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Some intrepid Japanese chemists tried to determine why hippos' sweat is red. What did they discover?

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Sweating Blood

A misunderstanding of hippo physiology gave rise to one of the most widespread and pointless practices in medical history.

BY SAM KEAN

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“Behold the hippopotamus!” Ogden Nash once wrote.

We laugh at how he looks to us.
Yet in moments dank and grim,
I wonder how we look to him.

Nash notwithstanding, hippos might see a lot in us they recognize. Unlike most mammals, *Homo sapiens* and *Hippopotamus amphibius* both have fragile, naked, nearly hairless skin. Moreover, because of that fragile skin, we both sweat copiously—a rare trait among animals, and one that’s been inspiring scientific research for millennia.

Hippo sweat isn't identical to the human kind, which is watery and seeps out of glands near the surface of our skin. Like magma, hippo perspiration erupts from deep within those two-inch-thick hides, and it's more viscous than ours. It's also crimson colored, which gives the animals an arresting sheen in the sunlight. Even today naive naturalists sometimes mistake it for blood.

Hippo sweat looks so much like blood, in fact, that it gave rise to a strange legend: that hippos deliberately injure themselves in times of duress. According to ancient Egyptian lore, when hippos near the Nile River got too fat or felt ill, they would pierce themselves on reeds, opening veins to let blood flow out. And for whatever reason—perhaps these hippos emerged looking healthier or more robust—Egyptian doctors decided there must be something to this practice and started prescribing it for their human patients. The Western world inherited this treatment as bloodletting, which persisted in mainstream medicine until the 1800s. In this way a simple misinterpretation in natural history gave rise to one of the most widespread—and useless—medical practices of all time.

Still, not until recently did chemists examine hippo sweat in detail to confirm that its color has nothing to do with blood. One reason for the delay was the fearsome nature of the hippopotamus: however cuddly they look, they're fiercely territorial, with jaws that can snap crocodiles—or people—in half. Not until 2000 did a few brave Japanese chemists get curious enough to devise a research plan, which involved tiptoeing into the hippo pen at the local zoo to dab the beasts with paper towels.

But their plan failed. The molecules in hippo sweat turned out to be quite fragile chemically, prone to breaking down with the slightest change in temperature or pH. So the Japanese scientists had to go back in for more sweat. Then go back again. And again and again. Hippo sweat proved so dainty it took seven years to figure out a collection method that allowed them to preserve the molecules long enough to determine their structure—which meant sponging the brows of a lot of hot, ornery beasts.

The chemists eventually discovered that hippo sweat is a clear liquid when it emerges from the skin: only after a few minutes' exposure to air does it turn crimson. They then traced that color change to two molecules, which they named, delightfully, hipposudoric acid and norhipposudoric acid. Each acid consists of three carbon rings, which react in air and link together into long, colored polymer chains.

Now, studying hippo sweat might not seem the most worthwhile (or sanest) pursuit, but the preservation process devised could help scientists capture the fragile essences of other animals.

There could be commercial applications too. Although hippos perspire for the same reason humans do—to keep cool—the Japanese study revealed that there’s more to hippo sweat than thermoregulation. Despite their thick skin, hippos are prone to sunburn. But when the acids in hippo sweat link together into chains, they absorb sunlight quite effectively, especially light between 290 and 400 nanometers—the dreaded ultraviolet range. Hippo sweat, in other words, is a natural sunscreen.

As a result, several chemists have started exploring whether hippo sweat could serve as a human sunscreen. Honestly, the product might take some getting used to: “The liquid [sweat] had the tacky consistency of egg whites,” reported one biologist who tried it, “and lathered up into a creamy foam.” But her skin absorbed the lather quickly, and it reportedly works wonders as a lip balm. (If getting hippo sweat close to your mouth sounds unappetizing, remember that some lip balms contain beeswax, which is essentially insect droppings that worker bees extrude through abdominal glands, then chew up and spit out. In that light hippo sweat doesn’t seem so outré.)

Even if hippo sweat never makes it commercially, it’s a fascinating example of nature’s creativity and a good reminder, with regard to bloodletting, of how unexamined speculation about nature can go wrong. Truth in science is rarely so superficial.

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Ancient DNA

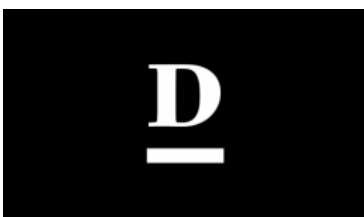
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