

Chocolate, vaginas and maggoty wounds...

We act as if **bacteria** are a **terrible threat** and we must protect ourselves against these organisms **at all costs**...

Whole industries have developed to shield us from these supposedly **deadly** microorganisms...



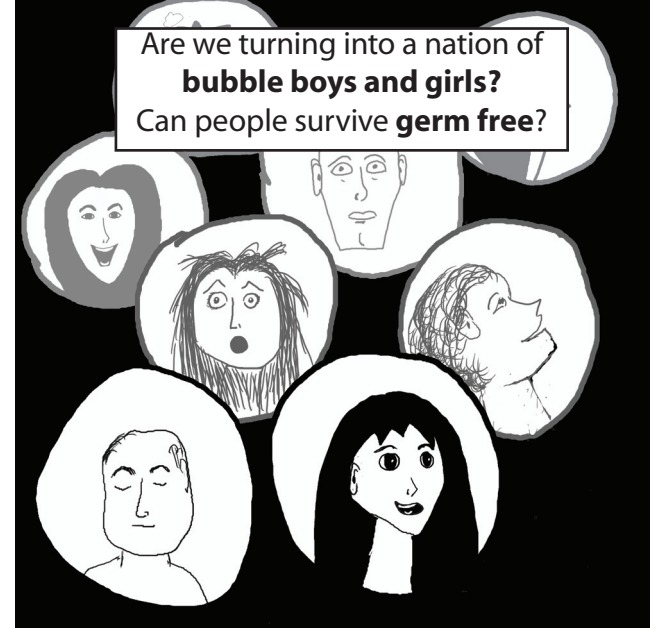
Antibacterial soaps are so prevalent it is hard to find something simply labeled "soap."



Triclosan is one of the common antimicrobials and it finds its way into many things... check out this antimicrobial towels.



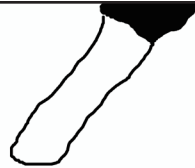
Are we turning into a nation of **bubble boys and girls?**
Can people survive **germ free?**



That **2 liter** bottle of diet coke you drank yesterday... we contain that mass of bacteria packed into our guts and smeared over our bodies. Sorry.



We have 10^{13} human cells in our bodies yet, we carry 10^{14} microbes. Who's in charge?
What are you: a **human** or a **petri dish?**

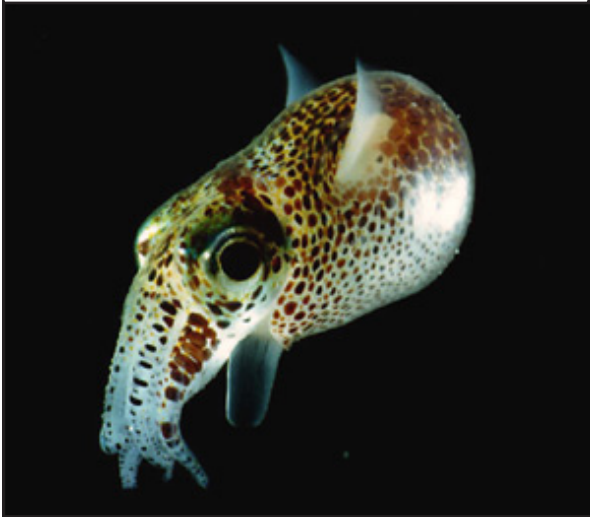


That overnight E.coli culture you grow up for your mini-prep might contain 10^9 bacteria...

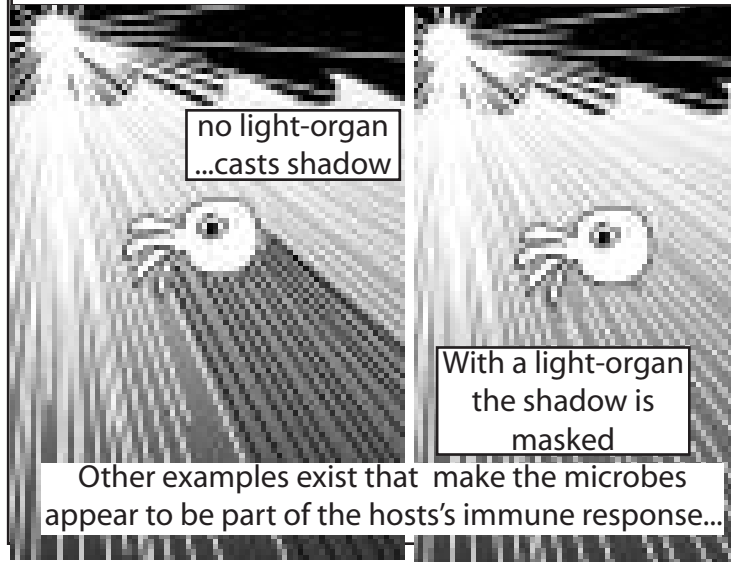
At that concentration, 10^{14} bacteria would fill **5000, 2 liter** diet coke bottles. That's a lot of diet coke.

Such an abundance of microbes must have an effect on our immune response.

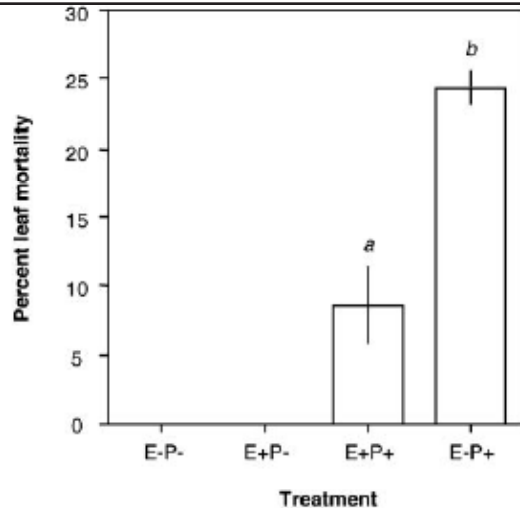
Moving outside of humans and mice it is easy to find examples of host-microbe interactions that are clearly symbiotic. The best characterized involves a squid and the bacterium, *Vibrio fischeri*.



Vibrio fischeri colonizes a specific organ in baby squids. The squid uses this light producing bacteria to eliminate its shadow when viewed from below and thus escapes predators.



"Germ Free" cacao plants are sensitive to infections.



Arnold et al, 2003 PNAS 26: 15649-54



The "bee wolf" wasp chooses to lay its eggs in disabled bees. The wasp inoculates eggs with bacteria that grow within its own antennae. This material is required for the survival of the developing wasps. www.vespa-crabro.de/bienenwolf2.htm

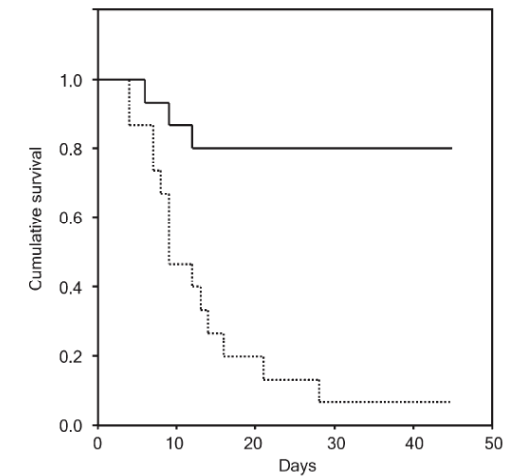


Figure 5. Cumulative Survival of Larvae with (Solid Line) and without (Dotted Line) White Substance in the Brood Cell

Brood cells that have been cleared of bacteria do not support development. *Curr Biol.* 2005 Mar 8;15(5):475-9.

"Lactobacillus are the **Xena warrior princesses of the vagina**"

- Sharon Hillier

So, is that a good thing?



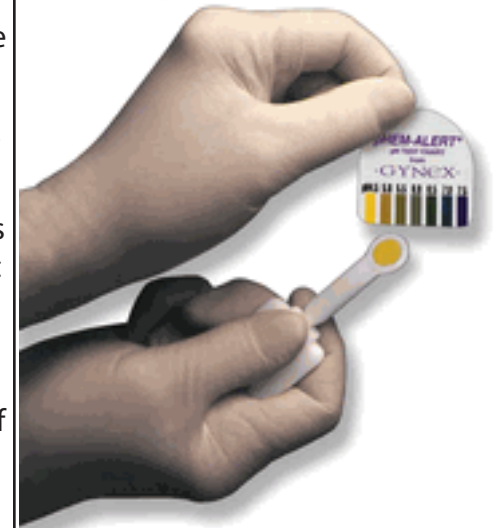
Bacterial vaginosis is the strongest risk tested for HIV.

Taha et al. 1998 AIDS 12: 1699-1706

Risk factors	Unadjusted risk ratio (95% CI)
Disturbance of vaginal flora	
None	1.00 [†]
One criterion	1.54 (0.81–2.93)
Two criteria	1.71 (0.86–3.38)
Bacterial vaginosis	3.50 (1.47–8.31)
Gonorrhoea present	3.11 (0.76–12.79)
Trichomoniasis detected	1.88 (1.32–3.38)
Syphilis reactive	1.04 (0.24–4.28)
Yeast infection	0.84 (0.40–1.76)
Age (1 year increase)	0.91 (0.87–0.95)
Electricity in the house	2.19 (1.00–4.80)
Sexual partners ≥ 2	1.28 (0.58–2.82)

BV or **bacterial vaginosis** can be detected by change a change in the pH so that it rises above the natural pH of 4.5. Testing is can be performed with pH paper. Other tests include the production of an exudate, the release of "clue cells," and the wiff test that releases a characteristic smell when mucus is treated with base. A characteristic of BV is the flora change. BV can be caused by many different bacteria. Microbes over-represented during an outbreak of BV include the following genera: Gardnerella, Prevotella, Mobiluncus, Bacteriodes, Fusobacterium, Peptostreptococcus, Porphyromonas, Atopobium

pHEM-ALERT®
VAGINAL pH TESTING MADE EASY



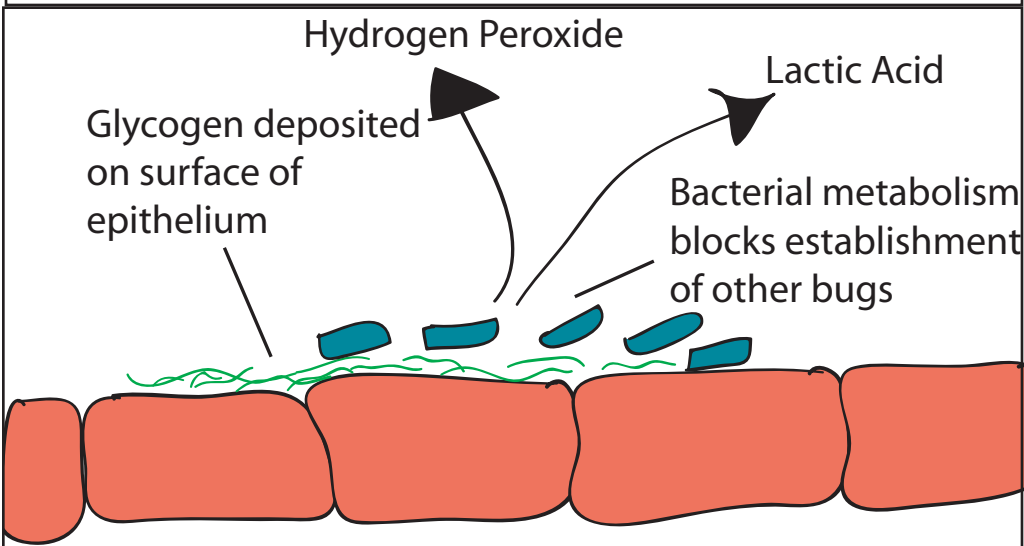
These are the microbes found in healthy vaginas. Note there are many members of the genus **Lactobacillus** but the yogurt bacterium, *L. acidophilus* is not normally present.

Table 1. Frequency of isolation of *Lactobacillus* species from 101 women at baseline and at 4- and 8-month follow-ups.

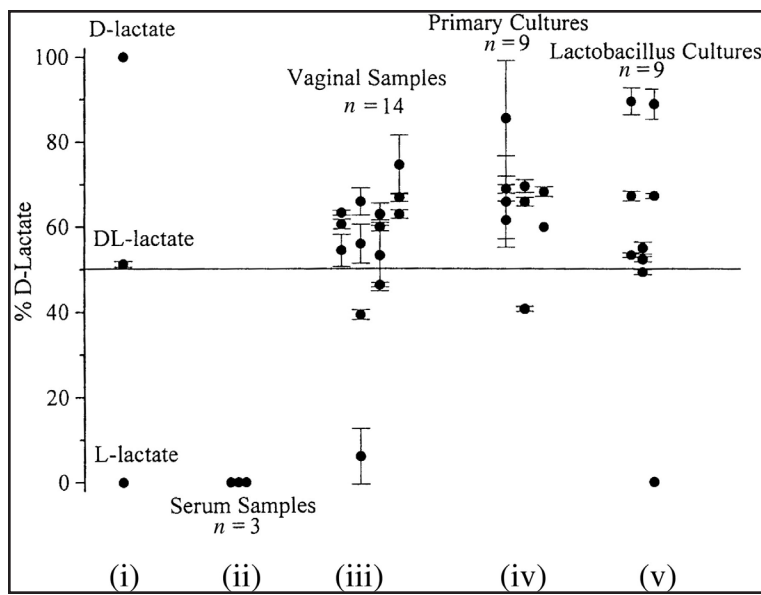
<i>Lactobacillus</i> species	Baseline (n = 86)	4-Month follow-up (n = 86)	8-Month follow-up (n = 100)
<i>L. crispatus</i>	33 (38)	33 (38)	37 (37)
<i>L. jensenii</i>	35 (41)	35 (41)	38 (38)
<i>L. 1086V</i>	13 (15)	16 (19)	24 (24)
<i>L. gasseri</i>	4 (5)	2 (2)	1 (1)
<i>L. ruminis</i>	1 (1)	0	0
No <i>Lactobacillus</i> isolated	23 (23)	25 (25)	16 (16)

NOTE. Data are no. of women in whom species is isolated or no. of women in whom no *Lactobacillus* species is isolated (% of women in group). Some women were colonized with ≥ 1 species of *Lactobacillus*. 1086V, Designation for unnamed *Lactobacillus* species.

One idea is that these bacteria are converting glycogen, that is secreted by the vaginal cells, to lactic acid. Do the bacteria affect the pH of the vagina?



The proof that **bacteria make the lactic acid buffer** in the vagina is that the vaginal lactic acid comprises both D and L enantiomers. Human enzymes can make only the L-lactate whereas the bacterial enzymes make both forms of lactate. Hum Reprod. 2001 Sep;16(9):1809-13.



One can buy products designed to bring the vaginal pH to healthy levels but they **contain only L.acidophilus** while claiming to restore normal flora.

