorringe, "The Navy," 500.

14 Merritt Roe Smith, *Harpers Ferry Armory and the New Technology: The Challenge of Change* (Ithaca, N. Y.: Cornell University Press, 1977), 326-35.

threatened by the new reality. Whatever their reasons, these Civil War veterans of the "marlinspike school" maintained a negativist policy toward rapidly developing nineteenth-century naval technology, inspiring one historian to conclude that "the idea that the wooden ship was superior to the metal one and that sails were still as necessary as steam clung like barnacles to the minds of veteran naval officers."[15]

During the Dark Ages, marlinspike leader Porter was opposed on a number of issues relating to the direction of the postwar navy by engineers such as Chief Engineer Benjamin F. Isherwood. Porter advocated sails while Isherwood pushed steam propulsion. Porter believed wood provided the best material to construct lightweight, economical cruisers, in part because the navy yards specialized in wood construction. Porter believed in the superiority of the commerce raider, while Isherwood had called for the construction of sea-going ironclads as early as the Civil War.[16]

As *de facto* navy secretary during the brief term of Navy Secretary Adolph E. Borie, Admiral Porter actively opposed the onslaught of technological change taking place in naval technology. He required all vessels of the navy to be fitted out with full sail power.[17] He supported the order of Louis M. Goldsborough's Board

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15 David B. Tyler, *The American Clyde: A History of Iron and Steel Shipbuilding on the Delaware from 1840 to World War I* (Newark, Del.: University of Delaware Press, 1958), 110.

16 Swann, *John Roach*, 189; Allard, "Naval Technology," 117; and Sprout, *American Naval Power*, 199.

on Steam Machinery to replace all four-bladed screws with two-bladed ones to improve the hydrodynamics of the navy's auxiliary steam warships. This measure had the effect of decreasing steam efficiency and speed, necessary qualities for an effective warship.[18]

Isherwood's commerce raider *Wampanoag* became an early casualty to the conflict between Porter's camp and Isherwood's. Swift and well-armed, she fulfilled the navy's need for a proper commerce raider with which to fight foreign enemies during the Civil War. Despite a heavy armament of three 60-pound, and ten 9-inch, cannon, the *Wampanoag* was fast enough to set a speed record of seventeen knots that remained unequaled for over a decade.[19] This revolutionary vessel was the most formidable raider able to challenge the commerce of the Union's likeliest potential foreign enemy, Great Britain.[20] The Goldsborough Board rejected the vessel, however, in 1869 because of her consumption of coal and secondary use of sails. She was scrapped, even though she represented the Union navy's most effective contemporary cruiser.

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17 Bennett, *Steam Navy of the U. S.*, 612-13, 639-40; and Lance C. Buhl, "Mariners and Machines: Resistance to Technological Change in the American Navy, 1865-1869," *Journal of American History* 61, no. 3 (December 1974), 705.

18 Bennett, *Steam Navy of the U. S.*, 639-43.

19 Office of Naval Intelligence, *The United States Navy as an Industrial Asset: What the Navy has Done for Industry and Commerce* (Washington: Government Printing Office, 1923), 52; Morison, *Men, Machines and Modern Times*, 99; and Canney, *The Old Steam Navy*, 133-144, 177.

20 Long, *New American Navy*, 11; and Stanley Sandler, *Emergence of the Modern Capital Ship* (Newark, Del.: University of Delaware Press, 1979), 65, 67.

The case of the *Wampanoag* provides a benchmark for changing attitudes in the Navy Department toward new technology in the late-nineteenth century. The *Wampanoag*, represents an old-navy equivalent to the 1880-cruisers *Atlanta, Boston,* and *Chicago,* except that the *Wampanoag* was faster. Line officers, convinced of the effectiveness of sailing warships, resisted steam propelled warships such as the *Wampanoag* from 1865 until the 1880s, when they finally conceded that the era of sailing warships had passed.

The old-salt mentality of resisting new technology continued to pervade the naval establishment of the 1880s. Admiral Porter argued for the use of full sail power into the late 1880s despite calls to discard sails and rely entirely on steam power for warships by Navy Secretary William E. Chandler and members of the second Naval Advisory Board, because the rigging interfered with gun operation and sails required valuable storage space.[21] Old Salt Commander Robley D. Evans threw a prototype of Bradley Fiske's rangefinder overboard during its trials on board the USS *Yorktown*, claiming it was "of no value on board ship."[22] Fiske was later awarded the Elliot Cresson gold medal for the design of this

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21 48 Cong., 1 sess., "Additional Steel Vessels," *Senate Report 161*, 1884, 85-86; 48 Cong., 2 sess., "Report of the Secretary of the Navy," *House Exec. Doc. i, Part 3*, 1884, 41, 229; Seager, "Ten Years Before Mahan," 508; Sprout, *American Naval Power*, 195; Morison, "The War of Ideas," 2; and Swann, *John Roach*, 189.

22 Edwin A. Falk, *Fighting Bob Evans* (New York: Jonathan Cape and Harrison Smith, 1931), 167.

revolutionary rangefinder by the Franklin Institute in Philadelphia, Pennsylvania.[23]

Despite the influence of the marlinspike school, the 1880s also marked a rapid departure from the Dark Ages. The marlinspike school failed to anticipate the rapid technological changes taking place, causing its extinction as it failed to adapt. With the decline of the marlinspike school, the push for naval modernization cleared another hurdle.

In the spring of 1883, the promise of new naval construction funding opened the floodgates of innovation and renewal within the Navy Department. Under the Act of 3 March 1883, the ABCDs became the first warships funded in an annual congressional appropriation. Congress authorized $1,300,000 for construction of four relatively sophisticated vessels of war.[24]

Naval personnel participated in the subsequent flurry of creativity. Bradley A. Fiske, a prime example of this creative genius, obtained sixty patents on devices in fields ranging from depth sounding, internal and external shipboard communications, to navigation, rangefinding, and gun direction.[25] Of the eighteen

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23 Bradley A. Fiske, *From Midshipman to Rear-Admiral* (New York: The Century Company, 1919), 170-72; Elting E. Morison, "The War of Ideas: The United States Navy, 1870-1890," *Harmon Memorial Lectures in Military History*; no. 11 (Colorado: United States Air Force Academy, 1969), 7; Elting E. Morison, "Inventing a Modern Navy," *American Heritage* 37, no. 4 (June/July 1986), 153; Edwin A. Falk, *Fighting Bob Evans* (New York: Jonathan Cape and Harrison Smith, 1931), 167; and Paolo E. Coletta, "The ' Nerves' of the New Navy," *The American Neptune* 38, no. 2 (April 1978), 125.

24 United States *Statutes at Large*, vol. XXII, 477.

original submissions received by the Naval Advisory Board for the design of the ABCD warships, most were devised by naval personnel such as Admiral Porter, Rear Admiral Thomas O. Selfridge, Passed Assistant Engineer George W. Baird, and Passed Assistant Naval Constructor F. T. Bowles, a Naval Advisory Board member.[26] In 1884, Bowles also submitted the first request of the Navy Department to establish a model ship basin at a cost of $50,000. This important tool for determining the resistance of hull forms was not authorized by Congress, however, until 1896.[27] This flood of creativity and invention prompted Rear Admiral Edward Simpson to write Senator Eugene Hale in 1884: ". . . the age is full of progressive ideas, and we must become accustomed to departures from old forms."[28]

Renewed funding for naval construction in the 1880s encouraged new industry. For example, by 1888 a domestic gun cotton industry had emerged on both coasts and Benjamin Hotchkiss had returned from Paris to establish a Connecticut plant for producing rapid-firing guns and self-propelled torpedoes.[29] The industry that benefitted

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25 Coletta, "'Nerves' of the New Navy," 123-124; and Peter Karsten, *The Naval Aristocracy: The Golden Age of Annapolis and the Emergence of Modern American Navalism* (New York: The Free Press, 1972), 298.

26 Robert W. Shufeldt to William E. Chandler, January 31, 1883, "Report of the Naval Advisory Board, 1882-1884," box 1, R. G. 45, The National Archives.

27 Francis T. Bowles to William E. Chandler, April 17, 1884, "Report of the Naval Advisory Board, 1882-1884," box 4, R. G. 45, The National Archives; and O. N. I., *Navy as an Industrial Asset*, 97.

28 48 Cong., 1 sess., "Appropriations for the Navy," *Senate Report 405*, 1884, 4.

the most from new naval construction, however, was the steel industry. Up until the early 1880s, American steel production specialized in manufacturing steel rails for the railroad industry. This production had skyrocketed from only 19,643 long tons in 1865 to 1,711,920 by 1885.[30]

Many Americans remained skeptical about the production of rolled steel plates despite the industry's ability to supply the needs of railroads. Chief Engineer Isherwood argued for iron-warship construction, even in 1881, when line officers pushed for steel construction. Isherwood opposed the use of steel because he correctly feared that the government would have to finance an infant American rolled-steel industry.[31]

It took a capitalist such as John Roach to risk his business to undertake the production of vessels requiring high-quality rolled steel plates. Roach produced much of the necessary steel himself. He convinced the Phoenix Iron Company of Philadelphia, Norway Iron

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29 John G. B. Hutchins, *The American Maritime Industries and Public Policy, 1789-1914* (Cambridge: Harvard University Press, 1941), 458; and Benjamin Franklin Cooling, *Gray Steel and Blue Water Navy: The Formative Years of America's Military-Industrial Complex, 1881-1917* (Hamden, Conn.: Archon Books, 1979), 77.

30 U. S. Bureau of the Census, *Historical Statistics of the United States, Colonial Times to 1957* (Washington: Government Printing Office, 1960), 416-417; and Morison, *Men, Machine and Modern Times*, 171.

31 John D. Long, *The New American Navy* (New York: The Outlook Company, 1903), 18; Morison, *Men, Machine and Modern Times*, 171; Edward William Sloan, III, *Benjamin Isherwood: Naval Engineer* (Annapolis: United States Naval Institute Press, 1965), 239; Norman Friedman, *U. S. Cruisers* (Annapolis: United States Naval Institute Press, 1984), 17; Kenneth J. Hagan, "Admiral David Dixon Porter, Strategist for a Navy in Transition," United States Naval Institute *Proceedings* 94, no. 785 (July 1968), 140; and Swann, *John Roach*, 156.

and Steel Company of South Boston, Massachusetts, and Park Brothers of Pittsburgh to produce any additional requirements necessary. All the steel interests involved in this initial experiment lost money because of start-up costs and the extraordinarily high quality required by the government contracts. These steel producers accepted the losses believing they would be offset by later profits.

In order to supply the needs of the ABCDs, they produced the first open-hearth plates and structural parts in the United States. The navy set their ductility requirement at 25 percent for 60,000 pound tensile strength, where Lloyd's of London and the French required only 20 percent for a tensile strength between 60,000 and 64,000. The navy's high standards were later relaxed at the request of the steel makers to 23 percent, but they still exceeded contemporary European requirements. The ABCDs also required the first heavy steel forgings from the American steel industry. This included ingots for propeller shafts and gun barrels. Industry attempts to produce such large forgings met with mixed results. The propeller shafts broke during trials and only forgings for six-inch guns or smaller could be produced. Larger tubes had to be ordered from England. Despite these set-backs the demands placed on the steel industry by the ABCD contracts set the standard for subsequent high-quality structural steel produced in the United States according to experts such as steelman Charles Schwab and Navy Secretary John D. Long.[32]

The ABCD program planted the seed for the naval-industrial complex through the close cooperation between Roach, the steelmakers, and the navy. Together they forged a relationship that would grant the steelmakers future profits, Roach added prestige and later navy contracts, and the navy its superior steel quality. In the process, they built the ABCD warships, and unknowingly, they also had begun a relationship that would develop into the dreaded military-industrial complex of the twentieth century.

After the demise of the wooden sailing warship, new forms of fighting craft had emerged. The wooden frigate of former times became the steel cruiser of the late-nineteenth century. Its duties included scouting, commerce raiding, and convoy duty, and it evolved into different forms such as the protected cruiser.

Predecessor of the light cruiser, the protected cruiser served an interim role in nineteenth-century navies. It granted the best possible protection from enemy ordnance without heavy armor. It incorporated speed with the greatest possible firepower. To obtain protection against enemy guns without increased armor, the protected cruiser had watertight compartmentalization throughout its hull, while coal bunkers were positioned around its vital areas to prevent an enemy shell from scoring a direct hit on the its

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32 Long, *The New American Navy*, 37; O. N. I., *Navy as an Industrial Asset*, 46-47; Benjamin Franklin Cooling, *Gray Steel and Blue Water Navy: The Formative Years of America's Military-Industrial Complex, 1881-1917* (Hamden, Conn.: Archon Books, 1979), 166; Karsten, *Naval Aristocracy*, 177; and Dean C. Allard, "The Influence of the United States Navy upon the American Steel Industry, 1880-1890" (M.A. thesis, Georgetown University, 1959), 28-32, 41-42.

machinery. In addition, a protective deck of 1.5 inches of steel provided added protection for the ship's engines, boilers, and magazines. This deck was crowned and often referred to as a "turtle deck," because it sloped down from both sides of the horizontal deck above the waterline to meet the the hull below the waterline. With coal stowed above it, this turtle deck defended the ship from incoming shells, rapid-fire guns, and torpedoes. These cruisers were also equipped with a ram bow, specially reinforced for close action. The design resulted in odd gun arrangements to enable the cruisers to fire ahead while ramming. The *Atlanta* and *Boston*, being of the same class, had their eight-inch guns mounted *en échelon* so they could fire either broadside or straight ahead. And the *Chicago*'s main armament had to be sponsoned over the side to allow unobstructed fore and aft fire.[33]

The controversy that revolved around the construction of the ABCD warships involved three different aspects of their design. The first problem was the construction of the hull and the kind of protection these vessels would incorporate. Secondly, the struggle between sail and steam proponents plagued the construction of the ABCDs. And third, what armament should the ABCD warships employ? In other words, the major debates over the construction of the ABCDs centered on the hull and armor, propulsion, and ordnance.

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[33] Francis T. Bowles, "Our New Cruisers," United States Naval Institute *Proceedings* 9 (1883), 595-631; Simpson, "The United States Navy in Transition," 16-22; *Specifications for Building the Hull of the Twin-Screw Steam Cruiser Chicago for the United States* (Washington: Government Printing Office, 1883).

Those who supported construction of the ABCDs included Republican party leaders, the party press, and most naval officers. Those who attacked the designs of the ABCDs included the Democratic press, those who stood to gain by their criticism, and the disaffected naval personnel who were excluded from the process and felt their opinions should be noted. In the first case, periodicals such as *The Nation* and Washington *Post* provide prime examples. In the second case, designers such as Herman Winter and Englishman William H. White, Captain George E. Belknap, Commander Robley D. Evans, and Democratic shipbuilder Charles Cramp proved scathing critics. And in the third case, Admiral David D. Porter, former Chief Engineer Benjamin Isherwood, and Chief Constructor Theodore Wilson presented their own arguments. These varied groups made for some strange bedfellows, although many of their criticisms proved correct.

The use of steel to build the new American warships was the brainchild of the first Naval Advisory Board member Lieutenant M. R. S. Mackenzie. His advocacy of steel resulted in the 1881 majority decision that recommended steel over iron for warship construction. The report included reasons such as steel's greater durability with less weight relative to iron, the rapidity with which European powers were developing steel shipbuilding technology and the fact that steel would eventually replace iron as the primary shipbuilding material. Rear Admiral Simpson, second chairman of the second Naval Advisory Board added that steel increased interior

space relative to wood while providing the rigidity necessary for watertight bulkheads.[34]

For the construction material, the most significant alternatives to steel in hull construction were iron, ironclad, composite, and wood-sheathed. In the first case, the construction materials would be American wrought iron, which Isherwood believed to be similar in quality to low-grade European steel. Iron is typically more brittle than steel; hence, it cannot withstand as much wear as steel. It is also heavier than steel, increasing the displacement of an iron vessel over a steel one. Otherwise, vessels built of these materials are similar. In the case of the United States, however, no open-hearth steel industry existed for the construction of rolled plates before the ABCD warships.[35]

Isherwood and Chief Constructor John Lenthall had urged the construction of oceangoing ironclads since the Civil War. They did so again in the minority report of the first Naval Advisory Board in 1881.[36] These large warships were commonly built for the European powers through the 1870s. No such vessels had been built in the United States since the Civil War, but their construction was

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34 47 Cong., 1 sess., REPORT OF THE BOARD, "Report of the Secretary of the Navy," *House Exec. Doc. 1, Part 3*, 1881, 31; and Simpson, "The United States Navy in Transition," 21; and Swann, *John Roach*, 154-164.

35 REPORT OF THE BOARD, "Report of the Secretary of the Navy," 1881, 42-44; Edward William Sloan, III, *Benjamin Franklin Isherwood: Naval Engineer.* (Annapolis: United States Naval Institute, 1965), 238; and Buell, *Memoirs of Charles H. Cramp*, 167.

36 Ibid., 41-42.

technically feasible. The iron industry had the means to produce high-quality iron armor, and the navy yards were skilled at constructing ships of wood.

Theodore D. Wilson, chief constructor during the construction of the ABCDs, supported neither steel, nor iron, nor ironclads. He defended the continued use of wood. He wished to continue building wooden sailing warships into the 1880s, but he compromised by advocating the composite method or metal sheathed with wood. With composite ships, the structural pieces of the ship were typically iron or steel, while the hull itself comprised two layers of wooden planking, This method subsequently proved short-lived because the mixture of a rigid metal structure with a flexible wooden shell was unreliable. The structure failed to give when the hull did and the planking failed to seal tight because of its metal structure.[37]

With wooden sheathing, a metal ship's hull was encased by wooden planking and sheathed with copper. The planking had to be thick enough to reduce electrolysis between the copper and the iron or steel hull. The advantages of this method included increased protection of the ship from grounding and underwater weapons and the fact that copper-sheathed ships could cruise for longer periods than ordinary ships without undergoing bottom cleaning. On the other hand, sheathing could cost $70,000 for a vessel such as the *Chicago*, almost ten percent of her contract price. Sheathing

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[37] Theodore D. Wilson to William E. Chandler, July 12, 1884, "Report of the Naval Advisory Board, 1882-1884," box 5, R. G. 45, The National Archives; 48 Cong., 1 sess., "Additional Steel Vessels," *Senate Report 161*, 1884, 37-39.

increased a ship's displacement, thereby reducing the potential for added coal, armor, or ordnance and hull repairs became far more complicated as well. Wilson condemned the unsheathed *Chicago*, predicting that her ". . . not being sheathed in wood and copper, she will foul very quickly and her speed will be reduced."[38]

The greatest difficulty regarding propulsion arose over whether to equip the ships with sails or not, and how large their sail rigs should be if they had to have it.

Engineers and younger officers argued against carrying any kind of sails at all. The rigging and sails of the *Chicago* weighed nearly 100 tons, added weight that should have been reserved for additional coal.[39] In addition to space requirements, sail rigs posed hazards during battle. Lowering the spars and telescopic masts could exhaust a crew before they took battle stations. The goal in battle being to minimize the number of uncontrollable variables, retaining sail rigs actually increased the risk of falling rigging or a fouled screw.

Admiral Porter believed, as did many veteran line officers, that the new cruisers should be equipped for full sail, which required

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38 Theodore D. Wilson to William E. Chandler, August 11, 1884, "Report of the Naval Advisory Board, 1882-1884," box 5, R. G. 45, The National Archives; "Additional Steel Vessels," 12-14, 26-27, 44, 77, 107; Philip Hichborn, Naval Constructor, "Sheathed or Unsheathed Ships?" United States Naval Institute *Proceedings* 15, no. 48 (1889), 21-56.

39 "*Chicago*, U. S. S., constructed at Chester, Pennsylvania," box 37, R. G. 45, The National Archives; Hagan, "Admiral David Dixon Porter," 140; Seager, "Ten Years Before Mahan," 508; Sprout, *American Naval Power*, 195; Morison, "The War of Ideas," 2; and Swann, *John Roach*, 189.

heavier spars and rigging. His defense was that the United States lacked the coaling stations necessary for steam-powered warships. While this argument had some validity, it hides the fact that Porter and other old salts dreaded the end of their venerable sailing warships. The designers of the ABCDs compromised by keeping a two-thirds sail rig, which required lighter spars and rigging and carried less added stored material.[40]

Insofar as steam propulsion was concerned, what became the heart of the debate was the ABCDs' lack of speed and the *Chicago*'s powerplant design. The speed of the *Atlanta*, *Boston*, and *Chicago* was by no means record-breaking. The ABCDs never reached the contract speeds for which they were designed. They could all be overhauled by fast merchantmen and large warships, but they were comparable in speed to the similar classes of ships in other navies.[41]

As for ordnance, no one opposed the use of breechloading rifles and rapid-firing guns on the ABCDs. The primary ordnance of these vessels were six- and eight-inch breechloading rifles. The former were the first such American made rifles, while the latter were imported from England. The rapid-firing guns were Hotchkiss 47mm cannons and Gatling Guns, the former built by an American firm in Paris and the latter made in America. There was no call for using the

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40 Gorringe, "The Navy," 500; Sprout, *The Rise of American Naval Power*, 195; and Swann, *John Roach*, 189.

41 "Our Slow New Navy," *Scientific American Supplement* 17 (July 2, 1887), 2; Washington *Post*, September 13, 1885; and "New American Men-of-War," *The Engineer* 56 (October 26, 1883), 325

old smoothbore cannons, although with the exception of ordnance, the ABCD ships retained the trappings of vessels equipped for close action.

Engineers and sea trials exposed three defects in the ABCDs ordnance during the construction process. The only defect found in workmanship, was the use of bronze sills for the rifle mountings (Figure 11). These bronze sills were much more malleable than the steel deck. Consequently, when the *Atlanta*'s rifles were tested with a full charge for the first time they pulled the sills out of the deck, putting themselves temporarily out of action. This defect was soon remedied in all the ships by installing steel sills in place of the bronze ones.[42] Humorist Bill Nye reported that

> She [the *Atlanta*] has all the modern improvements, hot and cold water, electric lights, handy depots, and a good view of the ocean, but when she shoots off her guns they pull out her circles, abrade her deck, contuse her rotunda, and injure people who have always been friendly to the government. Her guns are now being removed and new circles put in, so that in future she would be enabled to give less pain to her friends and acquire more gloom into the ranks of the enemy.[43]

Two deficiencies in their ordnance had to do with design. The big guns were ill-protected from rapid-firing guns. The guns' deflective armor shield was not thick enough, nor wide enough to prevent enemy rapid-fire guns from endangering the gun crews. On the

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42 Captain F. M. Bunce to Rear Admiral Bancroft Gherardi, February 13, 1888, box 36, R. G. 45, The National Archives; and Fiske, *From Midshipman to Rear-Admiral*, 97.

43 "Bill Nye Sees the Navy," United States Naval Institute *Proceedings* 61, no. 386 (April 1935), 490.

Atlanta and *Boston*, the two forward guns could not be fired at the same time because the flash from one could seriously harm the gun crew of the other (Figure 12). These last two design flaws were never remedied. They were raised by British critics, who were more interested in promoting their own arms industry at that time.[44]

The powerplant of the *Chicago* came under closer scrutiny than any other aspect of the ABCD warships. Designed by Miers Coryell, the boilers and simple walking-beam engines had been previously used by Coryell for a passenger liner built by John Roach for the Cromwell Line. The *Louisiana* had steamed successfully for that line with these walking-beam engines and Roach had the experience in building them. Consequently, the Naval Advisory Board chose this proven technology when space considerations required a powerplant able to fit beneath the ship's waterline. They had already experienced a great deal of criticism for allowing the *Dolphin*'s powerplant to sit above the waterline, exposing it to potential enemy fire. This they wished to avoid with the *Chicago*.[45]

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44 "New American Men-of-War," *The Engineer* 56 (October 26, 1883), 325; William H. White to Francis T. Bowles, January 12, 1884, in Frederic Manning, *The Life of Sir William White* (New York: E. P. Dutton and Company, 1923), 125-126; and William Bainbridge Hoff, "A View of Our Naval Policy and a Discussion of its Factors," United States Naval Institute *Proceedings* 12, no. 37 (1886), 138.

45 "Political Shipbuilding," *The Nation* 41 (1885), 106; Washington *Post*, September 13, 1885; "New American Men-of-War," *The Engineer* 56 (October 26, 1883), 325; William H. White to Francis T. Bowles, January 12, 1884, in Frederic Manning, *The Life of Sir William White* (New York: E. P. Dutton and Company, 1923), 125-126; "The New Cruisers," New York *Times*, February 23, 1884, 4; *Army and Navy Journal* 21, no. 1069 (February 16, 1884), 587; "Additional Steel Vessels," 14-18; and Bennett, *Steam Navy of the U. S.*, 781.

The *Chicago*'s boilers were considered equally defective. Externally fired and seated on brick pedestals, the boilers were thought to be unstable in case of ramming or heavy rolling. The bricks might start or the boilers might fall off their stands. The Naval Advisory Board was chastised heavily by the press and other designers for the propulsion unit of the *Chicago*. Miers Coryell, resigned from the board shortly after the storm of criticism broke.[46]

Little fault was found in the overall design of the cruisers. Critics had compared the cruisers unfavorably with ironclads and armored warships, but the Naval Advisory Board could not be held accountable for the type of warships Congress had authorized. At least one critic found fault with the 1.5 inch protective deck within the ship. This type of protective deck was then popular in protected cruiser designs in England and the designs of the ABCDs had been patterned largely after British protected cruisers, many of which were constructed in the 1880s. Therefore, many of their faults were also inherent in British designs.[47]

Despite complaints by politicians and antinavalists about the quality of design and workmanship in the ABCDs, the vessels went on to have successful, enduring operational lives.

First of the protected cruisers to be commissioned, and least distinguished of the ABCDs, the *Atlanta* became a platform for

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46 Ibid.

47 "New American Men-of-War," *The Engineer* 56 (October 26, 1883), 325; "New Steel Cruisers," *Scientific American* 17, no. 432 (April 12, 1884), 6892-93; and "Additional Steel Vessels," 44.

Bradley Fiske's experiments in wireless telegraphy just after her commissioning in July 1886 (Figure 13). Along with the *Boston*, *Chicago*, and *Yorktown*, the *Atlanta* was assigned to the Squadron of Evolution, formed on 30 September 1889. The navy had formed the squadron to test fleet tactics with modern ships and to show-off America's latest technology to the world. From 1890 to 1892, she cruised the Atlantic Coast, West Indies, and South America. She performed the same duty from 1892 to 1895 while attached to the North Atlantic Squadron. The *Atlanta* failed to participate in the Spanish-American War, because she was undergoing a refit from 1895 until 1900. Between 1900 and 1904, she joined the South Atlantic and Caribbean Squadrons. In 1903, the *Atlanta* landed men at Santo Domingo to protect American interests, then later joined other navy units to prevent Columbia from landing troops to pacify the Panamanian revolution. She served as a training vessel in 1905 and as a barracks ship for the torpedo boats at the Norfolk Navy Yard and later at Charleston. The first of the ABCDs to be stricken, the *Atlanta* was sold for scrap in June 1912.[48]

With the most distinguished career of the ABCD warships, the *Atlanta*'s identical twin *Boston* began service with the Squadron of Evolution in September 1889. In October of 1891, she was detached

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[48] *Dictionary of American Naval Fighting Ships*, vol. I, s.v. "*Atlanta*," (Washington: Government Printing Office, 1959), 71; Fiske, *From Midshipman to Rear-Admiral*, 96-100; Long, *New American Navy*, 24; Mitchell, *Modern American Navy*, 171; and K. Jack Bauer and Stephen S. Roberts, *Register of Ships of the U. S. Navy, 1775-1990* (New York: Greenwood Press, 1991), 141.

from the squadron to serve with the Squadron for Special Service in the Pacific. The *Boston* was sent to Hawaii in August 1892 to protect American interests. In January 1893, commanding officer Captain Gilbert C. Wiltse sent a landing party ashore that encouraged pro-American forces to overthrow the Hawaiian government. The later provisional government was not recognized, however, by the Cleveland administration. In early 1896, the *Boston* crossed the Pacific to join the Asiatic Station and patrol the coasts of China and Korea. The *Boston* distinguished herself in May 1898, during the Battle of Manila Bay, throwing more weight of shell at the enemy than any other ship, except the cruiser USS *Baltimore*. Shortly after the engagement, the *Boston* was joined in Taku, China, by the USS *Petrel* and USS *Nero* as a show of force shortly after a Chinese *coup d'etat* had occurred. In the spring of 1899, the *Boston* recrossed the Pacific to patrol the North and South American coasts. In November 1903, she joined the *Atlanta* and other American warships to support the Panamanian revolt from Columbia. In April 1906 the *Boston* helped care for the victims of the San Francisco earthquake. A year later, she carried a peace mission between Honduras and Nicaragua in the aftermath of their war. In 1911, the *Boston* was lent to the Oregon Naval Militia until 1916. In 1917, the *Boston* was transferred to the United States Shipping Board. In 1918, the navy reacquired her and assigned her to San Francisco as a receiving ship. She served this duty until 1946 when she was towed off the California coast and

sunk. The *Boston* had served the longest of the ABCD ships after a life-span of fifty-nine years.[49]

The *Chicago* became the flagship of the Squadron of Evolution upon her commissioning in 1889 (Figure 14). Later she was attached to the North Atlantic Squadron and then the European Station in 1893, under Captain Alfred T. Mahan. Like the *Atlanta*, the *Chicago* missed the hostilities during the Spanish-American War while laid up. The *Chicago* became flagship for the South Atlantic Station from late 1899 to mid-1901. In January 1905, she became the flagship of the Pacific Station, a post which she held for three years. From 1910 through 1916, she served with the Massachusetts Naval Militia and the Pennsylvania Naval Militia for another year. During World War I, she served as flagship of Submarine Force, Atlantic. In July 1919 she joined Cruiser Division II, in the Pacific, as flagship. From December 1919 until September 1923, the *Chicago* served as submarine tender for Submarine Division 14, at Pearl Harbor, under the command of Chester W. Nimitz. From 1923 until 1935 she served as a barracks ship and in 1936, the *Chicago* was sold for scrap and foundered while being towed from Honolulu to San Francisco.[50]

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49 *Dictionary of American Naval Fighting Ships*, vol. I, s.v. "*Boston*," (Washington: Government Printing Office, 1959), 144; Vessel Files, United States Navy Operational Archives and Ships' History Branch, Naval Historical Center, Washington, D. C.; Bauer, *Ships of the U. S. Navy*, 141; Long, *New American Navy*, 189-190; and Mitchell, *Modern American Navy*, 41-171.

50 *Dictionary of American Naval Fighting Ships*, vol. II, s.v. "*Chicago*," (Washington: Government Printing Office, 1963), 144; Vessel Files, United States Navy Operational Archives and Ships' History Branch, Naval

The ABCDs incorporated many first-time applications of technology and design. The fact that they were steel permitted numerous innovations. They were equipped with double bottoms, armored conning towers, coal bunkering for protection, and crowned decks. Their hulls were divided into watertight compartments, an unworkable design in wooden vessels. They were equipped with the first rapid-firing guns, and American steel-breechloading rifles. They were the first American warships designed with electric lighting and searchlights (Figure 15). They were also designed with torpedo launchers, refrigerators, telescopic masts, and innovative gun arrangements. Guns sponsoned for unobstructed fire fore and aft complemented the broadside gun arrangement. And the *Chicago* was the first American warship since the Civil War to employ twin screws.[51]

The ABCD warships integrated modern technology and obsolete naval strategy; a mixture that satisfied no one. Benjamin Franklin Cooling has noted that "the ABCDs were not a commitment to fleet tactics," while others have commented that the ABCDs were "pre-Mahanian," or "transitional vessels." These vessels did not fit the Mahanian role of American capital ships of the 1890s. On the other hand, they could not be pigeon-holed within the old navy either.

Historical Center, Washington, D. C.; Long, *New American Navy*, 24; and Mitchell, *Modern American Navy*, 215.

51 "Ships Chicago, Boston, Atlanta and Dolphin," 72; O. N. I., *Navy as an Industrial Asset*, 60; Francis T. Bowles, "Our New Cruisers," United States Naval Institute *Proceedings* 9 (1883), 611-612; and Alden, *American Steel Navy*, 16.

They accommodated such features as a ram bow, fighting tops, racks of cutlasses and pikestaffs as well as breechloading rifles, quick-firing guns, and electrical lighting.[52] Rear Admiral Simpson, head of the Naval Advisory Board said that

> . . . it is impossible to provide any single ship with all the appliances that are considered necessary for a perfectly equipped vessel of war. Every vessel, therefore, must present a compromise.[53]

J. C. Soley, son of James Russell Soley and an officer in the navy, described the ideal cruiser in an 1878 *Proceedings* article:

> . . . the vessel should be large enough and strong enough to carry a powerful engine, that it should be a powerful ram, that it should have an all round fire of heavy guns, with large coal capacity and sufficient sail power for cruising under sail alone.[54]

This description indicates the varied technologies incorporated into contemporary warship design during the 1880s. It was virtually impossible to incorporate all of these ingredients without some compromise.

The U. S. Navy had yet to build warships according to "command technology."[55] The Naval Advisory Board gathered all the latest

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52 Cooling, *Gray Steel and Blue Water Navy*, 40; Kenneth J. Hagan, *American Gunboat Diplomacy and the Old Navy, 1877-1889* (Westport, Conn.: Greenwood Press, 1973), 41; and Sexton, "Forging the Sword," 136.

53 Rear-Admiral Edward Simpson, "The United States Navy in Transition," *Harper's Magazine* 73, no. 433 (June 1886), 22.

54 Lieut. J. C. Soley, "On a Proposed Type of Cruiser for the United States Navy," United States Naval Institute *Proceedings* 4, no. 8 (1878), 139.

55 William H. McNeill, *The Pursuit of Power: Technology, Armed Force, and Society since A. D. 1000* (Chicago: University of Chicago Press, 1982), 278.

designs and naval technology into the ABCD warships, but the lack of purpose doomed the ships to obsolescence as soon as they were launched. The goal of building the ABCDs was simply to produce something as soon as possible. The old wooden fleet was rapidly deteriorating and the United States lacked the necessary industrial base to build modern capital warships. The navy did not know exactly what it wanted. It only knew it had to begin the process of rebuilding the fleet, and start immediately.

The ABCDs provided an important test of new technology and American industry. They also provided practical experience in naval architecture, steel shipbuilding methods, and new naval technology. As the first steel warships they also ushered in a new era of modern American warships, rekindling civilian and service interest in the navy. They proved that after years of naval decline the United States could still compete technologically with other naval powers. As examples of modern warship construction, they proved invaluable to designers and manufacturers alike. For instance, the second Naval Advisory Board instituted nearly sixty alterations and additions to the *Chicago*'s design and seventy each for the *Atlanta* and *Boston* before they were completed.[56]

Technologically, a rapid shift occurred between the ABCD ships and the old navy. Ineffective smoothbore muzzleloaders gave way to steel breechloading rifles. With little transition to iron, American

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[56] 49 Cong., 1 sess., "Ships Chicago, Boston, Atlanta and Dolphin," *Senate Exec. Doc. 153*, 1886, 5-11; and Augustus C. Buell, *The Memoirs of Charles H. Cramp* (Philadelphia: J. B. Lippencott Company, 1906), 171.

warships evolved from wood to steel. The ABCDs set many precedents for American warship construction. They were the first American steel warships ever built. Perhaps even more significantly, they had been designed and constructed at a time when little steel-shipbuilding experience existed in the United States. Furthermore, the American steel industry, better known for producing railroad materials, had supplied the ABCDs with domestic rolled steel superior in tensile strength to any foreign steel available at that time. The American navy had begun to reverse its technological decline. When referring to the *Atlanta*, Bradley A. Fiske commented on the rapid technological change wrought by the ships:

> Since then [the construction of the *Atlanta*] we have had ships of gradually increasing size, battleships, battlecruisers, submarines, etc.; but each one of these ships that has followed the *Atlanta* has been a change only in degree from ships before her, and not a change in type, at least not so sudden a change in type as was the *Atlanta*. . . . We were all very proud, officers and enlisted men alike, of being ordered to the *Atlanta*.[57]

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57 Fiske, *From Midshipman to Rear-Admiral*, 95.

Chapter Five

THE END OF AN ERA

> When it is recollected that the work of building a modern navy was only initiated in the year 1883, that our naval constructors and shipbuilders were practically without experience in the construction of large iron or steel ships, that our engine shops were unfamiliar with great marine engines, and that the manufacture of steel forgings for guns and plates was almost wholly a foreign industry, the progress that has been made is not only highly satisfactory, but furnishes the assurance that the United States will before long attain in the construction of such vessels, with their engines and armaments, the same preeminence which it attained when the best instrument of ocean commerce was the clipper ship and the most impressive exhibit of naval power the old wooden three-decker man-of-war.[1]

This quote from President Benjamin Harrison's annual message to Congress in 1891 indicates the scope of the transformation of the navy that occurred during the 1880s. American imperialist aspirations, fear of the French Panamanian canal project, and tensions over recurrent Monroe Doctrine violations prompted civilian and service policy makers to initiate naval reforms that led to a naval renaissance in the 1880s, which historians have traditionally placed in the 1890s. Without the numerous policies and programs implemented in the 1880s there could have been no basis for America's "new navy."

Naval reform began in the early 1880s in response to increasing European imperialism. Foreign threats to the Monroe Doctrine

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[1] James D. Richardson, ed., *Messages and Papers of the Presidents, 1789-1897*, vol. IX, 1889-1897 (Washington: Government Printing Office, 1898), 200.

Insofar as enlisted personnel were concerned, the period between 1880 and 1893 experienced the greatest flurry of ratings' changes of the "Gilded Age." The navy began to prepare its enlisted men for modernization. For instance, the rating of "electrician" was established in 1883 and "oiler" in 1884. In the same year, "boilermaker" and "finisher" were changed to "machinist." Nearly twice as many ratings were added in the period between 1880 and 1893 than during the fifteen years since the Civil War.[4] By 1890, differences emerged over the proper training of seamen with respect to the increased mechanization of the navy. This ongoing debate, which continued into the twentieth century, generally pitted those of the marlinespike school, who advocated sail training, against the "Young Turks" who urged technically-based experience. Those in favor of specialized, technical training finally won out by the turn of the century.[5]

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4 Frederick S. Harrod, *Manning the New Navy* (Westport, Conn.: Greenwood Press, 1978), 191-192.

5 Rear-Admiral S. B. Luce, "Naval Training" United States Naval Institute *Proceedings* 16, no. 55 (1890), 367-396; "Discussion: 'Naval Training,'" United States Naval Institute *Proceedings* 16, no. 55 (1890): 396-430; Lieutenant W. F. Fullam, "The System of Naval Training and Discipline Required to Promote Efficiency and Attract Americans," United States Naval Institute *Proceedings* 16, no. 55 (1890), 473-536; "Discussion: 'Captain Chadwick's Letter Relating to the Training of Seamen'," United States Naval Institute *Proceedings* 28, no. 102 (June 1902), 298-308; "Discussion: 'The Training Ship'," United States Naval Institute *Proceedings* 28, no. 102 (June 1902), 276-308; Lieut. Victor Blue, "Converted Yachts or Small Gunboats for Training Landsmen," United States Naval Institute *Proceedings* 28, no. 102 (June 1902), 221-229; Lieut.-Comm. John Hood, "The School of the Officer," United States Naval Institute *Proceedings* 28, no. 102 (June 1902), 195-206; and Paullin, *Paullin's History of Naval Administration*, 422-24.

Postwar academy graduates became technical experts, achieving distinction in science and technology. America's first Nobel laureate, Albert A. Michelson (class of 1873), conducted important experiments with light refraction and successfully calculated the speed of light, became America's leading physicist and an instructor at the Naval Academy. Bradley A. Fiske ('74) published the immensely popular *Electricity in Theory and Practice* in 1883. Frank J. Sprague ('79) left the navy in 1883 to become Thomas Edison's assistant, inventing electrical appliances, electrical railway equipment, control devices, signals, and elevators. William S. Sims ('80) revolutionized naval gunnery by introducing the Sims-Scott continuous-aim fire-control system into the navy. David W. Taylor ('85) became the world's foremost designer of warship hulls, provided the genius behind the naval shipbuilding programs leading up to World War I, and encouraged the development of early naval aeronautics.[6]

Other academy graduates excelled in industry. William L. R. Emmet ('81) joined General Electric Company and developed numerous electrical appliances, especially the steam turbine.

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[6] Office of Naval Intelligence, *The United States Navy as an Industrial Asset: What the Navy has Done for Industry and Commerce* (Washington: Government Printing Office, 1923), 10; Thomas J. Misa, "Science, technology and industrial structure: Steelmaking in America, 1870-1925," (Ph.D. diss., University of Pennsylvania, 1987), 69; Paolo Coletta, "The ' Nerves' of the New Navy," *The American Neptune* 38, no. 2 (April 1978), 123; Peter Karsten, *The Naval Aristocracy: The Golden Age of Annapolis and the Emergence of Modern American Navalism* (New York: The Free Press, 1972), 293-99; and Clark G. Reynolds, *Famous American Admirals* (New York: Van Nostrand Reinhold Co., 1978), 317-318, 349-350.

Between 1879 and 1884, six assistant naval constructors were sent overseas to study marine engineering with the Royal Navy at Glasgow and Greenwich. Three of them, Francis T. Bowles ('79), Homer L. Ferguson ('82), and Lewis B. Nixon ('82), later became successful industrialists, heading the Fore River Ship & Engine Company, Newport News Ship & Engine Company, and Crescent Shipyard, respectively. Nixon progressed even further in 1902 by becoming president of the United States Shipbuilding Company, a conglomerate including six major shipbuilding firms and Bethlehem Steel Company.[7]

These examples represent only a few of the numerous young officers who achieved success in navy-related technical fields. By 1889, the growing sense of every officer his own technician prompted A. T. Mahan to proclaim:

> It is now thought, practically, more important for a naval officer to know how to build a gun, to design a ship, to understand the strength of materials, to observe the stars through a telescope, to be wise in chemistry and electricity, than to have ingrained in him the knowledge of the laws of war, to understand the tactical handling of his weapons, to be expert in questions of naval policy, strategy, and tactics. This is, I think, all wrong.[8]

Congress promoted the education of future naval architects and marine engineers by turning the navy's personnel into educators. In 1879, Congress authorized the navy to billet engineers to various

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[7] Ibid.; Tyler, *American Clyde*, 93; and Karsten, *Naval Aristocracy*, 293-99.

[8] Alfred T. Mahan, "Letter of Captain A. T. Mahan," United States Naval Institute *Proceedings* 15, no. 48 (1889), 58.

universities to teach marine engineering. Over forty-five men were so assigned over a fifteen-year period beginning in 1879. This number included many academy graduates that had been a part of the elite "cadet engineer" program, such as Ira N. Hollis, Henry W. Spangler, and Mortimer E. Cooley of the class of 1878. These engineers taught at such esteemed schools as the University of Pennsylvania, Cornell, Vanderbilt, Purdue, and Johns Hopkins. The navy curtailed this practice, however, by 1896.[9]

Like many other groups during the progressive era, naval personnel began to organize into special-interest associations. Two professional societies dedicated to the betterment of the navy and its technology emerged during this period. The first naval-related association was founded in 1873 as the United States Naval Institute. Stephen B. Luce and a group of colleagues established the institute to help instill a sense of professionalism in the naval ranks and to provide a forum for both officers and engineers through its *Proceedings*. In 1880, a group of naval engineers led by Passed Assistant Engineer George W. Baird, later famous for installing electric lighting in the White House, founded the American Society of Naval Engineers. Other society members included Ira Hollis,

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[9] Frank M. Bennett, *The Steam Navy of the United States: A History of the Growth of the Steam Vessel of War in the U. S. Navy, and of the Naval Engineer Corps* (Pittsburgh: W. T. Nicholson, 1891), 732-743; Karsten, *Naval Aristocracy*, 176; Harold G. Bowen, *Ships, Machinery, and Mossbacks: The Autobiography of a Naval Engineer* (Princeton: Princeton University Press, 1954), 17; John D. Alden, "Growth of the New American Navy," *Naval Engineering and American Sea Power*, ed., Rear Admiral R. W. King (Baltimore: The Nautical and Aviation Publishing Company, 1989), 36; and Misa, "Science, technology and industrial structure," 69.

Benjamin Isherwood, and George W. Melville, founder of the National Geographic Society. The American Society of Naval Engineers was the seventh engineering society established in the United States.[10]

The growing professionalization of the navy resulted in numerous articles and books. In addition to Fiske's book, Chief Engineer J. W. King published his celebrated book *The Warship and Navies of the World, 1880* in 1881 after an 1876 tour of Europe, and F. T. Bowles published *Ships of War* in 1885.[11] Naval officers and engineers wrote articles for the United States Naval Institute *Proceedings*, while engineers could also publish their articles in the American Society of Naval Engineers' *Journal*. Both line officers and engineers contributed regularly to periodicals such as the *United States Army and Navy Journal, and Gazette of the Regular and Volunteer Forces*, *The United Service*, and occasionally to popular magazines such as *Harper's Magazine, North American Review*, and *Scribner's Magazine*. Frequently, these articles focused on the vulnerability of the "old navy" and advances in naval technology. In journals, such as the Naval Institute *Proceedings*, the numbers of these articles gradually grew through the 1870s to a crescendo by the late 1880s.

Other factors that marked the 1880s as a pivotal decade in American naval development were the founding of the Office of

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10 Alden, "New American Navy," 36.

11 Francis T. Bowles, Assistant Naval Constructor, USN, *Ships of War* (New York: A. J. Johnson and Company, 1885); and J. W. King, *The Warship and Navies of the World, 1880* (Annapolis: United States Naval Institute Press, 1982).

Naval Intelligence (O. N. I.) and the Naval War College. Established by Secretary Hunt shortly before leaving office in 1882, O. N. I. assigned its first naval attaché to England in the same year. Naval attachés insured a steady flow of information to Washington concerning foreign navies. This intelligence was especially important during a period of rapid technological change, such as the 1880s. Even so, nineteenth-century naval weapons experts were far more open about the latest developments than their twentieth century equivalents. This was especially true since many experts were private industrialists, eager to gain contracts overseas. The intelligence provided by the attachés applied to more than just technology and as a result, the navy kept abreast of the latest advances in personnel, medicine, and administration as well. The Office of Naval Intelligence kept the navy well-informed, allowing it to stay abreast of the latest developments in foreign navies.[12]

The establishment of the Naval War College added impetus to the movement for naval rejuvenation in the 1880s and added one more nail to the coffin of the marlinspike school. By the 1880s, officers could no longer rest on the laurels of an academy education and practical experience they may have gained in the service. In addition to becoming literate in naval technology and policy and active in professional societies, officers required continuing education in strategy and tactics to keep pace with the latest developments. In

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12 Paolo E. Coletta, "The 'Nerves' of the New Navy," *The American Neptune* 38, no. 2 (April 1978), 126-127.

order to fill this need, Secretary Chandler founded the Naval War College in 1884. Under the guidance of Rear Admiral Stephen B. Luce, it provided for the needs of officer education. Even so, the movement for a Naval War College was resisted every step of the way by the marlinspike school. Bradley A. Fiske noted that

> Luce . . . realized what nobody else realized in our navy, *or in any other navy* [italics Fiske's], that naval officers as they grew older needed instruction in strategy, in addition to the instructions which their duties gave them . . . [he] had conceived the idea of establishing a naval war college. Despite covert sneers and loud guffaws, Luce succeeded in getting a few officers to see the light he saw.[13]

Navy Secretary Chandler did manage to leave a greatly reformed department to his successor. An energetic administrator, he brought unity and order to the previously contentious ranks of the naval officers. He returned the department to civilian control by ordering that all new assignments for officers pass his own hand-picked board and receive his personal approval, taking that function away from the admiral of the navy. At Chandler's request, the number of officers in the navy was reduced by the Congressional Act of 5 August 1882. He opposed political influence applied by congressmen on behalf of naval officers. In cases such as the controversial Robley D. Evans's dismissal, allegedly involving Evans's conduct and Republican patronage, Chandler's policy could produce a great deal of opposition in Congress.[14] In 1884, he discontinued the practice of

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[13] Fiske, *From Midshipman to Rear-Admiral*, 107.

[14] Reeves, *Gentleman Boss*, 348; and Richardson, *William E. Chandler*, 318.

moving officers' families to convenient points of call at navy expense, a measure that proved unpopular. The composition of the second Naval Advisory Board also reflected Chandler's civilian control ideals by including two civilian engineers as members and rejecting the obvious choice of Admiral Porter as its chair in favor of an officer of lower rank.

Despite his alleged corruption, Chandler developed a department prepared to enter the twentieth century. Chandler's insistence that heavy forgings and armor be manufactured domestically motivated Congress to found the Gun Foundry Board in 1883. This board's findings and expertise provided the basis for America's steel ordnance industry.[15] America's first high-velocity, breech-loading rifles were produced at the navy's Washington Gun Factory during his tenure; later they were installed on the ABCD warships. He encouraged the growth of Hunt's Office of Naval Intelligence and the use of naval attachés abroad. He closed the navy yards at Pensacola, League Island, and New London, reduced work at the navy yards in Portsmouth and Boston, and instituted an eight-hour workday throughout the navy yards. He also encouraged the House to lower the cost ceiling for repair of older ships from thirty percent to twenty, to insure their retirement and the continued building of modern warships.[16]

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[15] Benjamin Franklin Cooling, *Gray Steel and Blue Water Navy: The Formative years of America's Military-Industrial Complex, 1881-1917* (Hamden, Conn.: Archon Books, 1979), 41-46.

Funding, however, from the House was also necessary for naval reform. From 1875 through 1881, the Republican administration could not count on support from the Democratic House. Between 1881 and 1883 the Republicans finally succeeded in authorizing the ABCDs only after gaining control of the House and the executive, and tying the Democrats for control of the Senate. When the Republicans introduced another naval construction bill in 1883, however, the House shelved it.[17] Not until the Cleveland administration gained the White House did Congress finally loosen the pursestrings.

Heightened Democratic sensitivities over Republican spending failed to subside fully until 1885. The reform process continued in earnest only after Grover Cleveland's navy secretary, William C. Whitney began an investigation of alleged Republican fraud in the Navy Department. Only then did Democrats join the pro-navy Republicans in bipartisan support for increased construction. House Democrats had found a navy secretary they trusted and Democratic shipbuilders, such as Charles Cramp, upon whom to shower naval construction contracts. The Republicans for their part had supported naval expansion regardless of the party occupying the White House.[18]

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16 Ibid. 35, 52-53; Charles Oscar Paullin, *Paullin's History of Naval Administration, 1775-1911* (Annapolis: United States Naval Institute Press, 1968), 398-407; Herrick, "William E. Chandler," 398-402; George F. Howe, *Chester A. Arthur: A Quarter-Century of Machine Politics* (New York: Frederick Ungar Publishing Company, 1935), 238; Thomas C. Reeves, *Gentleman Boss*, 345-348; and Richardson, *William E. Chandler*, 307-315.

17 Richardson, *William E. Chandler*, 299.

Whitney' measures had far fewer obstacles to clear since he was a Democrat and Chandler had already addressed many of the department's internal conflicts by the end of his term. Through economic measures, Whitney reduced annual departmental costs by twenty percent over Chandler's administration. Determined to avoid the shortcomings of the second Naval Advisory Board, Whitney bought British designs for the first warships authorized under his tenure, causing an outcry from Republicans for failing to employ American designs.

Even though Chandler reversed the downward spiral of the navy's postwar direction, Secretary Whitney accelerated the pace of development toward a new navy. He presided over the emerging naval-industrial relationship by pooling the armor and armament requirements from the appropriations bill of 1886 for a grand total of $4,000,000, a figure calculated to motivate steel makers to invest in new plants and equipment. Bethlehem Steel Company accepted the contract and erected the necessary plant in Pennsylvania.[19] This milestone of creating an industrial base for naval development would not have been possible, however, without the foundation of reforms instigated by Chandler.

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18 David B. Tyler, *The American Clyde: A History of Iron and Steel Shipbuilding on the Delaware from 1840 to World War I* (Newark, Del.: University of Delaware Press, 1958), 71; Donal James Sexton, "Forging the Sword: Congress and the American Naval Renaissance, 1880-1890" (Ph.D. diss., University of Tennessee, 1976), 80-81; and Sprout, *American Naval Power*, 190-192.

19 Cooling, *Gray Steel and Blue Water Navy*, 65-74.

By 1887, it had become popular to be pro-navy. Congress created the Senate Select Committee on Ordnance and War Ships and the House Commission on Ordnance and Gunnery. The navy even began to construct its own steel vessels in competition with private shipyards. In an avalanche of legislation for naval increase, Congress authorized thirty new ships before Cleveland's term ended. The Democratically controlled House had authorized 99,276 tons' worth of new warships under Secretary Whitney, from 7 March 1885 to 5 March 1889, compared to only 11,986 tons authorized during Secretary Chandler's term, from 17 April 1882 to 6 March 1885 (Appendix F).[20]

Historians disagree as to when the so-called military-industrial complex originated, but all agree that it had its start in nineteenth century naval armaments production. Some suggest that the foundation of the modern American naval-industrial complex was in place by the early 1890s. A. Michal McMahon argues that it existed before 1850; Johannes R. Lishka traces it back to the first Civil-War ironclads of 1862; and Benjamin Franklin Cooling believes construction of the USS *Dolphin* marked its beginning.[21]

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20 Pulsifer, "Navy Yearbook," 760-776; Paullin, *Paullin's History of Naval Administration*, 407; Cooling, *Gray Steel and Blue Water Navy*, 58-65; George T. Davis, *A Navy Second to None: The Development of Modern American Naval Policy* (Westport, Conn.: Greenwood Press, 1940), 44-47; Herrick, *American Naval Revolution*, 33-38; Hirsch, *William C. Whitney*, 335-336; and Sexton, "Forging the Sword," 140-151.

21 Johannes R. Lishka, "Armor Plate: Nickel and Steel, Monopoly and Profit," *War, Business and Society: Historical Perspectives on the Military-Industrial Complex*, ed., Benjamin Franklin Cooling (Port Washington, N. Y.: Kennikat Press, 1977), 43; A. Michal McMahon, "Transit Failure: Technology

In the shipbuilding industry, a basic level of naval-industrial relationship had existed between contractors and the Navy Department during the old paradigm. The separation between the navy and private contractors had not yet faded as it would in the 1890s. After the Civil War, the navy relied increasingly on private shipyards, such as Roach's and Cramp's, because of the inefficiency and corruption thought to be prevailed in the postwar navy yards by the Democratic House.[22]

The naval-industrial complex emerged as a result of the navy's inability to keep pace with the rapidly changing technology of the late-nineteenth century. Without the aid of private industry, the navy could not have constructed the new navy of the 1890s because the cost of building modern facilities was too prohibitive. The navy yards were able to construct and repair wooden ships, but they were not equipped to build iron or steel warships of any kind until the late 1880s. In the meantime, the navy had to encourage private industry to build modern warships. In the past, the navy's iron warships and monitors had come from private yards (Appendix C). The same held true for the early years of steel warships. The federal government

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and the Process of Industrialization," *Naval Technology and Social Modernization in the Nineteenth Century* (Manhattan, Kans.: Military Affairs, 1976), 105; Robert L. O'Connel, *Sacred Vessels: The Cult of the Battleship and the Rise of the U. S. Navy* (San Francisco: Westview Press, 1991), 61; Benjamin Franklin Cooling, *Gray Steel and Blue Water Navy*, 15 and "Formative Democratic Framework," *Naval Technology and Social Modernization in the Nineteenth Century* (Manhattan, Kans.: Military Affairs, 1976), 23; and O'Connel, *Sacred Vessels*, 61.

22 Sprout, *American Naval Power*, 190-192; and Richardson, *William E. Chandler*, 309-314.

lacked the facilities to build a steel warship of its own until the USS *Maine* was laid down in New York in 1888.[23]

American naval officers had previously enjoyed close ties to private industry, but in the late-nineteenth century their relations became more intimate.[24] Beginning with the ABCD warship program, navy engineers were billeted to steelmaking firms and shipbuilders as quality inspectors. On the other end, the navy established boards, such as the second Naval Advisory Board and the Gun Foundry Board, and assigned navy experts such as Lieutenants F. M. Barber and William H. Jacques, to advise the shipbuilding and steelmaking firms. As a result, the navy set quality standards, rejected substandard steel, and recommended the measures necessary to improve its quality.

The close cooperation of steelmakers, shipbuilders, and the navy, during the ABCD program planted the seed of the naval-industrial relationship, establishing the initial affiliation between the navy and the steel industry. A more interdependent association resulted from the 1885 ruling of the Gun Foundry Board that the government should provide heavy steel forging contracts attractive enough to compel private industry to produce them. Congress endorsed this proposal, and by March 1887 Bethlehem Iron Company had signed

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23 K. Jack Bauer and Stephen S. Roberts, *Register of Ships of the U. S. Navy, 1775-1990* (New York: Greenwood Press, 1991), 102; and Donald C. Canney, *The Old Steam Navy: Frigates, Sloops, and Gunboats, 1815-1885* (Annapolis: United States Naval Institute Press, 1990), 146.

24 Karsten, *Naval Aristocracy*, 176.

Secretary Whitney's four-million-dollar contract to supply gun forgings and steel armor for the armored cruisers *Maine* and *Texas* and four monitors.[25] This authorization included the funding necessary to acquire an open-hearth steel plant from Whitworth's in England and install it in Pennsylvania.

By the time of the Bethlehem contract, the relationship between American and European steelmakers, American government officials, and American naval officers had become tight-knit. The steelmakers included Bethlehem of Pennsylvania, Whitworth's of England, and Creusot of France. Lieutenant F. M. Barber facilitated much of the technology transferred between Creusot and Bethlehem, while Lieutenant William H. Jacques played the middleman between Bethlehem and Whitworth. These officers became exclusive agents of Creusot and Whitworth's in the United States. Jacques returned to the United States, after studying Whitworth's steel production, to supervise the construction of Bethlehem's new heavy-forging plant. Eventually, Jacques retired from the service to work for the steelmakers as did many other officers, such as Lieutenant C. A. Stone and Lieutenant John F. Meigs.[26]

By 1888, the navy had achieved its purpose in sponsoring close ties to the steel industry; heavy ordnance and armor forgings could

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25 United States *Statutes at Large*, vol. XXIV, 592-4.

26 Cooling, *Gray Steel and Blue Water Navy*, 69-74; Karsten, *Naval Aristocracy*, 176-77; Misa, "Science, technology and industrial structure," 77-83; and Allan R. Millett and Peter Maslowski, *For the Common Defense: A Military History of the United States of America* (New York: The Free Press, 1984), 254.

be obtained domestically. The navy encouraged steelmakers to look forward to future contracts. An interdependent relationship had developed; the navy benefitted by an expanded steel industry and the steel industry benefitted by an expanded navy.

By 1890, the production of steel warships had become a team effort. The navy supplied the expertise; the federal government supplied the funding; and the steelmakers supplied the labor and raw materials. A strong relationship between the navy and steelmakers that included price-fixing, naval personnel as industry advisors, government funding for plant improvements, and covert negotiations between steelmakers and government officials.[27]

Envious of armored-warship construction that had taken place overseas since the Civil War, naval officers began to call for capital-ship construction and fleet tactics. Throughout the 1880s, more officers began to perceive *guerre de course* as a bankrupt strategy. In 1880, Lieutenant Charles Belknap recommended a class of "offensive, sea-going, armored man-of-war" capable of "carrying the war into an enemy's country." Writing anonymously that same year in *The United Service*, another officer noted that "We should not forget that naval wars must hereafter, as heretofore, be decided by fleet engagements." And in 1889, in an essay written for the *North American Review*, entitled "Our Future Navy," Rear Admiral Stephen

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[27] John G. B. Hutchins, *The American Maritime Industries and Public Policy, 1789-1914* (Cambridge, Mass.: Harvard University Press, 1941), 458; and Misa, "Science, technology and industrial structure," 66-67.

B. Luce presented a forceful argument for fleet tactics and American battleship construction.[28]

During the 1880s, Congress also counted a growing number of navalists among its members. These included such influential Senators as John T. Morgan, Joseph N. Dolph, William J. Sewell, Matthew C. Butler, and Eugene Hale, future Naval Affairs Committee chairman. In the House, an impressive array of representatives supported a big-navy policy, including Thomas B. Reed, Henry Cabot Lodge, William G McAdoo, John A. Kasson, and John R. Thomas. Some big-navy supporters, such as George M. Robeson, John D. Long, and Hilary A. Herbert, had been, or would become, navy secretaries. Others, such as Washington C. Whitthorne, Charles A. Boutelle, and Benjamin W. Harris, had been, or would become, head of the House Naval Affairs Committee.

During the 1880s, these politicians supported their calls for naval spending with the threats posed by Chilean ironclads and the current craze of coercing an enemy into paying a tribute rather than have its coastal cities laid waste by armored warships. The specter of a foreign-controlled isthmusian canal and failing American prestige were also justifications often raised by big-navy forces. In 1880, Representative Harris argued that the navy should be capable of extorting "from an enemy terms of an honorable peace, by aggressive war upon the high seas." And in 1887, South Carolina's Senator

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[28] Belknap, "Naval Policy of the U. S.," 386; A Junior Officer, "Naval Reorganization," 466; Rear Admiral Stephen B. Luce, "Our Future Navy," United States Naval Institute *Proceedings* 15, no. 51 (1889), 541-552.

Matthew C. Butler argued for a fleet of first-class battleships, referring to commerce raiding an "insignificant kind of guerilla, bushwhacking affair."[29]

The true new navy emerged in the 1890s. The rise of navalist forces, coupled with a reformed naval service, increasing calls for a blue-water naval policy, and the growing naval-industrial complex in the late 1880s provided the foundation for the new navy of the 1890s. Five factors provided the catalyst, however, for the final transformation from the ferment of the 1880s to the new paradigm of the 1890s: the Panama Canal, the Samoan disaster of 1889, publication of Mahan's *Influence of Sea Power upon History*, a growing sense of "new" Manifest Destiny, and the appointment of Benjamin F. Tracy to head the Navy Department.

The activity of the Inter Oceanic Canal Company on the Isthmus of Panama became the most pressing influence on American naval policy in the 1880s. Begun in 1881, the French-owned canal project posed a grave threat to American prestige, especially with respect to the Monroe Doctrine. Mahan denied that a respectable navy would develop as a consequence of increased American merchant shipping, stating that "The motive, if there be, which will give the United States a navy is probably now quickening in the Central American Isthmus."[30] Allowing the French to control shipping in American

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29 49 Cong., 2 sess., *Congressional Record*, vol. XVIII, 1807; and 50 cong., 1 sess., *Congressional Record*, vol. XIX, 6720.

30 A. T. Mahan, *The Influence of Sea Power upon History, 1660-1783* (Boston: Little, Brown and Company, 1890), 88.

waters was unacceptable to the United States, strategically and commercially. In a message to the Senate, President Rutherford B. Hayes stated in March 1880 that "The policy of this country is a canal under American control. The United States cannot consent to the surrender of this control to any European power."[31]

With the increasing demands placed on the navy by imperialism in Latin America and the Pacific and the additional threat of the French canal, the need to fortify the American fleet became more urgent. Through control of the canal, European powers could oversee American coastal shipping in time of peace and pose a major threat to American security in time of war. Lieutenant Charles Belknap stated the question bluntly in an article judged to be the United States Naval Institute *Proceedings*' prize essay of 1880 by the panel of Secretary of State William M. Evarts, Navy Secretary Richard W. Thompson, and Senate Naval Affairs Committee Chairman John R. McPherson:

> Are we prepared in contravention of its [Monroe Doctrine] principles, to allow one foreign power . . . to assume control of a canal, the unfriendly possession of which would be a standing menace in time of war?[32]

In 1885, the French canal company went bankrupt, sparking rumors that the British would lend their support to the venture. This supplanted the French threat with the specter of British territory

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[31] Richardson, *Messages and Papers of the Presidents*, vol. VII, 1869-1881, 585-586.

[32] Belknap, "Naval Policy of the U. S.," 378.

both north and south of the United States. In the late 1880s, the French parliament even debated intervention in Central America to protect its investment, a move bound to bring France into direct conflict with the United States. Gone were the days when a wooden sailing ship could protect America interests. If the United States failed to revive the fleet, the Europeans could make a travesty of the Monroe Doctrine. Former Lieutenant Commander Henry H. Gorringe wrote in 1882:

> Our relations with France must sooner or later become strained through her possession of the exclusive right of way over the shortest route across the American isthmus . . . . Whether republic, monarchy, or empire, France is ever ready to guard and defend the property of her citizens.[33]

Regardless of who owned the canal, the proximity of future international maritime commerce to America's coastline required the United States to build a modern navy.

In 1878, the United States signed a treaty with the Samoans to acquire the right to use the harbor at Pago Pago as a coaling station. In 1879, the British and Germans followed suit. Throughout the 1880s, the Germans tried to force the American and British presence out of the islands. The United States and Great Britain stood fast. By 1888, hostilities had nearly broken out, when the USS *Adams* and the German ship *Adler* had cleared for action in a dispute over a power struggle between competing Samoan tribes. By March 1889, all three powers had sent warships to Samoa to protect their interests. Just as

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[33] Gorringe, "The Navy," 487.

war appeared imminent between the Germans on one side, and the Americans and British on the other, a hurricane swept the island. All three of the German vessels, and two of three American warships, were lost while the lone British steel cruiser survived by steaming out to sea. In the aftermath of the catastrophe, cooler heads prevailed and a settlement was negotiated in Europe.[34]

This incident increased navalist sentiments for two reasons. Since the 1870s, the Germans had been interested in acquiring territory in Latin America and the Pacific.[35] Tensions had already been running high between the United States and Germany, with its Realpolitik doctrine of forceful foreign policy. The Samoan disaster confirmed the fact that the Germans were a world-wide colonial contender. During the hurricane, the inability of the American ships to gain the safety of the open ocean while the British steamer survived, underscored the need for modern American naval vessels instead of obsolete wooden cruisers.

With Panama and Samoa to remind Congress of the threat posed by an opportunistic European powers and America's relative naval impotence, the theories of Mahan found fertile ground to grow. The essence of Mahanian-style naval policy had been voiced by naval officers and politicians for over a decade. With threats to the Monroe

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34 Walter LaFeber, *The New Empire: An Interpretation of American Expansion, 1860-1898* (Ithaca, N. Y.: Cornell University Press, 1963), 54-55; Beisner, *Old Diplomacy to the New*, 68; and Donald W. Mitchell, *History of the Modern American Navy, from 1883 through Pearl Harbor* (New York: Alfred A. Knopf, 1946), 39-41.

35 LaFeber, *The New Empire*, 35.

Doctrine by powers such as Spain, France, Great Britain and Germany, the United States could no longer hide behind its ocean barriers. *Guerre de course* had failed to provide a viable deterrent naval strategy since before the Civil War. Even a defensive naval policy required some offensive capability in order to break a potential naval blockade or strike at an enemy's coast.

By the end of the 1880s, a literary and cultural movement supporting American expansion and the philosophy of cultural supremacy began to emerge. Social Darwinism supported Josiah Strong's popular theory that America's "Anglo-Saxon race" proved superior to all others. His book *Our Country*, published in 1885, sold over 170,000 copies and was translated into several different languages.[36] Strong voiced sentiments similar to those of John W. Burgess and John Fiske, who also popularized the Anglo-Saxon or "Teutonic race." These publicists encouraged missionary efforts and attempts to "civilize" non-Western culture.[37] In the process, they provided justification for militarism and imperialism. Consequently,

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36 Josiah Strong, *Our Country: Its Possible Future and Its Present Crisis* (New York: Baker and Taylor Company, 1885); and Richard Hofstadter, *Great Issues in American History* (New York: Random House, 1958), 183.

37 Julius W. Pratt, "The Ideology of American Expansion," *Expansion and Imperialism*, ed., A. E. Campbell (New York: Harper and Row, Publishers, 1970), 28-32; Robert H. Wiebe, *The Search for Order, 1877-1920* (New York: Hill and Wang, 1967), 224-239; LaFeber, *The New Empire*, 72-80, 95-101; Beisner, *Old Diplomacy to the New*, 81-84; and William John Brinker, "Robert W. Shufeldt and the Changing Navy" (Ph.D. diss., Indiana University, 1973), 202-203.

America's unique Manifest Destiny gave way to a "new" Manifest Destiny of the 1890s.[38]

Navy Secretary Benjamin F. Tracy's policy of large-scale rearmament developed as a consequence of flagging American prestige, Mahan's theories, the failure of *guerre de course*, and the increasingly threatening diplomatic climate. The administration of President Benjamin Harrison was in a big-navy mood. Tracy and Secretary of State James G. Blaine were in favor of naval expansion as was the president. As Harrison stated in his annual message to Congress for 1890: "There should be no hesitation in promptly completing a navy of the best modern type large enough to enable this country to display its flag in all seas for the protection of its citizens and of its extending commerce."[39]

The new navy really got its start, however, from Congress' acceptance of Tracy's big-ship policy. After years of talk, many Congressmen were also in a big-navy mood. Incorporating the theories of Mahan, Navy Secretary Tracy worked closely with Senator Eugene Hale to develop his 1889 naval program. Tracy asked for battleships and cruisers and advocated a fleet with offensive, even first-strike, capability. The Naval Appropriations Act, passed by Congress on 30 June 1890, marked a radical departure from previous naval legislation, by authorizing three

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38 Millett, *For the Common Defense*, 249.

39 James D. Richardson, ed., *Messages and Papers of the Presidents, 1789-1897*, vol. IX, 1869-1881 (Washington: Government Printing Office, 1898), 200.

oceangoing battleships. These 10,000 ton warships (USS *Massachusetts*, USS *Indiana*, and USS *Oregon*) formed the basis for the true American new navy.

Conclusion

By the early 1880s, the navy realized it failed to function even in a diplomatic role. In years past, it had coped with localized incidents in the Pacific and Caribbean, but the Panama Canal and Samoan crisis provided reminders of America's naval inferiority. European imperialist pressures in both the Western Hemisphere and Pacific required a fleet with muscle. The navy ultimately had to compete with the British, Germans, and French in these waters and the navy's decrepit wooden hulls were not up to the task.

Growing international tension, the burgeoning American economy, and swollen officer ranks provided the basis for the naval renaissance of the 1890s. The credit for bringing Congress's attention to the navy's plight, however, rests primarily on the shoulders of postwar naval officers. Divided military and political factions had stifled naval development since the Civil War. The line and engineer ranks opposed each other on the future policy and technology of the navy. Before any reforms could take place in the navy, the service-wide deadlock between line and staff officers had to be resolved. Commenting on this state of affairs, James Russell Soley concluded:

> Until this rehabilitation can be accomplished, the navy will only serve the purpose of a butt for the press and a foot-ball [sic] for political parties; and its officers, a body of men whose intelligence and devotion under a proper system would be equal to any trust,

> will be condemned to fritter away their lives in a senseless parody of their profession.[1]

Eventually, young junior officers, raised in a period of rapid technological change, and engineers, who had advocated improved naval technology, prevailed over more traditional line officers, who still believed wood and canvas served a primary role in the navy. With a growing consensus among naval personnel and political support building in favor of a new navy in the early 1880s, naval progress quickly emerged.

Credit for initiating naval reform lies with Navy Secretaries Hunt and Chandler. Hunt began the movement toward naval reform, but his efforts failed to produce results. Where Hunt left off, Chandler continued the drive for reform, laying the basis for increased production that occurred during the Whitney administration. Without Chandler's reintroduction of civilian departmental control and policies to rein in the officer ranks, experimentation with new steel warship production, and establishment of important advisory boards, later warship production would not have been possible. Although few new warships were authorized during his administration, Chandler paved the way for Secretary Whitney's impressive warship production figures and the founding of America's heavy steel forging industry.

Similar to the deadlock between line and staff officers, partisan political forces had been counterbalanced during the postwar era.

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[1] James Russell Soley, "Our Naval Policy–A Lesson from 1861," *Scribner's Magazine* 1, no. 2 (February 1887), 235.

The final decision over naval policy rested with Congress, regardless of the pressure applied by naval personnel. In Congress, the conflict arrayed pro-navy Republicans against penny-pinching Democrats. Republicans and Democrats had maintained political equilibrium between the House, Senate, and Executive during the navy's so-called "Dark Ages."[2] The Democrats' anti-spending agenda blocked the Republicans' pro-navy position, adding further complexity to the struggle. The parsimonious congressional policy allowed the navy to wallow and slip to third-rate status rather than support its use as a tool of foreign policy. These political and departmental schisms resulted in a lack of clear postwar naval direction. Finally, foreign and domestic events catalyzed these various factions into a concerted movement behind naval reform.

With the Republicans gaining control of the Senate and the executive in 1882, the partisan equilibrium that had characterized Congress since 1875 finally tipped in favor of the Republicans and naval development. The United States had begun its climb back to a respected naval power, with Navy Secretary Chandler pushing reform in the Navy Department, and the second Naval Advisory Board directing the construction of the navy's first steel, steam-powered warships.

Had the postwar navy kept pace with the rest of the world it could have maintained a respectable force, gradually modernizing

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[2] Robert G. Albion, *Makers of Naval Policy, 1798-1947*, ed. Rowena Reed (Annapolis: United States Naval Institute Press, 1980), 200.

and preparing for naval mechanization. Naval reforms in administration, operations, and technology flourished in the 1880s because congressional parsimony and reactionary navy leadership squeezed a rapid technological transition into a span of ten years. Old wooden cruisers and rusty monitors were replaced by steel warships. New technology made the traditional naval policy of commerce raiding and passive coastal defense obsolete, and the federal government began to develop the industrial base needed to construct modern warships. The naval reforms of the 1880s reversed the decline of the postwar period, leading to America's naval renaissance. By the middle 1890s, the United States would eventually be counted among the world's leading naval powers.

During the 1880s, a variety of factors combined to produce the transition that linked the two paradigms and culminated in the new navy of the 1890s. Strong opposition to new technology and strategy faded with the demise of the "marlinspike school." House Democratic opposition to naval construction ceased and naval warship construction increased dramatically. Technically trained naval personnel infiltrated the officer, engineer, and enlisted ranks. This was facilitated by the creation of new ratings in the enlisted ranks, the development of the Naval War College and professional societies, and the granting of teaching opportunities for officers and engineers. Mahanian-style naval strategy began to gain support in the navy and Congress. Strong ties developed between the navy, government, and private industry to facilitate naval development. Consequently,

armor, ordnance, and steel production also experienced a dramatic increase.

The 1880s represented a transitional period where America's traditional strategy of *guerre de course* remained standard naval policy, while use of modern technology became accepted practice. Naval development of the 1890s had a different rational. Naval policy had changed from the defensive role to an offensive one, complete with Mahanian strategy, capital ships, and contingency plans. In 1881, the navy was ranked behind Chile, China, and Denmark, at twelfth among the world's navies. It retained this ranking until the late 1880s, when new warship construction began to reverse the fleet's decline and bring about its development from a peace-time navy to an industrialized, war-ready arm of the military. By 1896, according to the Secretary of the Navy, the navy ranked sixth in the world behind Great Britain, France, Russia, Italy, and Germany, and just ahead of Spain.[3]

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3 51 Cong., 1 sess, "Report of the Secretary of the Navy," *House Exec. Doc. 1, Part 3,* 1889, 3; 54 Cong., 2 sess., "Report of the Secretary of the Navy," *House Doc. 3,* 1896, 9; Donald W. Mitchell, *History of the Modern American Navy, from 1883 through Pearl Harbor* (New York: Alfred A. Knopf, 1946), 27; and Walter R. Herrick, "William H, Hunt, 7 March 1881-16 April 1882," *American Secretaries of the Navy,* ed. Paolo Coletta (Annapolis: United States Naval Institute Press, 1980), 392.

ILLUSTRATIONS

Figure 1. Secretary of the Navy William E. Chandler. Reproduced from Leon Burr Richardson, *William E. Chandler: Republican* (New York: Dodd, Meade and Company, 1940), Frontispiece.

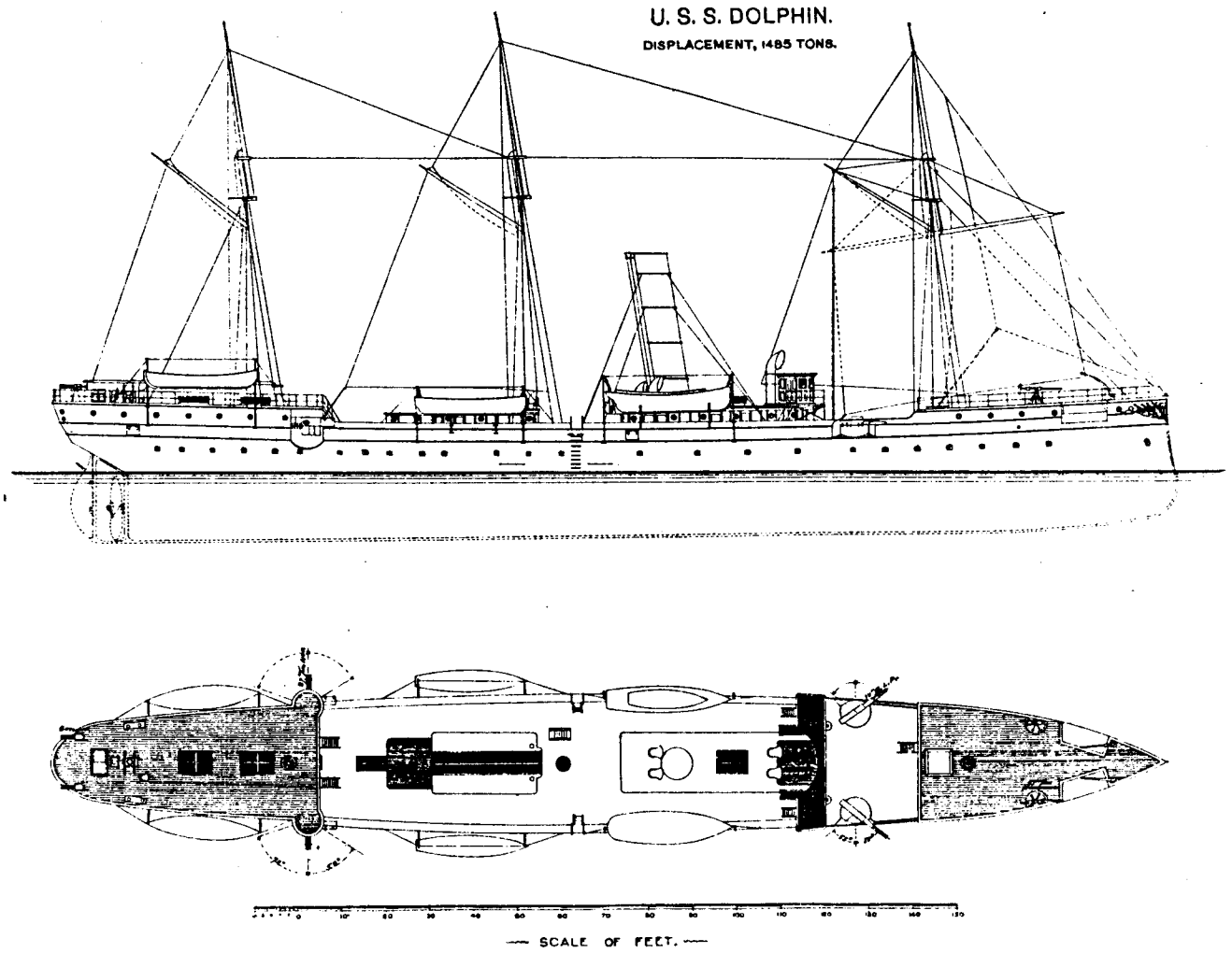


Figure 2. Overview of the USS *Dolphin*. Society of Naval Architects and Marine Engineers *Transactions* 1 (1893), Appendix (plate 26).

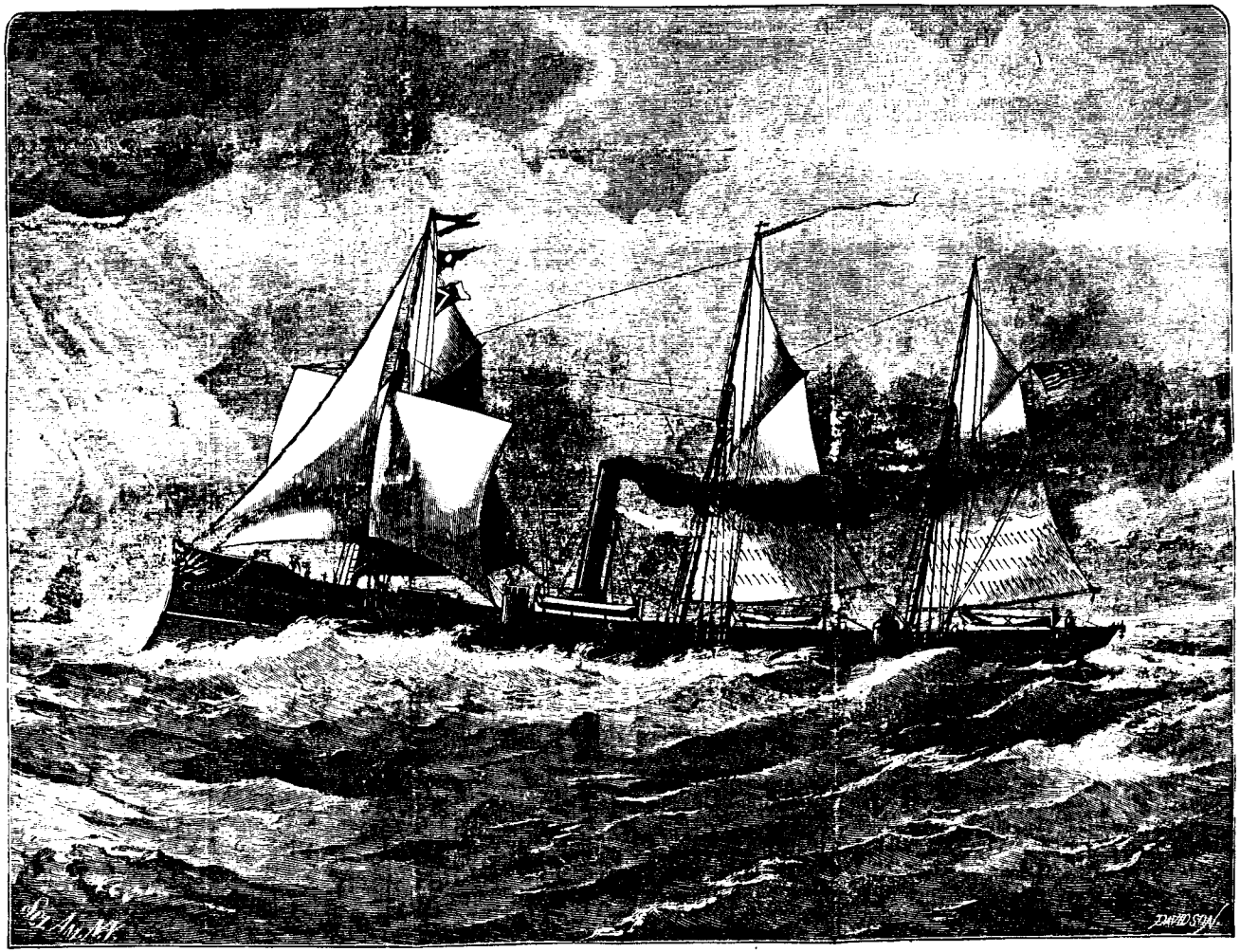


Figure 3. "The Dispatch Boat Dolphin." Reproduced from *Scientific American Supplement* 17, no. 432 (April 12, 1884), 6890.

Figure 4. Shipbuilder John Roach. Reproduced from Leonard Alexander Swann, Jr., *John Roach: Maritime Entrepreneur* (Annapolis: United States Naval Institute, 1965), Frontispiece.

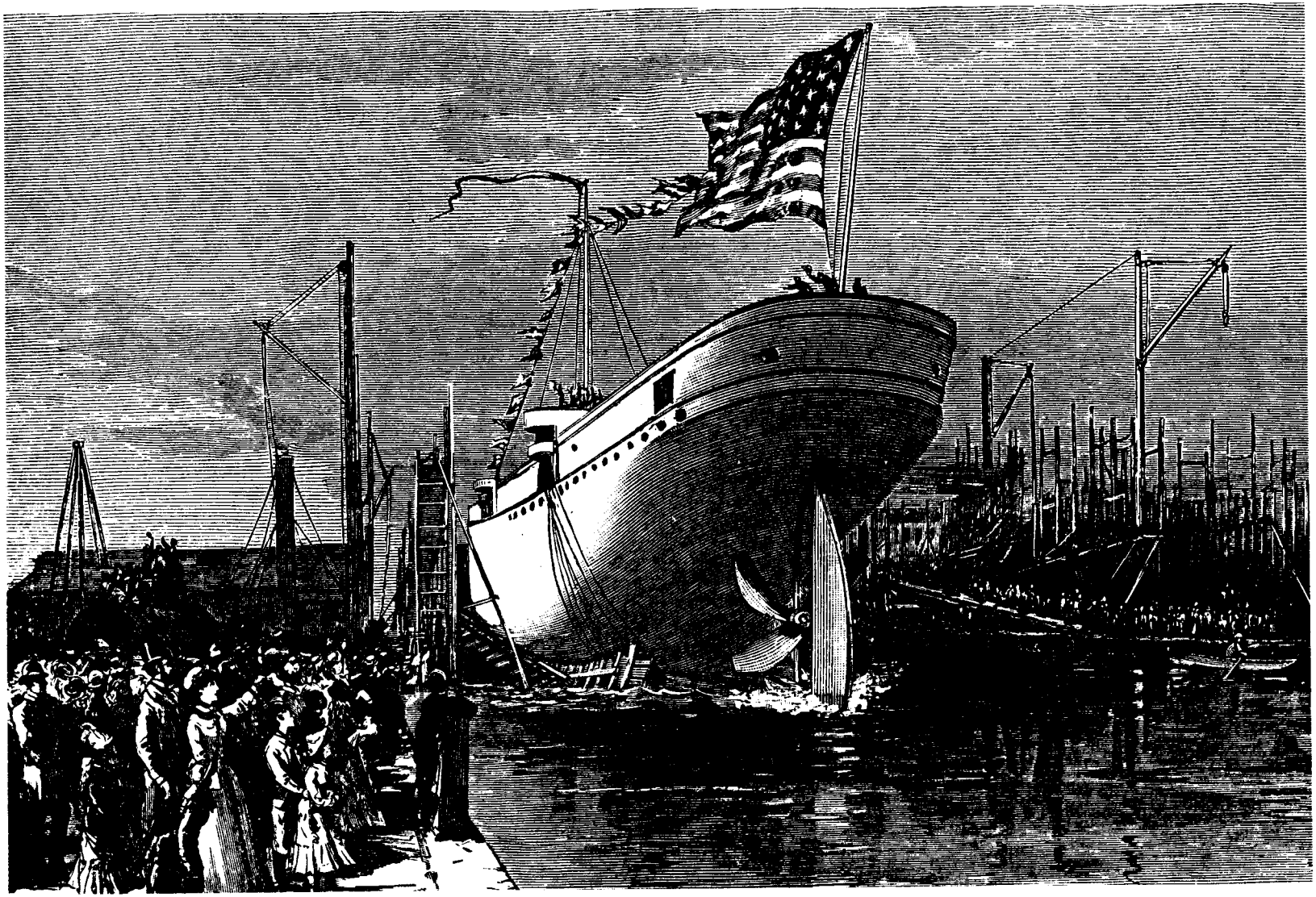


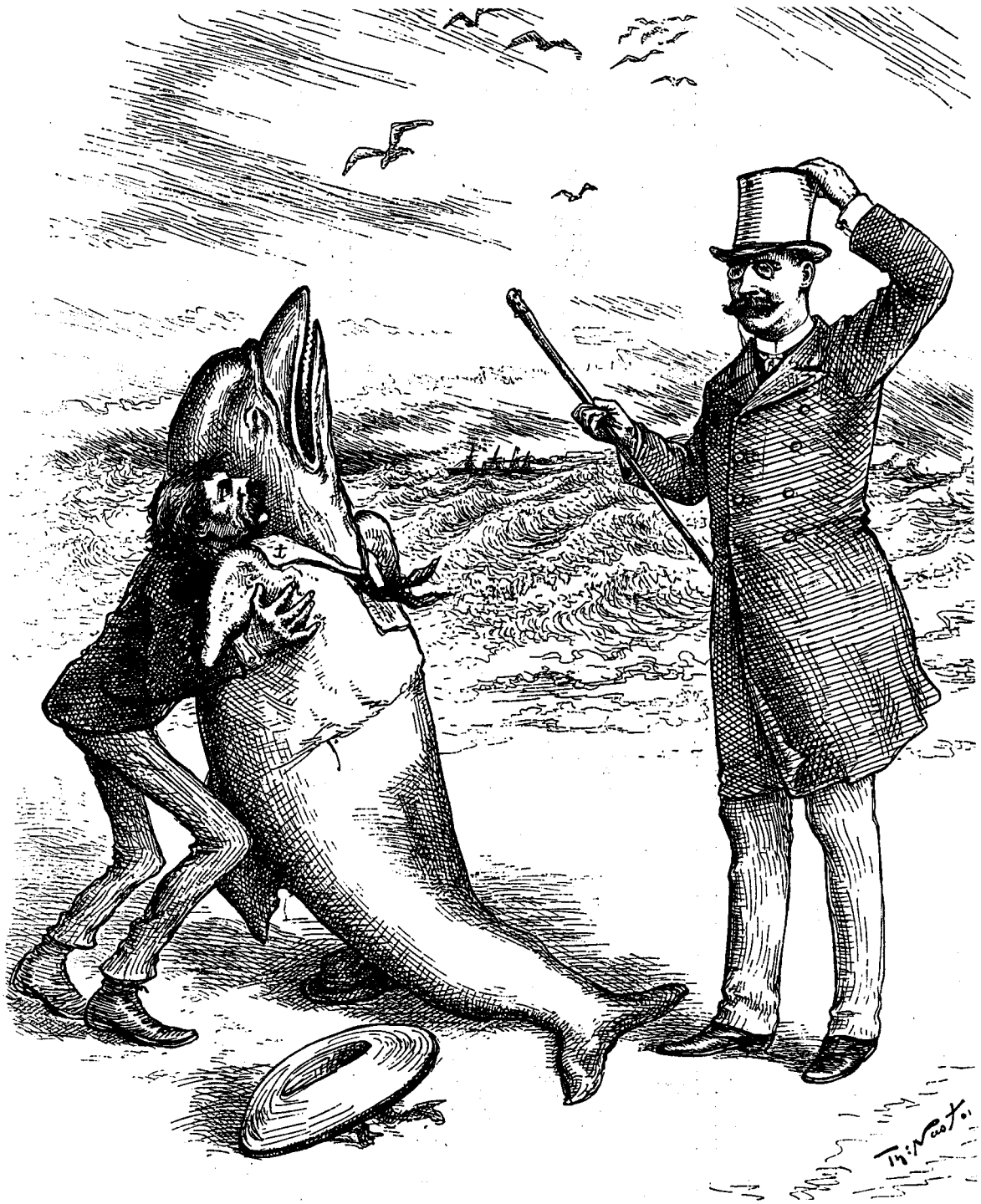
Figure 5. "The launch of the United States Dispatch Boat Dolphin." Reproduced from *Harper's Weekly* 28, no. 1427 (April 26, 1884), 273.

Figure 6. Secretary of the Navy William C. Whitney. Reproduced from Mark D. Hirsch, *William C. Whitney: Modern Warwick* (New York, 1948), Frontispiece.

CRUELTY.

DOLPHIN. "What! go to sea, Secretary WHITNEY? Why, that might make me seasick!"

Figure 7. Thomas Nast cartoon "CRUELTY." Reproduced from *Harper's Weekly* 29, no. 1485 (Saturday, June 6, 1885), Cover.



DOLPHIN. "Put me into a heavy sea, Secretary WHITNEY! Why, you'll want me to fire off a gun next!"

Figure 8. Thomas Nast cartoon (untitled). Reproduced from *Harper's Weekly* 29, no. 1489 (Saturday, July 4, 1885), Cover.

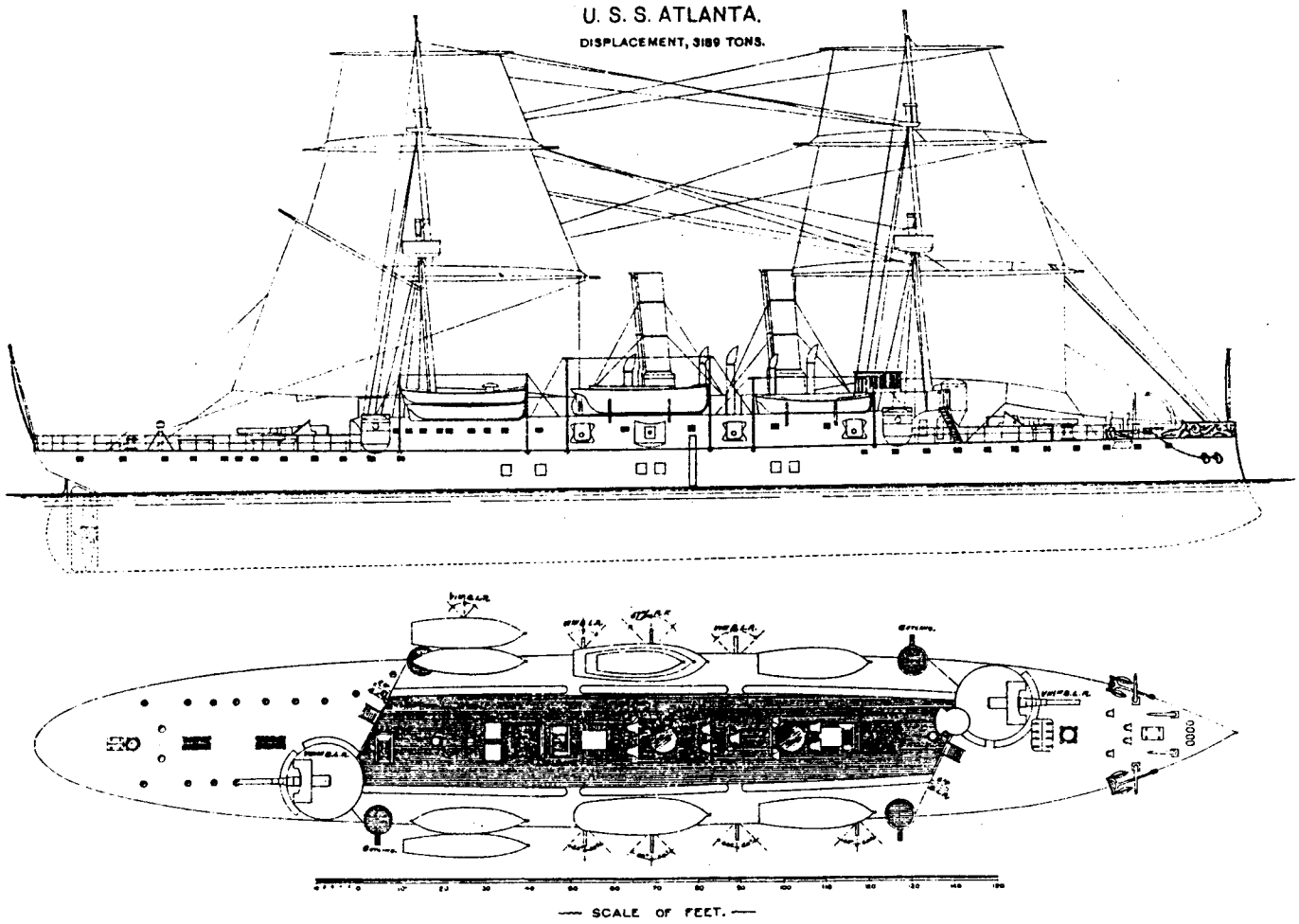


Figure 9. Overview of the USS *Atlanta.* Society of Naval Architects and Marine Engineers *Transactions* 1 (1893), Appendix (plate 9).

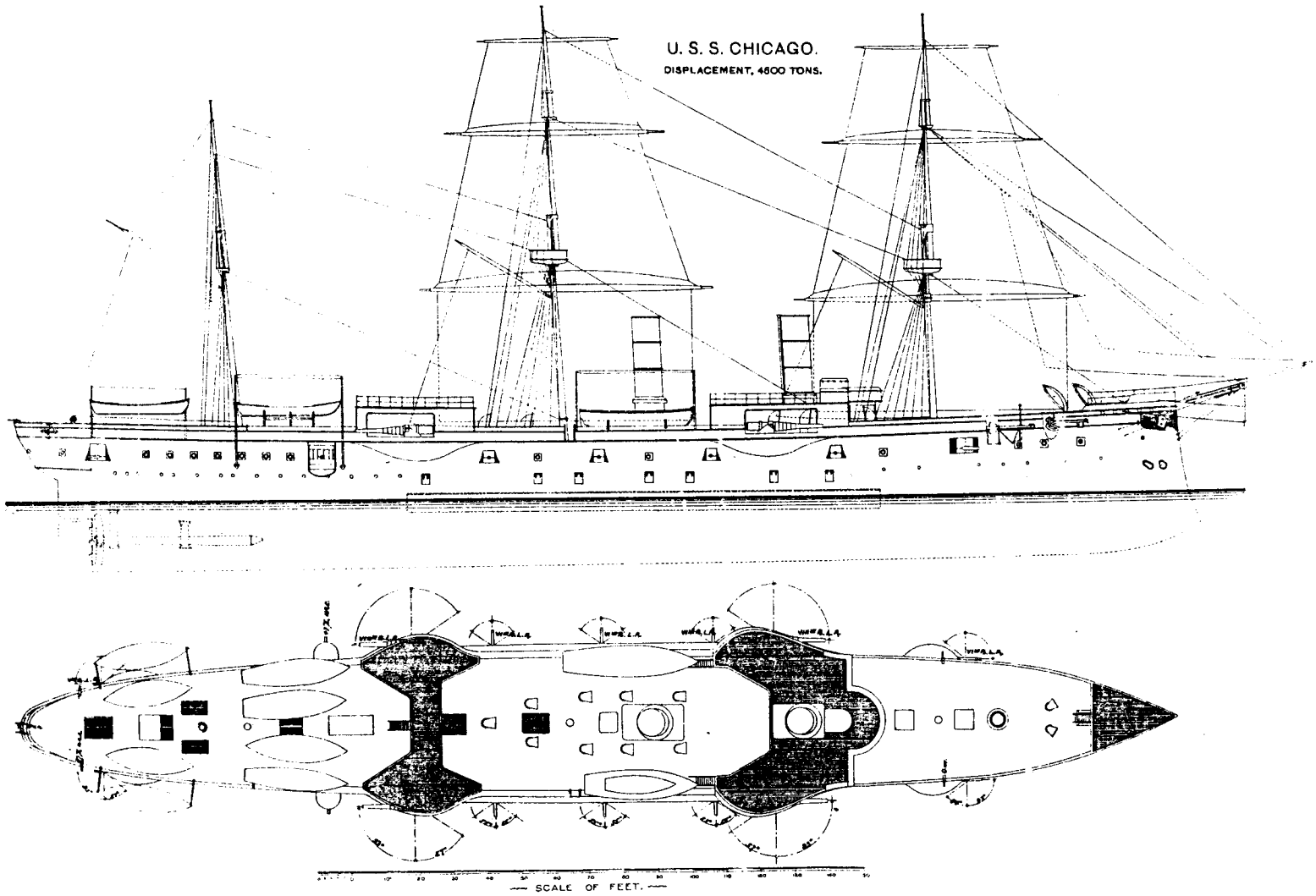


Figure 10. Overview of the USS *Chicago*. Society of Naval Architects and Marine Engineers *Transactions* 1 (1893), Appendix (plate 10).

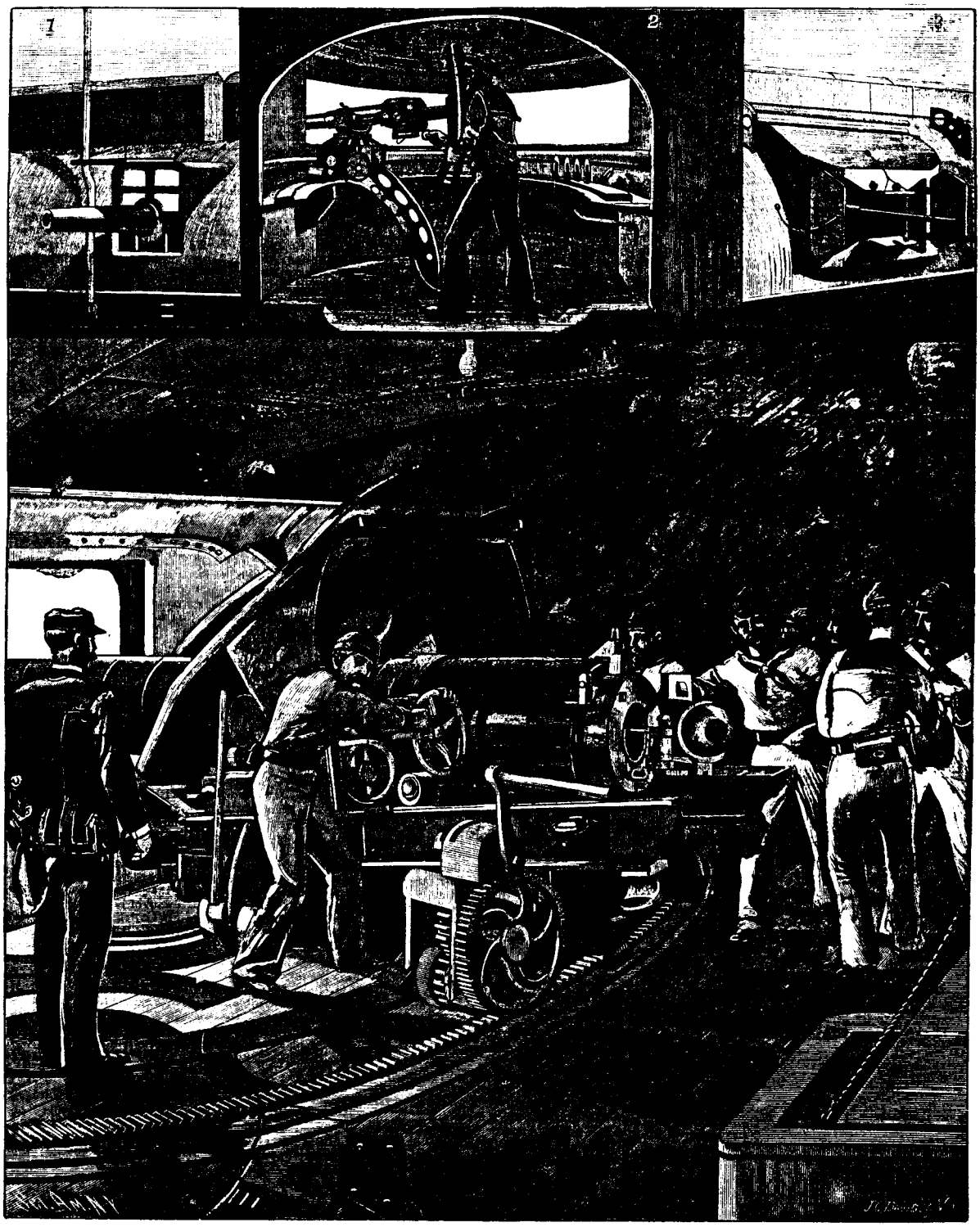


Figure 11. "The Armament of the New War Steamer Atlanta." Reproduced from *Scientific American* 57, no. 6 (August 6, 1887), 79.

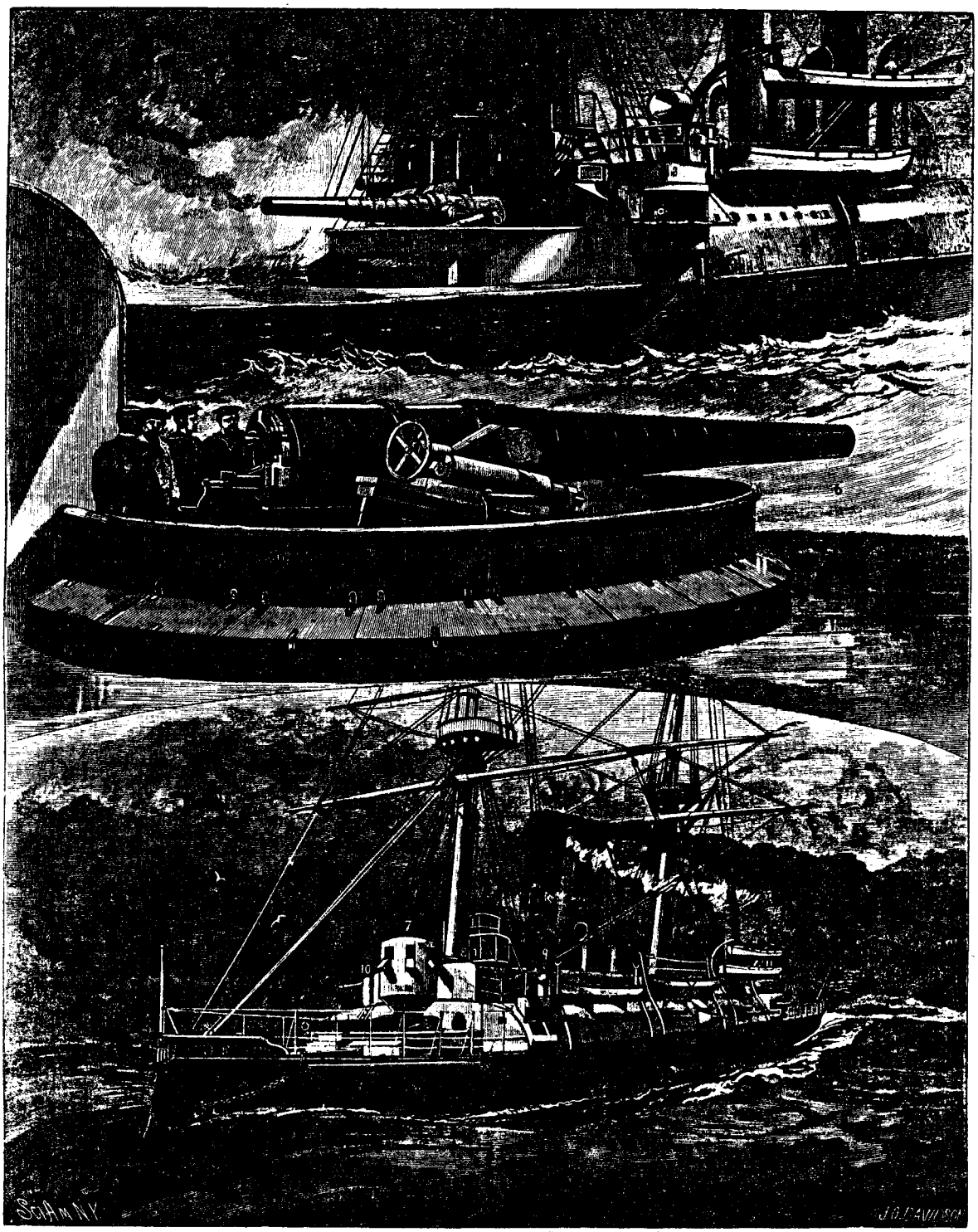


Figure 12. "Sketches on the Cruiser Atlanta." Reproduced from *Scientific American* 56, no. 21 (May 21, 1887), 319.

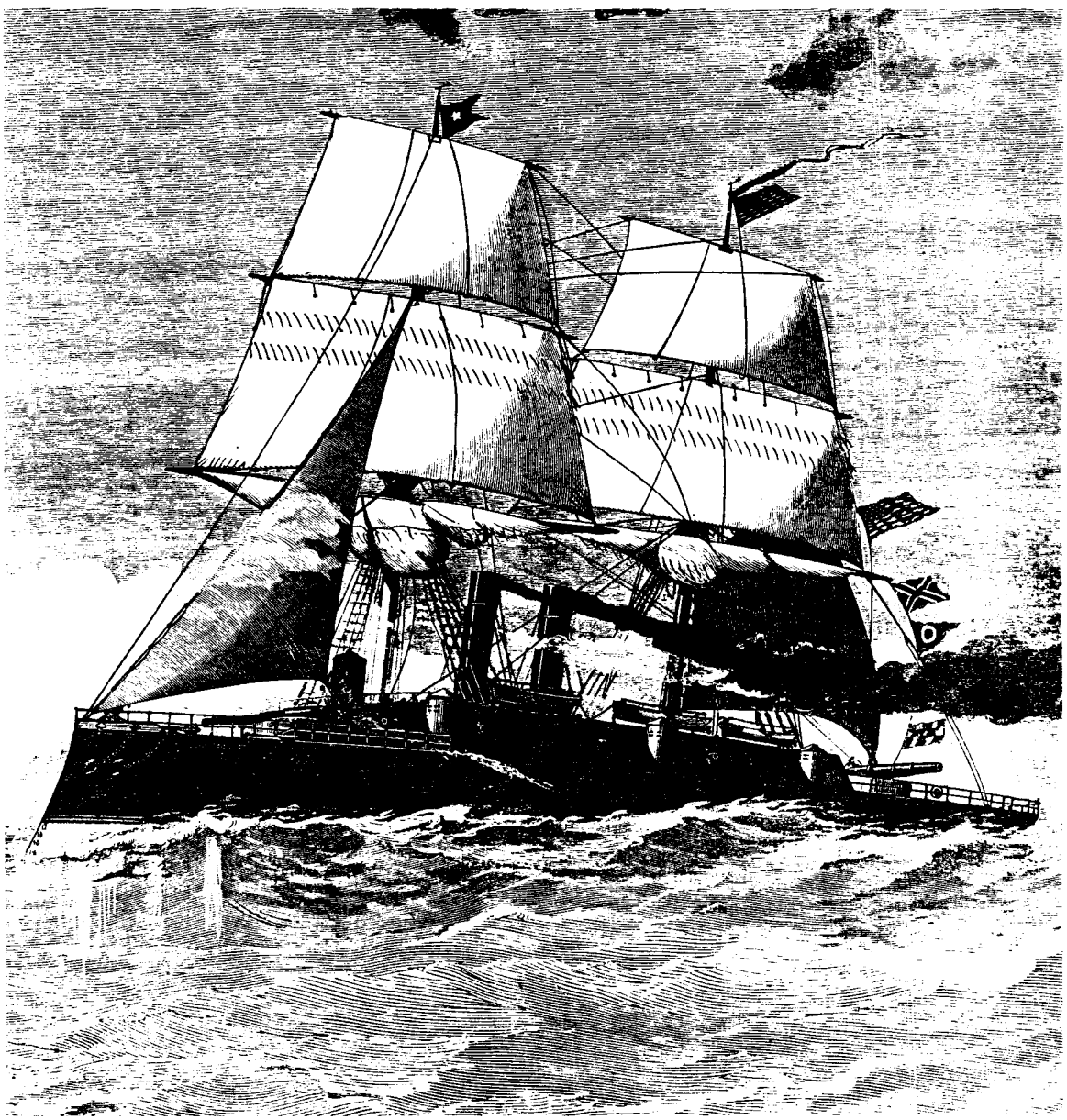


Figure 13. "The New United States Ship of War Atlanta." Reproduced from *Scientific American Supplement* 17, no. 432 (April 12, 1884), 6889.

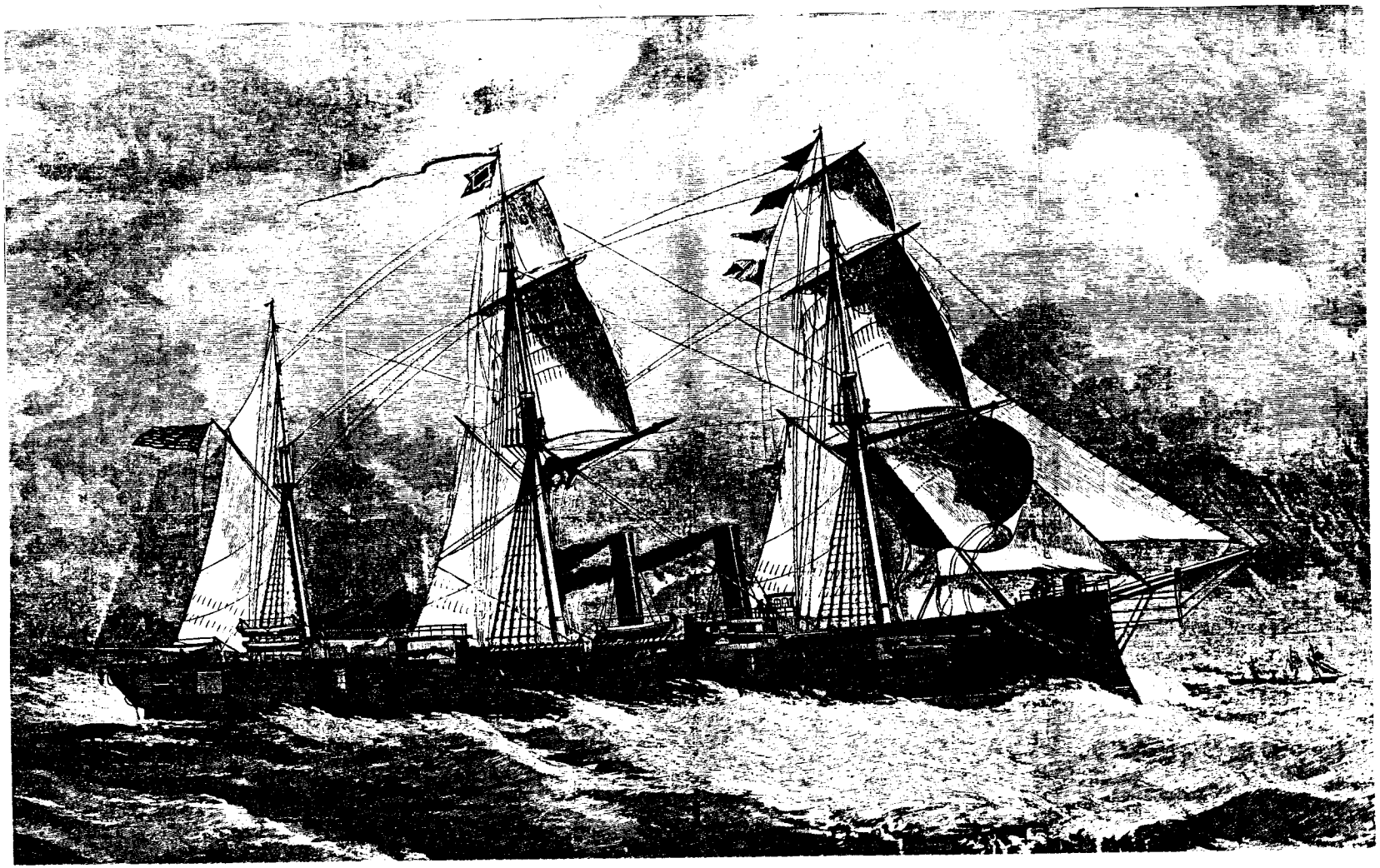


Figure 14. "The New United States War Steamer Chicago." Reproduced from *Scientific American Supplement* 17, no. 432 (April 12, 1884), 6891.

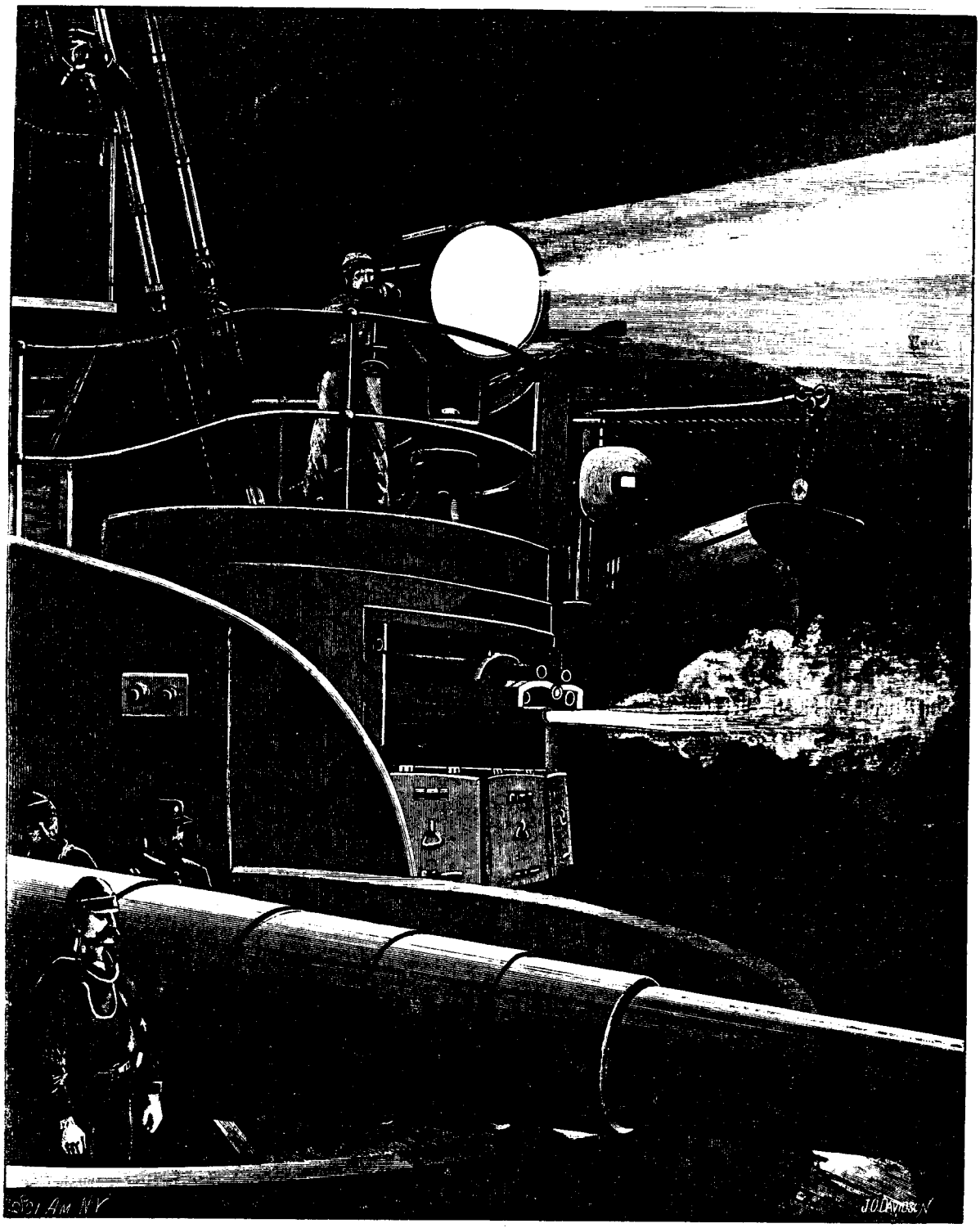


Figure 15. "Search Light on the U. S. Cruiser Atlanta." Reproduced from *Scientific American* 56, no. 24 (June 11, 1887), 372.

APPENDIX

APPENDIX A.

Political Party Control 1875-1891
(House, Senate, Presidency)

YEAR	HOUSE	SENATE	PRESIDENT
1867-69	Republican	Republican	Republican
1869-71	" "	" "	" "
1871-73	" "	" "	" "
1873-75	" "	" "	" "
1875-77	Democrat	" "	" "
1877-79	" "	" "	" "
1879-81	" "	Democrat	" "
1881-83	Republican	tie	" "
1883-85	Democrat	Republican	" "
1885-87	" "	" "	Democrat
1887-89	" "	" "	" "
1889-91	Republican	" "	Republican

SOURCE: U. S. Bureau of the Census, *Historical Statistics of the United States, Colonial Times to 1957* (Washington: Government Printing Office, 1960), 691.

APPENDIX B.

United States Government Financial Statistics 1865-1890
(in dollars)

Year	Expenditure	Revenue	Surplus	Naval Appropriation
1865	1,297,555,224.41	333,714,605.08	-963,840,619.33	122,612,945.29
1866	520,809,416.99	558,032,620.06	37,223,203.07	43,324,118.52
1867	357,542,675.16	490,634,010.27	133,091,335.11	31,034,011.04
1868	377,340,284.86	405,638,083.32	28,297,798.46	25,775,502.72
1869	322,865,277.80	370,943,747.21	48,078,469.41	20,000,757.97
1870	309,653,560.75	411,255,477.63	101,601,916.88	21,780,229.87
1871	292,177,188.25	383,323,944.89	91,146,756.64	19,431,027.21
1872	277,517,962.67	374,106,867.56	96,588,904.89	21,249,809.99
1873	290,345,245.33	333,738,204.67	43,392,959.34	23,526,256.79
1874	287,133,873.76	289,478,756.06	2,344,882.30	30,932,587.42
1875	274,623,392.84	288,000,051.10	13,376,658.26	21,497,626.27
1876	258,459,797.33	287,482,039.16	29,022,241.83	18,963,309.82
1877	238,660,008.93	269,000,586.62	30,340,577.69	14,959,935.36
1878	236,964,326.80	257,763,878.70	20,799,551.90	17,365,301.37
1879	266,947,883.53	273,827,184.46	6,879,300.93	15,125,126.84
1880	267,642,957.78	333,526,610.98	65,883,653.20	13,536,984.74
1881	260,712,887.59	360,782,292.57	100,069,404.98	15,686,671.66
1882	257,981,439.57	403,525,250.28	145,543,810.71	15,032,046.26
1883	265,408,137.54	398,287,581.95	132,879,444.41	15,283,437.17
1884	244,126,244.33	348,519,869.92	104,393,625.59	17,292,601.44
1885	260,226,935.50	322,690,706.38	63,463,771.27	16,021,079.67
1886	242,483,138.50	336,439,727.06	93,956,588.56	13,907,887.74
1887	267,932,179.97	371,403,277.66	103,471,097.69	15,141,126.80
1888	267,924,801.13	379,266,074.76	111,341,273.63	16,926,437.65
1889	299,288,978.25	387,050,058.84	87,761,080.59	21,378,809.31
1890	318,040,710.66	403,080,982.63	85,040,271.97	22,006,206.24

SOURCE: 39 Cong. to 51 Cong., "Report of the Secretary of the Treasury," *House Executive Document 1*, 1865-1890.

APPENDIX C.

Warship Construction United States Navy, 1861-1883

Type	Number	Private Contractor	Navy Yard
1861 — 1866			
Wood	124	41	83
Iron	8	8	0
Monitor	56	56	0
Subtotal	188	105	83
1867 — 1883			
Wood	16	4	12
Iron	6	4	2
Monitor	4	4	0
Subtotal	26	12	14
Total	214	117	97

SOURCE: Frank M. Bennett, *The Steam Navy of the United States: A History of the Growth of the Steam Vessel in the U. S. Navy, and of the Naval Engineer Corps* (Pittsburgh: W. T. Nicholson, 1896), Appendix B.

APPENDIX D.

Bids for the ABCD Ships, 2 July 1883
(in dollars)

Bidder	*Location*	*Atlanta*	*Boston*	*Chicago*	*Dolphin*
Allen & Blaisdell	St. Louis	–	–	–	380,000
William Cramp & Sons	Philadelphia	650,000	650,000	1,080,000	375,000
Delameter Iron Works	New York	–	–	1,163,000	–
Harlan & Hollingsworth	Wilmington	775,000	777,000	1,120,000	–
Harrison Loring	Boston	–	748,000	–	–
Quintard Iron Works	New York	763,400	–	–	–
H. A. Ramsay & Co.	Baltimore	–	–	–	420,000
John Roach	Chester, Pa.	617,000	619,000	889,000	315,000

SOURCE: 48 Cong., 1 sess., "Report of the Secretary of the Navy," *House Exec. Doc. 1, Part 3*, 1883, 56.

APPENDIX E.

Gun-Power Comparison 1886

GUN	Weight of Charge	Weight of Projectile	Muzzle Velocity	Muzzle Energy	Penetration in Wrought Iron	Muzzle Energy Per Ton of Gun
9-inch smoothbore	10	73.5	1,320	1,117	nil	279
11-inch smoothbore	15	136	1,240	1,450	nil	203
8-inch converted muzzleloading rifle	35	180	1,450	2,623	10.0	358
8-inch steel breechloading rifle	125	250	2,050	7,285	18.2	560
10-inch steel breechloading rifle	250	500	2,100	15,285	23.7	588
12-inch steel breechloading rifle	425	850	2,100	25,985	27.6	591

SOURCE: Rear-Admiral Edward Simpson, "The United States in Transition," *Harper's Magazine* 73, no. 433 (June 1886), 26.

APPENDIX F.

Ships Authorized, United States Navy, 1883-1889

YEAR	NAME	TYPE	DISPL. (tons)	COST (dollars)	BUILDER
1883	*Dolphin*	Dispatch Vessel	1,486	4,268,801.80	Roach
	Atlanta	Protected Cruiser	3,000	total	" "
	Boston	" "	3,000		" "
	Chicago	" "	4,500		" "
Total	Tonnage	Authorized	11,986		
1885	*Charleston*	" "	3,370	1,599,858.20	Union
	Newark	" "	4,083	1,830,117.20	Cramp
	Yorktown	Gunboat	1,710	768,030.59	" "
	Petrel	" "	890	464,035.52	Columbian
1886	*Amphitrite*	Monitor	3,990	2,195,980.07	Harlan & Hol.
	Monadnock	" "	3,990	2,756,760.35	Burgess
	Puritan	" "	6,060	3,395,465.91	Roach
	Terror	" "	3,990	2,217,102.10	Cramp
	Baltimore	Protected Cruiser	4,413	1,976,729.35	" "
	Vesuvius	Dynamite Cruiser	930	319,555.33	" "
	Cushing	Torpedo Boat	105	98,666.29	Herreschoff
	Maine	2nd Cl. Battleship	6,682	4,677,788.75	U.S. Govt.
	Texas	" "	6,315	4,202,121.49	" "
1887	*Bennington*	Gunboat	1,710	769,317.71	Palmer
	Concord	" "	1,710	765,284.42	" "
	Miantonomah	Monitor	3,990	2,540,136.85	Roach
	Monterey	" "	4,084	2,761,371.06	Union
	San Francisco	Protected Cruiser	4,083	2,135,303.31	" "
	Philadelphia	" "	4,410	1,958,660.38	Cramp
1888	*Olympia*	" "	5,865	2,979,283.38	Union
	Cincinnati	" "	3,183	2,371,904.52	U.S. Govt.
	Raleigh	" "	3,183	2,199,729.80	" "
	Marblehead	Cruiser	2,072	1,291,162.93	Loring
	Detroit	" "	2,072	1,233,039.90	Columbian
	Montgomery	" "	2,072	1,267,109.71	" "
	New York	Armored Cruiser	8,150	4,346,642.39	Cramp
	Bancroft	Gunboat	839	297,360.17	Moore
1889	*Castine*	" "	1,177	671,464.20	Bath
	Machias	" "	1,177	657,761.07	" "
	Katahdin	Harbor Ram	2,183	1,529,827.39	" "
	Iwana	Tugboat	192	33,253.57	Loring
	Narkeeta	" "	192	33,648.91	" "
	Wahneta	" "	192	33,176.52	" "
	Triton	" "	212	----------	Dialogue
Total	Tonnage	Authorized	99,276		

SOURCE: 62 Cong., 3 sess., "Navy Yearbook: Compilation of Annual Naval Appropriation Laws from 1883 to 1912," *Senate Doc. 955*, compiled by Woodbury Pulsifer (Washington: Government Printing Office, 1912), 760-776; and Frank M. Bennett, *The Steam Navy of the United States: A History of the Growth of the Steam Vessel in the U. S. Navy, and of the Naval Engineer Corps* (Pittsburgh: W. T. Nicholson, 1896), Appendix B.

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