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THE WAR DEPARTMENT AND OUR NEW FOREIGN POLICY.

It did not require the test of the late war to prove the mettle of the American soldier, or the skill and heroism of the officers that led him into battle; but it did require just such a test to open the eyes of the American public to the woeful incapacity and confusion that reigns in certain branches of the War Department. With all the accumulated experience of the great Civil War to go upon, our quartermaster, subsistence, and medical departments should have been among the most efficient in the world. They were popularly supposed to be so, and the public never doubted, when war was declared, that in the transportation of troops, the bringing up of supplies, and the care of the sick and wounded, we should show something of that characteristic order and method which has contributed so largely to our present industrial supremacy.

The public was doomed, however, to a bitter and humiliating disappointment. The confusion that existed from the first in the Southern camps was merely a prelude to the scenes of inexcusable suffering and neglect which marked the progress of the campaign and the melancholy home-coming of the troops at its close.

Nor can the department be absolved of all blame because great results were actually achieved in the few months of the war. The same results could have been achieved, and should have been, without the terrible accompaniments of neglect and starvation that are causing a thrill of anguish and indignation to pass from one end of the country to the other. The performance of one duty does not atone for the total neglect of another, and the demand of the public for a searching and impartial investigation is both reasonable and just.

Apart from its moral aspects, however, there is another consideration of a very practical nature which makes it imperative that the investigation should be set on foot at once. We refer to the portentous change which has taken place in the foreign relations of this country, and the widespread and complicated field of naval and military operations upon which the nation has entered.

Cuba, with its diverse and bitterly opposed races to be pacified and garrisoned; Porto Rico to be held as England holds Jamaica; Hawaii, in the mid-Pacific, and the Philippines, 8,000 miles away in the Southern Seas, are all likely to become the outposts of military activities, which have hitherto been confined to our own borders and represented by a mere handful of 25,000 men. If the wish of a considerable section of the American people is fulfilled, we shall find ourselves embarked upon a colonial policy which will demand the very highest efficiency in those very branches of the War Department that have broken down so completely in the present war.

If we cannot form and maintain a camp within our own borders without starting so preventable an epidemic as typhoid fever, how, in Heaven's name, are we to maintain permanent camps in the fever-laden towns of Cuba and Porto Rico? If the transportation and nursing afforded our sick troops on a short trip from the West Indies is such that they die, soon after landing, "of starvation, because they do not have food that is suitable to a convalescent," how, we ask, are the convalescents to be brought over the 8,000 miles of ocean that separate Manila from the United States? Yet the work of transporting troops and maintaining them in garrison duty in some of the deadliest climates in the world, of bringing home the sick, of transferring garrisons from one island to another, will have to be carried on continuously as part of our control and administration of these newly acquired possessions. Does any one doubt that, if our present methods were followed, the mortality among the troops would be a repetition of that which is now carrying off our soldiers by the hundred?

Our War Department stands in need of immediate and sweeping reform. This reform is necessary for the double purpose of visiting condign punishment upon the parties who are answerable for the present mortality among our troops and of placing the depart-

ment on a footing which shall enable it to cope successfully with the grave military problems of the future.

AMERICAN PROGRESS IN ENGLISH INDUSTRIES.

The success that has recently attended American competition in those markets of the world which have been hitherto exclusively controlled by the English manufacturers has awakened a reasonable expectation that we would in the course of time obtain a foothold in Great Britain itself.

It now appears on the statement of no less an authority than The Engineer, of London, that the invasion of British markets has not only commenced, but is in very active and aggressive operation. Under the title "American Progress in English Industries" our contemporary gives a very candid review of the situation, which opens with the significant admission that British industry is pressed harder by this country than by Germany—a fact which will be surprising to those who are aware of the inroads which German competition has been making on the British industries.

The article carries special weight appearing in the columns of a conservative journal which has all along professed to make light of the "bugaboo" of foreign competition, and has endeavored to allay the fears of the manufacturers, which, as it now appears, were only too well founded. We publish the article in full in the current issue of the SCIENTIFIC AMERICAN SUPPLEMENT, and must be content to mention here a few of the leading facts adduced in proof of the reality and threatening character of our competition.

A Sheffield manufacturer is quoted as saying that it is best for Englishmen to realize that America is sending over in the regular way of business heavy consignments of steel. American steel is being sent to London and in large quantities to Birmingham. It is preferred for anything that can be made in large quantities by automatic machinery. The manufacturer finds it lower in price, and the workman likes it because its uniform temper renders it easy to be worked smoothly right through and with less wear on the tools.

The writer of the article was shown, in Sheffield, a consignment of American files, just received by a local manufacturer, which cost considerably less delivered in Sheffield (the home, by the way, of the British file industry) than those of domestic make. Moreover, many of the workmen prefer the American files for certain classes of work, and the quantity received in London and Birmingham is stated to be much greater than is generally supposed.

In Birmingham the British manufacturer is using American made brass, "because it is drawn so much truer than the English that it can be worked in automatic machinery with less trouble and greater economy." To these advantages is added that of cost, the American product being from 15 to 20 per cent cheaper. Steam India rubber hose piping, according to another manufacturer, is laid down on his premises from 20 to 25 per cent cheaper than it can be bought in the English markets.

It seems, moreover, that in the smaller sizes of malleable castings we are in a fair way to capture the trade, for not only can they be laid down in Sheffield at fully 30 per cent below the local prices, but (more significant than their cheapness) the workmen themselves openly confess their preference for the American production, on account of its truer and more uniform quality. The large industrial establishments, moreover, unable to obtain what they want in England, are adopting American labor-saving machines in large quantities, and admit that they would not be without them.

Our contemporary is correct in the assumption that the business of supplying these American inventions to British industries is only just beginning. It frankly admits that "there is no denying the advance of the American, both in his methods of production, his application of those methods in the use of the machinery by which they are applied and the men by whom they are worked." This remarkable article concludes with the suggestion that a healthy discussion of the subject would be seasonable.

We think that the first act of self-preservation on the part of British manufacturers should be to teach the average British workman that labor-saving machinery is worthless without a labor-saving workman to run it. The great struggle of last year, known as the engineers' strike, was fought out over this question, and the principle was established by the collapse of the trade unions in their attempt to limit the output of machinery. It will be interesting to see whether the British workman has yet grasped one of the chief, if not the chief, secrets of our industrial pre-eminence.

ARTIFICIAL FOODS.

The announcement that Prof. Lilienfeld had read a paper before the International Congress for Applied Chemistry, at Vienna, on the artificial production of albumen has made a profound impression on both scientific and lay readers. It has proved a boon to the papers, which have begun to settle down into midsummer dullness, after the stirring days of the war. It has given them an opportunity to reel off column after column, with such captions as "We Will Get Along

Without Meat," "Dining à la Tablet," "Aliment per Capsule," and equally sensational headings which the subject hardly warrants. It will doubtless prove interesting to some of our readers to examine a few statements which have been made, and to see what has actually been done.

Dr. Lilienfeld in his paper describes the artificial synthesis of albuminous substances which form an essential element of nitrogenous foods. He found it possible to prepare pepton hydrochloride by the condensation of phenol and glycocoll with phosphoric oxychloride. The substance thus obtained gives all the reactions of albuminoids. The lecturer demonstrated the preparation and properties of the new compound. By previous conversion into the sulphate and decomposition of the latter, free pepton was obtained which resembled both in its chemical and physiological behavior the natural pepton from albumen. The analytical data corresponded with those given by natural pepton. From what has been said it will be seen that Dr. Lilienfeld does not claim to have made albumen by synthesis, but to have made pepton a digestion product of albumen. Chemists will not be readily convinced that pepton has been really synthesized, as a proteid molecule is so complex, mobile, and of such high instability that a change in its constitution may readily be brought about, so that until more definite tests have been made, and until Dr. Lilienfeld pleases to give more of the details of his processes, which he holds secret at present, pending the issuance of a patent, chemists will be apt to suspend judgment.

Even if artificial albumen may be produced at a moderate price, it does not necessarily follow that it will in any way tend to solve the problem of food supply, and we are not sure as yet that the new product is physiologically identical with that produced in Nature's laboratory. Pure albumen has been made on a large scale and it is not at all dear, but we are not aware it has ever occupied an important position, in dietetics or that it has been proposed as a substitute for ordinary articles of food; so that it is really absurd to think the time will come when we shall carry about a complete meal in a pill box, and, like the artificial diamond, Prof. Lilienfeld's discovery may not be valuable from a commercial point of view, certainly not while glycocoll is selling for some \$75 a kilogramme.

The subject of chemical synthesis is an important one, and in Germany alone in scores of laboratories chemists are actively experimenting along this line, which has in the past yielded discoveries which have netted large fortunes. Substances which were formerly produced only by the slow processes of Nature are now "built up" in laboratories and the products successfully meet every test.

The peculiar thing about these synthetic products is that they are far less costly than those which are made from the organic substance, usually a plant. If the substance to be produced is an extract, instead of crushing and distilling the plant or bean, the chemist proceeds to make up his product working backward, as it were. It is only necessary to cite one example of such a process. Take artificial flavoring extracts, for instance. Raspberry essence may be made by taking 4 parts of glycerine, 1 part nitric ether, 1 part aldehyde, 5 parts ethyl acetate, 1 part ethyl formate, 1 part ethyl butyrate, 1 part ethyl benzoate, 1 part ethyl cœnanthate, 1 part ethyl sebocate, 1 part methyl salicylate, 1 part amyl acetate, 1 part amyl butyrate, 5 parts tartaric acid, 1 part succinic acid. These various chemicals are added to 100 parts of alcohol. This gives an excellent imitation of the flavor of the raspberry, and it is largely by such formulas as this that our artificial fruit essences which are sold to such a large extent are made. Those who have refined taste in the matters of fruit flavors are not deceived by such imitations, however. "Vanillin," the substitute for vanilla, is another example of a synthetic compound.

Discoveries along these lines have enormous commercial possibilities, and no one outside of the active field of chemistry knows what great strides have been made in chemical synthesis. There has been rather less success in foods than in other lines, possibly from the fact that there is no such chance for profitable manufacture as in technology. It is along coal tar lines that most of the important work has been done. Now we have drugs and colors which a few years ago could only be obtained from natural products at enormous expense. Modern chemists find laboratories freely open to them, especially in Germany, where every facility is offered to them in the hope that finally they will make an important discovery. One German professor of chemistry is said to have made over \$40,000 in a single year on one coal tar product. Indigo is successfully produced artificially, and alizarine has replaced madder root for a red color, and is now used as a base and can be combined chemically to get any color. Chemists have also succeeded in making artificial morphine, and they have been able to make artificial caffeine, the essential principle of coffee.

The new coal tar drugs have taken a most important and aggressive position in modern medicine. The alkaloids which were formerly extracted from various plants are now made in the laboratory. Oil of

wintergreen is produced artificially, and the bitter almond oil is even better than the natural product, as it contains no prussic acid. Artificial sugar, not saccharin, has been produced in the laboratory, but not on a commercial scale, and artificial alcohol has also been made. There are great possibilities in the utilization of by-products and waste products of all kinds. One chemist has recently discovered the means for utilizing the spent yeast of breweries in the making of a meat extract substitute.

Let us hope the day will never come when the older methods of eating with which we are familiar will be superseded by artificial foods, though this would please our vegetarian friends. If we had fifty articles of diet like artificial albumen, there is no reason to believe that we should be any better off than we are at present. Indeed, we would probably require almost as much food as we do now for the waste material which the human economy requires. Artificial foods have never been very popular, and are not considered very healthy. It is very probable that if the time ever comes when a considerable portion of our food is produced in the laboratory, the world will be attacked by such an epidemic of dyspepsia as it has never before seen.

Food is both an index of the civilization attained and a factor in the attainment, and as eating and drinking became a finer art, life became more refined and manners more attractive. There is, indeed, a sentimental side to it, and while living would be immensely simplified, the great institution of society, the dinner, would soon become a thing of the past and Brillat-Savarin would become as antiquated as Lycurgus. We would indeed "return to nature" with a vengeance, but not in the way of which Rousseau dreamed. The subtle delights connected with all our favorite dishes would soon evaporate, and we doubt if we could endure very long to have our food produced in the laboratory of some great syndicate instead of in our own private laboratory—the kitchen.

THE ARMAMENT OF OUR NEW WARSHIPS.

On another page we publish the official drawings and a digest of the findings of the Naval Board which examined the wrecks of Cervera's fleet. We wish to draw particular attention to the tabular analysis of the gun-fire of our fleet, showing the number of hits made by each caliber of gun, and the ratio of the number of hits to the number of guns engaged for each caliber. The data contained in the table is among the most valuable of all that has been gathered during the war, and it is to be hoped that it will exercise a powerful influence upon the designs for newer and more up-to-date ordnance which we presume are being prepared by the Bureau of Ordnance for the armament of our future warships.

In the comparison of the relative efficiency of each caliber and type of gun, as shown by the ratio of hits scored to number of guns employed, it must be borne in mind that the table takes no account of the number of shots each gun fired—it is based merely upon the hits actually scored and the number of guns that could be brought into action. However, as the Spanish cruisers were at all times within range, at least of the large guns, it is reasonable to suppose that all of the guns that could be brought to bear were actively engaged throughout the whole of the engagement, and that the number of hits for each gun is a test of its relative efficiency.

The figures in the table are a powerful indorsement of the rapid-fire type of gun. Commencing with the "no hit" record of the 13-inch gun, and $\frac{8}{100}$ hit per gun for the 12-inch, there is an increase as the caliber diminishes, the 5-inch rapid-firer scoring $2\frac{1}{2}$ hits and the 4-inch rapid-firer 4 hits per gun. The low figure for the 1-pounder is due to the range being too great, and in a less degree the 6-pounder was similarly affected.

Evidently then we ought to aim at reducing the weight and increasing the rapidity of the heavier armament of our warships. As we recently pointed out, 10-inch 30-ton guns are being built of equal penetrating power to our 13-inch 60-ton guns, and there are 8-inch 18-ton guns whose penetration is equal to that of our 10-inch 27-ton guns. The smaller modern guns are not only more rapid in their fire, but their trajectory is much flatter and the chances of scoring a hit are that much better. If only a few out of every hundred shots fired reach the mark, it is an obvious advantage to fire the largest number of shots in the shortest space of time, and for this kind of work a gun that weighs over 30 tons is altogether too slow. In view of the terrific destruction worked by such 8-inch shells as did land on the cruisers, it would seem desirable to retain this caliber on our future ships, especially as an 8-inch rapid-firer can now be built that will deliver 4 or 5 shots per minute.

LANGUAGES OF THE PHILIPPINES.

According to a Spanish missionary, who resided eighteen years in the Philippines, there is no language that is common to all the islands, but each canton has a dialect peculiar to itself. All these dialects, however, have some affinity, somewhat like that which exists

between the Italian dialects of Lombardy, Sicily, and Tuscany. On the island of Luzon there are six dialects, some of which are current in the other islands. The most universal are the Tagala and Bisaya. The latter is very coarse, while the former is more polished and peculiar, and to such a degree that a Roman Catholic missionary who had a thorough knowledge of everything pertaining to the islands was accustomed to say that the Tagala language had the advantages of four of the principal tongues of the world: that it was mysterious, like Hebrew; that it had the articles of the Greek, as well for appellations as for proper nouns; that it was as elegant and copious as Latin; and that it was as well adapted as Italian for compliments and negotiation.

The natives make use of but three vowels, and have but twelve consonants, which they express differently by placing a dot above or below them. They have learned from Europeans to write from left to right, instead of from top to bottom, as they formerly wrote.

Palm leaves were formerly used for paper, and an iron style for a pen. They use writing for correspondence only, as they have no books of science or history. The missionaries have had religious works printed in the various dialects of the islands.

The natives of the Moluccas have a very pleasing way of corresponding with their friends. They arrange flowers of different colors in a bouquet in such a way that the receiver understands, by examining the varieties and their shades (which represent so many characters), what his friend intended to say to him.

THE UNDEVELOPED RESOURCES OF CUBA.

Whether Cuba becomes permanently a part of the United States or not, American brains and capital will largely contribute toward the development of many hitherto unsuspected resources, and the island that has so long suffered from misrule may be expected to blossom as the rose. Probably no more promising field for making money through legitimate and wisely directed toil has presented itself to the American youth in this century than does the "Pearl of the Antilles," now that the last vestiges of Spanish oppression have disappeared.

While sugar and tobacco have been the principal commercial products of Cuba, their importance may soon be equaled by others less generally known. The soil and climate of Cuba are eminently adapted to all tropical fruit and vegetable culture. In fact, these products grow so luxuriantly and naturally there that the natives raise all they need for home consumption without any effort. Bananas grow wild in the most extravagant manner, but the variety is poor and needs only a little scientific culture to make it equal to any imported into the United States. We import some 15,000,000 bunches of bananas into this country every year, and Cuba could produce every one at a nominal cost. Probably the banana, next to the coconut, is the best poor man's fruit. It grows without much cultivation, and hence it is the lazy man's fruit as well. But when we come to oranges and pineapples, it is quite a different matter. These two fruits require cultivation and the most careful handling from the time the plants are started until the fruits reach market.

The Cubans and Spaniards were never willing to pay the price of labor and attention required to make the raising of pineapples and oranges profitable. Long before the war the industry, such as it was, had drifted into the hands of Americans, who systematically cultivated a few plantations, and shipped their products to the United States. The native owners of an orange grove would gather their fruit by shaking the trees or rapping the limbs with poles. Fruit thus harvested and shipped to this country was naturally in poor condition, and half the cargo would decay on board the steamers. The oranges were packed in barrels with the same utter disregard for their tender qualities, and less system was employed in this work than an American would give to potatoes.

It was only natural that shipping oranges to the United States under such conditions should prove unprofitable, and that in time energetic Americans should go into the business and raise and ship oranges at a good profit. Oranges grow as easily in Cuba as they do in Florida or California. There are thousands of semi-wild groves scattered throughout the island which produce fruit so inferior that they are of little value for market purposes. These trees, however, can be budded and grafted with fine Florida oranges, and in two years they can be made to yield large crops of exquisitely flavored fruits. There is an opportunity for making a fortune in securing these neglected trees such as the early growers found in Florida when they first realized the value of the wild Indian orange trees.

The pineapples of Cuba can be raised to perfection. The famous Porto Rico "sugar loaf" pines can be duplicated in Cuba. People never realized what enormous and delicious "pines" could be produced under good cultivation until the London gardeners raised them in hothouses. Two years ago these magnificent pineapples from London hothouses were imported into this country, and sold as high as \$3 and \$4 apiece. They were as superior to the ordinary pineapple as a modern

Florida orange is to the semi-wild product of the old Indian groves. It is believed that fully as fine pineapples can be raised in Cuba as ever came out of an English hothouse. The soil, the climate, and all other conditions are favorable to the perfect development of the fruits, provided the owner is willing to give the necessary labor and intelligence required for the production of all fancy fruits. It is this knowledge and skilled labor that Americans can and will supply.

Other fruits of great commercial value flourish in Cuba like the proverbial green bay tree. Lemon trees reach a superb size there, and the fruits are equal to the famous imported La France lemon of the Mediterranean shores. But no effort has been made to raise lemon groves systematically. Coconuts are native products of the island, and they thrive without apparent effort in the rich soil. The grape fruit, shaddock, lime, and similar semi-tropical fruits, which have obtained a small foothold in Florida, grow wild in Cuba. Many little known fruits, such as the guavas, sapotas, sapodillas, and kumquarts, are commonly found in all parts of the island. Many of these have peculiar flavors, and it requires a residence in the island to make one acquire a taste for them. On the other hand, there are many tropical fruits raised in Cuba that only need to be tasted by Americans to be appreciated. These can be cultivated with every prospect of success.

But if fruits are important products of the Cuban soil, what must one say of the vegetables? These grow and yield crops about every month in the year. Tomatoes are as plentiful as sands on the seashore. Vines never cease to produce fine tomatoes. In mid-winter it is possible to purchase in Cuba corn, celery, lettuce, tomatoes, and artichokes cheaper than in our American cities in midsummer. The plants simply revel in the warm, moist climate.

Winter market gardening must, therefore, figure prominently in the future Cuban industries. Good market land is cheap and plentiful. With ten to twenty acres, an enterprising American farmer could raise all the vegetables he could use, and ship enough to the United States to pay him a moderate income. The truck gardening of Cuba has been even less developed than its fruit industries. The vegetables need not come in competition with those from our Southern States, for the time of shipping them north would naturally be in the early part of our winter. Then consignments of fresh vegetables direct from Cuba, in fast steamers, would find ready purchasers in many of our principal cities. We may soon expect to have watermelons in March and April, green peas in December and January, and tomatoes all the year round.

Market gardening in Cuba would be the easiest sort of work that a farmer could undertake. With considerably less cultivation than we give to our gardens and farms in the United States, fruits and vegetables produce remarkable crops, and, without fertilizers, the same land continues to raise plants and their fruits with prodigal luxuriance.

Onions and potatoes raised in Cuba are equal to any imported from Bermuda, and they could be shipped to the United States at less cost than from the latter place. In a very few years American brains and industry could monopolize most of the trade in tropical fruits and winter vegetables, which is now controlled largely by alien West Indian planters.

The effect that all of this development of latent Cuban industries would have upon our coast trade can readily be imagined. Already several new steamship lines are in the course of preparation for what is expected to be an active trade with Cuba when the war ends. It is the opinion of shippers that the trade with the island, when once begun, will develop quickly, and new industries will spring up with such marvelous rapidity that the "booming" of our own Western States in the past will be completely cast into the shade.

Besides the fruit industry, it is expected that Cuban mines will show unusual resources, and that much of our machinery will be needed to develop these. Iron ore is so plentiful in various parts of the island that American steel manufacturers have established mills there in the past, and one American firm has nearly \$3,000,000 invested in iron mines near Santiago. The copper mines of Cuba are also known to be rich, but the real extent of their contents is not definitely realized. In the great mountain chains that rib the center of the island gold and silver have also been discovered, but so far no mining for the precious metals has been attempted. Under the Spanish rule the mineral resources of Cuba have never been thoroughly examined, and no one has ever attempted to mine systematically for such products.

Thus, the outlook for hardheaded capitalists and energetic business men from the United States is promising in Cuba, whether the United States extends a protectorate over the island or merely shows a fatherly interest in helping the home government to maintain peace and order. All that is required for Americans to develop the industries of the island is a stable government, which will guarantee to protect their rights and make a peaceful existence on the island certain.

G. E. W.