

Geological Climates

It was with great surprise I read Prof. Haughton's unqualified statement in last week's NATURE, that—"It is impossible to suggest any rearrangement of land and water which shall sensibly raise the temperature of the West of Europe,"—since I had, as I thought, in my recently-published volume—"Island Life"—not only "suggested" such a rearrangement, but also adduced much evidence to show that it had actually occurred throughout the periods when both the West of Europe and the Arctic regions enjoyed a much higher temperature than they do now. I will now briefly re-state my "suggestion," and will also make a few remarks on the general causes of difference of temperature, which may serve to render the subject more intelligible.

It is now well known that places in the temperate zones owe their temperature at different seasons only partially to the amount of direct sun-heat they receive, but very largely to the amounts of heat brought to them by currents of air. Thus we explain, not only the mild winter climate of our islands as due to the prevalence of westerly and south-westerly winds which have become warmed by passing over the Atlantic, but also the wonderful inequality of temperature at different seasons of the year. When we have warm spring-like days in mid-winter, it is because these warm currents of air are passing steadily over our islands; while continued hard frosts are as clearly due to masses of cold air from the north or north-east which drift down to us, often with no perceptible wind. Again, when in April and May we have days as cold as those of December and January, they can always be traced to northerly or easterly currents of air, and are probably often connected with the southern drift of the icebergs at that season. It is clear then, that if south-westerly winds were to continue throughout the winter, the severity of that season would be entirely abolished; and the same effect would be produced if by any means the winds from the north and east lost their severity.

Now the source of the constant warmth of our westerly winds is admitted to be the influx of warm water into the North Atlantic—chiefly by the Gulf Stream; and this warm northward flow of tropical water, being primarily due to the trade-winds, is not confined to the Atlantic, but is equally present in the other great oceans, and similar effects are produced in them, though nowhere to so great a degree as in our islands, owing to our insular position and the great extent to which Europe to the east of us is permeated by water as compared with North America or Asia. The North Pacific, with its great Japan current, is probably quite as warm as the North Atlantic; but Vancouver's Island, though further south than London, has not so mild a climate; and this can be clearly traced to the great mass of land to the east and north of it, the lofty snow-clad mountains, and the absence of those deep gulfs and inland seas which do so much to ameliorate the climate of Europe.

Prof. Haughton states, in his "Lectures on Physical Geography," that the Kuro Siwo, or great Pacific current, is two and a half times as large as the Gulf Stream, while the Mozambique current, which forms the outflow of the warm waters of the Indian Ocean, is one and a half times as much, so that these two currents have together four times the bulk and heating power of the Gulf Stream. If therefore these two currents at any time obtained an entrance into the Arctic Ocean, it is difficult to over-estimate their effect on its climate. The Gulf Stream, of which probably not half passes northwards of our islands, gives to Iceland the same winter temperature as Philadelphia, and keeps the North Cape (far within the Arctic circle) permanently free from ice, and this, notwithstanding the powerful counteracting influences of the lofty Scandinavian mountains on the one side, and the huge ice-clad plateau of Greenland on the other. Suppose that only an equal proportion of the Kuro Siwo entered the Arctic Ocean, is it not probable that no sea-ice at all would form there? While, if Greenland were less elevated and thus ceased to be an accumulator of ice, the combined effect might be to render the whole Polar area free of icebergs. This would at once do away with the chief source of winter cold to all north temperate lands, and ameliorate the climate of America as much, proportionately, as that of Europe.

But we have yet to consider a still more powerful agent in ameliorating the climate of Western Europe in Secondary and early Tertiary times. The heated waters of the Indian Ocean have now no northern outlet, and only penetrate the continent in the sub-tropical Red Sea and Persian Gulf. Now if we suppose the waters of the Bay of Bengal and the Arabian Sea to have had northward outlets through the heart of the Euro-Asiatic

continent, penetrating in two or more directions into the then much more extensive Arctic Ocean, we should have an agency at work which would render the presence of any permanent ice in the North Polar area as impossible as it is now in Scotland. The cooling agency of ice being once abolished, the comparatively small area of the Polar as compared with the Tropical seas (about one-tenth) would facilitate the raising of the temperature of the former to perhaps 15° or 20° F. above the freezing point, and this would not only give the Arctic lowlands a climate quite sufficient for the vegetation which we know they supported, but by doing away with the only source of our winter cold, would give our islands a perfect immunity from frosts and render them capable of supporting the vegetation now characteristic of sub-tropical lands.

That the modifications of land and sea here indicated *did* exist throughout a considerable portion of past geological ages, and that the existing consolidation of the great northern continents, to which the possibility of our present Arctic climates is mainly due, is a comparatively recent and abnormal phenomenon, I have endeavoured to prove in the work already referred to. At present I have only undertaken to show, that a "suggested" rearrangement of land and water adequate to raise the temperature of Western Europe to a very sensible, or even to a very large extent, is "possible." ALFRED R. WALLACE

Photophonic Music

I HAVE not yet met with any reference to the capabilities of the photophone for giving musical harmonies. Might not some curious effects be got in some such way as this:—Suppose a disk perforated with holes in four concentric circles corresponding to the notes of a chord; a beam of light to be sent through each circle to a lens and disk of rubber with tube (as Prof. Bell has described), the four tubes debouching in a cup-shaped cavity to be applied to the ear; lastly, the disk to be rotated variably by means of a small windmill or otherwise. Another arrangement might be to make the beams of light pass through the holes to selenium cells in four telephone circuits, the four telephones being placed in one frame, against which the listener's ear would be put, or coupled in pairs, one pair put to either ear. Again, might not harmonised tunes be obtained thus:—Suppose a broad open drum of wood or cardboard rotated uniformly on a screw forming a vertical axis. The drum is perforated in a spiral band of four lines of holes (for the light), corresponding to the notes of the harmonised air to be produced. This spiral band passes before four rubber disks or selenium cells (as in the former system), but arranged vertically and placed within the drum, at the lower part. The drum, it will be understood, works gradually down the axis, presenting a continuous four-line series of holes before the receiving apparatus. Again, a long continuous strip of cardboard, with four rows of holes, might be passed before the receiver in any convenient way. M.

The "Philosophy of Language"

THOUGH it is my principle never to answer any criticism of my writings, I find myself obliged to deviate for once from this rule by the character of your highly esteemed review, and by the desire to find a discerning appreciation from your readers, whose judgment has for me the greater value, as it is the main aim of all my works to restore the relations between the science of mind and natural philosophy. Therefore you would oblige me very much by publishing the following short remarks:—

The critic of my *brochure* ("Max Müller and the Philosophy of Language,") says, "... Nor is speech the deliberate product of a conscious will." Now it is the real aim of all my works on the philosophy of language to show how the human will—before dark and unconscious—grows to consciousness by language and human activity intimately connected with it. Can there be the least doubt of this, even if I refer only to the motto of my "Origin of Language,"—"Language has created reason, before language man was without reason"?

Your critic has made me say just the contrary of what I really have said. Besides, it would have been only fair if the critic had pointed to the following little passage of my *brochure*:—

"Max Müller has since expressed his full assent to this view," (viz., my theory of the origin of language).

Mayence, November 11

LUDWIG NOIRÉ

[I gladly accept the author's assurance that he adheres to the view that "language has created reason." At the same time his