

they have brought to bear the scientific training they had received at their universities and polytechnic schools. Thus they have already, in many fields formerly remunerative to British manufacturers, distanced the latter, immensely aided though these be by their long occupation of the ground and by permanent natural advantages, such as cheapness of coal and of freight, superior command of capital, &c., and this is likely to go on to an increasing extent if many British chemical manufacturers decline to profit from a scientific study of their respective branches. This is all the less excusable, as England from of old has been a stronghold of scientific chemistry, and can hold its own against the whole world in that respect."

To these words I will only add that one of the best possible signs of advancement in the study of science so necessary for the permanent well-being of our manufactures would be to find well-thumbed copies of Dr. Lunge's three volumes not only on the alkali-maker's shelves, but in the house of every manager, and on the table of every free library in the manufacturing districts.

H. E. ROSCOE

OUR BOOK SHELF

Aide-Mémoire du Voyageur. Par D. Kaltbrunner. (Zurich: Wurster et Cie., 1881.)

THIS is a sort of supplement to the "Manuel du Voyageur" by the same author, noticed in these pages at the time of its appearance. The present volume may be described as a collection of constants in all departments of science likely to be of service to the scientific traveller, and indeed to students of many kinds. It contains a series of sections in geography (mathematical, physical, and political), geology, biology, and anthropology. To each section is prefixed a list of works to be consulted on the particular subject, numerous plates and maps, an index, and a table of authors whose works are cited. The whole work seems to us well put together, the information really useful, and, so far as we have tested, trustworthy, though the lists of works are not always so complete as they might be; this can be easily amended in subsequent editions. To all interested in geography in its widest sense, the work must prove of real service.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

Geological Climates

I SHOULD not say more on this subject, but that the last paragraph of Mr. Starkie Gardner's letter seems to imply that I have adopted some of his views without acknowledgment. Now I certainly read his article in NATURE of December 12, 1878, with much interest and profit; but, as regards the special question of the cause of the mild climates of Eocene and Miocene times, I entirely disagreed with his views, as is sufficiently shown by my recent letter in NATURE. I quite admit that the closing up of the North Atlantic between Europe and North America might have considerably raised the temperature of Britain, but it would just as certainly have rendered the Arctic regions even colder than they are now, by shutting out the Gulf Stream, whereas all the evidence points to continuous mild Arctic climates through Cretaceous, Eocene, and Miocene times. Again, though I admit that there has probably, on more than one occasion during the Tertiary period, been a land connection between North-West Europe and North-East America, yet the peculiar distribution of the Tertiary mammalia of Europe and North America indicates that such connection was exceptional, and only endured for very

short periods, the rule being a separation like that which now exists. I could therefore only have quoted Mr. Gardner's view to disagree with it; and I did not think it advisable to encumber the exposition of my own theory with more references of this kind than were absolutely necessary. I may add, that the extension of the Miocene Arctic flora to Grinnell Land since Mr. Gardner's article appeared, renders his views still more untenable. Of course I here refer to my chapter on "Mild Arctic Climates" in "Island Life." In my letter to NATURE I confined myself strictly to the point raised by Prof. Haughton, which I did not consider had been adequately met by Mr. Gardner's hypothesis.

ALFRED R. WALLACE

Is your correspondent, Mr. Ingram of Belvoir Castle, quite certain that he has not confused the *Araucaria Cunninghamii* of Queensland with *Cunninghamia lanceolata* of China? The names are misleading.

H. KING

Chithurst, Petersfield

Temperature of the Breath

FROM time to time during the past few months letters on "the temperature of the breath" have appeared in NATURE, and some conjectures have been advanced regarding the cause of the high temperatures produced by breathing on thermometers enveloped in silk or other materials.

One of the correspondents supposes that the high temperature thus produced indicates a cooling action of the breath. The refrigerating agency of respiration by the heating of respired air and by evaporation from the lungs is sufficiently well known, and has been calculated by Helmholtz; but it is scarcely logical to ascribe to the breath a temperature so obviously produced by the intervention of another agent, and this hypothesis would involve the rejection of all observations hitherto made by physiologists on the temperature of the breath and of the blood.

A few lines which appeared in NATURE of October 7 indicated what appeared to me to be the simple and philosophical explanation (*i.e.* hygroscopic condensation) of the phenomenon under discussion. The higher temperatures produced in dry than in wet weather, and by some materials than by others, distinctly point to the hygroscopic state and nature of the material as the modifying influences.

The question is entirely physical, and not physiological. Wrapping the thermometer is a new factor in taking the temperature of the breath, and is, *prima facie*, the cause of the high temperature. Some further experiments which I have just completed place the matter beyond all doubt. Not to occupy your space with unnecessary details, I give only an outline of them:—

1. A current of air directed upon the bulb of a naked thermometer caused no appreciable rise; neither did the mercury rise when the bulb was enveloped in silk; but when it was enveloped in dried silk it rose several degrees. (The silk was dried by heat, and allowed to cool in a stoppered bottle.)

2. Three thermometers—(1) bulb naked, (2) bulb wrapped in silk, (3) bulb wrapped in dried silk—placed in a current of hot damp air for some minutes, marked respectively 116°, 120°, and 123° F.

3. Two thermometers, one naked, the other wrapped in silk, were placed in a flask, with their stems passed through the cork. The flask was then immersed in hot water (about 150° F.). The naked thermometer rose rapidly, the covered one very slowly. After twenty minutes the temperature of the water was 120°, and the naked thermometer marked 112°, while the covered one registered only 108°.

4. Two thermometers, one naked, the second wrapped in dried silk, were fixed in a flask as for last experiment, but a little water was placed in the flask, which was then plunged into hot water as before. The naked thermometer rose rapidly at first, but it was soon outstripped by the covered one. The following was the result after some minutes:—Water, 128°; naked thermometer, 118°; covered thermometer, 136°.

5. Two thermometers, one naked, the second enveloped in dried silk, were passed through a cover fitting a glass vessel which was carefully dried and heated, and the cover was cemented on to prevent the passage of moisture from the air. After an hour the naked thermometer had cooled to 81° (temperature of air), and the covered one to 83°. They were then changed to a similar vessel containing a little water; the