Our digestive identity; we are what we digest, not what we eat

Is the vegan or carnivore biome shaping our social paradigm and agency?

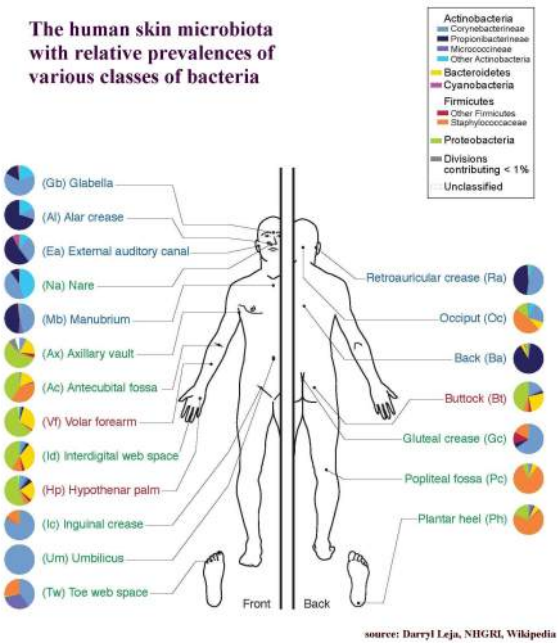
By Ir. Luc Sala, n.i.

We often assume that what we eat is what shapes us, but it's better to realize that it is what we (or the livestock in our guts) digest. Our digestion plays a distinctive role in the formation and evolution of our identity, our gut biome affect our total health, but also our moods and behavior. New approaches in pre- and probiotics underline this. One could even ask whether special diets like eating vegan or vegetarian influence more than a individual's health, do they point to for instance a different social attitude and agency. Can we see in the millennial laisser-faire attitude an emerging social paradigm shift towards more plant-like behavior? Or, does meat eating lead to aggression, Or, does meat eating lead to aggression, to the boomer agency of fixing things, maybe even extremism at times?

Identity is quite a fashionable term these days, used in politics and the media a lot. Usually it refers to personal identity, that what one is in totality, with the personality as the relational expression of it. But we also see it used in social identity, in identification and in digital identity, while the mathematical identity A=B means an equality relation. In a very broad perspective identity is what comes with manifestation, for everything has an identity once the quantum-physical probability curve collapses.

Here I introduce yet another identity type, pointing at a deeper or broader level of who we are, and what one could tentatively call our digestive identity in relation to what we eat and digest and including our biome, the life-forms we host. In our microbiome or metagenome we

have a variety of microbes, bacteria, archaea, protists, fungi, yeasts, eukaryotes, viruses[1] including bacteriophages) that we host in our guts and on our skin, and in our mouth and teeth. But in fact they are everywhere in our system, in organs, tissues and biofluids (micro-animals are excluded, but parasites like helminth endoparasites (worms) are sometimes included). They are ecological communities of commensal, symbiotic and pathogenic microorganisms and are in reality an inseparable part of who we are. We are what we think, feel and intuit and how we express this in our actions, but our well-being and agency has much broader roots than just what happens in our brains.



We are more than an epigenetically driven expression of our human DNA, for in our guts, on our skin and elsewhere in our body we have microbes, bacteria, phages, arhaea and many life forms that are an integral part of our system. We couldn't exist without them, for instance

1 The Human Microbiome Project (HMP) was a US (NIH) research initiative started in 2007 and ended in 2016 to improve understanding of the microbial flora involved in human health and disease. A European HMP-counterpart is MetaHIT.

the essential digestion of food in our guts doesn't happen without all those symbiotic guests (meaning we wouldn't survive without them).
We are, as human beings, ecological units, composed of various species living and acting together in a symbiotic way.That also means the DNA of all what lives inside and around of us on our skin plays a role in the totality of who we are. The idea of a holobiont[2] identity (Lynn Margulis, 1991), the host plus all of its symbiotic microbes and living things inside us, certainly makes sense. –The entire assemblage of genomes in the holobiont is termed a hologenome.

Gut identity, holobiont

We are symbiotic beings, we and our small guests are one; the hologenome theory of evolution recasts the individual animal or plant (and other multicellular organisms) and thus humans as a community of whatever lives in and on us. This constellation acts as a single entity, with a homeostasis that involves all the parts and depends on communication and exchanges between all those 'guests". Guests with their own identity, and their own DNA expression, and there are a lot of them.
The access to a much wider range of DNA (billions of it in our gut) means there is much more biodiversity in our system than just the human DNA. Maybe this is a source of genetic information which is used or can be used to deal with external influences and even play a role in evolution. How this exactly works is still studied but cannot be ignored in the context of looking at 'identity'.

Especially the gut biome is relevant. The idea that differential microbial composition is associated with alterations in moods, behavior and cognition is now establishing the microbiota–gut–brain axis as an extension of the well-accepted gut–brain axis concept. As science finds out more and more that we are influenced by our gut biome, we become more aware of the relevance and truth of the age-old insight, that we are what we eat, or rather that we are what we digest or what our biome digests for us.
Our biome is then a psychological as well as a physiological factor and plays an essential role in for instance our immune system. Healthy

2 Margulis, Lynn; Symbiosis as a Source of Evolutionary Innovation (1991)

gut bugs also produce nutrients like vitamin K, serotonin, and other essential hormones and the neurotransmitters we rely on to function optimally. The relationship between our gut biome and autism (see later) is a case in point, but probably there is much more, our biome could be a deciding factor in how we express emotions, deal with impulses (like emotional challenges, diseases, viruses, attacks on our immune systems), how we deal with others (our social identity), and maybe even the way we deal with the unexplainable, the magical, the otherworld.

The essential human capabilities, like self-consciousness and our inclination to shape our world, our ambition to make a difference, the entrepreneurial drive and our anthropocentric world view may have more to do with our guts than we have realized thus far. There is a social component.

Notably the difference between those who eat meat and those who don't might be a pointer towards understanding how our biome influences our individual, but also our social identity.

Maybe we should look much more at the digestive identities of animals (and of plants and mushrooms/fungi, bacteria, archaea, viruses) and how they deal with stimuli, how they play and learn, even at the microscoping level this is how life is expressed.

Evolution is adapting and learning, but mostly (and obviously so in humans) this involves unlearning, the dialectical process of dissociation (like in Hegel) and allowing for antithesis and synthesis. In human beings this has become a major factor in the evolution of our agency (with some dramatic results!) and these days we see that dealing with trauma (or rather not dealing with it but forming substitute identities[3]) limits our capability to alter the neurolinguistic patterns. Innovation is allowing to make room for new associations between the brain hemispheres, not stuffing and blocking this connection with 'learned' but unoriginal noise (which goes under the name of education, but basically means constipation or even obstipation). Our total biome plays a role here, not only the brains in our head.

3 Sala, Luc, Krippner, Stanley: identity 2.0 (www.share-shop.nl/identity.pdf) ISBN 9789492079350 (2020)

Another angle could be to study the differences between vegetarian and meat eating populations, like in India where the Hindus are mostly vegetarian, the Muslims not. Is there a difference in their entrepreneurial profile, in their social behavior, in their willingness for change?

Digestive identity

In this essay the perspective is limited to the digestive identity. One can see the digestive tract as part of the skin, our body can be seen as having a kind of donut shape. The alimentary system with the esophagus, the stomach and the guts are the hole in the donut.

The microorganisms that live in our digestive tract, when properly balanced, promote a healthy body, influence the immune system, bowel movements, metabolism, hormones that help with appetite regulation, but also moods and how your organs function. Deficiencies in the gut biome may cause all kinds of diseases, also mental problems.

We are what we digest and we all do this in a different way, depending on our gut biome, the peristaltic movements, the state of the intestinal barriers and our state of mind. Many believe that the quality of what they eat defines the digestion, but this is a somewhat limited view, of course promoted by the health and new-age food industry; buy bio, buy organic, buy macro-biotic, eat vegan, eat raw!

But there are a number of factors involved in digestion, apart from the initial quality of the intake. **The way the food is prepared, the tempo and timing, the environment (atmosphere, sound and lighting) and the people one is eating with are other main factors.** This means that for some people, the quality of the intake is not so important, their digestion is mostly influenced by the people around when eating. For others, the quality of the cook, the love in the preparation and presentation matter most. One could indicate these digestive patterns and the relative importance of these factors as their personal digestive matrix; optimizing their digestion has to take this into account. A diet should honor and provide for all the factors in the digestive matrix. Establishing the priorities in this matrix could be a much better help in achieving health and fighting obesity than yet another ‘food’ based fashionable diet.

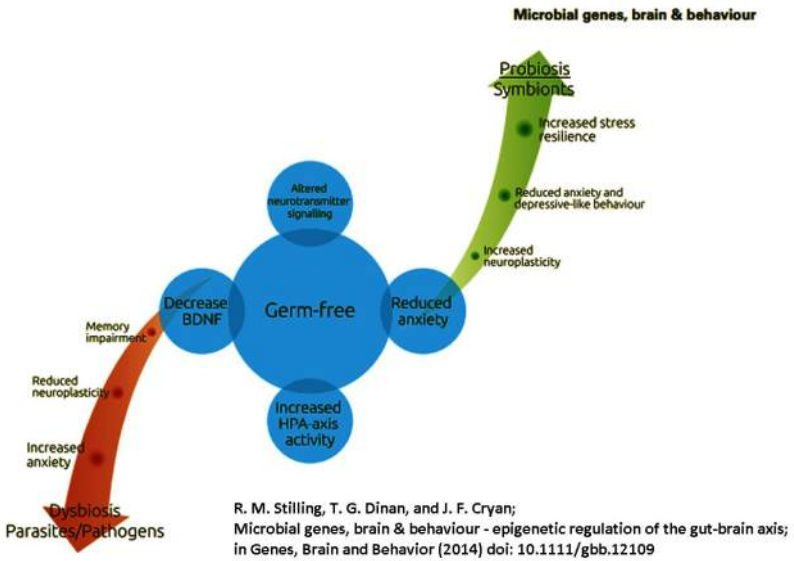
There is such an enormous variety in diets, all claiming to provide the desired effects like slimming down, a better skin, more muscles, etc. but usually only effective for specific groups, blood-types, cultures etc. Nothing works for all, although the so-called Mediterranean diet .

If we look at these diets they mostly concentrate on the intake, the food, and we can see that for many people this only covers part of the digestive matrix, and should be supplemented by actions or remedies in the other parts.

Autism and gut biome

More and more the condition of our gut and whatever lives in there, our gut biome, is accepted as an important factor in how we feel, think, and act. The dictum: “fix your gut, fix your brain.” indicates the importance of the coordination of the microbiota-gut-brain axis for our bodily and mental health, physiological homoeostasis, immunological development, glutathione metabolism, amino acid metabolism, etc.

Autism is one of the disorders, where the gut biome seems to differ from the normal situation, but there are many more, like in diabetes 2 allergies, and irritable bowel syndrome (IBS). The immune system and microbiota may engage in “cross-talk” by exchanging chemical



signals, which may enable the microbiota to influence immune reactivity and targeting.

Autism spectrum disorder (ASD) comes with cognitive inabilities, impaired communication, repetitive behavior pattern, and restricted social interaction and communication, often leading to a debilitating situation. Some forms like Asperger's (no longer seen as a separate disorder in DSM-V) or high-functioning autism (HFA) show peculiar capabilities and talents, which allow for some to actually have a meaningful contribution to society.

Autism has long be seen as a kind of insensitivity to normal communications, but is more and more recognized as oversensitivity, which is defended or dealt with by insensitive reactions to stimuli.

Autists have an elevated comorbidity for many things, but notably also gastrointestinal disorders like "leaky gut", pointing at a physiological base for the disorder, like dysbiosis or microbial imbalance in the gut.[4] Their gut biome shows a marked difference with 'normal' people without autism, but there is no single distinctive profile of the composition of the microbiota in people with ASD.

As there are similarities between ADHD (Attention Deficit/Hyperactivity Disorder) and autism, the gut biome may be an interesting avenue to deal with this, and the step towards PTSD is not far removed, especially in the context of adrenal complex disbalances in PTSD.

Probiotics

The administration of probiotics (mostly a mixture of Bifidobacteria, Streptococci and Lactobacilli) is a promising treatment for neurobehavioural symptoms and bowel dysfunction, and there is adequate research confirming this. The faecal microbiota transplant approach is also becoming popular, but clinical trials are still limited and heterogeneous.

Many types of bacteria are classified as probiotics. They all have different benefits, but most come from two groups. Lactobacillus is the most common probiotic, it's in yogurt and other fermented foods. Different strains can help with diarrhea and may help people who can't digest lactose, the sugar in milk. Bifidobacterium is in some dairy products. It may help ease the symptoms of irritable bowel syndrome (IBS) and some other conditions. There are many natural probiotics, in

4 Pulikkan, Mazumder, Grace; Role of the Gut Microbiome in Autism Spectrum Disorders; in Adv Exp Med Biol. 2019;1118:253-269. doi: 10.1007/978-3-030-05542-4_13.

Behavioural phenotypes of differential microbiota composition

Parameter	Microbial composition	Phenotype	Species/strain	Behavioral test	Reference	Reversibility	Involvement of vagus nerve
Anxiety	GF	Reduced basal anxiety	NMRI	OF, LDB, EPM	Diaz Heijtz *et al.* (2011)		
Anxiety	GF	Reduced basal anxiety	Swiss-Webster (f)	EPM	Neufeld *et al.* (2011a,b)	✗	
Anxiety	GF	Reduced basal anxiety	Swiss-Webster (m)	LDB	Clarke *et al.* (2012)	✔	
Anxiety	N+ *Citrobacter rodentium*	Increased anxiety	CF-1 (m)	OHB	Lyte *et al.* (2006)		
Anxiety	N+ *Lactobacillus rhamnosus*	Reduced basal anxiety	BALB/C (m)	OF, EPM	Bravo *et al.* (2011)	✔	✔
Anxiety	N+ *Trichuris muris* (nematode parasite)	Increased anxiety	AKR (m)	LDB	Bercik *et al.* (2010)	✔	✗
Anxiety	N+ *Bifidobacterium longum*	Reduced anxiety after dextran sodium sulphate colitis	AKR (m)	SD	Bercik *et al.* (2011)	✔	✔
Anxiety	N+ *Campylobacter jejuni*	Increased anxiety	CF-1 (m)	OHB	Goehler *et al.* (2008)		
Anxiety	N+ *Lactobacillus helveticus*+ *Bifidobacterium longum*	Decreased anxiety	Wistar rats (m)	CDB	Messaoudi *et al.* (2011)		
Anxiety	N+ *Campylobacter jejuni*	Increased anxiety	CF-1 (m)	EPM	Lyte *et al.* (1998)		
Depressive-like behaviour	N+ *Bifidobacterium infantis*	Reduced immobility in FST after MS	Sprague–Dawley rats	FST	Desbonnet *et al.* (2010)	✔	
Depressive-like behaviour	N+ *Lactobacillus rhamnosus*	Reduced immobility in FST	BALB/C (m)	FST	Bravo *et al.* (2011)	✔	✔
Depressive-like behaviour	N+ *Lactobacillus helveticus*+ *Bifidobacterium longum*	Reduced depressive-like behaviour after MI	Sprague–Dawley rats (h)	FST, SD	Arseneault-Bréard *et al.* (2012)	✔	
Learning & memory	N+ *Bifidobacterium lactis*+ *Lactobacillus fermentum*	Improved spatial memory and amelioration of memory impairment during diabetic-like status	Wistar rats	MWM	Davari *et al.* (2013)	✔	
Learning & memory	GF	Impaired (short-term) recognition memory and working memory	Swiss-Webster (f)	NOR, TM	Gareau *et al.* (2011)		
Learning & memory	N+ *Citrobacter rodentium*	Impaired (short-term) recognition memory and working memory after stress induction	C57BL/6 (f)	NOR, TM	Gareau *et al.* (2011)	✔	
Learning & memory	N+ *Lactobacillus rhamnosus*	Enhanced fear memory	BALB/C (m)	cued FC	Bravo *et al.* (2011)		
Locomotion	GF	Hyperlocomotion and increased rearing	NMRI	OF	Diaz Heijtz *et al.* (2011)	✔	
Self grooming	GF	Increased time spent on self grooming	Swiss-Webster (m)	—	Desbonnet *et al.* (2013)	✔	
Social interaction	N+ *Lactobacillus helveticus*+ *Bifidobacterium longum*	Normalized social interaction after MI	Sprague–Dawley rats (h)	—	Arseneault-Bréard *et al.* (2012), Gilbert *et al.* (2013)	✔	
Social interaction	GF	Avoidance of conspecifics	Swiss-Webster (m > f)	TCST	Desbonnet *et al.* (2013)	✔	
Social investigation	GF	Decreased time spent on social investigation	Swiss-Webster (m)	STFP	Desbonnet *et al.* (2013)	✔	
Social novelty	GF	No preference for novel conspecific	Swiss-Webster (m > f)	TCST	Desbonnet *et al.* (2013)	✗	

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Genes, Brain and Behavior (2014) 13: 69–86

fermented product:, in Kefir, Kombucha, Kimchi, Tempeh, Miso, sauerkraut, soy sauce, etc.

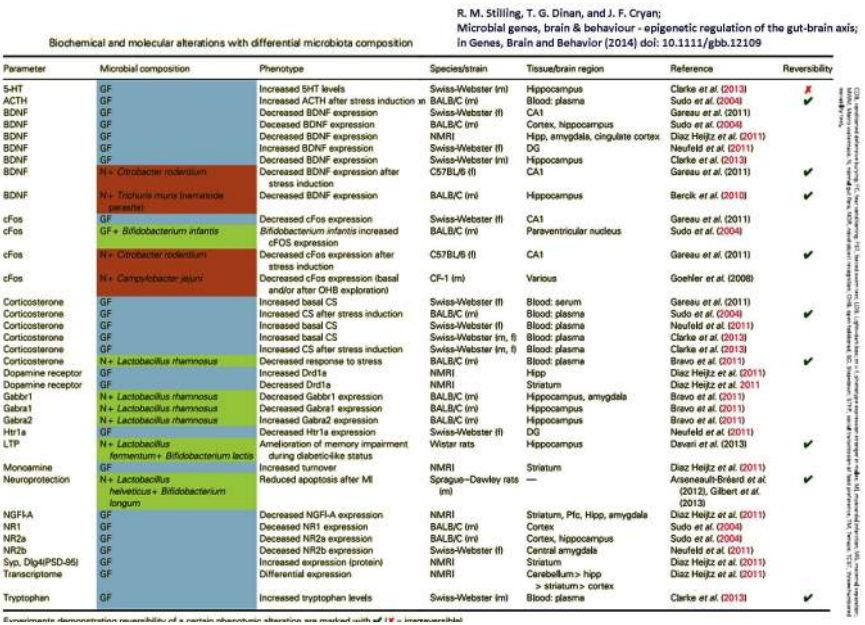
Prebiotics are substances, such as fructans and oligosaccharides, that induce the growth or activity of beneficial micro-organisms.

Taking antifungal herbs, in addition to taking a probiotic, can be necessary to reset the microflora and kill off pathogenic fungi. Whole herbs can help the body with detoxification and purification, and reduce inflammation in the gut.

The microbiota–gut–brain axis

Our guts, brains, nervous systems and behavior these days are considered as far more interconnected, mostly because of the influence of gut bacteria (the microbiome or also called microbiota) on emotional well-being.

The discovery of the beneficial effects of certain psychobiotics has changed the perspective. Psychobiotics are live organisms which, when ingested in adequate amounts, benefit the health of some psychiatric patients as mentioned above for autism, but also could improve mood, thinking, memory, creativity and emotional well-being.



R. M. Stilling, T. G. Dinan, and J. F. Cryan;
Microbial genes, brain & behaviour - epigenetic regulation of the gut-brain axis;
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Biochemical and molecular alterations with differential microbiota composition

Parameter	Microbial composition	Phenotype	Species/strain	Tissue/brain region	Reference	Reversibility
5-HT	GF	Increased 5HT levels	Swiss-Webster (m)	Hippocampus	Clarke *et al.* (2013)	✗
ACTH	GF	Increased ACTH after stress induction in	BALB/C (m)	Blood: plasma	Sudo *et al.* (2004)	✔
BDNF	GF	Decreased BDNF expression	Swiss-Webster (f)	CA1	Gareau *et al.* (2011)	
BDNF	GF	Deceased BDNF expression	BALB/C (m)	Cortex, hippocampus	Sudo *et al.* (2004)	
BDNF	GF	Decreased BDNF expression	NMRI	Hipp, amygdala, cingulate cortex	Diaz Heijtz *et al.* (2011)	
BDNF	GF	Increased BDNF expression	Swiss-Webster (f)	DG	Neufeld *et al.* (2011)	
BDNF	GF	Decreased BDNF expression	Swiss-Webster (m)	Hippocampus	Clarke *et al.* (2013)	
BDNF	N+ *Citrobacter rodentium*	Decreased BDNF expression after stress induction	C57BL/6 (f)	CA1	Gareau *et al.* (2011)	✔
BDNF	N+ *Trichuris muris* (nematode parasite)	Decreased BDNF expression	BALB/C (m)	Hippocampus	Bercik *et al.* (2010)	✔
cFos	GF	Decreased cFos expression	Swiss-Webster (f)	CA1	Gareau *et al.* (2011)	
cFos	GF+ *Bifidobacterium infantis*	*Bifidobacterium infantis* increased cFOS expression	BALB/C (m)	Paraventricular nucleus	Sudo *et al.* (2004)	
cFos	N+ *Citrobacter rodentium*	Decreased cFos expression after stress induction	C57BL/6 (f)	CA1	Gareau *et al.* (2011)	✔
cFos	N+ *Campylobacter jejuni*	Decreased cFos expression (basal and/or after OHB exploration)	CF-1 (m)	Various	Goehler *et al.* (2008)	
Corticosterone	GF	Increased basal CS	Swiss-Webster (f)	Blood: serum	Gareau *et al.* (2011)	
Corticosterone	GF	Increased CS after stress induction	BALB/C (m)	Blood: plasma	Sudo *et al.* (2004)	✔
Corticosterone	GF	Increased basal CS	Swiss-Webster (f)	Blood: plasma	Neufeld *et al.* (2011)	
Corticosterone	GF	Increased basal CS	Swiss-Webster (m, f)	Blood: plasma	Clarke *et al.* (2013)	
Corticosterone	GF	Increased CS after stress induction	Swiss-Webster (m, f)	Blood: plasma	Clarke *et al.* (2013)	
Corticosterone	N+ *Lactobacillus rhamnosus*	Decreased response to stress	BALB/C (m)	Blood: plasma	Bravo *et al.* (2011)	✔
Dopamine receptor	GF	Increased Drd1a	NMRI	Hipp	Diaz Heijtz *et al.* (2011)	
Dopamine receptor	GF	Decreased Drd1a	NMRI	Striatum	Diaz Heijtz *et al.* 2011	
Gabbr1	N+ *Lactobacillus rhamnosus*	Decreased Gabbr1 expression	BALB/C (m)	Hippocampus, amygdala	Bravo *et al.* (2011)	
Gabra1	N+ *Lactobacillus rhamnosus*	Decreased Gabra1 expression	BALB/C (m)	Hippocampus	Bravo *et al.* (2011)	
Gabra2	N+ *Lactobacillus rhamnosus*	Increased Gabra2 expression	BALB/C (m)	Hippocampus	Bravo *et al.* (2011)	
Htr1a	GF	Decreased Htr1a expression	Swiss-Webster (f)	DG	Neufeld *et al.* (2011)	
LTP	N+ *Lactobacillus fermentum*+ *Bifidobacterium lactis*	Amelioration of memory impairment during diabetic-like status	Wistar rats	Hippocampus	Davari *et al.* (2013)	✔
Monoamine	GF	Increased turnover	NMRI	Striatum	Diaz Heijtz *et al.* (2011)	
Neuroprotection	N+ *Lactobacillus helveticus*+ *Bifidobacterium longum*	Reduced apoptosis after MI	Sprague–Dawley rats (m)	—	Arseneault-Bréard *et al.* (2012), Gilbert *et al.* (2013)	✔
NGFI-A	GF	Decreased NGFI-A expression	NMRI	Striatum, Pfc, Hipp, amygdala	Diaz Heijtz *et al.* (2011)	
NR1	GF	Deceased NR1 expression	BALB/C (m)	Cortex	Sudo *et al.* (2004)	
NR2a	GF	Deceased NR2a expression	BALB/C (m)	Cortex, hippocampus	Sudo *et al.* (2004)	
NR2b	GF	Deceased NR2b expression	Swiss-Webster (f)	Central amygdala	Neufeld *et al.* (2011)	
Syp, Dlg4(PSD-95)	GF	Increased expression (protein)	NMRI	Striatum	Diaz Heijtz *et al.* (2011)	
Transcriptome	GF	Differential expression	NMRI	Cerebellum> hipp > striatum> cortex	Diaz Heijtz *et al.* (2011)	
Tryptophan	GF	Increased tryptophan levels	Swiss-Webster (m)	Blood: plasma	Clarke *et al.* (2013)	✔

Experiments demonstrating reversibility of a certain phenotypic alteration are marked with ✔ (✗ = irreversible).

There is also much interest in transfer of gut biome more directly. Faecal microbiota transplant (FMT) or bacteriotherapy and also known as a stool transplant, is the process of transplantation of faecal bacteria from a healthy individual into a recipient. FMT involves restoration of the colonic microflora by introducing healthy bacterial flora. It's becoming a routine with C-section births, transferring some stool and vaginal fluids from the mother to the baby. The microbiota effects pre- and postnatal development and it is shown that detrimental alterations in early-life stages may lead to undesirable phenotypes during adulthood. Being breast-fed strengthens also the microbiome by providing healthy flora through breast milk, establishing increased biodiversity.

It's kind of interesting to see the present interest in gut microbiota and FMT as innovation and the new kid on the block, as it clearly has historical roots.

The history of faecal microbial transplant (FMT) is a case in point: though often claimed as a 'new' therapy it has existed in the form of oral administration in European medical traditions since Ancient Greece, featured in several major works of medical description of the sixteenth and seventeenth centuries, and has been used in Chine-

se medical traditions since the Don-jin dynasty (4th century CE). Rectal delivery of FMT was used by the American doctor I.O. Wilson in 1910, following the identification of changes in faecal bacterial composition among patients with functional bowel disorders. [5]

Digestive communication

The fact that some people digest better when around some specific people kind of hints at communication between the digestive identities, and maybe this is not at an indirect level via the mood, but at an emotional level communicated between the adrenals (the emotion-ears). Another link might be via direct communication between the biomes. This could mean that DNA plays a role in such communication, in line with the suggestion (or is it mere speculation) that thought is a DNA expression process, influenced by epigenetic drives.

There is resonance between people concerning their digestion. Not only do couples that have eaten together for a long time are beginning to look similar, but there a group mind processes that link us, also at the digestive identity level. People influence each other's digestive process, and this is maybe not very noticeable for everybody, but there are people who really suffer because their partner's digestive messages don't sit well with them, their cooking makes them sick or their biomes don't match nicely. This phenomenon is also observed with some pets, the animals copy the food tolerance and preferences of their masters.

This view on digestion is speculative, but may have serious implications for those with food intolerances or allergies. Is it only the material they ingest, or are they influenced by the people around them, by the quality of the cooking or other factors in the digestive matrix? Some people have serious allergies in one environment but on a holiday trip can eat whatever.

5 Quted from: Alison M. Moore, Manon Mathias & Jørgen Valeur; Contextualising the microbiota–gut–brain axis in history and culture; Microbial Ecology in Health and Disease https://doi.org/10.1080/16512235.2019.1546267

Multiplicity

It has been suggested[6] that microbiota is an important mediator of gene-environment interactions and a factor in epigenetic expression of our genome, shaping brain and behaviour.

In the context of the Substitute Identity Model (SIM) people may have multiple identities (commonly referred to as personalities) each with a different set of digestive priorities. Given the identity state one is in, the optimal digestive matrix might be different, it may be specific to a certain state. Just as we shift between substitute identities, often unnoticed, we might be shifting between biome conditions related to these identities. This might involve different sections of the gut biome, with a different effect on behavior etc. In this perspective, it's like the epigenetic activation of our genome, what matters is what is activated, not what is present. It might be interesting to see how different identities and thus different activated biome sections (phylae, bacterial groups) work out in for instance neurotransmitter production.

Microdosing

One of the trends among the hip and creative is using microdoses of psychedelic drugs, claiming this affects their moods, their output and creativity. It's quite a fashion, but there is little research into what this microdosing really produces, most reports are anecdotal and focus on cognitive and mood effects, like creative boosts, assuming this is all happening in the brain. It may be that those tiny amount of psychedelics not so much affect our brains as our guts, that the biome responds and affects our moods. The research projects don't ever look into digestion or bowel movements or how the HPA-axis and adrenals react to microdosing, while it is known that 5-HT effect of psychedelics are also . However, leading researcher in this field James Fadiman is now including this in his guidelines and questionnaires concerning microdosing.

The effects of the gut biome on the moods of a person are now well recognized, so maybe the small amounts of psycho-active substances have an effect first on the gut biome and then, indirectly, on the mood

6 R. M. Stilling, T. G. Dinan, and J. F. Cryan; Microbial genes, brain & behaviour – epigenetic regulation of the gut–brain axis; in Genes, Brain and Behavior (2014) doi: 10.1111/gbb.12109

changes reported by microdose experimenters. Maybe even the access to large amounts of DNA in the gut biome plays a role here, and this is maybe also a factor in our evolution as a species.

The vegan biome versus the omnivore

These days more and more people, including many of the young millennials but less of the omnivorous baby-boomers generation turn to vegetarian or even vegan food. It's a bit of a fashion, an identification with healthy and conscious living, but growing in popularity. There are many good reasons to do so, the environmental impact and the animal bio-industry is well known. But that's not the only one, vegan food is supposed to help maintain and even boost a healthy gut biome, supporting weight loss and overall health. A healthy microbiome is a diverse microbiome. A plant-based diet with lots of fibers is the best way to achieve this. One of the predictors of good gut health is a variety of antioxidant-, phytonutrient- and fiber-rich foods. Plants provide the bulk of these. It isn't necessary to opt for a strictly vegan diet, but it's beneficial to limit meat intake. A vegan diet can improve your health, and even increase one's life-span, but experts say it's important to keep track of nutrients and proteins and one should still watch out[7]. Vegan does not by definition excludes a lot of processed foods, sugar, or gluten. Just look at the popularity of fake meats which are often very much processed and unhealthy.

One has to eat vegan consciously, as legume protein sources can increase risk of leaky gut, soy protein sources can cause hormone disruptions, there is risk of anemia due to a lack of heme iron, increased risk of depression with low omega-3 fatty acid intake, risk of Vitamin B12 deficiency, risk of consuming too much carbohydrate as vegan diets are generally lower in protein.

What's happened in the past in the West in the last century is we've moved to a typical diet that includes such highly processed foods like bread, rice, pasta, and a lot of animal meat, with obesity and all kinds of diseases as a result. It's too much of a generalization to say the baby-boomers are more carnivorous and the millennial are more herbi-

7 Dagnelie PC.; Nutrition and health–potential health benefits and risks of vegetarianism and limited consumption of meat in the Netherlands. Ned. Tijdschr. Geneesk. PMID: 12868158. www.ncbi.nlm.nih.gov/pubmed/12868158 (2003)

vores, but there is a distinct change in food patterns. This will have an effect on our culture and society, if we realize that animals are more about flux, change and innovation, while plants are more about permanence and collectivism. Are we moving towards a more social paradigm, because of our food choices?

Conclusion

In the context of healthy living our digestive effectiveness is a major factor, and this has been known all along. You are what your eat or better, what you digest! But seen in the holobiontic perspective this may have to do much more with our gut biome than we assumed. The interest in for instance faecal exchange therapy is certainly growing, some faecal substance is now routinely applied in C-section birth situations (recolonization) to help build the gut biome of the baby and boost their immune system.

Honoring our intestinal friends seems a sensible approach, pre- and probiotica might influence our moods, impetus and creativity more than we think. These days we swallow enormous amounts of drugs, vitamins, health supplements and such, maybe directing that intake more towards affecting our gut biome will yield better results.

Dec 2019

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