

THE REGION OF EXTREMELY LOW TEMPERATURE

partly because we may approach nearer to the lowest level of temperature than we may the highest known temperature and partly because there is an actual lower limit, while, so far as we know, there is no upper limit.

Everyone is familiar with the construction and use of thermometers. The commonest is made of mercury enclosed in glass. This may be used from -39°C . to perhaps as high as 500°C ., when properly made. At -39°C . mercury freezes, while it boils at 357°C . Alcohol, toluol, and some other liquids, which have lower freezing points, can be used for temperatures below -39° . For higher temperatures than can be measured with the mercury thermometer we may resort to gas and electrical thermometers. Also, for very low temperatures we use gas and electrical thermometers again.

Let us suppose that we had a thermometer made of some hypothetical substance so that it could measure all temperatures from the lowest to the highest known. The freezing point of water is at 0°C . and the boiling point at 100°C . Compared with the entire range of this hypothetical thermometer, the distance between the points beyond which life is impossible, seems almost infinitesimal, and we are tempted to ask whether our presence on the earth and the possible living conditions which we find here, are not merely an accident of temperature, or a transitional phase in the great sweep from sun temperatures, or higher, down to absolute zero. We are very dependent on the temperature of our surroundings. A permanent change of 50° in either direction would change this planet to such an extent that it would hardly be recognizable except from its dimensions. According to Humphries, the effect of one severe volcanic eruption per year would be sufficient to bring on an ice age. Even two or three near together might lower the temperature of the surface of the earth sufficiently to decrease the production of food to the point of famine. The volcanic dust, which is thrown into the air in such an eruption, is so fine and is thrown so high that it floats for a long time in the quiet upper strata of the atmosphere and becomes almost uniformly distributed over the globe. Thus, it acts as a great curtain and cuts down the amount of heat received at the surface of the earth.