

# International Journal of Naval History

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## The Guns at Filipstad: Some Reflections on the John Ericsson Bicentennial

by

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As far as I know, the guns at Filipstad are the only ones of their kind left in the world today. And what guns they are. Two 15-inch, cast-iron, muzzle-loaded smoothbores—“Dahlgrens”—each weighing some 42,000 pounds (21 tons) and capable of firing a 450-pound solid shot. They were the terror of the American Civil War. So what are these mammoth specimens doing in Filipstad, Värmland, in rural Sweden?



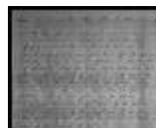
In 1865, with the Civil War finally drawing towards a close, John Ericsson purchased these two Navy Dahlgrens as a gift for his native country. Eugene B. Canfield lists their price at approximately \$6,500 each, give or take wartime inflation.<sup>[1]</sup> That Ericsson was

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both willing and able to buy these as a gift for a minor foreign power speaks volumes in itself. The war had given him even immeasurably more fame, considerable influence, and a sizeable personal fortune. Cast in 1863, these are later models intended for *Passaic* class monitors, apparently. The original 15-inch gun featured a 26½-inch muzzle diameter which would not protrude from the *Passaic*'s turret gunports. This may have been because it was not determined what the improved monitors' armament would consist of, perhaps a 13-inch prototype that Dahlgren advocated, or another, perhaps wrought-iron gun Ericsson himself offered to build for his proposed oceangoing super-monitors.<sup>[2]</sup> At any rate, Ericsson objected to the obvious solution of boring out the portholes to allow the muzzles to protrude from the face of the turret, as with the original *Monitor*'s 11-inch Dahlgren muzzle-loaders. Indeed, the obstinate yet persuasive inventor-engineer saw this as a positive advantage in the type of close-range combat which still dominated naval engagements. Given the limited supply of precious 15-inch guns, it would serve the nation best to avoid their getting damaged.<sup>[3]</sup> The C.S.S. *Virginia* it was well known had several of her guns blasted off in action against the U.S.S. *Cumberland* and *Congress*. Though this did prevent the guns from firing, the shock of impact threatened the structural integrity of the barrels themselves. By keeping the 15-inch guns entirely within the armored turret, this danger would be prevented. Ericsson also reasoned that larger port-holes would increase the chances of stray shot or shell finding their way into the turret, with obvious disastrous consequences.

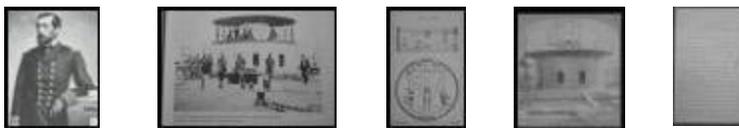


A controversy ensued as Ericsson and his principal assistant, U.S. Navy Chief Engineer Alban C. Stimers, worked on a muzzle-ring and “smoke-box” which would allow the thicker 15-inch Dahlgren to be fired within the turret, without incapacitating the gun crews from concussion or smoke. After several trials and errors, the innovative new system was proven successful, though the process cost Ericsson and his engineers some confidence on the part of already skeptical naval officers, namely the *Passaic*'s commander, Captain Percival Drayton (who never ceased to argue that the gunports should be enlarged instead, regardless of the risks to both the guns and their crews.)<sup>[4]</sup>

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It did not take long for the smoke-box system to be abandoned in the “Harbor and River” *Canonicus*-class of monitors. Both the gunports were bored larger and the 15-inch guns were cast with longer barrels and thinner muzzles which experience had by then shown was a safe alternative to the somewhat overly-cautious original design submitted by Dahlgren under repeated protests. It is also evident that the final monitors of the *Passaic* class were not fitted with smoke-boxes, and were armed with a bored down 15-inch guns.

I believe these versions at Filipstad are some of these, rather than the longer *Canonicus*-class variants, and perhaps were available for purchase by Ericsson nearly two years after their casting because by then the Navy had turned to the longer version instead.<sup>[5]</sup> Lying in a yard unused, Ericsson may have got them at a bargain price, though whether or not they would have proven as effective as the original, thicker-bored version, or the longer thinner-bored ones later is another matter for speculation.



These types of inordinately heavy naval guns could only be mounted in the centerline of a vessel, not on a broadside, and could only be worked on a turntable—preferably rotated by steam. In other words, 15-guns were distinctly turret-ship guns. Only the monitors carried them during the Civil War. When private shipbuilder William H. Webb encountered problems trying to mount 15-inch Dahlgrens onboard his large, oceangoing casemate-ram U.S.S. *Dunderberg*, it was Ericsson to whom the Navy turned again for assistance.<sup>[6]</sup> In this respect it is important to recall that a gun was only as good as its carriage, and that Ericsson devised iron, mechanized carriages of his own design for both the original *Monitor* and her sister ships. Indeed, the 12-inch “Oregon” gun he had built in England, and which also constituted the U.S.S. *Princeton*’s armament (along with the

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infamous “Peacemaker” of Captain Robert F. Stockton’s build) was worked by an equally-revolutionary iron carriage of his own design. There is also some evidence to suggest that the carriages used for the Union Navy’s only seagoing broadside ironclad of the Civil War, U.S.S. *New Ironsides*, were based on specifications supplied by John Ericsson upon request.<sup>[7]</sup>



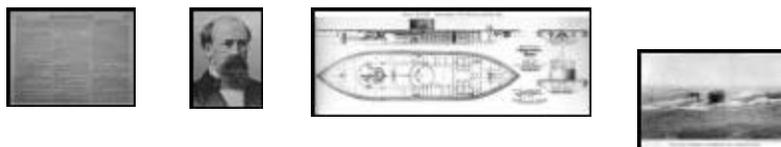
Soon after the Battle of Hampton Roads the State and Navy departments were beset by requests from foreign powers for plans of the stunning new ironclad warship, Ericsson’s *Monitor*. Contrary to popular belief, the Navy was already sold on Ericsson’s version of a turret ship well before the *Monitor* checked the *Virginia*. It only remained for a practical “test” to confirm his system over primarily the rival design put forth by the Chief of the Bureau of Ship Construction and Repairs, John Lenthall, and the Chief of the new Bureau of Steam Engineering, Benjamin Isherwood. The popular acclaim which followed Hampton Roads, not to mention the sensational reaction by foreign powers—especially Great Britain—only supported the Navy Department’s prior decision to favor Ericsson and the monitor-ironclads.<sup>[8]</sup> A crucial convert was the influential Assistant Secretary of the Navy, Gustavus Vasa Fox, who was behind the Bureau turret ship design, yet who also bent to the practical problems associated with a class of ironclads requiring, among other things, thick iron plates only obtainable at the time from abroad. Again, the climactic encounter at Hampton Roads, further convinced Fox, an eye-witness of the ironclad duel, that the *Monitor* was best for the Union Navy’s unique strategic requirements. Occurring as it did within months of the *Trent* Affair, Hampton Roads underscored the need for coastal defense ironclads capable of tackling enemy ironclads, Confederate or British, in home waters. This formula for checking coastal assault, for thwarting the pretensions of British naval supremacy and imperial power-projection,

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appealed to the lesser naval powers in Europe. The Netherlands, Russia and the Scandinavian countries could all identify with Ericsson's preoccupation with light-draft, heavily-armored, low-freeboard turret ships capable of mounting the heaviest guns possible—even if at the cost of long range and speed.



When Russia therefore appealed through diplomatic channels for plans of Ericsson's improved *Passaic*-class monitors, it was left to the Navy, and even to Ericsson himself who "owned" the system, to decide whether or not to empower the Union's only open friend during the Civil War, yet ancient enemy of Ericsson's native Sweden.<sup>[9]</sup> Arming both Baltic powers with monitors, however, was something which appealed to his sense of high-tech and ostensibly defensive strategic weaponry nullifying the sort of high-level naval deterrence which characterized England's traditional sense of "Balance of Power" politics in Europe. The more monitors in the world the better. Ericsson subsequently allowed copies to be made of his plans of the *Passaic*.<sup>[10]</sup> On May 20, 1862, he enthusiastically, if not realistically, offered to build a \$400,000 *Passaic* monitor in six months for Denmark, fitted to carry (but not actually equipped with) a pair of 15-inch Dahlgren guns, and was "also willing to procure an experienced sea Captain and crew to take the vessel to any port of Denmark [or] on the Mediterranean that you shall name."<sup>[11]</sup>



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The guns now at Filipstad were thus intended to arm a much larger “gift” for Sweden, her first monitor, the *John Ericsson*. Nor was Ericsson a stranger to the idea of sending such potent offerings of national power through the mail. Another meaningful specimen of the American Civil War now rests at the Technical Museum in Stockholm—perhaps by mistake. When Union forces at last occupied Fort Sumter a cored 15-inch shot fired from one of the *Passaic*-class monitors stationed before Charleston was apparently sent to Fox as a souvenir. Impressed, the Assistant Secretary, however, decided to forward it on to Ericsson—the man in whom he invested so much of his own professional reputation.



By the end of the war there was also another reason why Fox decided to send the 15-inch Fort Sumter shot to Ericsson. The public scandal over the failure of the ultra light-draft monitors, critically mis-modified by Stimers from Ericsson’s original plans—on top of the serious Congressional inquiries stemming from the controversy over Rear-Admiral Du Pont and the ironclad repulse against Charleston (April 7, 1863)—had gone a long way towards sapping much of Ericsson’s reputation following Hampton Roads. Part of this was invariably his own fault. Though he was not aware what Stimers had done to the light-drafts until too late, and could not be held accountable for how naval officers actually employed his “inventions”, properly or not, Ericsson was increasingly preoccupied with his giant seagoing monitors, *Dictator* and *Puritan*. These he regarded as the ultimate expression of his ideas of tactical superiority-based strategic ascendancy over British naval power—and the nation’s ultimate expression of strategic deterrence at sea. And this preoccupation on his part left far too much technical reliance upon Stimers, if nothing else, who was soon overwhelmed himself with the perpetual modifications being made to the *Canonicus*-class monitors also hastened in construction, as well as supervising repairs and improvements to the *Passaic* monitors fixed in place with the

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South Atlantic Blockading Squadron before Charleston. The 15-inch specimen was to tactfully remind Ericsson of his positive contributions to the Union war effort despite all the mishaps, and encourage him further. Fox, the Union navy's great facilitator and smooth-talker, knew how to manage Ericsson like no one else.



The shot, however, did not stay with Ericsson, who had agendas of his own. What better practical proof of Union technical and industrial power to show Britain than a cannonball which could only be (and was) fired from a gun which could only be mounted (and was) on a monitor-type ironclad? National power and Ericsson's own foresight and abilities were virtually synonymous factors, the price of the Union Navy investing so much into one man whose shifting personal reputation and status uniquely reflected its own. "A spherical projectile of 15 inch diameter might justly rank among the great inventions of our time had only a single gun been successfully made capable of projecting such a mass," Ericsson thus wrote to his friend, Bennett Woodcroft of the British Patent Office Museum, "but when we bear in mind that thirty one iron clad vessels have already been built in this country mounted solely with fifteen inch guns, the achievement in a mechanical point of view certainly deserves to be recorded." Ericsson wanted the specimen, a prize-piece of American (and personal) propaganda, to remain at a museum in London:

...the shot, found among the ruins of Fort Sumter...apart from mechanical considerations, possesses a deep interest as connected

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with an occurrence in which mankind is concerned. It was at Sumter that the flag of the United States was first insulted and where the gigantic contest commenced in which a million of men met to decide by mortal combat the fate of the infamous institution of slavery. The shot, therefore, that pierced the walls of Sumter and helped to secure the grand victory in behalf of human freedom, will merit a place in a museum specially devoted to the exhibition and preservation of those mechanical inventions to which we are indebted for the rapid advancement in civilization which has signalized the last century.<sup>[12]</sup>

Coming across this letter in 2001, I went looking for the British Patent Office Museum and was informed it was incorporated into the Science Museum in Kensington, London, in 1884. I was also told, however, that following World War I the shot was sent to the new Tekniska Museet, the Museum of Science & Technology, in Stockholm, Sweden. On June 29<sup>th</sup>, 2001, I emailed the Tekniska Museet, inquiring of an artifact “extremely important, personally donated by Ericsson to his British colleague for a very specific reason.” Dr. Ove Halén, the Curator of Collections there, replied that a search was on, and the next day, July 5<sup>th</sup>, happily emailed me that the shot was found, “amongst the earliest artefacts in our collections...” Sometime between 1922-4, Thorsten Althin, the first director of the Tekniska Museet, formally requested the 15-inch shot be sent to him, which was approved on February 6, 1924. There it now sits, in storage, “TM No. 149”. When I found myself in Stockholm in mid-November of this year (2003), giving a paper on John Ericsson and the monitors for the Swedish National Defence College, I made sure to look it up. Perhaps someday it should be sent back to the Science Museum in London, as Ericsson himself intended?

I also took the opportunity of my brief stay in Sweden to go to Filipstad, where Ericsson’s mausoleum, and the 15-inch Dahlgrens, can be seen—each a fitting, forbidding testament to this individual’s place in history. There I was greeted by Mr. Kjell-Åke Dahlberg, the Chairman of the John Ericsson Society in Sweden, and interviewed by Filip Lowalski, a reporter from the *Filipstads Tidning*.<sup>[13]</sup> The rather frank and surprising question they had for me was, Why is Ericsson so much more famous in America, evidently, than in Sweden? I could only answer, ultimately, that he was simply the right man at the right place at the right time. England in the 1820s and 30s was not prepared to accept many of his radical ideas, namely the screw propeller (1837)—I doubt if they would have ever really accepted them—and only accepted the monitor concept by proxy when Edward Reed, the Chief Constructor of the Royal Navy from 1863, openly incorporated aspects of it into his design for the coastal ironclad, H.M.S. *Cerberus* (following his inspection in July 1866 of the double-turreted monitor U.S.S. *Miantonomoh*, visiting at Portsmouth), and then of course Britain’s first mastless capital steamship H.M.S. *Devastation*.<sup>[14]</sup> Nor was Ericsson very high on the U.S.

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Navy's list following the catastrophic explosion of Captain Robert F. Stockton's "Peacemaker" gun, on board Ericsson's experimental screw-propelled warship U.S.S. *Princeton*, on February 28, 1844. When in 1854 Ericsson proposed building a monitor-type ironclad for Napoleon III, he was politely declined. Though France was at war, it was against Russia not England. Against Russia France had devised floating broadside batteries protected by armored plate; and against England shortly afterwards the French Navy turned to armored seagoing frigates.



The Civil War, though, provided Ericsson with an exceptional, perhaps unparalleled, opportunity. Just as it took men like Ulysses S. Grant and David Glasgow Farragut, tapped into their latent strengths and talents, and catapulted them into stardom, so did the sudden upheaval in America lead to an almost chance exploitation of Ericsson's genius. Typically, this did not go unopposed; both the monitor concept and the heavy 15-inch gun were considered too radical, too risky by naval professionals on both sides of the Atlantic.

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In regards to the monitors' armament, the chief opponent was another Swedish descendent, John A. Dahlgren, who was at the outbreak of the Civil War one of the nation's leading authorities on European developments in ordnance and armor, an accomplished scholar of modern naval warfare, and an eminently successful gun designer. But Dahlgren's conception of effective naval firepower ended with his 11-inch

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shell gun. When Ericsson managed to contract for the original *Monitor*, this was the heaviest shipboard weapon available, and there was more than a little doubt that his experimental battery would even be allocated a pair of these precious commodities. From the start, Ericsson was most likely annoyed of his reliance upon another inventor (and another U.S. naval officer) to see his own plans fully realized. In fact, the weapons determined the size of the *Monitor's* turret, and consequently the entire structure of the ship.<sup>151</sup>



Hence on October 8, 1861, when Ericsson requested specs for the 11-inch Dahlgren, the superintending naval officer, Commodore Joseph Smith (the Head of the Bureau of Yards and Docks) was quick to inform Captain A. A. Harwood, the new Chief of the Bureau of Ordnance, that in addition to these two of the guns themselves would need to be “supplied at New York for the use of said Vessel.” On the 13<sup>th</sup> Ericsson wrote Smith he could not “proceed with the work on the battery turret until the receipt of drawing of the Dahlgren gun” but by then it was already en route. Smith, in the meantime, was sure to remind Secretary of the Navy Gideon Welles that the Dahlgrens “should be prepared soon, as in case they are not ready when demanded by the Contractor, advantage may be taken of that clause in the contract which provides that the test shall be made by the Department within ninety days after the time stipulated for her completion.” The Navy’s own Bureaus had to cooperate fully and quickly amongst themselves. Increasing tension between the private contractor and the Government/naval professionals meant increased efforts to insure such an arrangement was not “impaired in any manner on our part.” This was probably more a relationship of mutual “respect” than mutual trust. “If the guns are not furnished and the vessel should prove a failure,” Smith warned, “the contract may be vitiated and the Government suffer.”<sup>161</sup>

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Yet he also was more diplomatic in this working relationship than we might expect. Indeed, Ericsson had little choice, and, as it turned out, neither did Dahlgren. Immediately following the Battle of Hampton Roads, Fox and Major-General John E. Wool inspected the battle-scarred *Monitor* and conferred with her officers. Wool had already been telegraphed by General George B. McClellan to prepare to evacuate the Union position at Newport News, if the Navy lost control of the Roads, and fall back on Fortress Monroe, taking care of the valuable 12-inch “Union Gun”—the only one of its kind in existence.<sup>[17]</sup> Undoubtedly, Fox was shown the Army’s massive, experimental rifled smoothbore and its companion 15-inch caliber smoothbore as they were both prepared to assist in the defense of the fort.<sup>[18]</sup> Two of his telegrams made on the following day confirm that the Assistant Secretary had made the important connection between the corporeal events of recent days and the Union ironclad program’s course for the future. The first, to Lieutenant Henry Wise, Assistant Inspector of Ordnance at the Navy Department, requested Dahlgren to assist Brigadier-General J. W. Ripley (the Army’s Chief of Ordnance) in the casting of “some projectiles for the Union gun here.”<sup>[19]</sup> The second one, to Dahlgren, clearly reflected Stimers’s previous frustration in not being allowed to fire the special wrought-iron shot specially cast for the *Monitor*’s 11-inch guns but ultimately not allowed for Dahlgren’s fear that the guns would be overstrained. “It is the only thing that will settle the *Merrimack*,” Fox persisted. Additionally, “We must have more of these boats with 15-inch guns, and you must go ahead with your furnaces at once to make them to stand solid shot.”<sup>[20]</sup>



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Dahlgren replied that the risk of an 11-inch gun burst within the *Monitor*'s turret—as a result of firing wrought-iron shot—outweighed their use. “I am only awaiting the action of the Senate and then for as large guns as you want with solid shot.”<sup>[21]</sup> The day before the *Virginia*'s attack, Dahlgren wielded his authority in ordnance matters in response to Fox's “proposition to build a vessel like the ‘Lancaster’ so as to carry 20 guns of XI in. on the Gun deck, in lieu of 22 of IX in., and to retain the two XI in. on the Spar deck.” The increase, he calculated, would add from 170 to 280 tons' weight to the vessel and nearly 80 extra men to the crew. Twelve 11-inch guns could only therefore be contemplated, six to a broadside. But whether these should be on a regular broadside-carriage on an enclosed gun-deck or an open-deck pivot was another matter, especially since such large guns would have to be stowed at sea “in two line fore and aft on each side of the middle line of the deck”, parallel to the ship's side. “You may safely rely on one thing,” he concluded to Fox:

...that the power of a ship of War may always be in proportion to her capacity,

And that the largest ship can always be made the most powerful in offense as well as in defense.

The smaller ship can never be made more effective than the larger, unless the means of the latter are misused.

It has always been urged that a small vessel with a single gun can annoy and injure the larger vessel having like itself only a single heavy gun.

But when the large vessel can bring 6 or 7 such guns against the one gun, the chances are increased in that ratio, and the One-gun vessel is not able to attack with impunity.<sup>[22]</sup>

The events at Hampton Roads had Dahlgren rather eating his words later. Ericsson's published remarks on the ironclad duel, that the *Monitor*'s 11-inch guns should have been aimed more at the *Virginia*'s waterline, Dahlgren argued only proved his point; that the lack of wrought-iron shot would not have made any positive difference in the battle's outcome. “That the use of but one XI in. gun at a time should have effected so much against a vessel 4 times the size with perhaps 6 or 8 times the Ordnance power, presenting an entire oblique surface to the *Monitor*'s aim is so good a result that it seems to me the excess of hypercriticism even to suggest that more might have been done...”<sup>[23]</sup> Here was both veiled criticism of Ericsson, the now wildly-popular civilian inventor, and yet an acknowledgment by Dahlgren that Ericsson's principles—embodied in the *Monitor*—had somehow overturned his own.<sup>[24]</sup> The smaller, lighter-draft turret vessel had succeeded in driving away the large, deep-draft, broadside-armed opponent. Various

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proposals submitted by Dahlgren before the battle emphasized either converting shallow draft gunboats into armoured central battery ironclads or lightly protecting the new double-ender gunboats with their open-deck pivots.<sup>[25]</sup> Now Ericsson and Fox were rushing forward with plans of even more heavily armoured turret-mounted guns, of even heavier caliber—designed to inflict singular mortal blows against ostensibly “more powerful” ironclads. “With all my heart” Ericsson wrote to Fox less than a week after Hampton Roads, “if you can make the guns I [will] most willingly supply the gear for supporting, working and housing the same. Enforce your plan of employing such heavy ordnance and in twelve months we can say to England and France, leave the Gulf! We do not want your Kings and monarchical institutions on this continent.”<sup>[26]</sup>



Nevertheless, the conflicting demands of the Civil War itself soon forced the Navy Department to make hard choices in regards to the new monitors and their armaments. Fox was not altogether satisfied with Ericsson’s improved monitors of the *Passaic* class. “Putting in for only 9 knots is a most serious mistake and one that I blame myself for not insisting upon,” Fox confided to Stimers on April 23<sup>rd</sup>, 1862, “but I found nobody to back me, not even Ericsson who would leave us nothing to hope or wish for, if the speed was put at twelve knots.” Faced with sheer technical limitations in the multitude of often conflicting warship qualities such as speed, range (seakeeping), maneuverability, draft, cost, production time, and offensive and defensive power, Fox noted that Ericsson “gives us powerful ordnance, invulnerability, but not speed.”<sup>[27]</sup> On the other hand, if the Assistant Secretary wanted “four more similar vessels of 12 mile speed,” Ericsson wrote he was “ready to take the matter in hand”—as opposed to continuing with the design of the much larger, faster, ocean-going monitors. Already he suspected that “Captain Dahlgren hesitates about the 20 inch gun.”<sup>[28]</sup>

Ericsson’s suspicions proved well-founded. He was willing to enlarge the 26-foot interior diameter turret designed to house two 15-inch guns just under 13½-feet in length, if the 20-inch designs Dahlgren provided would not fit. Dahlgren later specified the lengths of his 20-inch guns at 17 feet but peevishly declared Ericsson’s turrets were proscribing the limits, not his guns.<sup>[29]</sup> As such, Ericsson and Dahlgren continued to wrangle over the heavy guns for the new proposed monitors in the crucial months following Hampton Roads. Without the heaviest possible ironclad-killing armament the

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ocean-going monitors, at least, would be useless. Ericsson pushed Welles, through Stimers and Fox, in an effort to gain as much as possible before the momentum of his success with the *Monitor* was lost.<sup>[30]</sup> When that occurred, it seemed, so would the last, best chance for any more leaps forward in warship and ordnance design.

Dahlgren, for his part, resisted, preferring to initiate a whole series of American target tests which would free professional and public opinion from the influence of British experiments—as well as potentially demonstrate that his existing 11-inch guns were sufficient for winning the war.<sup>[31]</sup> Simply enlarging smoothbores and the monitor turrets (with their laminated plates) to accommodate them was a hasty expedient. Truly establishing American superiority over British practices would require more time, money, and patient deliberation than circumstances—or Fox and Ericsson—allowed; a pressure Dahlgren resented.<sup>[32]</sup> After all, whose authority was going to influence the major decisions regarding the Navy's ordnance, if not ironclad warships, his or Ericsson's?<sup>[33]</sup>

This issue became manifest with Ericsson's surprising answer to Dahlgren's reservations. "I am glad that the Ordnance Department at last admits that the gun which has required so long a time to plan is a mere experiment", he wrote to Fox:

This candid confession now authorizes me to step forward with an offer to build the guns as well as the vessel. With your permission I will relieve you of all responsibility and make the guns under guaranty [sic]. I will however change the material and give you wrought iron pieces. Sir William Armstrong has just shown what the writer demonstrated twenty years ago, viz: that wrought iron may be so combined as to produce the most reliable material for ordnance.

The subject is a mere engineering question that can be best settled by those who know most about iron.<sup>[34]</sup>

Dahlgren's role could thus be completely eliminated. Ericsson's dexterous maneuver also implied another Navy Bureau would be bypassed in the process of constructing ironclads; the Bureau of Ship Construction & Repair would not design or build them, private contractors would; the Bureau of Yards & Docks would not supervise their construction, their designer would have the final say; nor would the Bureau of Ordnance would not be responsible for designing or building their armaments.<sup>[35]</sup> It was consolidation of power in the hands of private shipbuilding industry, under John Ericsson's direction. But could Fox and Welles maintain their direction of Ericsson? Could they afford not to?

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The following day, May 15, Fox wrote to Harwood assuring him the Department appreciated the “difficulties which the Bureau of Ordnance is called upon to surmount in the fabrication of guns of enormous caliber.” But the duel between the *Monitor* and the *Virginia* demonstrated the inadequacy of the Navy’s existing guns to combat ironclads. Dahlgren’s insistence that his smoothbores could not—or should not—be fired with greater charges only meant “we are called upon to produce larger calibers and a great initial velocity.” The question was then whether or not the cast-iron guns of Rodman or Dahlgren’s design and manufacture could be utilized. Perhaps testing a 20-inch prototype would be in order? At stake was nothing less than the survival of the Union against rival foreign technologies:

The United States Naval Ordnance has to its very great credit, led all nations in the perfection of its smooth bore guns. It devolves upon it to keep pace, and lead, if possible, in the production of smooth bore and rifled guns of such calibers and velocities as shall be irresistible against anything possible to construct which will cross the ocean.<sup>[36]</sup>

“Most everybody doubt the strength of such large masses of cast iron to resist the tremendous discharge which the new condition of things impose”, Fox meanwhile admitted to Ericsson. “I think we shall have to come to hooped guns—not a single shot of the *Monitor* penetrated the *Merrimac*—of this I have the most positive information.”<sup>[37]</sup>

The tide had definitely turned against the 20-inch smoothbore, but the 15-inch was left intact, probably due to the simple fact of existence of at least one working model—as

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with the original *Monitor* herself. Even Ericsson was astonished at Dahlgren's 20-inch specifications, "64 inches in diameter!" He was willing to "demonstrate that such a mass of metal will be so much compressed by the internal force under heavy charges as inevitably to cause fissures in the chamber and hence bursting."<sup>381</sup> Still what truly made the Union's turret-ships ominous, as reported in November 1862 by visiting Royal Navy officer Captain John Bythesea, *was* their armament, which would be either 15-inch Dahlgren-designed smoothbores, or 300-pounder Parrott rifles. Dahlgren himself, Bythesea wrote, "stated to me at Washington in April last that he did not think favourably of rifled guns larger than 40 pdrs. or of the range of any guns beyond 2,000 yards." At the time the Chief of U.S. Navy's Bureau of Ordnance was busily designing a gun "to carry a projectile of 20 inches diameter and spoke of adopting a plan which has been submitted to him of a gun with 36 inch bore." Perhaps Dahlgren was indulging in his own boasts calculated to impress foreign minds. More importantly, "he was of opinion that for the protection of rivers and harbours the gun would soon be the principal part and the vessel only its carriage."<sup>391</sup>



By the summer of 1862, the Union's fortunes had turned for the worse. The ironclad-ram C.S.S. *Arkansas* helped foil the joint Army-Navy campaign against Vicksburg, while Confederate General Robert E. Lee had snatched the strategic initiative from McClellan in the East, eventually driving the Army of the Potomac off the Virginia Peninsula and back to Washington. The pressure was now on the Navy to at least revive Northern morale. Yet Dahlgren was still balking about his own lack of control, and tacitly willing to leave the onus upon the man behind the monitors, who, he wrote in his diary, "is just the man to be very wrong or very right, when one or the other..."<sup>401</sup> But Fox wrote Ericsson "I have so much confidence in your scientific skill that I do not permit myself to hesitate with regard to that or the pilot house about which Dahlgren expresses some

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doubts of its standing a heavy shot.” Clearly, the man behind the ships was more important than the man behind their guns. Therefore Fox “told Dahlgren he must consult with you and if the 15 in. gun cannot be furnished, why then to do the best he can for you.” The situation demanded results above and beyond conflicting personalities:

What we want is an invulnerable vessel with any kind of a gun. We are again in a pinch where another Monitor may strike a blow as important as that of the first creation of your brain. Let every effort be thrown upon *one* boat and call upon the Bureau of Ordnance in time for the guns.<sup>[41]</sup>

In the meantime Ericsson’s work on the new monitors was being “driven all night. Even one inch plates cannot be furnished fast enough.”<sup>[42]</sup> But there was comparatively less zeal for Ericsson to expect in return concerning the new monitors’ armament. There were plenty of reasons to move cautiously than otherwise, Dahlgren argued, even suggesting Ericsson resort to mounting the longer 15-inch Rodman (army) guns in the new turrets to save time. This of course Ericsson found “impracticable” and too late in any case. Dahlgren then noted the “great difficulty however in procuring the fabrication of such guns at all, and whether they shall prove reliable or not when made, remains to be seen.” There was, after all, only one prototype of this caliber in existence. Even his 11-inch gun was in 1854 “considered too heavy to be allowed as a gun of the Navy—and was not admitted until I went to sea in the Plymouth (1857-1858) and proved practically that the gun was manageable.” Could Ericsson ‘practically prove’ a class of ordnance two and half times’ heavier without a trial? Could manufacturers be persuaded “to encounter the risk” of casting them?<sup>[43]</sup> The immediate concerns of the Civil War seemed to weigh against their adoption.

What ultimately tipped the scales in favor of procuring 15-inch smoothbores for the monitors, however—despite the difficulties, despite the risks—was the recurring influence of European concerns. On August 4, Frederick Edge, a journalist proclaiming to be an American “heart and soul...not merely the correspondent of an English (loyal) newspaper”, requested permission to visit the ironclads under construction. Edge told the Assistant Secretary of the Navy exactly what he wanted to hear, exactly when he needed to hear it. “England and France will not interfere, notwithstanding all their talk: their harvests are bad, and, besides, they fear your iron navy. 1863 will see the U.S. the first naval power on the ocean—incontestably.”<sup>[44]</sup> Here was an invaluable opportunity for crucial international publicity, if not propaganda. Perhaps not coincidentally, Ericsson’s early April suggestion of *Dictator* for his large “Ocean Monarch” class of monitors was finally approved; his recommended “Protector” for the sister ship was changed to *Puritan* by Fox on the 8<sup>th</sup>.<sup>[45]</sup> But there was also the danger of revealing technological secrets. Fox deferred the question to Ericsson.<sup>[46]</sup> Four days later, on August 18, Edge wrote from Philadelphia his thanks in touring the *New Ironsides*. “She is a noble looking craft,

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but still I cannot help preferring Ericsson's principle." Having now "found the road" to act "against these infernal rebels and their still worse sympathies and fellow-conspirators in England", he would now do everything in his power to "silence many of the enemies of the government here and put a final stop to all opposition in Europe."<sup>471</sup> It was in this vein, therefore, that Ericsson wrote on August 29, 1862 he would "cheerfully incur the expense" of re-attaching the roof of the turret and the pilot house of his first *Passaic* monitor at his own expense when the first pair of 15-inch guns arrived. "The Nation cannot afford to sacrifice the prestige which will attend a perfectly successful first trial of our system", he explained to Dahlgren. If the guns for the second monitor were delayed, Ericsson felt it better to "put only one XV inch gun into each", rather than none at all, "well convinced that with only one of the large guns in each vessel we shall be able to destroy all rebel craft[,] inspire a wholesome dread in Rebeldom[,] and prove to foreign powers that we can punish intermeddling."<sup>481</sup>



Ericsson had made it plain that without 15-inch caliber guns his monitor system would be powerless. Until their armaments were supplied, the ironclads could never be completed. Captain Dahlgren, as Chief of the Bureau of Ordnance, was expressly informed that the guns would be needed at least 14 days before the ships could be delivered to the Navy for immediate operations against the South—and for these Welles and Fox by October were counting the weeks, no longer the months. But on October 1, Dahlgren, acutely feeling the war passing him by in the Washington Navy Yard (while colleagues gained rapid promotions due to combat service), requested to be put in command of any naval attack on Charleston, instead of actively—and vitally—assisting

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in its preparation. Even in this regard the ironclad program was undeniably more under John Ericsson's influence than his. Though Welles was suspicious of Dahlgren's personal ambition, combined with the scholar-inventor's personal relationship with the President, his rejection was sensitive and reasonable. Rear-Admiral Du Pont was already given command of the expedition. "Your natural desire however to be present is appreciated and if you desire it," Welles wrote, "you can have orders to an iron-clad that will take part in the attack, or as Ordnance officer to this special force, retaining at the same time your position as Chief of the Bureau of Ordnance." As for considerations of rank and promotion, Welles reminded Dahlgren that Commander David Porter's theatre of service "has not been considered desirable." "One Captain in the Navy preferred the command of a Sloop of War instead of the chief command of the Western flotilla."<sup>[49]</sup> The Secretary might have added that Dahlgren was perfectly useful where he was, and much more vital for the Union precisely because of Ericsson's demands than otherwise.

Dahlgren refused the counter-offer. "He thinks the tender of a single ship to an officer who has had a navy yard and is now in the Bureau, derogatory," Welles wrote in his diary.<sup>[50]</sup> On the 10<sup>th</sup> of October he also informed Welles that of the fourteen 15-inch guns needed by the 1<sup>st</sup> of November, for the seven monitors expected to be ready by the 15<sup>th</sup> of that month, only eight were cast and four possibly completed by the 1<sup>st</sup>. This excluded a fifth gun, Dahlgren's own prototype, which "by a singular coincidence" he noted in his diary, was "lying at the wharf near the *Monitor*, being prepared for firing..." This he intended to test-fire or "prove" until it was destroyed.<sup>[51]</sup> Ericsson and Stimers objected, however, asking for all *five* guns to be delivered to the *Passaic* (New York), *Nahant* (Boston), *Montauk* (New York), *Patapsco* (Wilmington, Del.), and *Sangamon* (Chester, PA).<sup>[52]</sup> It was the old dispute: Dahlgren's propensity for cautious testing was unrealistic in relation to the overriding demands of the war itself, if not Ericsson's confidence that the guns would work. Nevertheless, by the 12<sup>th</sup> the prototype was fired with 30lbs. of powder to Dahlgren's satisfaction, and by the 26<sup>th</sup> it had been fired 250 times with no signs of wear or fracture; "so the class will work" he noted in his diary. This was a rather immaterial, if not personal, point since the same entry also noted that the *Passaic's* 15-inch gun was mounted in New York. The difference to Dahlgren, however, was that in the meantime he applied for command of one of the monitors—only at that point to be rejected.<sup>[53]</sup>



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Towards the end of 1862, Dahlgren's views, like many other authorities in the U.S. Navy, had changed. In his masterful annual report as Chief of the Bureau of Ordnance—which Welles drew heavily upon for his own—Dahlgren summarized that both “the construction and armament of ships-of-war” were “so unavoidably interwoven that it is impossible to treat or consider either independently of the other, or to form any reliable opinion as to their future course or final shape.” Indeed, the age-old competition between offence and defense was “impelled now...by existing circumstances with a rapidity beyond all precedent in naval affairs.” As Dahlgren recounted for the Secretary, up until the development of shell-fire in naval warfare, “the defense had the advantage of the attack, for the broadsides of these vessels, when continued for hours, were seldom able to do more than destroy masts, men, and guns. The instances are very rare of a line-of-battle ship being sunk, or fatally injured in battle by the sole action of shot.” His own scholarly exploration had revealed that, aside from the devastation of the Turkish fleet at Sinope by a Russian squadron armed with Paixhans shell-firing guns, “there was no illustration of the full effect of shells in any of the operations during the Crimean War...” Nevertheless, the French were quick to utilize iron-armoured batteries with success against the Russian forts at Kinburn in 1855, and then followed this up shortly afterwards with the first ironclad frigate, the wooden-hulled *Gloire*. This had set the British Admiralty off in a race, “with a remarkable celerity, quite regardless of expenditure”, starting with the iron-hulled H.M.S. *Warrior*. Yet the urgent nature of the European Powers' rearmaments against one another still made these “gigantic” and “costly” efforts, at best, experiments. Furthermore, “their shores being washed by the deep waters of the ocean”, Dahlgren elaborated, their ironclads “must be more than mere floating batteries, and be possessed of the best nautical qualities”:

With the United States the case is, happily, different—the depth of water on the coast being generally adapted to vessels of light or moderate draught, and only a few of our ports are at all accessible to heavy iron-clads like those of France or England.

Vessels of the *Monitor* and [New] *Ironsides* class are likely to serve present purposes sufficiently well, and to give time to obtain from our own and the experience of others better data than can now be had for advancing to a more perfect order of vessels.

This was his first point in acceptance of the Union's ironclad program, as it already stood: geographical reality. Though the defense in naval warfare seemed to regain the edge with armor-plating, few of the leading experts (including himself) were in agreement as to either the best form of armor, or “upon the cannon that shall be employed to overcome that resistance.” Warship designers meanwhile had to accommodate the weights of each to the point “that a vessel with one-half greater capacity than a two or three-decker is so far shorn in height as to leave but one gun-deck, thus becoming a

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frigate by the general definition. Of course the ordnance is reduced proportionately in number and weight.” Offensive and defensive qualities were *concentrating* themselves as armor needed to be thicker, and guns larger. Nor was there any clear advantage to solid slabs of iron for plating when fastening them strongly was just as important, the veritable chinks between the armor, while the “ordnance expert can by no means rejoice in being free of difficulties that puzzle his ingenuity”:

If he acquires power by greater weight, he loses by loss of time in manipulation of the gun and projectile, hence some reduction by slowness of repetition. Then, again, shall he use rifled or smoothbore, breech or muzzle loaders? Shall he pierce or crush and break bolts and strip off the armor, or shall he even attempt to enter the interior with shells?

At any rate, Dahlgren’s own conclusion was that despite the advent of iron armor plating, no “sea-going ship is considered to be so armored as to be impregnable to artillery.” Though Armstrong’s vaunted 150-pounder with 50-pound charges had burst after only a fourth round in April, trying to fully pierce the *Warrior* Target, both the 13-inch Horsfall smoothbore and a Whitworth rifled gun had unquestionably accomplished the object. But armor-plating also bought time during an engagement for one’s own guns to take effect. The duel between the *Monitor* and the *Virginia* was a case in point, subsequently misinterpreted by British authorities, namely the Duke of Somerset, the 1<sup>st</sup> Lord of the Admiralty, who had “imputed the default of injury to life or limb in this combat to a lack of power in the artillery which the two vessels carried; which is no doubt true; but it is equally true that no guns of like weight and kind now used in the British Navy would have effected as much under like circumstances.” According to Dahlgren, Somerset “more nearly approached the present state of the question when he doubted the capacity of plates finally to resist the action of Ordnance; but was in fact overestimating the service to be expected of the Armstrong gun.”

In the meantime, Dahlgren’s own target tests had actually confirmed Ericsson’s belief that laminated armor was a viable, though temporary, substitute for solid plating, and was even “preferable on many accounts...and would be altogether if it were not for the increased number of bolts that become requisite, and are the weakness of all such plating.” Likewise, iron metallurgy had yet to produce slabs of iron at greater thicknesses with welds as strong as thinner plates. Dahlgren’s greatest tribute to Ericsson, however, was in stating that “the turret class” was free of many of the inherent weaknesses of heavy iron-armored seagoing vessels, and were “probably of greater and more certain endurance under severe fire than the ordinary plated vessel”: “So far they are likely to find the most fitting sphere for their peculiar powers in the less troubled waters of harbors and rivers; though the ability that has devised them may also be able to give a wider scope to their usefulness.”

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If Dahlgren had finally come round to Ericsson's choice of ironclad design, he also seemed to acknowledge the practical utility of the 15-inch gun. At longer ranges rifled fire became ineffective, and elongated shells frequently toppled in flight while round shot could at least be ricocheted off the water. Against an ironclad, Dahlgren was also convinced from his own testing—and the graphic experience of the *Galena* in action against Fort Darling (May 15, 1862)—that smashing was better than penetrating.<sup>[54]</sup> “So long as the present mode of plating continues, there can be little doubt that it will be most effectively attacked by cracking and bending the iron, starting the bolts, stripping off the armor, and breaking away large portions of the wooden structure within.” Though rate of fire was jeopardized by a smoothbore heavier than his own 11-inch gun, Dahlgren had to admit that “it may be conceived that the effects of shells of 330 pounds, and shot of 450 pounds, will be damaging beyond any experience in former battles.”<sup>[55]</sup> Like the monitors themselves, the gun was at worst an experiment and at best the supreme naval weapon afloat. This was a conclusion Alexander Holley had more or less reached in his monumental contemporary *Treatise on Ordnance and Armor* (1865):

As far as results can be compared, the simple 15 in. cast-iron ball at a moderate velocity appears to be capable, with much less strain upon the gun, of inflicting much more of the kind of damage under consideration, than the more powerful and costly rifle-bolts, because it wastes less power in local effect...  
...the destructive effect of heavy projectiles at low velocities, particularly upon the *Warrior* class of armor, has been seriously underrated, especially in Europe.<sup>[56]</sup>

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Finally, a major Congressional inquiry at the close of the Civil War found that “officers of the navy generally prefer the Dahlgren gun for naval service, while the officers of the army express a preference for the Rodman gun. Both of these guns would appear, from the testimony, to be the best cast-iron now known to any service.” Though it would be better for the nation to invest in wrought-iron guns, such as that of Horatio Ames, the costs were practically prohibitive—at least during the immediate crisis of the war.<sup>[57]</sup> Commodore John Rodgers was adamant with the Committee on the sheer power of the 15-inch Dahlgren gun, and for good reason: it was his under his command of the *Passaic*-class U.S.S. *Weehawken* that the Confederate States Navy’s improved Virginia, the *Atlanta* was compelled to surrender at Wassaw Sound on June 17, 1863. “The first shot that was fired by the *Weehawken* at the *Atlanta* was at a distance of between three and four hundred yards,” Rodgers recounted, “and...with thirty-five pounds of powder”:

It broke a hole through the side of the *Atlanta* some four or five feet long, knocked in about a couple of barrels of splinters of wood and iron, wounded a whole gun’s crew, and prostrated between forty and fifty men, including those that were wounded. Those who were stunned by the mere concussion remained insensible for some ten minutes. It completely demoralized the crew. They had fancied they were in a secure castle—they found they were in a paper house; and their running below I attribute, in a great degree, to their surprise.<sup>[58]</sup>

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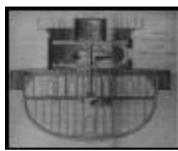
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At the time of his testimony, Rodgers was in command of the seagoing monitor U.S.S. *Dictator*, Ericsson's warship ideal; and this is an appropriate place in this paper to get back to Sweden, and the various questions this paper has briefly addressed. On the 1<sup>st</sup> of December, 1864, Rodgers wrote to his wife Anne of a visit earlier that day of Swedish and Norwegian naval officers to his ship. "I think they were well pleased," he observed, and though they were "polished gentlemen" they were mostly "plain sailors" in a sense that few in any navy in the mid-1860s understood (though Ericsson the engineer had come to understand it very well indeed.) In Rodgers' words, "they had not especially gone into high science nor the mysteries of steam engineering." Thus he noticed an acute parallel with "Porter in his journal of the cruise of the *Essex*", which described native islanders more amazed with the working of a grindstone than "any of the [other] unknown civilized appliances" displayed to them. "We had been showing those officers the wonders of the Machinery," Rodgers continued, "and they said 'how wonderful', &c. without any hearty admiration, for they did not fully comprehend the problems":

At last seeing the shot hoisting gear I told some men to hoist a shot. Interest and comprehension at once sparkled in their eyes, and one of them with some half dozen orders on his heart more or less said "this is Mr. Ericsson's?" I could not help laughing as I thought of the grindstone and said "No, I believe not."

When invited by the Swedish captain to join him as a guest on his own vessel, Rodgers also "had to go into high diplomacy":

I said that I had not done myself the honor of calling upon the English and French vessels in the harbor, because the threats of foreign intervention in our domestic troubles had made me unwilling to invite their civilities—that in their temper to the Americans, they would come on board and afterwards Pooh Pooh every thing they saw—that if I called on him I should be obliged to visit the other foreign vessel and that I begged therefore he would take my kindest wishes and thanks for his visit, instead of a call.<sup>[59]</sup>



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I think part of the reason why America seems to revere John Ericsson even more than his native Sweden—erects a statue and monument in its national capitol literally at the right hand of Abraham Lincoln's<sup>[60]</sup>—has something to do with America's enduring obsession with the Civil War, and the almost legend-like quality of the Battle of Hampton Roads (not so much the destruction of the wooden Union warships *Cumberland* and *Congress* on the first day by the C.S.S. *Virginia*, but the epic duel the next morning between the "*Monitor* and the *Merrimac*".) Likewise, Ericsson himself cut a striking heroic image; the cranky but brilliant scientist, scoffed by experts, who nonetheless perseveres to create a technological wonder of the modern (Victorian) world which goes on to "save the day". As President Calvin Coolidge stated in his opening dedication speech to the John Ericsson Memorial in Washington, D.C., "The life of this great man is the classic story of the immigrant, the early struggle with adversity, the home in a new country, the final success."<sup>[61]</sup>

But again, Ericsson's image by the end of the Civil War in America was rather less than great, and his "success" (presumably that of the monitors) was anything but "final". When Fox in 1866 asked for his advice on the plans for an ironclad-navy base at League Island, Philadelphia, Ericsson forlornly replied that "the opinion of a person who stands before the Country simply as an inventor and a mere mechanician could not possibly assist you":

The civil and mechanical engineers of America nearly to a man, are my opponents at heart, and they give tone in such matters, and consequently you could not now find an orator or an editor of any leading paper who would mention my name in connection with the late struggle or in connection even with the Iron Clad Navy. A friendly hand may in a dexterous manner slip in a line, but nothing more.<sup>[62]</sup>

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What Ericsson was implying here was that he had become a *victim* of his own success. An inventor and “mere mechanic” could not have excited so much controversy, made so many enemies, had he not also been nationally famous, like Grant or Farragut. Grant’s star fell with his presidency, while the close of the Civil War virtually deprived Ericsson (and Fox) of their singular usefulness in preserving the Union. The crisis passed, the nation saved, “mediocrity” returned with a vengeance to overwhelm the likes of Ericsson. Time itself gradually eroded away the previously deep-cut, hard-won significance of the monitors, and their dread weapons of mass destruction. Two lonely guns in rural Sweden are all that remain of these.

Their presence there, however, *is* significant. There is no mystery. “I cannot omit to say that ever since I brought out the screw propeller and directed my attention to naval warfare, the construction of a permanent iron navy, its preservation and readiness to brought into active service at a few days notice, has engaged my attention,” Ericsson wrote Fox. “Indeed this great problem has been with me a profound study the successful solution of which I have ever connected with the safety of my native Sweden.”<sup>[63]</sup> The “mere mechanic” had already by then taken matters into his own hands, while Fox shortly afterwards prepared to take the *Miantonomoh* to Russia, dazzling all the crowned heads of Europe along the way. Among these was the King of Sweden, who boarded the monitor while in Stockholm on September 22, 1866. Later that evening, Fox took occasion to propose a flattering toast to his special friend and colleague, in war and peace, John Ericsson.<sup>[64]</sup> This I think pleased the Swedes vastly more than the technical sophistication of the *Miantonomoh* herself; that a great and powerful nation such as the United States felt such obvious and sincere gratitude to one of their own. Ericsson too could not help but be charmed with the customary flattery of Fox, who had clearly

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outdone himself this time. “Accept my candid thanks for the many kind things which you were pleased to say of the humble scribe”, he wrote, adding “Your generosity in this respect pleased my countrymen very much.”<sup>[65]</sup>

This year marks the bicentennial of John Ericsson’s birth, and it has been my own privilege to share in some of the celebrations which have been made in his honor. Nor do I have any doubt that my “stories” on Ericsson, the monitors of the American Civil War, and the guns at Filipstad—our common naval history—made my rural Swedish hosts quietly reflect, almost disbelieving, then smile in a deeply satisfied way. The local monsters, the pair of slowly rusting 15-inch Dahlgren guns around which children now play—like the 15-inch shot now sitting in a warehouse of the Museum of Science & Technology in Stockholm—are in fact international, if somewhat hidden, treasures.

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<sup>[1]</sup> Eugene B. Canfield, *Civil War Naval Ordnance* (Washington: Navy Department, Naval History Division, 1969), 22. Assistant Secretary of the Navy Gustavus Vasa Fox testified to Congress by the close of the Civil War that the 15-inch gun cost approximately \$7,500; see the *Report to the Joint Committee on the Conduct of the War: Heavy Ordnance*, No. 121, 38<sup>th</sup> Congress, 2<sup>nd</sup> Session, 1865, 5.

<sup>[2]</sup> See 19-5-1862, Ericsson to Gideon Welles, Ericsson Papers, American Swedish Society, Philadelphia, PA. Ericsson explained his thoughts to Fox the same day in more detail: “a 16 inch ball (weight 550 lbs.) will produce the greatest effect possible . . . As a small ball can be propelled at a greater speed than a large one, the practical question is simply: what size ball will produce a hole or rent so large that it cannot be stopped during action? Whatever that size be, there let us stop, and then go for the greatest possible initial velocity,” 19-5-1862, Ericsson to Fox, Fox Papers, New York Historical Society, New York; also 6-6-1862, Ericsson to Fox, Fox Papers.

<sup>[3]</sup> 16-10-1862, Ericsson to Fox, Ericsson Papers, Library of Congress, Manuscript Division, Washington, D.C. (hereafter “L.O.C.”); 30-10-1862, Ericsson to Fox, Fox Papers.

<sup>[4]</sup> See for example, 23-11-1862, Drayton to Dahlgren, Dahlgren Papers, L.O.C. “But still considering the various inconveniences in loading and risk of accidents which may disable the gun,” Drayton wrote, “I am fast coming to believe that in the end we will have to bore out the port, and I for one would much rather take the extra risk from [an] enemy’s shot than suffer all the annoyances of the present system taking in view the ultimate uncertainty attending it.”

<sup>[5]</sup> See Alexander Holley, *A Treatise on Ordnance and Armor* (New York: D. Van Nostrand, 1865), 116.

<sup>[6]</sup> 28-7-1865, Captain Percival Drayton to Gregory, U.S. National Archives, Record Group (hereafter “R.G.”) 19, Entry 1240, Box 2. Referring to the *Dunderberg* in a letter to John Bourne, he wrote “As the

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side armor of the hull of this shapeless mass of timber averages only 3½ inches in thickness any of our small monitors could send this extraordinary specimen of human genius to the bottom in a few rounds,” 27-4-1866, Ericsson to Bourne, Ericsson Papers, L.O.C.

<sup>[7]</sup> 17-4-1862, Commodore Joseph Smith to Ericsson, Ericsson Papers, PA.

<sup>[8]</sup> See *Congressional Globe*, 37<sup>th</sup> Congress, 2<sup>nd</sup> Session, No. 44, 08-2-1862, 697.

<sup>[9]</sup> See for example, 20-3-1862 and 14-8-1862, Fox to Ericsson, Fox Papers.

<sup>[10]</sup> See Daniel G. Harris, “The Swedish Monitors”, *Warship* (1994), 22-34. Harris notes that Denmark’s request for plans of the monitors was turned down. Denmark accordingly turned to turret-ship designs based on Captain Cowper Coles, R.N., resulting in the successful *Rolf Krake*, built by Napier’s in Britain. It may be that Denmark’s close ties with Britain, particularly the Crown, led to Washington’s refusal to supply specifications of its most potent weapons-system. By October 1862, Ericsson noted “it would be highly objectionable at present to make any explanations in public exposing the peculiar construction of our Iron Clads. We imagine that we have got hold of ideas far in advance of England and France and we mean to keep them to ourselves; at any rate until we have crushed out the rebellion,” 10-10-1862, Ericsson to A. C. Banstan, Ericsson Papers, L.O.C.

<sup>[11]</sup> 20-5-1862, Ericsson Papers, L.O.C.

<sup>[12]</sup> 12-5-1865, Ericsson to Woodcroft, Ericsson Papers, L.O.C.

<sup>[13]</sup> Published in their December 5, 2003 issue. Many thanks again to Catharina Jönsson of the Swedish National Defence College for an English translation. Mr. Dahlberg also very generously took me to see nearby Långban, Ericsson’s birthplace.

<sup>[14]</sup> See 31-7-1866, Reed to Admiral Robert Spencer Robinson (Controller), found in the British Public Record Office, Kew (hereafter “P.R.O.”), ADM 1/5981 (From Surveyor, July – September, 1866); also E. J. Reed, *Our Ironclad Ships* (London: John Murray, 1869), 50-5, 241-2; (Oscar Parkes, *British Battleships: ‘Warrior’ 1860 to ‘Vanguard’ 1950: A History of Design, Construction and Armament* (London: Seeley Service & Co., Ltd., 1970), 166; D. K. Brown, *Warrior to Dreadnought: Warship Development 1860-1905* (London: Chatham Publishing, 1997), 56-7; and Stanley Sandler’s pivotal work, *The Emergence of the Modern Capital Ship* (Newark: University of Delaware Press, 1979). Reed remained skeptical of Ericsson’s ideas compared with his own preference for high freeboard, central battery ironclads; “if we have made a mistake with reference to the introduction into the British Navy of turret-ships, and especially of monitors, that mistake has consisted in adopting them too rapidly, rather than too slowly.” The experience of the American Civil War had, in his assessment, given “ample cause for the exercise of prudence and caution in introducing them,” *Our Ironclad Ships*, 254.

<sup>[15]</sup> Though “the entire vessel is but a piece of mechanism, built for specific objects,” Stimers enthusiastically wrote to Dahlgren, the armament would in some degree still have to be modified for the weapons platform, rather than vice-versa. Ericsson and Chief Engineer Stimers preferred the barrels of the 11-inch Dahlgrens eventually assigned to the *Monitor* to be shortened by 18 inches. Since the ironclad was intended for short-range actions added range would be a secondary concern to easier loading and greater rate of fire. 16-11-1861, Stimers to Dahlgren, Dahlgren Papers, L.O.C.

<sup>[16]</sup> 8-10-1861, Ericsson to Smith, R.G. 45, Entry 464, AD, Box 49; 11-10-1861, Smith to Harwood, R.G. 74 (“Records of the Bureau of Ordnance”), Entry 16 (“Letters Received From the Secretary of the Navy

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and Navy Department Bureaus”), Box 4 (September 1861 to December 1866), Letterbook, 10; 13-10-1861, Ericsson to Smith, 12-10-1861; Smith to Ericsson, R.G. 45, Entry 464, AD, Box 49; 19-10-1861, Smith to Welles, R.G. 71, Entry 1, Vol. 74, (Letterbook, 126-7.)

<sup>[17]</sup> 9-3-1862, telegram, McClellan to Wool; 10-3-1862, telegram, Wool to McClellan, *Official Records of the Union and Confederate Navies in the War of the Rebellion*, 30 vols., (hereafter “*O.R.N.*”), ser. 1, vol. 7, 75-6, 84.

<sup>[18]</sup> 11-3-1862, telegram, Fox to Welles, *O.R.N.*, ser.1., vol. 7, 91-2.

<sup>[19]</sup> 11-3-1862, telegram, Fox to Wise, *O.R.N.*, ser. 1, vol. 7, 92.

<sup>[20]</sup> See the original 11-3-1862 telegram, from Fox to Dahlgren, found in the Dahlgren Papers, L.O.C.

<sup>[21]</sup> 11-3-1862, Dahlgren to Fox, *O.R.N.*, ser. 1, vol. 7, 92-3. Both the 15-inch gun and a rifled 12-inch were being tested at Fortress Monroe. “Since the recent naval engagement, it is thought that nothing can stop the *Merrimack* here except the *Monitor* and the big guns (the 15-inch and 12-inch). General Wool is desirous of having both of these guns mounted on the beach and plenty of ammunition for them as soon as possible,” 11-3-1862, T. G. Baylor (First Lieutenant of Ordnance), to Ripley, *O.R.N.*, ser. 1., vol. 7, 93-4. Nicknamed “Floyd” the 15-inch prototype was ordered by Stanton to be renamed the “Lincoln Gun” in March 1862; 11-3-1862, telegram, Stanton to Wool, *O.R.N.*, ser. 1., vol. 7, 94.

<sup>[22]</sup> 7-3-1862, Dahlgren to Fox, Dahlgren Papers, L.O.C.

<sup>[23]</sup> 17-3-1862, Dahlgren to Harwood, R.G. 74, Entry 201, Item 5, Box 2. Dahlgren quickly added that “Of course I would not be understood as wishing to depreciate the high merit of the projector and builder of the *Monitor* which so astonishingly endured the brunt of the *Merrimack*’s fire.” 12-3-1862, telegram, Ericsson to Fox, *O.R.N.*, ser. 1, vol. 7, on aiming at the *Virginia*’s waterline.

<sup>[24]</sup> “Now comes the reign of iron—and cased ships are to take the place of wooden ships and Stone Forts—Battering Rams to stand in lieu of Ordnance,” from Dahlgren’s curious history-essay, dated “March 8, 1862” but nevertheless finished afterwards. Dahlgren somewhat unfairly comments “Upon the untried endurance of the *Monitor*, and her timely arrival did depend the tide of events—Two circumstances which in the particular case amounted to Accidents,” Dahlgren Papers, L.O.C. In another sense, both the *Monitor*’s defensive capabilities and her immediate deployment to Hampton Roads were by design.

<sup>[25]</sup> See 7-10-1861, Dahlgren to Welles, R.G. 74, Entry 201, Item 5, Box 2, for Dahlgren’s proposal to convert the screw-gunboat U.S.S. *Pawnee* with iron plating “not less than 2 inches thick, nor more than 3 inches.” This would “extend along the sides of the section where the body of the vessel begins to fall off into the fine lines of the ends, the extremes of the side plating to be connected across the interior by a transverse partition of plating.” See Donald L. Canney, *Lincoln’s Navy: The Ships, Men and Organization, 1861-65* (Annapolis, Maryland: Naval Institute Press, 1998), 66-7, for a description of the *Pawnee*, originally armed with four 11-inch pivots but eventually changed to twelve 9-inch broadside guns. See 16-10-1861, Dahlgren to Harwood, R.G. 74, Entry 201, Item 5, Box 2, for his suggestion to partially armor double-ender gunboats.

<sup>[26]</sup> 13-3-1862, Ericsson to Fox, Fox Papers, Box 3.

<sup>[27]</sup> 23-4-1862, Fox to Stimers, Fox Papers, Box 4.

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<sup>[28]</sup> 28-4-1862, Ericsson to Fox, Fox Papers.

<sup>[29]</sup> 6-5-1862, telegram, Wise to Dahlgren, R.G. 45, Entry 464, AD, Box 49. 7-5-1862, telegram, Fox to Dahlgren, R.G. 45, Entry 464, AD, Box 49; and 8-5-1862, Dahlgren to Fox, R.G. 74, Entry 201, Item 5, Box 2. On May 7, 1862, Stimers informed Fox that "Captain E. is...discouraged about getting guns of sufficient magnitude and I believe is about to propose to build them himself," 7-5-1862, Stimers to Fox, Fox Papers, Box 4.

<sup>[30]</sup> See for example 10-5-1862, Welles to Harwood, R.G. 74, Entry 16, Box 4. Fox likewise wrote to Ericsson he was "all ready to receive the plans of the big ship, and trust you will hurry it forward before the people change their minds about iron vessels," 13-5-1862, Fox to Ericsson, Fox Papers.

<sup>[31]</sup> See 28-6-1862, *Scientific American* (vol. 6, no. 26), "What We Ought to Do in Relation to Iron-Plated Ships", 407.

<sup>[32]</sup> "I have been using every effort to complete the draft of the 20 in. but have been entirely over run", Dahlgren wrote to Fox on May 13. "It is my desire to carry out the views of the Department to the best of my ability. But there is no Royal Road in science, nor should we Republicans desire it to be so." The English now admitted to being rash, and were 'deservedly', 'predictably' condemning similar U.S. practices; 13-5-1862, Dahlgren to Fox, Fox Papers, Box 3; see also his attached letter to Harwood, dated 13-5-1862, warning of production of larger caliber smoothbores without further testing, etc.; also found in R.G. 74, Entry 201, Item 5, Box 2. Ericsson received Fox's telegraphic news of Dahlgren's 20-inch guns "with delight". He could now inform Fox of his plans to construct a 30-foot outside-diameter turret to house them. But Fox cautioned "Our advance people think it is an entire risk and experiment and so do I, but the times demand it, and I will take the responsibility"; 13-5-1862, Ericsson to Fox, Fox Papers, Box 3; 13-5-1862, Fox to Ericsson, Fox Papers.

<sup>[33]</sup> As Robert Schneller noted, Dahlgren "did not want his reputation damaged by a gun he was forced to develop against his better judgement," "The Contentious Innovator: A Biography of Rear Admiral John A. Dahlgren U.S.N. (1809-1870): Generational Conflict, Ordnance Technology", Ph.D. thesis, Duke University, 1991, 318.

<sup>[34]</sup> 14-5-1862, Ericsson to Fox, Fox Papers, Box 3.

<sup>[35]</sup> The Bureau of Ordnance, for example, could not guarantee the success of all the new ordnance, "in consequence of the deficiency of Officers skilled in the inspection of guns..." It would therefore have to "employ expert civilians for the purpose until skilled assistants can be spared from the service afloat," 12-6-1862, Harwood to Welles, R.G. 45, Letters Rec'd.

<sup>[36]</sup> 15-5-1862, Fox to Harwood, R.G. 74, Entry 16, Box 4.

<sup>[37]</sup> 15-5-1862, Fox to Ericsson, Fox Papers.

<sup>[38]</sup> 16-5-1862, Ericsson to Fox, Fox Papers. Ripley (*Artillery and Ammunition*, 100) quotes Alexander Holley's measurements for the 20-inch Dahlgren (*A Treatise on Ordnance and Armor*, 120-1).

<sup>[39]</sup> 8-11-1862, Bythesea to Lord Clarence Paget, P.R.O., ADM 1/5791.

<sup>[40]</sup> Entry dated 30-7-1862, Madeleine Vinton Dahlgren, *Memoir of John A. Dahlgren* (Boston: James R. Osgood and Company, 1882), 377. Dahlgren was also increasingly frustrated with his responsibilities at

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the Bureau of Ordnance, preferring the glory of a flag-command, which Welles and Fox both opposed despite Dahlgren's close ties with Lincoln; *Memoir*, 374.

[\[41\]](#) 4-8-1862, Fox to Ericsson, Fox Papers.

[\[42\]](#) 16-8-1862, Fox to Welles, also 20-8-1862, Welles Papers, L.O.C.

[\[43\]](#) 23-8-1862, Dahlgren to Ericsson, Ericsson Papers, L.O.C.

[\[44\]](#) 4-8-1862, Edge to Fox, Fox Papers, Box 3.

[\[45\]](#) 1-4-1862, Ericsson to Fox, draft, Ericsson Papers, PA; 6-8-1862, Ericsson to Fox, Ericsson Papers, L.O.C.; 8-8-1862, telegram, Ericsson to Fox, Fox Papers, Box 3.

[\[46\]](#) 14-8-1862, Fox to Ericsson, Fox Papers.

[\[47\]](#) 18-8-1862, Edge to Fox, Fox Papers, Box 3. See also 26-12-1862, Edge to Fox, Fox Papers.

[\[48\]](#) 29-8-1862, Ericsson to Dahlgren, Ericsson Papers, L.O.C.

[\[49\]](#) 8-10-1862, Welles to Dahlgren, Dahlgren Papers, L.O.C. Welles had relieved Charles Davis, whom he regarded as "more of a scholar than sailor", and giving his command of the Mississippi flotilla to 'reckless' David D. Porter; "a young and active officer is required for the duty...it will be an incentive to junior officers." In his diary Welles also revealed that "Dahlgren, whose ambition is great, will I suppose be hurt that Porter, who is his junior, should be designated for the Mississippi command, and the President will sympathize with D., who he regards with favor, while he has no great admiration or respect for Porter," Howard K. Beale (ed.), *Diary of Gideon Welles: Secretary of the Navy under Lincoln and Johnson*, 3 vols. (New York: W. W. Norton & Company, Inc., 1960, 1: 157-8; also 163-5.

[\[50\]](#) Entry dated 9-10-1862, Beale, *Diary*, 1: 163-4.

[\[51\]](#) 10-10-1862, Dahlgren to Welles, R.G. 45, Letters Rec'd. Entry dated 3-10-1862, Dahlgren, *Memoirs*, 381

[\[52\]](#) 11-10-1862, Ericsson and Stimers to Dahlgren, R.G. 74, Entry 22; also Ericsson Papers, L.O.C.

[\[53\]](#) Dahlgren, *Memoirs*, 381. In all fairness, John Rodgers' own request for a monitor command was also denied; 27-10-1862, Welles to Rodgers, Rodgers Family Papers, L.O.C. Welles wrote "[Dahlgren's] speciality is in that branch [ordnance] of the service; he knows his own value there at this time, and for him to leave it now would be detrimental to the object he desires to attain. He is not conscious of it, but he has Dahlgren more than the service in view"; entry dated October 9, Beale, *Diary*, 1: 164.

[\[54\]](#) See Captain John Rodgers' official report, dated 16-5-1862, to Rear-Admiral Louis Goldsborough, *O.R.N.*, Series 1, Vol. 7, 357-8. See also Executive Officer L. H. Newman's 16-5-1862 report of damages and Corporal of Marines John Mackie's account, 16-5-1862, Rodgers Papers, L.O.C. Rodgers himself later observed the iron fragments from the *Galena's* shattered armor plating "became very formidable grape shot; our principal loss I am convinced was from them," 19-5-1862, John to Anne Rodgers, Rodgers Papers, L.O.C.

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<sup>[55]</sup> 22-11-1862, *Congressional Globe* Appendix, Report of the Secretary of the Navy, Enclosure No. 5, Report of the Bureau of Ordnance, 709-22.

<sup>[56]</sup> Holley, *A Treatise on Ordnance and Armor*, 178-9; also 152-3, 171. Holley stressed, however, that the 15- or 20-inch shot had to strike at relatively high velocities upon impact—at close range—to achieve this sort of maximum power. One assumes, as did Ericsson, that a low-freeboard, monitor-type ironclad was best suited for this.

<sup>[57]</sup> *Report to the Joint Committee on the Conduct of the War: Heavy Ordnance*, 2-5.

<sup>[58]</sup> *Ibid.*, 71. Rodgers continued: “I will give you a little anecdote related by one of the *Atlanta*’s officers in regard to that first shot. He was a lieutenant who had been in our service. He said that he saw the *Weehawken* coming up, and the captain of the gun said to him, ‘that round thing is turning, sir.’ He looked and saw the ‘round thing’ turning; he then saw the ports trained on him, saw the flash, saw the ball coming, heard the report, and almost simultaneously had an intense sensation at the pit of his stomach. The next thing, he found himself lying on the deck; he presumed he had been there about ten minutes; he said to himself, ‘am I hurt?’ he ran his hands over his legs, his body, and his arms, and said, ‘no, I am not hurt;’ he jumped up and looked around for his gun’s crew, and he found them all lying at his feet. With a few applications of his toe he would wake a man up, saying, ‘get up, get up,’ and the man would start to his feet. At first the man would stare about him wildly, not knowing what was the matter, but as soon as he got a little speculation in his eye he would dive below,” 72. See also Alvah F. Hunter (Craig L. Symonds, ed.), *A Year on a Monitor and the Destruction of Fort Sumter* (Columbia, South Carolina: University of South Carolina Press, 1987) 77-8, 93.

<sup>[59]</sup> 1-12-1864, John to Anne Rodgers, Rodgers Papers, L.O.C.

<sup>[60]</sup> John Ericsson’s Memorial is at Independence Avenue and Ohio Drive.

<sup>[61]</sup> Delivered on 29-5-1926; *Prosperity and Thrift: The Coolidge Era and the Consumer Economy, 1921-1929*, Coolidge Speech: Address...at the Dedication of the Statue of John Ericsson, Washington, D.C., May 29, 1926, from hand copies of the speeches of President Calvin Coolidge, preserved by Everett Sanders.

<sup>[62]</sup> 22-3-1866, Ericsson to Fox, Ericsson Papers, PA.

<sup>[63]</sup> *Ibid.*

<sup>[64]</sup> 1-10-1866, James H. Campbell (of the U.S. Legation in Stockholm) to William H. Seward, No. 48, *Papers Relating to Foreign Affairs, 39<sup>th</sup> Congress, 2<sup>nd</sup> Session, Part II, Diplomatic Correspondence* (Washington: G.P.O., 1867), 179-81. For the transatlantic voyage of the U.S.S. *Miantonomoh* see John D. Champlin, Jr. (ed.), *Narrative of the Mission of Russia... From the Journal and Notes of J. F. Loubat* (New York: D. Appleton and Company, 1873).

<sup>[65]</sup> 20-12-1866, Ericsson to Fox, Fox Papers.