

Measure Temperature of Single Cells

Cytology

Accurate measurements of temperature inside of a single cell of a living organism can be made to within less than one two-thousandth of a degree, using a pair of wires less than one twenty-five-thousandth of an inch in diameter. Methods of making and using these microscopic wires were described by Dr. D. M. Whitaker, of Stanford University, speaking before the meeting of the Pacific Division of the American Association for the Advancement of Science.

To make the microscopic wires, said Dr. Whitaker, an ordinary fine wire is placed in a tube of glass or quartz which melts at a temperature higher than the melting point of the metal, but below its boiling point. Thus for copper wire a glass would be used that melts at a temperature between 1980 degrees Fahrenheit, at which copper melts, and 4190 degrees, at which it boils. Then the glass tube is softened by heat, melting the metal. When the tube is pulled, it can be stretched to a capillary tube of minute dimensions, with the melted metal inside. As the glass cools, the metal "freezes" into a still finer wire.

For obtaining thermocouples, used for the delicate temperature measurements, two different metals are drawn out in the same kind of glass, and then the glass capillary tubes are fused together. A short glass needle is the result, with two metal cores. A little of the glass at the end is removed, exposing the wires. They are then joined together, either by silver-plating or by melting them. The resulting thermocouple, like any similar junction of two such metals, whether large or small, gives off an electric current when heated. With the micro-thermocouple inserted in a cell which is to be studied, operating under a microscope, the current is measured on a sensitive galvanometer. From this current the temperature can be found with great precision.

Science News-Letter, June 29, 1929

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