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SCIENTIFIC AMERICAN SUPPLEMENT

No. 602,

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WORK ON THE PANAMA CANAL LIKELY TO STOP.

Recent reports from Panama indicate that work will shortly cease on the line of the proposed canal, and, unless the difficulties in the way have been greatly exaggerated, a further loan asked of the deluded investors, for the most part poor people, would be a cruel wrong, because only serving to postpone impending disaster and raise hopes that cannot be realized. All the work done for a twelvemonth, and even longer, has consisted of the dredging of soft material by contractors paid by the cubic yard; men not in anywise identified with the project, and having no interest in either its success or failure. Meantime the projectors have been considering the really formidable problems on the solution of which depends the final accomplishment of the work. Foremost of these is the control of the torrents that at various periods pour down the sides of the mountains, and which, if unchecked, make all hope of maintaining a canal vain, and still another is the obstacle interposed by a mountain which has been found to be moving slowly into the very path of the canal. Add to these the deadliness of the climate and the important difference between the mean level of the two oceans which the canal is designed to connect, and it is not surprising that the engineers in charge of the enterprise, skilled engineers as they are, have not been able to discover a practical means of accomplishing their purpose. Now, when it is too late, the French investors will realize that the unfavorable reports from the United States which have followed the work from its very inception have not been animated by ungenerous motives. At the International Canal Congress, which met in Paris, May 15, 1879, Admiral Ammen and Captain Selfridge, of our navy, and the accredited representatives of the United States, declared that the route by way of Panama was impracticable. Both these officers are identified with a series of careful surveys made across various parts of the isthmus, including Panama, and their opinion was supported by that of many other engineers who preceded them on the isthmus. But the French were inexorable. Lieut. Lucien N. B. Wyse, of the French republican navy, had made a reconnaissance across the isthmus, and the French engineers, led by De Lesseps, who, it may be said without prejudice to his fame, has won more victories in the line of diplomacy than in that of engineering, showed a hasty willingness to accept Wyse's conclusions, though they were opposed by the experience of older and more experienced men than he.

Bad management was apparent at the very start of the enterprise, and if the two officers of the company who recently came hither from Panama on their way homeward are to be believed, this bad management has continued up to the present. Large quantities of material, as unnecessary as it was costly, have been constantly sent out, only to rot or rust in the swamps or on the sides of the hills. As many as fourteen locomotives, too heavy for use on the temporary lines constructed along the soft dump mounds, are at the present time rusting and corroding in the various sections, and apparatus and tools in vast quantities, whose design or weight precludes its use, is strewn along the highways or remains unpacked upon the shores of the port.

Reports say that both the French and United States governments will be asked in turn to take up and carry out the project of a canal at Panama, but it is not likely that either will do so. No doubt strenuous efforts will be made to reorganize the present company, if these negotiations fail, and to secure more capital. There is little probability, however, that much more money will be expended on this unfortunate scheme, where already several thousand human lives have been sacrificed and over $275,000,000 expended, and all for nothing!

HOW WAS THE UNEBI'KAN LOST?

The disappearance of the new Japanese cruiser Unebi'Kan, while on a voyage from Europe to Japan, is exciting much interest on the other side of the ocean, especially among naval officers and ship builders. A model ship she was, being both fleet of foot, strong in battery and buoyancy. She was built in France by a famous designer, and officered and manned by Frenchmen, with a dozen Japanese to make up the complement, two of whom were experienced officers, drilled in European naval schools. She arrived safely at Singapore late last November, and departed thence for Yokohama on the 3d of the following month. What course she took from Singapore can only be conjectured; and the English, who generally follow one course with steamers—the direct one which leaves the Paracels Islands either on the starboard hand or to port—incline to the opinion that her commander, through error of judgment, followed the course *via* the Palawan passage, and either foundered in the monsoon, which reports say was, at the time, more than usually fierce, or came to grief in the passage itself, which contains no end of reefs.

Against the former we have the fact that the Frenchman brought his ship safely through a terrific gale some days out from Port Said, and that the Unebi-K'an proved herself a really admirable seaboat. From all accounts, her powerful engines forced her through the seas with rare precision, and she would seem to have been as staunch and stiff as a church steeple withal. There is no reason why, knowing the power of his engines, her commander should not have taken the direct but far more boisterous route east or west of the Paracels; and for the same reason, if more familiar with the eastern or Palawan passage, he would seem to have been justified in taking that, even though he heard at Singapore, as no doubt he did, that the southeast monsoon was blowing with unwonted violence.

To the minds of many who have sailed with big guns, the fact, as reported, that the cruiser "carried two 35 ton guns well up above her water line" will have an important significance. Had one of these broken adrift while the ship was laboring in the heavy seas, it is not likely that any amount of good seamanship on the part of her commander would, under the circumstance of their unshipshape setting, have sufficed to save her. The rush of such a gun to one side at a critical moment might, with the leverage exerted by its mate in the same direction, be enough to capsize the ship in the same manner as the British ironclad Captain was capsized; though the latter was masted, and the Unebi'Kan was not. The course taken and the track made by the Frenchman from Cherbourg to Singapore shows him to have been a close and careful navigator, and, though not of that class of old sea dog having a face like a lion and the paws of a bear, evidently possessed good judgment and a sailor's instinct. The stability of the modern cruiser, especially this type, which is much shorter in the beam than the big war ship, and is good for nineteen knots an hour in a smooth sea, is of unusual importance at present, because it is thought to be the most efficient yet constructed. But if the beam is insufficient for the size of the present battery, or the center of gravity is too high up for weathering critical moments of wind and sea, the information cannot come too soon; and besides the humane desire to learn the fate of the officers and crew of the ill-fated Unebi'Kan, the naval world will await with impatience the solution of the mystery hanging over the disappearance of the Unebi'Kan.

INFECTION FROM DAIRY PRODUCTS.

The subject of purity and healthfulness of milk and its products has received much attention from medical and sanitary authorities during the past year, and some very remarkable results of investigations are now being made public. It has been found that milk may be the vehicle of very serious contagion, and that the diseased condition of the cow may so affect its milk as to make it the disseminator of acute disease. Coincident with this work, a contemporary has collected from all over this country and Canada the opinions of professional authorities on the subject of the milk of distillery swill-fed cows. The opinions are generally adverse. The subject is of special interest at the present period. Legislation adverse to artificial butter has been carried and is now in force. From the investigations we allude to, it appears that there is every chance that artificial butter or oleomargarine is the safer product of the two.

A lecture on the etiology of scarlet fever was recently delivered by Dr. E. Klein, F.C.S., before the Royal Institution in London. The principal theme of the paper was the relation of scarlet fever to milk supply. The possibility of the dissemination, and even origin, of the disease from this source was considered at length. Recorded cases are quoted to prove its possibility. The lecturer treats it as a certainty that milk has thus caused the spread of scarlet fever.

Experiments by V. Galthier, a French scientist, have been published. These were directed to tubercular sickness. Dairy produce from cows affected with tubercular disease was the subject of the investigations. Prof. Galthier found that such articles of diet could communicate phthisis or consumption to poultry and swine, and could become thus directly or indirectly a serious menace to man.

Within the last few years a number of outbreaks of disease have been traced with great certainty to dairies as the center of contagion. So well proved have these cases seemed, that they have originated special popular names for the sicknesses thus occasioned. Thus milk typhoid, milk scarlatina, and milk diphtheria have come to be recognized. In a number of accurately recorded cases, an outbreak of some specific disease has been noted. The general history in all was identical. The spread was limited to a certain number of families. The medical officers found that all the families thus affected were supplied with milk from the same dealer. Then, on examining the stables or dairy whence the milk came, the source of contagion was manifest. A case of scarlet fever would be found in the family or among the employes, or some of the residents possibly had diphtheria. In a number of instances such conditions were established. At the present time the English health authorities consider these cases proved. They form the basis for a somewhat disquieting suspicion affecting our milk supply. The means of guarding against the trouble in its source are not simple, owing to the extended range of

milk producers. The farmers are scattered all over the country, and an inspection of all the dairies hardly seems within the bounds of possibility.

Milk is so easily affected by aerial contamination that the above state of affairs seems only too probable on its face. It is known to all dairy workers that scrupulous cleanliness and good air are essential to the preservation of milk. A decaying substance in a cellar will affect all the milk and butter that may be present, imparting to it or causing in it a disagreeable taste.

But there is a more alarming aspect of the question. The result of some of the more recent observations is that cows may themselves become infected with a sickness resembling scarlet fever, and that such cows may, by their milk, cause the true scarlet fever to be developed in human beings.

This conclusion has been led to by an examination of data in recorded cases. In some instances where the origin of the sickness was traced to milk, and where also a scarlet fever case had existed in some person connected with the dairy, too long a period elapsed before the breaking out of the epidemic to allow it to be attributed to direct conveyance by the milk. Another class of cases is cited in which a human origin, proximate or ultimate, could in no way be traced. In one such instance an outbreak of scarlet fever was associated with a certain dairy. No human being could in any way be fixed upon as the originator. Even the sanitary conditions were examined, with negative results. The disease was finally attributed to certain cows. Examination of them showed the presence of disease, whose symptoms included sores upon the body, ulcerations, and a visceral complaint resembling that occurring in scarlet fever in the human being. The outbreak had, from other data, been limited to these cows as a source. Their disease so similar to the human scarlet fever made it almost a certainty that they were the origin of the trouble.

The examination by bacterial analysis was entered into, and confirmed these suspicions. The same micrococcus was found in the blood of scarlet fever patients and in the affected cows. The action of the human microbe on animals was identical with that of the vaccine one. This investigation, a full outline of which it is needless to give, clinched the proof. Succeeding occurrences investigated in the same general way gave identical results.

It may be considered as clearly proved that milk can be a serious source of danger to health or life. The remedy is a simple one. By heat the micrococci are destroyed. If the milk is heated to 185° F., it will be rendered safe. Any infectious microbes present will be killed. But while this disposes of the milk, it does not touch the disposal of milk products. Butter, cream and cheese are all uncooked. Butter represents raw fat, or uncooked oleaginous matter. It cannot be heated to a high degree without injury. One of the methods of freeing it from casein was to melt it, but the process was found to cause deterioration. Butter must be uncooked.

In this is found a strong plea in favor of oleomargarine. The argument is of such force that it would seem to entitle artificial butter to a little more consideration than legislators have awarded it. It is well known that the manufactured article keeps better than the natural one. In cruises to the West Indies and tropics, it is found that real butter tends to turn rancid. The process of manufacture, owing to the heat employed, cannot fail to leave oleomargarine free from bacteria. These recent observations afford other pleas in its favor.

The recent papers on the subject of the milk alkaloid tyrotoxicon show one cause for milk infection. It now seems certain that, as this alkaloid or ptomaine, tyrotoxicon by name, has come to be recognized as a cause of illness, it will be supplemented by such bacteria as those alluded to. Certain inexplicable cases of milk or cheese poisoning, when analysis shows no tyrotoxicon, may thus be accounted for. Cream cannot well be heated, and may be the vehicle for contamination. Ice cream thus may produce illness. It has been definitely proved that cold has so little effect on bacteria that the freezing of ice cream is but a slight safeguard, if any.

Several cases of ice cream poisoning have been noticed. As it is necessarily made from a raw product, and as freezing is so well endured by bacteria, it is possible that bacterial infection, quite unsuspected, was the cause.

The Safety of Modern Oil Lamps.

BY S. B. NEWBURY AND W. P. CUTTER.

By the law of this State, no oil or burning fluid which evolves an inflammable vapor at a temperature lower than 100° Fah. is allowed to be sold, transported, or stored. In order to determine whether a given sample of oil complies with this requirement, a small portion is gradually warmed in a partially closed vessel, and tested from time to time by bringing a small flame near the surface. The appearance of a bluish flame upon the oil indicates that the "flashing point" has been reached. The standard fixed by law, namely, 100° Fah., is based upon the temperature which the oil is supposed to reach when burned in an ordinary lamp, and no danger of explosion is to be apprehended in case the oil in the reservoir of the lamp remains at a temperature considerably below that at which it may give off an inflammable vapor.

Professor C. F. Chandler, of Columbia College, made in 1872 a series of experiments on the temperature which the oil may attain in lamps of different patterns. The results of this very careful and exhaustive research have been constantly quoted, and have for many years formed a reliable basis for discussions concerning the safety of illuminating oils. In the case of twenty-three lamps, Professor Chandler found the average temperature attained to be 83° Fah., the air in the room standing meanwhile at 74° Fah. The highest temperature reached was 100°, which seems to have been an exceptional case, as of the remaining twenty-two lamps, no one gave a temperature of over 91° Fah.

Within a very few years great changes have taken place in the construction and power of the burners used on household lamps, resulting in a very great improvement in the brilliancy and steadiness of the light. These modern burners give out also a great deal of heat, as every one using them must have noticed. It seemed to the writers desirable to determine to what degree the oil in these modern lamps becomes heated, and thus to ascertain whether the present legal standard is sufficiently high to afford protection from danger of explosion. For this purpose two of the most powerful modern burners were chosen, the "Rochester central draft" and the "Electric Argand," and were compared as to heating power with a "Duplex" burner having two wicks, each one and one-half inches wide, and an ordinary single burner with a wick one inch wide. Tests were made in glass and metal lamps, except in the case of the Rochester burner, which requires a lamp of special form made only in metal. In all these experiments the temperature of the oil was ascertained by means of a small thermometer fixed by a rubber stopper in the orifice by which the lamp is filled, and so placed that the bulb dipped about an inch below the surface of the oil. The temperatures reached, in Fahrenheit degrees, after two and a half hours' burning, are as follows, the air in the room standing meanwhile at 74°:

Burner.	Glass lamp.	Metal lamp.	Metal lamp with shade.
Rochester	—	100	104
Electric Argand	97	98	110
Duplex	95	96	110
Single	86	88	94

The above table shows that the oil in metal lamps becomes more readily heated than in those of glass, as Dr. Chandler has already pointed out. The very high figures of the third column show how greatly the heating of the reservoir is increased by the use of a white shade. The lower result given by the Rochester burner is probably owing to the constant current of air which in this form of lamp passes up through the central tube of the reservoir, and thus to some extent keeps the oil from becoming heated. The single burner may serve as a type of those generally used some years ago, and by comparison with this the greatly increased heat given out by the more powerful burners is plainly shown.

If there is any relation between the temperature reached by the oil in the lamp and the danger of explosion, which we can scarcely doubt, these figures certainly show that an oil which would be safe in an old fashioned lamp might be dangerous in a modern one; and further that the legal standard of 100° is actually lower than the usual temperature of the oil in the lamps beside which we habitually write our letters, or about which our families gather in the evening.

It is of course impossible to state what degree of danger may exist under such conditions, but there can be little doubt that an oil heated in a lamp beyond the flashing point is dangerous, whether that flashing point be high or low. Absolute safety can only be obtained by the use of thoroughly reliable oils of a higher standard than that required by law. Fifteen years ago, long before the introduction of these modern burners of high heating power, Dr. Chandler urged the adoption of a much higher legal standard than the present one, and stated that the requirement of a flashing point not lower than 120° would add but a few cents per gallon to the cost of the oil. Now that the necessity of better oils has become urgent, and in view of the great progress that has been made in the process of petroleum refining, the adoption of a more strict legal requirement would certainly cause no hardship to manufacturers.

The results of the tests given above are by no means a reproach to the new forms of burners which have been lately introduced, for the excellence of the light which they give will always greatly outweigh the trifling increased cost of better oil. Dealers who supply these lamps should, however, take especial pains to furnish oil of suitable kind, and should insist that no inferior article be used. Certain well known brands of oil show a flashing point far above the legal requirement, and are thoroughly safe to use in any modern lamp. The manufacturers of these oils should welcome a standard which would shut out all inferior products from the market.

We are at present engaged in an extensive series of tests of various commercial oils of different flashing points, with the object of determining the comparative illuminating power of each when used in the best modern lamps. We have little doubt these experiments, when completed, will show that the use of oils of higher grade is in the interest of economy as well as safety.

Laboratory of Cornell University, June 10, 1887.

Recent Ballooning.

At Quincy, Ill., July 4, Mr. Baldwin, the aeronaut, made a balloon ascension, and when at a height of 5,000 feet, leaped from the basket with a parachute and descended safely to the ground. Time, 3m. 20s. It was an extraordinary performance.

At Portland, Me., says the *N. Y. World*, on July 4, Prof. Charles H. Grimley, a well-known aeronaut, and one man made the start from Lincoln Park, in the center of the city, at 5 o'clock in the afternoon. The wind was from the south and it was expected that the balloon would pass over a small part of Casco Bay and descend on the mainland of Falmouth, five miles further on.

The balloon rose about two thousand feet and then struck a westerly current, which carried it rapidly toward the open ocean. At the rate it was traveling it would take less than half an hour to cross the bay and be beyond the outer islands, where the sea was running high. Prof. Grimley at once saw the danger, and although he had passed the city limits he determined to descend into the bay. Prof. Grimley said that, no matter at what risk, the balloon must come down; and, obeying his touch on the valve line, the balloon, at that time rapidly sweeping along at a height of over two thousand feet, was made to take a downward course, settling with great speed, while passing over one of the small islands.

Opposite Windward Cove the professor let go the drag rope, and on nearing Clapboard Island he began to hope that the wayward balloon might be stopped by catching in the tops of the tall pine trees. The long cable dragged through the trees, sawing off branches and mowing a path through the twigs and boughs, but not stopping the balloon. A number of men on the island ran in the direction the balloon was drifting. The drag rope whipped about the trunk of a tree and held fast for a moment, while the men secured it to a large rock. Then the wind rose again, and the balloon bounded upward and strained with wonderful power on the rope, which had been passed around the bowlder and securely fastened. For a second the rope resisted the pressure, and then it parted as though it had been but a cord.

The released balloon went up, stood still for a little space, and, feeling the influence of the strong wind, went forward and downward into the ocean, burying the basket completely beneath the waves, and submerging the professor and his companion. The balloon slashed through the water at a terrific rate, and the strain was tremendous. Only a thread was between the two wet and sorely pounded men and death. The balloon was soaked and in danger of bursting. If this had occurred, the basket would have at once sunk and the outflow of gas would have suffocated the voyagers.

Fortunately, the varying course of the balloon was in the direction of a yacht. The men on board managed to secure the drag rope, and the aeronauts, clearing themselves from the ropes, sprang into the water. Their removal from the car caused the balloon to rise again, and in a moment it was sailing out to sea. The voyagers were picked up by the yachtsmen. The balloon was lost.

OLEAN, N. Y., July 5.—Aeronaut Clarage, who fell from his balloon yesterday afternoon, remained unconscious until 1 o'clock to-day, when he died.

LONDON, July 5.—A Havre dispatch says that the well-known aeronaut L'Hoste made an ascension on Sunday afternoon from Dunkirk, France, steering for England. Shortly after midnight, while off the mouth of the Thames, the balloon began to descend, and though ballast was promptly thrown over, he fell into the sea. He was picked up by an English steamer.

Shark Fishing at Nantucket.

Mr. Albert A. Gardner, of Nantucket, Mass., writing on July 13, 1886, to Prof. Baird, stated that the primary object of shark fishing about Nantucket was sport, the boatmen taking out parties for this purpose. The profit arising from catching the sharks is of a secondary nature. The bait used in fishing is fresh fish, if possible; otherwise, a piece of salt pork is used. The only portions of the shark having a value are the liver, for the oil it contains, and the jaw, which after being cleaned is worth from $1 to $7, according to size and quality. Many of the sharks taken are worthless, except for the oil contained in the liver, and are simply destroyed.