The questions whether a geological period is to be classified as hitherto it always has been classified, by an appeal to zoology or by an appeal to ice, and whether the naturalists who have devoted themselves to the study of mammalia have only "opinions," while Dr. James Geikie enjoys "the facts," may be left in silence to the judgment of geologists. In the review under discussion all reference to my own opinion and works has been carefully omitted. Here, so far as I am concerned, the discussion ends. W. BOYD DAWKINS

Owens College, February 11

## Geological Climates

IN NATURE, vol. xxiii. p. 241, Dr. Haughton repeats his former statement that "it is imposible to suggest any rearrangement of land and water which shall sensibly depress the temperature of the east of North America." Now we must only look about us to see that the east of Asia is colder than the east of North America, parallel for parallel, and this especially in winter. The *mean temperature of January* is as follows in places situated as far as possible under the same latitude and at the same distance from the sea :—

| Lat. N. | Eastern Asia. | | Eastern North America. | | Difference. |
|---|---|---|---|---|---|
| 56½° | Ajan ... ... ... | − 4·2 | Naïn, Labrador | − 3·8 | ... 0·4 |
| 53 | Nikolayewsk, Amoor | − 12·1 | Rigolet, Labrador | − 1·1 | ... 11·0 |
| 43¾ | St. Olga Bay ... | 12·9 | Portland, Maine | 21·2 | ... 9·3 |
| 43¼ | Wladivostok ... | 6·1 | Portsmouth. N.H. | 25·0 | ... 18·9 |
| 40¾ | Newchwang ... | 10·4 | Paterson, N J. ... | 26·6 | ... 16·2 |
| 40 | Pekin ... ... ... | 23·7 | Philadelphia ... | 31·3 | ... 7·6 |
| 31¼ | Shanghaï ... ... | 38·3 | Mean of Savannah and Ft. Marion | 53·6 | ... 15·3 |
| 22¼ | Victoria, Hong Kong | 59·5 | Habana, Cuba[1] | 71·4 | ... 11·9 |

This shows that (1) from lat. 20° to 55°, Eastern Asia is everywhere from 7½° to 19° F. colder in January than Eastern North America ; and that (2) those parts of the coast of Eastern Asia which are not separated by mountains from the interior lowlands are much colder than those which are sheltered, but even the latter parts, though relatively warmer, are yet much colder than the same latitudes in Eastern North America. These differences are explained by geographical position. Asia is the larger con tinent; its eastern interior is more secluded from the influences of warmer seas, and its eastern coast more subject to Continental influences, and thus colder in winter than North America. We thus see by the example of Asia that a colder temperature than in Eastern North America does really exist now in the same latitudes. The example of Eastern Asia shows us geographical conditions which tend to produce an exceedingly cold winter. We have but to look at the middle and higher latitudes of the southern hemisphere to see so cold summers that nothing of the kind is met with in the northern. I do not know on what authority Dr. Haughton states that the annual temperature of 32° F. is met in the southern hemisphere but on 62° 41′ S. We do not have observations during the winter in these latitudes, but the mean temperature of January (the warmest month) is found to be 35·2 on 60° S. and 32·4 on 63½° S. Or (by the observations of Sir J. Ross) the mean annual temperature can certainly not be less than 4½° below that of January, so that it would be not higher than 30·7 on the 60° S., and 27·9 on the 63½° S.

St. Petersburg, February 5 A. WOEIKOFF

[1] Nearly one degree to the North of Victoria.

## Variable Stars

WITH reference to your remarks on variable stars in the Astronomical Column of NATURE, vol. xxiii. p. 206, I beg to send a few observations made by me (on some of the stars referred to) during the past few years :—

5. 35 Camelopardi. October 1875. I found this star about 6½ m. and fainter than *o* (27 Fl.).—October 6, 1879. 7 mag. ; about 1 mag. less than *o*.

6. Rümker's star. I have the following observations : March 27, 1875. About 7 m. ; fainter than 25 Monocerotis.—January 19, 1876. 6½ m. ; less than 25, but brighter than two 7 m. stars *s.f.* it.—March 18, 1877. Distinctly visible to the naked eye ; about 6 m., but less than 25 (5.6 m. Heis). The above observations were made in the Punjab.

7. 65 $b^2$ Geminorum. December 1, 1880. 65 so exactly equal to 64 Geminorum with opera glass that I could see no difference between them in magnitude.

8. 16 Leonis Minoris. March 27, 1875. About 7½ m.—January 19, 1876. 7·3 or 7·5 m.

10. Lalande 38405. August 31, 1877, I found this star fainter than Lalande 38388, which lies about 20′ north of it ; also less than a 6 m. Harding (Lalande 38214) *s.p.* it. Brighter than Lalande 38342 (7½, 8), which lies *n.p.* it.

11. 33 Capricorni. August 1875 I estimated this star as 6½ m. ; August 1876, 6 m., and slightly brighter than 35 Capricorni.

12. ι (17) Andromedæ. From numerous observations, beginning in May 1875, I have detected a variation in the light of this star to the extent of about half a magnitude. It is sometimes distinctly brighter than κ Andromedæ, and sometimes decidedly fainter.

With reference to β and δ Scorpii I find the following observation in my note-book :—

"Punjab, August 10, 1876. β Scorpii (2 m. Heis) and δ Scorpii (2·3 m. Heis) almost exactly equal. Perhaps δ, if any thing, *very* slightly the brighter of the two. J. E. GORE

Ballisodare, Co. Sligo, Ireland, February 5

## The Mode of Flight of the Albatross

THERE seems to be a prevailing idea that the albatross in his flight is in some way "assisted by the wind." I think this is a mistake ; the manner is well known. The method I believe admits of a very simple explanation. His secret consists in his power of acquiring great momentum together with the large superficial area of his extended wings ; with scarcely a motion of his wings he will fly straight against a strong wind with a velocity greater than that of any racehorse ; this is inconsistent with the idea of his being "assisted by the wind."

In attempting to rise from the water (I believe he is unable to rise from the land or from a ship's deck) he flaps his wings violently to get his body out of the water ; at the same time, paddling rapidly with his webbed feet, he acquires a moderate degree of momentum, sufficient, with outstretched wings, to carry him forward and upward upon an easy incline. The case is similar to that of a boy taking a run with his kite string in his hand to give his kite a start. During this first rise he will generally give a few heavy, lazy flaps, and then stretch his wings steadily to their full extent ; now as he gradually rises he must of course as gradually lose his acquired momentum till it suits him to acquire more, when he may be twenty, thirty, or fifty feet above the surface, but a much greater distance from the place where he left the water, measured on the surface ; by slightly altering his position, by a movement of his tail, he takes a shoot downwards at any angle that suits his convenience, still without his wings outstretched. This is precisely the case of a boy shooting down a coast on his sled ; the propelling force is the same. The bird directs his course mainly with his tail, the action of which upon the air is identical with the action of a ship's rudder upon the water. By this downward motion, his velocity rapidly increasing, he acquires a degree of momentum sufficient to carry him up again to a height equal to or greater than that from which he started. In this up and down long wave-like motion, with all its variations on either side, consists the whole of his flight day after day for hundreds of miles ; at long irregular intervals he may give a few lazy flaps with his immense wings. Other birds use the mode of flight of the albatross, but to a smaller extent, for the reason, in the case of smaller birds that, the ratio of feathers to bulk being greater, their specific gravity is less, consequently they are unable to acquire the degree of momentum necessary to carry them upward ; but on the other hand they have the power of sustained effort in moving their wings rapidly, which the albatross has not. Gravitation then, which prevents him from rising directly on the wing, is the motive power of the albatross when aloft. He must always take a run or paddle over the surface of the water in order to get a start, and on the land or the deck he is a prisoner, because he has no water in which to paddle himself along with his webbed feet, and he is unable to run. Instead of being assisted by the wind, his speed is lessened by just so much as the wind's velocity, when it happens that the direction of the wind and his intended course are opposed to each other, but with the wind his speed is just so much greater than it would be in a calm.

I do not advance this explanation as an imaginative theory. I claim more for it. I have had many opportunities of studying the movements of the albatross for consecutive days, and I feel confident that the above will be found to answer all required conditions. HOWARD SARGENT

Cambridge, U.S.