



Research Article

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The Earth-Connected Human Superorganism Vs. The Machine

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Abstract

As the SARS-CoV-2 pandemic winds down, two clear choices have emerged for the path that we, as humans, can take. One path involves recognition that humans are a microcosm of Earth's predominant life: microorganisms. As a superorganism body with thousands of species and billions of microbes, we are an Earth-connected human reflection of life on Earth. A second path is the ultimate devaluation and repudiation of human nature and value as we succumb to the Siren's transhumanism song and conversion into a programmable (and hackable) cyborg: the Machine. While we are literally built for Earth, honed to Earth, and a preserver of Earth's life, our majority microbial copartners and our body's integrity have been systematically attacked for decades of what we trusted to be "expert best practices" among the food, drug, chemical, medical, and public health industries and institutions. But in hindsight, it has been a multi-pronged toxicological attack on the human superorganism.

The attack extends beyond humans to include the microbiomes of animals (e.g., honeybees), soil, and plants. Despite remarkable human resiliency, the attack leaves many weak, sick, and increasingly reliant on prescription drugs just to stay alive. Two diametrically opposed paths are at hand. In the first, restoration of the human superorganism and increasing development of superorganism capacities leads us to improved health, less reliance on pharmaceuticals, and a nature-based connection (the microbial internet) here on Earth. In the second, the core belief that humans are inadequate to live and thrive on Earth prevails, and it leads us away from humanity and self-determination to existence as a programmable/hackable machine. Instead of being the embodied repository of Earth's life, we become just another icon/device appearing on a computer screen. This opinion article discusses our present fork in the road.

Keywords: Human superorganism, Holobiont, Chronic diseases, Microbial planet, Transhuman, Machine, Safety, Gene therapy, Covid 19, Glyphosate

Introduction

Humans should never be viewed as a single species that is apart from nature. As this opinion article will illustrate, such a view is not only archaic, but it can enable practices that readily damage human life on Earth.

In our most basic and healthy form, we are a magnificent composite of a mammalian body combined with the tens of trillions of human resident microbiota (the bacteria, archaea, viruses, protozoa, and fungi) along with their genes. The human

microbiota inhabit several different locations of our body (e.g., gut, skin, airways, urogenital tract, breast tissue, breast milk). Most of these trillions of microbes are not just friendly to our body, but play essential roles in our overall development and function influencing such overarching factors as circadian rhythms and lifespan [1]. Our composite life form is also referred to as a holobiont or superorganism.

In this regard we are much like a coral reef. As a fundamental composite of life on Earth, we are uniquely suited to both exist and



function on Earth. In fact, the human superorganism body functions much like a mobile vessel or grand repository that accumulates and distributes microbes as we move through our daily life [2]. During prior centuries we may not have known about the biological complexity of humans, but our lack of knowledge did not detract from the reality across millennia of our ancestors. Our ancestors were closer to the microbiota of soils, crops, and animals than many of us are today. They also consumed naturally probiotic-laden, fermented foods in most, if not all, cultures [3,4].

A 21st century examination of the true nature of humans shows that we embody Earth's predominant life forms, partner with those life forms, rely on those life forms, interact with those life forms even outside our own body, and help to constantly distribute/redistribute those life forms across the globe by our very existence. Of course, the life form most predominate on Earth and our copartner are the microbes. Recently, a collaborator and I wrote four review articles detailing the need to approach healthcare, medicine, safety, pain management public health and holistic wellbeing by placing the human microbiome front and center. Nowhere was this more obvious than in the care of children after adverse childhood events [1,5,6]. This priority ensures not only that the attention is placed on better health for the whole human (the superorganism), but also ensures that we all go through life better connected to Earth's natural internet of microbial life. To deplete the microbiome from our human superorganism bodies weakens our bond with each other and disconnects us from life on Earth.

Because the human microbiome is a slight majority of the body's cells [7] and an overwhelming majority of our genes (hundreds of times more than the number of our human chromosomal genes) [8], it is well overdue that medicine, public health, public policies, and we the people as individuals understand and comprehensively embrace precisely who we are biologically: Earth-connected superorganisms. This article has a goal of taking that next step to bring public policies into sync with our fundamental nature and ensure that any policies support rather than degrade and/or destroy the human superorganism.

This opinion article highlights three major points

1. There is ongoing, wanton destruction of the human microbiome that compromises human vitality and resiliency at both the individual and global population levels.
2. The constant message through various media that humans are underserving of their place on Earth is buttressed by the

destruction of human body integrity.

3. Given government approved human biological degradation, the Siren's song of easing life's struggles by becoming a "Transhuman" machine is a final step in isolating us from life on Earth.

Our Microbial Co-Partners Are Critical for Our Health, Vitality, Unified Consciousness, And Integrity

Being a superorganism/holobiont composed of thousands of different species is not a luxury for us. It is a necessity. It is how we are designed to function. Many of our microbial copartners are intimately connected to our various systems biology units, tissues, and organs. Our microbiota can control many aspects of the development and proper function of our systems using a variety of direct, indirect and epigenetics strategies [1,9-13]. Our microbiota are also critical as they provide:

1. A connection to the world outside of our body via the internet of microbes [14].
2. A filter and gateway to our internal mammalian body [15,16]
3. A front-line defense against pathogens via a process known as colonization resistance [Kim et al., 2017 17]. Remarkably, our human microbiota display the properties of memory, computation and statistical physics, environmental and networked sensing, electro-chemical communication as well as physical/chemical shape-shifting and consciousness [18-24].

Our microbes can use extracellular vesicles as one route of both interbacterial communication and bacterial-systems biology regulation [25,26]. Recently, a curated microbial body map was created depicting our microbe distribution across 22 human body sites as well as the associations of these microbes with health and disease [27]. It is becoming increasingly difficult for the outdated scientific dogma describing humans as but a single species among many on Earth to continue when the scientific reality is that our body in a fully conscious, healthy form is more like an ark that has been loaded with thousands of different species in double digit body sites as a representation of Earth's predominant life form: the microorganisms. This 21st century scientific view of the fundamental nature of the human superorganism including our natural interconnectivity with life on Earth is a game-changer when it comes to the debate over the role of humans amid life on Earth. (Table 1) [28-39] Illustrates examples of key microbes in different body location that carry out significant function for the whole human.

Table 1: Examples of Key Co-Partner Bacteria That Regulate the Human Body.

Bacteria	Location	Function	Reference(S)
<i>Bifidobacteria</i> particularly <i>B. longum</i> ssp. <i>infantis</i>	Early infant gut	Facilitates necessary infant immune maturation; reduces inappropriate inflammation; protects against the risk of later-life allergic diseases	[28-30]
<i>Akkermansia muciniphila</i>	Gut	Regulates mucin production/turnover and protects integrity of the gut lining	[31,32]
Combinations of specific <i>Bifidobacteria</i> strain and <i>Lactobacillus</i> strains	Gut	Stress resiliency and protection against anxiety	[33]
<i>Lactobacillus</i> spp.	Vagina and cervical canal	Protects against bacterial vaginosis and against recurrent miscarriage	[34,35]
<i>Lactobacillus</i> spp.	Oral cavity	Inhibition of <i>Streptococcus mutans</i> biofilm formation and promotion of dental caries	[36]
<i>Dolosigranulum pigrum</i> in combination with <i>Corynebacterium pseudodiphtheriticum</i>	Nasal cavity	Protective combination against otitis media in childhood	[37]
<i>Acintobacter</i> genus	Nasal cavity	Abundance of this genus appears to reduce the likelihood of atopic sensitization in children	[38]
<i>Staphylococcus epidermidis</i>	Skin	Promotes protection of the skin barrier by producing specific ceramides	[39]

Human Devaluation and The Illusion of Environmental Incompatibility

The past century has been filled with what can only be described as a devaluation and manipulation of human life. Whether by accident or by design, the emergence of formal toxicological safety testing paired with formal development of the pharma-medical complex have resulted in longer yet sicker lives with an increase in both human multimorbidity [40-42] and disabilities [43,44]. Population control measures resulted from a combination of global wars combined with genocide and/or pseudoscience-justified, government inflicted famine (e.g., Lysenkoism) [47]. Increased contraceptive practices [48] was combined with regional limits on family size (e.g., China) that had impacts on the number of abortions, family, human behavior, and gender ratios [49-51].

As humans, we have been constantly told that we are destroying the planet and selfishly using planetary resources that we do not deserve to high and have directly caused certain climate-inflicted destruction [52-54]. The message has been clear from alarmists that Earth would be a better, idyllic place if only humans ceased to exist [55]. The actual nature and status of humans and Earth's environment is just the opposite of the promoted illusion. We are

a microcosm of life on Earth that has been a part of our inherent being despite being under almost constant toxicological assault across much of the past century.

We are not a single species nor were our ancestors as those who would denigrate humans often promote. There exists a biologically sacred bond between the status of our microbiome and the systems biology component of the human body. The two must be in sync and balanced for our health, well-being, connectivity to our environment, and full human capacities to emerge and be maintained. When damaged, we are left weak, sick, functionally dulled, and increasingly dependent upon the healthcare structure and others [6,56]. A prolonged public health and policy assault has been waged against our microbiome-systems biology integrity, and this has been going on for more than a generation [56]. This is illustrated in the health and policy decisions that facilitated the damage. The legacy of our damage and human suffering because of these public health/policy decisions is detailed in the recent book "Tragic Failures: How and Why We are Harmed by Toxic Chemicals" [57]. Examples of the prior and present harmful chemicals, foods, food additives, and pharmaceuticals that damage our microbiome and our body's functions are shown in shown in Table 2 [58-84].

Table 2: Examples of Widespread Government Regulatory-Sanctioned Practices that Sicken, Biologically Compromise, and/or Degrade the Human Superorganism*.

Factor	Known Adverse Effect	Reference(S)
Elective Cesarian Surgery	Lack of Core microbiome transfer to the baby with elevated risk of chronic diseases; surgery-associated antibiotic administration additionally damaging the microbiome	[58-60]
Covid-19 Gene Therapy/ Vaccination (Pfizer)	Postmarketing Safety Data submitted to the FDA by the vendor indicated the observance of more than 1,000 forms of adverse side effects/disease conditions following gene therapy/vaccine administration. The vaccine fatality rate exceeded that reported for the viral infection.	[61]

Covid-19 Drug Treatment: new drug remdesivir vs. old off-label drug ivermectin	A long standing, Nobel Prize winning human drug, ivermectin, was effectively blocked from off-label physician use by various medical/public health organizations. Instead, a new expensive drug, Remdesivir, was pushed as the treatment option. A recent study found that one of the outcomes of this public health policy push against ivermectin was unnecessary human death.	[62,63]
Glyphosate	The antimicrobial is distributed from soils across the food chain damaging the microbiomes and physiological systems of many species including humans.	[64-66]
Food Emulsifiers	Destruction of mucin-regulating gut bacteria (e.g., <i>Akkermansia muciniphila</i>), destruction of the gut lining, promotion of chronic diseases.	[67]
Artificial sweeteners	Examples: Aspartame, Saccharine, Sucralose, and Acesulfame potassium all reported to decrease bacterial diversity, increase gut permeability and/or damage the gut lining, alter mucosal immunity and increase inflammation.	[68,69]
High Fructose Corn Syrup	Decreased gut bacterial diversity, impaired gut barrier, elevated risk of metabolic syndrome	[70,71]
Antibiotics Without Complementary Microbiome Therapy	Damage to the microbiomes in several body locations and increased risk of future diseases	[72-74]
Non-Steroidal Anti-Inflammatory Drugs (NSAIDs)	Microbiota dysbiosis, gut barrier damage, bacterial translocation, potential elevated risk of certain pathogen infections	[75-77]
Proton Pump Inhibitors	Altered gut microbiota profiles, changes in drug metabolism by gut microbiota, increased prevalence of specific pathogens and increased risk of enteric infections; elevated risk of bacterial infection spread to the liver	[78,79]
Selective Serotonin Reuptake Inhibitors	Drug effectiveness varies depending upon microbiome composition and antipsychotics can act as antibiotics and selectively alter the gut microbiome.	[80]
Triclosan	Exposure to this antimicrobial exacerbates microbiome-driven colitis and colitis-associated diseases	[81,82]
Bisphenol A	Exposure can cause gut microbiota dysbiosis and predispose for several chronic diseases.	[83,84]
See also [6,56].		

The Human Superorganism: Naturally Connected to Earth

One of the striking findings during the past two decades has been the changing view of microorganisms and the human body. Thanks to microbiome research pioneers like Élie Metchnikoff, Martin Blaser, Rob Knight, Jack Gilbert, Seth Bordenstein, Justin and Erica Sonnenburg and many others, we now understand that micro-organisms are not merely a chance encounter for the human body and one that we should fear because of possible infections. Instead, we learned they are a critical and vast component of the human body (in the form of multi-body site microbiomes) needed for optimal everyday "human" function and health [6,85]. With each new discovery of relevance to the human microbiome, we learn that microbes are not just tagging along for the human experience. They are critical partners crafting our experience. In fact, much of what we are in the present reflects our ancestral co-partnership with ancestral microbes [86]. They affect not just our metabolism, physiology, health, and lifespan, they are preparing their next generations of microbes to copartner with our future children. That is, if we can halt the practices that have significantly degraded our microbiomes [87]. Within our bodies we house a microcosm of the most predominant forms of life on Earth. We are a superorganism by our very nature.

In The Human Superorganism: How the Microbiome Is

Revolutionizing the Pursuit of a Healthy Life [2], I likened humans to a walking coral reef or a mobile tropical rainforest in our complex species composition and capabilities and the molecular synergies that result. The irony is that much effort, human energy, financial support, and respect for the health and preservation of coral reef and tropical rainforest ecosystems has been developed across decades. We know the importance of the coral reef and the tropical rainforest to planetary health and wellbeing. There is tremendous interconnectivity and ecological value in nurturing the health of these superorganisms. But we have not yet applied our almost sacred commitment to the preservation of coral reefs and tropical rainforests to the same multi-species marvel that is our human superorganism body.

One of the major benefits that humans make to Planet Earth is to collect and then redistribute microbes as we travel and visit both different geographic locations and other humans. I have likened us to the American Pioneer horticulturist, John Chapman (also known as Johnny Appleseed). Chapman planted apple seeds across the Midwest U.S. largely during the first half of the 19th century so that the region might benefit from the fruits of apple trees in later generations. We, too, can spread health-promoting microbes, not to cause disease as might worry germophobes, but rather to aid healthy and balanced microbially-laden ecosystems in our backyards, cities, and around the world.

Extremophiles in All the Wild Places Including the Human Body

Extremophiles are organisms that have the ability to not only withstand adverse conditions but also to thrive in the most extreme conditions that Earth has to offer. Microorganisms in this category show us the full range of life on Earth. Extremophiles are thought to have been the first life on Earth (archaea, bacteria, and some fungi), and may also be the best candidates for life on other planets [89]. Categories of extremophiles cover a broad range of different environmental and functional features. For example, they include: acidophiles, alkaliphiles, halophiles, radiophiles, piezophiles, psychrophiles, thermophiles [90]. Poly extremophiles, where organisms can withstand more than one harsh condition, are thought to define the boundaries of areas and possibly planets that

can support life as we know it [89].

Extremophiles are not just meant for the wildest, most extreme habitats on Earth (e.g., Antarctic glaciers, hot springs, the Dead Sea, volcanoes, space vacuums, the deepest part of oceans), they are also an inherent part of us. Our superorganism bodies carry close microbial relatives of Earth's most isolated microbial inhabitants.

Table 3 [91-100] illustrates examples of human extremophiles that form a part of our own microbiome. The Human Superorganism carries not only thousands of microbial species that operate in more moderate conditions, but also have microbial co-partners that are both ancient in ancestry and are extremophiles. In fact, it will be shown that many of our own extremophile microbes are closely related (e.g., same genus) to extremophiles across the far reaches of Planet Earth reaching toward the boundaries of space.

Table 3: Extremophiles as an Inherent Part of the Human Superorganism.

Name Or Category of Microorganism	Location	Special Property/Features	Reference(S)
<i>Methanomassiliicoccus luminyensis</i>	Human gut	<i>Methanomassiliicoccus luminyensis</i> is novel as a methanogenic archaeon that does not require Na ⁺ ions for energy conservation.	[91]
<i>Methanobrevibacter smithii</i>	Human gut	There is a high prevalence of this methanogen archaea. It is found in most human guts.	[92]
<i>Methanobrevibacter oralis</i>	Breast milk	The presence of this archaea along with <i>M. smithii</i> in breast milk emphasizes the role of human-archaeal-bacterial mutualism through methanogenesis.	[93]
<i>Ruminococcus champanellensis</i> sp. nov	Human gut	In the human gut, this bacterium degrades cellulose and cellobiose to produce acetate and succinate.	[94]
<i>Magnetospira</i> sp. QH-2 and <i>Desulfovibrio magnetis</i>	Human gut	Magnetic orientation/association with hippocampus role in orientation and balance	[95]
<i>Tetragenococcus</i> halophiles	Human gut	Hyper salt loving, halophilic bacteria do occur in the human gut. This example produces lactic acid and is thought to be beneficial for human health.	[96]
<i>Bacillus alcalophilus</i> AV1934	Human feces	An alkaliphile bacteria from the gut, this bacterium exhibits a novel potassium ion coupling apparently used in motility.	[97]
<i>Streptacidiphilus bronchialis</i>	Human bronchial lavage	This is a novel alkaliphile actinobacterium (not evolutionarily obvious) that was recently isolated from a bronchial lavage.	[98]
<i>Haloferax massiliense</i> sp. nov.	Human gut	This example was isolated from the defecation of a 22-year-old Amazonian female. A genome sequence and characterization have been reported. The genus contains species that are halophilic archaea, which beyond the human gut, inhabit hypersaline environments such as the Dead Sea and the Great Salt Lake.	[99,100]

A recent discovery about the human microbiome is that Earth's most ancient microbial life form, the archaea, are a much more significant part of the microbiome than previously thought. New analysis tools have given us a better view of our archeal copartner. More than 1,100 distinct archeal genomes have been found in the human gut alone [101]. Kinkar and Saleh [102] found that the specific composition of archeal secretomes reflects the specific environment in which each archaeon is found as well as

their requirements for nutrient uptake, maintenance of their cell walls, and/or their specific interactions with their environment. To demonstrate our own natural connections to Earth's farthest reaches, Table 4 [103-112] illustrates examples of archaeal and bacterial extremophiles that are closely related to those inhabiting our own body (same genus). This table contains extremophile examples from Earth's environment as well as from ancient humanoids.

Table 4: Examples of Extremophiles in Wildlife, Nature, and Ancient Civilizations Related to Those in Modern Humans*.

Genus/Category	Locations/Survival in Nature	Reference(s)
<i>Methanomassiliicoccus</i>	Coastal and deep-sea marine sediments, submarine mud volcano samples, anoxic lake waters, freshwater sediments, deep-sea brine samples, hot spring sediments, and peatland soils	[103]
<i>Methanobrevibacter</i>	Neolithic dental calculus	[104]
<i>Magnetospira</i>	Salt Marsh at Woods Hole MA	[105]
<i>Tetragenococcus</i> (previously called <i>Pediococcus</i>)	Lupine seed fermentation	[106]
<i>Streptacidiphilus</i>	North China soil	[107]
<i>Haloferax</i>	Dead Sea	[108]
<i>Bacillus</i>	Hyperthermal vents; International Space Station conditions, and even simulated Martian surface conditions	[109,110]
<i>Desulfovibrio</i>	Sri Lanka geothermal springs	[111]
<i>Ruminococcus</i>	El Chichón volcano in Mexico	[112]

Our Intimate Connection to Life on This Planet Should Never be Doubted nor Dismissed

Attitudes Toward Microbes and Exposure to Natural Environments Affects Our Physiology and Health Status

We are healthier when we connect our microbes and physiology to those microbes in the environment. Governmental decrees designed to isolate healthy humans from each other and from nature only contribute to microbiome and physiological degradation [5,56]. Additionally, Robinson et al. [113] posited that germaphobia has contributed to the prevalence of immune-driven disorders and mental health conditions and that our weaker connection to nature has further fostered immune related chronic disease. These researchers surveyed 1,184 individuals (the majority in the UK) about their visits to nature and attitudes toward microbes. They found a direct positive relationship between a positive attitude and knowledge of microbes and the frequency and duration of visits to natural environments. They also found that a viral-centric focus of microbes and lack of knowledge about microbial diversity, such as occurred with the Covid-19 scare, was more likely to be associated with an overall negative view of microbes and increased germaphobia [113].

There are numerous examples where exposure to microbes in natural environments aid our metabolism, physiology, and well-being. For example, *Mycobacterium vaccae* is a soil bacterium that reduces stress/anxiety upon human exposure [114,115]. Not surprisingly, part of this natural soil bacterium that is beneficial to humans is being examined for potential patented drug development [116]. An entire research initiative within the developmental immunology area known as the “hygiene hypothesis” argued that early life exposure to farm animal environments (without pesticides) provided protection against later life allergic diseases.

A significant difference was found between rural farm living and nearby urban areas in childhood immune status and the prevalence of allergic diseases. We now know that status of the microbiome-host immune co-maturation is the basis for the “beneficial barnyard effect.”

Findlay et al. [117] pointed out that the Covid-19 pandemic had the potential to harm the human microbiome and general health precisely because the mandates encouraged people to live in as sterile an environment as possible. The researchers warned that implementation of physical separation, extensive hygiene, travel barriers, and other measures that influence overall microbial loss could have long term adverse health consequences. Removing ourselves from a microbe-rich natural environment is precisely the opposite of what humans should be doing for improved health. Recent information suggests that microbes can play a very useful role in integrative pain management [118]. If the Covid-19 public policy measures were yet another major step in the long march of human microbiome degradation and immune dysfunction promotion, then what could come next? What could take us even further from our whole human status as a superorganism that houses trillions of Earth’s microbes?

Enter Transhumanism and The Allure of The Human Machine

The Siren’s Song of Transhumanism and the “Smart” Body

When the human body and microbiome are sufficiently degraded, and we are taught to devalue our inherent capacities, the historic body-as-a-temple concept evaporates. In a cultural environment where we routinely disparage ourselves, we can be more easily persuaded to cyborg ourselves just to become worthy of some future existence [119]. Rather than expanding through the

internet of microbes and superorganisms in the envisioned “human machine” world, we are encouraged to import new hardware connected to anything and everything.

A key element for transhumanistic modification of the human body was the recent public policy of mandated gene therapy. It fits the narrative that the human body is somehow a flawed design and incapable of thriving or possibly even living on Planet Earth. But the message that humans are the only selfish species and a blight upon Earth is predicated upon a biological lie: that humans are only one species. The single species idea for humans is important for the 21st century proposition that humans are defective beings. That our only hope to continue to exist on Earth is for us to increasingly become non-human, machine-like, transhuman or even post-humans. That by becoming robotic and less “human,” we will become a higher, more valuable lifeform. The ever-present labeling of humans as inherently defective is the lure that entraps the human superorganism into accepting the life of a programmable and readily hackable machine, the ultimate transhuman.

In many ways this is a Faustian deal based on biological lies. Early waves of medical devices/machine implants important for addressing human diseases have illustrated the take-home message that the patient does not have security over the body’s machines. Best [120] described the situation where life/death decisions can be at the mercy of extortion from medical device hackers. But this is just the tip of the body ownership issue. Imagine next level chipping/transplanted devices where optional machinery is installed simply to create the “Smart” body. The hackable transhuman enters into what has been characterized as a new form of slavery, digital slavery [121]. The new slavery is wrapped up in a glitzy package that actually draws us away from our inherent nature as multi-species, free-willed beings made distinctly of the Earth’s predominant life forms and well-suited for the Earth if left in our natural state. The answers can be found inside of us, not in the latest Tech start-up.

Conclusions

More than fifty years of microbiome-disconnected public policies have increasingly degraded human and environmental microbiomes around the globe and compromised us as human superorganisms. Rather than simply reversing what has been a prolonged assault on humans, a suggested solution to our increasingly sick, prescription-drug-overloaded bodies is to take just one more step: to become increasingly nonhuman, to become a machine. The heavy hand of Covid-19 policies from 2020 and beyond should be enough to demonstrate that a fully hackable “human” machine is nothing more than a 21st century maximally shackled slave. If we are ever to realize our full potential as multi-

species beings and truly inhabit the Earth rather than separating ourselves from it, we must identify and reverse the public practices that damage our microbes and our bodies. We can still become that glorious, microbial vessel, the naturally connected human superorganism.

Conflict of Interest

The author declares that there is no conflict of interest. There was no financial support for the preparation or content of this paper.

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