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Building Medicinal Agroecology: Conceptual grounding for healing of rifts

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Abstract:

In this chapter we argue that industrial food production, distribution and consumption play a central role in perpetuating the present intersecting crises of poor health, biodiversity loss, climate change and inequality. At the centre of our argument lies a contention that multiple rifts (e.g. between humans and nature, urban and rural, food and medicine) have been radically accelerated by industrial capitalism and the technocratic responses it produces, and that such rifts are the root causes of these crises. Fundamentally extractive in their commodification of labour, nature and knowledge, current food systems have cemented these deep metabolic, epistemic and social rifts, the roots of which reach back to at least the invention of the plough. The implications continue to shape health outcomes today. We argue that medicinal agroecology, existing in diverse forms but united by an understanding of food and nutrition *as* medicine, heals the rifts which separate us from the natural world and each other. Medicinal agroecology, as we conceive it, offers a pathway to planetary health by directly addressing the root causes of these crises rather than their symptoms, and thus constitutes a planetary medicine.

1. Introduction

> "All things are connected. Whatever befalls the earth befalls the children of the earth."
> (Chief Seattle, c. 1786 – 1866; a widely shared sentiment)

It is common to talk about the extinction of 'beautiful others', like snow leopards, or 'necessary others' like buzzing bees that pollinate our food crops; but homo sapiens are caught up in the same web of life, resting on the same foundation of complex inter-species relations from the ground up: fungi, bacteria, nematodes, worms, insects, plants, trees, birds and so on. The word human and the word humus, for soil, have the same root. All things are indeed connected and agroecological wisdom sprouts from this awareness.

As political agroecologists, our approach to medicinal agroecology is inspired by and aligns with the struggles for collective and individuals' rights by local, indigenous and small-scale producers engaged in protecting their way of life. We therefore begin by acknowledging that diverse medicinal agroecologies already exist, while emphasising that a fundamental epistemic shift is required to appreciate them.

As such, our chapter proposes that medicinal agroecology refers to understandings of food and nutrition *as* medicine, and heals the rifts which have opened up beneath and between us, and which separate us from the natural world and each other. This is a political proposition that seeks not only to resist the objectification of nature, but to embrace a culture of care. This requires that issues of power, control and governance be addressed, and that social and political action for systemic change be centred (Anderson et al, 2021). It simultaneously entails: a) nurturing agroecology by empowering grassroots, place-based and people-led processes, and b) deconstructing the existing food regime that disables agroecology.

To advance a conceptual and philosophical grounding for a medicinal agroecology, we react to three provocations that, we propose, are intensifying the erasure of medicinal agroecologies:

- Cheap 'food from nowhere' as solution to feed the poorly resourced,
- Approaches to medicine that tackle symptoms, disconnected from food and diet,
- An acceptance of urban lifestyles as fundamentally extractive.

At the centre of our argument lies a contention that multiple rifts have been radically accelerated by industrial capitalism and the technocratic responses it produces (Schneider and McMichael, 2010; Saurabh et al, 2020). Fundamentally extractive in their commodification of labour, nature and knowledge, these altered relations have cemented deep metabolic, epistemic and social rifts, the roots of which reach back back to at least the invention of the plough (Hyams 1952; Montgomery 2007; Scott 2017)., The implications continue to shape our food system and health outcomes today.

Critical of industrialised food and healthcare provision, we consider how the pursuit of profit has led to a quest for high yields and genetic uniformity which has increased the toxic load and reduced the diversity and nutrient density of available foods, as well as how the promotion of inappropriate diets and growing disease burdens are compounded by technocratic responses that further embed and reproduce corporate power structures. In reflecting on the implications of stacking health, biodiversity and climate crises, we engage with the concepts of 'syndemic' and 'planetary health'.

At its most transformative, agroecology is concerned with the intersection of soil, community, individual and planetary health and justice, thus constituting a complex approach that involves systems thinking and biosocial and biocultural lenses of inquiry in combination. The syndemic perspective, we argue, intersects with agroecology in a number of ways, especially when the medicinal aspect of agroecology is emphasised.

The chapter is structured as follows: after this introduction, section 2 grounds our argument through a historical glance at the idea that humans, and their health, are connected to all other things in the web of life. This is our point of departure.

In section 3 we trace the roots of the epistemic rift and unpack some of its consequences on agricultural practices and food system design, such as soil destruction, the erasure of diverse medicinal knowledge ecologies, and the establishment of unhealthy and unjust diets.

In section 4 we delve deeper into some of the consequences of the rift, particularly on human and planetary health through a look at some recent figures regarding the global burden of disease.

In section 5, we warn against emerging co-opting discussions around planetary health through industrial-friendly dishing-out of planetary diet discourses.

We conclude the chapter in section 6 with a summary of the main points raised in this chapter and an offering for nourishing research agendas with regard to medicinal agroecology.

2. All things are connected: humans in the web of life

Chief Seattle's quote, with which we begin this chapter, expresses a truism among most, if not all, indigenous people and many peasant cultures: that *all things are connected*. Since the Buddha realised the "diversity and interconnectedness of the biocommunity" (Bilimoria 2017), Asian and European thinkers of different kinds have spoken about how we are bound up with one another and our habitat. Many have taken action to defend life by defending habitats against degradation and contamination on that note. The idea of a complex web of life has been central to animism across cultures for thousands of years and expresses a relationship between people and their surroundings that rests on an understanding of the complexities that has slowly dawned on modern science in the 20th century, notably in ecology. That we are one with the earth and that we live in a complex web of life that sustains our livelihoods is no longer seriously disputed by any commentators, but, of course, continues to be disregarded or circumnavigated to suit creative accounting.

In the introduction to the 50th anniversary edition of Rachel Carson's Silent Spring (2002 [1962]) Linda Lear writes that by 1957, as a result of her research on DDT and related petrochemical pesticides, Carson "...believed that these chemicals were potentially harmful to the long-term health of the whole biota" (Lear in Carson 2002: xv) and "strongly" stated that they should be called "biocides" (ibid: xvi). She also argued that "...public health and the environment, human and natural, are inseparable" (ibid: xx), thus reflecting themes that had emerged already in the 1940s in the work of Eve Balfour, whose pioneering studies into soil and health took place during the Haughley Experiment. The first ever comparative study on, respectively, organic and petrochemical farming (on two farms in Suffolk, England), which began in 1939, it led to Balfour's milestone publication 'The Living Soil' (1943). Here Balfour presented evidence for her argument that the "...interrelationship between soil vitality and the health of plants, animals, and man [sic], is of so important a nature, and of such far-reaching implication, that it is high time the general public were given an opportunity to study it".

Shortly after that, Albert Howard published 'Soil and Health: A Study of Organic Agriculture' (1945), which shared this understanding. In 1952 Edward Hyams's 'Soil and Civilization' followed, which ruminates on the collapse of civilizations as a function of soil degradation. In the 1960s and 70s, James Lovelock, Lynn Margulis and others worked on similar themes that have become known as Gaia Theory (Lovelock & Margulis 1974; Lovelock 1979), thus establishing a foundation for these transdisciplinary perspectives. More recently, it has been noted by Deem et al (2019) that: "The idea that human, animal, and environmental health are connected has been around, in various renderings, for many years." (Deem et al, 2019: 9). The authors list various versions: One Medicine from the 1960s, Conservation medicine from the 1990s list, EcoHealth, Ecosystem Health, One Health and Planetary Health.

Yet, despite these seminal contributions, the rifts between people and nature have only deepened with intensifying impacts. Central to our argument is that the marginalisation of traditional medicinal and nutritional knowledge and agroecological food growing practices is due to the deep-rooted establishment of what Schneider and McMichael (2010) have called the "epistemic rift". Understanding and healing the rift are, we consider, necessary steps of agroecological transitions.

They are also important to illustrate and fulfil the epistemic ambitions of this chapter, to lay the conceptual ground for an authentic medicinal agroecology and, ultimately, to understand the present and future battlegrounds of this emerging field.

3. Capitalism, the epistemic rift and the erosion of people's medicinal knowledge

The concept of epistemic rift emerges from a rich debate in rural sociology, agrarian studies and Marxist scholarship on the idea of a metabolic rift - or the rift which opens when the place where plants are grown (for food and medicine), or animals are bred, does not coincide with the place where organic matter and food waste (including human 'manure') are disposed of. This rift carries a consequence of soil depletion. The metabolic rift has been connected to the division of labour between town and country, the expansion of urbanisation and later, the mainstreaming of green revolution technologies (see for example the work of Jason Moore 2000 and John Bellamy Foster 1999) that have resulted in a reliance on chemical fertilisers. The growth of towns and cities that follows the expansion of capitalist industrialisation, is associated with new practices of waste management (of human manure and household waste), that once used to be regarded as precious nutrients, and returned to the compost to later feed the soil. Except for a few timid attempts in France and Belgium (Kohlbrenner 2014) to build an infrastructure for those nutrients to be returned to farmland for production , modern urban settlements were equipped with landfills, incineration, and sewage systems that ignored centuries of wisdom in the management of natural resources and human settlements. These systems have instead contributed to the depletion of agricultural soils - through loss of minerals and organic matter - by breaking the closed loops of resource cycles that preceded them.

The rise of consumerism, population boom and the establishment of industrial agriculture have exercised further and ongoing pressure on agricultural soils and the ecosystem more generally. While capitalist urbanisation has played a crucial role in this story, the debate on the rift has also highlighted that extractive and exploitative practices preceded such urbanisation dynamics. There is indeed a lively debate on the origins of humans' exploitation of soils, some tracing theseback to the rise of agrarian capitalism in the XV century; others to land enclosures and the slave trade (cfr. Moore in Schneider and McMichael 2010). Others place important points of departure in the destruction of soils and medicinal wisdom to even earlier times, such as the invention of the plough (Hyams 1952; Montgomery 2007) or the growing power of mercantile interests and religious factions which obstructed or even outlawed the reproduction of medicinal practices (Buhner 1988). A shared point in these debates is the focus on the displacement of people - whether people displaced from common lands where they used to pasture their animals, cultivate and forage were forced to migrate to industrial centres to find a job, or enslaved and deported overseas, and forced to work in plantations on the 'new' continent. These debates shed light on the role of a knowledge rift in the mistreatment of both people and nature, and the subsequent erasure of food/medicinal knowledge. If knowledge can only be kept alive and reproduced so far as it is used, then we understand that forced displacement, be it through the enclosure of land and/or slavery, was a contributing factor to the loss of traditional ecological agricultural and medicinal practices. The metabolic rift has therefore always been enmeshed with the knowledge rift: people's bodies and people's knowledge were systematically disempowered by mercantilist ambitions and the changing geopolitical relations these ambitions forged.

The long-term establishment of industrialisation, capitalist urbanisation and colonialism (today in the form of land grabs and neo-colonialism) have fuelled the merging and consolidation of metabolic and knowledge rifts, in what has been termed the 'epistemic rift' between society and nature - a rift so deep that we have forgotten that we have forgotten. The epistemic rift is reflected in the dystopic urban-rural, town-country divide, which has normalised the idea that agriculture and food do not belong to cities, but to the countryside; the idea that society and nature are two different entities, rather than the former being a part of the latter. The practical eradication of communities from the land, the proliferation of urbanised lifestyles alienated from a daily contact with soils, plants and the wider ecology, have removed the possibility to use, and reproduce food, medicinal and agroecological knowledges that were shared and built through practical and spiritual practices by previous generations over centuries.

As cities continue to grow and struggle to address their crises of pollution and overcrowding, processes of planetary urbanisation have rendered many rural areas hinterlands of resource extraction and toxic residue, making the human habitat hazardous to health. As traditional food ways are eroded and replaced by an industrial diet, and as the quality of food as commodities decreases and the use of additives increases, people's health is further gravely undermined. Urbanised lifestyles that, in the context of a planetary urbanisation (Brenner 2014), are pervasive in both rural and urban contexts, represent what has been called the imperial mode of living (Brand and Wissen 2021). This way of living is based on the extraction of resources from the land and from the people; on speculative mindsets; on the oppression and imperialist domination of the south by the north; and on profit over people. Urbanisms are both ideologies and ways of life; or ways of life co-shaped by ideas on how to organise them. An urbanism based on the centrality of soil stewardship and the equity-based value systems of agroecology - an alternative to the capitalist urbanism we know today - is needed to reverse the epistemic rift (see for example the work on an agroecological urbanism by Deh-Tor 2017 and 2019 and by Tornaghi and Dehane 2021).

The epistemic rift did not only occur as a happenstance of more urbanised ways of life, but was consciously fed by ideas of progress, practices of knowledge validation and the supremacy of technological innovations omnipresent in mediated communication, education institutions and international governance institutions, that have labelled traditional knowledge as 'superstition', 'folklore', 'unproven', 'dangerous' or placebo.

The 'multiplexity' of knowledges that have historically co-evolved in different locations worldwide, through layered encounters of botanical, therapeutic and ecological knowledges, has been, to a great extent, co-opted, exported and codified as science (Augusto, 2007). Yet, despite underpinning modern allopathic healthcare, these rich ecologies of knowledge are under constant threat of erasure.

The development of the epistemic rift, and the establishment of modern medicine and agriculture as norm and convention, had an amplifying effect on the consolidation and expansion of detrimental practices, the full scale of which is yet to be felt.

The day-to-day workings of the epistemic rift, and the separation between humans and nature, effectively switches off humans' natural ability to connect with, and understand their own bodies, as well as plants and other living beings in their territory. The deep connections between us and the climate, the ecology, the bacteria in our guts and the medicinal metabolites of the plants we consume, have progressively been severed and denied. The neglect of these faculties is a reflection of an attitude to tame, dominate, domesticate and artificially reproduce nature, rather than to cherish a world we are constitutive of and co-evolved with. The loss of such knowledge

means not only the lack of ability to cater for our own health (by selecting food and plants, forage, etc.), but sometimes for our own survival. Research from Grivetti (1978, 1979, 2006) and Grisetti et al (1987) for example, has observed the comparative impact of drought on different indigenous communities in Africa. Those who have actively retained the knowledge of edible and medicinal wild, drought-resistant plants (often called the 'weeds of agriculture') were able to resist famines caused by extreme droughts, while those who did not , died in their millions. Traditional knowledge of medicinal plants, and food as medicine, has been developed by humans across the world. The Indian Ayurveda, the Chinese and the Tibetan medicines are just a few renowned examples of traditional knowledge, validated by centuries, or millennia of practice and observation, and which, together with many other community-based knowledges rooted in their lands, biomes and cultures, have been discredited by imperial science and a European sense of superiority. The exclusive consumption of cultivated plants has become hegemonic, alongside the vilification of foraging and the eating of wild foods on the basis of the constructed tale that hunter-gatherer communities had poor diets, a fact disproven by several researchers who studied the intake of forager communities living in extreme environmental conditions (Codding & Kramer, 2016; Reyes-García & Pyhälä, 2017; Sahlins, 2009).

An argument persistently levelled against calls for better food and farming standards is that 'people need cheap food'. This is augmented, and even weaponised, by the assertion that 'more food is needed' to feed our ever-growing cities and global population. Seen together, these arguments justify efficiency drives that further consolidate control of the food system in the hands of a few corporate conglomerates. Indeed, anyone seeking to challenge this consolidation, and to resist the structural inequalities it exacerbates, is regularly accused of being 'anti-science', a counter-narrative with a long historical tradition. The results of the 'cheap food' narratives, perpetuated over centuries of slow violence by landed and corporate interests, have been declining food and farming standards, environmental destruction, and a series of intersecting public health crises. Alongside industrially produced food, '[i]ndustrial society has given us effective medical treatments, but it's also making us sick' (De Decker, 2021).

The establishment of what we now call 'conventional' agriculture (what a splendid example of the epistemic rift!), that is: the mainstreaming of fossil fuel-intensive agriculture and food from nowhere, has impacted on, among other things, the reduced number of crops and plant varieties available today as food. A recent study, for example, compares the diversity of seeds and breeds of peasant systems to that of commercial food systems (8774 versus 100), and notes that not only the diversity of species is extremely reduced, but also that the genetic diversity *within* species has been severely eroded (since the 1960s this diversity has been reduced by 75%). The same study also observes that the nutritional qualities of chain-bred varieties have declined by up to 40% (ETC 2017). This productivist quest for genetic uniformity is increasingly cited as the root of pest epidemics, infectious diseases and of novel animal-human transmissions. (ETC 2017; Wallace 2020).

The reliance on only a few selected plant (and animal) species as food, and the selective breeding of plants for characteristics suitable for commercialisation (i.e. colour, sweetness, etc.) has considerably reduced the number of medicinal compounds in plants, as well as their nutritional value, and impoverished peoples' diets with systematic and devastating health consequences. Emerging research on plants' medicinal compounds (secondary metabolites) notes that commercial breeding directed to please consumers with familiar sweet tastes, have progressively removed those compounds responsible for bitter tastes, which often have important medicinal properties (Ku et al. 2020).

The discrediting of human metabolic intelligence and people's knowledge, and the impoverished medicinal and nutritional value of commercial plants come together in a powerful and catastrophic third main consequence of the epistemic rift: the mainstreaming of biologically and ecologically inappropriate and unhealthy diets. The reduced and impoverished food choices, and the ongoing loss of traditional knowledge with the advance of urbanised ways of life, are further amplified by people's diaspora, displacement, colonisation or migration: communities exposed to fragility, and therefore in vulnerable financial conditions, are often prone to toxic 'cheap food', and without access to culturally or biologically appropriate diets. The global burden of disease is enormous, and food is a significant contributor to this.

4. People's health & (in)appropriate diets

According to the Global Burden of Disease Study (Afshin et al 2019) – based on data from 204 countries and territories, 369 diseases and 87 risk factors – the deaths of 11 million people in 2017 "were attributable to dietary risk factors". Not too little food – the annual figure for death from starvation is around 9 million (TheWorldCounts 2021) – but the *wrong* food. There might be some overlaps between these estimates, meaning that they cannot necessarily be added together. While this is beyond the scope of this chapter, what is certain is that millions of people die every year from either eating unhealthy food or having inadequate access to food. For reference, the current total annual number of deaths (of all causes) is around 55m (UN 2019).

The United Nations' Food and Agriculture Organisation (FAO 2021) underlines that "[m]alnutrition, in all its forms, includes undernutrition (wasting, stunting, underweight), inadequate vitamins or minerals, overweight, obesity, and resulting diet-related noncommunicable diseases." With 1.9 billion adults and 38.9 million children overweight or obese and 462 million adults and 194 million children suffering from undernutrition, the global burden of malnutrition has serious and lasting impacts on societies across the world (Ibid.).

Globally, non-communicable diseases are said to cause the death of an estimated 41 million people annually (Johns Hopkins 2021b). That means that more than 70% of all deaths worldwide are caused by what we can call the problems of a modern lifestyle, much of which turns on our dinner plate – wrongly filled or empty, as the case may be – and is compounded by poor labour conditions and increasing toxic environmental loads.

Humanity is increasingly eating the same diet across the world – industrially produced starches, vegetable oils, refined sugars, and processed meat (Khoury et al. 2014). We may hence assume that the US figures from Johns Hopkins on non-communicable diseases – often attributed to diet and lifestyle – could serve as a useful indicator for the future: 35% of the US population is obese (115m), 20% have cardiovascular diseases (66m), 15% have Type 2 diabetes mellitus (50m), 4% have some form of cancer (13m) and 3% have an autoimmune disease (10m) (Johns Hopkins 2021a). This is over three quarters of the population.

These staggering figures ought to give pause, especially when seen in the light of data from the current pandemic. According to data from Johns Hopkins, 18 months into the pandemic first recorded in Wuhan in December 2019, approximately 3.8m people have died following infection with SARS-CoV-2 (2021) - and studies strongly correlate pre-existing conditions – especially obesity (Peters et al. 2020; Wang et al. 2021; Poly et al. 2021; Wu et al. 2021) and diabetes (Corona and Vena et al. 2021) which in turn are diet-related conditions - with increased severity of the course of the disease known as COVID-19.

There are many ways of dissecting these numbers and we have here presented merely a cursory overview for indicative purposes to undergird the notion that food matters when it comes to health. All of these numbers will weigh heavily on health systems that are geared to curative and palliative, rather than preventive medicine.

With the ongoing drive for genetic uniformity and intensification of food production systems in some areas, and land sparing for biodiversity in others, health vulnerabilities associated with extraction are exported, creating new points of rupture, and leaving some more exposed than others. Yet, as 2020 aptly demonstrated, novel pandemics will not be readily contained by such technocratic practices and imaginaries, travelling fast along supply chains of ever-cheaper goods and labour.

To many who had sounded alarm about zoonotic spillover due to increasing pressures on ecosystems combined with growing industrial farming of animals (e.g. Wallace 2016), the COVID-19 pandemic did not come as a surprise: it is a foreseeable product of an economic system based on over-extraction.[1] Wallace et al. put it this way:

> "...the cause of COVID-19 and other such pathogens is not found just in the object of any one infectious agent or its clinical course, but also in the field of ecosystemic relations that capital and other structural causes have pinned back to their own advantage." (2020).

What is more, pandemic effects are exacerbated by other aspects of the same structures. For this reason, the current pandemic has been described as part of a *syndemic* – a 'synergistic epidemic' (Horton 2020a).

The concept of syndemics developed in the context of working with impoverished inner-city populations in the US in the 1990s (Singer & Snipes 1992). It is a systems approach to address public and community health in which complementary elements in the course of any disease are considered (Singer 1994, 1996, 2009). From the syndemic perspective, ill health is viewed as the coming together of multiple factors, both physiological as well as social. On the one hand, pre-existing health conditions and concurrent diseases of whatever kind are considered in conjunction; while on the other, the course of a disease assemblage is combined with a critical perspective on the existing social, cultural, economic and political backdrop, leading to an appreciation of disease as a complex whole. 'Syndemic', then, is a conception of (ill) health as a biosocial phenomenon (Singer et al. 2017). Through an embrace of multiple dimensions, a syndemic understanding permits transcending conceptualisations of health that consider solely the individual, bound organism with at best comorbidity and multimorbidity factors (ibid: 941-942; Mendenhall et al. 2017: 951).

The syndemic framework enables more socially conscious approaches to medicine and public health by insisting on the importance of social and ecological systems and relationships. The insights gained from approaching health through a syndemic framework raise crucial questions with regard to narrowly conceived public health strategies as responses to COVID-19 or any other health issue. If we are living a syndemic crisis, then our responses need to be equally systemic and address the socio-ecological context which fans the syndemic flames.

It is our contention that food – its production, distribution and consumption – plays a central role in this crisis. The consequences of the epistemic rift we discussed above, especially the dwindling of opportunities to choose biologically appropriate diets – for reasons of ignorance, corporate greed, and/or economic hardship – as well as the ominous decline in nutritional content of crops, are crucial factors in malnutrition. Industrial food production is intricately implicated in and exacerbates the collapse of biodiverse ecosystems and habitats as well as human health through carbon

[1] However, despite the imminent threat of deforestation and industrial agriculture as a source of zoonosis, at the time of writing, the origins of SARS-C0V-2 have not been established; the debate on origin was recently reignited by Wade, 2021.

emissions, agricultural toxicity, but also deforestation and the expansion of the agricultural frontier. Food storage and transport contribute equally by relying heavily on energy-intensive modalities (including digitalisation), ever-increasing asphaltation, and long-distance, just-in-time logistics. In conjunction with austerity-entrenched poverty and anguish, historical disinvestments in public health, deteriorating infrastructures, including housing that is hazardous to health (damp, mouldy, over-crowded), the global food system is an explosive part of the syndemic mix.

Understanding growing disease burdens, and how we respond to them from a systems perspective also calls on us to acknowledge the importance of structural inequalities that inflict 'slow violence' on the most vulnerable whose life-support systems are being eroded and polluted (Nixon, 2013).

5. From planetary health to a planetary diet?

In light of the many dysfunctions and disconnections regarding health and food, one might surmise that the old dictum 'all things are connected' is gaining renewed traction given that even the Lancet – one of the world's leading, establishment medical journals – and the Rockefeller Foundation have embraced the idea of planetary health (Horton & Lo 2015; Demaio & Rockström 2015; Clark 2015; Whitmee et al. 2015). At first sight there are similarities between The Rockefeller Foundation-Lancet Commission's take on planetary health and the idea of medicinal agroecology we are developing here. From both these perspectives human health should not be – indeed, cannot be – understood in isolation from the health of our habitat. Both agree: the planet's health is people's health.

A closer look, however, reveals fundamental differences. While we would welcome that such a prominent journal and philanthropic power players promote a holistic health framework, their track record of industrial solutions stands in contrast to the agroecological conception we promote here, which seeks to build health and equity from the ground up, literally, providing access to soil to improve health by way of food sovereignty and the building of interspecies alliances.

In order to realise planetary health, the landmark EAT-Lancet report (Willett et al 2019) and resulting 'Planetary Diet' has been strongly criticised for being highly reductive and deeply embedded in global power (e.g. Shiva 2019). Highlighting some of the contradictions and vested interests, investigative journalist Joanna Blythman writes:

> "[EAT] has a partnership with Fresh, a body made up of 40 of the world's most powerful corporations, a roll call of the big names in pharmaceuticals, pesticides, GM, and ultra-processed food. They include Bayer, which now owns Monsanto and its infamous Round-Up (glyphosate) pesticide, Big Sugar (PepsiCo), Big Grain (Cargill), palm oil companies, and leading manufacturers of food additives and processing aids" (Blythman 2019).

While a full critique and detailed analysis of the Planetary Diet is beyond the scope of this chapter, we focus here on one further point of contention. The report's approach to taxation indicates how the Planetary Diet falls short of offering pathways to establishing and enhancing planetary health in ways that address the systemic causes of mounting and interconnected crises. In their aim to make food prices "fully reflect the true cost of food", including through "[e]xperimentation with sugar or soft drink taxes", the report recommends a critical review of subsidies for fertilisers, water, fields, electricity, and pesticides, and gestures towards the possibility of removing these entirely (Willett et al. 2019, 479). However, as such taxation measures will drive up food prices, the recommendation continues that "...where appropriate, social protection or safety nets (e.g., increasing income

through cash transfers) can be established to protect vulnerable populations, particularly children and women, while keeping trade open" (ibid.).

What does that mean? It means that the funding flows that subsidise the petrochemical food industry should be reorganised. Yet reducing the direct funding of petrochemicals will increase production cost in a system reliant upon petrochemical inputs. In order to keep trade open – as the report elegantly puts the widely accepted imperative that profit margins must continue to grow – food prices will rise. As the number of people who cannot afford to feed themselves will increase with a price hike, the report proposes to remedy this problem by subsidising the *purchase* of petrochemically grown food, rather than its *production*. Instead of feeding the petrochemical and fossil fuel industry directly, the financial flows should be funnelled through consumers, who are thus made more dependent on state benefits and aid. And all the while, the petrochemical trade stays open and the food continues to contain harmful residues in the context of a food industry strongly geared to run on seeds that need fertilisers and pesticides.

It must be noted that the Rockefeller Foundation, which "...as the unparalleled 20th century health philanthropy heavyweight, both profoundly shaped WHO and maintained long and complex relations with it, even as both institutions changed over time" (Birn 2014, 129), is no newcomer to public health, nor to agriculture. Although now supplanted by the Bill and Melinda Gates Foundation as the primary agenda setter in global agriculture, health governance, drug research and development, the Rockefeller Foundation, together with other philanthrocapitalists such as the Ford Foundation, were important funders of the Green Revolution, which aggressively expanded petrochemical agriculture across the globe (Kohler 2007). These players continue to play a powerful role in the shaping of contemporary food and health systems. Shaped in their image, the industrial food system has been designed, rather than arisen by happenstance – and the EAT approach to planetary health is merely an updated version of the same. What the Rockefeller Foundation, EAT, the Lancet et al. are promoting is an effort to deliver on the demands of the dictum that 'everything must change so that everything can stay the same'.

Effectively, then, rather than a contribution to the medicinal agroecology debate, the EAT-Lancet's version of a planetary diet runs counter to it, going hand in hand with a wide range of corporate responses to the climate crisis – such as precision farming, robotics, genome editing and other technology-heavy innovations. These 4th Industrial revolution (4IR) responses – also referred to by the World Economic Forum as 'The Great Reset' – are about change *within* the industrial mode of production, thus maintaining current social and economic inequalities. Medicinal agroecology, on the other hand, embraces the demands from a growing movement of peasants and civil society: the crises humanity faces cannot be remedied by more of the same, and the industrial mode of food production must be discontinued. Directly addressing an array of nexuses – including but not limited to: environmental justice, soil and gut health, the nutritional value of food, prevention of zoonotic spill-over, regeneration of biodiversity – the agroecological pathway to planetary health gets to the roots of causes rather than merely suppressing their symptoms.

We must question the implications of forever chasing the symptoms with new technologies that are likely to lead to the emergence of new problems, or to temporarily obscure or suppress others, including the rising environmental footprint of increasingly high-tech healthcare (De Decker, 2021). Seen together, the combined ecological footprint of 4IR in agriculture and technological responses to ill-health applied within wealthy nations are likely to accelerate climate change - pushing against the limits of planetary boundaries.

6. Conclusions

Amidst the mounting consensus that the dominant food regime is failing against its own metrics, including rates of hunger and malnutrition, there is acute concern that it is not only contributing to intersecting biodiversity and climate (HLPE 2019; IPCC, 2019, Swinburn et al, 2019; Herren and Haerlin, 2020), but causal to the epidemic of chronic health conditions (FAO, 2021; Johns Hopkins, 2021). Despite recognition of the need to transition to agroecological food and farming systems that produce nutrient-dense foods that are more resistant to climate stress (IAASTD, 2009; UNCTAD; 2013; Anderson et al, 2018; Leippert et al, 2020), technofixes for this failing food system and the ill health it produces, both in human and planetary terms, continue the deceit that it emerges from the logics of relentless progressivism. These are the same logics that now drive us inexorably towards the 4IR - with new modes of production being proposed to further industrialise our food systems, this time through a process of de-naturing and de-labouring the food system entirely. And so, it seems, we are forever chasing our symptomatic tails, and that 'Each new phase of world capitalist development, is accompanied by a new form and scale of rupture in socio-ecological relations' (Schneider & McMichael 2010:465).

In this chapter we have argued that food – its production, distribution and consumption – plays a central role in perpetuating or transforming present crises. Medicinal agroecology offers a pathway to planetary health by directly addressing key nexi of these crises (soil health, gut health, nutritional value of food, prevention of zoonotic spillover, regeneration of biodiversity, amongst other), that is, it addresses root causes rather than symptoms and constitutes a planetary medicine.

In a medicinal agroecology framework, human and more-than-human relations matter. Whom you are connected to and in which ways, the conditions in which you live, what you eat, drink, breathe and the ways in which you are able to dispose of your waste matter; always and in all ways matter, but especially to health. Rather than pursuing techno- or pharmacological interventions to mask symptoms, the agroecological framework brings complexities to the fore and considers holistic approaches to healing people and planet.

We want to conclude this chapter by offering a few questions to nourish a research agenda for medicinal agroecologies to thrive.

What are the opportunities to move away from our present trajectory - of medicating populations against the passively accepted symptoms of modernity, and against otherwise entirely natural processes? And what are the challenges of this trajectory in the context of planetary urbanisation and ongoing urbanising societies? What might the implications be for reconceptualising planetary health if discussions were instead embedded in autonomous modes of production and reproduction? If we reconnected and re-membered our rich ecologies of knowledge, how then might knowledge travel and connect up heterogeneously to optimise exchange, adoption and adaptation? How might we, in support of medicinal agroecologies, shift away from productivist approaches in favour of practices that care for and cherish the proliferation of healthy and happy wild plants and recognise human and planetary health's dependency on wildlife and wild landscapes?

These questions raise a series of tensions – not least about how and when agroecology embraces some technologies but not others. As political agroecologists with an interest in questions of power, control and social agency, we recognise that the path towards nourishing research and practice for medicinal agroecologies remains embattled and fragmented. Walking it requires an unrelenting

engagement in healing the (ever deeping) epistemic rift. Addressing public health issues by applying agroecology as planetary medicine is now more relevant and important than ever.

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