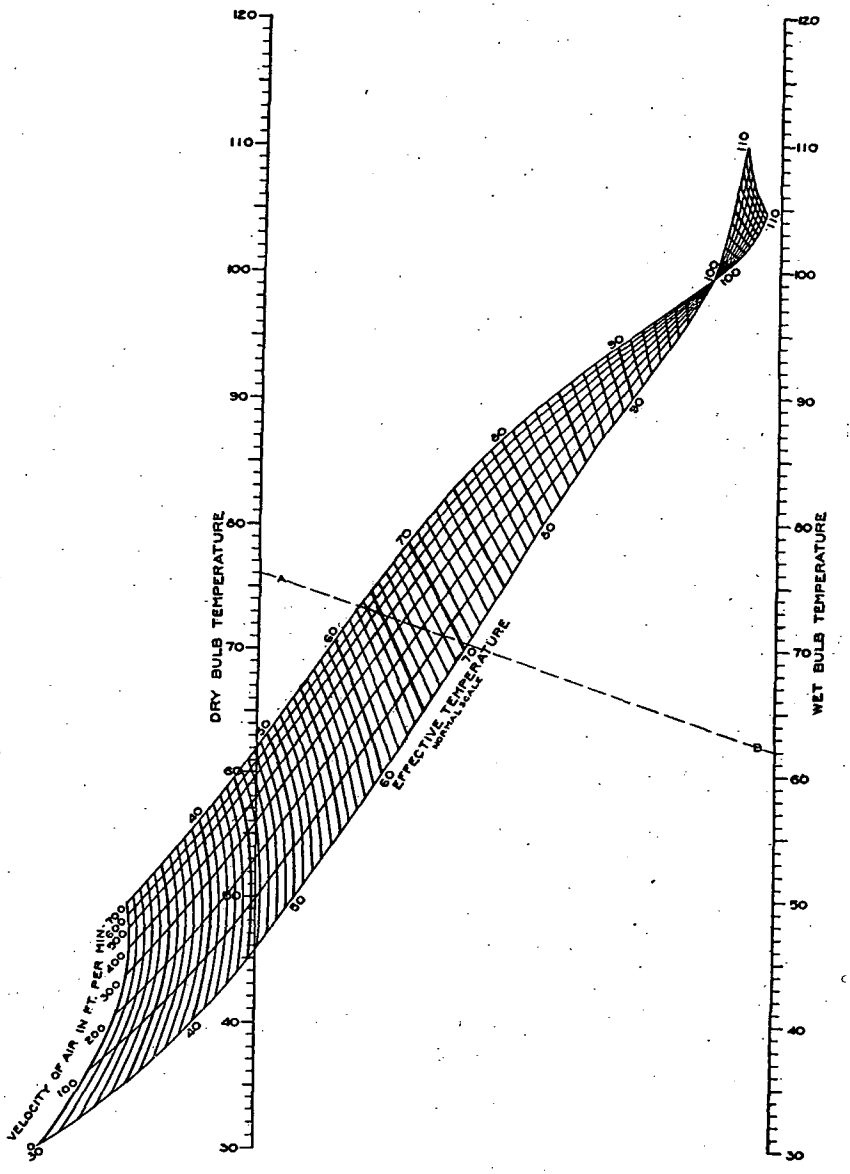


FIG. 1. THERMOMETRIC CHART SHOWING NORMAL SCALE OF EFFECTIVE TEMPERATURE
(Applicable to human beings at rest and normally clothed).

air conditions with no apparent discomfort or injury to health. In the light of the present knowledge of air conditioning these views are not justified. Acclimatization to extreme conditions involves a strain upon the heat regulating system and it interferes with the normal physiologic functions of the human body. Thousands of years in the heat of Africa do not seem to have acclimatized the Negro to a temperature averaging 80 F. The same holds true of northern races with respect to cold, although the effects are mitigated by artificial control. All this seems to indicate that adaptation to a climate averaging between 60 and 75 F is a very primitive trait[8].

In certain individuals the psychologic factor is more powerful than acclimatization. A fresh air fiend may suffer in a room with windows closed regardless of the quality of the air. As a matter of fact, instances are known in which paid subjects refused to stay in a windowless but properly conditioned experimental chamber because the atmosphere felt suffocating to them upon entering the room.

RELATION OF TEMPERATURE, HUMIDITY AND AIR MOTION TO SENSATIONS OF WARMTH AND COMFORT

Temperature, humidity and air motion taken together, determine the feeling of warmth and influence the elimination of body heat. In other words, the temperature sensations of the human body depend not only on the temperature of the surrounding air as registered by a dry-bulb thermometer, but also upon the temperature indicated by a wet-bulb thermometer. Dry air at a relatively high temperature may feel cooler than air of considerably lower temperature with a high moisture content. Air motion makes any moderate condition feel cooler.

On the other hand, in cold environments an increase in humidity produces a cooler sensation. The dividing line at which humidity has no effect upon comfort varies with the air velocity and is about 46 F (dry-bulb) for still air and about 51, 56 and 59 F for air velocities of 100, 300 and 500 fpm respectively.

The Effective Temperature Index

Combinations of temperature, humidity and air movement which produce the same feeling of warmth are called thermo-equivalent conditions. Elaborate experiments made by the A.S.H.V.E. Research Laboratory show that this newly-developed scale of thermo-equivalent conditions not only indicates the sensation of warmth, but also determines the physiological *effects* on the body induced by heat and cold. For this reason, it was called *Effective Temperature* scale or index.

Effective temperature is a relative index of the degree of warmth or cold felt in response to temperature, humidity and air movement. It combines these three factors into a single value. All air conditions which are thermally equivalent to each other have the same effective temperature value. The scale of effective temperatures is based on the degree of warmth and comfort experienced by a healthy individual in pure still air, saturated with moisture and with the surrounding objects at the same

[8] *Civilization and Climate*, by Ellsworth Huntington, *Yale University*, 1924.