

much resemblance to the vitreous ashes of Krakatoa, drawn on p. 587, as they are very thin.

I have examined this sediment with the naked eye to see whether I could perceive anything like the large corona. I darkened the room and admitted the sunlight through a narrow slit on to the glass. The sediment sparkles with various colours, chiefly pink and green, I suppose owing to interference; and it is difficult to judge which colour preponderates. I find a decided excess of green at a small angular distance from the sun, and often pink preponderates at a greater but varying distance. These colours being similar to those seen in the large corona are slightly confirmatory of the theory that the sediment from the rain is the substance which has caused it and the strange sunsets and sunrises; but other substances are also capable of giving a green light near the sun. Moisture on glass gives quite different colours, so far as I have observed.

The cirrus-like wisps on which the sunset phenomena appeared were definite and very small at the end of November; but on the whole grew larger and more indefinite, till at length they have been quite imperceptible for several weeks past.

On April 24 there was the first moderately bright aurora I have seen since October 5. Can this remarkable absence of auroras and the scarcely less remarkable frequency of lightning have been caused by the volcanic dust? If so, it may also account for S. Tromholt's finding auroras so scarce and poor in Iceland during the winter, as mentioned on p. 537 (vol. xxix.), though he does not say whether they were scarcer than usual there.

THOS. WM. BACKHOUSE

Sunderland, May 10

Pons' Comet

PONS' comet was visible here with the naked eye throughout the month of February, including the nights of greatest moonlight. I so saw it on some twenty or more nights during that month, and append some notes as to its comparative brightness, so far as I could judge.

February 3.—“Comet visible till 10.45. Could see ‘old moon’ with naked eye easily, and in telescope Grimaldi and Aristarchus, but only with a very small part of sunlit portion in field.”

February 6.—“At 8.45 could see comet with naked eye, though sky not quite free of sunset-glow and somewhat hazy, and moon nine days old. It was altogether faint, but most of the tail visible at other times could be seen—certainly more than I should have expected.”

February 9.—“At 9.30 found the comet with naked eye and could see it without difficulty, but there was only the suggestion of a tail. Comparing it with α Sculptoris by looking midway between the two, they produced the same effect on the eye; but of course the least magnifying power showed the difference.”

February 10.—“8.20 to 8.50. Found comet with naked eye, but it was very faint, and to the unaided eye looked certainly fainter than α Sculptoris. Yet it seemed to me that more of the tail (or the tail more certainly) was visible than last night.”

February 11.—“Found comet with naked eye about 8.10, and watched it up to 9.40. As the sky lost the traces of sunset I could pick it up without difficulty, in spite of the full moon shining in a cloudless sky. It was not quite so easily seen as α Sculptoris, but I may say that λ^1 and λ^2 Sculptoris, though each marked as of the same magnitude as α , I could not get a glimpse of, though I tried hard.”

February 12.—“At 8.15 found comet with naked eye without difficulty, and so at intervals up to 9. Found it again with difficulty at 10.15; it was then getting low and into the haze: in the telescope it seemed then to have lost (at a guess) half its light.”

On the subsequent clear nights in February there was no difficulty.

March has been much cloudier, and owing to this and moonlight I only saw it with naked eye certainly on four nights—the 1st, 4th, 16th, and 17th. My note for the 4th is: “Found and saw comet with naked eye several times, though not easily, between 8.15 and 8.40 p.m. Could see the outline of the ‘old moon’ without difficulty.”

The 5th is marked as doubtful both as to comet and “old moon.”

March 14.—“A fine pink glow in evening, and splendid afterglow about 7.15—never saw it better. Found comet easily with opera-glass, but could not see it with naked eye, the moon rising before the glow had vanished.” So also on the 15th.

March 16.—“Saw comet repeatedly with naked eye (looking a little above it) between 7.45 and 8.30. Sky very good.”

March 17, 7.40 to 8.10.—“Found comet with naked eye, and saw it many times, looking a little above it; could not be quite sure of seeing it direct.”

Owing to clouds I have only seen it on two nights since, the 24th and 28th; and that only with opera-glass and telescope.

Nelson, N.Z., March 29

A. S. ATKINSON

Snow and Ice Flora

IN the account of Prof. Veit Brecher Wittrock's interesting work on the Arctic snow and ice flora (NATURE, vol. xxviii. p. 304) your reviewer enumerates the countries and mountain ranges where red snow has been observed, but does not mention the Southern Alps of New Zealand, where as far back as 1861 this plant was observed by me. The fact that green and red ice have been found in these high northern latitudes, and that the unusual coloration has been traced to microscopic organic life is of special interest to me, as I repeatedly observed green as well as red ice amongst the glaciers of New Zealand, first at the head of the Rangitata River, as far back as February, 1861. At the time I published an account of this occurrence, which was reprinted by others (amongst others see Hochstetter's “Neu Seeland,” 1863, p. 342). Since then during my alpine explorations I have repeatedly observed the same phenomenon, so that evidently at the Antipodes there occurs a counterpart of the Arctic snow and ice flora. It is to be hoped that some able botanist will some day do the same work for us that Baron Nordenskjöld and his able coadjutors have done for Greenland and Spitzbergen.

JULIUS VON HAAST

Christchurch, N.Z., December 31, 1883

The Rotation Period of Mars

NOTWITHSTANDING his comparatively small diameter and slow axial motion, the planet Mars affords special facilities for the exact determination of the rotation period. Indeed no other planet appears to be so favourably circumstanced in this respect, for the chief markings on Mars have been perceptible with the same definiteness of outline and characteristics of form through many succeeding generations, whereas the features such as we discern on the other planets are either temporary atmospheric phenomena or rendered so indistinct by unfavourable conditions as to defy lengthened observation. Moreover it may be taken for granted that the features of Mars are permanent objects on the actual surface of the planet, whereas the markings displayed by our telescopes on some of the other planetary members of our system are mere effects of atmospheric changes which, though visible for several years and showing well-defined periods of rotation, cannot be accepted as affording the true periods. The behaviour of the red spot on Jupiter may closely intimate the actual motion of the sphere of that planet, but markings of such variable unstable character can hardly exhibit an exact conformity of motion with the surface upon which they are seen to be projected. With respect to Mars the case is entirely different. No substantial changes in the most conspicuous features have been detected since they were first confronted with telescopic power, and we do not anticipate that in future ages there will be any material difference in their general configurations. The same markings which were indistinctly revealed to the eyes of Fontana and Huyghens in 1636 and 1659, will continue to be displayed to the astronomers of succeeding generations, though with greater fulness and perspicuity owing to improved means. True there may possibly be variations in progress as regards some of the minor features, for it has been suggested that the visibility of certain spots have varied in a manner which cannot be satisfactorily accounted for on ordinary grounds. These may possibly be due to atmospheric effects on the planet itself, but in many cases the alleged variations have doubtless been more imaginary than real. The changes in our own climate are so rapid and striking, and occasion such abnormal appearances in celestial objects that we are frequently led to infer actual changes where none have taken place; in fact, observers cannot be too careful to consider the origin of such differences and to look nearer home for some of the discordances which may have become apparent in their results.

The rotation period of Mars has been already given with so much precision that it may seem superfluous to rediscuss the point, but it is very advisable to see whether recent observations

confirm the values derived from former results. The "Hourglass" or "Kaiser Sea," which is admittedly the most prominent mark on the planet, is a very suitable one for comparisons to find the intervals of rotation. Early in 1869 I saw it with a 4 $\frac{1}{4}$ -inch refractor as it passed the central part of the disk. On February 2, 1869, it was central at 10h., on February 4 at 11h., and on February 5 at 11h. 30m.

I observed the same object in February of the present year with a 10-inch reflector (power 252), and noted it crossing the planet's central region at the following times:—

1884				h. m.
February 14	...	...	...	5 55
15	...	...	...	6 35
19	...	...	...	9 5
22	...	...	...	11 4

I have combined my observation of February 4, 1869, with that of February 14, 1884 (as I regard this pair as the best obtained), to ascertain the rotation period. The interval includes 5487d. 18h. 55m. = 474,144,900 seconds. Correcting this for the difference in longitude between Mars and the earth at the two epochs and for defect of illumination (there is no necessity to apply any correction for equation of light, as the apparent diameter of the planet on the dates selected for comparison was about 16", and hence the distances were nearly the same), I find the time of rotation resulting from the discussion of these observations to be

h. m. s.
24 37 22 $\frac{34}{100}$ (5349 rotations),

which is in satisfactory agreement with the periods computed by Kaiser, Schmidt, and Proctor from a much longer series of observations. In order to exhibit the small differences between the period now computed and those resulting from some of the best modern determinations, I give the following summary:—

	h. m. s.	
J. H. Mädler ...	24 37 23 $\frac{8}{100}$	<i>Ast. Nach.</i> 349.
1864, F. Kaiser ...	24 37 22 $\frac{62}{100}$	<i>Ast. Nach.</i> 1468.
1866, R. Wolf ...	24 37 22 $\frac{9}{100}$	<i>Ast. Nach.</i> 1623.
1869, R. A. Proctor ...	24 37 22 $\frac{735}{1000}$	<i>Mon. Not.</i> vol. xxix. p. 232.
1873, F. Kaiser ...	24 37 22 $\frac{591}{1000}$	<i>Annalen der Leidener Sternwarte</i> , vol. iii. p. 80.
1873, J. F. J. Schmidt	24 37 22 $\frac{57}{100}$	<i>Ast. Nach.</i> 1965.
1884, W. F. Denning	24 37 22 $\frac{34}{100}$	

It is obvious that Mädler's period of 24h. 37m. 23 $\frac{8}{100}$ s. is about one second too great. If we take a mean of the other six values (all within 0 \cdot 6s. of each other) we get

h. m. s.
24 37 22 $\frac{626}{1000}$

which may be fairly regarded as a very near approximation to the true sidereal rotation period of Mars.

The computations of Kaiser, Schmidt, and Proctor are severally based on very long periods, the comparisons being modern observations with those of either Huyghens or Hooke during the last half of the seventeenth century. It is unfortunate, however, that there is some question as to the correct identification of the spots depicted in some of the ancient drawings. The representations by Hooke on March 2, 1666 (old style), at 12h. 20m. and 12h. 30m., also those by Huyghens in 1659, 1672, and 1683 give a large irregular spot, extending in a north and south direction, which can only be identified as the "Hourglass" or "Kaiser Sea." It would appear, however, that this interpretation is incorrect in certain cases, for the several drawings do not only show disagreements with each other but also when compared with modern observations originate discordances of period, small it is true, but still too large to be attributed to simple errors of observation. No doubt the period which approaches nearest to the truth will become apparent from future observations, though it can hardly admit of definite settlement for many years, inasmuch as the differences between the several times of rotation as above deduced are very insignificant, and must so closely accord with the real period of the planet that the errors such as exist must be allowed to accumulate over a lengthened interval before they will become distinctly manifested. A comparison extending over fifteen years is insufficient for the purpose, for a computed time of rotation, erroneous to the extent of one-tenth of a second, will still, at the termination of such a period, answer to the positions of the markings to within 9 minutes of time. It is to be remarked that Mr. Marth, whose opinion is entitled to great weight, has, for some time, adopted the period of 24h. 37m.

22 $\frac{626}{1000}$ s. for the rotation of Mars. This corresponds to a daily rate of 350 \cdot 8922, and forms the basis of his computations in his "Ephemerides for Physical Observations of Mars," annually published in the *Monthly Notices*. W. F. DENNING

"The Electrical Resistance of the Human Body"

WILL you kindly publish the inclosed from Prof. Dolbear? It furnishes a complete explanation of the discrepancy between his measurements of the resistance of the human body and those which I have recently made. At the same time, as I have pointed out to him, the fact that this resistance may sink below 500 ohms with "soaked skin," even if that be "abnormal," is of the highest physiological importance, and goes far to explain the hitherto mysterious deaths from accidental passage of a current through the body. Most of these, as Prof. Forbes remarked to me, have taken place with alternate, not continuous, current machines. W. H. STONE

Wandsworth, May 11

College Hill, Mass., April 23, 1884

DEAR SIR,—I have to acknowledge the receipt of your pamphlet "On the Resistance of the Human Body," for which I am obliged. I am glad to know that physiology has some one in its ranks who is interested in that line of work, and who knows what to do in order to settle such vexed questions.

I have also seen in the last *Electrical Review* that has reached me an article on the same matter, in which you refer to me and what has been published concerning some of my work, that needs a little elucidation. In the early days of telephony the experiment was often tried of making the human body part of the circuit in order to see how speech could be transmitted through the body, in the language of those days. Bell wanted to know what the resistance of the body was when in such circumstances, and I measured it from hand to hand when thumbs and fingers grasped the terminals of a wire and found it to vary between 6000 and 15,000 ohms, and wrote to him to that effect, and from that grew out the statement to which you have referred. Now under such conditions that work is right, as I have frequently since proved.

It seems to me that when we speak of the resistance of the body or of any body, and do not define what is meant by body, it is fair to assume that the body is the ordinary body under ordinary conditions. If the resistance (the *actual*) of the wire is found to be a thousand ohms by one party and another one files off the rust from the contacts and then finds the resistance less, both parties may be right. Now the skin of individuals is more or less horny in texture, and so has high resistance which soaking may reduce, and the question then properly arises, is the hard skin properly a part of the body? The resistance of a farmer's hand is often twice as great as that of a child's or of a man of sedentary habits, but solely, as I think, because of the thickness and density of his skin. Does not the question resolve itself into this—What is the resistance of a dry hand and the resistance of a soaked hand? What is the resistance of a good conductor and the resistance of a poor conductor? If the poor one is made better in any way, its resistance is correspondingly increased.

If the condition of the body is abnormal, its resistance may also be abnormal. I should call a soaked skin abnormal.

Still it is of the utmost importance that we should know what the resistance is under all conditions, as being the only way to advance in knowledge of the physiological effects of known currents, and I would again express my gratification at your persistent work in this field, and if I can in any way be of service to you I shall be pleased to be employed.

Yours very truly,

To Dr. W. H. Stone

A. E. DOLBEAR

Instinct in Birds

MR. GRAVES, who writes on this subject (*NATURE*, vol. xxix. p. 596), is, I fear, not so accurate an observer as the magpie, for he misquotes the day fixed by the birds for building, and then indicates that the young "mags" are restricted to four in each nest, while the fact is there are often six or seven in a nest. The magpie is too fond of a fresh egg for breakfast to escape the attention of the gamekeeper. I have often seen the greater part of their nest shot down, repaired, and reoccupied by the birds year after year. I know of no bird that begins the work of *nidification* here early in February, nor any that devotes two months to the work. The rook (*Corvus frugilegus*) is the first to