

of Australia, the Kalahari Desert of Africa, and the Atakama Desert of South America. These inland drainage areas are estimated by Murray<sup>1</sup> to occupy 11,486,000 English square miles, or about three-seventeenths of the total land-surface of the globe.

It was shown by very numerous observations during the *Challenger* Expedition that in the open ocean far from land the daily fluctuations of temperature in the surface waters do not exceed one degree Fahrenheit. Hence the atmosphere over the ocean may be said to rest on a surface the temperature of which is practically uniform at all hours of the day. This is in striking contrast to what obtains on land-surfaces towards the centres of the continental masses, where the air is often dry, and solar and terrestrial radiation produce a very wide daily range of temperature, possibly one hundred degrees Fahrenheit from 3 p.m. to 3 a.m. In the temperature conditions here indicated we have one of the prime factors of meteorology,—a factor which determines the position of the great permanent anticyclonic areas over the oceans. Air with a large quantity of water-vapour absorbs more of the sun's rays, becomes in consequence more heated, and is specifically lighter than dry air; hence moist air ascends in cyclonic areas, is deprived of its moisture in ascending, becomes cool, and spreading laterally descends as heavy dry cool air in anticyclonic areas. The redistribution of the mass of the atmosphere is brought about in this manner. Numerous observations show that winds are simply the movements of the atmosphere that set in from where there is a surplus to where there is a deficiency of air. Isobaric maps and maps showing the prevailing winds are in accordance with each other.

Now, the two belts of inland drainage areas and low rainfall above referred to are likewise the regions of high annual atmospheric pressure, which pass in two belts completely round the globe. The belt of high pressure in January in the northern hemisphere broadens as it passes over land and contracts as it crosses over the ocean. Its greatest breadth is over Asia, and its least over the Pacific, that is, where land and ocean attain respectively their maximum dimensions. Similar relations exist in the southern hemisphere. In the *winter months* of each hemisphere these areas on land are occupied by anticyclones, in which heavy, dry, cold air descends and flows out on the surface all round. In the *summer months* of each hemisphere these same areas become cyclonic, and the winds are drawn in at the surface from surrounding regions and are deprived of their moisture before reaching the centre of the desert regions, where they ascend as warm currents to the higher regions of the atmosphere.

The primary cause of the rainless, desert, salt-lake, and inland

<sup>1</sup> See *Scott. Geogr. Mag.*, vol. ii. p. 552, 1886.