

"teen 7-inch Palliser rifles in lieu of seventeen 64-32-pounders previously ordered from Woolwich by the Dominion Government.

"The differences of cost between the home manufacture and importation speak for themselves. The efficiency of Canadian manufacture will, I believe, be established by the proof of the gun now being constructed, as well as inferentially from the fact of the success in the United States of the Palliser principle of conversion and construction. I would, however, for the future manufacture in conversion of 64-32-pounders recommend that the A-tube be prolonged about 2 feet 6 inches beyond the muzzle of the cast-iron gun, which would allow of sufficient length for the use of pebble powder, which being slower burning and exercising less strain on the gun, yet gives a higher initial velocity than the *poudre brutale* for which the short Woolwich guns were originally constructed. With the addition of the chamber I believe the 64-32-pounders could be made to penetrate considerably more than 5 inches of iron, as it has already done. The cost of this change would be inappreciable and the practical inconvenience of increased length *nil*, as the preponderance already existing would allow of an increase of 4 feet of A-tube if required for ballistic purposes. I believe it would also be advisable in lieu of studs to adopt the expanding base-ring system so successfully experimented upon at Shoeburyness, and already introduced in the United States as invented by Captain Butler, U.S.A. It will be seen that a system of *gradual conversion* will enable us (at a minimum of cost and maximum of efficiency) to avail ourselves of the scientific experiments carried on at Shoeburyness and elsewhere."

When it is remembered that science has to wait upon her handmaid, mechanical skill, the comparatively circuitous yet progressive march of modern artillery is not surprising. The earliest guns were of great length to allow of the consumption of the weak slow burning powder. They were composite breech-loaders of coiled wrought iron. When the powder was improved, the breech closing apparatus in the infancy of mechanical skill could not be made strong enough, and had to be abandoned for muzzle-loading, the cumbrous length was got rid of. Then the powder, being so improved as to acquire the title of *poudre brutale*, had to be modified as to reduce the strain of enormous charges on monster guns, which will again have to be lengthened and chambered and probably breech-loaded. The diagram perhaps indicates the direction of the next step in the march of artillery. It is not within the scope of this paper to discuss the claims of various systems, and certainly not hastily to condemn our own (which in spite of the impetuous attacks made upon it since the accidental burst of a single gun) has stood the test of time, and will no doubt be further modified to suit modern requirements. Under the circumstances, however, I must respectfully admit that I do not regret that the advice, I presume given by the Colonial Defence Committee, to purchase short Woolwich guns, has not been followed by the Dominion of Canada.

Meantime the batteries of garrison artillery organized at the important points marked on the map should be employed in constructing