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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.

AN AMERICAN FLOATING EXPOSITION.

In the year 1901 an officer of the Department of Commerce and Labor suggested that for the furtherance of our export trade it would be an excellent idea to equip a large steamer as a floating exposition of American products, and dispatch it on a tour of the principal ports of the world. At its first mention the idea is a decidedly attractive one, and it receives no small measure of indorsement in the fact that it has already been successfully tried by Great Britain and, we believe, by Germany also; while we understand that as part of the comprehensive scheme for the extension of her foreign trade, which Japan has now under serious consideration, that country has planned the fitting out of a similar vessel. We are pleased to note that a strong company which has been formed in New York has advised the Department of Commerce and Labor that they have decided to adopt the suggestion originally made in the Geographic Magazine in 1901. It is proposed to equip a steamer of about 8,000 tons for the special purpose of the expedition, and fit up the various decks with exposition booths of much the same character as those to be seen in any of our great industrial exhibitions, with the one important exception, however, that only exhibits of a thoroughly serious character will be accepted, all exhibits of a trivial or purely speculative and doubtful character being refused. The steamer, in addition to devoting three decks to exhibits, will have living accommodations for about 200 representatives of exhibitors. A route has been laid out which will include a visit to practically every port of importance in the world, and will involve a journey of about 60,000 miles, the trip around the world being made in about fifteen months' time.

The plan is to allow each person who subscribes for forty square feet of space or more, to display his goods and send on the steamer a representative, whose duty it will be to see that the exhibit is properly arranged at each port, to meet the merchants and dealers invited to inspect the exhibits, explain the utility and advantages of the goods, quote prices delivered in the country of consumption, and ascertain what the markets of the country demand, the conditions of competition, and everything affecting the extension of our export trade in each particular locality. The representative will also appoint local agents at the various ports of call. In connection with the visit of the floating exhibition, extensive missionary work will be carried on at each port of call previous to its arrival. By means of circulars printed in the various languages, to be distributed hundreds of miles back in the interior, it is hoped to arouse widespread interest, and nothing will be left undone that judicious newspaper discussion and legitimate advertising can accomplish to prepare the ground for the work of the expedition. The expense of the trip is to be borne entirely by the sale of space on the vessel, of which about 20,000 square feet will be available. Attention is called to the fact that the enterprise is not designed with a view to any profitable return in money to the promoters, but is intended to be a dignified, broad-minded plan to further the cause of America's export trade.

We consider that this ambitious scheme is one of that class whose work is creative, and whose success depends almost entirely upon the thoroughness with which its well-laid plans are followed out. If none but the very best of American products are carried; if the greatest care is exercised to select competent representatives, who should be possessed of at least a fair knowledge of the language of the principal countries to be visited, and if the preliminary missionary work is judiciously and comprehensively carried out, this exposition should prove to be a most powerful factor in the extension of our export trade.

SANITATION OF THE PANAMA CANAL ZONE.

That the two prevailing diseases that render life unhealthy at the Isthmus of Panama can be successfully controlled by the use of simple precautions and remedies, is the opinion of Col. W. C. Gorgas, U. S. A., who is the Chief Sanitary Officer of the Isthmian Canal zone. In a brief but comprehensive and lucid article, to be found in the last annual report of the Smithsonian Institution, this officer describes the sanitary conditions at the Isthmus, and shows the cause and cure of the two great scourges of that country, yellow fever and malaria.

Briefly stated, the sanitary problem is to protect the fifteen thousand men that are likely, before many months, to be employed on the canal, from these two diseases. Yellow fever is conveyed from man to man only by the female Stegomyia, who has previously bitten some human being suffering from yellow fever. Therefore, yellow fever cannot originate in a place where there are no infected Stegomyia, until a yellow fever patient has been introduced and has infected the local pest; or until the mosquito, infected at some distant point, has been introduced. Practically, the introduction of a yellow fever patient is the only method by which the locality can be infected.

At present yellow fever is endemic nowhere on the Canal Zone except in the city of Panama, and the immediate object of the sanitary measures is to get rid of the infected Stegomyia at present in the city. This can be accomplished with great certainty by establishing a system whereby the health authorities are certain to be informed of every case of yellow fever, and then fumigating the house in which this case occurred, so as to destroy all the mosquitoes within its borders. The same thing must be done with all contiguous houses. It has been found by experience that this kills all the infected mosquitoes at that particular focus. By doing the same thing at every other focus as yellow fever occurs, all the foci in the community are gradually destroyed, and when the last focus has been got rid of, yellow fever is at an end. A more expeditious method is to systematically fumigate every house in the town.

The Stegomyia is a house mosquito, and being cleanly in her habits seeks principally the clean rain-water barrels and water containers, and never travels far from her birthplace. Therefore, as an additional sanitary safeguard, every receptacle for water should be so screened that mosquitoes cannot have access to it. The safest precaution is to pipe the water supply in from a distance, so that the people will not need to keep a supply of water in vessels. As a further preventive of standing water, yards must be thoroughly cleaned, sewers must be put in, so as to discourage the throwing of waste water into the yards, streets should be paved and swept, and garbage collected so as to decrease to the minimum all trash that is capable, in any way, of retaining fresh water. These precautions are exactly those which the government carried out at Havana, with results so flattering that yellow fever has been wiped out of that once famous, or rather infamous, center of the scourge. When Panama has thus been freed from yellow fever, as it most certainly will be, no more cases can occur until a yellow fever patient is introduced from some infected point without. This will be absolutely prevented by a proper system of quarantine.

An even more important problem than that presented by yellow fever is the control of malaria throughout the Canal Zone. The ten thousand natives of the district are distributed in about twenty small villages along the route of the canal, and these people are very generally affected with malaria. A recent microscopic examination of the blood of these people, taken at random at various points along the line, shows that out of several hundred cases, fifty per cent contained mosquito parasites in the blood. Four times out of five, if the female Anopheles bites a native she becomes infected, and when she bites one of our nearby laborers, he in turn becomes infected. Hence, if our laboring force is not to be completely used up, as was that of the French government, preventive sanitary measures must be taken.

There are two ways of approaching this problem; either by doing away with the infected human being, or by doing away with the mosquito. Since it is out of the question to do away with the infected natives, the remedy must be sought in the extinction of the mosquito. If some substance could be introduced into the circulation of the infected man and kill the parasite, and at the same time not be injurious to the man, the desired object would be effected, and in quinine has been discovered the suitable poison. This vegetable substance is harmless to man and fatal to the malarial parasite. Most of the effective tropical sanitarians, the Germans and the Italians conspicuously, have achieved a great success by inducing as large a proportion of the population as possible to take regularly small quantities of quinine, and they have succeeded, without adopting any other measures, in doing away with malaria in the several localities.

The disease may also be successfully attacked from the side of the mosquito, and the Anopheles may be as effectively exterminated as the Stegomyia by covering up water containers, clearing up the yards, preserving the surface of the road so there will be no puddles, instituting a regular system in all towns for the collection of garbage, and by the use of oil. Since the malaria problem along the route of the Panama Canal is, because of local conditions, more serious than in any place where the above-mentioned methods have been tried, the government intends to make sure the work of extermination by applying both systems, and it is confidently expected that, by the time the work is in full swing, our laborers will be completely protected from the two great tropical diseases.

COLLOIDS, SUSPENSIONS, AND RELATED PHENOMENA.

Van't Hoff's "Laws of Chemical Equilibrium in Rarefied Gases and Solutions," published some twenty years ago in the transactions of the Swedish Academy, might have escaped general attention had they not found an advocate in Ostwald. In this famous essay it is shown that dissolved substances behave like gases, but the argument is not easy to follow even now, when the facts have become familiar. It will be recalled, also, that Van't Hoff's laws, apparently, did not apply to acids, alkalies, and salts, that is to say, to the substances called electrolytes, which, when dissolved, conduct the electric current and are decomposed by it. These apparent exceptions, however, were soon explained and the great riddle of solution answered by Arrhenius. Recent work in theoretical chemistry has been largely devoted to the development of the Van't Hoff-Arrhenius theory, which is now firmly established.

We know more than a hundred thousand definite organic or carbon compounds, and a great many inorganic ones, all of which have fixed melting or boiling points. Many of them are also characterized by definite crystalline form. Very few of these definite and sharply-characterized compounds are found in living organisms and consequently they contribute little to the comprehension of vital processes.

Most of the substances which occur in animal and vegetable organisms do not crystallize or possess fixed melting and boiling points, and Van't Hoff's theory does not apply to them. A solution of albumen, for example, exerts an osmotic pressure so small that the mass of the albumen molecule computed from this pressure by the formula used for crystallizable compounds is too large (15,000) to be generally accepted. There is no reason why the albumen molecule should not be very large, but it seems wrong in principle to apply the usual formula for calculating molecular weight to such a substance, which does not form a solution in the ordinary sense of the word.

There are, also, inorganic bodies which have very large molecules, if we may judge from their inability to pass through porous membranes. If a solution of salt or sugar is put into a bag of parchment paper or a sausage skin free from grease, and suspended in a vessel of water, the salt or sugar gradually diffuses through the envelope, but many apparently dissolved substances, including silica as well as albumen and gelatine, do not diffuse under these conditions. These facts were discovered in 1830 by Graham, who gave the name crystalloids to the diffusible substances, most of which crystallize, and the name colloids to the non-diffusible substances, most of which do not crystallize. Van't Hoff's theory of solution applies to crystalloids, but not to colloids. The study of colloids, which may fairly be called the foundation of knowledge of the vital process, has been reserved for the twentieth century, and great progress has already been made.

Silica, alumina, ferric and zinc oxides, arsenic and antimony sulphides, are some of the many inorganic colloids. Of especial interest, partly for practical reasons, are the colloidal metals. Within the last ten years silver, gold, platinum, bismuth, and other metals have been brought into "colloidal" solution by various methods. In Carey Lea's process, solutions of metallic salts are decomposed under special conditions; in Bredig's the metal is pulverized by the electric arc under water; in Paal and Mueller's the metal is held in suspension by dissolved substances. Under the most powerful microscope the dark brown, red, and green liquids thus produced appear as homogeneous solutions, the metallic particles being invisible, but the ultramicroscope of Siedentopf and Zsigmondy, which distinguishes objects as small as four millionths of a millimeter (1-6,000,000 inch) in breadth, resolves these and other inorganic colloidal solutions into separate particles and thus confirms Graham's view of their nature.

In principle, indeed, every solution, even of a salt, is a suspension. De Bruyn and Von Calcar have crystallized salt from solution by centrifugal separation, and De Bruyn and Wolff have shown that solutions of sugar, like turbid liquids, disperse and polarize light.

True suspensions, formed by filtering the coarser particles from a mixture of starch and water, or by pouring alcoholic solutions of resins into water, behave like inorganic colloids. Both are subject to "cataphoresis," that is, they are moved by an electric cur-