THE will of the late Charles L. Colby, of New York, bequeaths $20,000 to Brown University.

MORRIS M. WHITE and Francis T. White have given Earlham College, a Quaker institution in Richmond, Ind., $25,000, to be added to the endowment fund and to be known as the John T. White memorial fund, in honor of their father.

MRS. JOSIAH FISKE, of New York city, has given $5,000 to Radcliffe College in memory of her late husband. The College has also received $6,568, the balance of a bequest by the late Caroline B. Perkins.

MR. T. E. BONDURANT, of De Land, Ill., has offered to give $20,000 to the endowment fund of Eureka College, Illinois, provided the Board of Trustees will secure $100,000 additional by the first of March, 1897. Mr. T. J. Underwood, of Sangamon County, Ill., has donated $10,000 towards the fund.

PROF. G. F. ATKINSON has been made full professor and head of the department of botany at Cornell University, succeeding Prof. Prentiss, who has held this position since the organization of the University.

DR. E. B. DELABARRE, professor of psychology at Brown University, has been appointed director of the psychological laboratory at Harvard University during the absence of Prof. Münsterberg. Dr. Mark Wenley, recently Examiner in Philosophy to the University of Glasgow, and Lecturer at the Queen Margaret College, has been appointed Professor of Philosophy in the University of Michigan.

THE committee of fifty-one, in charge of the project for the removal of Union College to Albany, at a meeting in that city on February 26th, decided to present to the Legislature a bill calling for the bonding of the city for $1,000,000 for the purpose.

A PUBLIC meeting on behalf of the University College of Wales was held in Cardiff, on February 5th, under the presidency of Lord Windsor, with a view to raise £20,000 required to meet conditional grants from the Treasury and the Drapers' Company in aid of the building fund of the college. Subscriptions amounting to £13,400 were promised, including one of £2,500 from Lord Windsor.

AT a meeting of the Senate of the University of London, on February 19th, Sir Henry Roscoe was elected Vice-Chancellor of the University, in the room on the late Sir Julian Goldsmid.

AT a meeting of the Convocation of Oxford University the proposal to allow women to take degrees was rejected by a vote of 215 to 140. A similar proposal will soon be voted on at Cambridge, where the movement to admit women to degrees is probably stronger than at Oxford.

DISCUSSION AND CORRESPONDENCE.

CHUAR, HEGEL AND SPENCER.

IT is with much hesitation that one undertakes to criticise or even comment upon a paper written in the style of that by Major Powell which appeared in SCIENCE on February 21st. The author speaks with such authority regarding the nature of matter and mind, and rebukes so firmly the philosopher and the metaphysician, that one shrinks from indicating even by a question that one may be numbered with such, or, at least, found in the class of their admirers. No one likes to confess that he is the subject of 'feverish dreams;' or write himself down as a 'wrapt dreamer' who 'imagines that he dwells in a realm above science—in a world which, as he thinks, absorbs truth as the ocean the shower, and transforms it into a flood of philosophy' (p. 271). It must be to any conscientious man a matter of sincere regret that he has cast over some unoffending physicist 'the spell of metaphysics,' and made him turn from that useful tool the spectroscope with the despairing exclamation that 'all his researches may be dealing with phantasms!' I cannot, of course, speak for Chuar, who, as a savage, has a right to be shameless, but I cannot but think that both the shade of Hegel and the living Spencer would be loth to confess themselves 'immersed in thaumaturgy,' and lovers of the wonderful, who, 'in the revelry developed by the hashish of mystery' find 'the pure water of truth' insipid (p. 269).

Nevertheless, as one who has spent several

years in studying the works of the philosophers, and as one willing to pocket his pride for the sake of extending his knowledge, I feel impelled to confess that there are many things in Major Powell's paper which are not clear to me. The fault is doubtless mine, since the paper is an exposition of 'the true and simple,' loved by the spirit of sanity extant among mankind 'in the grand aggregate' (p. 269). I can touch upon but one or two of the points which perplex me.

Those of us who busy ourselves with the history of philosophy are accustomed to believe that there are philosophers of many kinds, some of whom believe in 'substratum' *et id omne genus*, and some of whom hold such things in derision. Had not the author set himself over against philosophers in general as the champion of sanity, I should have been inclined to class him among them and describe him as a Positivist of a somewhat naïve sort. Did not Comte confine human knowledge within the limits of the phenomenal? Did he not reduce cause and effect to antecedent and consequent? Was he not the avowed enemy of all 'reification?' Did not Berkeley and Hume and Mill handle without gloves the notion of 'substratum' here attributed to philosophers generally? One seems to be listening to an old, old story; and yet there must be some mistake, for all these men are everywhere allowed to pass unchallenged as philosophers, and so must have been addicted to something stronger than 'the pure water of truth.' As to the classification of Hegel with Chuar and Spencer, those who think they understand Hegel (and there are such) stoutly maintain that he did not believe in 'substratum,' and that it was in throwing away the remnant of it left by Kant that he has earned the gratitude of posterity. It is, of course, possible that Major Powell has made a more careful study of his works than they, and has discovered a real similarity between his doctrine and that of Spencer.

The passages which dwell upon the constitution of matter occasion me no less perplexity. "All matter has four factors or constituents, number, extension, motion and duration, and some matter at least has a fifth factor, namely judgment" (p. 265). To one not habituated to 'the true and simple,' this seems at first glance 'reification' of the worst sort.

These 'entities' (I use the word for want of a better) are made factors or constituents of matter. The first four, of which alone I wish to speak just now, are not commonly regarded as of such a nature that when put together they can make a thing. The Pythagoreans have been criticised for 'reifying' number in making it the principle of all things. Descartes has been criticised for treating extension in much the same way. Major Powell goes further and 'reifies'—what other word can one use?—motion and duration. Why he left out impenetrability it is hard to say, but that may be explicable as an oversight, for the article bears the marks of having been hastily written. Why he chose motion and duration, I cannot conceive. Can we think of these as constituents of matter?—as constituents of the ultimate chemical particle to which he refers (pp. 265 and 270)? Some of the philosophers who object to the reification of things define motion as the change of spatial relations between material objects. If such be motion, it is difficult to think of motion as a constituent of an atom. If motion be something else, it would be interesting to have it defined. Is all its motion present to an atom at a single instant as all its extension is? Or can an atom at a single instant be said to have motion at all? I almost slipped into saying 'be *in* motion at all,' but such an expression must be abandoned; the atom's motion must be, so to speak, in it. Those who are not ashamed to read the works of the philosophers will remember that this difficulty about having motion at a single instant came to the surface something more than two thousand years ago. And if the motion in question is merely a factor of the atom, a constituent, is it not fair to suppose that an atom may have motion without changing its place at all? What have external relations to do with the existence of the constituents of this particular atom?

As to duration. Here the difficulty is as great. Can an atom have its duration all at once? Must it not take it bit by bit as it comes to it? Then the duration which helps to constitute the atom must at each instant be different from that

which plays its part as factor at the next. A further difficulty rises with the thought that, perhaps, after all, duration cannot have its being in a single instant, but needs at least two to be duration. The atom at any instant is just what it is, and is made what it is at that instant by the presence of all its four constituents. If duration needs more than one instant to be duration, how can it be present at a single instant? That duration really implies more than a single instant seems clear from the fact that "in the material world we have no knowledge of something——which has not duration as persistence or duration with persistence and change" (pp. 270–271). Surely a thing cannot persist all in an instant any more than a bird can flock all by itself, or one man look alike. There are philosophers 'lost in the meaning of words, forever wandering in linguistic jungles' (p. 266), who have maintained that duration is nothing but a name for a certain kind of order in things, the order we call successive. Such philosophers, 'in the revelry developed by the hashish of mystery,' protest against the reification of duration, and even so far forget themselves as to denounce the tendency to reify it as a lapse into mediævalism. Making it a constituent of matter they regard as reifying it, and they are capable of interrupting a man at a spectroscope with the diabolical suggestion that they would as lief reify the relations 'greater' or 'smaller,' as the philosopher did when philosophy was in its infancy.

Regarding the fifth factor, which serves as a constituent of some matter—'judgment'—Major Powell's expositions do not appear to me luminous. Many views have been held as to the relations of mind and body, and even philosophers have not been at one as to the particular sort of mystery in which they would decide to revel in discussing this problem. Most of them now speak with some hesitation upon the subject, and confess that the problem is difficult of solution. To Major Powell it is as clear as noon-day. There is matter which consists of number, extension, motion and duration, and there is other matter which consists of these with the addition of judgment. But bodies consist of ultimate particles. In describing in what these ultimate particles resemble each other and in what they differ, the author seems to have overlooked this fifth factor, which is to differentiate some particles from others (p. 265). This must be an oversight, for are not the two classes clearly distinguished as different in the number of their constituents? And are we not informed that the constituents 'are never dissociated, but constitute matter' (p. 265). The chemist has then to reckon with chemical particles which have judgment and those which have not. Presumably more or less of the former are found in the human brain, and the chemist of our day should not overlook them. We have here a new kind of atom, more complex in its nature than other atoms, and gifted with a constituent of a very remarkable sort. Since the five constituents are never dissociated, we may expect to find such atoms also in other situations, where the common man never thinks of looking for judgment. And this fifth constituent has the peculiar faculty of developing 'into cognition of the constituents of matter, of their relations, and also a cognition of cognitions and the relations of cognitions' (p. 268). Notwithstanding this surprising development, it presumably still remains a constituent of the atom. Since brains consist of nothing but atoms, and nonentities must not be reified, this factor, to be real at all, must be a constituent of individual atoms. And since the atoms in brains keep coming and going, the careful observer may reasonably hope to find such atoms everywhere, with their fifth factors developed into a 'cognition of connitions and the relations of cognitions.' It is gratifying to one who finds all this obscure to be told that "science does not lead to mystery but to knowledge, and the mind rests satisfied with the knowledge thus gained when the analysis is complete." We are quite willing to take the author's word for the fact that it is here complete, but we must confess with humility that we walk by faith.

Having nerved ourselves to the effort of accepting the two kinds of matter as a refuge from mystery, we feel a mild wonder at certain sentences which seem to indicate that there are, after all, two worlds and not one. "Concepts of number, extension, motion, duration and judgment are," we are informed, "developed by

all minds, from that of the lowest animal to that of the highest human genius" (p. 269). What is this mind, of which the author speaks? And what is meant later by the author's division of reality into 'the material world' and 'the mental world' (p. 271), or 'the material world' and 'the spiritual world' (ibid). If we are dealing with indissociable constituents of matter, would it not be as wise to speak of 'the material world' and 'the world of duration,' or 'the material world' and 'the world of motion?' But I waive these questions, as being possibly the products of a 'feverish dream.' It must be accepted as a general answer to all such, and a sufficient consolation to the discontented, that 'the simple and the true remain' (p. 271).

As a last word I may add that the more sober of the philosophers of our time have, notwithstanding 'the intoxication of illusion,' been accustomed to think that it is not prudent for a philosopher who has no special knowledge of the subject to venture into other fields, as, for example, that of anthropology. Some even go so far as to believe that it is not wise for an anthropologist to venture into philosophical discussions unless he has acquainted himself with the writings of those who have preceded him in work of that kind. Perhaps it is because they are 'immersed in thaumaturgy' that they find in such contributions to philosophical literature more heat than light.

GEORGE STUART FULLERTON.

UNIVERSITY OF PENNSYLVANIA, February 27, 1896.

THE TEMPERATURE OF THE EARTH'S CRUST.

IN the December number of the *Journal of Science* Prof. Alexander Agassiz gives the temperatures found at different depths in a well-known mine in the Lake Superior region, as follows:

At 105 ft.—59° F.
At 4580 ft.—79° F.

Or an increase of temperature of 1° F. for each 223.7 ft.

With this he compares Lord Kelvin's figures of 1° in every 51 ft; also the figures obtained in the St. Gothard tunnel, showing a rise of 1° for every 50 ft.

The Lake Superior figures would make the solid crust of the earth nearly 90 miles in thickness, instead of Lord Kelvin's deduction of twenty miles.

Now I wish to suggest, as a tenable hypothesis, that the Lake Superior district having been far in the heart of the ice cap of the glacial period, the refrigeration of the crust of the earth penetrated to so great a depth that its effects *still linger*.

Take, for example, the 100° C. line, which normally is 9,000 feet below the surface. During the many thousand years of the ice cap this may have been forced downwards to a depth of, say, 40,000 ft. Since the removal of the ice, during, say, 7,000 years, the internal heat has been slowly rising towards the surface. But it has not yet had time to regain its former levels of temperature.

It would be interesting to ascertain what are the rates of increase of temperature now under regions where the subsoil is permanently frozen, as in the tundras of Siberia and Alaska.

It does not seem clear to me that the earth's crust necessarily became greatly thickened in the Superior region. The refrigeration need not have penetrated deeply enough for such an effect.

SERENO E. BISHOP.

HONOLULU, January 24, 1896.

THE X-RAYS.

SHORTLY after mailing my note of last week I took a photograph by means of the X-rays, using a Crookes' tube connected with an induction coil actuated by a make and break current, and therefore giving the electrodes a fixed polarity.

The photograph shows only one electrode which, from the manner in which the tube was connected, was the cathode, thus confirming the views expressed in my previous letter.

RALPH R. LAWRENCE.

BOSTON, March 5, 1896.

THE INSTINCT OF PECKING.

IN discussing Prof. Morgan's lecture on instinct it has several times been stated that chickens pecked instinctively, but had to be taught to drink. There was a note in *Nature* last year, concerning some species of Asiatic pheasants—it may possibly have been the Jungle Fowl—to the effect that the young did not