

COMMENTARY

What are Ectothermy and Endothermy?

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LAST week I looked at the energy efficiency of animals which depends on the lifestyle of the species and the response of the individual to its surround environmental conditions.

However, some animals have resorted to extreme measures to conserve energy; more specifically, the processes of ectothermy and endothermy. In order to do this I will first explain the terms used in body temperature regulation by animals and what they mean in terms of classification and ecology. However, the information is too large to fit into one article so this week I will look at ectothermy and address endothermy in next week's article.

Humans have always found it easier to understand objects, organisms, or processes if we classify them, as it brings order to the chaos. Two simple terms used to classify animals are by referring to them as either "cold-blooded",

like reptiles or "warm-blooded" which include animals like birds and mammals. These terms do not refer to the temperature at which the blood is maintained but to the desired body temperature the animals can maintain. Active animals usually maintain a body temperature of around 38°C.

If we want to be more scientific about it we would use the term "homeothermic" to refer to the cold-blooded animals, this means that they cannot change the temperature of their body so as they move about the heat leaves their body and that is why you see lizards basking in the sun. They are not taking a tan or relaxing but getting their body temperature back up to the optimum temperature. While the warm-blooded refers to the term poikilothermic this means that the animal can vary their body temperature, so they are not dependent on the environment to regulate their body temperature.

At this point you might be wondering when we are going to get to ectothermy and endothermy. Well both of these terms are used in ecology and refer to the energy source used to regulate the ani-

mals' body temperature. So that endothermic animals obtain energy from the food they ingest while ectothermic animals use solar energy.

Of course animals that utilize these methods of body temperature control have certain characteristics which have their own disadvantages and advantages. In terms of ectothermic animals, if its body temperature is too high it will go in the shade and if it is too low, the animal will go in the sun, and let the sun do all the work of raising the body temperature. Therefore its resting metabolic rate is low, and only uses a few calories. The opposite is true of endothermic animals, because although they are staying still and are at rest physically, their body is burning up a lot of calories fuelling metabolic reactions to maintain their body temperature. However, ectothermy puts the animal at risk of predation as it has to spend a lot of time in exposed in the open. Therefore they have to be cryptically coloured and able to spend long periods motionless.

Some ectotherms are more efficient in that when faced with a period of food scarcity they place

their bodies in a state of torpor, which is a state of temporary hibernation where the animal's body temperature and metabolism drops. When food availability increases, they reanimate themselves. However, rather than entering a state of torpor, some ectothermic species switch to another food. This is quite a common arrangement among these animals, and in many species the diet of the offspring is very different to that of the adult. This is quite advantageous since it means that parent and offspring would not be competing with each other.

Also by utilizing ectothermy, these animals are capable of maintaining a small body size but an elongated body shape. It is viable energy-wise to be small, this is because as I mentioned earlier, when at rest ectotherms expend very little energy whether they are big or small. This energy expenditure when at rest increases as the animal decreases in size. When it comes to having an elongated shape, if an endotherm were to have this body shape, there is a lot of body heat lost as this body shape has a large surface area.

Finally, ectotherms are capable of exhibiting short bursts of activity without expending much energy, which can be used to run away from or fight a potential predator.

This burst of activity is possible by using anaerobic metabolism.

In animals, energy is stored in the tissues as lactate molecules, so this type of metabolism works by converting the lactate molecules into glycogen after intense activity is over in the absence of oxygen.

Therefore we can see that ectothermic animals commonly referred to as "cold-blooded" animals rely on the sun and shade to regulate their body temperature. This method of temperature control makes them more susceptible to predators but they have developed methods like cryptic colouration to avoid being consumed.

However, there are characteristics and advantages to ectothermy, such as, increased energy efficiency, a small size, elongated shape, and capability of exhibiting bursts of energy to escape predation.