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NEW YORK, SATURDAY, MARCH 11, 1905.

The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

A PORT ARTHUR MYSTERY EXPLAINED.

Thanks to the courtesy of the officers of the Port Arthur fleet, one of whom devoted a whole morning of his brief stay in New York to an interview with the Editor, we are enabled, in the present issue, to answer, in great detail, a question which was uppermost in the minds of most of us during the various operations of the Russian fleet at Port Arthur. We refer to the fact that ships which had been torpedoed or mined, and were, therefore, supposed to be out of the fight for good, would reappear, apparently in good fighting trim, in an incredibly short time after the various disasters. It was known that there was but one drydock available at Port Arthur, and that it was not large enough to admit more than one vessel at a time. By what magic then, we asked, were these awful injuries repaired, and the prognostications of experts, naval and amateur, as to the supremacy of the torpedo so rudely set at naught?

The answer to this question, as given in the article published elsewhere in this issue, will possess a fascinating interest, particularly as this is the first time that the facts have been made known to the world. Moreover, the story, coming as it does direct from some of the chief participators in that wonderful naval and military struggle at Port Arthur, is not without a touch of true dramatic interest over and above that due to its technical features. Throughout the course of the war we have recorded, either by pen or picture, every event of leading importance as it transpired; but necessarily this record has been chiefly a story of the successes of the Japanese fleet. It gives us, therefore, much pleasure to present this authentic account of the magnificent effort made by the officers and men of the Russian imperial navy to retrieve the disaster that fell upon them on that memorable night of the 8th of February, 1904.

PROPOSED MANHATTAN LOOP FOR BROOKLYN ELEVATED ROADS.

That the whole system of transportation in the city of Brooklyn is in a wretched state of inefficiency goes without saying. The tracks are rough, the cars, which are too light for their work, are poorly heated, and their motors are of insufficient power for modern requirements. The service on every line, surface or elevated, is altogether inadequate, and on every possible point of comparison the system is years behind that which can be found in many smaller cities of America that do not compare in extent and population with Brooklyn. The most important duty that the Brooklyn lines perform, or rather fail to perform, is that of getting the busy toilers to and from their work on Manhattan Island with some degree of dispatch and comfort. The B. R. T. which, being interpreted, stands for Brooklyn Rapid Transit, is a vast combination of several ill-assorted and unrelated street and elevated roads, upon which the unfortunate Brooklynite is dependent for his means of getting about. For various reasons, which do not come within the province of a technical paper like the SCIENTIFIC AMERICAN, this B. R. T. is in a state of poverty and disrepair which is a disgrace to New York city, and must be seen to be appreciated.

We said that the chief duty of the B. R. T. is to get the Brooklyn toiler to his work and back again, with comfort and dispatch. He is brought in; he is taken back; but not with comfort and dispatch. Rather is he herded, driven, loaded, and unloaded, under conditions as to space and air, and even cleanliness, which remind the writer forcibly of a certain half-hour when he stood pitifully regarding a herd of "dumb driven cattle" that were being unloaded at the Chicago stockyards. There is a saying among suburban railroad men that "the money is in the straps." Judged on this basis, the B. R. T. should be simply smothered in wealth; for at certain hours of the day a strap is a luxury so scarce on a Brooklyn car as to provoke a competition for its possession, only less strenuous than the headlong rush to secure a coveted seat.

There are many causes that contribute to this transportation fiasco. One of these is the fact that each of the two bridges across the East River is a terminus, and that there is no connection whatever between them. The trains and cars that cross to Manhattan, unload and receive their hundreds of thousands of passengers at two separate centers which are not related either to each other or to the general system of transportation on Manhattan Island. It has long been recognized that the only sensible way to prevent the useless congestion at these two terminals is to connect them by a system of tracks, and thereby form a loop around which the trains can circulate, unloading or receiving their passengers at various points on Manhattan.

Just now there is a spirited controversy as to whether this loop shall be built by way of an elevated structure or a subway. It is the laudable wish of the Rapid Transit Commission to prohibit the erection of any more elevated structures, and build all future extensions of existing roads in subways. They would prefer to connect the two bridges by a subway below Center Street. The Brooklyn cars would then cross the East River by one bridge, pass down by a four per cent grade into the Subway, and return by the other bridge, thence making the circuit of their various routes on Long Island.

To this scheme the Brooklyn Rapid Transit Company is unalterably opposed, being in favor of the connection of the bridges by an elevated structure over the same route proposed by the Rapid Transit Commission. Although it is not so stated, the B. R. T. objection is based upon the facts (well known among railroad men) that the equipment of the Brooklyn elevated roads is unsuitable for use in the Subway. The majority of the cars are too light, weighing much less than the heavy Subway cars; they are not fireproof; and their electrical outfit, motors, wiring, etc., if it used the higher tension current with which the Subway is equipped, would be liable to constant short circuits and danger of fire. On the other hand, if the B. R. T. were equipped with heavier cars to match the Subway electrical installation, it would become necessary to strengthen the whole of the Brooklyn elevated structures. Hence the use of the proposed Subway loop by the B. R. T. would necessitate an outlay altogether of from $7,000,000 to $10,000,000. Of course, the very best thing to do at present would be to build the Subway, and make the necessary improvement in the rolling stock and elevated structures of the B. R. T.; but this company is (or claims to be) so impecunious as to be quite unable to face the outlay. All things considered, we think that in the present dilemma, the suggestion made at the last meeting of the Rapid Transit Commission is worthy of at least careful consideration. It was proposed to build an elevated structure between the two bridges, with the understanding that it is to exist only for a period of five years, during which it would be leased by the B. R. T. At the end of that time the proposed Subway loop beneath the East River and through certain districts in Brooklyn will be in operation. By this time, also, it is to be hoped that the B. R. T. will have recuperated to the extent of being able to bring its equipment up to the level of that of the Rapid Transit Subway in New York.

NEW EXPERIMENTS IN TURPENTINING.

The old system of boxing southern pine trees for the production of turpentine and resin has very greatly reduced the pine timber wealth of the Southern States. Three years ago the Bureau of Forestry determined that something should be done to eliminate so destructive a method of procuring naval stores. Its three years of experiments toward this end have demonstrated that a new system of turpentining, which requires the use of earthen cups and metal gutters, not only greatly conserves the life of the timber tapped, but also gives an increased yield of resin, and therefore a greater profit than is possible by boxing. The box method and the new cup and gutter system of turpentining are fully described and illustrated in Bulletin No. 40 of the Bureau of Forestry.

While the new system is not yet in use by all turpentine operators, its application is extending as rapidly as the necessary equipment can be secured. At present there is but one company supplying the kind of cups and gutter iron required. It is hoped, since the demand for this material is very great, that in the near future the supply will be sufficiently increased to enable turpentine operators to procure the needed equipment.

While, in the work just completed, the Bureau of Forestry has performed an important service to the turpentine industry, it feels that a still more conservative method of turpentining can be found which, consistent with a maximum yield of turpentine, will inflict the smallest possible injury upon the trees. With this in view, the Bureau has begun an entirely new line of field experiments, in order to determine to what extent the wound now made in tapping the trees can be lessened.

The principal experiments now set on foot comprise the practical working of a number of different turpentine crops. One set of trees will be used to determine the best width of face to be cut on trees of different diameters.

Another set of trees will be used to demonstrate the rate in height at which weekly chipping should proceed, in order to stimulate a full flow of resin. It is believed that the weekly chipping now practised cuts away in height, at one time, too much of the living wood. At present this upward chipping amounts to about 18 inches every year, and it is thought that this can be reduced at least one-half or two-thirds. Such a saving in face height will permit a considerable increase in the number of crop years, which should give a much increased total yield of resin, as well as reduce the demand upon the area of pine forests. There will also be an economy for operators in not having to move their equipment from one set of trees to another as frequently as is the case at present.

Still another set of trees will be devoted to finding out how deep toward the center of the tree each streak should be chipped. Under the present practice, it is believed that an unnecessarily deep cut is made, thereby greatly reducing the vitality of the tree and consequently its capacity to produce resin.

WIND PRESSURE ON BRIDGES.

Referring to our recent discussion of the question of the proper amount of wind pressure to provide for in bridges, a correspondent draws our attention to the fact that no mention was made of the extra surface which is presented to the wind when a train moves onto a bridge. He asks whether this surface should not always be taken into account, and its effect provided for in calculating the wind stresses on any given span. Our correspondent is entirely right in supposing that allowance should be made for train surface, and indeed this is always done. It was not our intention, in the article referred to, to cover the whole question of wind pressure, but merely to draw attention to the fact that the unit pressure adopted has been unnecessarily large, and to give the process of reasoning by which our engineers have arrived at the lower figure which is now likely to be generally adopted. It is probable that in the early days of bridge designing, no account was taken of the great increase in the area of a bridge which takes place when a train, or even a large number of horse-drawn vehicles, is crossing a bridge. The proportion of the train surface to the bridge surface, and consequently of the strains due to each, will of course be very much larger in the shorter spans. In the longer bridges the proportion will rapidly decrease; but it can never reach a point, even in a structure of the length of the Brooklyn or the Forth bridge, at which it becomes a negligible quantity. There can be little doubt that it was the increase of surface due to the entrance of the passenger train upon the big spans of the Tay Bridge, that was the immediate cause of their being blown bodily sidewise into the river.

STUDIES OF THE FOOD VALUE OF FRUIT.

At the University of California, Prof. M. E. Jaffa has carried on, in co-operation with the U. S. Department of Agriculture, a number of investigations which have to do with the food value of fruits and nuts, the special object of this and the earlier work which it continues being to study the value of such foods when they constitute an integral part of the diet.

Nine dietary studies and 31 digestion experiments were made, part of them with persons who had lived for a number of years on a strictly fruit and nut diet, and others with university students who had been accustomed to the ordinary fare. In the majority of the dietary studies and all but one of the digestion experiments fruit and nuts constituted all or almost all of the diet. Thus, in one series of tests the daily ration consisted of apples and bananas, alone or in combination, eaten with walnuts, almonds, Brazil nuts, or pecans. In other experiments different combinations of grapes, pears, figs, walnuts, and other fruits and nuts were eaten with small quantities of milk, cereal breakfast foods, etc., the latter articles being taken simply to give a relish to the experimental dietary combinations, some of which were rather unusual.

In connection with this work the nutritive value of individual fruits and nuts was studied and many data were collected and summarized regarding the composition and energy value of these materials, an interesting feature of the work being a comparison, on a pecuniary basis, of these and some common foods as sources of protein and energy. In general, it may be said that the chief nutrients in fruit consist of sugars and other carbohydrates and in nuts of protein and fat. In other words, while both fruits and nuts furnish the body with energy, nuts furnish some building material (protein) as well. Some idea of the range may be gained from the fact that at ordinary retail prices in the United States, 10 cents expended for fresh grapes will supply the body with about 830 calories of energy, and in the case of dried apples or apricots will supply about 1,200 calories, as compared with 6,600 calories from 10

cents' worth of wheat flour. In the case of almonds this sum will supply 0.08 pound protein and about 1,100 calories of energy, and in the case of peanuts 0.28 pound protein and about 2,800 calories, while expended for cheese it would provide 0.17 pound protein and about 1,300 calories, and for flour 0.46 pound protein, as well as the large amount of energy noted above.

Although some of the dietaries showed that it is quite possible to obtain the needed protein and energy from a fruitarian diet, the majority of those studied fell below the tentative dietary standards. It is hardly just to ascribe this entirely to the form of diet since the same people might have consumed no larger quantities of nutrients on an ordinary mixed diet. The nutritive value of the fruitarian diet is perhaps most clearly shown in the case of one of these subjects, a university student, who though entirely unaccustomed to such fare gradually changed from an ordinary mixed diet to one of fruits and nuts without apparent loss of strength or health. He was then able for the eight days of the experiment to carry on his usual college duties and for a part of the time also performed heavy physical work on an exclusive fruitarian diet without material loss of weight.

The cost of the fruitarian diet per person per day varied from 18 to 46 cents, values which compare favorably with those found for an ordinary mixed diet.

Although it is undoubtedly advisable to wait until more data have been gathered before making definite statements regarding the digestibility of different fruits and nuts, enough work has been done to show that they are quite thoroughly digested and have a much higher nutritive value than is popularly attributed to them. In view of this it is certainly an error to consider nuts merely as an accessory to an already heavy meal and to regard fruit merely as something of value for its pleasant flavor or for its hygienic or medicinal virtues.

As shown by their composition and digestibility, both fruit and nuts can be favorably compared with other and more common foods. As sources of carbohydrates, fruits at ordinary prices are not expensive; and as sources of protein and fat, nuts at usual prices are reasonable foods.

In the investigations at the University of California the question of the wholesomeness of a long-continued diet of fruit and nuts is not taken up. The agreement of one food or another with any person is frequently more or less a matter of personal idiosyncrasy, but it seems fair to say that those with whom nuts and fruits agree can, if they desire, readily secure a considerable part of their nutritive material from such sources.

THE DANGERS OF DINING.

BY HUGO ERICHSEN.

Of late, food adulteration has become so common, that most of the State legislatures felt called upon to pass pure food laws, which are an effective safeguard against sophistication when enforced. But are they enforced? Is it not barely possible, in view of recent disclosures, that the position of food commissioner may afford petty politicians an opportunity for "graft"? In such a case neglect of duty would flood a State with foods that, while not positively harmful to health, are certainly not what they pretend to be. A few instances will suffice. Green tea is generally adulterated with soapstone, gypsum, China clay, indigo, turmeric, or graphite. The bulk and weight of coffee are increased by the admixture of numerous roasted grains; and some years ago letters patent were issued for the manufacture of a pressed coffee bean containing absolutely no coffee at all. Sugar and the various starches are commonly employed in the preparation of the lowest grades of cocoa and chocolate. Imitation butter consists mainly of lard, and, as might be expected, this material also enters largely into the composition of certain compounds dignified by the name of cheese. Two barrels of flour are made out of one by the addition of potato starch. The grocers of yore considered themselves pretty shrewd when they added a liberal quantity of sand to their supply of sugar. But the methods of their successors are far more subtle. And for the unsophisticated layman, it is indeed almost impossible to detect the adulteration of sugar with glucose, unless he has recourse to a chemist. Most of us have seen pickles that appeared to be preternaturally green, and, presumably, many a housewife has been filled with despair at being unable to obtain this beautiful color in "putting up" vegetables. The greening of these pickles is effected by the addition of sulphate of copper to the water in which they are boiled, a proceeding that is strongly condemned by sanitary authorities.

When sulphate of copper is indicated medicinally, however, the eating of these pickles might be a good way to introduce it into the system. Some day, in place of the druggist, we may have a dealer in medicated foods! Imagine a physician prescribing fruits preserved with salicylic acid in a case of rheumatism, or recommending milk containing formaldehyde to a patient requiring an intestinal antiseptic!

Somehow formaldehyde, in my mind, is closely associated with the lacteal fluid. I have no particular desire to slander the milkman, but presume it may be regarded as an accepted axiom that the milk sold in most of our large cities is impure. In some communities, as I know by experience, the so-called inspection of milk is a farce, and intrusted to men as a recompense for political services rather than because of efficiency.

The recent typhoid fever epidemic at Ithaca, N. Y., shows how the water supply of a whole city may be polluted. Now suppose that milk cans are rinsed out in this water, and you have an idea how the typhoid-fever germs might be transmitted to the customers of a milk route. Nor is this illustration without precedent. Several cases have been cited by authorities on the subject, in which milk was thus contaminated.

Auto-intoxication is a condition with which many persons are afflicted without knowing its precise nature.

Some folk are taken violently ill after the ingestion of strawberries, butter, peas, beans, crabs, or canned asparagus. That is to say, they cannot eat any of these articles of diet without experiencing very unpleasant consequences, although they may consume every other kind of food with impunity. Apples, although generally regarded as most wholesome, do not agree with everybody.

But the dangers arising from auto-intoxication and idiosyncrasies are not the only ones that threaten the epicure. There is always a possibility of mistaking poisonous fungi for mushrooms. It is an old saying that the best way to tell the difference between a poisonous fungus and a mushroom is to eat it—if one lives it is a mushroom, if one dies it must have been a toadstool.

It is strange yet true that some animals develop immunity with reference to certain poisons. For instance, it is a well-known fact that hares and rabbits feed upon the leaves of the deadly nightshade with impunity. In the course of time, however, a sufficient quantity of atropine is deposited in their muscular tissues to poison anyone who may use them as food. For this reason, it is advisable not to dine upon rabbits in regions in which the belladonna plant abounds.

The dangers of eating tainted meat are well illustrated by an occurrence at Middleburg, Holland, where 256 soldiers and 36 citizens were prostrated after eating meat from a cow that had been killed while afflicted with puerperal fever. Ballard, to whom we owe this report, also refers to fifteen cases of ptomaine poisoning, with one death, that were caused by the ingestion of baked pork. Ptomaines are found in many articles of food besides fish and shellfish, and their presence cannot be easily ascertained. In Arizona whole families were poisoned by eating fish, and yet the fish did not give forth any perceptible odor. Ptomaines are formed in edibles through chemical changes, and are not due to the uncleanliness of the receptacle in which the food was kept or carelessness in serving it.

At Wellback, England, 72 persons were poisoned with boiled ham that was served as a lunch, during an auction sale, by the proprietress of a neighboring hotel. Of these unfortunates, four died.

According to statistics, sausage poisoning is a rather common occurrence. By bacteriologists it is commonly ascribed to the presence of an anærobic bacillus. The toxemia partly involves the digestive tract and partly the nervous system. Kerner reported 155 cases of sausage poisoning, with 84 deaths. Most of these occurred in Wuertemburg and Baden, Germany, where the methods of curing sausages favored putrefaction. Mueller recently reported 124 cases of sausage poisoning, and stated that 6 died within 24 hours out of 48 cases that proved fatal.

Among the most recent reports concerning ptomaine poisoning, two are particularly interesting. One of these pertains to the case of Comte Lionel de Laubespin, of Paris, who died in the early part of June, 1904. The count, with a dozen other guests, including the Marquis de la Guiche, partook plentifully of duck *à la Rouenaise*. All were ill next day, but the count alone succumbed. To cook Rouenaise duck, the bird is strangled and the blood coagulates. The meat, therefore, quickly goes bad in hot weather. Inquiry revealed that in order to prevent this, some dealers inject corrosive sublimate before strangling. At about the same time, Francisco Mora-Silva, secretary of the Consulate of Ecuador at New York, died at the Roosevelt Hospital of ptomaine poisoning due to eating strawberries.

Some of the fish in the waters of Japan are said to contain an active poison, wherefore their sale is prohibited in the realm of the Mikado, for fear that they might be utilized for suicidal purposes.

Rye, while in the ear, is very subject to a disease by which the grain becomes soft and black, a condition equivalent to mortification. When eaten in this state, the corn produces the most serious consequences in those who partake of it. Pellagra, a very foul condition of the skin, in which the cuticle loses its natural character and becomes squamous or scaly, and dry, discolored, and thickened, has been traced to this source. Gangrene also not infrequently follows its ingestion. In Austria-Hungary whole villages have been afflicted in this way, and it is no uncommon sight in those countries to meet men and women who have lost part of their anatomy by eating bread prepared from diseased rye.

Some years ago Vaughan and Novy discovered a poison in decomposed dairy products which they termed tyrotoxicon. This is the toxin to which a number of cases of poisoning from cheese and ice cream have been attributed. The scientists named have also been able to isolate it from oysters that had caused illness at a church festival.

Many persons would be ready to believe that the malodorous Limburger is a menace to public health, though they would be loth to ascribe toxic effects to the cheese commonly served in aristocratic households. And yet about 300 cases of cheese poisoning have been reported to the Michigan State Board of Health alone, to say nothing of the long list that might be compiled from the sanitary records of other commonwealths.

I shall content myself with a mere mention of the fact that parasites are occasionally introduced into the gastro-intestinal tract by means of fruits and vegetables. But meat also harbors the eggs of these creatures. And there was a time when trichinosis was comparatively common, but since the government introduced obligatory meat inspection, and no pork is sold without having been subjected to microscopical examination, the disease is seldom encountered.

From the incidents mentioned it will be clear that dining is not the innocent occupation it was supposed to be, that it is, in fact, attended by some risk. And I can vividly imagine the effect produced by the perusal of this essay upon the average reader. Possibly he may feel as did Wolsey when Henry VIII. said to him, according to one Shakespeare:

"Read o'er this; and, after, this:
And then to breakfast with what appetite you have!"

But, fortunately for mankind, every bullet does not find its mark, and the chances of dying of ptomaine or tyrotoxicon poisoning are not any greater than those of perishing in a railway accident or being struck by a brick falling off a roof. We may, therefore, indulge in a certain fatalism, and continue to enjoy our meals as long as we have anything to eat and are blessed with a good appetite.

NEW COMPOUND FORMED IN ELECTRIC FURNACE.

A new compound, the boride of manganese, has been recently formed in the electric furnace by M. Binet de Jassoneix, of Paris. The method of obtaining this body is described in a paper read before the Académie des Sciences. Amorphous boron reduces a considerable number of metallic oxides. With the oxides of iron, nickel, and cobalt it gives a metallic mass from which crystallized borides of these metals can be separated, as M. Moissan has already shown. Troost and Hautefeuille have prepared a boride of manganese, $Mn B_2$, containing 28 per cent of boron. The oxides of manganese are reduced by boron in an air furnace, but it is difficult to obtain a metallic mass. In the electric furnace where the temperature is higher, the boric acid which is formed is volatilized, and a melted mass containing boron and manganese is formed. The present experiments were carried out by placing a carbon trough in the furnace, containing a compressed mixture of oxide of manganese and boron. This is reduced in a few seconds. When the manganese is in excess, the metallic mass may contain 97 per cent of the latter, and takes the file easily. With an excess of boron, on the contrary, we obtain a hard and granular mass containing some 20 per cent of boron. These metallic masses are attacked by acids and burn with incandescence in chlorine, but the action stops at once in the latter case and the melted chloride of manganese protects the residue from further action. This residue contains the new compound, boride of manganese, which is separated by washing with water and alcohol. It is a brilliant metallic powder, formed of small broken crystals. Its density is 6.2 at 15 deg. C. In fluorine gas it burns with a flame, and in chlorine with incandescence. When heated in oxygen it glows brightly and forms a fusible borate. It is attacked slowly by cold water giving off hydrogen and forming manganic hydrate. Hydrochloric acid dissolves it, and forms a gas which burns with a green flame. The author analyzed the compound, and finds that it corresponds to the formula Mn B. It is to be placed in the series of definite and crystalline borides of iron, nickel, and cobalt which M. Moissan has already formed.

NEW SUN SPOTS.

Another group of sun spots has appeared on the eastern meridian. They cover an area of possibly 3,000,000,000 square miles and are more active than the great spots which appeared last month, and which are breaking up and disappearing beyond the central meridian.

These new spots are likely to cause disturbances of some importance in the atmospheric conditions later, but it is too early to predict positively as to that.