

perature of the sun can be used, but there are several indirect methods, fortunately, by which we can obtain the temperature of the visible radiating surface, the photosphere. These are mostly too technical for a lecture of this kind, but one of them, perhaps, may be made to come within its range. Theory and experiment have shown that the radiation, the emission of heat and other energy, from a perfect radiator, (the sun is probably not quite a perfect radiator), varies as the fourth power of the temperature. This is known as Stefan's law and it is evident that if we can find the radiation sent out by the sun we can determine its temperature by extracting the fourth root of the radiation. The radiation or amount of energy emitted by the sun at the distance of the earth has been very carefully and accurately determined, (of this I shall have something to say later on), and has been found to amount to 1.95 calories per square centimetre per minute. This is the value outside our own atmosphere, but owing to the absorption of the latter less than two-thirds of this reaches the earth's surface. 1.95 calories means in plain language that if you have a little cube of water each side being a centimeter, two-fifths of an inch long, (less than a thimble full of water altogether) and if the sun is allowed to shine directly on one of these sides for one minute, and no heat is lost by reflection or otherwise, the temperature of the water would be raised $1^{\circ}.95$ C, or $3^{\circ}.5$ F. Put in another way the amount of heat reaching us from the sun is sufficient to raise the temperature of a layer of water two-fifths of an inch thick $3^{\circ}.5$ F in one minute. Knowing the amount per square centimeter 93,000,000 miles from the sun we get the total emission by multiplying 1.95 by the superficial area in square centimetres of a sphere 186,000,000 miles in diameter. Dividing this enormous amount by the superficial area of the sun we get the amount radiated per unit area, and applying the proper constants and extracting the fourth root we obtain the temperature of 5860° C. absolute. As the sun is probably not a perfect radiator its temperature would be higher than this figure and the other methods indicate a temperature not less than 6200° C., probably approaching 7000° . On the