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## PATRIOTIC CRITICISM.

Considerable discussion has been evoked by a letter recently published in *The Sun* in which the writer made some very just and timely criticisms upon the guns of our navy. Reference was made in this letter to the fact that in energy and rapidity of fire our larger weapons are greatly inferior to guns of the same caliber now being turned out by some of the leading manufacturers of Europe. In proof of this, certain facts, which are well understood by our ordnance experts, were quoted, and the statement was made that, while it is generally known and conceded that our gunners are the best in the world, it is not generally known that the guns they handle are far from being up to the present standard of excellence. The facts, as given, were perfectly correct. They may be found stated at greater length in the special editions which we have recently issued on naval and coast defence, where the pressing necessity for naval guns of greater rapidity and power is shown by a series of comparative tables.

The publication of this letter, however, drew forth an indignant protest from an ex-officer of the navy, who, after making a series of misstatements, which prove how greatly he and, we fear, many others stand in need of such information as the offending letter furnished, ended with the following statement:

"It is a crying shame that any one who calls himself an American . . . should make invidious comparison with other lands, or try to belittle his own nation."

In a brief but excellent editorial, *The Sun* makes the comment that, while the navy's guns are the best of their type ever made, and the early European guns were not serviceable, this is not true of them to-day, and the high quality of our weapons is no proof that they cannot and, therefore, should not be improved.

As it has been our intention to take up this extremely important question at an early date, we were gratified to see that a conservative journal like *The Sun* had lent its columns to the publication of such a strong criticism of what is undoubtedly the weakest point in our navy to-day, and we congratulate our contemporary on the fearless regard for the truth which prompts it to indorse the necessarily unpopular criticisms of its correspondent.

The late achievements of the navy, the deadly execution wrought by its guns upon the Spanish fleets, render the task of criticism an extremely unthankful one. To the lay mind the statement that the very guns that sunk Montojo's and Cervera's fleets are so far behind the latest productions of some European gun shops as to be distinctly in the second class sounds very captious and untimely. Yet the publication of such a fact with a view, not to the belittlement of the navy, but to its betterment, is more truly the expression of patriotism than to keep silent for fear of wounding the national pride.

It is true that the early and experimental European guns showed signs of failure; it is also true that when we undertook the manufacture of heavy ordnance we profited by their experience—as they did themselves. It is equally true that our guns designed in the late eighties have shown excellent qualities, being in some respects superior to guns of a similar date manufactured abroad. But it is equally true that, while the heavy guns on our ships are chiefly of the 1888 model, foreign powers have gone steadily ahead and are producing weapons which, weight for weight, are from thirty to forty per cent more powerful than our own and possess points of superiority in other points of comparison.

There is no sentiment in statistics. The facts have been demonstrated at the proving grounds and are recorded in the ballistic tables of the various ordnance manufacturers of Europe whose weapons are in the market for purchase by any fifth-rate power that cares to buy them. If Congress had furnished our Board of Ordnance with the necessary funds for experimental work, and if the board itself had been a little more progressive in spirit, the above mentioned criticism would have been uncalled for. As it is, our guns, which were the best of their kind at the beginning of

the present decade, can scarcely be expected to hold their own with the improved weapons of to-day, in which are embodied all the results of ten long years of experimental work by the highest ordnance experts of the old world.

An enlightened and thoughtful patriotism will lead us to look the facts squarely in the face and govern ourselves accordingly. The actual facts regarding the heavy guns which are carried on our crack battleships are such as ought to afford the Ordnance Bureau of the Navy Department the gravest concern. Within a year there will be a battleship afloat carrying 12-inch guns, which, if it should encounter one of our crack battleships, would overmatch her 12-inch guns to the following extent: To an energy of 25,985 foot-tons she would oppose 45,000 foot-tons; to a velocity of 2,100 feet per second she would oppose a velocity of 2,759 feet per second; and while the enemy's guns could penetrate 46 inches of iron at the muzzle, our 12-inch guns could only get through 31 inches. Moreover, the enemy's shells would be delivered in greater numbers and with a much flatter trajectory, thereby increasing the chances of a hit.

It may be answered that the superior marksmanship of our gunners would more than outweigh the superior ballistic properties of the opposing weapons. Perhaps it would; but why subject our men to such a handicap? If our gunners have been trained until they are the best marksmen in the world, the least the nation can do is to furnish them with the best weapon that a modern gunshop can turn out. It is the first duty of patriotism to insist that in all our future warships this shall be done.

## THE WORLD'S SUPPLY OF WHEAT.

The address of the President of the British Association for the Advancement of Science, at the great annual gathering of that society, has come to be regarded as one of the most notable occasions in the scientific world, a milestone of progress as it were, by which we may measure off our advance into the unexplored regions of science. It has so frequently been made the medium for the announcement of the more recent and valuable, we had almost said sensational, discoveries of science, that the attention of the scientific world is fixed upon the president of this renowned association with considerable expectancy when he delivers the annual address.

In the recent gathering, held at the ancient city of Bristol, the inaugural address delivered by Sir William Crookes was of an unusually startling and in some respects sensational character. Choosing as his main theme the question of the world's food supply, he produced a formidable array of statistics regarding the present and probable future ratio between the supply and demand of the world's staple article of food—all tending to show that, before many decades are past, the demand for wheat will be far in excess of the earth's capacity to produce it.

Although Sir William disclaims any intention of being pessimistic, we cannot but feel that his statistics, from whatever source they have been gathered, will bear revision, particularly as regards the wheat-growing area and capacity of the United States; and when one's confidence in the statistics for one country is shaken, a doubt is naturally thrown upon the accuracy and value of the statistics of the other wheat-producing countries of the world.

But while the distinguished lecturer may have been unfortunate in his choice of statistical authorities, there is no questioning the value of the remedy in the way of chemical treatment of the soil by which it is proposed to double the world's wheat supply and stave off the supposed danger for a practically indefinite period.

In 1871, according to the statistics gathered by the lecturer, the bread eaters of the world numbered 371,000,000. Ten years later they had risen to 416,000,000, and at the present time they number 516,500,000. The increase is in a geometrical ratio, for the yearly increase grows progressively larger. To supply 516,500,000 bread eaters will require a total of 2,324,000,000 bushels for seed and food; but the best authorities estimate the total supplies for 1897-98 to be only 1,921,000,000 bushels, which means a deficit of 403,000,000 bushels, which has not been urgently apparent, owing to a surplus of 300,000,000 bushels carried over from the last harvest. Respecting the present harvest year, we start with a deficit of 103,000,000 bushels, and have 6,500,000 more mouths to feed. It is claimed that the reason scarcity and high prices have not prevailed in recent years is found in the fact that since 1889 we have had seven world crops of wheat and rye abundantly in excess of the average, and these generous crops increased accumulations to such an extent as to obscure the fact that the harvests of 1895 and 1896 were each much below current requirements. Hence it is concluded that bread eaters must be fed from the current harvests, and that even a harvest equal to the fruitful yield of 1894 would not prove sufficient for current needs.

This being the present condition of things, the future prospects are determined by the lecturer in a survey of the various wheat-growing countries of the

world. The United States is the chief of the wheat-exporting countries. For thirty years it has been the principal source of the foreign supply, exporting no less than 145,000,000 bushels annually, and the bread-eating world to-day depends largely upon the United States for the means of subsistence. Sir William states that practically there remains no uncultivated prairie land in the United States suitable for wheat growing, and within a generation the ever increasing population of the United States will consume all of its own wheat and be obliged to import from other countries. The withdrawal of 145,000,000 bushels will cause a serious gap in the food supply of wheat-importing countries, with the probability of a dearth for the rest of the world after the British Isles have been supplied.

The statement that there remains no uncultivated prairie land in the United States suitable for wheat growing is so at variance with the facts that it raises a natural doubt as to the truth of many of the statements which follow regarding the other wheat-producing countries of the world. As a matter of fact, there are vast areas of land in the Western States that would now be raising excellent wheat crops if the cost of hauling or of railroad transportation did not render such farming unprofitable. There are other and yet vaster areas in Eastern Oregon, Washington, and other Western States, which will yield abundant harvests of wheat as soon as artificial irrigation is introduced, and in many States further to the east there are extensive areas, formerly devoted to wheat, that would at once be given up to this cereal if the price and demand warranted the change.

The lecturer finds even less comfort in an examination of Russia, the next source of supply to the United States in point of importance. The annual export of wheat from Russia is 95,000,000 bushels, but this supply is regarded as being provisional and precarious. The yield in European Russia is not over 8.6 bushels per acre, and in Siberia the climatic conditions are not favorable to wheat raising, except over a limited area. The ripening of wheat requires a temperature of at least 65° Fah., for fifty-five to sixty five days. As all Siberia lies north of the summer isotherm of 65°, it is ill adapted to wheat culture unless some compensating climatic condition exists. The Russian Minister of Ways and Communications declared in 1896 that Siberia never had produced and never would produce wheat and rye enough to feed the Siberian population.

Canada yields 18,261,950 bushels from 1,290,000 acres of fine wheat-growing land. Performance in this region however has not come up to promise, the wheat-bearing area of all Canada having increased less than 500,000 acres since 1884.

In Australia climatic conditions limit the wheat area to a small portion of the littoral belt. Queensland is stated to have 50,000,000 acres suitable to wheat, but it has never had more than 150,000 acres under cultivation. In South Australia the harvest averaged last year only 3¾ bushels per acre, and in other districts the yield is very unsatisfactory. New Zealand has a climate admirably suited to wheat raising, Denmark and the United Kingdom alone yielding as much per acre. The Zealander, however, finds fruit and dairy farming so profitable that he is not likely to devote his lands to wheat.

Exports of wheat from Austria-Hungary have practically ceased. France imports 14 per cent of her own production and Germany imports 35,000,000 bushels annually. The prospective supply of wheat from Argentina and Uruguay has been greatly overrated. The present wheat area in Argentina is about 6,000,000 acres and there is no prospect of that country ever being able to devote more than 30,000,000 acres to wheat. Of South Africa the lecturer says that wheat culture fails where the banana ripens. In India, though an enormous acreage is devoted to wheat, it has been declining for years. In 1895 over 20,000,000 acres yielded 185,000,000 bushels. One-eighth only of the yield, on an average, is available for export.

Summing up, Sir William Crookes estimates that there is to-day a deficit in the wheat area of 31,000 square miles. When provision shall have been made for feeding the 230,000,000 units likely to be added to the bread-eating population by 1931—by the complete occupancy of the arable areas of the temperate zone now partially occupied—where, asks the lecturer, can be grown the additional 330,000,000 bushels of wheat required ten years later by a hungry world?

The solution of the problem is to be found in artificial fertilization of the soil. Wheat pre-eminently demands nitrogen, fixed in the form of ammonia or nitric acid. All other necessary constituents exist in the soil, but nitrogen is mainly of atmospheric origin and is rendered "fixed" by a slow and precarious process, which requires a combination of rare meteorological and geographical conditions to render it of commercial value. After examining all the present sources of nitrogen, such as ammonia, formed by the distillation of coal, guano, cropping the soil with clover and plowing in the plant, the drainage of our cities, and the saltpeter of Chile, the lecturer concludes that