countries, while the second contains samples of all the articles which are manufactured in Belgium. A library and an information bureau are attached to this museum.

LETTERS TO THE EDITOR.

***Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

The editor will be glad to publish any queries consonant with the character of the journal.

Twenty copies of the number containing his communication will be furnishea free to any correspondent on request.

The Robinson Anemometer.

SO long as the anemometer law is purely empirical, it is doubtless largely a matter of individual taste that one should prefer to use a series of ratios whose values, even within the limits of ordinary usage, range between infinity on one hand, and 2.89 on the other, — a value which corresponds, according to *Science* of March 22 (p. 227), to a wind-movement of 25 miles per hour. Nevertheless occasion may be taken at some future time to point out a possible error into which one is easily led by use of this variable factor.

It seems, my "explanation of the effect of a uniform wind blowing across a whirler upon which an anemometer is being tested is very surprising;" indeed, I have wondered myself that so simple an explanation had not been suggested long ago. That it is "entirely untenable" cannot be admitted, since it is only made to appear so by my critic, who unfortunately omits from the very heart of the statement whose accuracy he questions, three very important words. Nothing more than this need be said. I am well aware, also, that "it has generally been considered that while these cups [of the anemometer] never respond instantly to the wind, and continually lag behind while the wind is rising, yet their momentum keeps them up, and about counterbalances this lagging while the wind dies down;" but that these effects about balance is exactly what does not occur, and therein is the novelty of the explanation I have suggested.

The substitute offered in *Science* of April 5 (p. 268) is based partly on an incorrect statement; namely, that a wind blowing directly at right angles to the path along which an anemometer is being carried will add its effect to that due to the motion of the anemometer. If the writer means that the sum of the two separate effects are to be taken, he is entirely wrong. It is a simple question of the resultant of two forces at right angles to each other, which is not the sum of the two separate forces. With this as a partial basis, the explanation is developed, and the astonishing conclusion reached that "the anemometer will be accelerated during more than three-fourths of the rotation [presumably of the whirler], and retarded during less than one-fourth of it." Had the author, in accordance with the principle of the parallelogram of forces, found the resultant of the two wind effects that act simultaneously upon the anemometer at each point of its path, and integrated or summed these up for a complete revolution of the whirler, he would doubtless have arrived at a much more accurate conclusion, — a conclusion that the ultimate resultant effect for a whole revolution "is only small in most cases, and is not very serious," as given in my original letter in *Science* of March 29; a view, moreover, that is entertained by Professors Dines, Stokes, and others who happen to have written on the question.

Even admitting that the explanation under discussion is correct, it does not account for the uniformity of the results obtained in England with the helicoid anemometer, which, being provided with a vane or tail, always presented its front directly to the resultant wind. The Robinson anemometer, from its construction, has no need of a tail, and the two instruments are circumstanced exactly alike so far as being equally subject to the resultant wind. It is presumed throughout this and previous papers that the axis of the Robinson anemometer is vertical or nearly at right angles to the plane of rotation of the whirler. The analysis of the problem is a little different when the axis is inclined more or less to the vertical, but the final result is practically the same.

Having several weeks ago submitted a paper containing in detail the various experiments and results that led to the development of the explanation given in *Science* of March 29, I do not desire to cite here any experimental confirmation of the theory, nor do I consider that the results given by Professor Hazen in any way disprove the theory. Why one should expect to be able to use the same formula for cone-shaped paper cups as had been found applicable to hemispherical metal cups, or should be surprised at a difference of twenty per cent less wind-velocity, does not appear.

Following the example of Professor Hazen, I intend to try some experiments with hemispherical paper cups, and have thus far completed a set; but the pressure of other duties has not afforded me opportunity to do more as yet.

C. F. MARVIN.

Washington, D.C., April 8.

The Metric System and Professional Teaching.

THE committee appointed at the Cleveland meeting to consider the relations of chemistry to public instruction, naturally have their attention called to the metric system of measures. No doubt the familiarity of the public with this system has much increased since 1866, when the Act of Congress was passed making it legal; but recent conversations with parties who might be supposed well posted on the subject show some views that appear to the writer incorrect, and adapted to retard the adoption of a much-needed reform.

A very prominent teacher of chemistry said he was not an advocate of its general use, and that no time would be saved in the instruction of children by such adoption. The Metric Bureau, in their leaflet, stated that "a year of the school-life of every child would be saved by the adoption of this system." This statement was made by teachers. I do not know its basis; but there are, in the English system of tables we use, about fifty factors to be memorized. As there is but one factor in the metric system, and that the same as our system of numeration, necessarily fifty times as much time is required to learn English measures as metric. If the Society for Psychical Research can tell us the average time required to memorize an idea, we should then know the saving of time in instruction, that would follow the adoption of the metric system.

An apothecary assured me that the adoption of parts by weight in the new pharmacopœia, with which he connected in some way the metric system, had, in his judgment, done great harm to the drug business: for, he said, the wholesale manufacturers put on the outside of their bottles that one part of this extract, etc., with nine parts distilled water (or required proportions), would make ten volumes of the officinal strength. The extreme simplicity of this process, my friend argued, reduced the drug business, so far as intellectual qualifications are concerned, below the grocer, and the metric system was somehow held responsible.

The metric system is in universal use by chemists. The arts of medicine and pharmacy are dependent on chemistry for their materials and their processes. As matters now stand, every student in the colleges of these arts is obliged to learn two new tables of measures, — apothecary and metric; for I assume that all professors of chemistry teach the metric, and some professors of materia medica also. In other schools the chair of chemistry teaches one, and the chair of materia medica the other system.

Is it not time to inquire if this is a rational condition of things? It will not do to say the apothecary weight is learned in the primary school. The metric is taught also, at the present time. Both are usually forgotten before the student matriculates. Neither can it be said that we break away from the system of our English cousins, for our fluid measures are not the same as theirs, now that they use the imperial gallon. There remains the single argument against the metric system in our professional schools, that it is not in general use by physicians. Those who do use it find the gram a most convenient unit. The difficulty of inducing a large body of men to change some of their basic elements of thought seems to be the greatest obstacle to a beneficial improvement.

Now, why not let the old doctors use the old system, but teach the graduates only the new; then add to the pharmacy laws a clause requiring every druggist to provide himself with a set of metric weights, making this condition as indispensable as a diploma? At present, when a prescription is presented in the met-

ric system, most druggists translate it into apothecary weight, and feel aggrieved that they are put to extra trouble thereby. If they had the weights, very many would use them sufficiently to become acquainted with their practical advantages, and thereby add their influence to the advancement of the reform. At present many who acknowledge the advantages of the metric weights, and would gladly see them used, do not have quite the energy required to actively push the change.

It is not understood by some that the object is to entirely supplant the present weights, not to make an addition to our stock. It seems very hard for them to realize that the particular set of arbitrary quantities, in which they happen to think, will in a few years pass into history along with cubits and sesterces, and be equally forgotten. It will be greatly to the advantage of all concerned to hasten this time as much as possible. Just now it seems as if the change was taking place rapidly in some of the mechanical arts; and the following quotation from the *Journal of Engineering Societies* is so apropos, that we add it as summing up the whole matter: "The Western architects prefer decimal subdivisions, because of greater ease in written operations, greater certainty and rapidity in mental operations with numbers of measure, decreased liability to error in figuring drawings (prescriptions), and a general saving of time and anxiety."

How well the above statement would apply to medicine and pharmacy! Simply let all teachers of pharmacy and materia medica agree to omit entirely all reference to the apothecary system of weights and measures, and adopt the law above stated, and the metric system will come into use, and the other die without a struggle. WM. H. SEAMAN, M.D.

Howard Univ., Washington, April 3.

Platinum in British Columbia.

IN connection with the article on platinum in *Science* for March 29, it may be of interest to some of your readers to know that platinum is found in association with gold in placer deposits in a number of localities in British Columbia, and that the most important occurrence of that metal yet met with in North America, so far as I am aware, is that of the Tulameen and Upper Similkameen in that province.

In the "Mineral Resources of the United States for 1887," Mr. David T. Day states that in consequence of inquiries set on foot for crude platinum, a total quantity of 448 ounces was obtained in that year in the United States. Part of this amount was purchased in Oregon, and part is stated to have been derived from British Columbia. This latter portion, no doubt, came from the particular region to which allusion is here made; for, though found in other places in British Columbia, it is here only that the quantity has been such as to induce the miners to collect and market it. The total product of the Upper Similkameen and Tulameen district in 1887 is estimated at from 1,400 to 2,000 ounces, and in 1888 at 1,500 ounces.

Placer gold-mining has been carried on in an intermittent manner in the district in question for many years, the gold found being generally scaly or "fine," and being invariably accompanied by a certain quantity of similarly "fine" platinum. In 1885, however, "coarse" gold was discovered on Granite Creek, a tributary of the Tulameen, and in association with it similarly "coarse" platinum, in grains and pellets which are sometimes as large as a pea; the platinum in some "claims" being present in quantity equal to half that of the gold obtained, by weight. Since this discovery, the platinum, which was formerly thrown away, has been kept and sold separately, the price obtained averaging about three dollars an ounce.

As is usually the case, the platinum here found is alloyed with several other metals of the same series, and with copper and iron. The metals of the platinum series include osmiridium (in considerable quantity) with paladium, rhodium, and osmium to lesser amounts (according to analyses by Mr. G. C. Hoffmann, *Transactions of the Royal Society of Canada*, vol. v. sect. iii. p. 17; *Annual Report of the Geological Survey of Canada*, 1887, p. 5, T.).

During the summer of 1888, I had an opportunity of examining the localities of occurrence of platinum here described, and, without entering into particulars, I may state that its association and distribution point very strongly to a mass of coarse intrusive diorite, which contains much magnetite in a disseminated form as well as in veins reticulating through it, as the source of the platinum. In consequence of the extreme rarity of this metal in its original matrix, this subject appears to be one of particular interest, and it is intended further to investigate it. GEORGE M. DAWSON.

Geological Survey of Canada, Ottawa, April 5.

The Age of the Denver Formation.

I HAVE read with much interest the article in the April number of the *American Journal of Science and Arts*, by Mr. W. Cross, on a formation which occurs near Denver, Col., which he calls the "Denver formation." It appears to be stratigraphically distinct from the Laramie formation, from which it is separated by an intervening deposit, the Willow Creek bed. Paleontological evidence is available from three sources, — the plants, the *Mollusca*, and the *Vertebrata*. The plants according to Ward, and the *Mollusca* according to White, do not differ from those of the Laramie, and most of the *Vertebrata* have the same character. The formation has, on the other hand, yielded some fossils which have been referred to the mammalian genus *Bison*, and described and figured under the name of *B. alticornis* (*American Journal of Science and Arts*, 1887, p. 323) by Professor O. C. Marsh. On the strength of this determination, Professor Marsh identifies the horizon with the pliocene.

This was the first determination made in recent years. When subsequently dinosaurian bones were reported from these beds, a great deal of discussion was aroused, and the persistence of this mesozoic type of *Reptilia* into cænozoic time was proposed and maintained in some papers of a fugitive character.

Several years ago I had the opportunity of examining remains of *Vertebrata* from near Denver and Golden, and they were clearly dinosaurian, and of the types which belong to the Laramie system. How is it possible, then, that a species of *Bison*, a pliocene genus, could occur in the same bed? The explanation is as follows.

In 1875 I published an account of the *Dinosauria* obtained by me east of Denver, in the Laramie formation. They included three genera, — *Hadrosaurus*, and two new ones, *Cionodon* and *Polyonax*. Subsequently, in 1878, I described parts of the skeleton of a dinosaur from near the Judith River, Montana, which was furnished with robust horn-cores. All of these types were figured in the "Final Report and Bulletin of the United States Geological Survey of the Territories." Thinking that this horned reptile would be found to belong to one or other of the nine genera of *Dinosauria* already described by Leidy and myself from the Laramie, I refrained from naming it.

Material recently obtained and described by Professor Marsh goes to show that the horned dinosaurs belong to the genus *Polyonax*, Cope; and not only this, but that the *Bison alticornis* belongs to it also. That the latter species is not a mammal is indicated by the characters of the brain-case figured by Marsh.

Thus is removed the only obstacle to the reference of the Denver and Willow Creek formations to the Laramie system.

E. D. COPE.

Philadelphia, April 4.

Platinum in Place.

IN *Science* for March 29, p. 232, the finding of platinum *in place* is commented on. The following extract from Wurtz's "Dictionnaire de Chimie" (vol. ii. p. 1035) may be interesting: —

"Le platine a été trouvé en place par M. Boussingault dans les filons aurifères de Santa-Rosa de Osos en Colombie. Ce sont des filons de quartz hyalin et de limonite traversant une roche de syénite ou de diorite; en Sibérie, MM. G. Rose et Leplay ont toujours trouvé le platine dans les vallées ouvertes au milieu des roches serpintineuses."

Dana ("A System of Mineralogy," 5th edition, p. 11) says, "In Nischne Tagilsk, it [platinum] has been found with chromite in serpentine." W. G. BROWN.

Washington and Lee Univ., Lexington, Va., April 3.