hundred and thirty miles from Austin, they lost the dog. We had travelled, in a general way, around two sides of a triangle, and were now making the third when the dog got lost. A few days ago, one month from the time he got lost, the dog came back home, fat and foot-sore.

Now it was utterly impossible for him to have taken the back track and to have returned home by the way we went out. How did he find the way from Hillsboro to Austin, if he had no sense of direction? for he had never been over a step of the way between the two places. W. F. CUMMINS,

Texas Geological Survey, Austin, Texas, Dec. 2.

The Need for Popular Scientific Instruction on Oriental Subjects.

THE prevailing fad for the uncanny and the remote, having passed beyond the stages of spiritism and "Korashan science" into those of Neo-Buddhism and "theosophy," is rapidly taking shape as an eager curiosity for information regarding the religious and philosophical ideas, the literature and the customs of the far-east, coupled with a tendency to look there for a fuller light and a more perfect practical direction to life than the religion and science of Christendom can afford. They who look upon the cultivators of this taste as grossly astray from the path of reason and common sense must assign the source of the delusion to an ignorance of the real character of that Oriental civilization to whose meretricious fascinations they have succumbed.

Those, on the other hand, who are more or less in sympathy with the orientalizing movement will, if perfectly sincere, retort that the contempt for Oriental ideas, or indifference to them, which exists in various degrees among the greater public, results from the prevalence of gross misconceptions regarding them, and a lack of familiarity with the literatures which express them and the social conditions in which they are practically realized.

The two parties are agreed, therefore, that more light needs to be thrown upon the subject; that there is, in fact, a crying need among the people at large for accurate information on Oriental subjects.

The same antithetical concord, if I may be permitted the expression, exists between the defenders and opponents of the historical accuracy of the Hebrew Scriptures. Both urge the necessity of a wider diffusion of the results of recent Egyptological and Assyriological researches.

The world is becoming so small since the apparition of steam and electricity, in their protean applications, that the thought and life of one portion of it can no longer be a matter of indifference to another, even the most remote; and a man can no longer be considered cultured whose thought and sympathy are limited by the boundaries of a nation, the shores of a continent, or the formulæ of a cult. No religion, and no social conditions, can be considered otherwise than as anachronisms, which are unable or unwilling to bear an impartial comparison with all others of every country and every age.

And if a truly scientific conception of the history and needs and destiny of humanity be the great desideratum, it is clear at the first glance that it can never be attained until we cease to identify humanity with the little ethnic, or geographic or religious group to which we may chance to belong; and we can never cease to do this until we have become far more familiar than we at present are with those oldest and most powerful of civilizations which have their seat upon the Asiatic continent.

For the student of anthropology there are other and special inducements for the fullest possible exploitation of the Oriental lands and peoples. They alone have a known history of a sufficient extent to be of any marked value in unravelling the numerous problems connected with the history of progress and the phenomena of retrogression. It is the East which has afforded, or must afford, the key to the chief enigmas of ethnology, of philology, of archæology, and, above all, of *hierology*, or comparative religion. In India we can follow the trend of philosophical speculation, and the changes of religious thought and sentiment, either internally elaborated or exteriorly impressed, for a period of not less than 3,200 years; the less intense and all-absorbing religion of the Turanians can be traced backward through more than six thousand years to the lowlands of Mesopotamia or the plateaus of the Altaï; and in relatively modern times we are permitted to witness in the history of Buddhism the successive metamorphoses of a great cult in the course of its transmigrations from country to country, from continent to island, from lowland to upland, from the monkhood to the people, from the Aryan to the Turanian stock, from an agnostic or atheistic to a pantheistic, a dualistic, a monotheistic or a polytheistic form.

The wonderful richness of this field for the student of the history of religions would suggest that if a medium of popular instruction in Oriental lore could be established, it might well afford expression at the same time to that fascinating and all-important science.

A recognition of the needs, some of which I have here roughly outlined, has induced me to undertake the publication of a bimonthly magazine, whose object will be an impartial presentation, from every point of view, of all branches of Oriental science and every aspect of the comparative history of religions. I shall be glad to have the coöperation of all who are at all interested in these subjects. MERWIN-MARIE SNELL.

Washington, D.C., Office of the Oriental Review, 2,128 H Street, N.W.

Algebraic Notation.

IN a communication to *Nature*, issue of Nov. 3, W. Cassie points out the advantages of a proposed new notation for indicating algebraical operations. In addition to the oblique line for division (now in use in some English scientific works), another oblique line, from left to right downwards, is employed to denote an exponential operator. Thus the quantity which follows this sign is the exponent of that which precedes. In complex expressions the lines also perform a bracketing function. Besides these two marks the radical sign is used to denote evolution, and it is this which the writer deems inexpedient.

In algebra the employment of both radical signs and fractional exponents adds unnecessary confusion to a subject rather difficult in itself. There is no good reason — except that both are in use — why both should be retained. The fractional exponent notation, of course, must be kept, since it serves for all cases; and there is certainly very little justification for setting apart a special symbol for indices whose numerators are unity. I tested all the radical expressions given in the letter referred to and found no difficulty in writing them in the fractional exponent notation. Indeed, the figure 1 in the numerator might be omitted, being understood. The symbol resulting suggests the radical sign itself, only that the quantity precedes and the exponent follows the sign. A notation which avoids all special spacing and various sizes of type, writing all expressions in ordinary letterpress has certainly a worthy aim, and it would be a pity to burden it with an unnecessary symbol out of symmetry if not out of harmony with another. JOSEPH V. COLLINS.

Miami University, Oxford, O., Nov. 30.

Electric Phenomena on Mountains.

TWO notes of great interest regarding this subject have appeared in this journal for Sept. 23 and Dec. 2. The phenomena of electric discharges from elevated points on the earth's surface were first noted, so far as I know, by a savant on the great pyramid in Egypt. As he stood on the pyramid with a bottle held at arm's length above his head, he heard the peculiar spitting and sputtering produced by the electricity passing from the bottle. The description by Mr. Stone is especially valuable, and shows the extreme importance of making careful observations. Close attention is being paid by the Weather Bureau to all manifestations of this kind on Pike's Peak. It is my impression that the origin of the phenomenon is not an electric cloud passing overhead but a discharge from, or to, the earth under an electric strain or change of potential. A mountain summit forms a point for discharge of electricity like a point on the conductor of an electric machine. On Mt. Washington this discharge frequently

continues all night. One frequently finds it impossible to sleep there though in the very best of health, and this is directly attributed to the electric discharge, this fact is noted by Mr. Stone.

To my mind the most important line of investigation is that regarding the connection between this discharge and the agglomeration of vapor molecules into cloud particles. Experiments have already shown a most marked effect upon steam when an electric discharge is passed into it. On Mt. Washington there are dense clouds weeks at a time, while a mile or two from the summit the sky may be perfectly clear. A most careful study of the phenomenon has shown that it could not be due to the rocks of the summit being cooler than the air, as thought by many, for the rocks were always warmer than the air except on nights when there were no clouds. Nor could the persistent cloud be due to the expansion and consequent cooling of air rushing up the side of the mountain for the peak is a sharp cone at the last 500 feet and the cloud-hood extended on all sides to a mile or two. It would seem probable that a careful study with instruments of the phenomena of mountain electric discharges would shed a great deal of light on the exceedingly complex subject of clouds and rain-formation about which we know nothing except that the ordinary theories need thorough revision. H. A. HAZEN.

Washington, D.C., Dec. 10.

A Multiple Key. — Preliminary Note.

IN psychological laboratories it is frequently desirable to make or break two or more electrical currents at the same instant.

Ewald's key solves this problem for the most simple cases, but a need for something more elaborate was felt. This led to the invention by Dr. Scripture and the construction in the work-shop of the Yale Psychological Laboratory of a multiple key which meets all present requirements. Ewald's key costs 20 marks; this one, made by the laboratory mechanic, of unlacquered brass, without platinum contacts, was made at a cost of less than $10.

It is arranged so that five currents can run through it. One, two, or three of these can be made and one broken at the same time. The other can either be made or broken at the same time or broken for an instant and then made again; or these makes and breaks can be adjusted so as to occur one after the other in any order. By reversing the key, it gives three breaks and two makes.

An illustration of the use of the key can be taken from one of the problems in reaction time now being investigated. A single movement of the key first breaks the shunt of the tuning-fork circuit and starts the time-marker vibrating on the recording drum; an instant later, say, .03 of a second, it closes a telephone circuit running to the reacting-room from the sound-room, thus producing the stimulus; it simultaneously breaks a current running through the registering signal on the drum and a closed key in the reaction room. This current is automatically closed again within .02 of a second, and again broken by the reaction on the closed key. As soon as the reaction takes place, the key is released and the tuning-fork curve stopped before the drum has made a complete revolution, thus saving all motion of the marker during the experiment, as well as space on the smoked paper. This not only saves much time, but also renders the records more legible and consequently more accurate.

CHARLES B. BLISS.

New Haven, Conn., Dec. 19.

Excitement Over Glacial Theories.

PROBABLY I have as much reason to be thankful for the frankness of Mr. McGee's letter in *Science* for Dec. 2, as for the courtesy of Dr. Brinton's previous review of my volume on "Man and the Glacial Period," for it doubtless gives expression to sentiments held by many persons in private, and it is better that I should have occasion to explain the misapprehensions which evidently prevail in some quarters. I beg, therefore, the privilege of your space for a brief statement of some points.

Mr. McGee refers to an apparent discrepancy between my observations on the rate of movement of the Muir Glacier and those of Professor Reid. If he had read Professor Reid's article carefully he would have seen that the discrepancy is more apparent than real. Professor Reid distinctly states that there was a quarter of a mile or more of width in the glacier which he was unable to reach with his stakes, and whose motion he therefore failed to measure, whereas by our method of taking angles directly upon the ice-pinnacles we were able to measure the portions which were presumably moving most rapidly.

As to my connection with the U. S. Geological Survey, the facts are that after I had, on the Pennsylvania Survey and at much private expense, mapped the glacial boundary from the Delaware River to Illinois, and published the results with considerable fulness, I was asked, in 1884, to complete the work to the Mississippi River for the U. S. Geological Survey and prepare a report on the whole line from there to the Allegheny Mountains. This I did, and the report was duly published in 1890. My formal connection with the Survey did not terminate until a month after the publication of my last book. I am not aware that any substantial error has been pointed out in my delineation of the southern border of the ice-sheet, which I was set to accomplish (see *The Dial* for Dec. 16, 1892).

The real point at issue relates to the question of the unity, or one might better say the "continuity" of the glacial period, and the disturbance all arises over the fact that I have been led to interpret the facts in accordance with the theory of glacial continuity, while Mr. McGee and some of his associates are committed to the theory that there were two or more distinct epochs. It is sufficient for me here to say that my conclusions are based on a large amount of field-work, and are supported by a respectable number of able geologists, and have recently been set forth at considerable length in an article in the November number of the *American Journal of Science*. In this I have not wholly disregarded Mr. McGee's science of geomorphy though I have not called it by that name.

Perhaps the best way for me to answer the charge of general ignorance will be to state in a few words the conception of the progress of events during the glacial period which I have been slowly led to entertain.

During the most of the Tertiary period the lands were low towards the pole and a warm climate prevailed. Toward the close of the Tertiary a slow elevation of these northern lands was in progress until they stood, say, 3,000 feet higher than now. This is shown by the fiords which characterize both sides of the continent from the latitude of Chesapeake Bay northward.

This elevation of land was probably the predominant cause of the glacial period, for the ice-movement in North America radiated, not from the pole, but from Labrador and the region about Hudson Bay. This elevation was accompanied by a rapid deepening of the river channels over the area and the consequent accumulation of detritus about their mouths.

Ice finally accumulated nearly a mile deep over the area north of the linemarking the "drift" and extending to New York City and Cincinnati. This accumulation of ice was coincident with, if not the cause of, a depression of the land in the more northern portions several hundred feet below its present level.

The final melting of the ice proceeded with great rapidity, but with various halts and oscillations of the front. The period of oscillation of the glaciers in the Alps is something like half a century. The periods during the great ice age were probably much longer, but a few centuries seems ample to account for the longest. These oscillations are marked by what Professor Cook aptly called "moraines of retrecession," of which there are twelve in Ohio.

Applying the principles of Mr. McGee's science of geomorphy, I explain the phenomena of slackened drainage which characterize the deposits along the extreme margin of the glaciated area as connected with the subsidence of the land increasing to the north, which marked the climax of the period, while the more vigorous signs of drainage action farther north are the natural results of the northerly re-elevation which went on synchronously with the unloading of the weight of the ice by melting. It is in these later stages of the deposition of ground that we find the remains of palæolithic man.

Whether this theory of the progress of events is correct or not,