Correspondence.

The Great Sewers of St. Joseph, Mo.

To the Editor of the Scientific American:

In your issue of January 30, in the description of the Brooklyn sewer, you mention it as probably the third largest sewer in the world. We have a sewer here which will place it fourth if not fifth or sixth in the list. I send you blue print of "Blacksnake sewer," in this city, commenced in 1884. We have this last season extended it 1,766 feet, and have now a total length of 2,486 feet. The blue print shows sections at different points as constructed this last season. It is egg-shaped and the same size, 17 feet high by 14 feet 6 inches wide internal diameter, is carried through its length. It has two curves, one of 573 feet and one of 192 feet radius, the angles being each about 70 degrees.

We have another sewer here, 14 feet diameter, circular, changed to egg shape in its extension, with a height of 15 feet and width of 13. This sewer we expect this season to extend 700 feet and then reduce to 14 by 12 feet for 2,000 feet further. I have always claimed for this Blacksnake sewer especially that it was the largest *brick sewer* in the world. If wrong, would like to know where its superior is. F. FANNING.

Saint Joseph, Mo., Feb. 8, 1892.

How to Extract Burs from Wool.

To the Editor of the Scientific American:

I read an article in the last number of the SCIENTIFIC AMERICAN (February 6) on "Carbonization of Wool." The object is to rid wool of burs. The process seems to be tedious and not likely to leave the wool either clean or uninjured. Forty years ago I lived near an old farmer cotton planter, who owned a small flock of sheep from whose wool he had manufactured the clothing and bed covering for the family. On his farm there grew an immense quanty of cockle burs.

The sheeps' wool was perfectly matted with them every year. He told me that he ginned them out as he did the seed from cotton. The breast of the gin must be raised, so as to let the teeth of the saws just come through the ribs. In this way they would catch a few fibers of the wool at a time and draw them away from the burs, when the revolving brush would flirt them into the "lint room." When the burs were thus relieved they would fall under the gin as cotton seed does. The wool thus freed from the burs was in the best possible condition for carding.

WILLIAMS RUTHERFORD.

Athens, Ga.. Feb. 8, 1892.

"Scientific American" versus Encyclopedia.

To the Editor of the Scientific American:

Run to an encyclopedia for information! and then—well, close the "ponderous tome" in disappointment, for that is almost sure to be the result of your quest if the object be to clear up a mooted point in scientific inquiry. Most of us are willing to concede that, with regard to historical matters, a reference to an encyclopedia will lead to conclusive results. But much confidence even in that field is hazardous in these days of "rich leads" in archæological diggings. About a year ago the SCIENTIFIC AMERICAN published the report of a discovery of a Babylonian cylinder, in the Palmyrian plains. An inscription on the cylinder cleared a point in history upon which Herodotus and Thucydides were at variance, and credit accrued to the latter, to whom it had been adverse for more than two thousand years. "What then, what rests!" Consult the cyclopedia less? No! but read the scientific journal more. It seems, in many views, that—

> "Science moves, but slowly, slowly,
> Creeping on from point to point."

On the other hand, a little incident, in a twinkling, turns out of doors the theories of ages.

Although unknown to the SCIENTIFIC AMERICAN as a subscriber, having taken it through newsdealers, I have taken and read it, with the best care at my command, for thirty-five years. All the volumes have been promptly bound and kept where they are as easy of access as is my dictionary; and I know them to be a treasure house of the richest treats. All three of the publications, the BUILDER'S EDITION, the SUPPLEMENT, and SCIENTIFIC AMERICAN proper, are thus kept bound and convenient. I know of nothing else to which I would so strenuously recommend the young as to do likewise with these valuable journals.

A few days ago, within my hearing, a group of young people were eagerly seeking information about the conjunction of the planets Jupiter and Venus when one of them, the youngest of the party, said, "Here is the SCIENTIFIC AMERICAN. It always has everything." And their wishes were quickly satisfied.

A scientific journal, with its columns freely open for controversy, for the number of years with which the SCIENTIFIC AMERICAN has been favored, winnows and assays, with an almost unerring precision, every current topic until the truth is reached. Controversy directs the blasts of that adversity by which alone science may be sublimated. For that reason text-books of science, so called, cyclopedias and the like should be very charily regarded, and a journal like the SCIENTIFIC AMERICAN should be in every household as a check and counter check. That which is considered science to-day may be held quite otherwise the next week or the next year. AUGLAIZE.

Defiance, Ohio.

A Needed Invention.

To the Editor of the Scientific American:

It is, probably, not generally known how injurious the electric street lights are to accurate work in astronomical observatories situated in or near cities where this system of lighting is adopted. No new nebulæ or faint comets can be discovered, and the sky illumination fogs the plates in photographic work.

If the top half of the globes could be painted, a large percentage of the trouble would be obviated, and this could easily be done were it not for the varying height of the light as the carbon is consumed, reaching nearly to the top of the globe at ignition, and sinking almost to its base at the time of extinguishment.

The invention desired is one that will maintain the light at one level, and that near the bottom of the globe, during the entire night. Could this be done and the upper half of the globe be painted white, it would benefit the street not only, but would also prevent nine-tenths of the light from ascending skyward.

The inventive genius who shall accomplish this feat will go down to posterity with honor, while astronomers and photographers of celestial scenery will, in particular, have cause to bless his name.

LEWIS SWIFT.

Warner Observatory, Rochester, N. Y., Feb. 11, 1892.

Wind Power for Electrical Purposes.

To the Editor of the Scientific American:

Talking of powers, why may not the winds that forever blow over these vast plains be used to develop and store electricity? At every point from an elevation of some fifteen hundred feet it may be said there is never an hour of the day when the winds are not blowing. Think what an enormous force could be created by some twenty large windmills co-operating. The cost would be nominal only. It has always seemed to me that if the winds blew with as much regularity in the Eastern States as they do where I mention, great use would be made of their power. From the Missouri River west for five hundred miles the winds are incessant, day and night, every hour and minute, no let-up, at the altitude I mention up to five thousand feet and higher. I make the suggestion. You may see objections, but I think none that are insuperable.

HOLT.

[Our correspondent's suggestion is practical. In the SCIENTIFIC AMERICAN of December 20, 1890, he will find illustrations showing the use of the windmill for driving electrical machines for lighting dwellings. Our engravings show all the mechanism and details as actually employed.—ED.]

Sugar in Mortar.

To the Editor of the Scientific American:

I wrote to you some time ago for a paper giving information about using sugar in plastering mortar; you sent me one, but the article in it did not suit our case, so we determined to experiment on it. Thinking the result of our experiment may be of some use to you or your readers, we will send it. We use the cheapest grade of beet sugar, costing here four cents a pound, and all lumps must be mashed up before putting in the mortar. The mortar must be dry or "stiff" when the sugar is put in, as it makes it very soft when mixed thoroughly. We put the sugar in when we temper it for putting on the walls, and put it in the hair mortar only, or first coat, and use about forty pounds sugar to the hundred yards. It is a little harder to put on than without sugar. But the result is we have a wall that cannot be easily damaged. We can draw a trowel corner over it, and bearing on hard can merely mark it. It does not crack by pounding on it, nor can the clinches be easily broken off. It does not color the white coat any, and we can find no fault with it, while on the other hand it is far superior to the unsweetened. Would like to know of some one else's experiments. We figure the extra cost at four cents per yard. Our sand here is very poor and loamy. C. E. SPALDING.

Big Stone Gap, Va., February 10, 1892.

The Architect of the Great Mormon Temple—Honor to whom Honor is Due.

To the Editor of the Scientific American:

In your issue of February 6, 1892, is an illustrated article relating to "The 'Temple Block,' Salt Lake City," in which mention is made of the men who superintended the construction of the Tabernacle and its world-famed organ, but the architect of the temple, which when finished will be one of the most beautiful and costly structures in the world, and is famed for the unique features of its architecture, is not given. It was Truman O. Angell, the father of the writer, and his work in connection with this structure proves him to have been possessed of rare genius as a designer of buildings. He died Oct. 16, 1887. C. E. ANGELL.

Salt Lake City, Utah, Feb. 13, 1892.

Magnitude of Molecules and Light Waves.

BY PRESIDENT MORTON.

When we hear that the successive vibrations in a light ray of average wave length number about 600 million of millions in a second the natural impression is that they must be submicroscopic in dimensions.

This, however, is far from being the case. The actual length of the waves in such a ray is about one fifty-thousandth of an inch. The parallel rulings on the glass plates known as Nobert's test plates, which are employed to test the defining powers of lenses, have been not only "resolved" but photographed when only one one hundred and fifty thousandth of an inch apart (*i. e.*, 150,000 to the inch). In other words, four such lines, spaced as in these rulings, could be drawn within the length of an average wave of light. This shows that the size of the ultimate particles or molecules of the glass must be very much smaller than the waves of light, since several furrows may be plowed through them within the width of an average wave.

All these magnitudes are, however, far beyond our direct perception or powers of realizing, but we may at least get at some sense of our shortcomings in power of conception from the following:

A maker of these "test plates," named Webb, many years ago, made for the Army Medical Museum at Washington a specimen of microscopic writing on glass. This writing consists of the words of the Lord's Prayer, and occupies a rectangular space measuring [illegible] by $\frac{1}{441}$ of an inch, or an area of $\frac{1}{129654}$ of a square inch.

The lines of this writing are about as broad as those on the test plates, which are $\frac{1}{51000}$ of an inch apart. They are, therefore, about as wide as average light waves. Now then to get some idea of the magnitude or minuteness of this writing.

There are in the Lord's Prayer 227 letters, and if, as here, this number occupies the $\frac{1}{129654}$ of an inch, there would be room in an entire square inch for 29,431,458 such letters, similarly spaced.

Now the entire Bible, Old and New Testaments, contains but 3,566,480 letters, and there would, therefore, be room enough to write *the entire Bible eight times over on one square inch of glass*, in the same manner as the words of the Lord's Prayer have been written on this specimen.

Such a statement, without doubt, staggers the imagination, but the figures are easily verified and are certainly correct, and the whole statement at least serves to bring home to us the limited nature of our mental capacities as compared with the facts of the universe.

It also furnishes an interesting suggestion in a very different subject.

It has been often stated that a physical basis of memory may exist in permanent structural modification of the brain matter constituting the surface of the furrows. In a highly developed brain this surface amounts to 340 square inches, and it would, therefore, appear that the entire memories of a lifetime might be written out in the English language on such a surface, in characters capable of mechanical execution, such as those of the Webb plate at Washington. See *The Lens*, December, 1873, p. 225 (Chicago). Also Trans. of Micro. Soc. (London), 1862, III., Vol. X., p. 69.—*The Stevens Indicator.*

A Soiling Experiment.

The indications from this experiment are:

The average cow will eat about seventy-five pounds of green feed a day, kept in the stable with grain ration added.

That cows fed on oats and peas, clover and corn, fed green in the stable, in midsummer, will give more milk than when feeding on a good blue grass pasture.

That a cow fed on green feed in a stable darkened and ventilated will gain in weight more than she will in a well shaded pasture.

That the cow responds as promptly to a well balanced ration of grain while eating green feed as she does on dry feed.

An acre of peas cut green weighed 13·5 tons.

An acre of peas and oats cut green weighed 24 tons.

An acre of corn cut green weighed 33·6 tons.

The second cut of clover in a drought was 3·1 tons.

It is not necessary to cut green feed oftener than twice a week, if it is spread to avoid heating.

Articles on "Time of sowing grass seeds, winter wheat and oats."—*James Wilson, Director Iowa Experiment Station.*

Manganin.

Manganin is an alloy of copper, nickel and manganese, and has remarkable electrical properties. Its resistance hardly varies at all. Even at a range of temperature varying from 15° to 97° C. the mean variation of resistance is only from 20 to 30 millionths of the original value. The resistance slightly decreases with the rise of temperature. Its specific resistance is very high, as much as 0·42 ohm per centimeter. These properties render manganin a superior material for the construction of artificial resistances, for which purposes it is now extensively used.