



KOMBUCHA,
FERMENTED FOODS
& THE HUMAN
MICROBIOME

BY: KOMBUCHA KAMP

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WHAT IS THE
HUMAN
MICROBIOME?

01

What is the Human Microbiome?

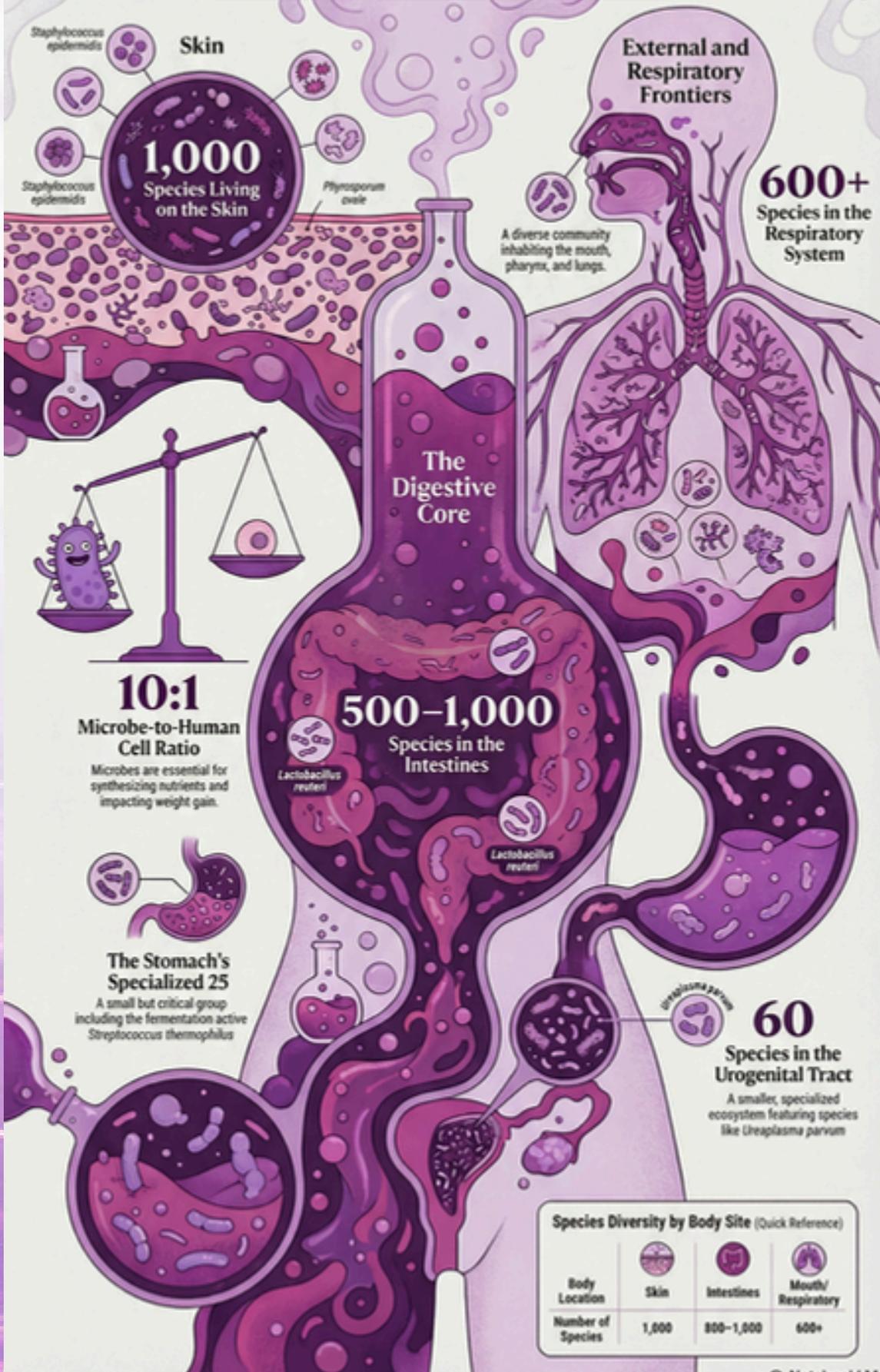
The Human Microbiome Project (HMP) has been researching all of the microbes that live inside and on our bodies for over two decades! What started out as the Human Genome Project morphed into the HMP when **scientists realized they couldn't fully understand how the human genome works due to the role bacteria play** in every aspect of our physiology.



The result of this research will take decades or even centuries to fully understand. The implications of this research are far-reaching and indicate **a radically new approach** to how we view what we put inside and on our bodies to ensure optimal health. **Thankfully there are many solutions that ancient humans employed to maintain a diverse and healthy microbiome.** Fortunately, science is now validating what our ancestors already knew!

The Inner Fermenters: A Map of the Human Microbiome

The human body is home to a vast ecosystem where microbial cells outnumber human cells 10 to 1. These 1,000+ species synthesize nutrients and defend against pathogens.



10:1
Microbe-to-Human
Cell Ratio
Microbes are essential for
synthesizing nutrients and
impacting weight gain.

**The Stomach's
Specialized 25**
A small but critical group
including the fermentation active
Streptococcus thermophilus

600+
Species in the
Respiratory
System

500-1,000
Species in the
Intestines

60
Species in the
Urogenital Tract
A smaller, specialized
ecosystem featuring species
like *Ureaplasma parvum*

Species Diversity by Body Site (Quick Reference)

Body Location	Skin	Intestines	Mouth/ Respiratory
Number of Species	1,000	500-1,000	600+



The bacteria in our microbiomes are essential to human health and aid in biological processes such as:

$E=mc^2$

Extracting energy from food

RETINOL
FOLATE
RIBOFLAVIN
BIOTIN
NIACIN

Producing essential vitamins



Regulating our immune system



Regulating our glucose levels and metabolism



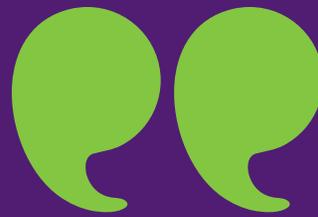
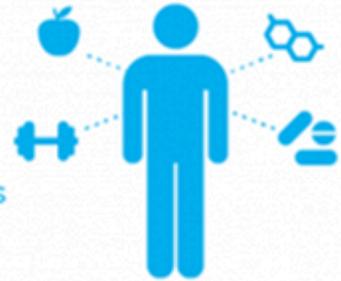
Protecting us against disease-causing microbes

SYMBIOTIC

The beneficial and symbiotic relationship between humans and our microbiomes has likely evolved and changed throughout human development.



Personal microbial communities shift throughout a person's life and are influenced by diet, exercise, medications such as antibiotics, pathogens, and other environmental factors.



*Symbiosis does not mean 'kumbaya', it means **healthy competition**.*

Alex LaGory

Co-Author of The Big Book of Kombucha

We are “Bacteriosapiens”

You might be asking yourself, **“What in the world is a “bacteriosapien”?”** Or perhaps this term intuitively resonates due to all of the information you’ve absorbed about the human microbiome! No matter where you fall on the spectrum, succinctly, **this term encapsulates what I perceive to be the innate relationship between bacteria and human beings.**

Ever since I first started learning about the human microbiome over 20 years ago, **ancient wisdom encoded in my DNA (and yours too) began to burble up to the surface of my consciousness.** It's truly amazing to tap into billions of years of change and evolution simply by tuning in.

Hannah Says - As a self proclaimed “word nerd” I love examining the roots and stems of language. They provide hidden clues to concepts. Bacteria comes from the Latinized Greek word “baktērion” which means “staff” or “cane” as the first bacteria observed under the microscope had that shape.

What are Bacteria?

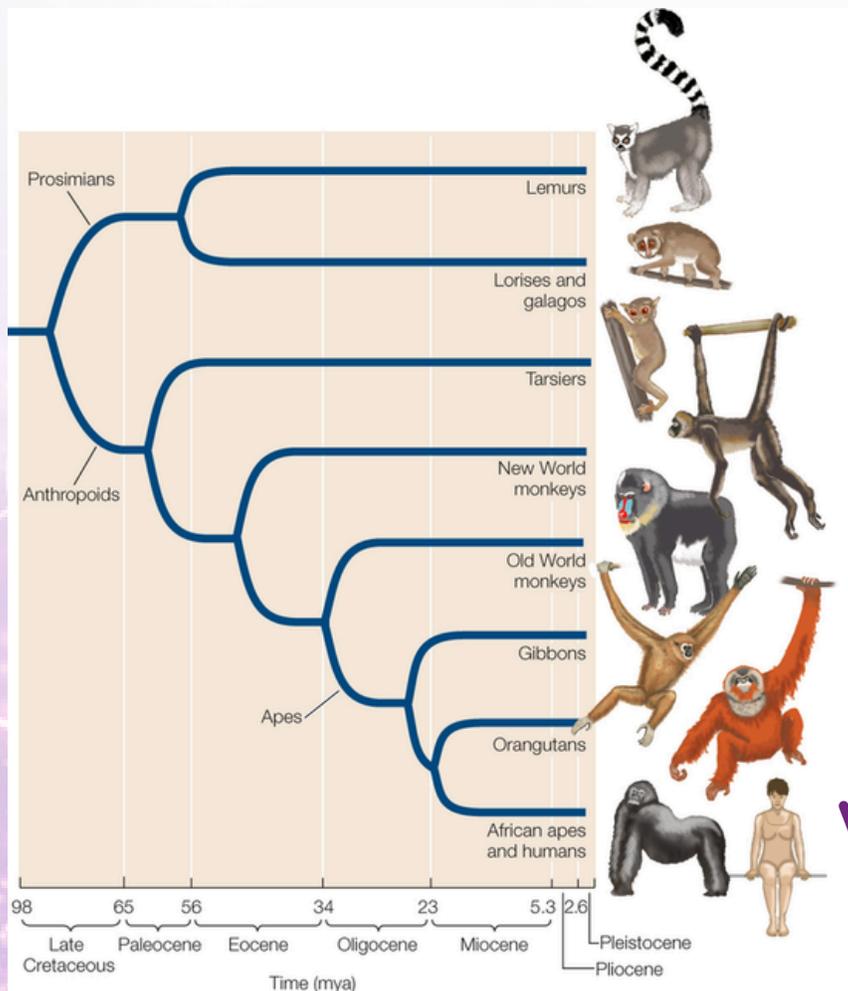
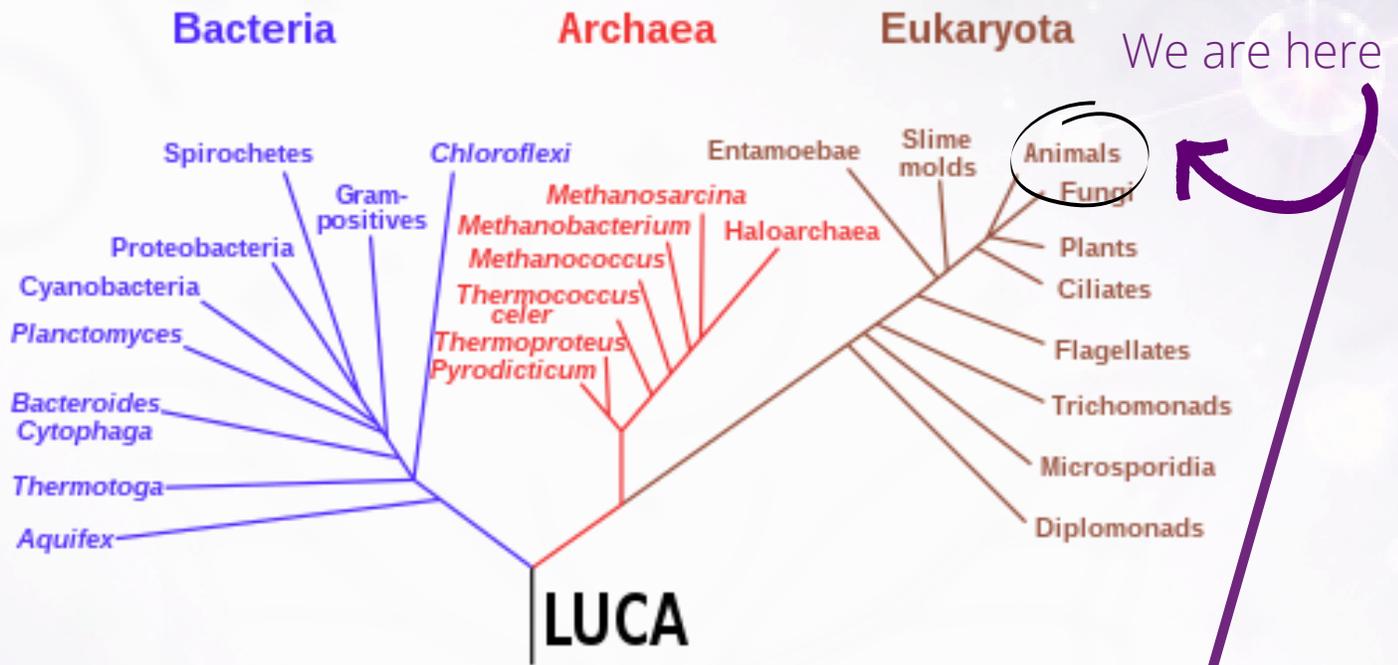
Just so we are all speaking the same language, I'll offer a brief overview of the characteristics of bacteria:

1. **Bacteria belong to their own Kingdom** and boy are there loads of them! So many we aren't even close to identifying or comprehending all that they are capable of doing.
2. **Bacteria are EVERYWHERE!** They live on every single surface on this planet - from the coldest mountain tops, to blazing hot oceanic steam vents, to the entire surface of your intestines, organs, blood, brain, gut, armpits, nasal passages, etc.
3. **Bacteria assist in all processes of life.** From our first inoculation via the birth canal to decomposition of our dead body (aka the "final fermentation"), bacteria give us life, nourish every aspect of our being and assist in breaking down and removing toxins.



Humans also happen to be rod shaped, with rod shaped appendages; a coincidence?

Phylogenetic Tree of Life



What are Bacteria? (cont.)

Bacteria also share these qualities with human beings:

- **Genetically fluid.** Bacteria have the ability to grab DNA from other cells and incorporate it into its own DNA structure. Called “gene transfer” this skill is what both creates “superbugs” and sets the stage for **epigenetics, the ability for our DNA to be modified by human behavior.**
- **Pleomorphic.** Bacteria can change shape and function depending on the environment. Many “bad bacteria” will not go bad unless they are in an environment that allows them to become “opportunistic pathogens.” What this means is **we have more control over how bacteria express their function when we are aware of how our actions impact their environment** (i.e. exercise, food choice, stress management)
- **Highly adaptive.** Pathogenic organisms have learned over time to “wait out” antibiotics. They want to live! They “teach” their offspring how to outmaneuver toxins intended to destroy them - again, this is how “superbugs” are formed. **Have you noticed the ways in which humans have evolved in response to living in a toxic environment?**

HOW GUT BACTERIA AFFECTS THE BRAIN AND BODY

We are more bacteria than we are human. Mounting research has suggested that the bacteria living in our digestive tract play a significant role in our overall health. Here are some of the physical and mental health conditions that have been linked to imbalances in gut flora.

DEPRESSION

More than a third of depression sufferers have "leaky gut," or permeability of the gut lining that allows bacterium to seep out into the bloodstream.

ANXIETY

Prebiotics can have anti-anxiety and antidepressant effects. Consuming beneficial bacteria can also positively change the way the brain responds to the environment.

SCHIZOPHRENIA

Studies in mice have linked a lack of normal gut bacteria with changes in brain development, but the genetics of the disorder are complex and not fully understood.

AUTISM

Autism often co-occurs with gastrointestinal issues like leaky gut or irritable bowel syndrome.

PARKINSON'S DISEASE

People suffering from this disease have different gut bacteria than healthy people.

OBESITY & DIABETES

A number of studies have linked instability in the gut microbiome to obesity and obesity-related health problems.

CROHN'S DISEASE

Abnormally high levels of certain bacteria strains may be present when Crohn's Disease develops, possibly triggering an atypical immune response.

COLON CANCER

Sugar-loving microbes in the gut — along with the carbs that feed them — can fuel colon cancer. High carb-diets may even be contributing to the rise of colon cancer.

ULCERATIVE COLITIS

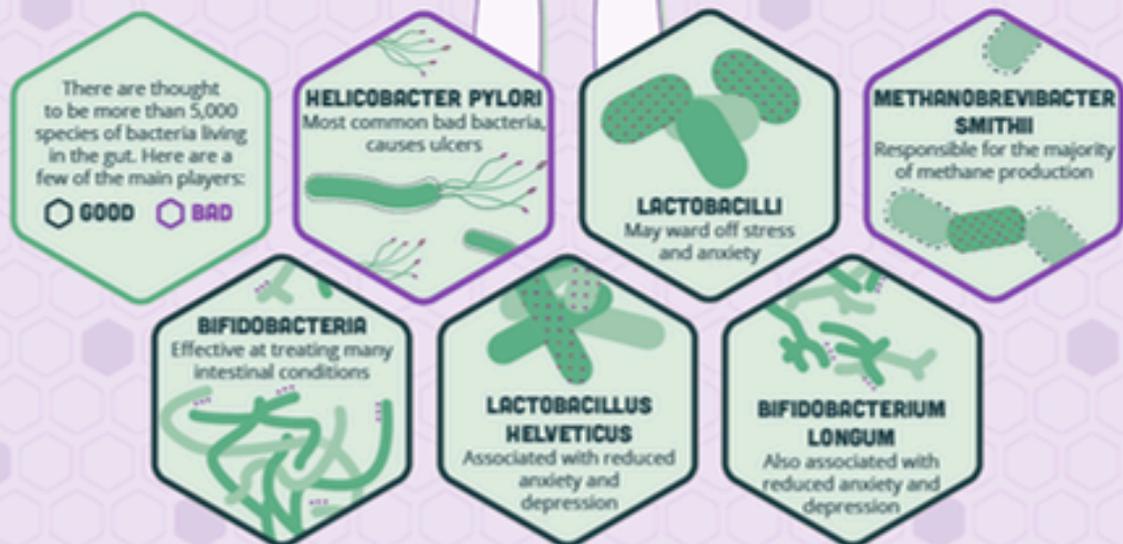
Imbalances in gut flora may be a main factor in both the onset and continuing symptoms of ulcerative colitis.

RHEUMATOID ARTHRITIS

Studies have found a link between low levels of certain good gut bacteria, high levels of unhealthy *Prevotella copri* bacteria, and autoimmune joint disease.

IRRITABLE BOWEL SYNDROME

There is a definitive link between IBS and an overgrowth of bacteria in the small intestines.



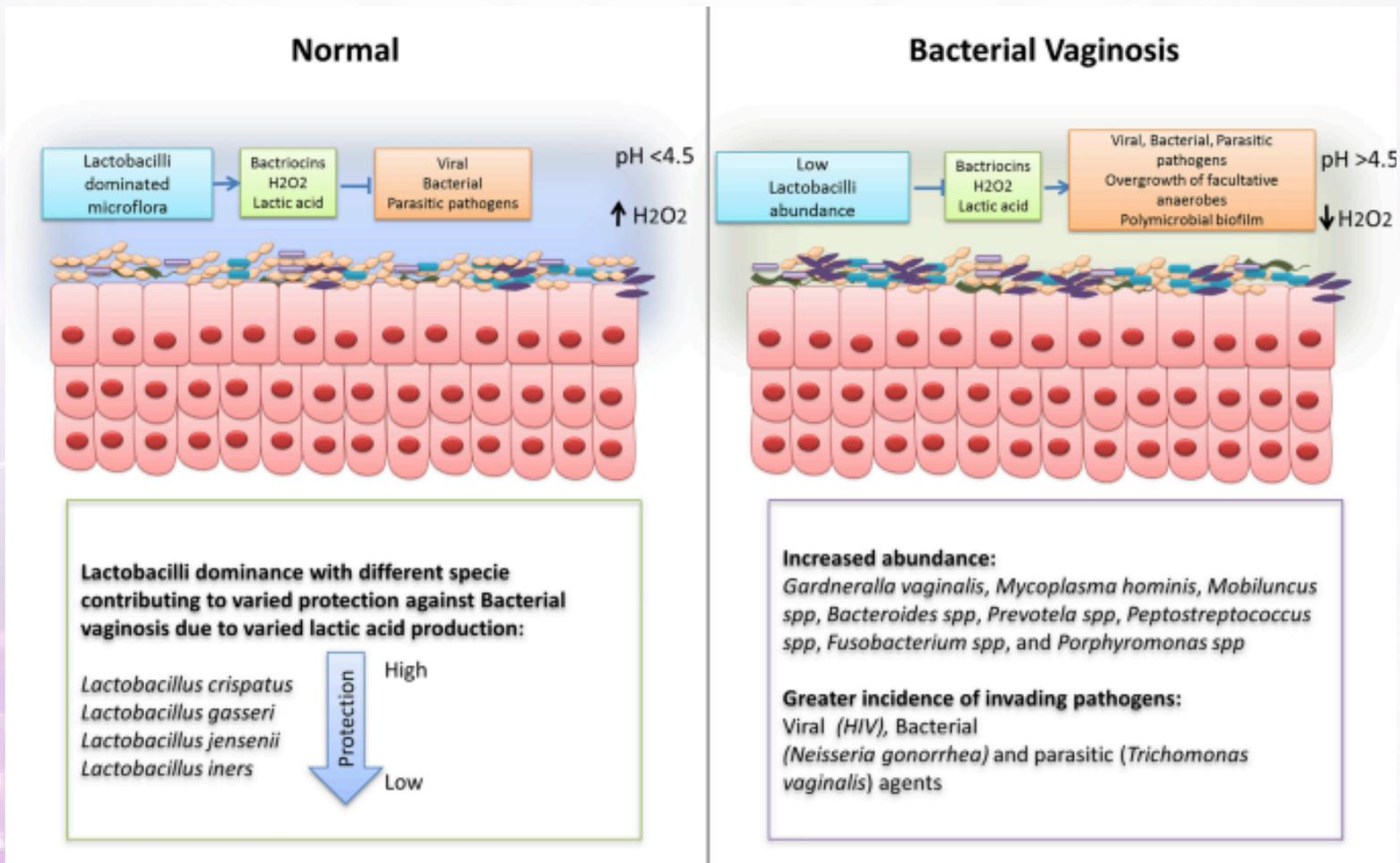
Sources: Psychopharmacology, Oxford University, UCLA Division of Digestive Diseases, Ahmanson-Lovelace Brain Mapping Center at UCLA, Scientific American, Acta Psychiatrica Scandinavica, The Atlantic, National Geographic, Cedars-Sinai, ScienceNews.org, The Scientist, Medical News Today, University of Helsinki Institute of Biotechnology, American Diabetes Association, Science Daily, U.S. National Library of Medicine, National Institutes of Health, LiveScience.com, WebMD.com



https://www.huffpost.com/entry/gut-bacteria-health_n_6480580

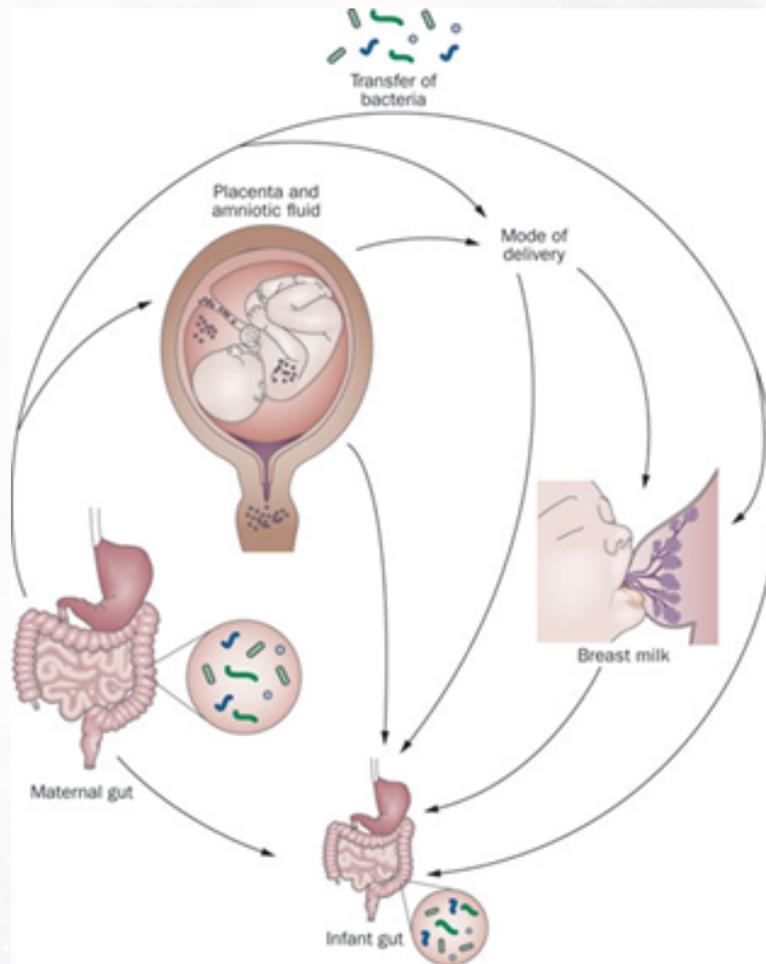
Bacteriological Heritage

So if we need so many bacteria to be healthy, where do we start? The good news is that **we are provided our very first dose of a healthy microbiome as we slide out the birth canal.** When a woman becomes pregnant her vaginal microbiome starts to change and cultivates microbes that will help the baby to digest her breast milk and will help to build the infants immune system.

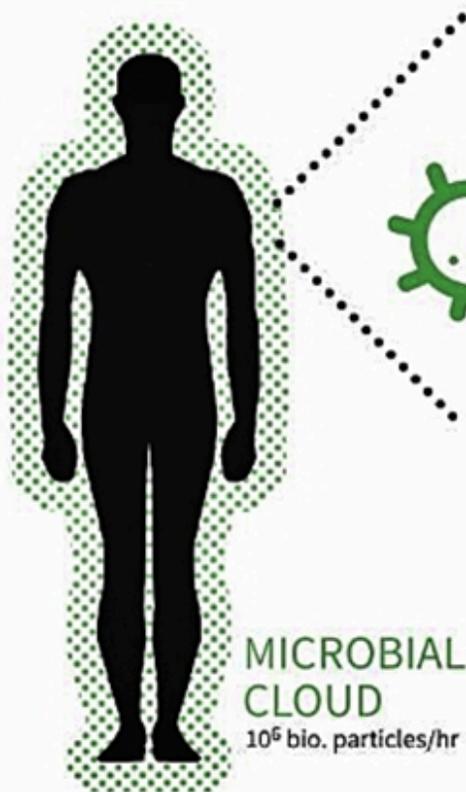


While diversity is an indicator of health in the gut microbiome, conversely, the vaginal microbiome is healthier when Lactobacillus spp. dominate.

Bacteriological Heritage



<https://peerj.com/articles/1258/>



Humans have **personalized** microbial clouds.



- Streptococcus
- Propionibacterium
- Corynebacterium



- 1) An unoccupied space has a distinct cloud compared to an occupied one.
- 2) Each **person** has their own distinguishable microbial cloud.

Bacteriological Heritage

There are other ways in which a child's microbiome can be strengthened including:

Wet nurse. Women of all ages are able to produce breast milk, even if they aren't pregnant. It was not uncommon for women to turn their infants over to a wet nurse. **By consuming breast milk from another woman's breast, the child is given a wider variety of microbes helping to diversify their microbiome.** Unfortunately most milk banks pasteurize breast milk due to an "abundance of caution" essentially rendering the most vital part of the milk invalid.

By Curt Teich (photographer) - Self-scanned, Public Domain



A Cuban Wet Nurse.

<http://delmarhistoricalandartsociety.blogspot.com/2016/10/the-wet-nurse-at-turn-of-century.html>



Andrey Osipovich Karelin (Nizhny Novgorod).
1837—1906)

*Straight from
the teat,
what a treat!*



Bacteriological Heritage

Mud pies & boogers. Our immune system begins in our mouth which is why you see infants and children sticking everything into their mouths. Assuming our soil isn't tainted with toxic chemicals, **eating dirt is one of nature's ways to keep us healthy.** Whether that's living in mud huts with dirt floors or simply getting dirt on our bodies via gardening, mud baths, playing in puddles and the like, it makes sense to get dirty! Plus, there is a hypothesis that explores if eating our boogers (not in public, though 90% of people admitted they do it!), may help boost our immune system as well.



People who interact with animals and nature feel better!

Bacteriological Heritage

Grooming. Human touch is vital. When we make contact with other people, trace amounts of microbes are transmitted that are then able to be processed by the recipient's immune system. Combing hair, back rubs, and even picking zits are all examples of grooming that creates a sense of care and bonding for the recipient and also increases their microbial diversity.

Safe, non-sexual, non-threatening human touch is a vital nutrient!



Bacteriological Heritage

Fermented Foods. Our ancestors really knew how to “trust their gut” and intuited how to preserve foods to last beyond harvest time. **Fermentation is present in every culture on the planet!** Beyond preservation, fermentation uses the action of microbes to break down toxins, enhance nutritional value and provide a range of flavors.



Toxic Overload

The real reason we need fermentation now more than ever is due to toxic overload. [There are over 80,000 chemicals found in our food, cleaning supplies, beauty products and more.](#) Humans are evolving as best they can however many are finding they simply cannot function in a toxic world.

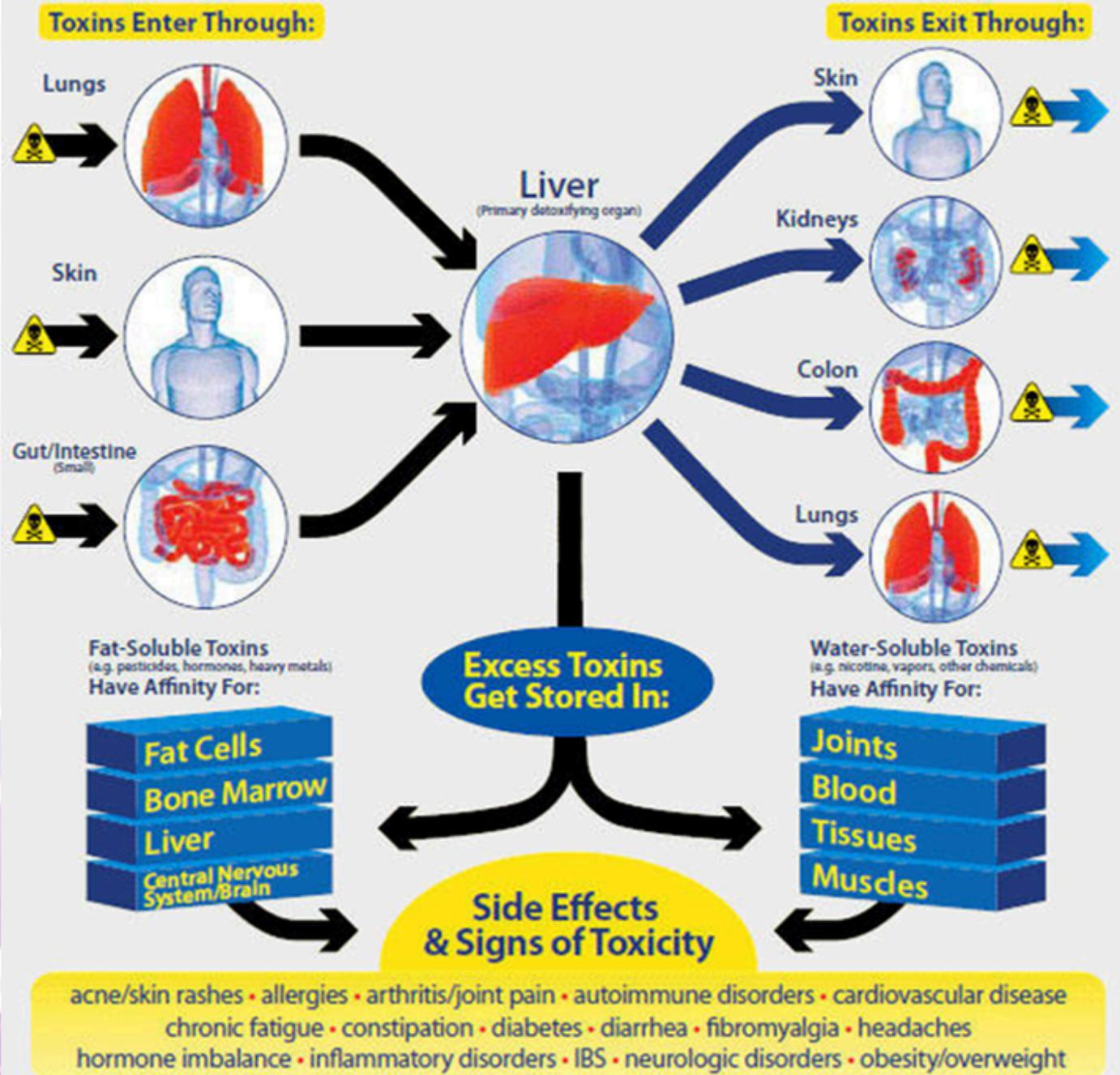
Thankfully that means as our awareness grows, we can make better products. However, the problem that persists is at a governmental and corporate level. **As long as there is a revolving door at the FDA (Food and Drug Administration) that is in lockstep with corporations that produce toxic chemicals, it will always be a struggle.**



The news abounds with shocking stories of unfit drinking water, toxic dumping that leads to increased rare cancers and microplastics invading the human body. **The only way to reverse this trend is to radically change our perspective at a very high level.** Until we are able to effect that change, individuals are left to seek out better solutions on their own. This is where Kombucha comes in!

Toxic Overload

The Process of Detoxification and Elimination



*You are a sponge in a toxic world.
Elimination is key to maintaining health.*

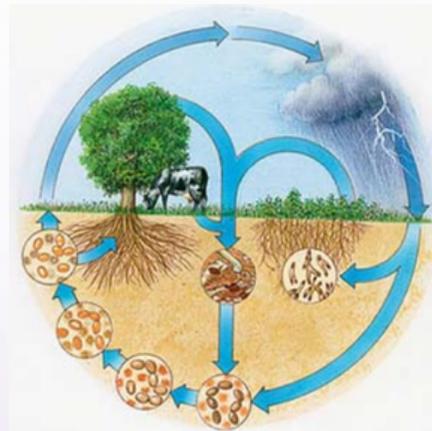
02

CULTIVATING
INNER TERROIR

02

Cultivate Inner Terroir

The gut is our soil and, like the soil, it must be microbially diverse to support life. Everyday we choose what to put in our bodies. Marketing firms spend millions to figure out how to trick people into consuming literal junk and garbage. The current healthcare system - *perhaps more accurately called a "sick care system"* - spends little time focused on our diets in order to serve pharmaceutical companies more concerned in "alleviating symptoms" rather than addressing root causes. It's a business model that nets them billions of dollars in profits by perpetuating illness rather than curing it.



There are inexpensive ways to circumvent this system and ***one of the easiest ways is by incorporating more fermented foods and drinks into your diet!*** Unfortunately, the results of decades of chemical poisoning means that some bodies are allergic to these very nutritious foods. If you have a histamine allergy, discuss with your primary care practitioner to ensure your organism is able to tolerate and benefit.

Diversity is Our Nature

If you look outside your window, do you see one type of tree? One type of bird or flower? No! You see an entire symphony of flora and fauna that exist simultaneously!

Diversity IS nature. Mono-anything is antinature.

Monocropping causes more plant disease, kills more animals and literally depletes the soil and in turn the crops of nutrients.

There are over 20,000 species of edible plants in the world, yet fewer than 20 species now provide 90% of our food. That means we are severely limiting the diversity of nutrients that are always bioavailable from our food and relying on synthetic supplements to make up the difference.



Diversity is Our Nature

Since diversity is our nature, Kombucha Kamp not only advocates drinking Kombucha, **we suggest consuming a wide variety of fermented foods and beverages in order to allow your unique microbiome to find the organisms that best support you!** Hence, for us, Kombucha is a gateway rather than an endpoint!



The beauty of the world lies in the diversity of its people.



Kombucha is a Gateway

Not only is **Kombucha** a gateway to learning about other fermented foods, **it is also a gateway to a wide range of concepts embodied in the process of brewing Kombucha.** The metaphor of the SCOBY and fermentation process are valuable when we consider how they can impact our own lives.

For example, the culture is symbiotic - that means it works with other microbes - specifically yeast. Researchers are using the Kombucha SCOBY to model how microbes are able to work together in complex systems. While most theories of evolution made popular in the late 19th century highlight competition, there is far more cooperation in the natural world.

Consider: How could society we emulate the Kombucha SCOBY and create more harmonious cooperation and mutual benefit?

Kombucha is a Gateway

Kombucha is a Gateway to...

- *Reclaiming health*
- *Feeling **good!***
- *rEvolution*
- *Ancient **DNA wisdom***
- *Quality vs quantity*
 - ***Consider the source***
- *Bacteria Forcefield*
 - ***Quorum sensing***
 - ***Immunity***
 - ***Gut feelings***
- *Common-Immunity = **CommUnity***

Once the microbiome and gut pH start to move back into balance, there are other benefits that start to unfold. For one, **the body is no longer able to tolerate high quantities of sugar or alcohol.** Plus, new flavors emerge from foods as the sugary plaques coating our tongues are dissolved by the organic acids in Kombucha. Hence, **Kombucha serves as a gateway into tasting all the flavors of food,** not just the extreme chemically-generated flavors of processed food.

Fermented Foods for Life

Since diversity is our nature, incorporating a wide range of fermented foods and drinks is vital to feeling great while also improving our digestion, supporting healthy liver function and boosting immunity. **There's a reason sauerkraut goes on a Ruben sandwich - how else are you going to process all that meat?!** Or why all condiments were originally fermented. Ketchup was originally a fermented fish sauce from Ancient China that morphed into a tomato sauce. Soy sauce, miso, even traditionally-produced mustard are all fermented with microbes and add a probiotic punch with every meal.

At Kombucha Kamp, we not only cultivate Kombucha, we are also bacteria farmers for JUN - Kombucha's raw honey cousin; milk kefir - the most nutritious fermented beverage; and water kefir - for those who don't tolerate dairy and find Kombucha to be too sour. **Check out all of our fermentation cultures at the [Kombucha Kamp store!](#)**



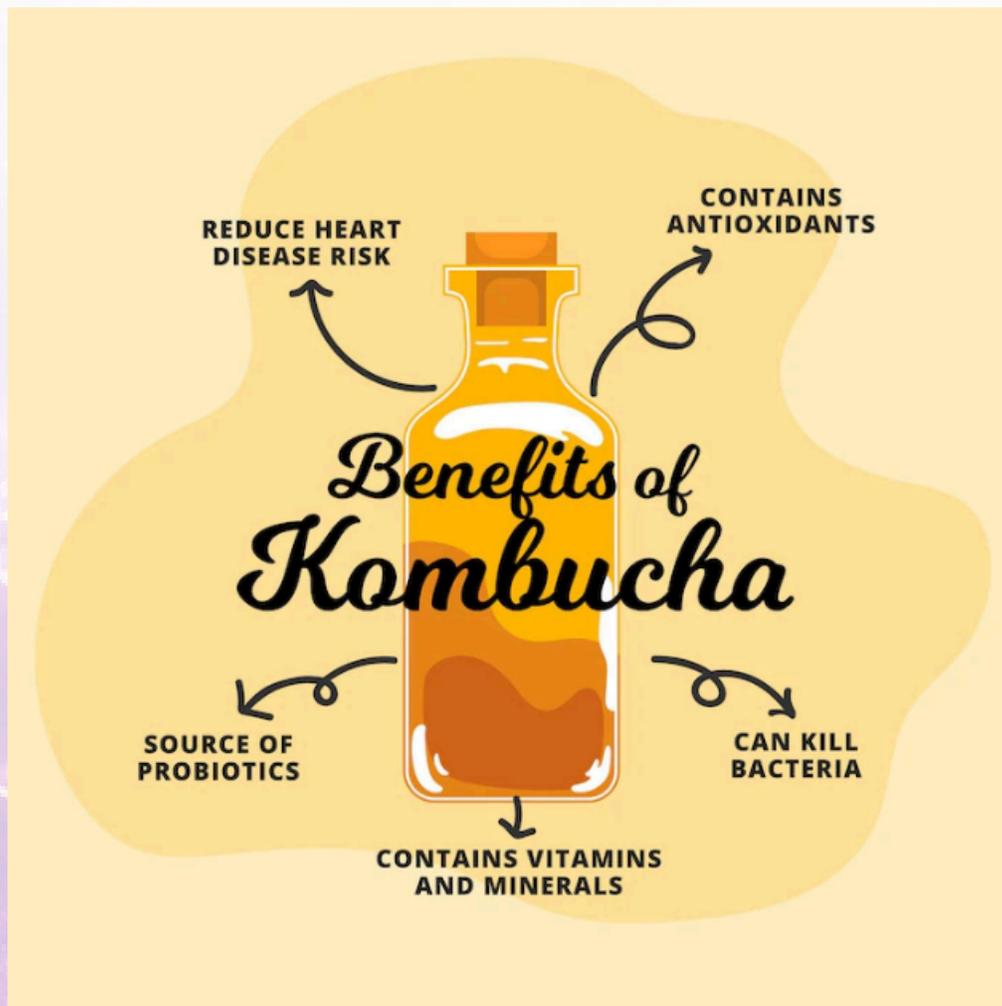
03

KOMBUCHA
BENEFITS

03

Kombucha Benefits

All fermented foods and drinks have their own unique properties and microbes which is why eating a variety of them is imperative to any *bacteriosapien*. So **let's drill down on why Kombucha, specifically, is so fantastic!** Kombucha Tea is JUST A FOOD – a naturally-carbonated, healthy tonic enjoyed by those who brew and consume it regularly, often throughout the day in small doses. People are usually very loyal to their daily Kombucha consumption, and consider the drink healthy for a number of reasons.



Top Anecdotal Reasons People Drink Kombucha

Here are the ones we hear most from our clients and on social media. Remember, **these are just opinions from people who drink Kombucha all the time, not scientists.** These are the benefits people say they can FEEL rather than scientifically prove. You may experience some, all, or none of these effects from consuming Kombucha.

- *A great substitute for sugary sodas, juices, or multiple trips to the coffee pot*
- *Acts as a snack or pre-meal hunger control*
- *Better digestion, enhanced hydration and motility*
- *Eliminates acid reflux reactions*
- *Clearer skin*
- *Maintains Hair Color*
- *Less arthritis pain and more flexibility*
- *Get sick less often, better immunity*
- *Relieve headaches, migraines, and hangovers*
- *Smooth energy from low levels of caffeine in the tea*
- *Reduced stress – L-theanine*
- *Just plain feeling better and happier!*

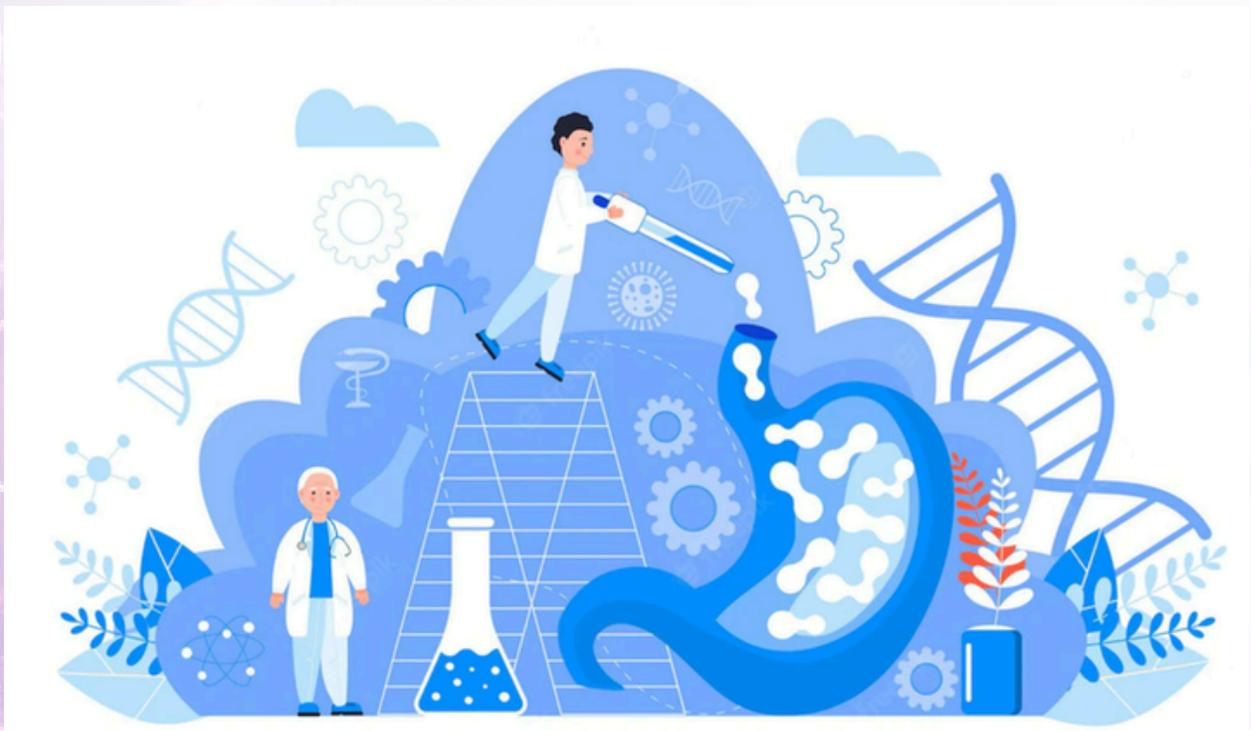
Kombucha Benefits: *Scientific*

Now that we have the anecdotal out of the way, is it really true that there are no benefits that science can confirm? **A brief review of the research done in the 21st century shows many promising potential benefits from consuming Kombucha that line up well with anecdotal reports.** As mentioned above, none of these are FDA-approved statements nor based on double-blind human trials, we are simply referencing a variety of scientific studies carried out around the world:

1. ***Helps bring the gut into balance.*** *Antioxidants, acids, enzymes, living bacteria and yeast all contribute to Kombucha's supportive effects to help with ulcers, candida overgrowth, and a variety of digestive issues.*
2. ***Compounds in the drink may help maintain a happy liver = happy mood.*** *Researchers call out antioxidant activity, reduction of oxidative stress, and even lead removal as potential causes.*
3. *Helpful to the heart and lungs as well.*

Kombucha Benefits: Scientific

- 4. Beneficial to those with diabetes or blood sugar issues.*
- 5. Shows potential for having positive effects against cancer cells.*
- 6. Improved Immunity (benzonitrile, benzoic acid, itaconic acid, isorhamnetin, quercetin, catalase, glucaric acid).*
- 7. Improved joint health.*
- 8. A rich source of B-Vitamins.*
- 9. Antibacterial against pathogenic organisms such as h.pylori, E. coli, and more.*
- 10. Certain acids present are considered candida-cides.*



04

HOW TO
KOMBUCHA

04

How to Kombucha

Now that we've discussed the many ways in which Kombucha can benefit the human body and human microbiome, you are probably eager to give it a try!



Start with Store-Bought

We do recommend purchasing commercial Kombucha from the store as that is where most homebrewers get their first sip. There are a range of choices and we typically recommend finding out if there's a local Kombucheria or Kombucha brewer in your area to sample. If there isn't one, here is a list of brands to try:

- **GT's Kombucha** - he's the OG - the guy who started selling it out of his kitchen when he was 16 back in 1995. All hail the King of Kombucha! His line comes in 30+ flavors so there will be one to please even the pickiest member of the family.
- **Health-Ade Kombucha** - Ginger Lemon packs a flavor punch, Pink Lady Apple is smoother in flavor plus they have some with added adaptogens for extra benefit.



Start with Store-Bought

For those who are looking for lower calorie count or guaranteed no alcohol products, here are some brands that are from concentrate with added probiotics or are dealcoholized. Any Kombucha is better than a sugary fruit juice, energy drink or soda!

- **Humm** - they have a low sugar line that uses allulose plus added probiotics
- **Brew Dr** - “crafted to remove alcohol” - this is more of a “tea soda” with gentle herbal flavors and less of that signature “Kombucha sweet-sour punch”

Read more about Kombucha labeling here →

<https://www.kombuchakamp.com/kombucha-nutritional-label-analysis>



Continuous Brew for Maximum Benefits

For those who really want to **maximize their benefits while minimizing their effort, then [Continuous Brew \(CB\)](#) is for you!** We think of CB as the easiest, safest, healthiest way to brew Kombucha and here's why.

- **Easiest**

- *Everything comes out of the spigot*
- *Less cleanup – less time to prepare*
- *Fast – brew time reduced to a few days*
- *Acts as SCOBY Hotel when on vacation*
 - *Brew at your own pace!*
- *Clean only once every 3-6 months*
 - *Based on taste – when sours too quickly*

- **Safest**

- *Less handling of cultures = less risk of mold contamination*
- *SCOBYs always in a pH protected environment*

- **Healthiest**

- *Some acids are expressed later in the fermentation process*
- *Higher quantities of glucuronic acid produced*

Brew on a Budget

"If you can brew a cup of tea, you can brew Kombucha!"

It literally is that simple. Plus, with tea and sugar as the staple ingredients, it's easy to brew for ***pennies per glass***. The SCOBY reproduces with every batch, so once you have a quality culture, it will last a lifetime if cared for properly.

"Can't I make my own SCOBY?"

There are those souls out there who simply want to see if a SCOBY can be grown from a commercial product. Back in the late '90s and even the early 2000's, this was absolutely possible! However, since the Kombucha Crisis in 2010, brands had to reformulate and while it's a good test to see if your commercial Kombucha is in fact alive, due to additives and other processes, those SCOBYs are not very robust.

[Click here for our basic 1 Gallon Kombucha Recipe](#)

Kombucha Tea, easy as 1 - 2 - 3!

Kombucha FUNdamentals

We're launching a Kombucha FUNdamentals course! This 10-part comprehensive, self-paced course covers DIY Kombucha, complete with info on traditional context and modern adaptations. We walk you all the way through first steps to perfecting flavor and fizz, PLUS you'll also get access to exclusive video content, Kombucha brew trackers, bonus handouts, and special discounts on equipment and cultures!

COMING SOON!



KOMBUCHA FUNDAMENTALS

**A COMPREHENSIVE COURSE ON THE
BASICS OF KOMBUCHA**

30 Day Kombucha Challenge

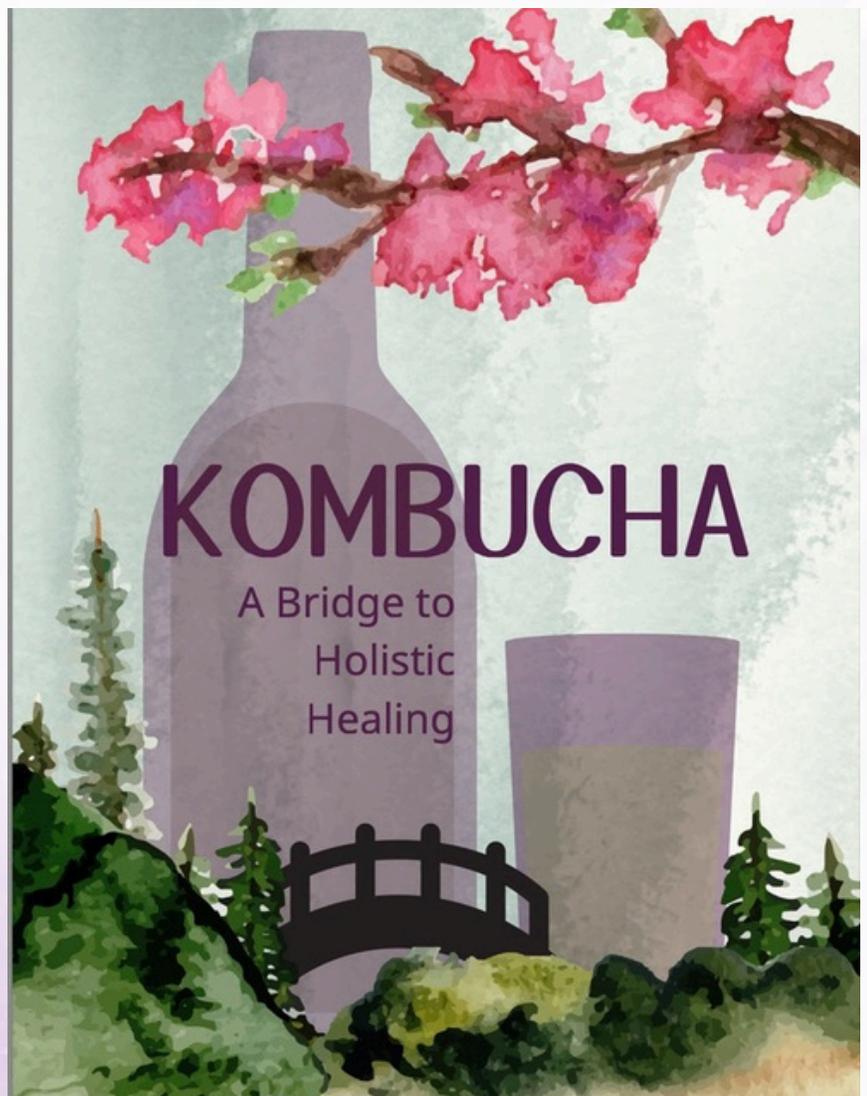
Kombucha is a bridge to holistic healing. In this 30 Day Challenge, Hannah uses Kombucha as a lens to focus on how to implement simple dietary and mindset changes for quick results.

Like the layers of an onion, the Challenge gradually unwraps nuggets of wisdom that have a profound impact. Anyone can participate as store-bought Kombucha may also be used.

Modules include:

- Goal Setting
- Sugar Detox
- Hydration
- Gut Health
- Personal Care
- Tools for Success

[Register Here](#)



05

WHO IS THE
KOMBUCHA
MAMMA?

05

Who is the Kombucha Mamma?

Thank you for reading this e-guide! Hi, I'm **Hannah Ruhamah, the Kombucha Mamma**. Mother to mazillions of bacteria across the globe! I'm grateful to be in service to humanity through the modality of Kombucha.

I've been brewing Kombucha for more than 20 years and teaching for nearly as long. As **bacteria farmers**, we are grateful to work with living, microbially diverse cultures grown in all organic ingredients.

Our Motto: Trust YOUR gut (not your tastebuds!)

Our Mission: Changing the World, One Gut at a Time™

Our Ethics: Quality Information; Quality Supplies; Quality Support

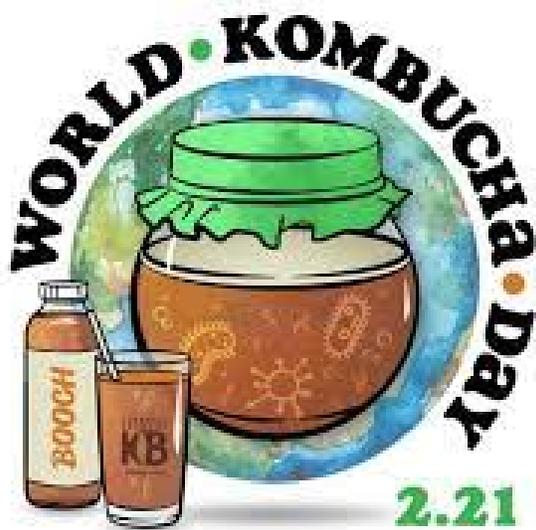
Healthy Boundaries = Healthy Culture

Who is the Kombucha Mamma?



Who is the Kombucha Mamma?

As an outgrowth of our mission and in homage to our mother culture, together **my husband and I also co-founded Kombucha Brewers International**, the non-profit trade association for commercially-produced Kombucha across the globe. **We advocate and educate to support small family businesses** who wish to enrich their local communities by brewing up fresh, healthy fermented foods and drinks.



2022 KOMBUCHA KUP
AWARDS OF EXCELLENCE



Who is the Kombucha Mamma?

We also co-authored the award-winning, best-selling, 400 page, ["The Big Book of Kombucha"](#) (Storey Publishing, 2016). Translated into over 5 languages, it continues to be a top seller and is lovingly referred to as the "Kombucha Bible". Authored as a "fun textbook", it's chock full of recipes, research and, of course, brewing tips.



Who is the Kombucha Mamma?

I also work as a consultant to help those who've fallen in love with the booch and want to share it with their communities. We also invent products specifically to support fermentation and the health of humans, animals, plants and the planet!



[@KombuchaKamp](#)

[KombuchaKamp.com](#)



RESOURCES



RESOURCES

Resources

- **What is the Human Microbiome**

- <https://www.hmpdacc.org/>
- <https://www.genome.gov/human-genome-project>

- **What are Bacteria?**

- <https://www.nature.com/articles/nmicrobiol201648>

- **Bacteriological Heritage**

- <https://pubmed.ncbi.nlm.nih.gov/7852253/>
- <https://www.cbsnews.com/news/eating-boogers-may-boost-immunity-scientist-suspects/>

- **Diversity is Our Nature**

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