

Body Heat

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A popular book on the maintenance of internal temperature in organisms. It is written in the usual breezy and colloquial style you have to come to expect from that kind of books. Books on natural science tends inevitably to contain a few fascinating facts, and thus even the perusals of indifferent books can often be rewarding.

The internal temperature differs between species. Cold-blooded animals tend to have lower temperatures, but the notion is of course misleading, as they simply lack internal ways of regulation and are dependant upon external factors. (Naturally all animals produce heat, but reptiles have slower rates of metabolism, hence their heat-productions do not keep up with heat-losses, thus there preferred habitats are tropical.) Birds keep higher internal temperatures than mammals, the reason being to keep their muscles primed for flight. However, there are upper bounds on temperatures, above which the brain ceases to function, and those limits are the same for all animals, being a biochemical constant¹. Thus birds, with their higher internal temperature, are more likely to overheat than mammals. One concludes that cooling mechanisms for the brain are crucial, and many animals have indeed, especially birds, developed such.

There does not seem to be any lower bound on temperature, except for the obvious one of freezing. Humans, especially children, have been known to survive extreme hypothermia. Typically this involves a stopping of the heart and an almost total metabolic shut-down². Some species have made this into a regular component of their life-cycles in terms of hibernations. The hedge-hodge is a prime example, surviving temperatures close to zero Celsius and with very intermittent heartbeats. The famous hibernations of bears are a sham in comparison, they involve only a moderate decrease in metabolism and a relatively light slumber, out of which they can easily be aroused.

In hot climates internal heat production exceeds natural loss, which hence has to be enhanced. There are numerous tricks. Humans are naked and sweat a lot (unlike most other animals), dogs pant quickly (in fact far more quickly than humans would ever be able to do) and let their wet tongues serve the same principle of induced evaporation, while elephants flap their huge ears, thereby cooling down the blood. Animals in cold climates have the opposite problem. Thus they are usually protected by thick fur (or feather) and big blobs of blubber. The polar bear has actually a black skin in order to enhance solarabsorption, however the transparent strains of the fur appear as white, enabling them to hide against the snow.

¹ The author speculates that the mystery of SID - Sudden Infant Death, could be due to overheating of the baby. Ironically most parents are concerned about their babies being too cold, but in modern living, the opposite is far more likely

² One does not survive a non-beating heart too long under normal temperatures, as the metabolism of cells indreases with temperature, and deprivation of oxygen quickly leads to death

Fevers are good, unless of course going out of hand. Even so called cold-blooded animals can develop fevers. The point of the fever is to stimulate the immunsystem and battle infections. When deprived of natural occurring fevers test-animals die.

Most of the fact and principle presented in the book ought to be known to the general reader. There are no attempts of going beyond the descriptive and introduce some simple mathematical analysis, although the simple underlying physical principles are explicated. One assumes that this is due to a general culture, in which the lay-readers are never expected to follow any mathematical reasonings, no matter how elementary.

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