Correspondence.

Screw-propelled Cunarders.

To the Editor of the Scientific American:

It is so seldom that I find an error in your valuable publication, that it rather pleases me to point one out that occurs on page 508 of the issue of December 23.

In the article entitled "The Turbines of the 'Carmania,'" in the second paragraph, you refer to the "Russia" as the first of the screw-propelled Cunarders to sail to the port of New York, and you give the date as 1867. Now the fact is that the steamer "China" sailed from New York on her first return voyage to Liverpool on April 9, 1862, and she was the *first* screw-propelled Cunarder to sail from New York. I happen to know this because I sailed from Boston just one week before in the "America," and while in Europe I made the acquaintance of three gentlemen who sailed on the "China," and who always spoke of her as being a screw steamer. Charles T. Barry.

Roxbury, Mass., December 26, 1905.

Chinese Music.

To the Editor of the Scientific American:

In "Chinese Music," by J. A. Van Aalst, p. 49, No. 2, the author, in describing the *pien-ch'ing*, or stone chime, says that it is "composed of sixteen stones suspended from a frame. These stones measure 1.8 feet one way and 1.35 the other, and differ only in thickness; the thicker the stone the deeper the sound." The stones are cut in shape of a carpenter's square, with the blades or legs much wider.

Questioning the conclusions of Van Aalst, I had cut two specimens of plate glass, similar in form to his illustration. They were of equal length and breadth, but one was much thicker than the other. The thinner gave out the deeper sound, as I suspected, and just the opposite of Van Aalst's statement.

E. H. Hawley.

U. S. National Museum, Washington, D. C., January 9, 1906.

Lubricating the Under-water Surface of Ships.

To the Editor of the Scientific American:

The letter signed D. B., which appears in your present issue, brings up a question of the utmost importance to owners of all kinds of seagoing craft, more especially to the owners of racing yachts both sail and steam.

His first idea relative to the pumping of air through small holes in a pipe which passes down the bow of a vessel and along the keel, to produce air bubbles to act as friction rollers, is most certainly a novel one. Possibly it might interest D. B. or some other of your readers, to know that experiments to determine the efficacy of this can be made on a small scale, and the merit of this idea much more easily determined than by getting some friendly owner to make such trials.

Four or five years ago, the marine inspector of the North German Lloyd made, at the instigation of certain interested parties, experiments to determine the relative friction caused on the bottoms of vessels coated with grease paint as compared with varnish paint. He conducted these experiments by pulling a wax-coated model through a small tank and registering the resistance. He then pulled the same model with a coating of varnish over it through the tank, again registering the resistance. The result thus obtained was much more decisive than it would have been had the experiments been conducted on steamers, where so many considerations come into play to make the result a doubtful one. There is no reason why such experiments could not be conducted on a model containing a small air pump to distribute the air around the under-body. The resistance should be compared to the pulling of the same model through the water with the air shut off and the bottom coated with varnish, for a varnish surface, contrary to the general opinion, offers less resistance to the water than a grease surface. This was most conclusively proved by the trials of the North German Lloyd inspector. The experiment is well worth trying, for it might be of valuable service to the owners of racing craft.

With regard to the pumping of kerosene through these holes to hinder the submarine growth, I am afraid that this would be found to be not only most expensive, but of doubtful efficiency. The best antifouling compositions on the market now accomplish their work for a period of from six to twelve months. This is due to the high percentage of mercury they contain. The submarine growths settle on the bottoms of vessels in the form of ovules or larvæ, and to prevent their attaching themselves to the metal they must be instantly coagulated. A solution containing one part of bichloride of mercury to fifty thousand parts of water is a more effective coagulator than kerosene, and very much cheaper. The mercury in the antifouling composition disintegrates slowly through the action of sea water, forming soluble mercurial compounds, which hover around the bottom of a vessel, coagulating all ovules, larvæ, or cirripedia that seek to attach themselves.

I must apologize for taking up so much of your valuable space, but the protection of the under-water surface of ships constitutes a science that is little known to the general public but is, however, of great interest.

New York, December 28, 1905. T. W. H.

A Unit for Light Measurements and a Centigrade Photometer.

To the Editor of the Scientific American:

We have the meter for measuring length and contents, the second for measuring time, the lactometer, hygrometer, and barometer for measuring various other values; but, although we have *the name* "photometer," there is no standard and no unit of generally accepted usage with which to express light values. Saying, "It is 50 degrees Celsius," we will be understood by almost any intelligent and civilized being, but if we should wish to express the light value prevailing, we can only do so in a very general way by stating perhaps, "This is a light room," or "It is very dark here." Why should not the architect be able to say, "This room will have 5 degrees of light on a bright noon," and we understand him? Why not the school teacher complain that "zero" was insufficient for his aula, or the physician prescribe "minus 20 degrees" as the light most convenient for a sickroom?

This deficiency has been most keenly felt in photography and kindred arts, and various devices have been invented to overcome it; all of these, however, suffer from the serious defect of not being based upon a standard or unit of light values which will admit of being generally accepted.

In submitting the following proposition, I believe by no means to have solved with one Alexander stroke this vexed question, but to be on the right track toward establishing such a value.

I propose to call "zero" the light force of the sun exerted during the first second after sundown (6 o'clock P. M.) upon a horizontal, light-sensitive surface, in a determined locality, and under determined conditions.

I propose to call "plus 100 degrees" the light force of the sun exerted during the first second after noon (12 o'clock M.) in the same locality, and with equal conditions as for "zero." The interval between these extremes should be divided into 100 degrees, and the scale thus established could be extended above 100 and below zero.

An ideal locality would appear to me to be any place on the equator on September or March 21, or any other point between the northern and southern tropic on equivalent days regarding the position of the sun. The observation, in order to avoid as much as possible atmospheric influences, should be taken at an altitude of 100 meters, while the sky is cloudless, the horizon unobstructed, and the humidity of the air medium. While this may appear as a long list of conditions, hard to comply with, there would be, I believe, no difficulty to find a locality where they prevail.

I have proposed the measurement to be made by a sensitized surface, having thereby in view a standard emulsion of some silver salt as it is now used in dry plates and photographic papers; but if a plan could be devised promising more stability, accuracy, and permanency, it should of course be preferred; however, the measurements should on no account be delayed for the want of an absolutely correct apparatus.

The system suggested by me has this in its favor:

1. It establishes a unit and a scale of light values.

2. It is as simple and elastic as the thermometer, and instruments *á propósito* could easily be devised after the standard has once been established.

3. It is a permanent standard taken from natural conditions which "we always have with us," and therefore may be verified and rectified at any time.

4. The scale being Centigrade, is easily memorized and fixed in one's mind.

This may be said against it:

1. It would be difficult to locate a place where the conditions required exist.

2. It would be impossible to devise an instrument recording the theoretical values so as to be easily read and utilized and sufficiently accurate.

The first of these objections had been made also when the meter was to be defined as the ten-millionth part of the earth's quadrant; and as regarding the second, while absolute accuracy of course would be desirable, a slight error should be of as little consequence as has been the error which occurred in the observations of the French commission which was appointed to fix the length of the meter. The idea of an instrument for measuring light values is already applied in the various exposure meters on the market for photographical purposes, and these, founded upon a unit as suggested in this paper, could easily be converted into photometers of general utility, if no better device in the meantime should be produced.

The best plan in the writer's opinion to establish this light unit and make the necessary observations would be by appointing an international commission; the next best, that for this purpose some of the funds be utilized, which are available for scientific investigations; and finally measurements could be taken by isolated but trustworthy persons, and the observations obtained by them tabulated and compared, and from these data the standard unit determined.

Guillermo Butzing.

Havana, Cuba, December 20, 1905.

Power Production of the Future.

To the Editor of the Scientific American:

Economy in the production and use of power must be, in an increasing sense, the watchword of the industrial life of the future. Our dynamical resources, particularly fuels of various kinds, vast as they are, must be, in the nature of the case, limited; so, as population increases and the uses of power multiply in inverse proportion to the reduction of its sources, all measures looking toward economy in both its production and its use excite increasing interest from all thinking men. Both engineers and political economists are especially interested in this question as the industrial and political activities of society are so closely linked.

The main dependence of the future for power, it would seem, must be in the fuller development of our water powers which are as yet only in the very infancy of their growth. The time is perhaps not far distant when every mountain stream capable of developing horse-power will be harnessed to electrical machinery delivering energy to near-by mills or distant cities. This is especially true of the South where the rainfall is copious and regular and the streams free from ice for the greater part of the year. The fullest utilization of this source of cheap power awaits the perfection of the methods of electrical transmission and transformation which are as yet crude and wasteful. A collateral advantage of the creation of great reservoirs for power purposes in the interior of the country, which I have not seen suggested, relates to their possible effect on climatic conditions in the surrounding country. Will not the presence of these artificial lakes, when sufficiently multiplied, retaining water summer and winter, have an appreciable effect on the humidity of the atmosphere regulating the rainfall, and correcting to some extent the disastrous results of forest destruction which has practically denuded our hills of timber, thereby rendering more frequent drouths in summer and floods in winter? So, as always in human progress, the development of one opportunity will perhaps bring unexpected good results in its wake.

But in the immediate future the hopes of the industrial world for cheap power must be centered on the perfection of the gas engine. Already remarkable progress has been made with this invention which its advocates believe is only an earnest of what the future has in store for it. When the ultimate form of the engine itself—the gas turbine—shall have been perfected, which perhaps may be some time hence, and the process of gas production somewhat improved we will have a prime mover, when linked directly to an electrical dynamo, of the highest thermo-dynamic efficiency and economy.

With the development and general use of the gas engine another vast economy will be made possible. This in the realm of transportation. Instead of hauling coal at great expense to the centers of industrial activity it will doubtless be found both convenient and economical to convert the fuel into gas at the pit's mouth and convey it by underground main to the city to be thence distributed for industrial and domestic uses, and besides with an entire absence of the dust, grime, and smoke incident to the transportation and use of coal, particularly soft coal, in the city.

In this use of fuel gas is to be found an abatement of the vexing nuisance of clouds of stifling smoke which afflict manufacturing centers like Pittsburg.

Until the methods of transporting electrical energy over long distances have been considerably improved, on account of the loss of power occasioned by friction, and leakage due to imperfect insulation, it will perhaps be much more economical to transport the fuel gas rather than the electricity, particularly as the gas plants will have to be moved from time to time, or the coal supplies fail, in order to obviate transportation charges.

The time is not far in the future when great cities like New York will be giving as much thought to the supply of their fuel gas requirements as they now do to the water supply, and with quite as much reason.

Let all such interests be controlled directly and entirely by the city as a safeguard against one of the greatest possibilities of monopoly known to modern times. Surely a city's heat, light, and power are too vital in their connection with the common welfare to be intrusted to private corporations.

A city could easily secure for public use vast coal fields, even hundreds of miles away, convert the coal into gas at the mine, convey it to its corporate limits, distribute it at reasonable rates to consumers in its factories and homes, and thereby give an incalculable impetus to its own industrial, commercial, and social advancement. J. Logan Irvin.

Americus, Ga.