sand, resting in one place on end, and much mixed on the surface, sides, and end with gravel and fossils belonging to later formations. Bones of whales and fragments of shells of the Miocene Formation have settled into its broken surface; but in the unmixed interior of the mass, it has yielded to me soft casts of *Gryphea* and *Cucullea*, hard fragments of the bones of reptiles, with coprolites, and teeth of the shark *Otodus*. The component materials of this marl agree with those of the Lower Marl of New Jersey, and, like the latter, rest directly upon the upper member of the Raritan Formation.

The Miocene Formation, so far as my own observation extended, is broken up, and so mixed with the drift at the base of the glacial deposits near the surface that the only evidence of its former presence here, below the belt of conglomerate, resides in the presence of vertebræ of Cetacea, fossil shells, and some teeth of sharks.

On the surface is the fine pale sand, forming a loose bed, underlaid by about two feet of pebbly conglomerate which rests in a bed of broken rocks, gravel, and boulders. The sand is spread thickly over most parts of the island, and along the western ridge it is set with granitic boulders measuring occasionally twelve feet in length and width by six to eight feet in thickness.

The whole Gay Head promontory is a scene of disturbed equilibrium, where the beds of rock-derived material have been softened by atmospheric agencies, pressed down by a load of stone and gravel, undermined by oceanic strokes of oceanic surf, and let down into gullies by trenching storms of rain.

LETTERS TO THE EDITOR.

**** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

A Mountain-Top Experience.

FREMONT PASS, Colorado, is 11,540 feet above the sea. To the east rises a peak by a rather steep slope, perhaps 2,000 feet higher. Its eastern slope is precipitous.

On Aug. 18, alone, I reached the summit of this peak. It was noon. Several miles away to the north a heavy thunder-storm was raging, while far to the west was another. Within a mile or two a massive cloud had formed between the lower mountains which shut in a gorge. I stepped to the very highest point of the peak. My contemplation of the extraordinary view afforded me was disturbed by a sharp buzzing as of bees seemingly beneath my hand which rested on the bulky pine sliver serving as my staff. But on lifting my hand I found no bees large or small.

As the buzzing continued, I vainly scrutinized the stick for signs of life. I then indifferently concluded that it was possibly caused by some boring insect in the wood. That settled (?), I lifted a large roundish rock to toss into the chasm below, when it, too, buzzed or crackled in my hand at a score of points. Close inspection revealed no bees or bugs on that rock. Can it be, I asked, that this rock is crackling from the change of temperature occasioned by a change of position? At that moment, the "bees" were swarming in my hat. Snatching it off, I was searching it for the buzzing things when they seemed to throng my hair. Immediately on raising my hand to my head the puzzling mystery was solved, as the strong flow of electricity fairly tingled and buzzed through my fingers, and, looking up, I saw a cloud forming overhead. I was acting as a lightning-rod to that mountain-peak. Ignorant of my possible safety or danger in the involuntary experiment, I lacked the valor or scientific devotion to prolong it. Securing my box of flowers and that buzzing staff, I discreetly retired some distance down the slope from that summit surcharged with possible electrocution if I remained. Ere I reached the pass, two hours later, the storm from the north had reached the peak, and soon that rocky summit was whitened with snow, while hail and rain fell in the pass.

During my descent, while the thunder-cloud rapidly approached the peak, a strong wind blew through the pass directly toward the cloud until light rain began to fall. Is my experience as given a common one? Was it a dangerous one?

O. C. CHARLTON.

Denton, Texas.

The Gemination of the Lines in Mars.

As far as one can judge from newspaper reports, the recent observations on Mars render certain the existence of the curious Schiaparelli lines, but as yet nothing has been seen of the doubling, or gemination, which has been claimed. If this negative result shall be sustained by the accounts yet to come from observatories in lower latitudes, there still remains the interesting question, How did such a mistake come to be made?

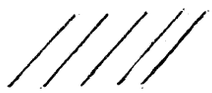
A bit of personal experience will, I trust, be pardoned, since it points to what seems to me the explanation of the error, if one exists; at least, it shows the existence of a *vera causa* able from single lines to produce double ones. The lens in my left eye possesses the power of double refraction. If I close the right eye and look at a line drawn obliquely, thus  the paper being held squarely in front of me, I see nothing peculiar; there is to me, as to anyone else, only one ordinary black line. But if the line slopes thus  I see two lines  the lower one being decidedly less deeply black than the other. As I now hold the paper, the bottom towards me, No. 1 appears as a single line, No. 2 as a double one, like No. 3. If now I turn the side of the page towards me, revolving it through an arc of 90°, No. 1 shows double and No. 2 single.

No. 1.

No. 2.

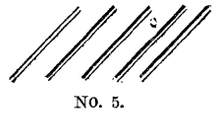
No. 3.

If I draw a set of single lines as below



No 4.

and look at them with both eyes, or with my right eye alone, I see only so many single lines; but if I close my right eye, then with my left I see ten lines, each original line being geminated by a fainter one exactly parallel, and pretty close to it, as in No. 5.



No. 5.

If now I turn No. 4 to the right or left, the double images will approach each other, and at the same time slide by each other a little until I have turned the paper 90°, when the images will coalesce, each line appearing sharply defined, single, and very black, except at each end, where for about $\frac{1}{16}$ of an inch the color will be fainter and the line less sharply defined. I can vary my experiments in many ways, each time getting the well-known phenomena of double refraction.

The application to the lines in Mars is very simple. If a person possessing an eye with this power should see the planet's image in the telescope, and be able to perceive the Schiaparelli lines, he would see each accompanied by a twin line of the same length, but not quite so sharp and distinct. If the lines ran, as in No. 1, from north-west to south-east, he would not see the secondary ones, but if his other eye chanced also to have a double refracting lens with axis at right angles to the first, he would then see the secondary lines in the same way.

I know, from my own experience, that one may possess this power without being conscious of it. I discovered it only when experimenting on single vision. In ordinary use (i. e., with both eyes) I cannot perceive any indication of it, the greater illuminating power of the ordinary ray, plus that of my other eye, com-

pletely conceals the secondary image. I have no doubt that if I should look at Mars through an instrument powerful enough to show the single black lines, I should rediscover the twin line of each, that is, if I used the polarizing eye.

I presume others have noticed this power in themselves, or discovered it in other persons, but I have not happened to come across such. One can easily test his own eyes, by making a fine black dot on a piece of white paper and examining it with one eye at a time. If he possesses this power, he will see two dots pretty close together, one much darker than the other. Then let him revolve the paper; the paper will go around, but the dots will retain their relative position. If, for example, the secondary dot is to the right of the other, it will stay to the right, however much the paper is turned. It may be necessary to move the paper nearer to or farther from the eye, but if the double-refractive power is there, it will soon be found. C. B. WARRING.

Park Lupin, Aug. 29.

The Aurora of July 16.

THE various accounts of this aurora which have come to my notice contain no mention of a band or curtain formation. They all agree in describing the aurora as simply an arc of light, with well-marked streamers of more or less brilliant coloring. I append a description of an appearance, not already noted, which was observed by me in Mechanicsburg, Pennsylvania.

The day had been cool and fair, and after sunset only a few clouds could be seen in the north. About nine o'clock a faint auroral arc was visible, and later a brilliant white ray shot out from the north-west and extended beyond the zenith. Nothing more of note occurred for an hour. By this time the clouds had disappeared, with the exception of two small stratified bands, which hung low in the north. They were parallel with a narrow opening in line with the horizon. At 10.15 this space became brilliantly lighted, the color changing between green and pink. Then from the eastern edge of the space a brighter and intensely green light spread rapidly westward, and apparently descended from between the clouds, assuming the shape of a band in folds or waves like a banner in a breeze, as those who have seen this appearance in more northerly latitudes describe it. When the band became well defined, it grew stationary and the green light increased in intensity; and then occurred a magnificent electrical display. From the upper edge a bright pink light suffused downwards until it almost overspread the curtain, when it paused; and for a few seconds there was presented a pink banner, edged with a regular but narrow border of bright green, in stationary folds or waves. Yet there was no progressive wave-motion observed, as seems common to this phenomenon. The formation was repeated after a time, but very indistinctly. As nearly as could be estimated, the entire occurrence could not have lasted more than ten seconds. W. M. STINE.

Athens, Ohio.

The Ancient Libyan Alphabet.

IN *Science*, Aug. 19, Dr. Brinton treats my equation of *Fínagh* with *Phœnician* as "fanciful," and traverses my assertion that the stress falls on the root *fín*. The equation may be fanciful, but the assertion, stigmatized as "utterly incorrect," is absolutely true. Dr. Brinton says that the stress "falls on the last syllable, and not on the penult (see Hanoteau, 'Grammaire Tamachek,' p. 5)." From this the reader might suppose that the French scholar was on Dr. Brinton's side, and accented the word on the last syllable. Such is not the case. Hanoteau does not accent the word at all, makes no remark on its accentuation, and in his grammar nowhere refers to the question of accent. It is Barth, a supreme authority on a point of this nature, who always accents the word on the penult, as already stated by me. What Dr. Brinton appears to have mistaken for an accent in Hanoteau (p. 5) is not an accent, but a diacritical mark used by him to distinguish the "r grasseyé" answering to the Arabic *ghain* from the soft *r* (*r'* and *r*), and in the same way to distinguish the deep gutteral *k* (*q*) answering to the Arabic *qof* from the ordinary *k* (*k'* and *k*). Hence he writes *tifinar'*, the mark falling, not on the final vowel *a*, but on the final consonant *r*, which he means to be pronounced as with the Northumbrian *burr*, or like the Arabic *ghain* (tifinagh, as Barth always writes it, and always accenting the *i* of *fín*, thus, tifínagh).

It is strange that Dr. Brinton should have at all ventured to take up my reference to Hanoteau, for on the main issue Hanoteau is dead against him, writing that "le système d'écriture des Imouchar' [Sahara Berbers] est analogue à celui des Arabes et des Hebreux" (p. 1). In other words, it is Semitic. But doubtless the passage has escaped Dr. Brinton's notice. As to Dr. Collignon's cock-sure assertion that it is "antérieure à Carthage" and that "it is time to discard" the theory of its Punic origin, it will suffice to say that, if it comes to the *ipse dixit* argument, the name of Mommsen alone will outweigh fifty thousand Collignons.

Lastly, touching the squares and the rounds, otherwise a point of secondary importance, unless you have a theory to serve, my reference should rather have been to Hanoteau's "Grammaire Kabyle" than to his "Grammaire Tamachek." It is in the former work (p. 360) that is given the full table of the three variant Berber alphabets, with the following results: I. Five curves; six rectangular forms; two acute angles. II. Seven curves; five rectangles; two acutes. III. Six curves; five rectangles; three acutes.

And here the matter may rest, as Professor Newman needs no rehabilitation from me, and in any case cannot be held responsible for the incapacity of "French scholars" to assimilate his "phonetic system." A. H. KEANE.

79 Broadhurst Gardens, South Hamstead, N.W., Sept. 7.

BOOK-REVIEWS.

Life Histories of North American Birds, with Special Reference to Their Breeding Habits and Eggs. By CHARLES BENDIRE. Washington, Government. 554 p. 4°. Ill.

The Humming Birds. By ROBERT RIDGWAY. Washington, Government. 131 p. 8°. Ill.

THE publications of the Smithsonian Institution and of its offspring, the U. S. National Museum and the Bureau of Ethnology, are becoming almost too numerous to be kept track of by any but the professional librarian. Ordinary readers have long since despaired of the task, and consider it as a matter of course that they will seldom or never hear of them all, to say nothing of the pleasure of seeing them. True, many of these publications are of such technical character that only specialists care for them, and these are supposed to be cognizant of the publications pertaining to their study. On the other hand, there are many papers published by the Institution of great general interest, and it frequently happens that these are largely inaccessible to the general public. Any retrospective view of the work of the Smithsonian from its inception deals almost exclusively with its publications. These beginning with meagre annual reports, containing administrative and financial statements, have increased so in numbers and variety that it requires a good-sized volume to catalogue them. It is the intention here to refer to them in only the most general way.

At the present time they may be grouped under three heads: 1. Those of the Smithsonian proper; 2. those of the U. S. National Museum; and 3, those of the Bureau of Ethnology. Under the first of these we have (*a*) annual reports; (*b*) miscellaneous collections; (*c*) contributions to knowledge. Under the second we have (*a*) annual reports; (*b*) proceedings; (*c*) bulletins; and (*d*) special bulletins. Under the third come (*a*) annual reports; (*b*) contributions to North American ethnology.

To still further complicate matters and bewilder the enquirer, we find that frequently there are several editions of these volumes, one always appearing in the guise of a congressional document, and another in the form designed for general distribution. Besides this, it has of late become the habit, perhaps from the necessities of the case, to issue, under a separate cover, papers which may appear in various annual reports or proceedings.

The first few annual reports of the Board of Regents of the Smithsonian contain few or no papers of any great general interest. It was not many years, however, before these began to appear in an appendix to the administrative report. During the latter part of Professor Baird's administration a special feature