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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.

ELEVATOR FATALITIES AND THEIR PREVENTION.

Recently, in these columns, we were deploring the number of fatalities that occur in transportation on our railroads; but now it seems that the risk of travel on railroads is insignificant compared with that to which those who use the modern elevator are exposed —at least in New York city. For according to a statement of Coroner Jackson, no less than thirty persons have lost their lives in elevator accidents in this city since the opening of the present year; and, of course, a still larger number of people have received injuries more or less serious. Although we had noticed the frequency with which accounts of elevator disasters appeared in the daily press, we were certainly not prepared for this astounding statement from an official whose duty it is to know the facts. Think of it; thirty deaths in nine months, or a rate of forty per year killed in one city alone, in a form of accident that would be altogether preventable were human life not held so cheap, and were ordinary care exercised in the selection and operation of the plant.

There is absolutely no excuse for ninety-five per cent of the accidents that occur. The problem of providing an elevator that shall be perfectly able to perform its work, year in, year out, without any risk to the passenger, has been most carefully thought out and solved by the best mechanical and engineering talent of the day, with the result that there are on the market to-day elevator systems which, in the hands of competent operators and subjected to constant and competent inspection, provide as safe a form of transportation as any that exists. Unfortunately for the safety of life and limb of the public, accident-proof elevator systems cost money, and the combined parsimony and disregard for human safety of many of the owners of office buildings and warehouses leads to the selection of inferior and cheaper systems, of which there are sadly too many in this city at the present day. Moreover, there is apparently very little care exercised in the selection of operators. The elevators in important and crowded office buildings are often in the hands of mere boys, the test of whose fitness for the job seems to be the small amount of pay for which they will undertake it.

In view of the present condition of affairs, which can only be described as positively alarming, we are glad to learn that the Superintendent of the Department of Public Buildings has drawn up an amendment to the Building Code which seems to cover the case adequately, and will make it possible for the Building Department to enforce any needed alterations in faulty elevators, whether they are used for passengers or freight. The principal items of the amendment are, that the Superintendent of Buildings shall cause an inspection of elevators, whether for passengers or employes, to be made at least every three months, and that he shall prescribe suitable qualifications for persons who are placed in charge of the running of passenger or freight elevators; any repairs found necessary by the Department to be made without delay by the owner or lessee. In case defects are found to exist which endanger life or limb, the use of such elevator, upon notice being given by the Superintendent of Buildings, shall at once cease, and it shall not again be used until the Superintendent has granted a certificate certifying that the elevator has been made safe. Moreover, no person will be permitted to take charge of an elevator, whether for passengers or for freight, unless he shall first register at the office of the Superintendent of Buildings, giving his name and residence, and the location of the building in which he is to be employed, and shall first receive from the Superintendent of Buildings a certificate as to his competency. Now this is a really admirable measure. It covers the case adequately, and if its requirements are honestly carried out without fear or favor, there is no reason why the public should not be as safe in an elevator as they are upon the sidewalk or in their own homes.

BIG GUNS FOR FUTURE WARSHIPS.

Already the naval expert has begun to tabulate the lessons to be gathered from the naval war in the Far East. In some respects they vary widely; but there is one point on which they are all agreed, and that is as to the great value of the larger-caliber guns, say from the 8-inch to the 12-inch, as compared with the more rapid but less powerful guns of 6-inch caliber and less. Before the war we heard a great deal about the wonderful "hail of rapid-fire shell" with which the ship which carried a numerous battery of 5-inch and 6-inch guns was to "smother" her adversary, and "wreck his unprotected sides and upper works." The Japanese tactics, forced upon him by the necessity of defeating the enemy with as little loss as possible to himself, have changed all that. Japan possessed only a limited navy, every ship of which was thrown at once into the field of operations. She had absolutely no reserve to draw upon, and any gap that was made in her fighting line she could not hope to fill up. Hence, in the battles of the war, whether against ships in the open or against land fortifications, she has elected to fight, or rather she had no choice but to fight at long range, trusting to her superior seamanship and gunnery to enable her to place a larger percentage of effective hits upon the enemy than he could hope to do upon her own ships. The events of the war have shown that these tactics were correct; for the enormous losses that her gunners have inflicted upon the enemy have been brought about without the loss of a single ship, or even its serious disablement, at least as far as we know, by Russian gun fire.

To carry on a successful artillery duel at long range, however, is only possible with the high-powered, large-calibered gun. At the ranges of from 5,000 to 8,000 yards, at which the Japanese elected to fight, the 6-inch, 5-inch, and smaller-caliber guns were useless, the velocity of the smaller projectiles falling off so rapidly that they were, at such ranges, altogether ineffectual against the armored portions of a ship. Under such conditions, the engagements resolved themselves into a trial of skill between the marksmen of the 12-inch and 8-inch guns. And how excellent this was on the Japanese side may be judged from the fact that the official report sent in from the flagship "Czarevitch" spoke of her as having received three 12-inch projectiles in the neighborhood of the conning tower within a space of five minutes. Evidently the gun is supreme, and the big gun at that.

The effect of the war is showing itself in the designs for new battleships and cruisers that have lately been divulged. Japan herself has ordered from an English shipyard two battleships that will carry four 12-inch and four 10-inch guns, and a dozen 6-inch. The 10-inch gun forms the main battery of many modern battleships, notably those of the "Pobieda" class, now at Port Arthur, so that practically the new ships will have double the number of armor-piercing guns of the first class that are now carried by modern battleships. The British government are also following the same policy. Their new battleships of the "Lord Nelson" class will carry four 12-inch guns of 45 calibers, but no 6-inch or 7½-inch, their place being taken by ten 9.2-inch guns of 50 calibers. Thus the whole of the main battery consists of armor-piercing guns of long range and great penetrative power, while the intermediate or secondary battery has been abolished, and the vessel carries in its place a numerous battery of small 3-inch and other rapid-firers for protection against torpedo-boat attack. The same policy has been followed in the first-class cruisers of the "Minotaur" class, which will not mount any 6-inch guns, but will be armed with four 50-caliber 9.2-inch guns and ten 50-caliber 7.5-inch rapid-firers.

The 9.2-inch piece, which was recently illustrated in this journal, fires a 380-pound shell with a muzzle velocity of 3,100 feet per second, a muzzle energy of 25,485 foot-tons, and is capable of penetrating 12 inches of Krupp steel at a range of 3,000 yards. The 7.5-inch gun, which forms the secondary battery of the cruisers, has a muzzle velocity of 3,000 feet per second, and fires a 200-pound shell, with a muzzle energy of 12,540 foot-tons, and is capable of penetrating 8 inches of Krupp steel at a range of 3,000 yards. It is an interesting conjecture as to just where this progression toward the exclusive use of the larger-caliber guns will go; but it begins to look altogether possible, that before long we shall see the dream of Admiral Cuniberti of the Italian navy realized, when he drew up his plans for a 17,000-ton battleship, carrying an armament of twelve 12-inch guns and a dozen 12-pounders.

EXPERIMENTS ON THE MOSQUITO.

BY T. H. EVANS, M.D.

If the following experiments are interesting and curious they may also be valuable, for any matter concerning the habits of *Stegomyia fasciata* is of use in view of their relation to the transmission of infectious disease, as malaria, yellow fever, etc.

Experiment I. Securing the mosquito so that it cannot escape, and allowing the wings and proboscis free movement, a drop of liquid on the end of a blunt probe is approached to the proboscis. When the distance of the proboscis from the drop of liquid is reduced to about two millimeters, the proboscis darts into it. Various liquids seem to bring about different distances of attraction.

Experiment II. If a drop of lysol, a phenol derivative, has been used, the proboscis darts into it at the distance of two millimeters. In the space of two or three seconds the wings relax and droop, but do not flutter unless the experiment has been performed while they were in that state of excitement.

Experiment III. A solution of ammonia produces the same results, but in shorter time and over a wider interval of attraction.

Experiment IV. Repeated tests on the same animal, using poisonous solutions, give identical results while life lasts. From the fact that the proboscis continues to fly toward even poisonous solutions, and after their effects are apparent in weakening of vitality, I take it that—

(a) The movement of the proboscis is not voluntary, or not under the control of a reasoning intelligence.

(b) There is some inward suction, more or less constant, in the passageway of the proboscis.

(c) Lysol and other solutions may produce poisonous effects when introduced by means of this passageway to the mosquito's economy.

ARSENIC NEEDED FOR THE BODY AND FOUND IN DIFFERENT FOODS.

Not long ago M. Armand Gautier brought out the fact that arsenic is contained in minute quantities in nearly all the organs of the body. In some of the organs the proportion is relatively large, and leads us to suppose that this element is necessary for the proper working of these organs, and indeed plays an important rôle in the entire system. In a paper which he recently presented to the Académie des Sciences he brings out some further researches upon this point. These relate especially to the different kinds of food from which the system takes its supply of arsenic. This element is found in a large proportion in the exterior parts of the body, and a certain amount is constantly being lost through the falling or cutting of the hair and nails, and also by the natural evacuations. It became therefore of interest to find out from what sources the system receives the amount of arsenic which is needed to keep up the normal amount, and what is the proportion given by the various kinds of food, both animal and vegetable. Accordingly he made a series of analyses of different foods and showed the quantity of arsenic in each. The method he uses is to break down the organic tissue by a mixture of one part sulphuric and ten parts nitric acid. This is carried out at a low temperature. After re-treating with nitric acid the whole is finally carbonized. The arsenic is set free by a Marsh apparatus, at least in most cases. In the case of salt and water it is found by direct precipitation. Great care was of course taken to use perfectly pure reagents. The following extracts are taken from the table which M. Gautier has drawn up as showing the percentage of arsenic in different foods, water, and salt absorbed by the body. The figure gives the weight of arsenic in 0.001 milligramme per 100 grammes (0.22 pound) of solids in the fresh state or in 1 liter of liquid: Beef (lean), 0.8; milk, 1.0; eggs, yolk, 0.5; white, 0.0; mackerel, 3.9; lobster (muscular part), 2.2; eggs, 35.7; shell, 104; water extract, 10.7; shrimp, 0.16; shell of same, 7.6; wheat, 0.7; potato, 1.12; wine, 0.89; beer, 0.01; salt, refined, 0.7; gray salt, 45; rock salt, 14; Seine water, 0.5; sea water from surface, 1.1; from 30 feet depth, 2.5. The unusually large proportion contained in lobster shell and unrefined salt will be noted. Eggs have also a very high value.

From these results we may draw certain conclusions. The proportion of arsenic is extremely small in the muscular flesh of mammals as compared with that which the arsenic-bearing organs contain. Among the different foods, some of the fish and crustaceans, and especially their more highly phosphated products, are found to contain the largest proportion of arsenic. Rock salt is also one of the highest in the list. Wheat bread contains very little, and the proportion is not greater for Graham bread, showing that this element is not furnished by the bran. Green leaves, cabbage, and green beans do not show a trace of it, even in a large quantity of matter. This seems to show that arsenic is not essential for cell-life, at least in the proportion of 0.001 milligramme per kilogramme. On the contrary, the system derives a considerable quantity from water, wine, and common salt. M. Gautier utilizes his results to make an interesting calculation as to just how much arsenic an inhabitant of Paris absorbs per day on the average, taking as a base the statistics for the last decade. The result is as follows: The first figure gives the number of grammes (15.43 grains) of food per day, and the second the quantity of arsenic (in 0.001 milligramme): Bread and pastry, 420 grammes per day (arsenic, 2.9); meat, 180 (1.8); fish, 35 (4.3); eggs, 24 (0.05); vegetables, fresh, 250 (0.5); vegetables, dry, 40 (?); potatoes, 100 (1.12); milk, 213 (0.10); wine, 518 (2.9); beer, 30 (0.0); salt, 10 (2.3);