

Professor Biles, harbours, not that in the enemy's harbours. He thought the spirit in which the Author had written the Paper was one that was likely to be followed in essence in the future. Taking the two more recent ships, the "King Edward VII." and the "Lord Nelson," it would be seen that for approximately the same displacement the "Lord Nelson" had more powerful armament than the "King Edward VII."; there were the same 12-inch guns, six more 9-inch guns, and no 6-inch guns. Obviously the weight of armament in the "Lord Nelson" was considerably greater than in the "King Edward VII.," and the weight of armour was probably also greater, because the armour was thicker. That appeared to him to be the direction in which development should take place; because, without appreciable increase of displacement or of cost, there was an appreciable increase in fighting-force. Accepting the same conditions of design in the "King Edward VII." as were adopted in the "Lord Nelson," it would be possible to produce the same fighting-force in a smaller and less costly ship than the "King Edward VII."; but the opportunity for development lay in the increase of fighting-force rather than in the diminution of displacement; experience and skill had been devoted to making a given size of ship more efficient, rather than to attempting to make a smaller ship as efficient as those already constructed. Probably the Author really had in his mind the desire to restrict the size of the ship rather than a wish to make a retrograde step. If it was possible to get, for the same sized ship, an increased fighting-force, then a real engineering triumph had been achieved.

Correspondence.

Mr. Bertin. Mr. L. E. BERTIN, Chef du Service Technique of the French Navy, observed that the Author's concise summary of the problems confronting all navies lent itself to abundant comment, dealing, as it did, with the whole future of fleets, as well as giving an indication of their present condition. To the Author's praise of England's distinguished naval constructors, who had led the British navy through successive stages of progress, it was only just to add a eulogy on the statesmen who for 40 years had enlightened public opinion, supported the Admiralty, and secured that continuity of effort without which no great work was possible. The daily task of those who drew

up the plans, examined the reports and marshalled the columns of Mr. Bertin. the Navy Estimates, might, by absorbing their thoughts, limit their horizon; and this consideration lent inestimable value to the services of the veteran Author, who, after discharging high functions at the Admiralty, had retained an interest in the study of naval affairs and devoted his life to them with a disinterestedness equalled only by the loftiness of his views. When, however, consideration of the matter as a whole had to give place to points of detail—the selection of a type of ship, for example—some reservation must be placed on the estimates of anyone—be he lecturer, writer or even statesman—who thus entered upon the special domain of the Navy. The lessons of the past contradicted the infatuation of the public, who in many cases had favoured new types of battleships which had subsequently had an insignificant and ephemeral career. When the promised qualities of armament, armour, speed and coal-endurance gave a high total, the splendid prospect concealed some defect. Thus, at one time the extent of the armoured belt had been reduced beyond all reasonable proportion. In many old ships it was not the “heel of Achilles” that was vulnerable, but the throat of the hero; the heel itself was proof against the arrow. The most frequent error was that produced in the displacement by overload. Cases had been known in England and in France of battleships out of which 1,000 tons of the equipment had had to be taken in order to give them the desired draught, so that an addition of some 3,000 tons had had to be added to the planned displacement in order to complete the programme properly. These overloads had been occasionally exceeded in Italy, if Mr. Bertin might credit the draught measurements he had read on the hull of the “Sardegna.” Hence the preference given to the “Vittorio Emanuele III.” by the Author needed substantiation in respect of the absence of overload—a point on which the English Admiralty was no doubt informed by its excellent Intelligence Department. This reservation on a point of detail in no wise detracted from the indisputable value of the Author’s general conclusions. In unreservedly praising the battleships whereon the power of England rested, and in eulogizing their designers, the Author, as it were, heaved a sigh of regret over the dimensions which the French navy had unwillingly abandoned; and he regarded as of questionable advantage the high displacements and heavy cost to which the English Admiralty—taking the lead of the movement—had condemned the navies of all nations. For his part, Mr. Bertin did not doubt the wisdom of the farmer’s wife in placing her eggs in a number of baskets

Mr. Bertin, where the road was hilly. He had even had to lessen the displacement of vessels by very radical means—though not until after making thorough investigations to avoid any concealed defects, and taking care, once the minimum had been fixed, to exceed rather than go below it in execution. The *à priori* adherents of small displacements did not exhibit the same prudence; for while declaring themselves upholders of small vessels, they required everything that tended to make them larger. The Author who read the reports of the French Naval Estimates attentively must often have discovered in them contradictions which had not long disappeared; for he could not trace any in the last report, which he cited in a highly complimentary manner. It was a source of special pleasure to Mr. Bertin to be able, by this expression of praise, to pay his debt of gratitude to the compiler of the 1905 report. The care with which he had collected all the comments circulated by discontented contractors and welcomed by the venal or ignorant elements of the Press, had enabled Mr. Bertin, in the matter of the newest French vessels, to re-establish the truth, which, as the Author well knew, was difficult to divine. On the subject of armoured cruisers, their displacement and indispensable qualities, the Author expressed his views without reserve. He knew that a ship of war could not be at the same time a cruiser and armoured without being a very large vessel. He pointed therefore, not without pride, to the three “Minotaurs” of 14,600 tons, and the six ships of the “Duke of Edinburgh” class, of 13,550 tons, which were rivalled only by the four “North Carolinas” of 14,500 tons. The only French vessel of this class on the active list was the “Edgard Quinet,” of 14,200 metric tons (14,000 tons English measurement). This vessel, in view of the armament proposed for her equipment, he considered as the only French cruiser comparable with the “Minotaur” class. Mr. Bertin associated himself with this opinion the more readily because after the “Jeanne d’Arc” he had supported the “Edgard Quinet” class in preference to smaller cruisers. In the Author’s eyes, the long series of ships of lower class than the two cited above had taken a place in the estimates out of all proportion to their military value. Badly armoured cruisers, protected cruisers, often reduced to the condition of scouts, with nothing in prospect but flight from a fighting cruiser—mere outposts playing a part that could readily be filled by ocean greyhounds—had formed the bulk of the types so soon discarded. Together with the battleships too vulnerable to medium artillery, these were the vessels which had cost England the 17 millions sterling whose loss the Author deplored. Nevertheless,

there were duties for which 14,000-ton cruisers were infinitely too costly. The Author knew this well, and he went straight to the root of real economy in citing Lord Charles Beresford's humorous quip: "The word 'cruiser' is a mistake. The words 'armoured cruiser' are a greater mistake." The Author's proposal to provide each squadron in time of war with ships equivalent to the frigates of early days, by using the ocean greyhounds of commerce, which in times of peace would serve to establish rapid communication between England, Canada and Australia, was radical and simple. On this point Mr. Bertin's own experience was at fault. Neither St. Pierre and Miquelon nor Noumea would justify the establishment of such a service by France. He could only bow before the variety of England's needs and resources. Too much ink has been spilt over torpedo-boats and destroyers. For this and other reasons the Author had left them severely alone, preferring to direct attention to high-speed, armoured torpedo-rams, capable of running the gauntlet of quick-firing artillery. The Author had remembered them—if Mr. Bertin's recollection was correct—from the time when, as Civil Lord of the Admiralty, he witnessed the appearance of the "Polyphemus." But were not such vessels probably destined to be superseded in a very short time, their star or nebula paling before that of the newcomer, the submarine, whose military qualities were more apparent? It would seem that this latter offered the greater menace to the real queen of the seas, the battleship, which was still able to stand the shock of artillery. One pregnant lesson might be learned by perusing the Paper, namely, that ships of war became obsolete with disconcerting rapidity. It was much easier to strike vessels valued at £17,000,000 out of the list of efficient than to find the millions for replacing them. For this reason the types of greatest durability should be studied, the investigation requiring for success only ability to recognize present requirements and to foresee those of the future. The Author laid down no rules on this subject, but the two Tables at the beginning of his Paper merited serious attention. That on p. 2 represented the present; while the one on p. 1 was rather disquieting for the poor taxpayer, whose pocket seems to be menaced more than ever.

Admiral Sir N. BOWDEN-SMITH, K.C.B., had some hesitation in taking part in this discussion, because, knowing little or nothing of ship-construction, he feared he might advocate something which was impossible; but taking into consideration the many risks to which every vessel was subject, he would be glad to see the size of British battleships reduced, and the practice of putting £1,500,000 and 800

Admiral Sir
N. Bowden-
Smith.

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Smith,

men into one venture discontinued. As the Author mentioned, many vessels on both sides had succumbed during the present war to the submarine mine—a truly dreadful weapon and almost as dangerous to friend as to foe. With regard to the Whitehead torpedo, however, it appeared to him that its destructive powers had been somewhat over-rated; for if, on the memorable night of the 8th February, 1904, the Japanese had really discharged twenty-four torpedoes at the Russian ships at anchor in an open roadstead and totally unprepared, and had succeeded in striking only three of them, and those not fatally, it might reasonably be assumed that when ships were under way and moving at high speed they would generally escape being struck. It was somewhat singular that, although the destructive effect of mines had been so recently demonstrated, England should be giving up the mine in favour of torpedoes to be discharged from submarines. He did not believe that, because the naval actions in the present war had been fought at long ranges, 3,000 to 4,000 yards, future battles would take place under similar conditions. The Russians could not be said to have handled their ships with skill or boldness, and Admiral Togo must have had continually in his mind the fact that he could not replace a battleship during the continuance of the war. In future naval actions, where the sides were fairly equal and both had ships in reserve, Admiral Bowden-Smith saw no reason to suppose that actions would not be fought at closer quarters, and with more decisive results. Although, therefore, the lessons of the war pointed to the importance of heavier guns both on shore and afloat, the present secondary armament of 6-inch guns in some British ships should not be hastily condemned. The main question, large versus small battleships, he would put in this way:—If he could have six battleships of 17,000 tons displacement for £1,500,000 each, or at a total cost of £9,000,000, and for about the same price, or say at a cost of less than £10,000,000, he could have eight battleships of about 14,000 tons, he would prefer the smaller ships, provided they attained the same speed as the larger without increase of length, with similar coal-endurance, and with guns of the same calibre—though of course a less number in each ship. Eight ships could manœuvre together equally as well as six; and Admiral Togo's loss of two of his six battleships meant one-third of the whole—a very serious consideration. If the eight 14,000-ton ships could not be produced for something less than £10,000,000 then there was nothing for it but to proceed with the larger vessels; and, at all events, England had the satisfaction of knowing that her purse was as deep as that of most

other nations. Coaling at sea from cruising colliers should be carried out frequently, and possibly the introduction of oil-fuel might enable the size of ships to be reduced. In conclusion he would earnestly urge that in future only fighting ships should be built—exclusive, of course, of vessels needed for surveying duties, and certain small craft for service in rivers and shallow waters. Lest it should be imagined he was casting any reflection on the splendid armoured vessels Sir William White had turned out, Admiral Bowden-Smith would point out that in 1900 and up to 1901 England was building and fitting out little vessels of the "Condor" class, of absolutely no fighting value. About a dozen of these vessels were added to the Fleet, and they were probably intended to show the flag on foreign stations. But the day had gone by for doing this with a vessel of no importance, and if it was desired to show the flag on foreign stations, it should be carried by one of the splendid cruiser squadrons. The little sloops to which he had alluded could not have been intended for river-work, as the earlier ones had only single screws, and all were rigged. Again, was it wise to add eight scouts to the fleet at a cost of over £2,000,000? Surely in these days of wireless telegraphy, which was of great assistance in communicating, and considering that England possessed many fast cruisers with a sea-speed of over 20 knots per hour, these scouts could have been dispensed with; or, at any rate, two would have been enough. He maintained therefore that, whether the country built large or small battleships, it should in future build only *bona fide* fighting vessels.

Admiral Sir
N. Bowden-
Smith.

The Right Hon. Sir JOHN COLOMB, K.C.M.G., M.P., considered that public gratitude was due to the Author for stimulating attention to the Fleet by his constant incitement to the discussion of naval questions; but the views upon shipbuilding put forward in the Paper seemed to be founded upon the Author's personal apprehensions respecting public finance. The dominating influence controlling his attitude appeared to be not so much the strategical and tactical advantages or disadvantages of size in battleships, but the total at the foot of the bill for them. Of all men, civil engineers were the least likely to be frightened by big sums, and the last to put cost before efficiency. Perhaps that was why the Author commenced his attack on big ships by hoisting signals of financial distress. In no other way could Sir John Colomb account for his preliminary lament that the handsome surpluses of the past no longer existed, and for his introductory Table of comparative military expenditure. From Sir John's point of view this Table

Sir John
Colomb.

Sir John Colomb required revision. It showed the relation of the total military to the total public expenditure for the whole of each foreign state, but for only a part of the British Empire. As a matter of fact, the public revenue and expenditure of the United Kingdom was only one-half of that of the Empire of which it formed a part. The Navy was the shield of the whole Empire, but the whole Empire did not bear the burden of its cost. If the Author would add to the Table figures showing the ratio of the aggregate military to the aggregate public expenditure of the whole British Empire, so as to make the comparison between it and the German or the Russian Empire, or other states, a true one, he would find that the British Empire would be at the bottom of the Table, though the United Kingdom, treated as a separate entity, would still remain at the top. Thus adjusted, the Table would show that if, as the Author appeared to think, the mother-country was overweighted with the burden of this costly shield, the remedy ought to be sought for not in a cheaper and less effective battle-fleet, but in co-operation of the outlying parts of the Empire with the United Kingdom in the discharge of a common obligation to preserve the existence of all. Turning from what appeared to be the Author's general contention to some of the particular points he dwelt upon in its support, Sir John Colomb frankly differed from the doctrine of one type of vessel for extended ocean cruising, and another type specially designed for the seas of Europe. Its adoption must complicate the problem of distribution, and must weaken the essential power of concentration. It was on such grounds that he had deprecated, from his place in Parliament, the new programme of "coastal" and "ocean" destroyers. Again, he regarded the maximum of possible homogeneity as a fundamental principle of the constitution of a battle-fleet. If the adoption of the Author's proposals would prejudice the attainment of that cardinal condition of effective naval power, they should stand finally condemned. Whether they would or would not do so, British admirals, who would in war handle and fight the fleet, must be the sole judges. Vulnerability below water was a feature common to all ships; the torpedo and submarine mine menaced all indifferently. While doubting whether the word "mêlée," as used by the Author at p. 7, sufficiently accurately described the naval action under modern conditions of range, Sir John Colomb regarded it as certain that an increased number of ships meant an equivalent increase in the number of vulnerable bottoms offered to torpedoes and submarine mines. The two sides of the question seemed to him to balance; but in any case he was not prepared to admit the abstract proposition that numbers

must tell in a naval action, because so much depended upon the relative tactical value of the offensive and defensive powers of the units. He submitted that the cost of construction was only one aspect of that financial question which appeared to disturb so much the Author's mind. The cost of maintenance could not be ignored, and its recognition suggested the following question:—Would the annual cost of providing for the personnel and maintenance of three battleships of, say, 10,000 tons each be greater or less than the annual cost of providing for the personnel and maintenance of two battleships of, say, 15,000 tons each? Perhaps the Author could answer the question authoritatively; meantime, Sir John's impression was that the annual cost of maintenance of three ships would be a great deal more than that of two. If he were right in that conjecture, then such increase of the annual public burden could be justified only by the clearest proof that the smaller type of battleship was strategically and tactically a more perfectly effective instrument of naval power than the larger type. In conclusion, he wished to say a word about "ocean greyhounds" in relation to maritime war. He agreed with the Author that it was a high imperial duty to connect by fast services Canada and Australia with the Motherland. It was because he so entirely agreed that he contested the Author's further assertion that an "imperial postal service, running fortnightly to Australia and weekly to Canada, would form a splendid reserve of scouts for the Navy." As the Author truly said, swift communication encouraged and facilitated interchange of trade, and formed a bond of empire. But, when maritime war threatened imperial lines of communication, the Author proposed to discourage and hamper trade along them, and deliberately to break the bonds of empire, by robbing them of those vessels which, by reason of their exceptional speed, were practically immune from interference. The war-fleet must be complete in itself, and be provided in peace with all ships adapted to and essential for the performance of its functions in war. In any attempt to avoid spending what was necessary to secure that object, care must at least be taken that temptations offered by swift communications in peace did not corrupt good strategy in war.

Colonel VITTORIO E. CUNIBERTI, of the Italian Ministry of Marine, observed that the variety of the objectives of the British Navy, and the number of eminent naval experts who influenced the shipbuilding policy of Great Britain, placed a modest foreign student in an embarrassing position in expressing an opinion on the most desirable features to be observed, as far as was possible, in the preparation of the designs of British battleships in the

Sir John
Colomb.

Colonel
Cuniberti.

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Cuniberti.

future. The Italian writer could not but be heartily grateful to the Author for having indicated the "Vittorio Emanuele III." as a suitable type for the British Navy of the present day. Owing to several circumstances, which it was needless to refer to, this vessel had already been looked upon with considerable favour by foreign experts. But the opinion of the Committee on the French Navy Estimates, and that of so eminent and competent an authority as the Author, would certainly add to the interest and goodwill with which this "compromise" would be examined. He thought that 4 years ago this design became an actuality; it did not so much represent a new thing, but might be said to be rather the realization of an idea which was in the mind of every one. The improvements in engines, in ordnance, in armour, and more especially in the design of the vessels themselves—not merely following old traditions, but putting the material just where it was required—had swept away the old axiom that heavy guns and thick armour were incompatible with high speed. Indeed, the action of the 10th August off Port Arthur (a unique action as far as the meeting of modern fleets was concerned) had clearly demonstrated the necessity not only of long-range guns, but also of a speed superior to that of the enemy. The Japanese big ships kept the slower Russian ships well under their fire, which was efficient at 8,000 or 9,000 yards, and prevented them from coming near enough to use their 6-inch guns with effect. Why should not a "compromise" be arrived at in 16,000- or 18,000-ton battleships similar to what in a 12,000-ton battleship was not only possible but thoroughly successful? The draught did not consequently increase excessively; under certain conditions, the less the draught, the higher the speed. Half a dozen "Lord Nelson's" of 22 knots would form a splendid group.

Admiral
Sir John
Dalrymple-
Hay.

Admiral Sir JOHN DALRYMPLE-HAY, G.C.B., remarked that as England owned half the trade of the world she should possess half the warships of the world for its protection. She should at least have one battleship for every possible opponent battleship. The cost of these vessels formed a very small premium of insurance—less than 5 per cent.—on her commerce. The ships for this purpose should be of the highest speed—in his opinion, propelled by turbines. It was wise to discard all ships which had not speed and coal-carrying capacity. Battleships of 18,000 tons would fulfil present needs, and he believed this class of battleship was the only one requisite for the Navy. He did not think it advisable to build battleships of less than 18,000 tons; 15,000 and 10,000-ton ships would soon be out of date. It must be remembered that the needful supply of ammunition bulked

largely in tonnage. It did not do to be without it, and the supply after an action was not always assured. The British squadron which attacked Acre on the 3rd November, 1840, was not supplied with ammunition till it reached Marmorice several weeks after, and if M. Thiers had only known this, his desire to attack the British fleet would probably have given France a triumph. A large ship was so much more valuable in every way than a smaller one, that the cost of her possible loss must not be considered from an economical point of view. This would be false economy. Before subscribing to the opinion that the "Vittorio Emanuele III." was the best type, he would require to know her actual long-distance speed, her coal-endurance, and the number of rounds per gun which she stowed. The best man-of-war in the world might be useless, except as a prize, when she had not a shot in the locker. The torpedo was a splendid offensive weapon, going where it was sent, to sink the enemy. To add the human element to its freight, as in the submarine boat, was to weaken its offensive power. He did not believe the submarine was nearly so effective as the torpedo. Ships in shallow waters would have to be attacked by long-range accurate fire, and if beyond that, then by torpedo: while if inaccessible to either, they must be blockaded. It was not economy to spend money on protected light-draught vessels which had neither speed nor offensive properties. The fire from heavy ships "at too great a distance" might or might not be effective. It was to be hoped there would always be a "Condor," with as good a man to handle her, to effect the object where the big ship failed. In war opportunities always arose for adapting means to the ends to be achieved, or for improvising them on the spot. It was not necessary to have a supply of "Condors"; a supply of Lord Charles Beresfords would find out the way, even without a "Condor." Why should it be anticipated that a British battleship would be placed in a position to be the victim of torpedo-rams, and without any subsidiary squadron of her own to ward off or destroy the attacking force? In his opinion, the British Navy should always attack, and should think little about defence. The Japanese thought only of destroying the enemy, even if the assailant was destroyed in the process. If England had a battleship for every other battleship in the world, and one more, and if she lost a ship for every ship of the enemy destroyed, her one remaining ship would guard the seas, until she had again built what she required.

Captain T. FUJII, of the Imperial Japanese Navy, was much impressed by the Paper, as many of the Author's remarks also

Admiral
Sir John
Dalrymple-
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Captain
Fujii.

Captain
Fujii.

applied to the Japanese Navy. Many of the Japanese ships were well known, having been built in England by firms of the highest repute. The ships had always been the outcome of much investigation and discussion, by a Committee on Designs, consisting of the fighting officers and of those charged with construction; and in their design endeavour had been made to exercise foresight, which was so essential to future efficiency. The design of a ship was greatly influenced by the work she might be called upon to perform, which varied according to the conditions of countries; for instance, if she was to meet other ships on the high seas, she must have different arrangements from ships intended for bombarding fortresses; and if she was fitted for both these operations, so much the better. For example, in the matter of "high-angle fire," the latest two ships added to the Japanese Navy, the "Kasuga" and the "Nisshin," were capable of high-angle fire in certain operations, which other ships were not: so that ships which were likely to be called upon to perform such work would have to be designed accordingly. The recent operations of the Japanese Navy had taught valuable lessons which would bear fruit in the future. Without going into details he might say that many things would require alteration and addition. It would be a good thing if naval architects could give some means of protection against floating mines and torpedoes. The Japanese had found that small ships could not give many of the advantages of large ships—certainly so in battle; and though small ships were advocated by some, their experience was that all classes of vessels tended to increase in size. The submarine and the torpedo-boat, as well as vessels of other classes, had grown, with a view to render them capable of performing many functions shown to be necessary on service. In fact, he supposed that the requirements of war-experienced admirals, worked out by naval architects, showed that the first-class battleships of the future would approach 19,000 tons or even 20,000 tons in displacement, and would require many alterations and additions to present designs. While the personal element was not touched upon in the Paper, he might say that for some services it was necessary to select the men with great care, especially in the torpedo or submarine service. Marksmen also required careful selection. In the action on the 14th August, when the "Rurik" was sunk, the Japanese used armoured cruisers of the "Tokiwa" type and cruisers of the "Naniwa" type. The age of these latter ships was known, and they were not regarded as likely to become inefficient for many years. He agreed with the Author in all he said about protecting

the brains of the ship, in the shape of the commanding officer. The old cry of the English admirals "Never mind the shot but keep out the shell" had been strongly emphasized by Japanese experience; so that if naval architects could keep out shell they would do a great deal towards securing efficient warships.

Mr. H. G. GILLMOR, U.S. Navy, of Bath, Me., observed that no one could deny that Great Britain's shipbuilding for the Navy must necessarily be an answer to construction in hand elsewhere. In the past the answer had been given in the most direct manner, class for class, in ever more powerful and heavy vessels, leaving the question of cost to be met after the military problem had been solved. That this course was effective so long as the necessary funds could be obtained, the history of the British Navy readily proved. That it was expensive, the increasing ratio of naval and military expenditures to the aggregate public expenditures, and the cost of obsolete or partially obsolete vessels of comparatively recent date, alike testified. The Author was doing a service in urging the consideration of the financial with the military aspect of this question, perhaps a little in advance of the time when natural developments would force the consideration of both as forming parts of one question. Who would say that, if such a policy had been inaugurated 15 years ago, there would now exist all the present types of naval vessels, or that the trail of development would have been blazed quite so lavishly as it had? That armoured vessels were necessary to give and receive the heavy blows which determined naval supremacy seemed to be generally conceded. There was not the same unanimity of opinion as to the desirability of the subdivision of the armoured vessels capable of general service into the two classes armoured cruisers and battleships, and the tendency of each class to approach the other in characteristics was evident. It was the cruiser types which had in the past become obsolete most rapidly, and one obvious means of securing a longer tenure of armoured ships on the effective list would seem to be to substitute for the armoured cruiser the fast battleship of moderate displacement. The "Vittorio Emanuele III.," while perhaps not just the vessel which British opinion would accept as meeting the requirements, was an illuminating example of what might be done. By the use of a form especially adapted to her speed, her designers felt themselves sure of attaining a speed of $21\frac{1}{2}$ to 22 knots per hour on a very moderate power, and with large coal-capacity. Her gun-power and armoured protection made her more than a match, so far as these elements were concerned, for the armoured cruisers building or projected. Speaking roughly, sixteen "Vittorio Emanuele III.'s"

The Captain Fujii.

Mr. H. G. Gillmor.

Mr. H. G. Gillmor. could be built for the cost of twelve "King Edward VII.'s." Following the method of comparison used in the article in the *Scientific American* alluded to by the Author, the sixteen "Vittorio Emanuele III.'s" would be about equal in military value to fourteen "King Edward VII.'s," neglecting altogether the military value which many authorities attached to additional numbers. It was recognized that all systems of comparison were more or less illusory, and all that could be said for the method upon which this statement of relative efficiency was based was that it had commended itself to some competent judges as not without value. In considering the employment of this kind of vessel, there was one element of the design which it would seem might well receive attention if prolonged tenure on the list of effectives was sought, and that was the battery. For some years there had been no change in the maximum calibre of the guns installed in naval vessels, and a progressive increase in the calibre of the medium-calibre guns was to be observed. There were many who would consider an increase in the number of large-calibre guns and the suppression of the medium-calibre guns as too radical a step; but in the light of experience might it not be expected that the building of improved "Vittorio Emanuele III.'s" with a uniform battery of 12-inch guns, would render obsolete many of the armoured vessels building or projected, and that such vessels would hold a place on the list of effectives for a period which would approximate much more closely to the useful life of the hull and machinery than had been the case in many of their predecessors?

Rear-Admiral
Melville.

Rear-Admiral GEORGE W. MELVILLE, of the United States Navy, congratulated the Author on making so clear and forceful a presentation of his case. In fact there was so little in the Paper to criticize, and so much to commend, that he felt diffident in attempting to say anything on the subject. America had been brought to believe that there were but two classes of fighting ships to be considered, the heavily armed and armoured battleship of large displacement, and the armoured cruiser of large displacement, the two ships differing only in their armour, weight of guns, and speed; and as they could not very well have both qualities in the same ship, they believed it necessary to have ships of both classes. In the United States, as in England, there was some difference of opinion in regard to the speed and tonnage of both battleship and cruiser; yet in both countries there was a strong conviction that the same amount of fight could not be got out of 12,000 tons as out of 16,000 tons, be the cost what it might; and therefore the larger tonnage was favoured. The question whether

they should have a large number of moderate-sized ships, or a smaller number of large ships had been fully discussed in the States, and he believed that all officers who had given the matter proper thought were inclined towards the heavier ship. Personally, he believed that if a nation was able to bear the expense, the heavier ships of all classes had the best of the argument, under all conditions; and nations which could not afford to have the larger class of ship had better keep out of the expensive game of war, and confine themselves to the protection of their own harbours and coasts with harbour-defence ships of the "Monitor" class, or other vessels or appliances which would give them such protection as might allay their nervous fears, no matter how inadequate they might really be against the assault of their more heavily armed foes. In other words, the weaker nations must resort to such means as lay within their power. In this view the necessary fleet or fleets of small craft which all nations must provide to do the police-duty of the seas were left out of consideration. The heavy ships must be supported by colliers and scouting-ships, the latter to be the eyes of the fleet. Great Britain was strong in her strategic position in having naval stations in every part of the globe, not only as coaling-stations, but as naval stations for refitting, so essential now in the case of modern steam fleets. There could be but little doubt as to the requirements for scouting-vessels. The transatlantic liner was the ideal ship for this purpose, since she had large tonnage with great coal-carrying capacity, and speed enough to avoid a fight, which precluded the necessity of carrying a heavy battery; though she would naturally be fitted with a battery of light, rapid-fire guns, to enable her to repel torpedo-boats or destroyers. Being of large tonnage and high freeboard, these scouts could maintain their speed in all conditions of weather, and could fulfil in all respects the purpose for which they were intended. The torpedo-boat and the torpedo-boat-destroyer had hitherto failed to be much more than a good dispatch-boat, and they had not done well for long-distance steaming without the aid of colliers, or "mothering" by the other vessels of the fleet. Up to the present, the usefulness of the submarine was speculative. At best they were but scarecrows to a blockading fleet, and, unhappily, Great Britain had had several serious experiences with this peculiar craft, both in being run down and by internal explosions of a serious nature. In regard to accidents from explosions she was not alone, for the same had occurred several times in American Holland submarines, though

Rear-Admiral
Melville.

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not with the same fatal results. The sad loss of Submarine "A1" had at least demonstrated the best mode of attack against the submarine, namely by a bold dash directly at the enemy, whether afloat or just submerged. There was no question at all in his mind of the destruction of the submarine, if struck by a speedy vessel of any kind, particularly by a deep-draught vessel of high speed. Such a ship could bear down upon a submarine with perfect immunity to herself; for no torpedo was likely to do damage to a vessel dashing head on toward the submarine or torpedo. The speed of the ship and the parting of the sea at the vessel's bows would carry the torpedo to either side clear of the attacking vessel. A great deal of discussion had taken place on what had been termed "putting many eggs in one basket"; yet this was what it was necessary to do if the fleet was to lie in the line of battle, and to give and take blows: and as more of the necessary qualities could be provided in the larger vessel than in the smaller one, he could see no reason, except the matter of experience, why the larger vessel should not prevail. If a mixed battery were considered essential for each class of ship, then the best battery for battleships would be 12-inch guns supplemented by 10-inch guns to balance the battery, and for armoured cruisers 10-inch guns with 8-inch guns to balance; all the batteries to be protected in turrets or behind casemates. If a mixed battery was not desired, and the ship in either case could carry its batteries well, then all 12-inch guns for battleships, and all 10-inch guns for armoured cruisers, should be used, supplemented in all cases with quick-firing guns for defence against torpedo-boats and destroyers. The plan of defence against submarines, if they were sighted, was to run them down with any fast vessel in the fleet, after the manner of hunting whales. The American service had been afflicted at times, like the British, with cliques running after strange gods: not only were peculiar ideas put forward in regard to the size and speed of ships, but men were often wiled away from their true reasoning powers by the idea of the weird and ghostly, or the impossible and ghastly; hoping to get something for nothing, or depending upon the submarine to do the duty of the battleship. In this he felt he was characterizing fairly the ideas of some officers of all navies. He had in mind a prominent officer of the American Navy who had appeared before the Board on Construction, and had pleaded that no battleship should have a speed of more than 15 knots per hour, at a time when every other nation was building 18-knot battleships, and some 19-knot and 20-knot

ships. Thus did the idiosyncrasies of men run—and good men too, from whom better things were expected. In America faith was pinned to heavily armoured battleships and armoured cruisers of the heaviest class and high speed ; and he believed that this was in agreement with the views of the best minds in Great Britain.

Rear-Admiral
Melville.

21 March, 1905.

Sir GUILFORD L. MOLESWORTH, K.C.I.E., President,
in the Chair.

The discussion on Lord Brassey's Paper "Shipbuilding for the Navy" was continued and concluded.