On Methods for the Continuous (Photographic) and the Quasi-Continuous Registration of the Diurnal Curve of the Temperature of the Animal Body.

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(Abstract.)

In this paper, the author, after referring at some length to the earlier stages of the investigations of the temperature of man, and pointing out that the first approximate attempt to study the diurnal curve of the temperature of man commenced with the investigations of Jürgensen, of Kiel, whilst the systematic study of temperature in disease dates from the time of the researches and publications of Wunderlich, discusses the methods which he has adopted: (*a*) for the absolutely continuous and (*b*) for the quasi-continuous, registration of the diurnal curve of the temperature of man.

After referring to the method employed by Benedict and Snell for the quasi-continuous record of the curve of temperature, and which, as he points out, is in no sense an automatic method and involves, in a very serious manner, the errors due to the "constantly varying personal equation" of the observer, he declares himself a strong partisan of a thermo-electric method of recording exceedingly minute variations of temperature. Since the time when, early in life, he studied the question, the experimental conditions have changed in certain very important particulars:—

1. By the discovery of galvanometers of the moving-coil type which we associate with the name of D'Arsonval, but which had their prototype in the syphon-recorder of Lord Kelvin, and which are practically uninfluenced by changes in the surrounding magnetic field.

2. By the remarkable improvements in apparatus for maintaining a practically constant temperature in considerable masses of liquids, so that a thermo-couple may be maintained during days and weeks at so constant a temperature as to admit of the variations being absolutely neglected.

3. The employment of photographic recorders which admit of the registration of the movements of mirrors, as in magnetographs and seismographs has, further, facilitated such investigations as the one under discussion.

Under the headings (1) The Thermostat and its Regulators; (2) The

Thermo-couples, *i.e.*, the electric thermometers employed, and the leads; (3) The Automatic Photographic Recorder, the author develops his method of continuous photographic registration, and he dwells particularly on the perfection of the arrangement of the thermostat which he has, with the help of Herr Fritz Koehler, the University Mechanician, of Leipzig, devised. He further discusses, at some length, the arrangements of the photographic recorder constructed for him by the Cambridge Scientific Instrument Company, dwelling particularly on the optical arrangements which have been adopted, and which have resulted in an extraordinary clearness and sharpness of the curves furnished by the instrument.

Discussing, in the next place, the method of quasi-continuous registration of the curve of the temperature of man, in which an ink-record is inscribed on a comparatively slowly rotating cylinder, the author describes "the thread recorder" of Mr. Horace Darwin, F.R.S., specially wound, and with a more than usually delicate suspension, as the special instrument for the record of the curve of the temperature of man for such clinical investigations as will be carried out in future in hospitals and sanatoria.

The paper, which is one concerning methods of investigation rather than results, closes with some illustrations exhibiting the application both of the continuous and the quasi-continuous methods to the study of the temperature of the animal body.

The result which comes out very strikingly, and for the first time, from these first applications of very exact and automatic methods to the study of the heat changes in the animal body, is that the temperature in any given area never remains constant during two consecutive minutes or fractions of a minute, in consequence, no doubt, of varying, and in some cases, perhaps, rhythmical, variations in the action of the great vaso-motor centre and the centres which are subordinated to or in relation with it.