DR. BALFOUR STEWART'S METEOROLOGICAL BLOCKADE

IMAGINE a line drawn round any district, and consider all the air that passes over that line outwards and inwards in any time. Let the whole quantity of vapour of water carried across the boundary line by this air be determined. If during any particular interval of time there is just as much vapour carried outwards as inwards, there must be in that interval either no rainfall on, and no evaporation from the district, or there must be just as much rainfall as evaporation. If more vapour is carried out than in, there must be more evaporation than rainfall. Or, if more vapour enters than leaves, the difference falls in excess of rain above evaporation.

Dr. Stewart proposes to establish a *cordon* of meteorological stations, and to arrange a reduction of observations taken at them, so as to keep, as far as possible, an exact account of the quantity of vapour entering and leaving the space over the surrounded district. This appears to me a most valuable proposal, which, if well carried out, must have a very important influence, tending to raise meteorology from its present empirical condition to the rank of a science. The object of the present notice is to suggest that the same system of account-keeping ought to be applied to electricity.

Whatever we may think as to the nature of electricity, it certainly has, in common with true matter, the property of being invariable in quantity. This property is conveniently enough expressed, as it were, mechanically, by the one-fluid hypothesis, which asserts that positive or negative electrification of any piece of matter consists in the presence of more or less than a certain quantum of the electric fluid; that quantum being the amount possessed when the matter in question exercises no attractive or repulsive force, varying with artificial variations of the electric condition of the testing body presented to it. On this hypothesis, "quantities of electricity," positive and negative, are excesses of the quantity of the hypothetical fluid above or below the "quantum" corresponding to zero of the electric tests.

The ordinary fair-weather condition in our latitudes presents us with negatively electrified air in the lowest stratum, extending at least as high as our ordinary houses above the surface of the earth; and positive electricity of greater amount, on the whole, in the higher regions. The atmospheric electrometer indicates in absolute electrostatic units the total quantity of electricity in the atmosphere, over a certain area of the place of observation; being the excess of the amount of positive above the amount of negative electricity in the whole column. This excess in fair weather is generally positive. The fact that it is not the electricity in the lower regions alone, but an effect depending on the whole electricity of the atmosphere from lowest to highest, that is the thing observed in the ordinary observation of atmospheric electricity, renders this subject more suitable even than moisture for the application of Dr. Stewart's blockade. Thus, the hygrometrical blockade is complete only if both moisture and the effective component of wind are known at all heights above the surface; the electrical blockade is complete when, besides the electrometer measurements at the observatory, the effective component of the wind at all heights is known. But among the many

unknown quantities involved, the two departments of the blockade combined will give means for eliminating some and estimating others for which the hygrometrical blockade alone, or the electrical one alone, would be insufficient.

WILLIAM THOMSON

THE SCENERY OF ENGLAND AND WALES

The Scenery of England and Wales, its Character and Origin. By D. Mackintosh. (Longmans and Co.)

READERS of some of the geological journals are sufficiently acquainted with the name of Mr. Mackintosh. They know him as a writer who, for the last four or five years, with wonderful perseverance, has kept on enunciating certain views of denudation which he has adopted. His papers, however, do not suggest that their author possesses the large grasp of the subject, the range of acquirement in geological studies, and the gifts of style which must necessarily belong to the man who would successfully expound the history of the scenery of the country. The task is a difficult one—much more difficult than even geologists themselves usually believe—and the announcement that it had been undertaken by Mr. Mackintosh probably took a good many readers by surprise. They could not but award him the credit of great boldness, whether or not they found, on examination, that he deserved also the praise of success.

Mr. Mackintosh, as a writer on geological subjects, is under the influence of one dominant idea. He believes in the Sea, the whole Sea, and nothing but the Sea. It seems to haunt him like a nightmare. To his ear all sounds in Nature are drowned in the thunder of waves, the rush of ocean-currents, the beating of multitudinous billows, that batter and grind the solid substance of the land. A mist of ocean spray is ever in his eyes. He can but dimly see that any other powers are at work around him save the everlasting breakers. The fall of rain, the roar of rivers, the silent majesty of glaciers and snowfields, have little charm for him, and can never wean his affections from his first love. He can be brought to turn his thoughts neither to the right hand nor to the left, but keeps his eye stedfastly fixed on the one grand object of his faith and adoration. If, indeed, for a moment the contending claims of some other power in Nature obtrude too pertinaciously upon his notice, he clings to some bigger wave, or dashes into some stronger ocean-current until the temptation has passed away.

It is seldom that we meet with one governing idea so unflinchingly followed to the exclusion of anything and everything which might modify it; seldom that we encounter mental colour-blindness so thorough as to admit of the discrimination of apparently but one hue. Not merely does he everywhere and always reiterate that "the greater part of the land surface, at any given time, must present the form given to it by the sea," but he traces this marine sculpturing down to the minutest details of contour, even though rains and frosts and streams seem to rise up in protest to his face. The tendency unduly to exalt the power of the sea as a geological agent has always characterised the writings of English geologists, probably from the greater prominence which the sea acquires in the eyes of islanders. But the tendency never received such an extreme development as it has done in Mr.