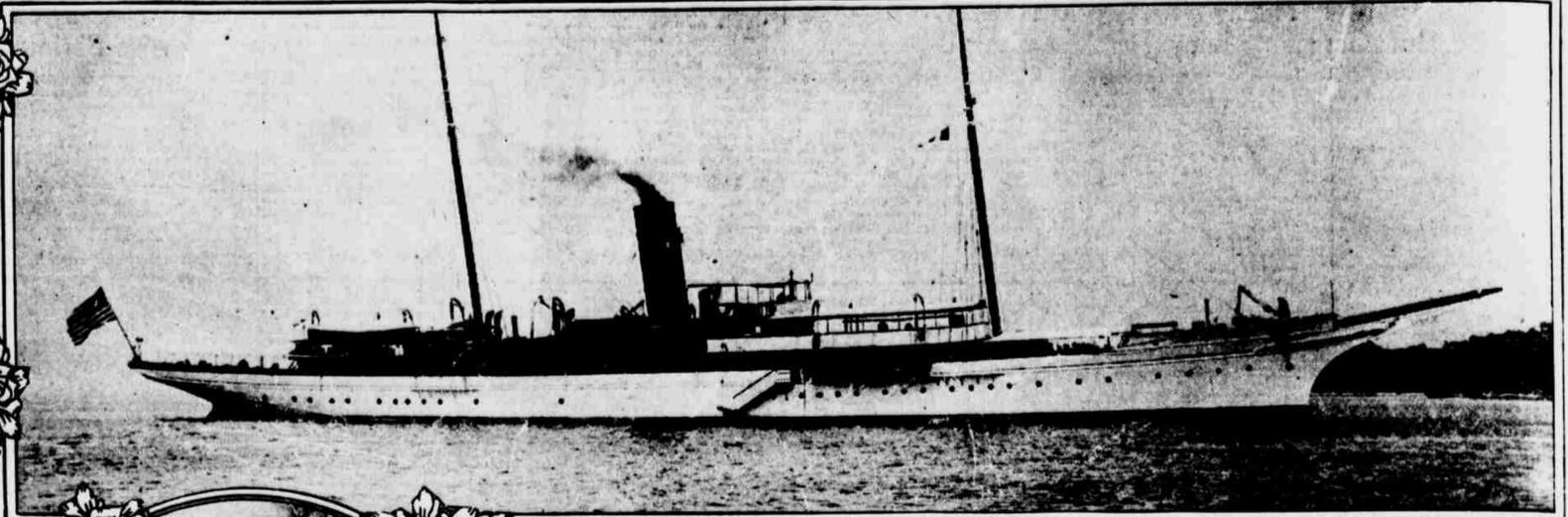




MRS. A. HAMILTON RICE PHOTO BY HIRSTED.



THE ALBERTA

PHOTO BY E. LEVICK.



DR. AND MRS. A. HAMILTON RICE

Dr. and Mrs. Rice Start on Six Months Exploration Trip in Yacht Alberta, Hoping to Add Much to World's Knowledge

By JOHN WALKER HARRINGTON  
**T**HREE People of the Great Forest are again to see Dr. A. Hamilton Rice. With Mrs. Rice he left here last week on the yacht Alberta for the River of the Amazons to complete his explorations in the northwestern part of the basin of the mightiest stream in all the world. He follows again the hidden trails of the Spanish conquerors—a conquistador of science—he to seek out the secrets of prodigal nature. The brother of Pizarro once went into the region of the Amazon lured by the stories which the Indians told to only to eager ears that great riches were hidden in the depths of the jungles and by the banks of tree choked tributaries. Dr. Rice's mission is largely that of the explorer and the geographer. Yet the voyage of the Alberta will have romantic interest from another point of view, for it is really a honeymoon trip for Dr. and Mrs. Rice, although their marriage took place a year ago. Mrs. Rice, who was formerly Mrs. George D. Widener of Philadelphia, is herself interested in science and will

help in the work of the expedition. She has been directing until recently the building and equipping of the great library at Harvard University which is a memorial to Mr. Widener, who was lost on the steamship Titanic. The expedition, although financed by Dr. and Mrs. Rice, is under the auspices of Harvard and attached to it are members of the faculty of that institution. Mrs. Rice has been studying in the Harvard laboratories and is especially devoted to microscopy. Although noted explorers long before the time of Dr. Rice sought to lift the mystery from the great valley of the Amazon, that region is to this day almost a virgin wilderness. A recent writer has declared that there is work there to occupy science for a thousand years to come. Daring adventurers have penetrated it in various directions and have often gone through great perils and privation. The records reveal that a century and a half ago one of the most resourceful explorers was a woman, Mme. Godin, who made a memorable and tragic journey from the jungles to the outposts of civilization. Dr. Rice began his explorations in the wilds of South America in 1901.

The yacht Alberta, chartered from the owner, Frederick G. Bourne, left Newport a few days ago and proceeded to the New York Yacht Club anchorage in the Hudson River near West Eighty-sixth street. Until last Wednesday, the day of her leaving this port, she was taking on additional supplies. She will stop first at Barbados and then go up the Amazon to Manaus, Brazil, 950 miles from the coast, and then into the Rio Negro to Santa Isabel, the base of the explorations. The region to which Dr. Rice and the scientist accompanying him are to give their attention is bounded on the north by the Guayabare River, on the west by the Andes, on the south by the Caqueta River and on the east by the Rio Negro. The territory included in the plan comprises parts of Brazil, Venezuela and Colombia. Dr. Rice has mapped about 100,000 square miles of this region. He proposes to make a survey of the tributaries of the Rio Negro and to complete as nearly as he can the maps of enormous tracts yet practically unknown to man. Other explorers such as Alfred Russel Wallace, Stradelli and Koch-Grumberg investigated the biology, the anthropology or the ethnology of the region. Although the mission of Dr. Rice is essentially geographical, he has with him a staff that will study the country from other scientific angles. The party includes Dr. William T. Councilman, professor of pathology at Harvard University; Ernest Howe of Newport, a geologist; Earl H. Church of the United States Coast and Geodetic Survey, topographer, and John W. Swanson of New York, wireless telegraph expert. So well equipped is this expedition that it is expected that it will accomplish more in the six months it will be away than could have been done in twice that period under ordinary conditions. The yacht Alberta is in herself a veritable floating citadel armed against trouble. One of the plagues of tropical South America comes from the insects. There are many flies and mosquitoes that inflict painful bites and cause disease. To ward off the flying pests Dr. Rice has had the Al-

berta equipped with rustproof screens of fine copper mesh, so that every deck and every port hole will be protected. There are other insects to be guarded against, among them various kinds of ants. One of the worst of them is the leaf cutting ant, the sauba, which will eat up the ordinary tarlatan mosquito net as though it were so much cobweb. In the account of one of his previous expeditions Dr. Rice tells how the ants devoured not only a mosquito net but a pair of trousers and the pockets of his coat. The tabano, or blood sucking fly, is a menace to life in this part of the Amazon basin. The chigos burrow into the skin and cause intense suffering. With the copper mesh screens and with other appliances for warding off the insects, the party expects to reduce the discomfort from this source to the minimum. Those familiar with stories of travel on the South American rivers from the times of the Spanish explorers to the days of Col. Theodore Roosevelt recall how canoes and rafts are continually being upset or demolished by the trees which have fallen into the streams. It will be many a day before a paternal Government will be taking snags out of the Amazon and its branches. You may remember how Gonzalo Pizarro, brother of the conqueror of Peru, turned back on his quest of treasure because he feared the perils of forest and stream, and how at last the intrepid Francisco Orellana made his way for 2,000 miles alone to the very mouth of the Amazon. In later years many explorers came to gravation and sometimes to death because their canoes were sunk by submerged tree trunks in the streams. The ill fated party of which Mme. Godin was sole survivor lost all its supplies by the upsetting of a raft. Other American explorers tell of the perils which they encountered in navigating rapids. It was to meet such conditions that Dr. Rice had constructed the launch Eleanor, named for Mrs. Rice, which is to be used in the exploration of streams. The launch represents the last word in efficiency. Strong as it is,

there is little in its outward aspect which reveals its qualities to the casual observer. It is forty feet in length and draws only two and a half feet of water. The hull is of oak of unusual thickness, doubly braced and sheathed with heavy copper. It resembles the hull of one of those reinforced craft which are used in Arctic exploration and could withstand the grinding of ice floes as well as the impact of floating timber. The launch carries 700 gallons of liquid fuel, 500 of gasoline and 100 of kerosene. The engine is capable of giving a speed of twelve knots an hour and the launch has a steaming radius of a thousand miles. The arrangement of the vessel makes it wonderfully available for exploration. In the wheelhouse is plenty of room for chronometer and clock and charts and a table, where six persons can sit. There is a deck on which two hammocks can be swung. The engine room, twelve feet in length, is equipped with the latest mechanical appliances. The Eleanor was sent ahead a few days ago on the deck of the steamship Cuthbert. Dr. Rice on previous expeditions was much impressed by the value of wireless telegraphy. He was in Brazil when one of his expeditions he found on the Madeira River William Godley and C. C. Chapman operating a station for the Marconi company. He learned that they were frequently in touch with the Arlington station maintained near Washington by the United States Government. It is possible to communicate over long reaches of South American forest and beyond mountains by the Hertzian wave, as the Brazilian Government has demonstrated. The expedition now on its way to southern waters is carrying a wireless outfit for land use which weighs only forty pounds. It can be taken by porters into the wilderness and quickly bring the party into communication with the outside world.

John W. Swanson, the wireless operator of the Alberta, who is also to have charge of the land wireless service, is one of the best known men of his calling. The People of the Great Forest—the Indian tribes who owing to the spread of disease seem to be much fewer than they were in the days of the Spanish explorers—have made trouble for white men from time to time. Dr. Rice is accustomed to dealing with them and he anticipates no unpleasantness. The accounts of his previous travels in that region give a graphic idea of the hard lives of these natives, so often sufferers from famine and disease and the attacks of the insect pests. They are not zealous explorers and when they are retained to go on expeditions it is only after much persuasion. The men are much attached to their families and when they start out on a journey they spend much time in ceremonious farewells. And what, by the way, was the idea of Orellana in calling the stream the River of the Amazons, thus giving to the world the impression that on its shores he had seen hosts of women warriors? There is nothing of Bellona in the nature of the Indian women of the present day. One tradition has it that Orellana was impressed by the intrepidity of the sole explorer, named the river for him. Years later, however, when the women joined with their husbands in fighting the invaders the name Amazons was bestowed. The animal life of this region is interesting. Although there are no grizzlies and tigers to call the big game hunter, jaguars and striped wildcats, tapirs, peccaries and hosts of other animals inhabit the dense undergrowth. Several explorers have borne witness to the tameness of the creatures of the forest. So little accustomed are they to the sight of man that they have no fear of his tribe at all. In many parts of the country, at least, the jaguars will come out of their lairs and look with curious eyes upon the human newcomers. They are not afraid of the river bank, lazily regard the explorers and then swim unconcernedly about, for to them the white man's gun has as yet acquired no meaning. The cayman, as the alligator in those latitudes is called, infests many of the streams and under certain conditions

has attacked human beings. These creatures lurk in the dark waters and are likely to drag down the unwary man who falls from canoe or raft. Various reptiles are found in the forest areas, including the anacondas and the boa constrictors, although these huge snakes are not so common as is supposed. The birds are brilliant accents in the setting of green. Macaws, with their brilliant plumage, are seen in all directions and the observer may see within his horizon hundreds of these beautiful jewels of the air, the humming birds, flying above the bright leafed forests. Despite all that has been said about the tropical diseases and the pestiferous insects, it is not unlikely that the years to come this part of the world may be the home of millions of men. The climate is benign and once scientific civilization comes to join hands with the explorer the mission of the conquistador of science will have been justified in the light of the most practical experience. From such an expedition, as headed by Dr. Rice the by-products alone are likely to be of great value. No palaces of gold, no cities paved with diamonds such as the fabled Pizarro hoped to find, will be closed, and yet in the great forests of rubber trees and of valuable woods there is untold wealth. The geologist, too, is likely to find new mineral resources which will add to the sum total of the wealth of the world. The region is considered by geologists to be the oldest land in South America. It is a land of water as far as the topography is concerned. The basins of the Rio Negro and the Orinoco are connected to this day by a great stream called the Casiquiare Canal. It is really a river between rivers, the connecting link between two enormous waterheds. When Dr. Rice returns early next year it is believed he will have much to our knowledge of the people of the Amazon and that many practical results will appear in the years to come as the results of his explorations.

RAW MILK VS. PASTEURIZED IN THE BATTLE AGAINST THE GERMS

By DR. PAUL BARTHOLOW.  
**T**HE question was asked lately in this city by thoughtful students of the milk situation (apropos of the continued gambling in supply and smuggling of low graded milk in the country): Can raw milk take the place of pasteurized? Can it be produced cheaply and cleanly? Certain members of the Government Department of Agriculture appear to think it cannot without an elaborate and costly scheme of inspection, and have formed themselves into a group to watch over the interests of pasteurized milk. (Ayers, "The Present Status of Pasteurized Milk," bulletin No. 342, 1916; Journal of Infectious Diseases, Vol. XIV, p. 217.) It is admitted that an efficient and far reaching inspection would supply the public with fresh milk, probably superior in nutritive qualities to the pasteurized. But in large cities—New York, for example, which consumes over 2,500,000 quarts a day, the product of six States and 350,000 cows; the product, too, of the labor of 127,000 operatives—inspection is not an easy problem. Some people might think that evidence of weakness, of imperfection in pasteurized milk; that a milk which needs so much artificial treatment stands self-condemned. At the moment there is reason to fear that criticism has been too well founded. The dealers and farmers have been so much occupied with their quarrel that they have had little time to consider the general welfare. Some of them are, perhaps, aware that, owing to the speculation in milk, pasteurized milk is in an equivocal position. The manufacturer is busily engaged in telling the consumer that the increased cost is justified, and emphasizes the price of raw milk, expense of machines and delivery. But the intelligent world is asking what comes of it all. The general verdict is by no means favorable to the dealer and farmer. The public are shrewd enough to suspect that there is an intimate connection between pasteurized milk and commercial speculation. The whole spirit of the present trade is speculative.

unquestionable record as a means of preventing disease, and the other side can offer nothing but promises of better performance. What is, therefore, the chief incident in the milk situation so far? Undoubtedly it is the world's shortage of milk, owing to the war, and the conspiracy of the farmer and dealer to maintain high prices. The latest phase of the milk trade in New York served one useful purpose: It dug out the truth that there is always a risk that combines will become too powerful. This side of the case is well worth considering. For pasteurized milk is a thing that concerns us all; we can hardly escape having to consume it, be it merely as an occasional article of our food; but it is a matter upon which most people when they come to deal with it find themselves without definite ideas. This is not surprising, for the usual descriptions of pasteurized milk—that it is milk which has been heated to 145 Fahrenheit and kept there for thirty minutes and then quickly cooled to 40 Fahrenheit—needs many qualifications. In commerce pasteurization is a process of heating milk for a shorter or longer period, as the different methods require, at temperatures ranging from 145 to 185 Fahrenheit, followed by rapid cooling. It is known that the high temperatures destroy, or at least suspend, the life of the germs of diseases like typhoid fever, tuberculosis, diphtheria and dysentery. But, unfortunately, even a temperature of 185 Fahrenheit does not destroy all the germs in a given quantity of milk; it is generally admitted that 1 per cent. of them remain alive. Hence the rate of cooling becomes of great importance. If it is too slow the milk goes through degrees of warmth most favorable to the development of bacteria. But if it is rapid enough the bacteria do not grow very quickly. In fact, bacteria grow only slightly in pasteurized milk in the twelve to twenty-four hours in which it is kept moderately cool or under 55 Fahrenheit. Pasteurization, then, is an sufficiently mature consideration a really good device. It has defects corresponding to its good qualities, and there is no doubt that heat injures some nutritive elements of milk, such as the phosphates, lecithin, albumin and the vitamins. These faults have been carefully traced in current numbers of *Le Nourrisson* by Prof. Marfan of Paris. He thinks it better to sterilize milk completely by heating it above 212 Fahrenheit. According to his experience in the Paris hospitals, it is a great mistake, in heating milk, to leave off just before it begins to be sterile,

for then all the previous labor is thrown away; in preventing the growth of germs it is not merely thrown away, but actually prejudicial. In this view, perhaps a wrong one, there is no absolute sterility in pasteurized milk, and though the heating is carefully carried out, it is not sufficiently complete to produce a thoroughly satisfactory result. The argument for pasteurized milk depends for its cogency upon several facts that are most clearly understood when grouped together. They may be thus stated: 1. Most disease germs are destroyed at the temperature of pasteurization, 145 to 185 Fahrenheit. Pasteurized milk, therefore, protects us to a certain extent against diseases which are conveyed by milk, such as typhoid fever, tuberculosis, paratyphoid, diphtheria, scarlet fever, diarrhoea, septic sore throat, foot and mouth disease, poliomyelitis, though the last is under suspicion, for if pasteurization prevented outbreaks of this disease the recent epidemic is hard to explain. Probably milk, if at all, is not the only or the chief way of poliomyelitis infection. But the protection is of the most variable nature. For, as the Government expert, Ayers, remarks, "as many bacteria may be introduced in cooling and bottling as were destroyed in the heating process." Again, while it is easy to destroy 99 per cent. of the bacteria when the milk is of good quality and contains but a relatively small number of germs, it is often impossible to destroy 99 per cent. when the raw milk contains 100,000 to the cubic centimeter. In Ayers' experiments he found that only 17 per cent. of the bacteria were

destroyed. Obviously even 1 per cent. may seriously infect the milk, since in numbers 1 per cent. may mean a multitude of such small creatures as microbes. Raw milk, even as it comes from the cow, is of doubtful purity. It is often stated by medical writers that milk in the healthy udder is sterile. In this case, according to the latest researches

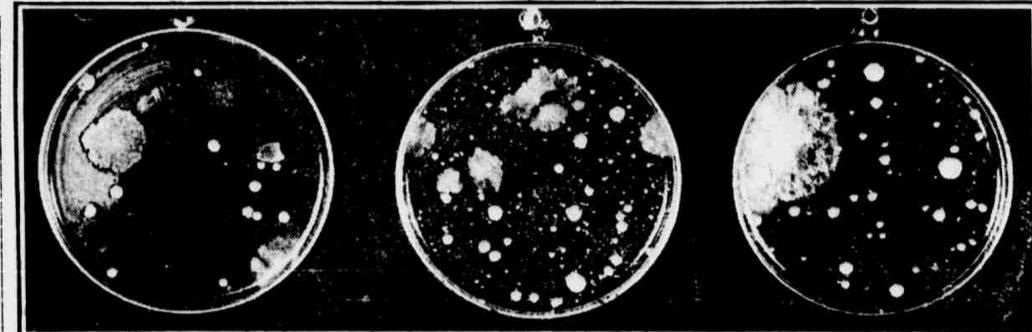
*Journal of Infectious Diseases*, Vol. XVIII, p. 437, 1916, they are wrong even as to facts, and milk just drawn is not free from bacteria. The third argument is that pasteurized milk has nearly all the qualities of fresh milk, that is, it is fully charged with nutriment and stable, though it is more insipid, graduated and reinforced in its quality than natural milk. This is in fact wholly fresh milk in taste, and its constant use is apt to prove wearisome. Pasteurized milk represents other subjects on which most experts have opinions. The method is an example of the profound misgiving that has beset all authorities, a distrust of the farmer, the dealer and their final work. It is also a process that has cost much and is likely to cost more. Yet it is not easy to find any justification for the high prices prevailing at present. According to the careful investigations of Bowen, the average cost of pasteurizing one gallon of milk is a little more than three-tenths of a cent. As a matter of fact, the cost is probably one cent a gallon and a quarter of a cent a quart. Though regulation by the Health Department has continuously lowered the number of bad milks pasteurized and so is of immense help to the consumer in getting a good milk for the price, yet there is too much inferior milk used for pasteurization. The difficulty as to good and bad milk the sanitary expert decides thus: Good milk should be pasteurized and bad milk should be destroyed. In New York city, but all pasteurized milk should have the same price. A dealer should not be permitted to offer

bad milk at lower price, to the probable injury of the good; it is freedom to do so under our laws and not regulation that is at fault. The Health Department regulation has been the safeguard of the public. In most of our large cities the greater proportion of milk is pasteurized, though there is a considerable minority of raw milk. The raw milk which commands the highest prices and which is both raw and pasteurized. According to circumstances it may be either. Certified milk has all the control given to it of the best raw milk by the city and State authorities, and is also under the constant supervision of private inspectors employed by physicians. It is produced under conditions of extreme care, and comes from tuberculin tested cows. These animals are also examined by veterinary surgeons for tuberculosis and other diseases. Raw certified milk may be regarded as almost safe. When pasteurized it is the safest and cleanest milk that we have. Inspected milk is a milk a little less carefully looked after and is ranked as practically Grade A milk. The ordinary meaning of the term milk in the ordinary meaning of the term is, whether it would be safe to depend upon our supply of raw milk, has seldom been seriously considered in this country. In Europe under the war conditions the cost of milk is so vital a matter that every effort is being made to reduce it without sacrifice of the quality. The result is that in France, England and Germany the authorities have studied the effects of raw milk with some attention but without arriving at a definite conclusion. Prof. Marfan sums up the matter in the following way: If milk could be produced under ideal conditions of cleanliness at the farm, if it came from healthy cows and if it were cooled and bottled in a dairy and shipped in refrigerator cars without perhaps being accepted as a food for babies. But in actual circumstances it is necessary to sterilize it in bottles, and this sterilized milk, he declares most positively, is better in all essential qualities than pasteurized milk. A similar judgment as to the conditions under which raw milk could be safely recommended is expressed by the German authorities in the last number of the *Sociale Praxis*. In this country the verdict of the authorities as to pasteurized milk is by no means unanimous. The great defect of the process is that it leaves an appreciable number of germs in the milk. With this feature of pasteurized milk some authorities do not feel quite satisfied.

There is a class of germs, or bacteria, more correctly called, which frequently occur in pasteurized milk. The difficulty of getting rid of them is well known to manufacturers. They have been the subjects of a study by Thom and Ayers, (*Journal of Agricultural Research*, Vol. I, p. 153, 1916.) It appears that the holder process does not kill all the spores. Spores should be expected to be resistant forms of microbes, and therefore takes a very high temperature to kill them. Besides molds in pasteurized milk it is not uncommon to find bacteria which afford evidence of the fact that more careful inspection is needed. Ayers rightly says: "A definite evidence for proper supervision of the process (pasteurization) is needed." The consumer would do well to control if he knew the necessity of the argument of the manufacturer, and better inspection would mean a more careful expenditure on raw plants and prices is hard to answer. The consumer will probably continue in its helplessness and be contented with a dealer tries to retrieve the situation by a deathly promise of inspection and amendment. At present a great deal of raw milk is sold in New York city. As a result pasteurization it is of interest to examine the germs in samples of raw milk. Usually in Grade B milk the bacteria is much less than in pasteurized. There is, in fact, a difference between the same quantity of raw milk before and after pasteurization. The difference is not so great as will be clear from a brief comparison. In Grade A milk there are 100,000 bacteria per cubic centimeter; this is the limit followed by the Health Department. Grade B the limit is 100,000 bacteria per cubic centimeter, and in raw milk 1,000,000. No one can say that these numbers are injurious, but the milk which shows them is of varying quality. Just in the samples of raw pasteurized milk that the merit is less apparent. I must concede this article is more very necessary, though it is a little criticism; which, in fact, is a germ in pasteurized milk which is shown growing on milk which has been heated to the pasteurizing temperature. Further disadvantage of containing bodies of dead bacteria, which, of course, is not possessed by fresh milk.



Dirt and dead bacteria in market milk.



From left to right—Raw milk, Grade B pasteurized milk, Grade A pasteurized milk, showing germ growth.