lowed to, and is easily caught, while after dark I must corner it to catch it. I have heard it make no vocal sound save a slight squeak if accidentally hurt. It appeared to be fully adult when caught, but I have no other means of knowing how old it then was. It now acts as if feeling the effects of age. At first I tried feeding it grain, seeds, and green food. It would eat no green food that I gave it and would not touch water. For two years I have given it only dry barley or dry wheat and no water. It seems to prefer the wheat. It is a mystery to me how such an animal can live and thrive for years on dry grain without water or moisture in any form. Once or twice a year I empty its box and put in fresh, dry sand, and set the box in an angle in the hall where it is perfectly dry. I put nothing more in the box but dry grain and a little cotton to make a nest of, yet under these conditions it has lived three years. Many birds and animals do not drink water, or but rarely, but most such eat either green food, soft insects, or freshly-killed flesh, from all of which sources some moisture is obtained.

From where does my pocket-mouse get its moisture? Some seems necessary to make blood, replace water evaporated from the lungs and skin and other waste. F. STEPHENS.

Santa Ysabel, Cal., Nov. 22.

Confusion in Weights and Measures.

THE interesting article in *Science* Nov. 25, on "weights and measures in England versus the decimal and metric system," recalls to my mind the difficulties I once experienced in stating the value in grains of a U. S. gallon of water at 60° F. A telegram was handed me one morning, requesting the above information, and I requested the messenger to wait until I had written a reply. Much to my astonishment, there existed the greatest confusion among the authorities upon this simple point, and it took me several months of investigation before I could write a satisfactory answer to the above telegram. Among the values noted were the following:—

U. S. Pharmacopœia, 1870,	58328.8862 grains.
" " 1880,	58329.6 "
Miller's Chemistry,	58317.3 "
Am. Chemist, Vol. I., p. 318,	58319.8 "
U. S. Dispensatory (last edition),	58328.886 "
Oldberg's Weights and Measures,	58335.218 "
U. S. Treasury Department,	8.3312 pounds.

The report on "Weights and Measures," by the Secretary of the Treasury (Senate Doc., 1857), says: "The gallon is a vessel containing 58372.2 grains (8.3389 pounds avoirdupois) of the standard pound of distilled water, at the temperature of maximum density of water, the vessel being weighed in air in which the barometer is 30 inches, at 62° F."

In view of all this confusion I thought it best to calculate a value for myself, basing my work upon the weight of a cubic inch of water as given in Barnard's "Metric System." My result was: "The U. S. gallon of distilled water at 60° F., weighed in air at 60° F., with barometer at 30 inches, weighs

58334.94640743 grains.

Referring to this result, Dr. Rice, Chairman of the Committee of Revision of the U. S. Pharmacopœia, was good enough to say: "Until further information is supplied, the value reported deserves preference before all others. It seems, however, highly desirable that this whole question of standards and relation of weight to measure, be finally settled by law, and preliminary to this, by a new scientific investigation which might be most suitably conducted under the auspices of the National Academy of Sciences or some other representative scientific body."

This U. S. gallon, of which we have been speaking, is, as is generally known, a survival of the old English wine gallon of 231 cubic inches, which has become disused in England since the Imperial gallon was introduced in 1826. It is not generally known, however, that although dignified by an apparently "standard" title, the U. S. gallon has no statutory existence whatever. In this lack of formal recognition the gallon does not stand alone, for not one of our common weights and measures, with the single exception of the "Troy" pound has any place upon the national statute books. In 1873 an act was passed providing that "For the purpose of securing a due conformity in weight of the coins of the United States, the brass troy-pound weight procured by the Minister of the United States at London in the year 1827, for the use of the mint and now in the custody of the mint at Philadelphia, shall be the standard troy pound of the mint of the United States, conformably to which the coinage thereof shall be regulated." Thus even the troy pound is seen to have no official recognition for general use, but only for the special purposes of the mint.

It is curious in this connection to note that the metric system, as a whole, was legalized in this country by act of Congress of July 28, 1866. The act reads: "It shall be lawful throughout the United States of America to employ the weights and measures of the metric system; and no contract, or dealing, or pleading in any court shall be deemed invalid or liable to objection because the weights or measures expressed or referred to therein are weights or measures of the metric system." By act of Congress the Secretary of the Treasury was directed to furnish each State with "one set of the standard weights and measures of the metric system." It is true that an act passed June 14, 1836, directed a distribution to be made to the several States of complete sets of "all the weights and measures adopted as standards," reference being made to the weights and measures then and now in common use, but it will be found upon inquiry that the expression "adopted as standards" refers to an action of the Treasury department made on the recommendation of Mr. Hassler in 1832, and not to any action on the part of Congress.

To quote from the report of the Secretary of the Treasury for 1857:—

"The actual standard of length of the United States is a brass scale of eighty-two inches in length, prepared by Troughton of London, and deposited in the Office of Weights and Measures. The temperature at which this scale is standard is 62° F., and the yard-measure is between the 27th and 63d inches of the scale."

"The gallon is a vesssel containing 58372.2 grains of the standard pound of distilled water, at the temperature of maximum density of water, the vessel being weighed in air in which the barometer is 30 inches at 62° F."

"The standard of weight is the troy pound, copied by Captain Kater in 1827 from the imperial troy pound. The avoirdupois pound is derived from this; its weight being greater than that of the troy pound, in the proportion of 7,000 to 5,760."

This troy pound was, as has been said, afterwards recognized by act of Congress, thus becoming distinguished from the other so-called "standards." WILLIAM P. MASON.

Rensselaer Polytechnic Institute, Troy, N.Y., Dec. 13.

Is There a Sense of Direction?

ON the first of May last, my camping outfit started from Austin, Texas, bound for the northwestern part of the State. They went through the country, taking with them our camp dog, "Old Rock," a common cur.

Professor Cope of Philadelphia and myself joined the party at Big Springs, two hundred and fifty miles from Austin. Our destination was the upper Red River and the Staked Plains. We travelled northward along the foot of the plains, sometimes without a road, for about one hundred and fifty miles. Thence we went west one hundred miles, and thence south across the high plateau of the Staked Plains one hundred miles. Thence we turned east, crossing our former route at Clarendon, continuing southeastward to Archer County, a distance of one hundred miles. We then went southwestward seventy-five miles, and then back eastward to Archer and Montague Counties. From there we turned southward to near Dallas, where I disbanded my party, and started my outfit back to Austin, the last of October. We had been in the field six months. "Old Rock" had faithfully followed the wagon except at one time, when, his feet getting sore from travelling in the hot sand, he had been hauled for a few days.

After the outfit started for Austin and when at Hillsboro, one

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