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### **Naval Warfare with Steam**

Sir Howard Douglas (1776–1861) fought in the Napoleonic wars in Spain, taught at the Royal Military College, served as lieutenant-governor of New Brunswick, lord high commissioner of the Ionian Islands, and as a Conservative M.P. for Liverpool. A military scholar, fellow of the Royal Geographical Society and Royal Society and associate of the Institution of Naval Architects, he wrote widely on bridges, systems of defence and attack, and on Britain's North American provinces. Written in retirement, when Douglas became an unofficial advisor to a succession of prime ministers, this work addresses the use of steam to propel ships, with detailed analysis of design, steering, propeller and paddle engineering and considerations of speed and manoeuvrability. The book goes on to examine tactics, including breaking the line, fuel economy and fleet arrangement. Built upon by others, this important work, first published in 1858, remains of interest to military historians.

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HOWARD DOUGLAS



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ON  
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# NAVAL WARFARE

WITH

# STEAM.

*Dedicated, by Special Permission, to*

FIELD-MARSHAL HIS ROYAL HIGHNESS THE PRINCE CONSORT, K.G.,  
&c., &c., &c.

BY

GENERAL SIR HOWARD DOUGLAS, BART.,

G.C.B., G.C.M.G., D.C.L., F.R.S.,

AUTHOR OF A 'TREATISE ON NAVAL GUNNERY,' ETC.

LONDON:

JOHN MURRAY, ALBEMARLE STREET.

1858.

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TO FIELD-MARSHAL  
HIS ROYAL HIGHNESS THE PRINCE CONSORT, K.G.,  
&c., &c., &c.

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SIR,

Authorized and honoured by your Royal Highness's gracious permission to dedicate to your Royal Highness this attempt to treat of a subject of vital importance to the country with which your Royal Highness is happily associated and identified, I have only to hope that my endeavour to give unity of system to the tactics of war by land and sea, as well as military strength to the formations of fleets, by applying the principles which regulate the dispositions and movements of armies to the new system of warfare on the ocean, for which this country ought to be fully prepared, may not be considered unworthy of the illustrious name by which my humble efforts are patronized, and not altogether useless to that great branch of Her Majesty's Service, on the efficiency and the supremacy of which the security of the Insular and Colonial Empire of Great Britain, must ever depend.

I have the honour to be,

SIR,

With sentiments of the most profound respect,

Your Royal Highness's devoted and

Most obedient humble servant,

THE AUTHOR.

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## INTRODUCTION.

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WE are now at the commencement of a new era in naval warfare, in consequence of the introduction of steam as a propelling power for ships, and its application, by all the maritime powers of Europe, to vessels of war, from those of the lowest class to line-of-battle ships of the greatest magnitude. This new power will necessarily modify, and, to a great extent, overturn, the present tactics of war on the ocean.

Hitherto the execution of naval evolutions has depended on atmospherical conditions, and often the best concerted plans for attack or defence at sea have been frustrated, when at the point of being successfully carried out, by sudden calms, or by unforeseen changes in the direction of the wind; while now, an elaborate system of appropriate machinery, put in motion by the expansive force of steam, by enabling a vessel to be moved at pleasure, with more or less rapidity, or to be brought to a state of rest, or again, to have the direction of its motion changed through the guiding power of the helm, will enable the commander of a ship or fleet to put in practice, without risk of failure, whatever manœuvre he may have determined on, whether for coming to action, or for counteracting the measures taken by his opponent, previously to, or during, all the battle movements of the fleet.

It is generally supposed that the present naval supremacy of Great Britain is mainly due to circum-

stances arising out of the particular nature of the moving power by which the evolutions of vessels, singly or in fleets, have been performed. That moving power is the wind acting on the sails of the ships—a power in its nature very variable; and it is evident that the introduction of steam, as a propelling power, whose action is entirely under the control of the engineer, will bring about great changes in the relative conditions of British and foreign navies, affecting, in consequence, the maritime importance of the several European nations.

This subject has already attracted the notice of scientific men in foreign countries; and an opinion prevails abroad, that the employment of steam as a moving power for ships of war will be attended with results beneficial to the nations of the Continent, while it will operate to the disadvantage of Great Britain.<sup>a</sup>

It is supposed that to superior tactical skill in our commanders, in anticipating the effects likely to arise from variations in the force and direction of the wind, and to the superior practical experience and expertness of our operative seamen in executing the orders of the officers, with respect to the manipulation of the rigging and sails, the British navy is in a great measure indebted for the success which has hitherto attended it in the hostile collisions of its ships with those of other nations;

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<sup>a</sup> “Des machines puissantes du genre d’un moteur obéissant rendra inutiles et la marine et les marins à voile dont la Grande Bretagne est un ruche si féconde.”—*Des Propulsions Sous-Marins*, par M. Labrousse, 1843.

“Ce changement rendra l’expérience et les habitudes navales moins utiles, et tournera à l’avantage de la France bien plus que de l’Angleterre.”—Paixhans, *Sur une Arme Nouvelle Maritime*, p. 28.

“La vapeur menaçait l’Angleterre de mettre la marine à la portée de tout grand peuple qui aurait des soldats aguerris et des finances prospères. . . . La vapeur, pénétrons-nous bien de cette vérité, place la question de suprématie maritime sur un terrain plus abordable pour nous.”—De la Gravière, *Guerres Maritimes*, vol. ii. pp. 256, 264.

and it is observed that when the complicated manœuvres required to govern the motion of a ship under sail shall be superseded by the more simple management of steam machinery, naval warfare under steam will be in a great measure independent of nautical skill and good practical seamanship, and that the evolutions of a fleet will be reduced almost to the precision of military movements in the field. It is hence argued that on the employment of steam-propulsion for ships of war becoming general in Europe, that supremacy which our warlike navy has so long and so happily for us maintained, will cease to exist, and that other nations, less rich in nautical resources, but more abundant in those, both personal and material, which are required for military service on land, will become relatively more powerful than they were under the former conditions.

But does it necessarily follow that Great Britain will no longer maintain her present superiority in naval warfare? or, if so, will her decline be wholly due to the employment of steam-propulsion in ships of war? The author ventures to think that such an opinion is unfounded, and that it can have been formed only on the presumption that our nautical science and mechanical skill are to remain stationary, while those of other nations go on improving. In this case there would, indeed, come a time when the superiority would be on the Continental side, but nothing appears, at present, to justify such a presumption. Our seamen of all ranks, are admitted to have, at this time, greater skill than those of other nations, not only in naval evolutions under sail, but also in the management of steam-machinery; and they continue to be diligently trained in all that relates to naval tactics with wind or steam: thus they are prepared to avail themselves of every improvement that science and practice can sug-

gest for the augmentation of their professional attainments.

This circumstance alone, *cæteris paribus*, should enable British commanders to preserve their present superiority over those of the Continent; but how much greater are the advantages of our country, in respect of its seamen, over every other nation! Foreign seamen being taken, chiefly by conscription, from towns or fields, have seldom more than that training which can be given them in ships of war, on board of which they serve almost wholly within the limits of the European waters; whereas our sailors, exerting the energies of a people long habituated to maritime pursuits, are trained in our vast mercantile marine to the performance of their duties in every region of the earth, while employed in transporting merchandise between the mother country and its widely extended colonial dominions.

Our superiority holds good also with respect to their training in the employment of steam. The machinery for the propulsion of a British steamer is the best that can be executed, and the engineers who attend it are well known to have greater skill and more experience than men of the like class in other nations; Englishmen are, in fact, generally employed to work the engines on board of the mercantile steamers of foreign countries; and no reason can be given why their skill and their energies should be stationary, or not keep pace with their increasing opportunities for improvement.

It may, therefore, be safely affirmed that the advantages which Great Britain has so long enjoyed in her maritime superiority, will rather be increased than lessened under the new and as yet untried power of motion; and it may be reasonably supposed that other nations will continue to follow rather than lead us in

the career of nautical warfare. The subject is, however, one of momentous importance to us, and it should engage us to bring every possible consideration to bear on the means by which Great Britain may, even at the outset, be enabled to maintain that superiority in steam-warfare, which has already been obtained for her by the skill and intrepidity of the officers and seamen of her glorious sailing navy.

New discoveries in the means and implements of war have at all times been necessarily attended, both in fleets and armies, by new formations in the array of battle, and by modifications, or entire changes, in their tactical evolutions. The greatest change in these respects took place at the epoch of the first employment of gunpowder in warfare; but every improvement in arms has, since that time, constantly led to counter-acting measures being taken in organization and movements both naval and military, of which the history of military science affords abundant examples. It must be observed, however, that alterations in tactics have always been made by slow degrees, and have generally followed at long intervals the improvements which rendered them necessary. At the present time it may be said that no efficient change has yet been made in military tactics to meet the introduction of the improved rifle as a general arm for the infantry of the line.

The employment of steam as a motive power in the warlike navies of all maritime nations, is a vast and sudden change in the means of engaging in action on the seas, which must produce an entire revolution in naval warfare, and must render necessary the immediate adoption of new measures in tactics, and new material resources; these should be forthwith studied, and provided, with all the mental and physical energies

which the talent and wealth of this country can exert; in particular, no money should be spared, considering the magnitude of the object at stake,—no less than the preservation of our naval supremacy,—in procuring all that is necessary to meet the requirements of the service at this momentous epoch.

The changes which political events have produced in the maritime affairs of all the nations of Europe, and the great improvements which have been made in naval constructions and armaments, and particularly the introduction of steam as a motive power since the termination of the wars arising from the great French Revolution, are matters with which it behoves the statesmen of this country to be thoroughly acquainted. One great naval power in Europe has disappeared as such, and another has sprung up in the New World. The steam fleet of France is in a state of progressive augmentation; the government of that country having acted upon the decision of its “*Commission d'Enquête*,” of 1849,<sup>a</sup> and has now attained a very formidable degree of strength. The division of the Russian fleet now in the Baltic, amounting to about 40 sail of the line, will speedily become a steam fleet; and the navies of the minor powers, Denmark, Sweden, and Holland, under the able administrations of those countries, are in a very efficient state. In short, the navies of Europe and of America have so increased in the number and strength of the ships, and their *personnel*, in all that relates to the science and practice of war, that, in a future contest, the sea will become the theatre of events, more important and decisive than have ever yet been witnessed.

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<sup>a</sup> See the *Enquête Parlementaire, sur la Situation et l'Organisation des Services de la Marine Militaire, ordonnée par la Loi du 31 Octobre, 1849.* Paris, Imprimerie Nationale, 1851.



The efforts of our nearest continental neighbours have been particularly directed during the last nine years to the re-attainment of that rank and consideration which their nation formerly held among the naval powers of the world; and, admitting this to be a just and laudable policy for France to pursue, Great Britain should, at the same time, keep steadily in view the measures now being carried out in that country, conformably to the recommendation of the Commission of Inquiry just referred to, and must take corresponding measures to increase in due proportion the power, efficiency, and numerical strength of her naval forces, in order to maintain her present position. Thus, the naval arsenals of two great nations in alliance with each other, one of them impelled by a necessity of the first and highest order — that of providing effectually for its own security, are resounding with the din of warlike preparations, while both nations might be participating in the financial advantages and social benefits of a sound, substantial, and lasting peace.

It may be proper to observe here, that the Commission of Inquiry, in its sitting of the 3rd February, 1851, decided, that the number of ships of the line which, by the Ordonnance of 1846, was limited to 40, should be increased to 45, and that each ship should be provided with steam power. This was the number adopted, but it appears from the discussion which took place on the occasion, that the proposition of M. Charner, one of the members of the Commission, to increase the number to 50 ships of the line was rather postponed than rejected. It was recommended to have the greatest number possible of ships of the line finished, afloat, and ready armed whenever they might be required. The reason for

adopting the smaller number was, that 45 ships would be finished in less time, and thus the funds voted would be economised, and the country be better prepared in the event of war soon breaking out. The number of ships actually finished is 47, and there is little doubt that it will soon amount to 50, as proposed by M. Charner.

In the sittings of the 12th February and the 10th March, 1851, it was resolved that the number of steam-frigates, *a grande vitesse*, should be 20, of frigates moved by sail and steam, also 20; at the same sitting it was decided that the number of corvettes should be fixed at 50, and that there should be 80 avisos. It was also decided that the construction of the 20 swift steam-frigates and the 50 corvettes should be completed gradually within the next ten years; at the same time it was determined that all sailing transports should be suppressed; and that, instead of them, there should be 20 steamers to serve as transports.\* The line-of-battle steamers are recommended to be built on the model of the ‘Napoléon,’ formerly the ‘Vingt-quatre-Fevrier;’ the engines of this ship, though rated at 960 horse-power, can be worked up to 1500 horse-power, and the ship is capable of stowing coal for 10 days when steaming at full speed. It was subsequently resolved that the “Equipages de ligne” (ships’ crews), and the “Mecaniciens,” or engine-men, should continue to be kept up by means of the maritime conscription; that 14 ships of the line then afloat should undergo the alterations necessary to convert them into steam-ships; that the number should be made up to 30 from the ships

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\* The transport, ‘Calvados,’ which was lately launched at L’Orient, the first of twenty vessels of the same class, is said to have accommodation for 2500 men, 150 horses, and 1200 tons of stores.

then on the stocks, and that 20 of them should be completed within ten years.

In the decision respecting the establishment of ships' crews for manning the 45 ships of the line decreed by the Ordonnance of 1846, it was regulated that an adequate increase should be made in the number of companies, each of which was appointed to consist of 60 seamen of the first, second, and third classes, with 20 seamen apprentices; also that the establishment of seamen-gunners should be on so large a scale, that there might be one well-trained gunner to every gun in the ships to which they should be drafted.

The decisions of French Commissioners, on subjects referred to them, are not subject to change with a change of government, as with us; they are, on the contrary, immutable, and are perseveringly acted upon till they are effectually carried out. It is well known that the idea of constructing a great harbour at Cherbourg originated with Louis XIV., though the work was commenced only in the reign of Louis XVI.; and, in the present year we have seen the completion of that vast work, which, in the language of the President of the Commission appointed in 1849, "is to contain the fleets which are to defend the French coasts and attack the English in their own country."<sup>a</sup>

Viewing France as that which she really is, a great power, whose safety depends upon her military forces, we have no right to cavil at any measures which the government of that country may adopt for its own

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<sup>a</sup> In a speech delivered at a sitting of the Commission of Inquiry before referred to, Jan. 27th, 1851 ('Enquête Parlementaire,' tom. i., p. 149), M. Daru, after observing that, in the expedition to Rome, the whole French army was embarked and conveyed in ten days from Toulon to Civita Vecchia, infers that 24 steam frigates, 24 transports, 3 corvettes, and 3 avisos, concentrated at Dunkirk, Cherbourg, or Brest, would suffice to disembark 30,000 men and 3000 horses on any part of Great Britain or Ireland.

security against its powerful continental neighbours. Her military preponderance is as essential to her safety, as the maritime preponderance of Great Britain (an insular and colonial power) is indispensable to hers. Neither should be jealous nor distrustful of the other in any legitimate use which either may make of the powers with which nature has endowed them, respectively, for providing effectually for their own security.

The author makes these observations in no unfriendly spirit; he takes facts and circumstances as he finds them, and he uses them merely in proof of the necessity which Great Britain is under of taking corresponding measures to secure her own position, as a great maritime nation, among the powers of Europe. Sincerely disposed to value and maintain, in his humble sphere, the friendly relations which happily subsist between the governments of England and France, and relying on the assurances lately given by the head of the French nation, the author cannot but admire the policy by which the government of France is actuated in so reorganizing its maritime resources as to raise its navy to the highest possible degree of efficiency. Great Britain, as an insular and colonial empire, can maintain that high position in the rank of nations which she has gained by the instrumentality of her navy, only by keeping that noble branch of her service, not merely in a state barely sufficient to protect herself against any one maritime power, but fully adequate to defeat any maritime coalition to which political circumstances may at any future time give rise. And it must always be borne in mind, that, to enable the navy of Great Britain to act on equal terms with that of any continental nation, it ought by far to exceed the navy of such nation in the number of ships of war of like force.

Taking France, for example : while the naval power of that country will, in the event of a war, be chiefly collected in the two seas on the shores of which her great arsenals are established, that of our country must be dispersed over the whole world with strength sufficient, in every region, to protect her numerous colonies and widely-extended commerce. The fleets of England will, in time of war, have to blockade two great ports in the British Channel, instead of one, as in former wars, and must, moreover, have dominant power in all the waters which surround the British Isles.

The manning of the British navy was, in former times, so promptly accomplished by compulsory service, that, often, the dangers which menaced the country by sea were averted by a consciousness, on the part of the enemy, that our fleets were fully prepared to oppose any attempt at aggression. But now that the Government depends upon a voluntary enlistment for the supply of seamen to man our ships of war, there is always a risk of delays taking place when a fleet is to be fitted for service ; it will signify little that we have abundance of ships and of the *matériel* for arming them, if the brave men who are to serve in them are not forthcoming at the time of need. The French have still their law of compulsory enrolment, from which they form their ships' companies ; but Great Britain has only the inducement which a liberal bounty and a careful attention to comfort on board the ships offer, to enable her to procure the men who are to defend the country and maintain the glory of her arms in naval warfare.

A brief notice of naval tactics under sail will be given in the present work, because it will be long before sails can be entirely superseded by steam-engines, if this supercession should ever take place.

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INTRODUCTION.

Steam fleets will be compelled occasionally, from exhaustion of fuel or from derangements of the steam machinery, to have recourse to sails ; and it is evident, therefore, that tactics with sails must not be hastily disregarded. A tract on naval warfare with steam is, however, indispensable at the present time, since evolutions which cannot be executed with precision and certainty, or even cannot be executed at all, with the sail, may be effectually accomplished by the steam machinery, while new evolutions and new formations must be subjects of contemplation ; and thus it is imperative that our seamen should render themselves equally expert in both systems. Before entering, however, upon the subject of naval tactics with steam, it will be proper to devote a section to the purpose of giving a brief history of the introduction of steam as a moving power to ships, and a brief notice of the nature and action of steam-machinery in its application to the *paddle* and the *screw*, together with an inquiry into the relative values of these agents, with respect to their powers of communicating motion, and to their conveniences in the armament of ships of war.

Aug. 16, 1858.

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