through which the sun's heat is conveyed to and from the earth, the lower and denser strata absorb the greatest amount, and are necessarily the warmer;" a sentence of which a teacher would score almost every word. Again, on the subject of dew, we read that "substances like glass, &c., which *rapidly* lose their own heat and *slowly* acquire that of others are susceptible of being copiously bedewed." The italics are ours. And once more, "when the temperature of the air is reduced below that of the invisible vapour it contains, the moisture becomes visible." These extracts could be multiplied till we might wonder if it is really a book on *Physical* Geography we are reading. But these are serious defects, and we wish they could be altered. By the side of them it is of less consequence that while we read in the Preface that "this revision embraces all that is important in recent discovery;" yet on turning to the temperature of the sea, where the most important changes have taken place in our knowledge, we are still referred to Sir James Clarke Ross, and told that the ocean has below the surface a uniform temperature of 39½°, for which at the equator we must descend deeper than anywhere else. We can scarcely imagine that any amount of clearness will atone for these things; let us hope they will be seen to before edition the ninth is required.

The Flora of South Australia. By R. Schomburgk, Ph.D., Director of the Botanic Gardens, Adelaide. (W. C. Cox, 1875.)

We have here a complete list of the indigenous flora of South Australia, both tropical and extra-tropical, with some general remarks prefixed. The most predominant natural orders in the colony are Leguminosæ, Myrtaceæ, Compositæ, Proteaceæ, Cruciferæ, Rubiaceæ, and Gramineæ. The genera and species are remarkably circumscribed in area; many are found in one spot alone. The colony is singularly devoid of native edible fruits and roots; on the other hand it produces abundance of valuable timber-trees and of plants suitable for the manufacture of paper and other fibres, and for the production of dyes; but most of the valuable crops are naturalised plants, introduced from Europe or other parts of the world.

A. W. B.

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.*]

Theory of Electrical Induction

In Nature, vol. xiii. pp. 437, 475, Prof. Paul Volpicelli gives an exposition of the two theories of electric induction, containing copious references to the writings of electricians, and numerous experiments of his own. It is remarkable, however, that he has not only omitted all reference to the works of Poisson, Green, Thomson, Beer, Betti, &c., who have studied the mathematical theory of induction, but he has not even introduced the word potential into his exposition, unless we are to take the word tension in the sense of potential, where he says that a certain portion of electricity possesses tension while another portion does not.

The result of this mode of treating the subject without calling in the aid of those ideas and phrases which the progress of science has developed, is to convey the impression that the whole theory of induction of electrification on the surface of conductors is still in a very imperfect and vague condition, whereas there is no part of electrical science in which we can trace more distinctly the correspondence, quantitative as well as qualitative, of the phenomena with the general laws of electricity. It appears, however, from what M. Volpicelli says, that an erroneous theory is still generally adopted in treatises on physics and electricity, and that it ought to be superseded by a more correct theory first proposed by Melloni.

Both theories admit that if an insulated conductor, without charge, is acted on by a charged inductor, the surface becomes electrified, oppositely to the charge of the inductor on the parts nearest the inductor, and similarly to the charge of the inductor on the parts farthest from it. The first of the two theories, however, asserts that both these electricities are "endowed with tension," whereas the second, that of Melloni, asserts that the electricity of the same kind with that of the inductor is alone "endowed with tension," while the other kind of electricity is entirely "latent or dissimulated."

The only sense which we can attach to the word "tension" as thus used, is that which modern writers mean by "potential," or potential function, the difference being that the word tension is often used in a vague manner, whereas potential is strictly defined.

Thus a point in space is said to have a certain electric potential, and since all points of a conductor in electrical equilibrium have the same potential, we speak of the potential of the conductor. But we do not speak of the potential of a charge of electricity, or of electricity being endowed or not endowed with potential. Such language would only lead us into error.

Let us suppose the inductor to be charged positively and the induced body to be insulated and originally without charge. Then, since its insulation prevents any electric communication with other bodies, its total electrification must remain zero, or there must be as much positive electrification as there is negative.

Hence for every line of electric force which proceeds from the inductor and falls on the induced body, there is another which proceeds from the induced body and falls on the walls of the room, or on some other body whose potential is zero. The potential of the induced body must therefore be intermediate between that of the inductor and that of the walls of the room, which is generally taken as zero. The potential of the induced body is therefore positive.

There is thus on the surface of the induced body a region nearer the inductor which is negatively electrified, and a region further from the inductor which is positively electrified. These regions are divided by a neutral line on the surface, which is the section of the surface by an equipotential surface in space which has the same potential as the induced body. The total charges on these two regions are exactly equal but of opposite signs.

If a small insulated conductor is placed in contact with any part of the surface and removed, it will be found to be electrified in the same way as the part of the surface with which it was in contact. A fine short needle point, or a burning pastille, placed on any part of the surface will dissipate the kind of electricity which exists on that part of the surface. See Riess, "Reibungs Elektricität," Art. 247.

If any part of the induced body is placed in electrical connection with the earth by touching it with a fine wire, positive electricity will be discharged, and the potential of the induced body will be reduced to zero. This will be the case whether the part touched be positively or negatively electrified. The quantity of electricity discharged will be the product of the potential of the induced body into its electric capacity.

After this discharge every part of the surface of the induced body will be negatively electrified, but the parts nearer the inductor more than those which are further from it.

In the mathematical treatment of the subject Thomson has found it convenient to divide the electrification into two parts, each distributed over the induced body according to its own law.

(α) The induced electrification when the induced body is connected to earth, and the charge of the inductor is E. This electrification is negative on every part of the surface, but the density is greatest next the inductor.

(β) The electrification when the induced body has a potential P, and the inductor, still in the same place, has no charge. This electrification is positive on every part of the surface.

From a knowledge of these two distributions it is easy to determine a third, in which the total electrification is the algebraical sum of (α) and (β), and in which the value of P is such that the total electrification is zero.

We might then assert that the electrification (β) is free, because it will be discharged if the body is connected to earth, but that the electrification (α) is latent or dissimulated, because it will not be discharged to earth.

The only danger of this mode of exposition is that it may suggest to a beginner the notion that electricity, like water and other substances, may exist in different physical states, in some of which it is more mobile than in others.

This idea of variation of quality once introduced into the