

the latter case at intervals of 10, 50, or 100 fathoms, to determine the depth and volume of masses of moving water derived from different sources.

The simple determination of the depth of the ocean at tolerably regular distances throughout the entire voyage is an object of such primary importance that it should be carried out whenever possible, even when circumstances may not admit of dredging, or of any thing beyond sounding. The investigation of various problems relating to the past history of the globe, its geography at different geological epochs, and the existing distribution of animals and plants, as well as the nature and causes of oceanic circulation, will be greatly aided by a more accurate knowledge of the contour of the sea-bed.

*Surface Temperature.*—The surface-temperature of the sea, as also the temperature of the air as determined by the dry and wet bulb thermometers, should be regularly recorded every two hours during the day and night throughout the voyage.

These records should be reduced to curves, for the purpose of ready comparison; and the following points should be carefully attended to:

1. In case of a general correspondence between the temperature of the sea and that of the air, it should be noted whether, in the diurnal variation of both, the sea appears to *follow* the air, or the air the sea.

2. In case of a marked discordance, the condition or conditions of that discordance should be sought in (*a*) the direction and force of the wind, (*b*) the direction and rate of movement of the ocean surface-water, (*c*) the hygrometric state of the atmosphere. When the air is very dry, there is reason to believe that the temperature of the surface of the sea is reduced by excessive evaporation, and that it may be below that of the subsurface stratum a few fathoms deep. It will be desirable, therefore, that every opportunity should be taken of comparing the temperature at the surface with the temperature of the subsurface stratum, say at every five fathoms down to twenty fathoms.

*Temperature Soundings.*—The determination of the temperature, not merely of the bottom of the ocean, over a wide geographical range, but of its various intermediate strata, is one of the most important objects of the expedition; and should, therefore, be systematically prosecuted on a method which should secure comparable results. The following suggestions, based on the experience already obtained, in the North Atlantic, are made for the sake of indicating the manner in which time and labor may be economized in making serial soundings, in case of the