may have been its weakness in the past it is now doing valuable work. It is well equipped, has an able Faculty, and a demand upon it greater than it can now supply. We see no reason why it should not be a very valuable auxiliary in the future development of the mining resources of the State.

## 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.*

### On the Interpretation of the Markings on Mars.

IN view of the large mass of conflicting observations of Mars now being reported, it occurs to me to mention one principle of interpretation which has not to my knowledge been suggested. On Mars, as on the moon, may it not be true that the most conspicuous permanent markings are due, not to land and water surfaces, but to contrast of mountain and plain? Mars through even a large telescope is brought scarcely closer than the moon appears to the naked eye, and it presents a general marking analogous to the "man in the moon," which we know to be but a shadow feature. (See, for example, Plate xxxiii. in *Astronomy and Astro-Physics*, October, 1892). If the permanent water surface of Mars is only one-half the area of the Mediterranean Sea, as lately estimated by Professor Pickering, it is, of course, impossible that the light and dark patches represent land and water; but the supposition that they represent, in general, open plain and rugged hill-country throws light on certain perplexing phenomena. The so-called canals are then probably mountain ranges separated by plateaus, and the so-called duplication is a bringing out by higher powers of outlying spurs and ranges, which with lower powers are either indistinguishable or mingled with the general mass. As our seeing improves, we may expect triplication, quadruplication, etc. An observer on Mars looking through a telescope at the Rocky Mountains from a distance of 100,000 miles would discern merely a long dark blur, while upon closer scrutiny he might distinguish parallel and off-shoot ranges with their foot-hills as separate dark lines, which might be termed "canals." The apparent straightness and regularity of the "canals" is doubtless the effect of distance.

By this interpretation we solve the difficulty suggested by Professor Pickering in *Astronomy and Astro-Physics*, October, 1892, p. 669, that some "very well developed canals cross the oceans." These "canals," then, are hilly peninsular extensions or ranges of mountainous islands. From Mars, Italy or Java would appear but as dark streaks in a greenish or bluish medium. Mr. Barnard mentions in the same number (page 683) that "long luminous streaks" seem to be a definite feature of the planet's surface. These are probably lines of snow-capped peaks. We must, on the whole, believe that the seas, lakes, and canals of Schiaparelli's map are as mythical as the seas of the moon.

When one compares the extremely diverse drawings of Mars given in the October *Astronomy and Astro-Physics*, one cannot but suspect that clouds have a large part in producing this diversity. The general appearance of the earth from Mars would certainly change from hour to hour from this cause alone. Predominant and cloud fog probably caused the "absolutely colorless, dark-gray" appearance of the Martian oceans, noted by Professor Pickering for a considerable time (*Astronomy and Astro-Physics*, p, 546 cf., p. 669). Similarly the North Atlantic, which might often appear from Mars as a blue or green spot, might for some time, in the spring of the year especially, be a dark-gray patch.

We must consider it likely that some of the rapidly darkening spots which Mr. Pickering observed were due rather to springing vegetation caused by showers on barren tracts than to inundation, particularly the case he mentions where a dark area suddenly appeared to the "south east of the northern sea and of fully double its area." It seems hardly possible, if the snows on Mars are as light as Professor Pickering represents, that such extensive inundations could occur; and it is simpler and more in accord with general analogy that many such temporary dark or gray-green spots should be due to vegetation rather than to water.

Professor Pickering did so admirably with his 13-inch instrument, that we may well believe that, if he had had a 30 or 40-inch telescope, he would now be able to give us a tolerably accurate account of the general physiography of Mars. We hope his appeal for a thorough equipment will meet a ready response.

HIRAM M. STANLEY.

Lake Forest University, Oct. 11.

### The Lines on Mars.

IN *Science*, Sept. 23, Mr. C. B. Warring communicates a theory to account for the gemination of the so-called canals of Mars. He suggests that the phenomenon may be due to a defect in the eye of the observer by reason of its possessing the power of double refraction in some or in all directions. That some eyes do possess the power of double refraction is a well-known fact. It is a defect which, I imagine, is much more common than is generally supposed. It may be suggested that data representing a large number of cases *might* show astigmatic eyes to possess the power of double refraction more frequently than others. I do not know that any data have been collected upon this point.

Concerning the existence of the canals of Mars and that they are sometimes really double, I have no doubt. My own recent work at the Lick Observatory has convinced me that they are not illusions due to imperfect eyesight. During the present opposition, I spent about thirty nights in the work on Mars, working with Professors Schaeberle and Campbell. On about half the nights I saw the so-called canals with more or less distinctness, but on only one occasion did I clearly see a canal double. This was August 17, when the canal called Ganges on Schiaparelli's map was clearly seen to be double, and was so drawn in my note-book. That the doubling was real and not apparent is evident from the fact that Professors Schaeberle and Campbell both saw the same canal double on the same night, and drew it so. Other canals, some of them nearly parallel to Ganges, were seen that night, but none of them appeared double.

Our work was done independently. In turn each went to the telescope, and made a drawing of what he saw. We did not see each others' drawings, nor did we talk of what we had seen. It was not until the next morning that we learned that each had seen Ganges double.

WILLIAM J. HUSSEY.

Leland Stanford, Jr., University, Palo Alto, Cal.

### A New Habitat of the Black-Throated Rock Swift, Micropus Melanoleucus.

AS curator of the museum, I have just procured for the State University of Nebraska a set of bird-skins prepared during the past summer, among which are five skins that must be of interest to ornithologists. They verify the discovery made by Professor Lawrence Bruner of the University of Nebraska, that the White-throated Rock Swift builds and breeds in the precipitous bluffs around Squaw Canon, Sioux Co., Nebraska, and, what is more likely, throughout the Pine Ridge regions, as Professor Bruner has observed them also at Crow Butte, near Crawford, Nebraska.

This isolated habitat of the White-throated Rock Swift, Micropus Melanoleucus (Panyptila Saxatilis), is several hundred miles east of its most eastern limits as known hitherto. Perhaps the Pine Ridge Buttes and bluffs, particularly those about Squaw Canon, are so admirably adapted to their nesting and high-flying habits as to be the attractive forces.

Although five specimens were secured, no eggs were found. It should be mentioned, perhaps, that the egg of this swift is unknown. However, it is the expectation of the author that they will be found on some of his own, or some of the other numerous excursions sent annually to this excellent field by the university.

The nests are built high up in the cliffs, in the most inaccessible places. The semi-lithified sandstone of these buttes is easily excavated; and, as nearly as could be learned, the swifts dig back about eighteen inches, the opening barely admitting the hand but expanding somewhat at the nest. The nests are built of grass.

As their early name implies, these swifts are all wings; accordingly the swiftness of their flight is such that the best shots make many misses and few hits. It took several rounds of ammunition for the five just added to the State collections. These specimens are all males, and inasmuch as their measurments differ slightly from published measurements, i. e., length 6.50–7.00 inches; extent, 14.00; they are given below for each bird:—

| | No. 1. | No. 2. | No. 3. | No. 4. | No. 5. |
|---|---|---|---|---|---|
| Length, | 6½ | 6⅜ | 6½ | 6⅜ | 6¼ |
| Expanse, | 14 | 14½ | 14⅛ | 14⅜ | 14 |

From the foregoing measurements it will be seen that, while the length is less, the expanse is greater than those published. These swifts were first observed by Professor Bruner while on a government entomological expedition in the summer of 1891. At the direction of Professor Bruner his ornithological assistant, Mr. J. B. White, shot and prepared the above specimens this past summer. Being in charge of the Morrill geological expedition sent to this region by the University, I had occasion to fall in with Professor Bruner's party, and to observe these swifts personally. We must have seen several hundred at Squaw Canon flying in and out among the buttes which rise with nearly vertical walls five hundred to twelve hundred feet above the Hot Creek Basin.

Having occasion to visit this region several times annually with parties of students, it is to be hoped that we may obtain data for further notes, and that it may be possible to secure their nests and eggs, in spite of their inaccessible abodes.

ERWIN H. BARBOUR.

University of Nebraska, Sept. 30.

### Star 1830 Groombridge.

IN *Science* for Sept. 30, I note the letter of Professor A. W. Williamson, in which he propounds an hypothesis, admitted by himself to be forced and unwarranted by any natural facts, to account for the incredible velocity attributed to the Star 1830 of Groombridge's catalogue. It is not necessary to resort to such untenable speculations to explain the phenomena referred to. The only reason for assigning such an extreme velocity to the star in question is the fact that it exhibits quite a large proper motion and no appreciable parallax. It may be, however, merely a case of masked parallax. If we suppose the star to have a large dark companion (numerous instances of which are known, as Algol, Procyon, etc.), we only need to assign to it a period and radius of revolution closely approximating that of the earth in its orbit, and a favorable position of orbital plane, to render the parallax quite imperceptible by the old methods. In such case the spectroscope might solve the problem by determining the orbital velocity, and thence the other elements, in case the plane of the orbit lay in our direction, and thus show that this star is really one of the nearest in the heavens to our system.

HENRY H. BATES.

Washington, D.C., Oct. 5.

### Dr. Brendel's Photographs of Auroras.

IN your issue of July 22, 1892, you copied from *The Scottish Geographical Magazine* an interesting notice of the expedition made by Dr. Martin Brendel and Herr O. Baschin to Bossekop on the northern coast of Norway, last winter, to study the northern lights and attendant phenomena. Therein mention was made of the photographs of the aurora obtained by Dr. Brendel.

By his courtesy copies of some of these pictures are before me. Dr. Brendel modestly regards them as valuable chiefly for what they promise for the future. He hopes to visit the Arctic regions again with a much better equipment. But he has already achieved a great feat in securing even these photographs, the first of the kind ever taken. Tromholt's attempt in 1885 cannot be regarded as a success. The faintness of the light, the quivering and shifting of the auroral rays, and the non-actinic quality of certain colors, combine to make this a very difficult task. Dr. Brendel