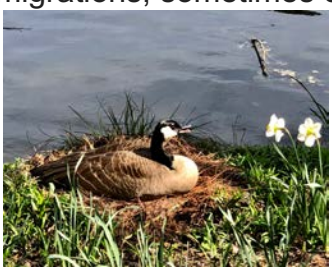
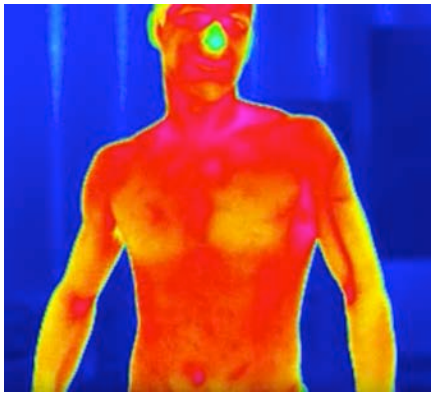
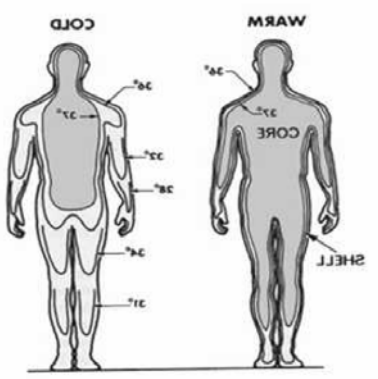
*** homeotherm ***

Animals which maintain a relatively constant core body temperature, regardless of the ambient environment, are called *homeotherms*, a word derived from the Greek words **´ομοιος θερμότητα = *"homoios thermoteta"* = *same heat***. Mitochondria are the intracellular metabolic furnaces that generate heat in homoeothermic animals, by a process called "futile cycling" (see ***mitochondria ***). In addition, birds and mammals have bodies covered with feathers or hair, providing external insulation. Superficial fat and physiological regulation of blood flow limits loss of heat. Behavioral adaptations range from changing body posture (tucking in extremities) to moving to areas in the local environment to avoid exposure to water or wind. More extreme measures are seasonal migrations, sometimes over thousands of miles.





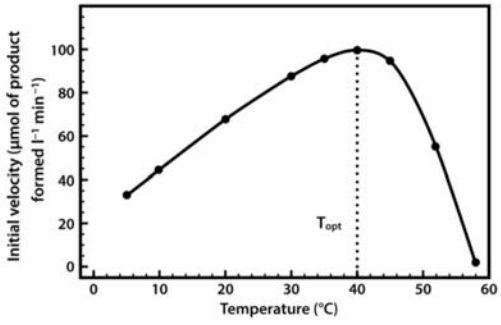


Humans lack extensive physical insulation and so construct shelters and have adopted clothing, allowing them to explore geographic regions with long months of frigid seasons, maintaining active outdoor activity even in conditions of intense cold.

In 1913, Leonor Michaelis and Maud Menten first showed that it was in fact possible to derive this equation mathematically from first principles, with some simple assumptions about the way in which an enzyme reacts with a substrate to form a product. Central to their derivation is the concept that the reaction takes place via the formation of an ES complex which, once formed, can either dissociate (productively) to release product, or else dissociate in the reverse direction without any formation of product. Thus the reaction can be represented as follows, with k_1, k_{-1} and k_2 being the rate constants of the three individual reaction steps:

$$E + S \underset{k_{-1}}{\overset{k_1}{\rightleftharpoons}} \mathrm{ES} \xrightarrow{k_2} \mathrm{E} + \mathrm{P}$$



The effect of temperature on enzyme activity.

*** The biochemical necessity driving the homoeothermic way of life involves activity of cellular catalytic reactions, which have an optimal range of temperatures around 40^0 C (100^0 F). Much above or below this range, and rates of reactions are slowed.