

periments which might be made, with the view of adopting the best possible weapon. Lord Lauderdale said that when the muzzle loader was adopted we had not discovered the proper powder for the breech-loader. Foreign powers were now adopting the breech-loading system, and he was therefore glad to hear that the Government did not consider the question settled. The Duke of Cambridge said that when this question was first brought under his notice there was a strong feeling among naval officers against the breechloading system. He believed many muzzle loading guns to be equally good with the breechloaders, but there was no reason why there should not be an inquiry on the subject and why experiments should not be made on both kinds of gun. One point must not be lost sight of, and that was the question of expense. The country had spent a great deal of money on the muzzle-loaders, and now, if a new system should be adopted, a considerable expenditure would necessarily be incurred. The Duke of Richmond was sure all would agree that it was the duty of the Government to see that the military and naval forces of the country were furnished with the best arms which could be procured, and that duty would not be neglected by the Secretary of war. The cost of the muzzle-loader was less than that of the breechloader, but that was not an important consideration except in a case where a doubt existed as to which was the better gun. Lord Landowne remarked on the dangers of making perpetual changes in the armaments of the country, and added that the experience of several years was, on the whole, favourable to the muzzle loading system. Lord Elphinstone was glad to hear that the Government intended to make further experiments with the breech-loader. Lord Cardwell thought it was an extremely wise determination on the part of the Government not to shut their ears against anything which might be advanced on this subject, but he reminded them that successive committees had invariably reported in favor of the muzzle loading system. Before they made guns, especially those which were to be used in ships, they had better know whether the breechloading process was successful, and successful to such a degree that they could safely trust it in the making of guns; for it should be borne in mind that no steel had yet been used in gunnery which is not liable to explode. If they had ninety-nine guns which did not explode, and one which did explode, such a feeling of consternation would be produced among soldiers and sailors that the one gun would do more harm than the ninety-nine others did good. What they wanted to know was not whether 100 guns could be made ninety-nine of which would not explode, but whether breechloading would prevent the risk of explosion altogether. The men who under the control of the illustrious duke managed the artillery of this country were not behind anybody in their zeal for new inventions, and among the inventions of the last few years none were more marvellous than those which have been introduced into the system of destroying human life. He was informed that the country had got the most powerful gun in the world, but still the Government were right, as there was no finality in inventions, not to refuse the trial of further experiments. The Duke of Somerset rejoined that the projectiles at present used for breechloading guns were more expensive than those which were made for muzzle-loaders. That was a point worthy of consideration from an economical point of view, as the men must practise, even though the projectiles were very expensive. With re-

gard to the suggestion that they ought to ascertain the opinion of the officers of the army, he would remind them that some years ago the officers were in favour of retaining 'Brown Bess.' The return was then ordered."

REAR-ADMIRAL SHERARD OSBORN writes (*Times*, May 3) to put the question respecting naval guns (discussed in Parliament on the 31st ultimo), from a professional point of view. First recognising the Duke of Somerset's successful efforts to substitute "forward" on the doors of Her Majesty's Gun Factory at Woolwich, for the word "finality," Admiral Osborn proceeds as follows:

"His Grace, as well as nearly every speaker who followed him in the House of Lords, acknowledged that the question of breech-loading guns *versus* muzzle-loaders, was essentially a naval question; yet no one added that the sailors had been but little consulted in the matter. The duke also touched upon the subject of the great length of our large muzzle loaders being so immediately connected with the huge size of our ironclads.

"Permit me to attempt, as concisely as I can, to put the matter before your readers from my point of view. The *Sultan*, of 9000 tons burden, only mounts twelve guns, eight of them are broadside ones—viz., four of a side for her main deck, and one a side on her upper deck. The other two are bow guns. Her main deck battery consists of 15-ton muzzle-loaders, each fifteen feet long. The naval constructor had, therefore, in building her, to deal with a beam or width to the ship sufficient to allow two fifteen feet guns to come inboard for loading, and leave room for a small passage way in the rear and the necessary hatchway. These elements, together with the thickness of her side and armour, amount to a big figure, and constitute the beam of an ironclad. The beam, as every one knows, governs the length of a ship, and the two together may be said to govern tonnage, so that it is the great length of muzzle-loaders which to no small extent causes our ironclads to be of such enormous bulk in proportion to their armament.

"Now, a breechloader, apart from all its merits, pretty freely acknowledged in the Lords, should also be a non-recoil gun, and the shipbuilder, instead of having to deal with its entire length, would only have to consider what portion of the gun need be inboard in action; therefore length inboard would be so much less, beam so much less, and the size of the ship greatly reduced. In fact, I maintain that the armament of the *Sultan* in breechloading guns could be carried in a ship of much less tonnage and cost than the *Sultan*, and that we should in such case very quickly recoup the country the four millions already spent in the muzzle-loading system, and for which some are ready to risk the safety of the State.

"Furthermore, assume that a smaller *Sultan* was carrying 15-ton breechloaders instead of muzzle-loaders, and that those guns were fifty per cent. more powerful, as Sir Joseph Whitworth is ready to pit his credit upon, should we not have gained enormously in both cost and power?

"Not only will the breechloaders be such an advantage for broadside ironclads, but the change also means everything in the turret system, whether applied to ships or to coast defence, because for the same reason that we can reduce the size of our ships, so shall we be enabled to lessen the size and ponderous weights of the turret.

"Mr Scott Russel asserts that if we knew what we wanted the country could produce it. My view of our requirements in breech

loading ship guns is simply this: that they shall be constructed of metal which shall bulge or rend in the event of being over tested and not burst explosively; that they shall not be built-up guns, and shall be of one homogeneous metal; that the breech arrangement be so simple that a child may understand it, and so strong that it shall be the last part of the gun to give way; that they shall burn at least fifty per cent. more powder than the present muzzle-loaders, and throw proportionately heavier projectiles; that the gas escape be less than the present service German breechloaders; that the powder to be used shall be quick burning, old, large-grained British powder—that *poudre brutale* which the present muzzle loaders have frightened us from. Lastly, that they be fitted as ship guns in such a way as to be either perfectly non-recoil or else recoil a little and return into their places in the port immediately, so that there shall be neither running in nor running out of the gun in action. Of course, when not in action the guns must be fitted, if necessary, to come inboard, but not necessarily right across the decks of broadside ships. I am told on good authority that these requirements are not in excess of what mechanical genius can now produce."

A correspondent of the *Times*, subscribing himself "A Member of the late Armstrong and Whitworth Committee," answers the assumption that muzzle-loading came into fashion some years back solely because we burnt our fingers with a peculiar system of breech-loading. He says:—

"I was at the time of transition a humble partisan of breech-loading for field and siege artillery, and a member of a committee which fired 20,000 rounds from rival breech loaders and muzzle-loaders, and conducted trials the most searching and exhaustive ever made or likely to be made. I do not say that either the muzzle-loaders or the breech-loaders then used represented finality in guns, but I do say that they presented adequate material for a judgment upon the relative merits of breech-loading and muzzle-loading for field and siege service; and that the committee pronounced judgment upon the intrinsic merits of a case fairly submitted and thoroughly investigated.

"That they had no fault to find with the particular systems of breechloading they had tested was shown by their recommending the breech-loading field gun for boat service and the breech-loading siege gun for case-mates, for flanking ditches, &c.

"If, then, the question of breech-loading field guns is to be reconsidered, new data are not wanting so much as new opinions.

"There is a *résumé* at the close of a French official report upon trials made since the war which is of great interest for us at this moment:

"Notwithstanding a few imperfections, the Woolwich *matériel*, taken altogether, constitutes a first class system of field artillery. The Woolwich wrought 9 pounder gave results which are not inferior to those of any gun actually in service in Europe. These results, however, can perhaps be surpassed. This is the end to be kept in view in the selection of a field gun, and which must be attained in the case of our adopting a breechloader. This method of loading, since it possesses practical inconvenience, must give, in compensation, notably superior results to the best muzzle-loading gun in order to be adopted."

Major-Genl. F. Eardly Wilmot also enters into controversy raised on the above subject. He complains that the letter of Admiral Osborn is scarcely fair. "The Naval Department of the Services (he says) has always,