few of them," etc. Everybody will understand the meaning of the sentence, which was, that a close examination of what he had assumed to be facts might lead to the rejection of a part thereof.

But it is also perfectly plain that all of this has really no bearing on the point at issue. It is always easy to quibble about words and phrases, while it is not always easy to avoid error in observation or erroneous deductions from correct observations.

If Dr. Shufeldt's observations and conclusions are correct, they are of the highest importance, and they must be subjected to the most searching examination before acceptance. I must still confess that there is much that is mysterious to me in his account of his sensations and observations. I do not understand what he means by saying, "My entire system seems to become thoroughly charged with this animal electricity." His "sense of the most profound relief," etc., in the case of the mulatto girl, is a mystery to me. His inability to use any other than a rubber penholder, and the statement that "even then the constant passage of the electricity is exceedingly exhausting during most of the time," are hard nuts for me to crack. In short, the whole matter hinges upon the question with which my first letter closed, — "Is man one of the extremely small number of animals having specialized electrical organs?" for only in that case is the expression 'animal electricity' properly applicable. In that letter I gave reasons for the belief that all such phenomena, the existence of which was certainly established, were nothing more than cases of accidental electrification by well-known methods and under long-recognized conditions; that under similar conditions no differences among individuals could exist; that such electrifications had been known for a long time, and that no extension of well-established principles was needed for their explanation.

To this statement nothing need be added until Dr. Shufeldt, or some one else, shows that it is insufficient to account for observed facts.

T. C. M.

Terre Haute, March 27.

A sensitive wind-vane.

In the last number of *Science*, under 'A sensitive wind-vane,' the statement 'The notation is the same as,' etc., should be 'The notation is opposite that,' etc. H. ALLEN.

Washington, D.C., March 25.

As suggested by Mr. Allen in his interesting letter in *Science*, No. 216, it is important first to determine what is meant by a sensitive vane, and still more important, in my judgment, to determine what kind of a vane is wanted in meteorological observations. I have experimented a good deal with both the long, heavy vanes, and those which are short and light. Neither variety, as ordinarily constructed, is satisfactory. I have more than once seen two large 'standard' vanes, on the roof of the office of the chief signal officer in Washington, sullenly staring each other in the face, while a very light breeze held a short and very light vane nearly at right angles to both of them. Such performances are confusing, to say the least. But it seems to me not impossible to have one vane which shall satisfy all the requirements. The desired conditions are to be met with in what is known as the *dead beat* galvanometer. In this, the needle under the action of a steady current, whether strong or feeble, moves to its proper position, does not go beyond it, and does not vibrate about it. This is brought about by making use of a force opposing the movement of the needle, which increases with the angular velocity of the needle, and is zero when the needle is at rest. Something of the same kind ought to be accomplished, and I think may be, for the wind-vane. The force opposing the motion of the vane should increase with its velocity, and *should be zero when the vane is at rest.* If the latter condition is strictly satisfied, it will be infinitely sensitive: the slightest breeze will move it, but the opposing force will prevent violent oscillations. Such a vane will be somewhat slow in its movements, and may not respond to extremely rapid fluctuations in the direction of the wind, through only a few degrees; but I do not believe meteorologists will consider this a serious objection. What is wanted is a vane which will be steady in a high and somewhat varying wind, and which can be controlled by the slightest movement of the atmosphere. About two years ago I suggested what appeared to me to be a solution of the problem. It was to use a small and extremely light vane, so as to reduce ordinary friction to the lowest limit, and then to 'deaden' its motion by means of a liquid damper. This might be applied at the extremity of the axis of the vane produced below the roof, or at any points in that axis. A fan attached to the axis, and moving in a closely fitting vessel of oil or other suitable liquid, would afford almost any desired degree of stability.

Some steps were taken towards the construction of such a regulator, but I do not think it has ever been completed. Possibly the same method may have been experimented upon by others. T. C. M.

Terre Haute, March 27.

A question for economists in regard to value.

Will not economists undertake to make some agreement as to what the meaning of the word 'value' is to be in scientific discussions? That a uniform meaning be given to this word is most essential to an intelligent discussion of an economic subject.

As an instance of the necessity of such an understanding, see the last number of *Science* ('Professor Marshall on the unit of value'). In that the professor evidently assumes that the market-price of commodities is their 'value.' Yet we all know that the price of a thing may be greater or less than its 'value' or worth. In order to establish a 'unit of value,' the professor proposes a plan whereby the variations of prices of commodities shall be averaged, and that plan implies that a dollar (money-unit) shall be established whose weight shall be increased or decreased from time to time as the average commodity price increases or decreases. All this is a matter of *money* and *price*, and not *value*. The real thing to be determined is what is *value*, and then a measure may be designed for it.

At present there is among economic writers a great confusion in the use of the word 'value.' Some, as Professor Marshall, use it as meaning price (market-price); some, comparative utility; some, exchange value; some, cost of production in terms of human labor; and some, "the average amount of socially requisite labor measured by time" involved in the production of the article. I hold that this last is the