

Re: Sweating hominids

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- *From:* "Marc Verhaegen" <fa204466@xxxxxxxxxx>
 - *Date:* Thu, 21 Jul 2005 15:16:43 +0200
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(sorry for the delay)

"Andrew Nowicki" <andrew@xxxxxxxxxx> wrote in message
<news:42CD980D.9CD42688@xxxxxxxxxxxxxxxx>

>> Sure. Evaporation cools the evaporating liquid. Evaporation is
>> intensified by the flow of air above the liquid. Fur impedes the flow of
>> air, so it impedes evaporation and cooling.

>>MV: 1) Then why do other mammals that are believed to sweat to cool down
>>have fur (patas, horse...)?

> Fur is useful for other reasons: it keeps the animal warm at night and
> keeps some biting and stinging critters away.

To a certain extent, but the sweating horses are still bitten by stinging
critters.

> For a small animal the lightweight fur is more practicable form of
> protection than thick hide or subcutaneous fat.

- a) Patas are smaller than we, horses larger.
- b) Patas & horses have +-no SC fat.
- c) SC fat layers in mammals are only seen in animals that come frequently in
contact with wet soil or water.

>>MV 2) Hairs enhance the surface from with water can be evaporated.

> Very short (about 1 mm) and dense fur may act as sponge holding the
> evaporating sweat and keeping uniform layer of the sweat by surface
> tension (capillary force). Fur is hydrophilic meaning that it attracts
> water and sweat. If the fur is much longer that about 1 mm, the
> evaporation of sweat from the tips of fur fibers cools the fiber tips, but
> little heat flows along the moist fibers because they are long and because
> sweat flows on the fibers away from the skin. (The amount of heat flowing
> through the fibers is inversely proportional to the length of the fibers.)

What does all this mean in the case of patas & horses IYO?

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- > By the way, wolves have sweaty paws which cool them pretty well due to the
- > contact with cool soil.

To a very limited extent perhaps. The sweaty pads are for enhancing grip (anti-slip). For cooling, they pant.

>>MV: 3) Do you have examples of other furless+sweating mammals that sweat a lot thermo-actively?

- > You mean sweat in order to cool. No. I have not researched this topic.
- > Elephants cool themselves by waving their ears. Hippos jump into cool
- > water. Note that female mosquito probes your skin before she plunges her
- > proboscis into a cavity called hair follicle -- this is the place where
- > your skin is thin and easy to pierce.

?? Andrew, have you any evidence for this?

Humans have 3 sorts of hair follicles: terminal follicles (clearly visible hairs, eg, scalp, beard, pubis, axilla...), vellus follicles (the nearly invisible hairs on our naked skin), and sebaceous follicles (which cause acne in face...). I never heard that mosquitos preferrably used these places, nor that our skin is easier to be pierced there?

- > A truly hairless animal does not have hair follicles, so mosquitoes cannot
- > penetrate it easily. I guess that the sweat glands may be weak spots too.
- > It seems that thick, hairless, sweatless hide is good protection against
- > skin parasites.

A very thick hide perhaps, but rhinos & elephants still need dust or mud baths.

- > I am too busy now to research this topic, but it seems that there are no
- > small, warm blooded, hairless aquatic animals. All the warm blooded,
- > hairless, aquatic and semi-aquatic animals are giants like hippos and
- > whales.

Lower limit in semi-aquatics in tropics = humans & babirusa (some river dolphins = fully aquatic are even smaller).

This suggest that heat loss for human-size aquatic animal is too high.

Not in the tropics, see above.

- > Another, much more convincing argument that hairless humans loose too much
- > heat even in tropical waters is the fact that we have to wear wet suits or
- > dry suits when we dive in tropical waters. Scuba divers who wear lycra
- > suits only really shiver with cold. (I was a scuba diver long time ago.)
- > **THIS IS VERY CONVINCING ARGUMENT THAT OUR HAIRLESSNESS WAS NOT AQUATIC**
- > **ADAPTATION.** A hairless, naked human may swim for a few minutes in tropical
- > waters to cool himself, but if he stays in the cool water much longer, he
- > will loose precious calories. If you do not believe me, spend two hours in
- > a lake dressed in swimsuit only. When you come out you will be cold and

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> hungry.

The neutral T_p for humans of recreational swimming in tropical waters is 25–28°C (dependent on water currents etc.), ie, the normal T_p of tropical waters, this means that without scuba equipment etc. you can stay comfortably in the water for hours. And this is indeed what we see in, eg, Moken & other "sea people". That you can eat well after a swim is something everybody knows: swimmers are a lot fatter than runners. Some doctors advise daily swimming to lose weight, but when you do that you'll normally gain a few kilos.

>>>AN: Another issue is the ratio of a mass of a hot or warm object to its >>>surface area. Small object, such as the patas monkey (body mass of about >>>5 kg) cools faster than big object because it has small ratio of heat >>>stored in the body to its surface.

>>MV: Yes, but what is the relevance to sweating IYO? Other mammals wet >>parts of the body to cool (esp. small mammals? eg, rats?) &/or pant >>(dogs...).

> Small animals can cool themselves easily. Their main problem is to stay > warm. Have you noticed the thin waist of the wasp? The thin waste prevents > loss of precious heat from the flight muscles to the rear part of its body > (called abdomen). The flight muscles work only when they are warm. Big > tropical animals easily overheat, so cooling is their big problem.

Yes, that why it's not very sensible to think that humans (with SC fat about 10 times thicker than chimps) once lived in savannas or so.

Marc Verhaegen

<http://www.onelist.com/community/AAT>

<http://groups.yahoo.com/group/AAT1>

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