



Calming and Repopulating the Gut

Fermenting for Health

Tom Rothsey

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**An experience based method for gut calming, cleansing, and
repopulation based on the colonisation of the infant gut**

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Important: Information provided in this booklet is for personal research purposes only based on what has worked for my family. Because every one of us is different, there is no one size fits all approach to any form of diet or protocol. Please consult with your chosen professional to fine tune the approach for you and your dietary and calorific needs. This booklet does not constitute medical advice in any way.

What is Fermentation?

Fermentation predates history, and all cultures on earth, past and present, either ferment or consume fermented foods. The organisms involved have an intimate relationship with us - a symbiosis so involved that we and they may be viewed as a community. Without our internal microbiota, we sicken.

Fermentation is simply the process by which starch or sugar is converted by an organism (or organisms) into either an alcohol or an acid. Enzymes produced by yeasts, moulds, or bacteria work to break down organic matter, and to synthesise beneficial compounds such as amino acids and vitamins. Enzymes are catalysts for chemical reactions that break down complex molecules, which may be looked upon as a process of 'pre-digestion' in the context of fermented foods and beverages. Of course, the health and nutritional benefits of fermentation far exceed merely making our food easier to assimilate.

The word ferment itself comes from the Latin for yeast, *fermentum*, which in turn comes from *fervere*, which means 'to boil'. When the Tarahumara people of the Americas brew pulque, their agave beer, the fermenting mixture 'learns to boil'. Our English word yeast comes from the Greek word *zestós* (boiled), itself most likely derived from the Sanskrit *yásati*, meaning (it) boils. The fermentation process results in the release of carbon dioxide, so it is easy to see how this relates to the idea of boiling, or bubbling. Interestingly, the word fervour, meaning an intense passion, also derives from *fervere*. When we immerse ourselves in the world of fermentation, we quickly acquire fervour – we bubble with enthusiasm and passion and life, just as our ferments bubble. We reconnect with our roots, and re-establish severed bonds of wider community. We wish to share our passion, as they say, "with all the fervour of the convert".

The Ecology of Fermentation

In his book *Wild Fermentation*, Sandor Katz likens the microbial succession that occurs during much lactic acid bacteria fermentation to the natural progression of growth in a forest. As an ecologist specialising in forest ecology and biodiversity, this is an appealing analogy to me.

In a forest environment, the process that ecologists call succession begins with "pioneer" plant species that colonise a newly opened space within the forest. As these pioneers grow, they alter conditions within the soil, and provide the right amount of shade and protection, so that secondary species may thrive. The secondary species eventually overtake the pioneer species and become dominant, though of course, some pioneers remain, confined to patches of micro-habitat, where they eventually senesce (slowly die off). In turn, the secondary species alter conditions to favour

tertiary species, those that will become the community dominants, and those species we think of when we think of a particular forest. Eventually, we have what is called the “climax community” – the highest form of expression of that community, and we generally name the community for those that express the highest form, or that have the greatest prominence, or importance for us.

In keeping with the principle of “as above, so below”, the process of microbial succession within a vessel of fermenting vegetable material is a micro version of the macro forest, and we give a successful ferment the name of the dominant and most desirable species in the fermented climax community: we call it lactic acid bacteria, or lactobacillic, fermentation. Initially in lactobacillic fermentation, our fermenting vessel with its largely anaerobic, saline (alkali) environment is colonised by enterobacteria. As enterobacters further deplete oxygen and acidify the environment, it becomes favourable to *Leuconostoc* and other bacteria, who in turn prepare the environment for lactobacilli as the pH drops (acidification). In keeping with our principle of “as without, so within”, this external community of micro organisms within our fermenting vessel is in perfect balance with the desired community of micro organisms within a healthy human digestive tract. Not only that, the succession of bacterial colonisation of the gut of the new born infant is remarkably similar – enterobacteria colonise initially (acquired in-utero), modifying the environment to provide the anaerobic and acidic conditions favoured by the other successional species (acquired during passage through the birth canal, cuddling, kissing, feeding, etc.), culminating in the climax community of lactobacillic bacteria of the healthy infant gut. This has important implications in regard to how we choose to re-colonise the gut microbiota after anti-biotic use.

Bacteria are classified as either Gram-negative, or Gram-positive, indicating their reaction to the Gram staining technique. The response is dictated by the thickness of the inner membrane of the cell wall, but there are also differences in cell wall components used to facilitate communication between our immune system and the bacteria in question. Though probiotic bacteria are mostly gram positive, this doesn’t imply a judgment, because some body-friendly bacteria are gram negative (e.g. some strains of *E. coli*). Interestingly, probiotic strains of *E. coli* have an initial effect of downgrading the inflammatory response of the immune cells that contact them by favouring production of interleukin-10 (IL-10) over IL-12. This allows modulation and “set up” of the immune response in the infant without initiating an immune response/inflammation feedback loop. If cultured further in isolation in-vitro, coliform bacteria eventually work to markedly increase production of IL-12, and so initiate an inflammatory response. For this reason, prolonged use of probiotic supplements utilizing patented coliform bacterial strains should be avoided. In life, however, as discussed above, the coliform bacteria modify the environment for gram positive bacteria. As these proliferate, the effect of the coliforms reduces, but they have already set up the immunomodulatory action that works to negate the preference for gram positive bacteria to promote an inflammatory response. In theory, when we want to restore balance within the ecology of our gut, we could take a succession of probiotic strains, taking each one for just the right amount of time to imitate the effects of nature. Or, we could just utilize nature. More on that later.

Probiotics

The diverse strains of microorganisms within the human digestive tract form an internal ecosystem that has profound effects on human health and well being. When that ecosystem is in balance, we thrive – when it is unbalanced, we invite and experience discomfort or disease. Scientists and physicians call this ecosystem our microbiota, but we know those beneficial organisms within our microbiota that promote internal ecological balance better as probiotics.

Probiotics help us in many ways - so much so, that they should be considered an essential food group. Probiotics compete successfully with pathogenic or potentially harmful bacteria within our digestive tract, lowering their populations sufficiently so we find we are less vulnerable to digestive disorders and disease. Probiotics also play a vital role in the human body by regulating immune and inflammatory responses, producing vitamins and enzymes, scavenging non-digested food components and human body metabolites, and feeding the intestinal lining. Some of the conditions scientists and physicians are now beginning to recognize that may either be prevented, relieved, or resolved by probiotics include: diarrhea, inflammatory bowel disease, irritable bowel syndrome, allergies, asthma, eczema, multiple sclerosis, yeast infections, the eighty plus recognized autoimmune disorders, cardiovascular disease, obesity, colorectal cancer, fibromyalgia, chronic fatigue syndrome, autism, leaky gut syndrome, upper digestive tract ulcers (through competitive advantage over *Helicobacter pylori*), colitis, depression, and autism. It is important to add, however, that probiotics should never be used as the sole means of treating serious medical conditions. Diet, lifestyle, and state of mind are also important, as are conventional and complimentary medical and therapeutic approaches.

Our internal microbiota are diverse and numerous, with more 10,000 different species making up the more than 100 trillion microorganisms that inhabit the average human body. Our microbiota occupy four distinct ecosystems, with different species having their own well-defined niches within each system. The ecosystems are: free floating in the intestinal lumen (anatomically, the lumen is the inside of a tubular structure in the body); adhering to the surface of the epithelial cells (skin, and the linings of body cavities and the intestinal lumen); within the mucosal layers of the respiratory and digestive tracts; and nestled within “crypts” (indentations of the intestines).

Prebiotics are foods which provide a competitive advantage within our internal ecosystem for probiotics. The best known source of prebiotics is dietary fibre – we can’t digest it, but many probiotic microorganisms thrive on it. Some prebiotic foods favour probiotics; others disadvantage the microorganisms they compete against; while others act like selective antibiotics, inhibiting the growth of unfavourable microorganisms (e.g. phenols like tannins, phytoestrogens, flavonoids, flavonols, bioflavonoids). When seeking out prebiotics, consume fibre foods for their soluble fibre content (e.g. oats, barley, rice bran, psyllium husk, berries, legumes, and unpeeled fruits and

vegetables) because this confers a twofold advantage: probiotic bacteria thrive on soluble fibre, and as they consume it, they release short chain fatty acids (not fats, but vinegar-like acids) that inhibit the growth of non-probiotic organisms, such as *Escherichia coli* (*E. Coli*). Good examples of prebiotics include: fruit and vegetables with the skin on; whole grains, nuts and seeds; dark unsweetened berry juices; herbs and spices (especially oregano); wholegrain sourdough bread; oats; legumes; green tea; and dark chocolate (or raw cacao). Foods to specifically avoid at all costs are the refined carbohydrates – most especially white bread and white sugar.

Our bodies are host to on average one hundred trillion microorganisms at any one time, and over 99% of these are bacteria, and about 80% of these inhabit our digestive tract. Some bacteria are always helpful to us (e.g. species of *Lactobacillus* and *Bifidobacterium*), while others are never helpful, and may cause disease if their numbers rise too high (e.g. *Clostridium difficile* and *Pseudomonas aeruginosa*). Outnumbering these, however, are bacteria that may be beneficial or detrimental to our health, depending on their population size and location within the body (e.g. species of *Bacteroides* and *Klebsiella*). Bacteria are self-replicating single-celled life-forms, and their rate of replication can be rapid indeed: *E. Coli*, for example, can double their population size in as little as 20 minutes if conditions are optimal.

The most common yeast of the human microbiota is *Candida albicans*. If kept in check by competition with probiotic organisms, it is harmless, but if it is allowed to attain a sizeable population, then it can be responsible for various symptoms, such as diarrhea, headaches, bloating, recurring infections and thrush (to name but a few). Probiotic yeasts confer benefits, despite their relatively low occurrence within us. *Saccharomyces boulardii*, for example, has been shown to be effective in the control of *Clostridium difficile* related diarrhoea, and to limit the populations of *Candida albicans* and *E. coli*.

A third principle also exists, that of “metabiotics”. Fermented foods or beverages in which the probiotic complement is no longer living still convey health benefits through the actions of their metabolites – enzymes and other compounds (e.g. short chain fatty acids) formed during the fermentation process. The cells of our immune system may still communicate with polysaccharides and other structures on the bacterial wall, so even dead bacteria contribute immuno-regulatory benefits.

Inflammation and resetting the gut

Inflammation is a natural part of our body's innate immune response, and plays a major role in healing. Without inflammation, our wounds, infections and tissue damage simply would not heal. So, when we talk about reducing or managing inflammation in the body, we are talking about chronic inflammation that has remained long after the need has passed, or an inappropriate response such as we find in auto-immune conditions. Inflammation is a protective isolation of the affected part, but problems arise with long-term inflammation of the gut because this isolation prevents proper communication between our immune cells and our probiotic bacteria. Immune cells identify all entities by contact with structures on the cell wall – probiotic bacteria illicit a state of immune system readiness when encountered, but unrecognised, foreign or pathogenic entities (antigens) are recognised as a threat, and so tagged with antibodies. These antibody-antigen complexes are then attacked by other immune cells and an isolated inflammatory response follows.

One downside of inflammation is that the fluids that accompany it have the ability to render our immune cells 'blind' to the polysaccharides and acids normally used to identify probiotic bacteria. So with long term inflammation of the gut, the immune system easily switches from a state of readiness to a state of war, and a cycle of auto-immune type responses and inflammation can become entrenched. As a result the structure of the gut itself may become compromised to the extent that undigested food particles may enter circulation through holes in the gut, where they in turn prompt an inflammatory reaction by becoming tagged with antibodies. This is the widely known 'leaky gut', and as it worsens, the number of antibody-antigen complexes in our circulatory system quickly exceeds the capacity of our immune response, and they become lodged in tissue. Once accumulated there, they are eventually located and attacked, along with the surrounding tissue, which our immune cells no longer recognise.

It stands to reason then, that eliminating foods that irritate the gut is a good first step to regaining our optimal health. Probiotics introduced to an irritated gut are likely to be identified as 'unknown', and therefore attacked by our immune cells, so we often don't get the benefit we hope or expect from them. The compromised gut and lack of probiotic balance have very much a 'chicken and the egg' relationship – either one of them could easily come first. There are also many other factors that contribute to this state of affairs, and to how it manifests within each of our bodies, but there is one approach that works regardless. I like to call that the 'resetting the gut' approach. At its simplest, there are only four steps – calm, heal, repopulate and replenish. Calm the gut to stop the inflammation/auto-immune merry-go-round; heal the gut damage through selective nutrition and carefully applied fermented foods; repopulate the gut with a protocol based on the colonisation of the infant gut, and replenish the gut with as much probiotic diversity as we can while identifying the optimal diet for our individual body and needs.

Calming the gut

There are many groups of trigger foods that provoke allergic type reactions that can lead to inflammation and worse over time. Some people appear sensitive to none of them, while others are sensitive to many. We can probably all guess the five major groups of trigger foods – gluten bearing grains, dairy, eggs, legumes, and yeast. Other triggers may be the nightshade family (eg tomatoes and potatoes), the onion family, shellfish, corn, or certain herbs and spices. The important thing, however, is that once the inflammation in the gut has subsided, and once the gut has been healed, many of these trigger foods can be reintroduced in moderation without symptoms or ill-effect. Others still may be introduced incrementally once probiotic balance has been achieved to habituate the body to their presence. Some foods though have no place in the body, and modern wheat is one of those in my opinion. Heirloom grains can often be reintroduced with no problems, and these are acceptable substitutes for many people.

As well as eliminating trigger foods, we want to eliminate the chemical triggers that enter us via processed and packaged foods. Many of the trigger foods are also hidden within processed foods, but we are also concerned with artificial colours, preservatives and sweeteners, many of which are recognised neurotoxins, neuro-exciters and irritants of the highest order. To calm the gut, we want to eat fresh, local food, grown as chemically free as possible, and later on, we also want to eat the skins of these. In an ideal world, we would never be exposed to the chemical glyphosate (roundup), which bio-accumulates, causes cellular mutation, is a neurotoxin, and has been found to cross the placental barrier. Apart from that, its presence favours pathogenic bacteria. As these displace probiotic bacteria, *Candida albicans* is allowed to achieve high enough populations to cause us real harm. While not a mould, *Candida* still produces mycotoxins, which it does at an alarming rate when it feels attacked. Probiotic bacteria ingestion (eating fermented foods, or taking a supplement is rightly viewed as an attack by *C. albicans*), and exposure to electromagnetic radiation (surrounding us every second of every day) are just two triggers for the production of mycotoxins.

We also want to cut our sugar intake dramatically, and reassess our fat intake. For a start, white sugar should never be taken; it is stripped of the minerals our body needs to process it so enters our bloodstream as a toxin. Brown sugar is white sugar with some molasses added back. Raw sugar has some molasses spun out of it, and rapadura (or similar) is pure evaporated cane juice. For cane sugar, rapadura is the best choice, but also consider coconut sugar, a high mineral sugar which is easily assimilated by the body. Honey and maple syrup are also sources of sweetness that the body assimilates well. As far as artificial sweeteners go, some are fairly toxic, and for those that aren't, it's never a good idea to trick the body into thinking it has had sugar when it has no such thing. In an ideal world we would get all our energy requirements from good quality fat sources, such as fish, coconut oil, flaxseed oil, olive oil, avocado and nuts, with a smaller contribution from red meats (if we eat meat). All in all, to calm the gut, red meat should be eliminated entirely, and reintroduced much later in moderation. The worst food to allow into the bloodstream through a leaky gut is undigested red meat, so best to keep away from that until the gut is healed.

There is no “one size fits” all diet, and while some people might thrive on a paleo diet, others do better on the FODMAPS diet (elimination of Fermentable Oligo-, Di-, and Mono-saccharides And Polyols). In the FODMAPS diet, lactose, fructose, fructans, sugar alcohols, and galactans are eliminated, but many foods containing these may be fermented and reintroduced on the diet, such as milk (kefir), and cabbage (sauerkraut). The one thing all the healthy diets on earth have in common is the elimination of ‘food-like products’ from the diet, and the return to eating clean, fresh, and local food. This is the place to start an elimination diet from. On top of that, the diet will ideally contain a high percentage of raw or lightly steamed vegetables, as well as minimal protein, and grains. For meat eaters, a little fish or chicken is ideal. For non-meat eaters, minimal protein can come from activated (soaked and dried) nuts and from some legume sources (even though these are taboo for meat eaters at this stage). Sprout the legumes first, and the first choice (in fact, ideally the only legume during this period), would be sprouted mung beans – the first solid food given to babies by mothers in many parts of India because of its easy digestibility. Green peas and chick peas may also be eaten, the chick peas ideally sprouted too.

Standard Trigger Removal Elimination Diet

| | Include | Exclude |
|--------------------------|---|--|
| Fruit | Whole fruits, unsweetened and diluted juice (all in moderation) | Oranges and orange juice |
| Vegetables | Bamboo shoots, chard, kale, spinach, zucchini, lettuce, bitter salad leaves, blood sorrel, beetroot, carrot, swede, Asian greens, sea vegetables, avocado, celeriac, broccoli, cauliflower, cucumber, watercress, sprouted greens, dandelion greens | Corn, tomato, potato, eggplant, capsicum, chilli, cabbage, Brussels sprouts |
| Grains | Amaranth, quinoa, buckwheat, millet, teff, rice (all in moderation) | Wheat, spelt, kamut, barley, rye, triticale, oat, corn |
| Animal protein | Fish (fresh water or sardines), chicken, some game (fat trimmed as appropriate, all in moderation) | Pork, beef, processed meats of all kinds, shellfish, goat |
| Vegetarian/vegan protein | Green peas, red lentils, sprouted mung beans, sprouted chick peas. None of these for meat eaters. | Soy and soy products. |
| Nuts and seeds | Flax seed, pine nut, coconut, brazil nut (ensure mould-free) | Peanut, walnut, almond, pecan, cashew, hazelnut, sesame seed, pumpkin seed, sunflower seed |
| Dairy | Rice milk | Milk, cheese, yogurt, butter |
| Eggs | - | No eggs |
| Oils | Coconut oil, olive oil, ghee | Butter, margarine, shortening, tallow, lard, sesame, almond, canola, starflower, walnut, sunflower, rice bran |
| Beverages | Clean water, mineral water, herbal teas | Coffee, tea, alcohol, soft drink |
| Sweeteners | Blackstrap molasses | No other sweeteners (you can add selected sweeteners back in moderation, but for now, try to resist!) |
| Condiments | Live vinegars of all sorts, fresh herbs and spices (salt and pepper included, but try to avoid garlic, mustard and caraway if they don't agree) 1 tbsp of mature sauerkraut with the main protein meal of each day | Ketchup, relish, chutney, chilli sauce, soy sauce, barbecue sauce, oyster sauce, fish sauce, etc. Just live vinegar! |

FODMAP Minimisation Diet

| | Include | Exclude |
|--------------------------|--|---|
| Fruit | Bananas, blueberries, boysenberry, cantaloupe, cranberry, clementine, dragonfruit, grapes, honeydew melon, kiwifruit, lemon, lime, mandarin, orange, passion fruit, papaya, pineapple, raspberry, rhubarb, strawberry, tangelo | Apples, apricots, avocado, blackberries, cherries, currants, dates, feijoa, grapefruit, lychee, mango, nectarines, peaches, pears, persimmon, plums, pomegranate, prunes, raisins, watermelon |
| Vegetables | Alfalfa, Asian greens, bamboo shoots, bean sprouts, broccoli, Brussels sprouts, butternut, cabbage, capsicum, carrots, chard, corn, cucumber, eggplant, green beans, kale, leek greens, lettuce, marrow, okra, olives, parsnip, radish, potato, pumpkin, silverbeet, spinach, squash, swede, sweet potato, tomato, turnip, yam, zucchini | Artichoke, asparagus, beetroot, cauliflower, celery, leeks, snow peas, mushrooms, peas, Savoy cabbage, spring onions, onions, garlic |
| Grains | Oat, rice, corn, buckwheat, amaranth, bulgur, millet, quinoa, spelt, sorghum | Wheat, barley, rye, semolina |
| Animal protein | Chicken, beef, lamb, pork, turkey, ham, salmon (wild), cod, haddock, plaice, trout, crab, lobster, prawns, mussels, oysters | Prosciutto, chorizo, sausages, salami, other processed meats |
| Vegetarian/vegan protein | Tempeh, natto, quinoa, chick peas, | Soy beans, tofu, red beans, broad beans, kidney beans |
| Nuts and seeds | most nuts, seeds and nut butters except pistachio and cashew | Pistachio, cashew |
| Dairy | Rice milk | All dairy |
| Eggs | Eggs | - |
| Oils | Olive oil, ghee, coconut oil, starflower oil, sunflower oil, lard, tallow | Margarine, butter, avocado oil, canola oil |
| Beverages | Clear spirits, whiskey, black coffee, tea without milk, water, peppermint tea | Beer, dandelion root tea, fruit teas, rum, sports drinks, soft drinks, chamomile tea, oolong tea, soy milk, wine |
| Sweeteners | Maple syrup, cane sugar | Agave, fructose, high fructose corn syrup, honey, isomalt, maltitol, mannitol, sorbitol, xylitol |
| Condiments | Chilli, chives, garlic, wheat free soy sauce, fish sauce, vinegar, rice wine vinegar, Worcestershire sauce | Relish, most ketchup, |

Some final words – adjust protein amounts where sensible for growing active children, and for adults with high protein needs. Listen to your body, and encourage your children to listen to theirs. If an elimination diet seems too onerous or debilitating, ease up on it. The main thing is relaxation. And this is my last word of advice here before a suggested and avoided food list: too much stress plays an intrinsic role in the breakdown of every system in the body, either on its own, or through its effect on hormone and neurotransmitter production and efficacy. Learn to relax, whichever way suits you best. Meditate if that is your thing, or take time for a long and undisturbed soak in the bath, or a walk on the beach, or in the bush, or whatever you can do that doesn't involve the production and release of the chemicals of stress. Do something nice for yourself every day, and never feel guilty about it – we can provide care for those we love so much more effectively when we take care of ourselves.

We can see from the two sample charts above, that there are areas of agreement, and areas of disagreement. Gluten bearing grains and milk, for example, are excluded from both, as they are in the paleo diet, which tries to emulate clean, ancestral eating. Other diets, such as the Weston Price modelled diet may utilise both, but they insist the gluten bearing grains are fermented (sourdough), and that the milk is raw. As mentioned before, there is no elimination or gut cleansing/calming diet that will suit everyone, and each camp has their own axes to grind, their own books to sell, and their own blogs full of money-making affiliate links to promote. This is where we come to the idea of each of us being our own 'health detective'. We need to look at all the options, learn as much as we can, and discover the common ground in all these diets that appear to work. Most of them will advise against modern gluten bearing grains, pasteurised and unfermented milk, and legumes. Eggs are a definite grey area, yeast sensitivity be mostly a symptom of internal imbalance. I would say that at the very least start with these five trigger foods eliminated from your diet – every diet that has successfully been used to address auto-immune conditions starts with eliminating these foods. From there, look at the remaining foods in the two charts, and frame a diet based on the foods which co-occur, and which you instinctively feel to be safe. If you can't be strict, don't beat yourself up about it, but get back on track as best you can. Remember we want to be stress free at this time too. A quick word about fish – oceanic fish may contain mercury which must be avoided at all costs when addressing auto-immune conditions, inflammation, or a compromised gut. Fresh water fish are fine, as are low food-chain oceanic species such as sardines.

Meanwhile, start to keep a food diary. It can be as simple as you like – two pages of an exercise book with the food you have eaten, and the times on one page, and the things that are happening in your body. Don't forget your mind, or emotions, or energy reserves either. If you feel bloated, note it down with the time – if you feel spacey or teary, note the time – if you feel very weary or energised, note the time. Eventually, you will have a record of the foods you have eaten, and the effects they have had on you. With your health detective hat on, you can trace back through the days, find all the times you felt bloated for example, and discover any triggers lurking in your food. This becomes even more important when you try to reintroduce excluded foods. Often, the reaction to a food that

doesn't agree is very quick. For now, we will assume things are reasonably calm in the gut, and move on to healing it.

Starving out pathogenic and non-probiotic bacteria

If I wanted to construct a society that most compromised the health and viability of the human animal without being too obvious about it, I couldn't do much better than the society we have now. Unless we have lived with a group of isolated Indigenous people, grew up in one of a number of religious groups known to avoid the trappings of modern life, or were the children of hippies, or proto-hippies, it's safe to assume that there is a high likelihood of us having a compromised gut. The combined effects of careless application of agricultural chemicals, environmental and dietary toxins, electromagnetic pollution, widespread endocrine disruptors, modern stress levels, blanket neurotoxin ingestion, and irresponsible use of antibiotics has led us all to a place where our gut health can only be questionable at best. More than one dietary 'guru' is on record stating that once the gut is compromised, it can never be successfully repopulated. Obviously this is something I disagree with, otherwise there would be no need for this booklet.

The kombucha scoby, water and milk kefir, and dental plaque are all examples of bacterial biofilms. Many bacteria, both 'good' and 'bad', and yeasts such as *Candida albicans* can construct biofilms utilising sugar and minerals from their food source. A biofilm is a safe home for micro-organisms, and we welcome them when they provide us with a stable community of probiotic organisms. They are less than welcome though when they protect pathogens, resisting both conventional and natural antibiotic attacks. This is why it is believed repopulation of the gut is impossible. In order to get probiotic species re-occupying the crucial crypt niches of the gut, we must first dislodge the biofilm protected pathogens. There is one exception to easily repopulated bacteria however – species of *Bacteroides* cannot survive long in an oxygenated environment, and they appear in no fermented foods. They can and are often still present in a compromised gut, and persons with an intact appendix will most likely have a store of *Bacteroides*. The vermiform appendix in humans is not a vestigial organ, or a useless appendage at all – rather it is a safe house for essential probiotic organisms, protected by a biofilm plug, that redistribute select species after infection. Failing repopulation by the appendix, *Bacteroides* can be reintroduced through faecal transplants (from a person with intact species in the gut), capsules (a fairly new innovation), or via the faecal/oral route where over the top disinfectant based hygiene is not practiced in a household where at least one person has a fully functional gut.

What happens to your water kefir grains if you forget to feed them? Basically, they seem to disappear, or turn to mush. Why is this so, and why is it relevant here? This is relevant because what they have done is consume their biofilm home to continue feeding themselves. This is exactly what we want to do with the biofilm in our gut that protects the less-desired species within us. Bacteria love the food group we call prebiotics, recall from earlier discussion that if we want to support our microbiota, we feed them fibre, complex sugar, and carbohydrates. So if we seek to rid ourselves of well-entrenched pathogens, first we need to render them vulnerable to attack with a natural antibiotic protocol. This means a diet in which as much fibre, sugar and carbohydrates have been eliminated. For omnivores, this is a little easier than for vegetarians or vegans, but even omnivores

need to be sure of the provenance of the things they do eat. Because of protein, energy, and other nutritional needs, the diet we can utilise to starve pathogenic bacteria will differ with each of us. There are some broad strategies, but if you are unsure of your nutritional needs, unsure of which foods contain what, have a pre-existing condition, are on medication, or have a very low body-mass index, consultation with a professional is advisable. Utilise information from the web in choosing your foods, which need to be low glycaemic index foods that are also low in fibre.

A website such as [World's Healthiest Foods](#) is highly recommended. Let's look at fennel from there – while fennel is a low GI food, 1 cup of fennel, while only delivering 27 calories, will provide you with 11% of your daily recommended fibre intake. This presents a problem, which is how do I eat a good, balanced diet without eating fibre? The two easiest ways are to juice vegetables with a Champion or other brand juicer that extrudes the fibre content. The other option is to cook broths with the vegetables, then drink the liquid only, with the solids (and most fibre) ending up on the compost. Supplementation with low intake, nutrient rich foods such as spirulina or chlorella can be helpful too. From a fibre perspective, chlorella is much lower in fibre than spirulina. Chlorella also has vitamin B12, lacking in spirulina. Pound for pound, both of these are higher in protein than red meats, and each has its own complement of other vitamins, minerals, and beneficial compounds. Add these to vegetable juices to supplement your vitamin and mineral intake. Using the above website, also get to know the average make-up of other common nutrient dense vegetables. Swiss chard, for example, is a low GI food that rates a little higher than fennel in calorific and fibre stakes, but chard is such a nutrient dense food that a little bit of fresh, organic chard will provide you with all your daily vitamin K requirements, as well as one quarter to a half of other essential vitamins and minerals. Notice that I say 'fresh' and 'organic'. Many conventional crops are grown for size, with bulk being made up mostly by extra carbohydrates, and many agricultural chemicals inhibit plant uptake of vital nutrients, especially essential micronutrients. The sooner you can eat a plant that has been harvested, the less of it you will need; the cleaner the growing process, the higher the nutritional density; the less hybridised or genetically modified the food, the more beneficial the nutrient to carbohydrate and fibre ratio will be. Know your food, and know where it comes from.

Energy at this time will come from the sources we would ideally utilise anyway – good quality saturated fats. Sure, we need to reduce sugar at this time, but in an ideal world, we would get all of our day to day energy needs from fat sources such as avocado, coconut oil, extra virgin olive oil, grass fed butter, ghee from grass fed animals, tallow from grass fed cows, fat from bone broths, flax seed oil, etc. Protein sources obviously are different for different diets – omnivores can utilise bone broths, fish and white meat in moderation. Bear in mind that most of us consume more protein than we need, but also ensure your intake is sufficient to match your activity levels. Children should really only follow a protocol such as this under the supervision of a qualified professional, but for a short period, most healthy adults can receive all their nutritional needs on the simplest of diets. For meat products, the main proviso is that all meat be grass fed and chemical free, and juices and vegetables should also be added to broths. For non-meat eaters, nuts, legumes and pulses as appropriate to your diet as determined via elimination. Soak, activate and ferment these for easy assimilation, and try to make this a habit in the long term too.

A Period of two weeks will be sufficient to disrupt the biofilm, and there are measures that will help there. Spirulina and chlorella will both assist with general detox, pathogen minimisation and biofilm displacement. Other measures you may wish to research yourself are supplements such as zeolite and diatomaceous earth. Zeolite is available as a human supplement in Australia, but diatomaceous earth is not approved for human consumption here. Both are used as stock supplements for the same reasons – improved animal health and production, pathogen minimisation, removal of heavy metals and toxins, etc. Both of these are used in humans to reduce pathogen load, to bind to and remove heavy metals and toxins, and to help scour and remove biofilms. Diatomaceous earth is available from fodder and rural produce stores (eg Norco) and comes in two grades: soil grade (for conditioning agricultural soils), and food grade (for livestock). Obviously if you look into diatomaceous earth and think this could be for you, you will ask for food grade. Apple cider vinegar appears to help by stripping minerals from the biofilm. Taken in the form of a fire cider, the added potent anti-inflammatory action will help general restoration of the gut too. Wormwood and bladderwrack as herbal remedies may also assist (consult a herbalist), as will lactoferrin, which also strips minerals from the biofilm. Lactoferrin is in human saliva, so chew your food well to make the most of this natural bounty. The enzyme nattokinase (from the fermented soy product ‘natto’), turmeric, and reishi mushrooms are indicated, as is the root of any of the two native Smilax species (or the true sarsaparilla root *Smilax officinalis*). Other useful remedies include cranberry, manuka honey, garlic, ginger, oregano, berberine, cinnamon, tulsi, clove, ginkgo, St John’s wort, rosemary, alfalfa and neem. Mineral wise, source foods high in zinc, magnesium, iron, and manganese, and consider supplements such as calcium citrate and magnesium citrate. A good reference for general biofilm treatment, which provides references and which coincides with my own research findings can be found [here](#). Tea, as well as being our easiest source of the neuro-relaxant GABA, contains tannins that will chelate minerals and render them unavailable to bacterial biofilm residents. Drinking a good quality, weakly brewed organic tea just before all meals will help the body on multiple levels.

A quick word on colloidal silver: colloidal silver can be used internally for both biofilm reduction, and pathogen reduction in the human gut. In our home, we use colloidal silver internally very sparingly, and there are good reasons for that. We will talk about the action of natural antibiotics a little later, but for now, we must understand that colloidal silver works against bacteria by adhering to structures on the external cell membrane, gaining access to the cell, and killing it. This is a non-selective action, and the main problem here is that our mitochondria were once free-floating bacteria engulfed and assimilated by larger organisms, and as such, their inner membrane retains all the structures of a bacterial cell membrane. Good luck finding any information on this, but my understanding of science and structure indicates to me that high level, continuous internal colloidal silver application has the potential to seriously compromise our mitochondria. An intense silver protocol over a period of 7 to 10 days can help with biofilm removal, but please exercise caution, and source a good quality product.

Natural antibiotics

How is it that natural antibiotics appear to kill pathogenic bacteria while leaving probiotic bacteria intact? How is it that we can initiate and complete a successful ferment by including ingredients with known potent antimicrobial action? Garlic is the most widely studied of these, and what has been found is that garlic (and we may assume most natural antibiotics that appear to have a selective bias) does have some inhibitory action on lactic acid bacteria, but this is small compared to its action against pathogens. Many of the natural antibiotics I recommend also appear in the list of recommended biofilm disruptors, and indeed, there is no reason why we can't start applying natural antibiotics at the same time we start starving the biofilm protected bacteria. All the following natural antibiotics must be organic if we hope to receive any real benefit from them.

Garlic must be locally grown (so not irradiated), and Italian to be beneficial (Russian garlic is very low in allicin). Take two cloves, and smash them in a mortar and pestle. Leave them for 10 minutes to activate the allicin, then eat them raw. If anyone complains about the garlic breath, just tell them what I was told when I lived in France – when everyone eats garlic, there is no problem. Do this three times a day.

Oregano, and all other traditional European culinary herbs. Did our European ancestors (those of us who have them) use culinary herbs just for the taste? No way! Every single European culinary herb has significant anti-microbial action, and oregano is the undisputed champion in this respect. Add fresh oregano, thyme, rosemary, sage, marjoram, tarragon and others to your cooking right at the very end, and source at least one good quality essential oil (preferably oregano). Place three drops of the oregano oil in some olive oil, mix well, add to a glass of water, stir, and then drink. Do this morning and evening.

Lemon myrtle leaves are nature's premier gentle natural antibiotic. I use a strong tea to kill skin-based golden staph (MRSA) infections (e.g. school sores), and a weak tea internally as a natural antibiotic. Lemon myrtle also works against viral and fungal pathogens, and against parasites.

Olive leaf extract is not only a great febrifuge and anti-inflammatory compound, it is also strongly antibacterial, anti-viral, anti-fungal, and anti-parasitic. Take a teaspoon morning and night, with a little manuka honey (despite the sugar).

Healing the Gut

Once the gut is healed, we will get back to the idea of eating raw fruits and vegetables, but until then, cooking and fermentation are our friends. Our ancestors developed fairly sophisticated strategies for rendering plant foods more available to us. Unlike herbivores, who utilise symbiotic microorganisms to ferment plant materials for long periods to release volatile fatty acids which provide them with a major energy source, the human gut doesn't work that way. Our symbiotic organisms do partially break down raw plant material into short-chain fatty acids that give us a certain metabolic boost, but most importantly, this feeds and encourages growth of the cells lining our gut. In a compromised gut, these organisms have been displaced, so raw vegetable matter and the fibre it contains are consumed by pathogenic microorganisms, which proliferate and dominate all the more. So initially, we will want to remove all fibre from the diet, and then give the gut what it needs to heal. As we are healing the gut, and starving the pathogenic organisms, we start to gradually reintroduce our probiotic allies in the form of fermented foods and drinks.

To heal, our gut needs the right building blocks, and these are protein, enzymes, amino acids and natural saturated fats. Unfortunately for non-meat eaters, the bad news is that fats from pasture raised organic animals, and the compounds and minerals that are extracted from their bones are the most beneficial things for gut healing. I will address vegan and vegetarian gut healing later, but for now, we enter the realm of the omnivore.

A good broth will resurrect the dead – South American proverb

Bone broths are easy to make, and provide us with all we need to start the physical healing of the gut. The other measures we will use help ensure it stays healed. From our broths we will get calcium, phosphorus, silicon, magnesium, sulphur and trace minerals; we will get gelatin, glucosamine, chondroitin, and L-glutamic acid; and we will get good, natural saturated fats – all the things we need to rebuild, heal and seal the gut. With the addition of fermented foods and beverages, the remaining enzymes, amino acids and metabolites are provided, and probiotic bacteria are introduced to recolonise and assist with healing.

Bone broth

Bones from organic, pasture raised beef or lamb, or true free ranging fowl.

Water

Onion

Celery and carrot tops

Vinegar

Salt

Roast the bones in a moderate oven. Or don't bother; this is to add flavour only. Place the bones in a slow cooker (or a large pot with a lid over the lowest heat you have), and fill with cold water. Add a good dash of apple cider vinegar (this will draw the minerals from the bones) and cook for one third of the total cooking time. Add a little quality salt (not too much), the onion (roughly chopped), and the celery and carrot tops (use a little carrot and celery if these aren't available). When done, strain the solids out. Drink some warm, and refrigerate the rest. Once cold, you will be left with a mass of coloured, meat flavoured jelly that is full of goodness. Chickens will take 8 to 12 hours, larger beef bones will take 24 – 48 hours, depending on size. Whole snapper frames may also be used, including the head, which provides thyroid hormones, less gelatine, but more omega-3s.

As well as the broths, other foods we want to consume include things like: vegetables that are cooked, but we want no fibre content. Peel them, deseed them, use only the florets of broccoli and cauliflower. They can be steamed, or roasted, or added to a broth to make vegetable soup. Avocados are good, as are activated nuts and seeds (nuts that have been soaked for some hours, then thoroughly dried). Remember we are past our initial elimination period, but we still want use potential trigger foods wisely until we feel the gut is on the way to healing. If you can source good, clean eggs from true free range fowl, then try raw egg yolks - cracking one into a broth or soup that has cooled to room temperature. Maybe stir in some kefir milk, or some sauerkraut juice. Avoid fruit at this time, just a bland diet of broths, soups, vegetables without too much seasoning. No grains at all, but activated nuts and seeds. Fermented coconut water is a great electrolyte and probiotic drink. As far as fermented foods go, here is a rough outline. Say a tablespoon or so of live apple cider vinegar (or fire cider) and water when you wake up. After a short while, a tbsp of milk kefir, building up to a quarter of a cup as you find the body tolerates it. A half cup of sauerkraut or kimchi (non-spicy) during the course of the day. If the gut is really sensitive, start with a little sauerkraut juice first, then build up to eating the fermented cabbage as well. Sometime in the afternoon, between meals, a half cup or so of kombucha. Of all the fermented foods, these are the best at initiating gut healing, and at keeping the inflammatory response at bay. There is a great diversity of probiotic organisms present among these ferments, and each has its special power, so to speak. Some are powerful transformers of lactose to lactic acid, some displace *Candida*, or other pathogens, some produce unique compounds with remarkable healing properties. Eventually, fermented soy products such as tempeh or natto, or other legumes may be introduced. Eventually, we aim to reach the stage where the gut is healed, and we can reintroduce raw vegetable foods, and start a gut repopulation protocol modelled on the bacterial colonisation of the infant gut.

Vegan gut healing

Vegan gut healing needs to focus on good quality saturated fats like coconut oil, avocado oil and fruit, macadamia oil, pure cold pressed olive oil, and flax seed oil, to give the best examples. For minerals and protein, activated nuts and grains are useful, and of course, a good variety of steamed vegetables, with lots of dark greens, but also all the reds and yellows and oranges you can manage. Fermented foods are as for omnivores, except for the milk kefir. For protein, gentle pulses are called for. I personally recommend sprouted mung beans to start with. For example gently cooked them with turmeric and coconut oil, with some vegetable broth. As things get better, moving on to split peas and split lentils, and then on to sprouted chick peas, and perhaps something like this, a very healthy Japanese style stew that tonifies the kidneys, adrenals and pancreas, regulates blood sugar, dispels heat and toxins from the body, and strengthens digestive function.

Adzuki Bean and Pumpkin Stew

2 cups sprouted adzuki beans

3 cups diced pumpkin

1 onion, diced

3 garlic cloves, diced

Thumb sized piece of turmeric, diced

Thumb sized piece of ginger, diced

Good handful of chopped kale

1 tsp black sesame seeds

Freshly cracked black pepper

¼ cup coconut oil

1 tsp sesame oil

2 tbsp sake

2 tbsp dried wakame flakes

1 tsp honey

Lime juice

Rinse sprouted adzuki beans, and bring to a slow boil in a pot of water that covers them by a thumb length. Add the wakame. Keep on the heat for 20 minutes or so. Meanwhile, in a separate pot, add the coconut and sesame oil, and add (in this order) the onion, garlic, turmeric and ginger, giving each a minute or so of gentle frying while stirring every now and then. Add the pumpkin, then the sesame seeds, and keep stirring for about 5 minutes. Add the cracked pepper, salt, and sake, stir briefly, then skim any scum off the beans and add them, water and all. Cook gently for 30 minutes, or until thickened. Five minutes before serving add the kale. Squeeze some lime juice in, mix, and serve.

Gut repopulation protocol

The succession of bacterial colonization within the new born gut follows the same natural order as the bacterial succession within a sauerkraut ferment, so we can utilise a maturing sauerkraut ferment in a gut repopulation protocol, which I take the liberty of calling the 'Rothsey Gut Repopulation Protocol', since I devised it from my own disparate streams of research. This is simplicity itself – we merely set up a sauerkraut ferment in a way which allows nature to do its thing (utilising a ratio of 5.5 g salt to 500 g of dry shredded cabbage, fermented within an ideal temperature range of 15 - 20° C), and we take 2 – 3 teaspoons of cabbage from the changing environment with the first and last meal every day for six weeks. In this way, we allow our immune system to reset and find its natural balance gradually, as it does when we are first introduced to the world outside of the womb. Make a series of small jars, because eventually the first jar will be compromised by oxygen exposure. When this has been judged to have occurred, move on to the next jar, which has remained intact since being set. Then move on from the second to the third jar, and so on.

In utero, we pick up our first bacteria, and these are probiotic species of enterobacteria, including some good strains of *E. coli*. These bacteria are aerobic, and their role in the neonate gut is to use up any stray oxygen obtained during the first moments of exposure to the atmosphere, and to acidify the environment. The same thing happens in a jar of sauerkraut – enterobacters consume any residual oxygen, and as a result of their feeding, they acidify the environment. Another thing that enterobacters do is facilitate production of interleukin 10 (IL-10) as opposed to IL-12, and IL-10 is one of the least inflammatory cytokines we have. As the infant gut population begins, this has the effect of priming the immune system, rather than putting it on the war footing that IL-12 (very pro-inflammatory) does. Prolonged use of enterobacters however is not recommended, because after a while they start to facilitate IL-12 production instead, which can lead to a feedback loop of chronic inflammation. Aerobic enterobacters, therefore, have a short lived but essential role both in our gut colonisation, and in a sauerkraut ferment. Now, why are they essential?

Enterobacter activity is essential to set both the ecosystem parameters of the healthy infant gut, and the successful sauerkraut ferment. The bacteria that follow in this natural succession are anaerobic and acid-loving, so the vital action of the enterobacters as they deplete oxygen and acidify the environment paves the way for the secondary species. Now these secondary species, and indeed tertiary and quaternary species, don't just appear out of thin air. In a human, these bacteria are obtained as we pass through our mother's birth canal, as we are fed, as we are kissed, as we are cuddled, as we breathe, and as we are exposed to the multitude of natural actions and interactions that being a member of a family entails. These bacteria also reside in small numbers on the foliage of the vegetables we ferment, in the soil they are grown in, on the hands of the farmer, the truck driver, and the shop assistant. They are wafted onto us by the passing winds, and appear in us, and on us, and on everything we pass or touch. This is the beauty of nature – the agents of human vitality, and the agents of human illness are everywhere, and the way they affect and colonise us is solely dependent on how close we are to a natural way of life.

When we live an unnatural life; when we consume not food but food-like products; when we consume neuro and other toxins and call them food; when we lace our water with a neurotoxin, and a thyroid and general endocrine inhibitor and call it health care; when we use toxic, residual chemicals on our food; when we sleep with smart phone, wifi and cordless phone radiation bombarding us at close range; in short – when we live the average modern Western life, we are running counter to nature, and so we should not be surprised that natural systems break down. We should not be surprised that we sicken. We should not be surprised that we cannot heal until we return to nature. The good news is that mankind is not just a destroyer, but also a creator. In the development of cultured foods and natural remedies, humanity finds all that is needed to begin to return to our true state – the physical manifestation of all that is implied by the term ‘God’ (whatever that may mean to you). To culture means to grow, and the culture and society we live in today is a direct result of the seeds we have sown in the past. We reap what we sow, it can be no other way; each moment as we engage with life and our fellow beings we sow seeds. If we are going to cultivate a healthy garden, giving careful consideration to the what, the where, the when, and the why of the seeds we sow is vital.

So, the earth is a beautiful, bounteous, and beneficent garden. Great, isn't it? But, getting back to our infant gut, and to the fermenting sauerkraut, as the primary species modify the environment for the secondary species, we run with nature. As the secondary species proliferate and further moderate the environment for the tertiary species we run with nature. And running with nature is a truly beautiful thing – the more the essential bacteria modify the environment, the more that pathogens are excluded. Primary fermentation in a jar of sauerkraut lasts somewhere between 18 and 36 hours, but even the action of the desired species in that short timeframe is enough to exclude most pathogenic species. By the time secondary fermentation is over (around 2 weeks), the environment within the sauerkraut jar or crock will not support pathogenic bacteria. Tertiary fermentation, which sees massive proliferation of the most effective probiotic lactobacterial species (*Lactobacillus plantarum*) runs from 2 to 5 weeks, and then specialised species from the secondary fermentation cohort return to metabolise the complex pentose sugars that are all that remains at this stage. So, this protocol runs for a six week period, where some maturing sauerkraut is eaten every day.

A cup of straight kombucha, first thing in the morning will also help the gut during this time. We also now need to be sure to reintroduce prebiotics (mostly fibre) back into the diet. Now that we are used to having minimal sugar in the diet, we will be giving our bodies more in the way of love if we continue to avoid or minimise sugar as much as possible. Continue avoiding the major trigger foods, but start slowly introducing those you feel you will be OK with. Don't forget your food diary, and remember – nobody knows your body as intimately as you do. By all means seek the services of a trusted professional when needed, but our guiding star at all times should be self-empowerment, and self-determination. In this way, optimal health becomes more than just a personal action – it becomes a social, a community, and a political action. As we learn and become well, we share what we have found. As we become empowered, we become immune to the mechanisms of social control.

Replenish the gut

This is actually the easiest part. We replenish the gut by including as much diversity of probiotic organisms as we can, but always being mindful not to overdo it. Food wise, we want sauerkraut obviously, but also things like kimchi, beets, carrots, tempeh, natto, nuka, raw fermented humus, or any other thing. Drinks may include beet kvass, milk kefir, water kefir, kombucha, or fermented coconut water. Each of these has its own individual complement of probiotic organisms. At this stage, we really want to be including a large percentage of raw vegetables (and to a lesser extent fruit) in the diet, and to cut back on our meat consumption, if we eat meat. Of course balance your diet to your needs, but generally, we in the West eat way more meat than we need. Meat should be ethically raised to be most energetically beneficial – please don't eat the products of abuse.

Final word

Anyone with a pre-existing condition, on medication for any condition, very young, very old, or with specific dietary needs should consult with a trusted professional before attempting any targeted protocol such as this one. It is important to match calorific and nutritional requirements to activity levels, and better to eat some of the prohibited food types than to allow the body to become weakened or compromised in any way. Never come off medication without consultation with a professional, but by all means, as you reclaim your health through dietary measures, feel free to ask them to reassess your continued need for any medication. If you are unhappy with your healthcare professional, it is your right (and duty) to find someone else more aligned with your vision. Be kind to yourself, and be kind to others. The only infinite resource is love - please be profligate with love.

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