Correspondence.

The Weathering of Glass.

To the Editor of the SCIENTIFIC AMERICAN:

In the last number of the SCIENTIFIC AMERICAN I noticed a communication relating to the color which common clear glass takes on when exposed to the air and sunlight. In relation to the same, which I have often noticed, I have formulated the following theory:

The glass is essentially a silicate of calcium with potassium and sodium. The silica used in making the glass always contains some iron, which tends to give to the glass a yellow color. To counteract this yellow color, the glass manufacturers add a small amount of manganese dioxide. This manganese is always present in the cheaper grade of glass in considerable amount, and on long exposure to the air and sunlight forms a permanganate of sodium or potassium, giving the corresponding color to the glass.

The presence of manganese in glass can be easily proven by fusing a small piece with potassium nitrate, with the resulting green color of the manganate of potassium being formed. W. S. LANDIS.

Metallurgical Laboratory, Lehigh University.

The Scientific American Reference Book.

To the Editor of the SCIENTIFIC AMERICAN:

Some days ago it became necessary, in preparing some legal papers, for me to know the exact meaning of certain words, as "ampere," "volt," "ohm," etc., as used in electric lighting. I have in my library the Century and Standard dictionaries, the Britannica and Chambers's encyclopedias. I used them all, and although each defined the words, the definitions were given in such technical language that I or any one else unacquainted with electricity would know no more after reading the definitions than before. I spent an evening trying to find out the meaning of the words, and had just about given up when I happened to see your "Scientific American Reference Book" lying on my table. I looked into that, and there I found just what I had spent hours trying to find, and in such plain language that any person would understand what was meant. I cannot too highly recommend your "Reference Book" to every professional man, and here take the liberty of expressing my appreciation of the same. A. H. VAN BUREN.

Kingston, N. Y., January 28, 1905.

Vestibuled Coaches.

To the Editor of the SCIENTIFIC AMERICAN:

Some months ago an article appeared in your columns entitled "The Menace of the Pullmans," showing the danger to passengers in day coaches, from being crushed by the heavier Pullmans. I called your attention at that time to the progress several roads were making in establishing the heavy, wide-vestibule type of day coach. Recently two striking illustrations have occurred, showing the stability of the modern day coach.

The latter part of January a train on the Boston & Maine Railroad known as the Halifax and St. Johns express, much behind time and running at a high rate of speed, was thrown from the track, by running into a broken rail. All except the engine, baggage car, and one Pullman left the track. One coach was thrown forty feet, another landed on the trunk of an apple tree, breaking it (the trunk) short off as if cut by an ax. The most harm done was the wrenching of the trucks from the body; no one was killed or fatally injured in this wreck.

The other case happened recently on a New York State road by the explosion of a boiler on a west-bound train, which at the moment was passing an east-bound train. The cars were thrown from the track, and yet in the accident no lives were lost except those of the engineer and fireman of the west-bound, who were killed immediately by the explosion. As both of the roads cited used the heavy vestibuled coach, is it not a striking argument for its general adoption? W. M. SNELL.

47 Winter Street, Boston, Mass., February 8, 1905.

Electrolytic Theory of Dissociation.

To the Editor of the SCIENTIFIC AMERICAN:

The following experiment performed in our laboratory may be of interest to your readers as showing an application of the electrolytic theory of dissociation to physiology:

Five dogs of the same breed and about the same size were selected. For two days they were each given the same amount of food, and allowed to drink as much as they wanted. In each case the food was weighed, and the water measured. The excrement was also weighed. They were then given again the same amount of food for the same length of time, but the water supply was diminished thirty per cent. The excrement was again weighed, and in each case was found to weigh less by a very appreciable amount. Less food was, therefore, assimilated when the water supply was diminished.

According to the electrolytic theory of dissociation, solutions of salts in water are dissociated into ions in proportion to their dilution. Since chemical action is a combination of ions, it follows that digestion, which is chemical action, will take place with greater facility in dilute solutions, and, consequently, that within certain limits, the same amount of food will furnish more nourishment in dilute than in concentrated solution. If, therefore, we do not drink enough water, the proportionate amount of food wasted is greater than it should be, and an increased burden is thrown on the organs which take care of the waste. The alarming prevalence of diseases in these organs is probably due largely to this cause. The engineer, to increase the efficiency and economy of his engine, endeavors to get as much power as possible out of his fuel with as little waste. So it should be with the food fuel we take into our bodies. R. E. HIRSCH.

Assistant Professor of Chemistry, Ohio State University.

Columbus, O., January 23.

Disease Dissemination Through Toilet Soaps.

To the Editor of the SCIENTIFIC AMERICAN:

That the upward way to better things is fraught with stumbling and uncertainty goes without saying; but that civilization is responsible for one of the greatest of known hygienic evils, will come as a surprise to the average reader, to whom the subject has never been brought home, and who carelessly exposes himself to infection with no conception of possible danger.

Reference is made to the practice, now so general, of placing toilet soaps in lavatories where different persons have access to and use the same cake of soap.

Whoever thinks of cleansing a cake of soap after use, or considers that filth and disease germs may exist in the discolored ridges and slime upon its surface?

In a public toilet room, soap, reeking with preceding contamination, is used in entire ignorance of the fact that a break in the cuticle will allow infection to be introduced into the circulation as direct and positive as vaccination.

In these days of health boards, and enforcement of ordinances prohibiting expectoration in public places, and the expenditure of large sums for sanitary purposes, it seems strange that this most potent source of disease has received so little public notice.

Contemplation of the actual conditions existing on every hand is appalling, and already this subject is undergoing the agitation which precedes reform. In two Eastern States bills are pending in the State legislatures seeking to make it a misdemeanor to expose toilet soap in public toilets, where it may be handled by different persons. Devices have been invented which obviate this evil by inclosing the cake of soap in such a way as to enable one to obtain sufficient for his use without handling it, and many prominent concerns are already equipped with them; but no reform ever becomes general without public sentiment being first aroused to the danger, and it is hoped that general discussion may lead to correction of this error.

Humanity is confronted with so many ills beyond control, it would seem that one so serious, yet preventable, should disappear as soon as the danger and remedy become fully known.

GEORGE FREDERICK SHAVER.

Some of the Best-Paying Crops.

To the Editor of the SCIENTIFIC AMERICAN:

In looking over some old copies of the SCIENTIFIC AMERICAN SUPPLEMENT recently, the writer was particularly impressed by an article on "Some of the Best-Paying Crops," which appeared in the issue dated July 20, 1901. A proper consideration of the facts given therein affords a very interesting measure of the advances that have been made in planting since that date.

For instance, for a crop of potatoes, in 1901, as the article sets forth, "150 bushels per acre is considered satisfactory to the farmer, which at 75 cents per bushel amounts to $112.50 per acre." Unfortunately, there are yet many farmers who consider 150 bushels "satisfactory," but the best growers now produce 300, and there are men who obtain more than that yield year after year.

Nor is that all to be said about the matter, for it can be shown that even 400 bushels of potatoes is not the limit that can be obtained. From the reports of various agricultural experiment stations, it appears that the Canadian experimental farms, near Ottawa, hold the record in potato production. There the yield on small plots, carefully managed, rose as high as 772 bushels per acre. Seven varieties gave over 600 bushels per acre, fifteen turned out more than 500 bushels, and for sixty-one the crop was 400 bushels or better.

While no such yields have been secured from large fields, it is manifest that the lesser yields in field planting are due to inferior cultivation. Moreover, even with what is called "field cultivation," the best farmers receive from $250 to $300 per acre of potatoes.

In turnips, which was another crop considered, the yield was said to be 400 bushels, usually, per acre. With present-day cultivation a crop of from 500 to 600 bushels is gathered. Where mangles produced 600 bushels, modern methods have turned out more than 50 tons, or say 1,800 bushels.

In field beans the development has been relatively very small, but as cultivated now there are few crops that pay truck growers higher sums for the ground occupied than string or snap beans. For it is a poor variety that will not give a quart of salable pods per foot length of drill, and drills may be made two feet apart. At five cents a quart—a common price—the return should be at the rate of $1,000 an acre, or more.

The yield of parsnips is put down at 500 bushels per acre in 1901, while carrots gave 600. The more careful cultivation now practised has increased the average crop from 10 to 25 per cent, and prices for table varieties are the same—75 cents a bushel. But the records show that a crop of 40 tons of carrots is not beyond reach, and parsnips can be made to yield 30 tons.

A most profitable producer (in certain sections) that was not mentioned by the writer of 1901, is the strawberry. In New Jersey and around Norfolk, Va., a crop of from 5,000 to 8,000 quarts per acre is called good, but there are growers who cultivate extra fine varieties with great care, and thus produce from 10,000 to 15,000 quarts per acre. And the extra fine berries bring from 10 to 15 cents per quart, and in some cases as high as 25 cents, where the ordinary crop brings from 3 to 7 cents.

The methods by which the improved crops are produced are simple and open to all planters. Where the land was plowed and harrowed once before planting, it is now plowed twice and harrowed and worked with a cultivator, perhaps five times, for some crops, before the seed is put in. The use of various legumes for improving the soil has become a regular practice. By the selection of seed and the crossing of varieties, productiveness, and the other good qualities as well, have been greatly improved. As an instance of this improvement, it may be noted that where a crop of 100 bushels of shelled corn was once called good, there is now a record of 238 bushels—all of which increase was due to the crossing of varieties and the selection of seed.

But it appears that the chief factors in the increase of farm crops are formed in the conservation of soil moisture and in irrigation. The dust blanket or mulching of fine earth has often added much more to the size of a crop than any quantity of expensive fertilizers, but a proper system of irrigation to give the required moisture at precisely the right hour is the most important feature of modern scientific farming. It is not too much to say that a proper use of tile drains in combination with a sufficient supply of irrigating water would double the yield of nine-tenths of the farms lying in the regions where it is commonly believed that the rainfall is abundant. For while rains may afford sufficient moisture on the average, it is of the utmost importance that the moisture be applied at precisely the right time.

As the writer of 1901 said, "Every man must decide for himself what crops he can raise with profit." But the day is gone when a man can depend on the experiences of his grandfather in deciding on methods of cultivation. The old-time sneers at "book farming" are seldom heard now, for the men who have accepted the lessons taught by the agricultural experiment stations are the only ones able to answer the question, "What are some of the best-paying crops?"

Northwood, Herkimer Co., N. Y. JOHN R. SPEARS.

The Current Supplement.

The current SUPPLEMENT, No. 1522, opens with an article by Emile Guarini on the viaduct of Fades, which article is splendidly illustrated. "The Spark Coil" is the title of an article which will be read with extreme interest by automobilists. Our Belgian correspondent writes on a liquid rheostat. Sir John Eliot's paper on meteorology in the British Empire is continued. Miss Agnes Clerke, the well-known English astronomer, writes on our solar system. M. Tsybikoff, a Buriat by birth and a Lamaist by religion, was probably the first Occidental who ever entered the forbidden city of Lhasa. A stirring account of his experiences begins in the current SUPPLEMENT. Splendid photographs of Tibetan scenes illustrate the article. Commander W. H. Beehler of the United States navy writes on estimating distances. "Waterproofing Fabrics" is the title of a most instructive technological article by H. Hield. Dr. Allan McLaughlin tells how immigrants are inspected. "The Light of a Glowworm" is interestingly discussed by Dr. T. Lamb Phipson. The usual electrical notes, science notes, and engineering notes are published.