and I think the poundal, as units of energy" looks as if I confuse force and energy. The context shows that I object to non-metric units as unscientific, and therefore do not care which unit bears the name poundal. The statement that I want to have Claus instead of Rank for the British unit of entropy is wrong. The claus is the unit of entropy in the practical metric system where the joule is the unit of energy. The rank is a name proposed by Prof. Perry for $\int dH/\theta$, and as this is not entropy in any real change, I cannot adopt it as a unit of entropy. As to $d\chi$, I will deal with that elsewhere; it is a side issue. The statement that I talk of "the entropy of a quantity of heat" is wrong. Prof. Perry holds that entropy is a factor of heat. I dissent, and agree with Prof. Planck that entropy is not a factor of energy. So far from talking of the entropy of a quantity of heat, I have explained very fully how and why entropy is in no sense a factor of heat.

I would not write were a review in NATURE not particularly important, and I trust you will, in fairness to my publishers and myself, allow this letter to appear.

41 Palace Court, W., May 1. JAMES SWINBURNE.

MY sole object in the controversy to which Mr. Swinburne refers was to show that, like most of the other writers of whom he complained, I have never either made or championed the mistakes he speaks of at the beginning of this letter. As to my notice of his book, I cannot admit that I have misrepresented him except as to the *claus*. I made a mistake in saying that his claus is what is sometimes called a *rank*. As he now says that the momentum of which he spoke was a *scalar* momentum, I submit that I was quite fair in my comments. I cannot admit that his $\theta\chi$ diagram is a side issue. JOHN PERRY.

### Origin of Plants Common to Europe and America.

THAT there is a resemblance between the floras of Canada and northern Europe, and again between the floras of Canada and of eastern Siberia and Japan, is well known. Including the horsetails and ferns with the flowering plants, probably about 575 species are identical in Canada and Europe, and again about 330 in Canada and Japan or the River Amur country. A large number of these are common to the three continents. The hypothesis generally accepted has been that, in some comparatively recent epochs, there has been a connection between Europe and America which facilitated the intermingling of the plant life of the two continents. The late Prof. Asa Gray suggested the probability that the migration of European plants had taken place across Asia to America. Lesquereux, from his studies of the flora of the Dakota group, on the other hand, maintained that the North American flora is not now, nor has it been in past geological ages, the result of migration, but that it is indigenous. It has long been known that species now extinct occurring in the Miocene of Europe had appeared in America at an earlier period. Lester Ward enumerates eleven species—all now extinct—as common to the Laramie group in the United States and the Eocene of Europe, and shows further that at least two living species now found in both Japan and America date their origin in America as far back as the Eocene. Twenty years ago my own studies in the distribution of Canadian plants also convinced me that whilst facilities had existed for migration in both an easterly and a westerly direction, Canada was the point of origin of many of the species now identical in Europe and America. This conviction has been heightened by further knowledge of the range in Canada of these identical species and by further discoveries during recent years of plants in the Pleistocene clays of Canada. Of seventy fossil species in these Pleistocene clays at Toronto, Ottawa and elsewhere, twenty occur at the present day in both Europe and Canada, fourteen are similarly Asiatic and Canadian, whilst eleven are common to the three continents. This, if it does not necessarily indicate that in Pleistocene times the intermingling of these floras had already been effected, at least shows that in this period these identical species were present in Canada, and had here their place of origin if there is nothing to indicate their presence at as early a period in Europe or Asia. In its vast areas of exposed Laurentian and Huronian formations, Canada has an old look about it, and must have furnished a home through long past ages for the growth and diffusion of northern temperate plant life, when other sections of the globe have from time to time been under water.

The peculiarities of the present range over Canada of many of these identical species also afford suggestions. Whilst many of them are distributed somewhat generally over the country, and many are high northern or Arctic, quite a number do not range west of Lake Superior; others have not been found west of the Rocky Mountains, whilst some are confined to British Columbia and Alaska. In view of their occurrence also in either Asia or Europe, this circumscribed range of so many species suggests their antiquity, and that the elevation of that lofty barrier, the Rocky Mountains, and the disturbance of the relations of land and water in Manitoba and the North-West Territories in more recent times, has resulted in these plants being confined to their present range where forest conditions were more suitable, and has led to the treeless prairies and plains being tenanted by new groups of species specially suited to the new conditions there, when the land rose to its existing level. A. T. DRUMMOND.

Toronto, April.

### Moisture in the Atmosphere of Mars.

IN your issue of May 5 I see a note in the astronomical column on Mr. Lowell's theory of the Martian canals. It is perhaps not just to criticise it on so short a summary, but there is a point on which I should like to ask a question. If, as Mr. Lowell says, there is not sufficient moisture on the planet to produce vegetation, how does the water return to the poles ready for the next summer? The only way, it seems to me, is by evaporation. His suggestion of artificial waterways to carry the water from the polar caps implies the existence of an atmosphere sufficiently dense to enable intelligent beings to live. That being so, is it not just as plausible that the evaporated water should condense in the form of rain on the general body of the planet as well as at the poles? although, of course, the excessive cold would account for an increased fall at these extremities.

Bournemouth, May 10. ARTHUR J. HAWKES.

### Radium and Milk.

IN the souring of milk the amount of lactic acid developed may reach 0·80 per cent. in three or four days when the milk solidifies. In view of Sir O. Lodge's suggestion (NATURE, October 1, 1903), I have made experiments comparing the rate of acidification, in two to three days, with and without the influence of radium rays from a 5 mgrm. radium bromide tube. The differences in five cases did not exceed the limit of experimental error, 0·01 per cent. of lactic acid, and in a sixth case with the milk solidified the difference only amounted to 0·05 per cent. of lactic acid. It therefore appears to me that under normal conditions radium rays have little or no effect on the functions of the lactic acid bacillus. WILLIAM ACKROYD.

Halifax.

## *THE BANTU RACES OF SOUTH AFRICA.*[1]

NOTHING so good as this book dealing with the Negro indigenes of southern Africa has yet appeared. Mr. Dudley Kidd's work is therefore entitled to take the first rank on this subject, at any rate as far as the Bantu races of South Africa are concerned.

It is a national humiliation to us to reflect that as a Government we have been connected with South Africa for more than a century, that is to say, two-thirds as long as our imperial connection with India has lasted, and yet that by Government endeavour or

1 "The Essential Kafir." By Dudley Kidd. Pp. xiii+436. (London A. and C. Black, 1904.) Price 18s. net.



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