SWEAT MATTERS

"From stigma to strength"

Sweat is often seen as something to hide, but what if we looked at it differently? This project explores sweat as a resource, a material, and a tool for self-discovery.

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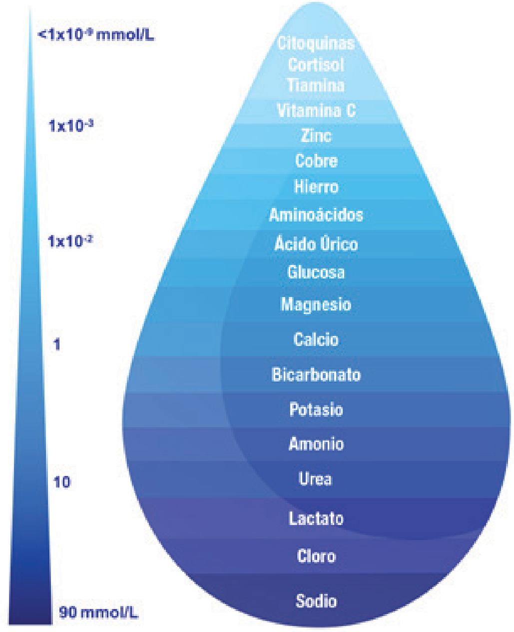
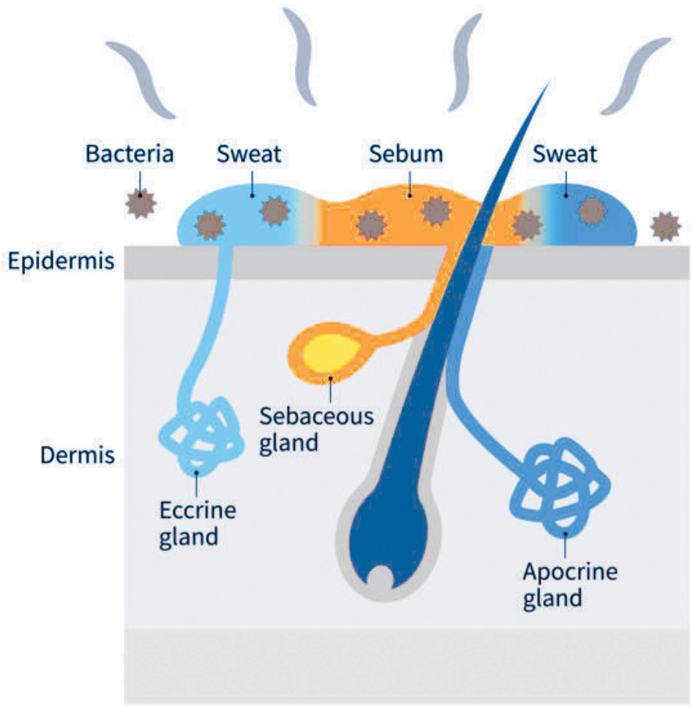
WHAT?

Sweat is ***99% water****, with minerals like sodium, potassium, calcium, and magnesium. It helps regulate body temperature and keeps us cool.*





HOW?

Sweat comes from two types of glands:

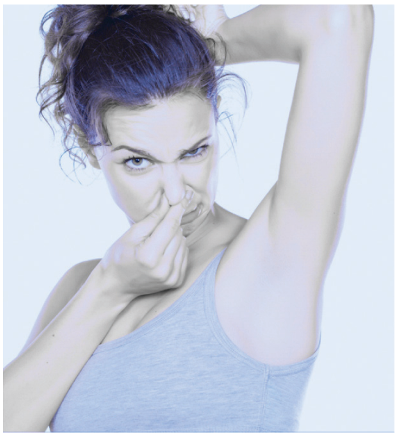
Eccrine glands *(all over the body) → Mostly water & salt, activated by heat/exercise.*
Apocrine glands *(armpits, groin) → Protein-rich, activated by stress, interacting with skin bacteria.*

WHY?

Sweat is essential for survival, an adaptive mechanism unique to humans that connects us all. Despite its importance, misconceptions fuel negative perceptions:

Sweating more doesn't mean losing weight
It's just temporary water loss.

Sweat does NOT remove toxins
That's the liver & kidneys' job.



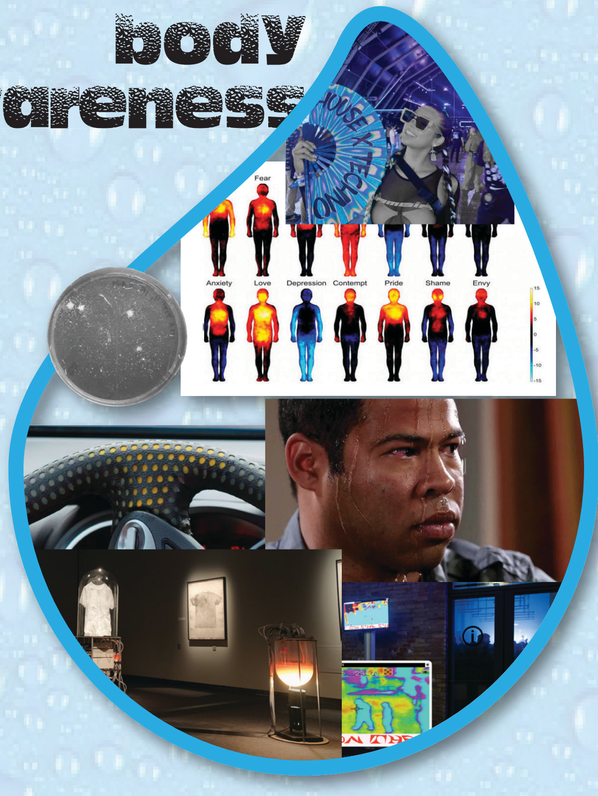
Sweat itself doesn't smell
Bacteria on the skin create the odor.

FRAMEWORKS

Physical response

sweat & society

body awareness



resource & material

UNDERSTANDING MY SWEAT

$A_2 = 69'35$ kg
$B_2 = 69'15$ kg
$X_2 = 0'7$ kg
$Y_2 = 0'35$ kg
$t_2 = 20$ min

Sweat Rate (2) $= \boxed{1'67\ L/h}$

sweat rate

Sweat rate is the amount of sweat lost per hour. Measuring it helps understand individual sweating patterns and hydration needs. I tested my sweat rate in two different conditions: ***Body Pump (1)****, an intense workout, and* ***Sauna (2)****, a passive heat exposure.*

Methodology

Before exercise – Empty bladder and weigh yourself naked ***(A)***. Weigh your water bottle ***(X)***.
During exercise – Perform the activity while tracking time. Drink as needed.
After exercise – Dry off completely, weigh yourself naked again ***(B)***, and weigh the remaining water ***(Y)***.

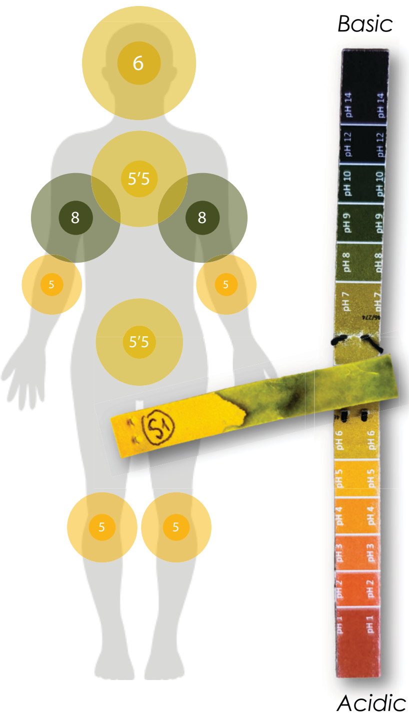
$C_1 = A_1 - B_1 = 69{,}3 - 69{,}15 = 0'15$ Kg
$Z_1 = X_1 - Y_1 = 0{,}75 - 0{,}1 = 0'65$ K
Total sweat loss $= C_1 + Z_1 = 0'80$ Kg $\approx 0'80$ L
$0'80 \rightarrow 0'75h$ (45 min)
$\rightarrow 1h \rightarrow$ $0'8/0'75 = \boxed{1'07\ L/h}$

An average human body produce approximately **1,044 liters of sweat** annually

The sauna caused more sweating despite less movement, this highlights how heat alone can drive fluid loss differently than exercise.

Though I have hyperhidrosis, my sweat patterns in these conditions seem typical (0.5–2.0 L/h).

Body Pump *(45')*



Sauna *(20')*

sweat mapping

To explore the ***variations in sweat pH across my body*** *and during different activities, I immediately applied pH strips to six areas: forehead, chest, armpits, elbows, lower back and knees.*

Human sweat pH is typically ***4.2-5.5****, but higher* ***(6.0-7.5)*** *in areas like armpits due to apocrine glands.*

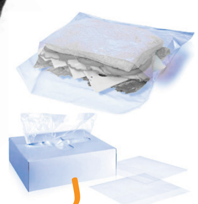
In sauna, overall sweat pH increased, possibly due to prolonged sweating, activity changes, or metabolic factors.

COLLECTING MY SWEAT

→ Xcontacto piel (realización)
→ bolsa limpia
→ pies sellados

Sweat **evaporates quickly** and is **hard to extract** from absorbent materials. Paper towels and sweat pads trapped too much liquid, while a DIY plastic suit leaked and felt impractical.

The best method was sitting inside a trash bag in the sauna, letting sweat drip while covering my feet to avoid contamination. It required no special tools, was relatively comfortable, and collected a good amount of liquid.



1 big trash bag + 2 sandwich bag + 1 zipper bag + 20 min in the sauna = 200 mL of sweat

Sweat should be stored in an **airtight bag** and **refrigerated** to avoid evaporation. Even when chilled, it gradually darkens and gains a stronger smell over time.

I recovered **36.36%** of my lost sweat in the sauna.

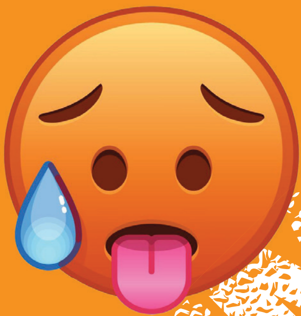
Personal growth

At first, I felt awkward collecting sweat in public, fearing judgment. Wearing extra layers at the gym or involving my family felt uncomfortable.

In the sauna, openly sharing my project changed everything. A couple of professors were curious, offering insights and even help. Instead of discomfort, I found support and new conversations.

This experiment turned into a journey of visibility and acceptance both for myself and for others seeing sweat differently.

EXPERIMENTING WITH MY SWEAT



Through material experimentation, I explore sweat's potential: reacting with pH-sensitive materials and extracting its minerals, to challenge perceptions and uncover its hidden value.

PH REACTIVE MATERIALS

To explore sweat's pH reactivity, I tested **Bromothymol Blue (BTB)**, a pH indicator that shifts from yellow (acidic) to blue (alkaline). Dissolved in alcohol for better solubility, it was applied directly to textiles and biomaterials.

dyed fabrics

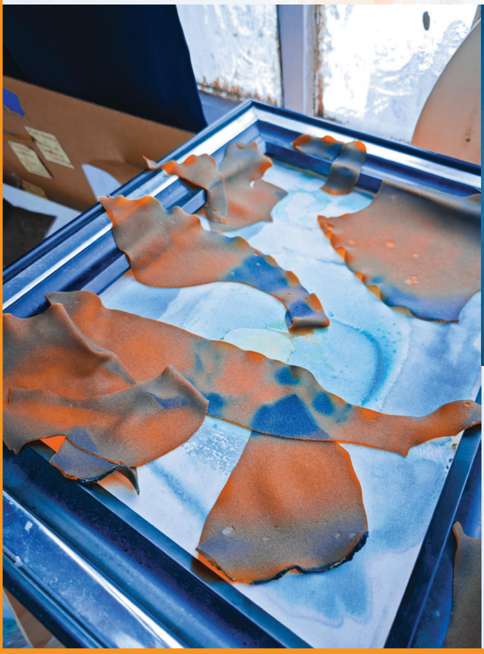
*A **96% cotton T-shirt** was dyed using a concentrated BTB solution in alcohol. Upon sweating, the fabric reacted, turning blue-green in high-pH areas like the armpits.*

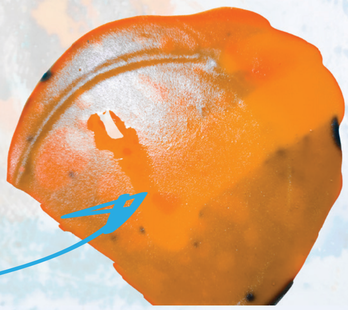
However, the dye transferred to the skin, which a mordant could help prevent. Interestingly, when re-dyeing the shirt, sweat-marked areas became visible. Rather than poor absorption, cotton dried too quickly, limiting pH reactivity.

***Next steps:** I'll mix agar with gelatin or xanthan for stability and fuse textiles with biomaterials for reactive garments.*

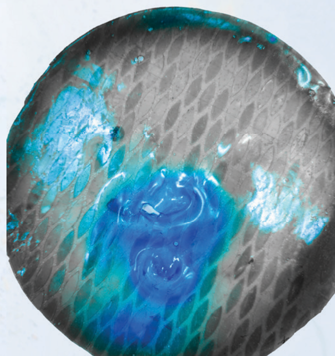
biomaterials

*Despite shrinkage, dried **agar** maintained repeated color change without degrading, proving its potential as an interactive material. However, its high moisture sensitivity led to structural instability and staining.*





__Alginate__ samples provided better transparency and structure than agar, resembling skin-like textures. However, prolonged exposure to liquid caused disintegration, limiting its usability.



CRYSTALLIZATION OF MY SWEAT

*Inspired by Alice Potts, I explored ways to **extract and crystallize the minerals** in my sweat. However, due to its low salt concentration, forming large, structured crystals was difficult.*

evaporation

I tested different approaches to sweat evaporation:

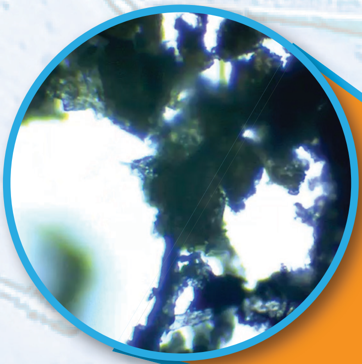
***Air-drying** (layering sweat on a surface over time) → Produced small, impure salt deposits concentrated around dirt particles.*

***Heat-accelerated evaporation** → Used a pot, but impurities from the surface affected the results. Testing with a clean container could improve purity.*

***Supersaturated solution method** (not yet tested with sweat) → This approach, used for growing salt crystals, requires a highly concentrated solution. Extracting enough sweat salt is the first step before attempting this method.*

under the microcospe

The obtained sweat residue showed semi-crystalline structures rather than defined fractals, confirming the difficulty of obtaining pure crystals.



Next steps

- [x] *Purify sweat before crystallization to reduce contamination.*
- [ ] *Test different evaporation speeds to optimize crystal structure and clarity.*
- [ ] *Explore electrocrystallization and additives like copper sulfate to enhance growth.*