Correspondence.

A Standard of Light.

To the Editor of the SCIENTIFIC AMERICAN:

May I offer an amendment to my previous article on a standard of light which you were so kind as to publish?

The information given by you that selenium is mostly affected by greenish-yellow rays suggested my looking up the elements found in that part of the spectrum. Finding barium, calcium, sodium, strontium, and the other less common elements of that part of the spectrum, impracticable to use in an alloy, it occurred to me that from their nature the oxides of these elements might be suitable in connection with an oxygen-hydrogen flame. IRVING G. CHATFIELD.

Forestville, Conn., March 16, 1906.

Preserve Niagara Falls.

To the Editor of the SCIENTIFIC AMERICAN:

I was interested in the Western letter of some weeks ago advocating the extension of the franchise for the use of Niagara for power. It argued that, as there is a waste of millions of horse-power, it should be used for financial gain to some one. The primary object of making money is to gain happiness—the goal for which the millionaire capitalist is striving as well as the common laborer who hoards his earnings for years that he may able to visit Niagara—the paragon of Nature's wonders. The only question, then, to decide is whether the money obtained from the utilization of Niagara's power will bring more happiness to the human race than Niagara preserved as it is as a wonder of the world.

Let me suggest: If Niagara is to be used up, bit by bit, for power, why not require all companies using the water to so construct the works that the water may be turned back into the river at will. If this were done in each case Niagara could be made to do duty as a wonder once a week at least, even if all the water was used for power. For power to run the machinery of the capitalists during the time Niagara did duty as a curiosity, storage electricity might be used—batteries being charged during the week by surplus power. These suggestions may be visionary, but unless something is done Niagara is doomed. By all means, let us save Niagara.

J. GREENE MACKENZIE.

Ethel, Mo., March 12, 1906.

The Niagara Problem.

To the Editor of the SCIENTIFIC AMERICAN:

In your issue of February 24, I was pleased to read a thoroughly sensible and practical article by Irvin A. Fort, North Platte, February 8, 1906, on the Niagara question. I have always been interested in the development of power in any form and particularly in large units. Several months ago I had the opportunity of listening to a lantern lecture by a geologist at Ottawa. The subject was to save the Falls (?). The gentleman speaking was much better versed on rock formation than engineering principles, and, although he allowed the engineers some credit for the wonderful plants, he deplored the waste of power both from overflow and not placing the turbines as low as possible, thus losing several feet of "head." The overflow was the old yarn, that because a few buckets of reserve water are seen coming out at the upper level, therefore, immense power is being wasted, these people rarely watching long enough to observe times when this flow entirely ceases owing to the full capacity being called upon. The other story about the turbines not being set as low as possible was a direct insinuation upon engineering ability and was backed by several diagrams showing a drop of nearly twenty feet in the race-way over a mile in length which emptied directly into Lake Ontario. The idea probably was that one or two feet would have done just as well, as water will generally seek its level, but in this case its level is required to be found in a hurry as there is lots more coming every second. The only wonder to me is, that the gentleman did not advocate placing the turbines on a level with the bottom of the lake, thus adding several hundred feet to the drop. I entertain an idea—perhaps mistaken—that if ever coal and other heating agencies were to become unavailable, these same agitators for the beautiful would change their tune to a more practical strain when cold weather set in. Any figures given above are merely illustrative, as I failed to take notes on the occasion mentioned.

W. L. MCLAREN.

Guelph, Ontario, Canada, February 27, 1906.

The Date of Easter.

To the Editor of the SCIENTIFIC AMERICAN:

Recent queries on the subject of Easter have aroused my curiosity, and as the Church's rule for the adjustment of the embolismic lunations is the simplest possible, I thought it might be interesting to reduce it to a general formula. Easter Sunday being the first Sunday after the 14th day of the "first month," or Nisan, the work depends on locating the latter day. The following is the result:

$$Y = m.19 + R = 4S + r \qquad N = 4n + t \qquad Y + S = m.7 + U$$
$$N - 15 = 25p + q \qquad q = 3x + r$$
$$\left.\begin{aligned} N + 19R + 29n + 22p + 29x + 10 &= m.30 + v \\ 6N + 2t + 6U + 6v + 4 &= m.7 + w \end{aligned}\right\} N.S.$$

Y is the numeric of the given year; N, the number formed by cutting off its last two digits; $m.19$, $4S$, etc., the greatest multiples of 19, 4, etc., in the immediately preceding numbers. (When merely the multiple is considered, it is $m.19$, $m.7$, etc.; but if the second factor is required, the multiple is written $4S$, $3x$, etc.) The quantities (R, r, t, U, etc.) following the multiples, are the respective remainders obtained by removing the given multiples. Thus: $1906 = m.19 + R = 4S + r$: dividing by 19 to remove $m.19$, we find $R = 6$; on dividing by 4, we get $S = 476$. For O.S. the cycle being fixed, and every fourth year a leap year without exception, the formula reduces to this:

$$19R + 15 = m.30 + v \qquad 6U + 6v + 6 = 6m.7 + w$$

Easter follows March 22 by $(v + w)$ days, where v depends on the date of the Paschal full moon, and w on the day of the week upon which the latter falls. There are two exceptions, due to the shifting of the cycle to adapt it to the solar year.

1. When $v = 28$ and $w = 6$ with $R > 10$, we must subtract 7, making Easter the 18th instead of the 25th of April. The first instances of this are: 1954, 2049, 2106.

2. When $v = 29$ and $w = 6$, we must again subtract 7 from the final result; putting Easter on April 19. The first instances are: 1609, 1981, 2076, etc. The reason for the difference in the formulas for O.S. and N.S. is the change made in the adjustment of the lunar cycle to the solar year when the calendar was corrected.

As examples, find Easter for 340 and for 1884.

(O.S.) $340 = m.19 + R = 4S + r$, whence $R = 17$, $S = 85$, $Y + S = 425 = m.7 + U$, and $U = 5$.
$19R + 15 = 338 = m.30 + v$; dividing by 30 the remainder $v = 8$.
$6U + 6v + 6 = 84 = m.7 + w$; whence we find $w = 0$.
March $22 + v + w$ = March 30, the date of Easter in 340 A. D.

(N.S.) (As p is evidently zero till the year 4000, we may disregard it, taking $N - 15 = q$.)
$1884 = m.19 + R = 4S + r$; whence $R = 3$, $S = 471$; $Y + S = 2355 = m.7 + U$, and $U = 3$.
$N = 18 = 4n + t$; whence $n = 4$, $t = 2$; $N - 15 = 3x + r$, or $x = 1$.
$N + 19R + 29n + 29x + 10 = 230 = m.30 + v$; and $v = 20$.
$6N + 2t + 6U + 6v + 4 = 254 = m.7 + w$; whence $w = 2$.
March $22 + 20 + 2 = 44$ = April 13, for Easter Sunday, 1884.

It may be noted that, since the Nisan new moon is never earlier than March 8 nor later than April 5 (ecclesiastical reckoning), the Paschal full moon, or that first following March 20, and which marks the 14th of Nisan, cannot fall earlier than March 21, nor later than April 18. This makes March 22 and April 25 the Easter Sunday limits.

Gauss has worked out a set of Easter formulas, to be used with a table of constants given by him, and I find on comparing the two exceptional cases, that my v and w are the same as his u and v; for the rest, however, the formulas are different, and as these require no table I think them preferable. The week-day formula incorporated in these Easter formulas I have for all dates from the institution of the Julian calendar, 45 B. C., until another change shall be made in the Gregorian calendar. This I will gladly furnish if any are interested.

I have been a diligent reader of the SCIENTIFIC AMERICAN for years; and one thing I have always appreciated has been the sound judgment (and I may also say the patience on many occasions) displayed by the query editor. G. P. BRYAN, S. J.

College of the Sacred Heart, Denver, Colo., March 1, 1906.

The Current Supplement.

The current SUPPLEMENT, No. 1578, opens with a conclusion of Mr. W. J. Harding's thorough review of the development of the torpedo-boat destroyer. The last installment of Mr. J. E. Petavel's instructive paper on the pressure of explosives is likewise concluded. The concrete user will find much that is of value in O. U. Miracle's excellent little paper on the causes of failure in the concrete block business. An entertaining article containing much curious information is that on the forerunners of the automobile. It seems that even as early as 1460 automobiles were not unknown. Of further interest to the automobilist is an account of the metals used in automobile construction. The metallurgist will find in an article on manganese bronze and its manufacture much that is new. Researches on metals of the platinum group are discussed by Prof. Henri Moissan.

Science Notes.

A little more than a year ago there died in Jena, that world-famous town, Prof. Ernst Abbe, who has had no small share in making Jena so well known to the entire civilized world. At the time of his death, papers and magazines contained full accounts of the life and work of this truly remarkable man, reciting in detail his numerous contributions to science and his successful experiment in organizing an industrial enterprise upon distinctively new lines. Since that time the feeling that here was a man whose work has been for the good of mankind and whose memory should be fittingly honored, gathered strength until there was appointed a committee to take charge of soliciting funds for the purpose of erecting in his native town, between the Volkshaus erected by him and the Zeiss works, a statue as a memorial. The names of a number of American scientists and business men who had had dealings with the Zeiss works were included in the committee named. We in America seem very far off from the little German town where the statue to Abbe is to be placed; and one might think it of little account whether we help to erect the statue or not. But this is a unique occasion, as Abbe was a unique man, and most of us who know anything at all about him will consider it a privilege to be able to contribute, be it ever so small a sum, to the statue that is to perpetuate his form to posterity. Contributions may be sent to this office or to the Bausch & Lomb Optical Company, Rochester, N. Y., the American agents of the Zeiss works.

In the course of their researches upon spring water, Messrs. Dienert and Bouquet had occasion to make a number of measurements as to the radio-activity of several springs which go to form the Avre, one of the streams serving for the water supply of Paris. To carry out the measurements they used an electroscope apparatus of the Elster and Geitel type. First, they determined the fall of potential which is obtained by a certain quantity of distilled water after one hour, thus giving the normal activity. In the second case they replaced the distilled water by an equal amount of spring water and made the same reading. Subtracting from the latter the normal activity we have the figure which is due to the spring water in question. The results which they obtained show that the water of the Avre is slightly radio-active, and the Breuil spring is stronger than the others. On coming out of the ground, it seems that the water of the spring contains the emanation which it dissolved out of the soil in the most concentrated state. Around the springs has been built a masonry vault, and it is to be supposed that the air within such chambers is strongly radio-active. They found this to be true, and in the case of the Breuil spring the air was over seven times as radio-active as the air of the laboratory, comparing by the electroscope method. Seeing that at certain points, as for instance when coming out of the soil, the springs seem to concentrate the emanation which they have collected from the soil, we may be able to use this method for revealing the presence of underground springs, and the authors are now engaged in making researches to this end.

A curious effect was noticed in connection with a kinetograph view which was taken in Germany not long ago. It was obtained at the time of the visit of the King of Spain to Berlin and represented the entrance of the procession into the city. The horse guards led off, then a line of carriages and lastly a line of mounted cavaliers. What was surprising about this view was that while the carriages moved in the line of march as they should do, the wheels appeared to revolve slowly in the contrary direction, and thus the spectators had the impression that the vehicles were about to be dislocated and torn apart. In another view of the same scene the wheels did not turn at all, or else swayed slightly to and fro about the center. This phenomenon is easily explained, although at first it puzzled nearly everyone. To take the views we photograph the objects successively within at least one-tenth of a second and then project them in the same order on the screen. In the case of a moving carriage wheel the rotation is suggested to the eye entirely by the displacement of the spokes. But here the kinetograph may be completely at fault. For instance, in one of the views a spoke of the wheel occupies a well-defined position. In the following views if the second, third, and fourth spokes are made to occupy exactly the place of the first in their turn, the successive images of the wheel will not differ from each other. The spectator will therefore not have the sensation of the wheel's movement. According to the relative speed of the wheel and the projection apparatus we may find that the successive spokes have a slight advance or lag relative to the position of the first one and give the illusion that the wheel is turning forward or back, as the case may be.

The question of laying down a second track of rails along the Siberian Railway has been postponed until perfect order has been restored on the line.