with them (MOURT'S *Relation*, p. 55 [Dexter's edition]). William Wood (*New England's Prospect*, part ii. chap. xvii. p. 101) speaks of them as made of this material: so does the Rev. Francis Higginson ("New England's Plantation," in YOUNG'S *Chronicles of Massachusetts*, p. 257).

Undoubtedly the Indians found it easier to cut up brass kettles for this purpose than to pound out with their stone hammers pieces of native copper. This they were in the habit of doing, according to Brereton ("Brief and True Relation of the Discovery of the North Part of Virginia," in *Collections of Massachusetts Historical Society* [3d series], vol. viii. p. 91).

HENRY W. HAYNES.

Boston, Jan. 13.

Meteorology and Mathematics.

AT a time when the tide of meteorological controversy in your columns runs high and the general outcry is for revision of the old theories,— all apparently because Dr. Hann last spring made some erroneous deductions from observations in the Alps, which has not convinced anybody (*vide* Hazen),— you may permit me to add my small share to the general conflagration, out of the ashes of which the true Phœnix may some day be expected to rise in all its glory.

What I here wish to sacrifice on the altar of truth is the so-called mathematical treatment of the circulation of the atmosphere; and I take occasion from a letter by William Ferrel in your issue of Jan. 2, wherein the writer complains that Dr. Hann has never attempted to show that his results have been deduced from erroneous principles or processes.

I am not aware that any mathematician has ever attempted to show, on rational mechanical principles, what would be the motion of a body of air moving over the surface of a rotating globe,— not over the free and empty surface, but on the bottom of the air universally enveloping and rotating with this globe, being part and parcel of this air itself,— but I think it can be shown, by looking ever so little into the true nature of this subject, that the problem is far more complicated than Professor Ferrel seems to imagine.

As the speed wherewith places at different latitudes on the earth's surface rotate differ in proportion to their distances from the axis, so it is concluded by Ferrel and others that a particle of air is deflected towards the east when moving towards the poles, and towards the west when moving towards the equator.

In proportion, however, as the speed of rotation of the particle of air changes while it moves from latitude to latitude, so also the centrifugal force to which it is exposed changes; and therefore, if a change in the former should have the effect of deflecting a current of surface air laterally, so also the effect of the latter must be to deflect the current in a vertical direction. The result hereof is that all pole-bound currents should appear as upper currents, and the surface wind should always be directed more or less towards the equator, and never in the opposite direction. This, however, does not agree with observations. There is a continuous current of surface air round the border of any anticyclone, while in strict consequence of Professor Ferrel's theory we should only expect to find this current round one-half the circumference of the high pressure, the other half being deflected into an upper current.

According to the way the writer was taught applied mathematics (a discipline, by the way, incomparably more difficult to master than mathematics itself), it is not admissible to pick out one of the forces acting upon a body in motion, and ignore another of equal importance, simply because it does not suit our purposes.

In a paper, "On the Cause of Trade-Winds," read before the American Society of Civil Engineers Dec. 18, 1889 (see "Transactions," vol. xxiii. August, 1890), the writer allowed himself to suggest how the gyratory motion of the surface air might be accounted for independently of a supposed effect of the earth's rotation, which theory, as we have just seen, doesn't bear closer inspection; and one of America's most eminent engineers, Mr. Charles Macdonald, got up at the meeting, and declared the explanation given the only rational one he had ever heard, and well worth the most careful study. I therefore beg to call the reader's attention to the contents of this paper; and, by comparing my diagrams with the isobaric charts over the North Atlantic for the autumn of 1889, he may see the reason why Dr. Hann found the temperature of the anticyclonic air in the Alps so exceptionally high.

FRANZ A. VELSCHOW, C.E.

Brooklyn, Jan. 7.

The Education of the Deaf.

SPOKEN language is the product of the mind enjoined with the enjoyment of all the senses. Its acquisition is facilitated through the sense of hearing, but the latter is not indispensable to it; and to its reproduction by the deaf (without its musical intonation) a normal throat and mouth are requisite. Dr. Gillett says, "This [intelligence] the deaf-mute has perfectly" (*Science*, Dec. 26, p. 355). As most of the deaf possess these requirements, the question that now arises is this: "Is it expedient to invent an artificial sign-language, which of course presupposes articulate speech, in order to impart the latter to the deaf?" Emphatically, no. The oral schools now in existence in this country prove this fact beyond the shadow of a doubt. One of Dr. Gillett's objections is this: "For, while he [the deaf] may utter distinct articulate sounds for others to receive, he cannot receive them himself, and is consequently thrown back upon the visible movements of the superficial parts of the organs of voice, which are chiefly the lips" (*Science*, Dec. 26, p. 357). The deaf will read from the lips-mouth readily when spoken to without voice, that is, mutely; and it is a phenomenon that they are enabled to recognize even the distinction between being addressed audibly and mutely. They will often converse mutely with each other in the school-room, when desirous of not being overheard by their teacher. Lately one of my patients happened to be a Chinaman. On inquiring of him what he uses at his meals, — a fork and a knife, or chop-sticks,— he said that at home he uses the latter, but when eating at a restaurant he uses the former. Early education and impressions are lasting. The same is applicable to those mutes who are educated by the combined system, where an artificial sign-language forms the basis of instruction. When a mute educated by that system meets a deaf-mute who was taught by the oral system, the former will naturally address the latter by signs. To start the conversation, the first question perhaps will be, "Do you know Mr. P—t?" The sign for "Mr. P—t" is this: closing the thumb and all the fingers except the forefinger, with which he taps himself at the temple. The other repeats the sign for "P—t," shakes his head, and indicates by expressions that he does not know what this sign means; then the former spells with his fingers the words "P—t, teacher;" and such conversations may occur so often that the one learns the meaning of signs from the other. The deaf educated by the oral system become so ambitious that they make efforts when in a small circle of society, by constant watchfulness, to follow the connection of the conversation, and try to hide their infirmity. They are even ashamed to use signs. I would gladly go extensively into the details of Dr. Gillett's article on the education of the deaf, but the pressure of professional duties will not permit me to devote the time necessary. I would like, though, to direct Dr. Gillett's attention to Hon. Gardiner G. Hubbard's article in *Science* of Dec. 19, to which I have to make the one exception only, that the first oral school in this country was established in this city, and was in operation in the fall of 1864 at No. 427 (old number 415) Eighth Avenue, consisting of two boarding and three day pupils.

B. ENGELSMAN.

New York, Jan. 8.

BOOK-REVIEWS.

The Science of Fairy Tales. By EDWIN SIDNEY HARTLAND. New York, Scribner & Welford. 12°. $1.25.

THIS volume is the latest issue in the Contemporary Science Series, and may be described as an attempt to group and classify the various stories of Celtic and Teutonic origin relating to elves and fairies, with illustrations from the stories of other nations. Mr. Hartland opens his work with a few remarks on savage ideas,

especially on the subject of spirits, and then proceeds to relate a large number of the tales, grouping them so far as possible, and aiming particularly to show how similar they are all the world over. The first class of stories dealt with are those that relate how human midwives are often snatched away and taken to fairyland to assist at the birth of fairy children. Then come the stories of changelings and babies stolen by the fairies, followed by tales of other robberies by the fairy-folk, as well as of robberies perpetrated or attempted by mortals against the fairies. Stories of men being put to sleep for years and even centuries, as in the case of Rip Van Winkle, occupy a considerable space, and the list is completed by two chapters on the swan maidens.

Thus the greater part of the book is taken up with the tales themselves, and we are rather disappointed at the meagre attempts to explain them. A few discussions appear here and there, and a brief concluding chapter sums up the author's theories, so far as he has any theories to offer; but one cannot help feeling as he closes the book that the "science of fairy-tales" is as yet hardly entitled to that name. Mr. Hartland has indeed marshalled a great body of facts on his chosen theme, and his book is written in a style that will make it attractive to all that are interested in its subject. But it must be remembered that facts are not science,—they are only the materials of science,—and that the real aim of the scientist is to explain the facts. Mr. Hartland shows very clearly that folk-tales bear a similar character everywhere, and that they must therefore be attributed to certain intellectual and moral characteristics common to all tribes of men; but what those characteristics are he does not even inquire. He ascribes the origin of the tales to the primitive belief in spirits,—but that is merely using the genus to account for the species,—and gives no real explanation at all. It is evident that the most difficult work connected with the subject is yet to be done; but meanwhile those who wish for a large and well-arranged collection of the facts will find it in the book before us.

Educational Review. Vol. I. No. 1. January, 1891. Ed. by NICHOLAS MURRAY BUTLER. *m.* New York, Henry Holt & Co. 8°. $3 a year; 35 cents a number.

The Pedagogical Seminary. Vol. I. No. 1. January, 1891. Ed. by G. STANLEY HALL. Worcester, Mass., J. H. Orpha. 8°. $4 a year; $1.50 a number.

WE have had in this country for many years a number of educational periodicals, but they have been of inferior character, and some of them practically worthless. There is room, therefore, for a new and better one; and the general interest now manifested in educational matters makes the present an opportune time for starting such a work. Two journals of the kind have now appeared in magazine form, one from a private publishing-house, the other from Clark University; and even a slight examination will show that they are superior to any thing of the sort that we have had in America hitherto. Whether and how far they will supply the existing need cannot be determined from the contents of the first numbers; but these give evidence of thought as well as of reading, and show that the editors of both are in earnest in their new undertakings. They are, however, quite different in character, and we shall therefore consider them separately.

The *Educational Review* opens with a number of essays; then follow brief discussions, editorial and otherwise; next comes a series of book-notices; and, last of all, a few extracts from foreign periodicals. Most of the articles are fairly well written, though none have any special merit of style, and some contain suggestions and criticisms of real interest. The book-reviews are similar to those that appear in the best newspapers, and will doubtless prove an attractive feature of the magazine. The notes and discussions present some good points, but one or two of those in the editorial department are marred by too much dogmatism. The least successful papers are the essays, not one of which is really satisfactory, their brevity being inconsistent with a proper treatment of their respective subjects, while most of them have the air of having been written to order. President Gilman writes on "The Shortening of the College Curriculum," intimating his opinion that it can perfectly well be shortened, but without suggesting any thing very definite. William T. Harris contributes a strangely narrow and shallow article on "Fruitful Lines of Investigation in Psychology," and also a book-review of similar tenor. We hope that these articles are not a sample of the way the *Review* will treat philosophical themes "Is there a Science of Education?" by Josiah Royce, is the first of a series of articles, and contains little besides vague generalities; but the author promises in future numbers to treat some more definite aspects of his subject. Superintendent Andrew S. Draper discusses "The limits of State Control in Education," and makes some suggestive remarks; but his paper is far too brief for a proper treatment of its theme. The last of the essays is by Charles de Garmo, on "The Herbartian School of Pedagogics," and bids fair, when completed, to give a good synopsis of Herbart's views; though whether these views are of much value admits of question. On the whole, the *Educational Review* bids fair to be useful; but we hope to find the essays in future numbers more elaborate and thorough.

The Pedagogical Seminary consists in the main of notes on the educational systems and theories of other countries. It opens with an editorial on the aim and purpose of the *Seminary*, followed by a paper, also from the editor, on "Educational Reforms;" while the rest of the number is mainly devoted to the study of recent changes in the schools and universities of foreign countries, and of foreign discussions on educational topics. The editor and his associates seem to desire and anticipate great changes and reforms in our own educational system, especially in its higher departments; but they leave us in great uncertainty as to what specific changes they wish for. However, they have here collected a mass of information which can hardly fail to be useful to educators, and which may suggest beneficial reforms in our schools. One cannot help asking, though, why President Hall and his associates have started this little publication of their own, when the *Educational Review* would have served them well as a medium for addressing the public. As the *Seminary* is to be published only three times a year, it will not contain a great deal of matter, and its fusion with the *Review* would seem to be easy as well as desirable. But however published, and from whatever source they may come, real contributions to our educational literature are certain to be welcome.

The Future of Science. By ERNEST RENAN. Boston, Roberts. 8°. $2.50.

THIS book is not just what its title would lead us to expect. It contains very little about physical science, and nothing whatever about its future: on the contrary it relates almost exclusively to the sciences of mind and society, and the future of religion. M. Renan takes the ground that the highest degree of intellectual culture is to understand humanity, and this work is written from that point of view. It is not a new work, however, but was composed forty years ago, when the author was young; and it has many of the characteristics that we should expect to find in a work coming from such a source. It is written in the author's usual diffuse and rambling style, and with rather more than his usual flippancy; and the views it expresses are those with which readers of his other books are familiar.

M. Renan starts with the assumption that "there is no such thing as the supernatural," and consequently that every thing that has hitherto been called religion is destined to pass away. "The religion of the future," he says, "will be pure humanism." God is "the category of the ideal." "In the future the word 'morality' will not be the proper word. . . . I prefer to substitute the word 'æstheticism.'" In short, to lead an intellectual life and pursue the scientific and artistic ideals is the only religion that is now left to us. Such is the opinion of M. Renan, which he reiterates without the least suspicion that he may be mistaken. Moreover, it appears that he himself, even at the age of twenty-five, had already reached perfection; for he says, "I, as a man of culture, do not find any evil in myself, and I am impelled spontaneously towards what seems to me the most noble. If all others had as much culture as myself, they would all, like myself, be incapable of doing an evil act" (p. 333).

But our readers must not suppose that the book contains nothing better than the above-quoted passages. On the contrary, when the author leaves the question of the future religion, and talks