

Oceanic Phosphorescences.

Nature dazzles the eye of man with many wonderful phenomena, but perhaps never more so than when she turns the gloomy night waters of the sea into a sheet of silvery fire. At these times every movement of the wave, every cleavage of the water by oar or prow, reveals in its dark depths a hidden fire which scintillates and sparkles with weird and mysterious light. The spectacle is one of absolute fascination, for the Spirit of Enchantment rests upon the waters and reality becomes fairyland. The ancients, keenly alive to a sense of the supernatural, saw in this luminosity a manifestation of some unknown power, and wondered; the ignorant read in it a portent of judgment and terror; while in all ages the curious and the searchers after knowledge have speculated as to its cause. But just as nature has invested its appearance with a halo of mystery, so she has also wrapt in much obscurity its immediate cause; and thus, though in the course of centuries varying suggestions have been put forward, nothing with any finality about it has been arrived at. It was asserted truly that certain fishes were luminous; sharks have glowed and shone, shoals of herrings, pilchards, or mackerel have been moving masses of light, and the fish drawn out of the water have lain in great shining heaps, the glow of which vanished as they dried and died. Many writers have described the passages of ships through such shoals—the sheet of moving flames—the beautiful pale greenish elf light that the fish exhibited; while poets have apostrophized the “mimic fires of ocean” and the “lightnings of the wave,” and scientists and naturalists have in turn tried to account for their power of luminosity. Some have attributed it to the presence of certain substances of a fatty nature excreted by the fish and adhering to the surface of their bodies; others have declared that it is due to a subtle power of the fish itself—a form in which the energy of life shows itself under certain conditions, just as this energy may be exhibited in heat, or motion, or electricity; others, again, have ascribed it to direct absorption and transmission of the light of the sun, and so on. Many theories have been elaborated, but none convincingly. But now, it is asserted, the secret is laid bare. It is wonderful how many secrets the searching light of the nineteenth century is claiming to reveal. It is, perhaps, a matter for still more wonder whether in the far future our descendants will indorse all our solutions, or whether they will not smile at some of them just as we, half contemptuously, discredit those of our ancestors. However that may be, we have, in this case, a solution offered to us that apparently approaches nearer the heart of truth than any yet put forward, in that it satisfies the various phases of the phenomenon and gives a unity and coherence to its manifestations. It is only lately that any very serious effort has been made to study this phenomenon, but the research has been abundantly rewarded, for it is now pretty certain that the luminosity is due to the presence in the water of various kinds of bacteria.

Now, bacteria are the very smallest living organisms of which we have cognizance. Millions of them can lie on a penny; therefore, to produce the gleaming appearance recognized by us as phosphorescence, they must be present in numbers too enormous even to contemplate with our finite minds. It would be immeasurably easier to reckon with the stars for multitude than with these phosphorescent bacteria. They are colorless, rodlike bodies, only known to us in the land revealed by the highest powers of the microscope, and careful comparison shows minor differences among them. For instance, some of them are capable of independent motion—we can hardly call it swimming—others are non-motile, some are inclosed in a jelly-like covering. Others are without this sheath. Their power of motion is probably due to excessively fine hairs at their extremities, which, moving to and fro in the water, act the part of oars. These cilia have not been found in all forms of bacteria which move, but their presence is inferred, since every advance in the study of motile forms increases the number of bacteria which are seen to possess them. These light-producing bacteria are known as photo-bacteria, and so far some half-dozen varieties have been distinguished and named. That they lie at the bottom of the matter—that phosphorescence is due to their presence—has been and can be proved in several rather pretty ways. It is not sufficient, of course, that we should always detect them in any examination of luminous sea water; to prove that they are the cause of light, we must be able to procure luminosity by introducing them into water that did not previously show this quality, and this can be done thus: Place a few of these tiny organisms into seawater or broth prepared from fish, and keep at a suitable temperature; they can then be cultivated without much difficulty, and as they spread and develop phosphorescence appears, so that a removal of the vessel into another room shows unmistakably the glow of the familiar light. It only appears, however, at the surface of the liquid, where the oxygen of the air has free access to the bacteria; if, for experiment's sake, the supply of fresh air be cut off—that is, if no oxygen be allowed to come near them—then the little colony of bacteria loses its fascinating power and remains dull

and shorn of its glory. But restore the air, and the microbes again recover their normal condition and luminosity seems a natural corollary. There is a tale told that a lady, whose husband made bacteria his study, took a leaf out of his book, and cultivated these bacteria on gelatine in such a way that as they developed they shone out the message, “Homage à M. Pasteur.” The shining letters were then photographed and the picture sent to the great bacteriologist, thus conveying in graceful form the warm appreciation in which he was held by those following in his steps.—Knowledge.

AN OPENING AND CLOSING DEVICE FOR FIRE-BOXES.

Considerable difficulty is often experienced in starting fires in locomotive and other furnaces, owing to the reduction in temperature produced by the entrance of cold air to the fire-box. An invention recently patented by M. J. Griffin, general yard master, and P. W. Hogan, car foreman of the Grand Trunk Railway at Island Pond, Vt., is designed to overcome this obstacle.

The invention as illustrated in the engraving consists in providing the fire-box with two doors sliding on guideways secured to the front of the fire-box. Projecting pins on the doors engage the slotted ends of levers fulcrumed on the lower guideway and connected pivotally at their lower ends by links, with the upper end of a bar sliding in a guideway secured to the front of the fire-box and is rigidly connected, as shown, with the lower end of a spring-pressed foot-piece extending above the platform in convenient reach of the fireman's foot.

Normally the spring of the foot-piece, acting through the medium of the bar, keeps the doors of the fire-box



GRIFFIN AND HOGAN'S OPENING AND CLOSING DEVICE FOR FIRE-BOXES.

tightly closed. When the fireman desires to shovel coal into the fire-box, he presses down the foot-piece in the manner shown, and moves the bar downwardly, thus causing the links to act on their respective levers to slide the doors outwardly in the guideways. After having thrown in his coal, the fireman removes his foot, this causing the doors to close automatically. It is evident that the doors during this process are open but a short time, so that cold air is prevented as much as possible from passing into the fire-box and reducing the temperature while firing up.

Protection of a Closet Trap.

F. P. Dunnington writes us from the University of Virginia as follows:

In cold weather, not unfrequently there is necessity for leaving the trap of a closet unused in a location where it cannot be warmed, when, if the water standing in it is frozen, the trap might be destroyed, or, if the water be removed, sewer-gas would escape. This difficulty may be overcome by putting into the trap about one pound of common salt. This salt will saturate three pints of water, which is approximately the volume required to fill a closet trap, and this solution will not be frozen at any temperature above zero. Repeated stirring will be required to get the salt dissolved.

In hot weather, in an unoccupied house there is danger of water evaporating from a closet trap, so as to “break the seal” and allow the escape of sewer-gas. This result may be prevented by putting into the trap about one-half pound of dried commercial calcium chloride (costing a few cents). This salt has so great an affinity for water that it will hold on to it even through the greatest heat of the summer, and it is not corrosive or poisonous.

In some degree calcium chloride acts like common salt in preventing freezing, but for this purpose common salt is most efficient.

Miscellaneous Notes and Receipts.

Uninflammable Celluloid.—According to Asselot, dissolve 25 parts ordinary celluloidine in 250 parts acetone and add a solution of 50 grammes of magnesium chloride in 150 grammes of alcohol until a paste results, which occurs with a proportion of about 100 parts of the former solution to 20 parts of the latter solution. This paste is carefully mixed and worked through, then dried, and gives an absolutely incombustible material.—Chemische Industrie.

Petroleum as Fuel.—To the endless number of recipes for the production of petroleum briquettes may be added the following: Petroleum, 10 liters; resin, 1 liter (?); soap powder, 1.5 kilos.; caustic soda, 3.3 kilos.; sawdust, 3 liters; and sand are heated with constant stirring. After ten minutes the mass begins to solidify. If liquid is still present, add soda. The mass thus obtained is formed into briquettes and cooled. Their heating value is said to be three times as great as that of coal briquettes.—Kraft und Licht.

Production of Stamping Ink for Linen.—Moisten 10 grammes of powdered dragon's blood resin and 10 grammes of powdered silver nitrate—lapis infernalis—throughout with a few drops of distilled water and increase the mixture by 10 grammes of white dextrine and enough glycerine so as to give the mass the consistency of a good printing ink. The rubber stamps employed should be rubbed before use with a few drops of sweet almond oil. Spread the ink on pieces of velvet for transferring purposes.—Färben Zeitung.

Antacid Shoe Polish.—A shoe polish which is free from acid is offered for sale under the name of “Antacid Glanzlack.” The recipe for its production is as follows: Filter 50 grammes of powdered gall nuts, 30 grammes of logwood and 200 grammes of water; after boiling for two hours, dissolve in the hot liquid 200 grammes of sirup and 30 grammes of green vitriol. The fluid is boiled until it commences to thicken, then add a solution of 10 grammes of ruby shellac in 200 grammes of alcohol, stir the whole well together and fill the finished dressing in bottles.—Fundgrube.

Easy Removal of Boiler Scale.—In the Bull. de la Société d'Encour. the interesting observation is reported that boiler scale is rendered quite loose and is for the most part washed away on emptying out the water, if the latter is allowed to cool off slowly after taking the boiler out of use, which requires a varying length of time according to the size of the boiler, but generally eight to ten days. The remainder adhering to the walls can be removed by a strong jet of water. Where boilers can be kept idle for so long a time, this method is of great convenience, especially for boilers with narrow pipes or parts of difficult accessibility.—Der Seifenfabrikant.

Gum Arabic.—The gluing agents which are found in commerce under the name of gum arabic consist only for the smallest part of genuine Arabian gum, and we mostly receive in their stead substitutes containing dextrine; partly also gum resins resembling gum arabic; for instance, the gum exuding profusely from the Flinderia maculosa, indigenous in Australia. The fact that the powdered gum is frequently adulterated with entirely worthless substances, such as pulverized cherry pits, also deserves mention. Rock sugar mixed with milk and soda waterglass is likewise sold, in lumps and powder form, as gum arabic. Such a surrogate anybody may prepare at home by very finely powdering 3 parts (by weight) of rock candy and dissolving by boiling in one part (by weight) of fresh cow's milk, which must not be skimmed. To the boiling solution add 7 parts (by weight) of soda waterglass of 33° to 36° Be. Cause a thorough mixture by stirring, allow the whole to cool off to 36° to 38° Reaumur (=115° to 118° F.), pour out on a tin plate with upturned edges, allow to harden and knock with a hammer on the back of the tin, whereby the gluing material separates in grains.—Maler Zeitung.

Preservative Composition for Furniture, Wooden Ware, etc.—A composition for the preservation of furniture and woodwork, etc., has been patented in France by the Société Allegre and Goillot, says a Continental exchange (Maler Zeitung). This composition is said to possess the peculiarity of imparting to the articles upon which it is used not only the desired gloss, but also the appearance and the brilliant color of perfectly new articles. This distinguishes it from other preparations used for like purposes. The coating leaves no visible layer after the application. The mass is composed of: 10 parts pale rosin, 82 parts benzine, 5 parts palm oil, ½ part mirbane essence, and 1½ parts essence of peppermint. The mixture is prepared by the cold process and the application is as follows: Apply a little of the composition on the furniture, floors, etc., by rubbing with an old soft silk rag and finish wiping at once with a dry silk rag, pressing down well, whereby an incomparable luster is said to be produced. The objects remain in this glossy condition one to two months, according to the amount of dust developing in the respective rooms, and are then again treated with the composition. The product must be kept hermetically closed up. If used in summer, it is well to add a few drops of oil.