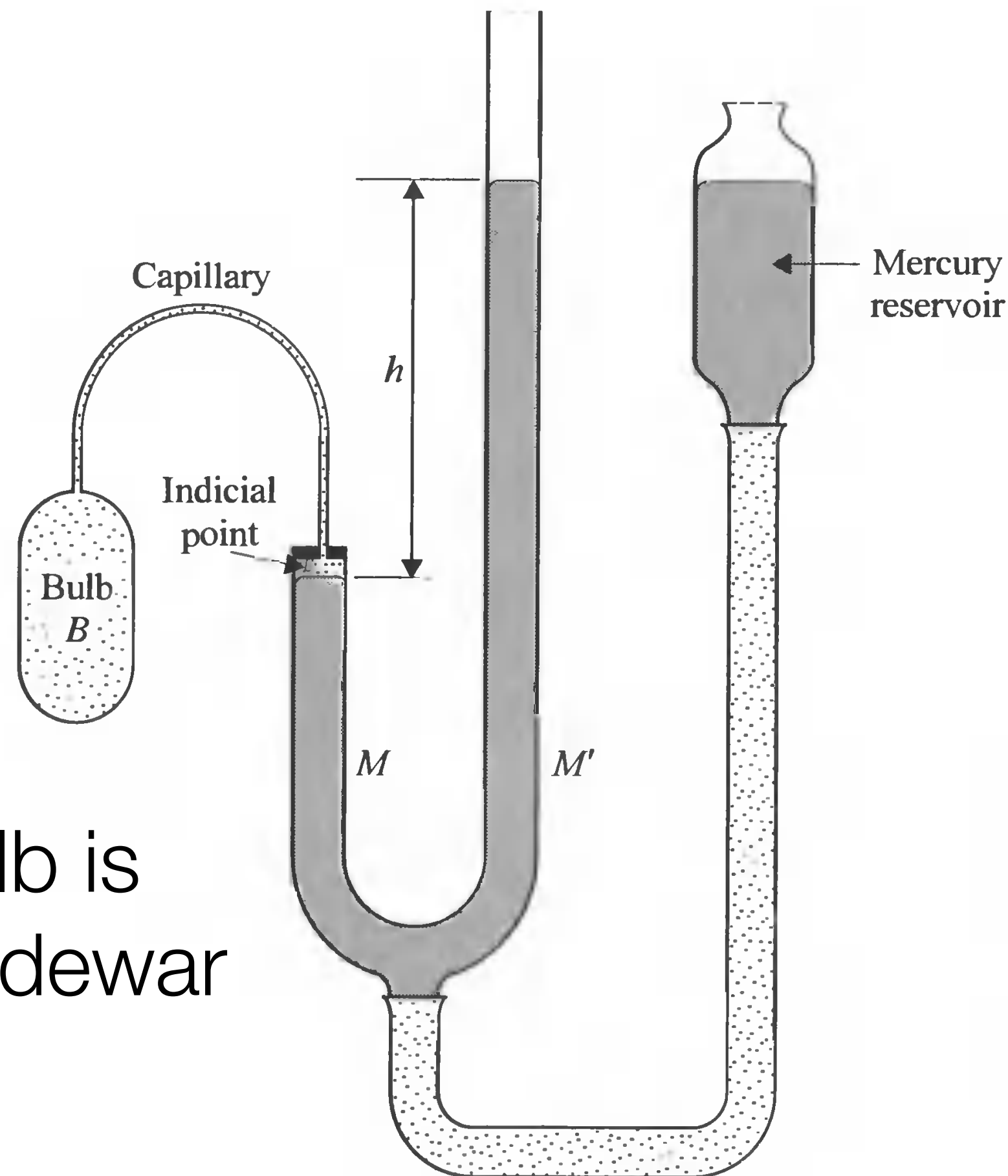


# The constant volume ideal gas thermometer

Changes in pressure in the bulb (at constant volume) defines a temperature scale:

$$T \equiv T_{\text{ref}} \frac{P}{P_{\text{ref}}}$$

$T_{\text{ref}}$  is a conventional constant



Gas bulb is placed in dewar

Place the bulb in the sample. If the sample is hot, then the gas will try to expand. But we can then increase the height of the mercury column  $h$ , increasing the pressure on the gas, to keep the volume of the gas fixed (at the indicial point). The pressure of the gas can be measured from the height of the mercury column.

The measured pressure  $P$  relative to a reference point  $P_{\text{ref}}$  defines a universal temperature scale, *which doesn't depend on the type of gas at low gas density.*

## Platinum Resistance Thermometer \$4500



Measure the resistance as a function of temperature. This temperature scale is calibrated against some kind of ideal gas thermometer