Correspondence.

The Paradise Fish.

To the Editor of the Scientific American:

In your paper of July 11, you print an article on the Paradise fish. The writer, in praising this really beautiful and interesting little fish, goes even so far as to "hope that they may be introduced into American waters."

Five years ago I imported six pair of two varieties of paradise fish (*Macropodus venustus* and *M. viridi auratus*). I have since that time raised many thousands of young ones from these, and am perfectly acquainted with their habits of nest building, their still more interesting ways of rearing their young, their fighting qualities, and also their diseases. I therefore hope that the Lord may prevent another experiment, which no doubt would prove as fatal to this country, as that made with the English sparrow. The Paradise fish are as fully, if not more, destructive to fish eggs, young fish, and fish food, than our native sticklebacks, darters, and the small varieties of sunfishes; they destroy without any other compensation than their beautiful colors and interesting habits, which, however, are only observable when the fish is kept in a glass vessel.

Those interested in this subject I respectfully refer to an illustrated article on the Paradise fish, printed August 11, 1881, in *Forest and Stream.*

HUGO MULERTT.

Cincinnati, O., July 13, 1885.

The Heat of Boiler Water.

To the Editor of the Scientific American:

In the article "Mechanical and Steam Engineering," by J. R. Williamson, in your issue of June 27, the writer makes the statement that "one cubic inch of water, with the requisite amount of heat, and at normal pressure, flashes into sixteen hundred cubic inches of steam, as would be the case in the bursting of a steam boiler (an expansion about the same as that of gunpowder)."

Admitting that a cubic inch of water will make sixteen hundred cubic inches of steam, and more, it is difficult to see where the "requisite amount of heat" is to come from, in the case of the bursting of a steam boiler.

To convert a pound of water into steam at atmospheric pressure requires 11,781 units of heat. Now, in case of the bursting of a boiler, the water can derive no more heat from its surroundings than the amount it actually contains at the time. In the case of a boiler working under the very common pressure of 90 pounds per square inch, or 75·3 pounds by gauge, the tempera-tur[illegible] water will be 320·2 degrees, and the number of heat units [illegible]. A pound of steam at same pressure would con[illegible] its sensible heat of 320·2 degrees, a latent heat of 890·9 degrees, a total of 1211.1 units of heat. But we are considering a pound of *water*, not *steam*. We have found that a pound of water contains, at the pressure named, 320·2 degrees. Now, this number of degrees, minus its temperature at atmospheric pressure, or 320·2 – 212 = 108·2 degrees, is the total amount of heat available for converting the water into steam. As it requires 1178·1 degrees to convert all of the pound of water into steam, and there are only 108·2 degrees available, it will be seen that we have only a little more than one-tenth enough heat, or enough to convert about one-tenth of the water into steam. This would hardly make the expansion "about the same as gunpowder." How would Mr. W. like to "blow off" a boiler, or even open a gauge cock, if, instead of water at 320 degrees, gunpowder issued forth in the same bulk and exploded as it came?

Now, while I would not underrate in the least the great destructive force contained in the water in a steam boiler under pressure, if suddenly relieved of that pressure by the bursting of the boiler, I do not like to see statements which so much exaggerate the facts, or which cannot be verified by the accepted theories of heat and steam.

W. D. EVANS.

Le Sueur, Minn.

A Large Poplar.

In the Botanical Garden at Dijon there is a poplar of colossal dimensions (species not stated) to which Mr. Joly devotes a note in the *Journal de la Societe Nationale d'Horticulture*. The height of this tree is 130 feet. Its circumference near the earth is 46 feet, and, at 16 feet above the earth, 21 feet. Its bulk is now 1,590 cubic feet, but six years ago, before the fall of one of the large branches, it was 1,940. From some historic researches made by Dr. Lavelle, and a comparison with trees of the same species in the vicinity, it has been pretty well ascertained that this poplar is at least 500 years old.

Unfortunately, it is now completely hollow up to the point whence the large branches spring. All the dead portions have been removed, and the interior has been filled in with beton.—*La Nature.*

The Fastest Railway Speed.

There have been so many reports as to the speed attained by fast railroad trains, and the conditions under which such runs were accomplished, that it is pleasant to be able to give full official details of a train speed attained on July 9, over the West Shore Railroad, which at least seems to "beat the record," so far as this Continent is concerned. It was a special train, run from East Buffalo Junction to the New York terminus of the road, 422·6 miles, at the average rate of 54·06 miles per hour while the train was in motion, but the remarkable speed attained was in the run from East Buffalo to Frankfort, N. Y., a distance of 201·7 miles. This whole distance was made, excluding stops, at an average speed of 59·63 miles per hour. The fastest speeds were between Buffalo and Genesee Junction —60·9 miles in 56 minutes, or at the rate of 65¼ miles an hour, while the last 36 miles of the distance was run an the average rate of 72·6 miles per hour. These figures are from the train sheet, as furnished by Mr. W. W. Wheatly, the chief train dispatcher, but there were also on the train officials of the Baltimore and Ohio, Wabash, and Grand Trunk roads, some of whom kept a careful record, and reported that several miles were made in 43 seconds each. The train was made up as follows:

	Approximate weight.
1 N. Y., W. S. & B. baggage car	32,000 lb.
1 " " " private car (No. 90)	56,000 "
1 Baltimore & Ohio " "	56,000 "
Total weight of 3 cars	144,000 lb.
Tender 34,000 lb. empty; 20,000 lb. load (two-thirds of full load)	54,000 lb.
Engine (62,500 lb. on 4 drivers)	94,500 "
	148,500 lb.
Total weight of train	292,500 lb.

Details of engine, Class B, N. Y., W. S. & B. Ry.:
Cylinders, 18 x 24 in.
Drivers (4) 68 in.
Firebox (inside), 5 ft. 10⅜ in. x 2 ft. 10⅛ in.; 17 sq. ft.
Tubes, 188, 2 in. exterior diameter, 10 ft. 10⅜ in. long.
Heating surface, exterior tube area, 1,084 sq. ft., total 1,212 sq. ft.
Boiler, 56 in., average diameter, 17 ft. 6 in. extreme length.
Smokebox, extended. 6 ft. 2¾ in. x 59 in.

Flavoring of Spirits.

In a recent discussion on use of alcohol before the College of Physicians, Philadelphia, Dr. A. W. Miller said: In making whisky we use alcohol produced by fermentation of corn, which is the cheapest article from which it can be made in this country. This is passed through percolators containing charcoal, sometimes animal and sometimes vegetable, which absorbs all the fusel oil and coloring matters. When this process is carefully performed, we have an absolutely pure spirit, which is made of such strength as to contain 50 per cent of alcohol by volume. To flavor this we import [illegible] Germany, where rye whisky is one of the cheap-[illegible] the oil of rye, which is there a waste product [illegible]tification of rye whisky. When this is dilut[illegible] to a proper strength, it can be used as a flavoring material.

Brandy is made in nearly the same way. The flavoring material is obtained by distilling the refuse of the grapes from which the wine is made, with sulphuric acid. There is only one pound of this obtained from a ton of the so-called marc. When this is properly reduced, it may be used as a flavoring ingredient. These are not the only ingredients used in flavoring, but they are all harmless in the proportions used. Another of these flavors is acetic ether. This is also present in the natural product. The peculiar bouquet of high-priced wines is probably due to the presence of acetates, and to the products of oxidation of fusel oil, producing valerianic acid and subsequently valerianates of ethyl amyl. These are present in an infinitely small proportion. Artificial rye whisky contains only one part of amylic alcohol in ten thousand parts; brandy only one in fifty thousand. In addition to acetic ether, there is formic ether in brandy, and also butyric ether. All these things are used by confectioners in flavoring candies, and, as far as I know, no one has suffered from their use, although they are used in larger quantities. There is another point, namely that liquor dealers insist upon having a wholesome article, while confectioners are not so particular.

The cordials which have been shown are made from the rectified spirit, with the addition of aromatics and sirups.

The curacoa is almost an exact representative of the simple elixir of the Pharmacopœia. This is a very useful manner of administering a mild form of alcoholic beverage, and is to be preferred on account of having the sanction of the Pharmacopœia, and having a definite strength. This is another point in favor of artificial liquors. The rectified spirit always contains 50 per cent of alcohol. The natural liquors vary greatly, sometimes falling to 40 per cent, and sometimes, as in rum, reaching 75 or 80 per cent.

I might say here that the unpleasant taste of ordinary diluted alcohol is probably due to the amylic alcohol, which is more soluble in strong than in dilute alcohol. Not being thoroughly combined, it causes a disagreeable taste and odor.

The economical value of these substitutes has been referred to. The rectified spirit can be bought for $1.25 per gallon, and its therapeutic value is equal to that of brandy at $10 per gallon.

I have proposed the name *spiritus maydis rectificatus*, because it designates the particular kind of grain from which this alcohol is derived, and prevents it from being confounded with the *spiritus frumenti* which is now officinal.

As far as my experience goes, California wines and brandies are perfectly pure. Their low price offers no incentive to adulteration. It is well known that brandies from different localities have different flavors. The California brandy also probably never reaches the age of the French brandy.

Chloroform.

Chloroformum, methenyl chloride, terchloride of formyl, according to Wood, was discovered by Mr. Samuel Guthrie, of Sackett's Harbor, N. Y., in 1831. It results from the action of bleaching powder (chloride of lime) upon methyl or ethyl alcohols, or of chlorine upon marsh gas. It is a heavy, colorless fluid, practically uninflammable, but will burn with a greenish flame; its smell is powerful and agreeable; taste hot, sweetish, and aromatic; solvent powers extensive; specific gravity 1·525 at zero and boils at 62° C. (143·6° F.); insoluble in water, soluble in alcohol and ether; unaffected by concentrated sulphuric acid. There are two officinal forms—chloroformum venale and chloroformum purificatum.

Chloroform is introduced into the system through the lungs, the stomach, and the skin. Whether its action depends upon an altered condition of the blood or upon its direct action upon the nerves is not certain; it is more than probable that both theories are correct —upon the blood by increasing its carbon and rendering it thicker, and upon the nerves by its paralyzing effect. That it acts upon the blood by destroying its red disks in the body is proven by the appearance of icterus following its administration either by inhalation or by the mouth (L. Hermann, *Archiv fur Anatomie, Physiologie, etc.*, 1866).

Chloroform from its quickness of action and smallness of dose is superior for surgical and obstetrical purposes to any other anæsthetic, although it has an increased amount of danger over ether, nitrous oxide, and bromide of ethyl. Its mortality is 1 to 5·860, that of ether 1 to 16,542, that of nitrous oxide 1 to 100,000. It is not an agent to be used indiscriminately nor in the absence of proper antidotes.

Deaths are rather due to paralysis of the heart and respiratory organs. When administered internally the symptoms produced are of the same character, only more intensified and more lasting than those following inhalation.—*Llewellyn Eliot, M.D., Medical Record.*

Death of Dr. R. H. Gilbert.

The projector of the elevated railroad system, which has had such rapid and prosperous development in New York city, had almost dropped out of people's minds, until the announcement of his death, July 10, in his 53d year, recalled to the public the fact that the first of these structures was known as the "Gilbert elevated road." The Doctor had patented his invention, but was only able after years of labor to induce capitalists to invest enough to make an abortive attempt to put it in successful operation. This attempt, however, showing that trains could be run from Trinity Church to Central Park in sixteen minutes, gave an impetus to such enterprises which resulted in the present system of elevated railroads, which are now carrying 100,000,000 passengers yearly. The first enterprise was foreclosed on mortgage in 1871, but the Doctor received $100,000 in stock of the later corporations in compensation for his patent claims. He had been for some years in poor health, which impaired his mental as well as his physical faculties.

Refrigerating or Cold Air Machines.

The great advantage of ammonia, for refrigerating purposes, over ether, and more particularly over dry air, is that the required effect is gained by a smaller expenditure of fuel. Ammonia boils at a temperature of –30° Fah. at atmospheric pressure, and has a vapor tension of 120 pounds per square inch at 65° Fah. It has a latent heat (by equal weight) of 900. Ether, on the other hand, boils at 90° Fah. at atmospheric pressure, has a vapor tension of about 10 pounds, while the latent heat is, by equal weight, 162, and by equal volume, 369. Air, of course, is not condensable, and does not enter into the comparison on the same basis. Putting theory, however, on one side, Mr. Jno. Chambers, of New Zealand, states that his machine, which is designed to do the same work as a dry air machine delivering 60,000 cubic feet an hour, will work with about one ton of coal per 24 hours, while the air machine will require four tons for the same work. It will keep a storage space of 20,000 cubic feet, enough to hold 7,000 carcases of sheep, at a temperature of zero, and occupies an area of 306 square feet, the cubical measurement required being 2,295 cubic feet. At a higher temperature, say 15°, a larger space can be kept cool.