University of the Sunshine Coast

Lisa Chandler, Donna Davis and Nigel Fechner

Where do all the faeries live? The future of biodiversity in a rapidly changing world.

Abstract:

Global biodiversity faces unprecedented challenges in the 21st century and beyond. Anthropogenic agitations now threaten to irreversibly destabilise the natural world. Despite precautionary urgings by the scientific community, the polarised moiety of environment adherents and dissidents prevails. The endurance or extirpation of species relies on both adaptability and intervention. This essay considers these pressing concerns by focusing on the role of fungi within wider ecosystems. The Kingdom Fungi is one group of sentient biota which understatedly drives ecosystem dynamics and the subsistence of larger organisms, yet whose members remain largely foreign to us. The essay explores the longstanding physical, cultural and historical inter-relationships between humans and fungi and their enduring role in human survival and development. Research indicates that fungi possess qualities which may well serve to ameliorate our errors of judgment and resulting ecological impacts yet paradoxically, the future of fungi could be imperiled by such human impacts. Two future scenarios are proposed and it is argued that if these diminutive organisms are as susceptible to environmental degradation and restructuring as flora and fauna, what prospects for perpetuity do our habitats face?

Biographical notes:

Nigel Fechner is a Senior Botanist at the Queensland Herbarium, having been employed there since 2000. He specializes in the identification and nomenclature of macrofungi. His particular area of interest is ectomycorrhizal fungi – those that form mutual relationships with plants.

Lisa Chandler is Associate Professor in Art and Design at the University of the Sunshine Coast (USC). She leads USC's Arts Research in the Creative Humanities (ARCH) research cluster and was the foundation director of the USC Gallery. Lisa has curated numerous exhibitions, including the award-winning East Coast Encounter, and has published widely on art and visual culture.

Donna Davis is a multi-disciplinary artist who explores the nexus between art and science. She develops artworks that imaginatively capture and create sites of ecological observation in order to provide new ways of 'seeing' in the mind of the viewer. Donna has undertaken art/science residencies with organisations such as the Queensland Herbarium, Brisbane Botanic Gardens. She has exhibited widely in both state and national touring exhibitions, and has works held in both public and private collections.

Keywords:

Creative Writing – Fungi - Ecological Adaptations - Anthropocene

Provocation

Nigel Fechner

An all too infrequent precipitation event unleashes tumultuous forces upon a fragile, yet persistent, vestige of natural habitat. Paradoxically, this nourishing rain also threatens stability within this remnant of once majestic forest. Unseen forces are at work, however, orchestrating a multitude of destructive life-sustaining functions. Deep within the uninhabited fissures and slivers of space encased within the organic detritus strewn haphazardly across the landscape, previously dormant fungal spores stir into action. Interred soil-borne kin likewise unshackle the fetters of their latency to heed the calling of a world being summonsed to conflict – a battle for resources and, consequently, survival.

A battalion of chemical-endowed decomposer fungi unleash the first wave of activity. Their arsenal comprises an admixture of cellulose and lignin-degrading incendiaries; accompanied by special operatives equipped with toxic heavy metal assimilation technology, and still others with anti-microbial weaponry. This is not a unified assault. This is every fungus for itself, each one clambering to assert ascendency over its rivalrous compatriots.

Flanking the decomposers is a cohort of uncompromising parasitic and pathogenic agents deployed with a manifest to selectively seek out weakened or otherwise compromised flora and fauna and ‘take them out’ – sociopathic fungi with attitude. Significant quantities of organic matter are supplied to the decomposer cohort by these subversive agents. Only the strong and the healthy within this biotic community will prevail.

Inhumed within the subterranean realm, Gaia’s paramedics fortify the embattlements. Charged with augmenting supply lines; integrating communication channels throughout the underground network; defending against invasion from adversaries, and reinforcing substratum cohesion - theirs is a protean assignment.

Life goes on!

Despite this dramatic portrayal of ecosystem function as on ongoing Armageddon, the perpetual struggle for survival belies an uneasy status quo. Such are the machinations of a healthy, fully functional environment.

But…..... !

This harmonious tension has been catapulted into disarray over the centuries through anthropic negligence and ignorance. Homo sapiens have evolved from obsequious benefactors of nature’s philanthropy to malefic perpetrators of environmental carnage. Humanity’s proclivity for sabotaging their environs for the sake of pecuniary remuneration has, paradoxically, imperiled their own subsistence.

In days of yore, when faeries frequented the coppices of medieval Europe, fungi were held in trepidation by some tribes, courtesy of folkloric inculcation with dire predications. Conversely, other cultures embraced the benefits that these organisms afforded. Whilst many European clans considered such vagaries of nature as reflecting the auguries of the supernatural, Asian and South American civilizations, in particular, accredited fungi with health-giving potential and spiritual enlightenment.

Humanity's affiliation with fungi appears to be a protracted one. Ötzi, ironically European, was discovered to have been carrying two species of fungi when his life came to an abrupt end 5300 years ago – one employed as tinder, the other for its anti-parasitic attributes. Some tribes of Australian Aborigines employed various fungus species for thousands of years for purposes including ceremonial artwork, edibility and medicinal properties; others equated their presence with malevolent spiritual incarnations. Archaeological evidence intimates that Chinese medicinal praxis dates back, at a minimum, 5000 years, and somewhat speculative evidence hints to entheogenic consumption in Algeria dating back 8000 years; emulated by a multitude of cultures thereafter (Moore 2000).

Humans have been savoring the culinary versatility of edible fungi for millennia. Moreover, they have learnt to expressly harness the transformative properties of fungal metabolites to their advantage. For over 12000 years humanity has progressively unveiled a subset of the life-sustaining provisions that the mycota accords.

Somewhere in the vicinity of 9000 BC, pathogenic fungi became one of the first microorganisms to prosper from the inception of agriculture within the 'cradle of civilization'– Mesopotamia. Rusts, smuts and ergot were furnished with a cornucopia of cultivated cereal crops as Neolithic peoples made the transition to an agrarian lifestyle. Monocultural husbandry brings with it an exponentially enhanced opportunity for diseases and pests to proliferate and so humanity's affiliation with fungi began on a confrontational foundation. Contra to this fomenting adversarial exchange between humans and microbes however, yeasts, albeit unwittingly, almost simultaneously provisioned the Neolithic world's populace with its most fundamental dietary ingredient – bread.

Within half a century, Mesopotamian cultures would be brewing beer, and henceforth the yeasts became an inseverable accoutrement for mankind. By the middle of the 6th millennium BC, Iranian predecessors had perfected the art of wine-making and, perhaps appropriately, this coincided with the invention of cheese in Poland. Ironically, agrarian ascendancy coincided with the end of a glaciation event, with its attendant temperature and sea level rises (Moore 2000).

Globally, between 8000-5000 BC, agriculture evolved, often independently within continents, and both an immutable reliance on, and an intransigent discord with, the mycota emerged. At this juncture, fungi's role in ecosystem function and maintenance was juxtaposed with the increasing degree to which human civilisation – propelled by the incongruous benevolence and malevolence of the mycota –prospered and advanced whilst concurrently depleting the resources that the fungi require for their own preponderance.

Thousands of years hence, amidst the volatility of the Middle Ages, silviculture developed as a means of artificially sustaining the growing need for timber products. Invariably, those tree species best suited to plantation culture were those which participate in ectomycorrhizal, or mutually supportive, relationships and another group of fungi became ensconced in humanity's expansion.

By the end of the 19th century AD, scientific endeavour unveiled what Chinese herbalists had advocated for millennia, albeit from a preternatural perspective. Antibacterial and antifungal compounds, the synthesis of which fungi have a seemingly interminable aptitude for, could be harvested and utilised for the betterment of human health (Miller 2013).

Fungi have played a significant role in human survival and development for centuries, and modern research indicates that they possess qualities which may well serve to ameliorate our historical errors of judgement. Paradoxically, the future of fungi could be imperiled by the inimical impacts imposed upon the world by humans. If these diminutive organisms are as susceptible to environmental degradation and restructuring as the flora and fauna, what prospects for perpetuity do our habitats face?

Cast your mind forward to 2200 AD. At this point you, as protagonist, choose how this union unfolds:

(A)

Homo sapiens is thriving. Finally, their propitious cognisance of the indelible alliance they share with fungi has proven redemptive for the species. Earth is slowly rejuvenating; temperature and sea level rises have been curtailed before breaching devastational boundaries. Carbon dioxide levels are declining in response to widespread reforestation programs. Climatic conditions are stabilising globally, and the incidence of apocalyptic natural disasters has fallen dramatically.

Intensive research has revealed a plethora of bioremedial purposes to which fungal entities can be deployed, and industries have been established on the basis of these functions (Stamets 2005). Renewable energy consumption now proliferates, but pollutants still persevere in the environment. Considering their similarity to recalcitrant compounds in organic matter, petroleum products – oil, diesel, petrochemicals – prove palatable to some fungi, such as oyster mushrooms, which are invaluable as both a clean-up agent and a food source. Other pollutants, such as plastics, are likewise susceptible to the degrading actions of the fungi and are befittingly dispensed with.

Mycelia actively participate in absorbing carbon, heavy metals and even radioactive isotopes, and also filter detrimental microbes out of water. Harnessing this potential has proved economically beneficial for the growing multitude of companies providing remediation services. Industries that exist in this future world are dedicated to the manufacture of fungi-derived antibiotics; reforestation supplements; natural insecticides; building materials and even the provision of cadaver recycling burials (Damialis et al. 2015).

Agriculture is conducted with a focus on environmentally sustainable methodologies. Fungal mycelia form networks that bind soil particles together, assisting it to resist erosion, as well as aerating it. Mechanical cultivation, or tilling, of the soil is minimised. Farmers use fungi to reduce erosion and in the application of fertilizer. Forestry inoculates plantations with an admixture of ectomycorrhizal fungi species to optimise growth rates and biomass recruitment. Primary production and economic parity have become universal phenomena (Miller 2013; Stamets 2005).

(B)

Homo debilis persists in small, isolated pockets. Inundation of coastal agricultural zones by seawater has depleted global food resources and habitable land area. Increased temperatures, combined with scattered infrequent precipitation, have further decimated cultivable land options along with those crops which have the potential to survive in the prevailing harsh conditions. Desertification is a natural phenomenon which has progressed with accelerating impetus. Catastrophic climatic episodes dominate weather patterns, extirpation of the biological world their hypothetical objective. Fungal ecosystem function is no longer viable. Forests have been immolated, organic debris is

scarce and carbon absorption by natural systems is negligible. Erosion has stripped the remaining habitable terrain of all residues of fertile soil.

The denouement of the anthropological era is enacted as a reprehensible collapse of biodiversity; the consummation of a ransacked, neglected, desecrated planet. Art imitates life as, at its zenith, humanity's impropriety ushers in the last mass extinction event, culminating in a resolution of Wellsian dimensions – life will continue, devoid of hominids, as microorganisms once again hold dominion and will ultimately resuscitate their ailing benefactor.

We have a choice to make!

List of works cited:

Damialis, A, Mohammed, AB, Halley, JM & AC Gange 2015 'Fungi in a changing world: growth rates will be elevated, but spore production may decrease in future climates', *Int. J. Biometeorol*, 59, 1157-1167

Miller, K 2013 'Mushroom Manifesto', *Discover* July/August 2013, retrieved March 28, 2018 from: http://doorofperception.com/wp-content/uploads/Mushroom_Manifesto-Stamets.pdf

Moore, D 2000 Slayers, *Saviors, Servants, and Sex: an exposé of Kingdom Fungi*, Springer-Verlag, New York

Stamets, P 2005 *Mycelium Running: How Mushrooms Can Help Save the World*, Ten Speed Press, Berkeley.

Creative Response

‘Where do all the faeries live? The future of biodiversity in a rapidly changing world’

Lisa Chandler and Donna Davis

Alice peers into the microscope, patiently making minute adjustments to the focus until details of the strange hybrid creature come sharply into view. As a mycologist she has devoted years of study to fungi but this particular species is crucial to her mission. Her brow furrows as she scrutinises the intricate organism. Observing the creature’s complex design and functions, she feels a sense of awe overwhelming her practised scientific gaze.

Alice recalls how, as a child, her grandmother would tell her of times when forests were abundant, inland rivers flowed and seas were clean. Her grandmother explained how she would search for mushrooms and colourful, oddly shaped fungi attached to rotting branches or emerging from the damp leafy forest floor in the densely treed property where she lived. She related amusing tales of woodland fairies who lived in tiny mushroom dwellings, carefully hidden from humans so they would not be thoughtlessly destroyed. She would hand Alice the VR goggles so that she could immerse herself in that time and place where chance discoveries revealed a wonderland of intriguing shapes, patterns, textures and clusters of mushrooming structures.

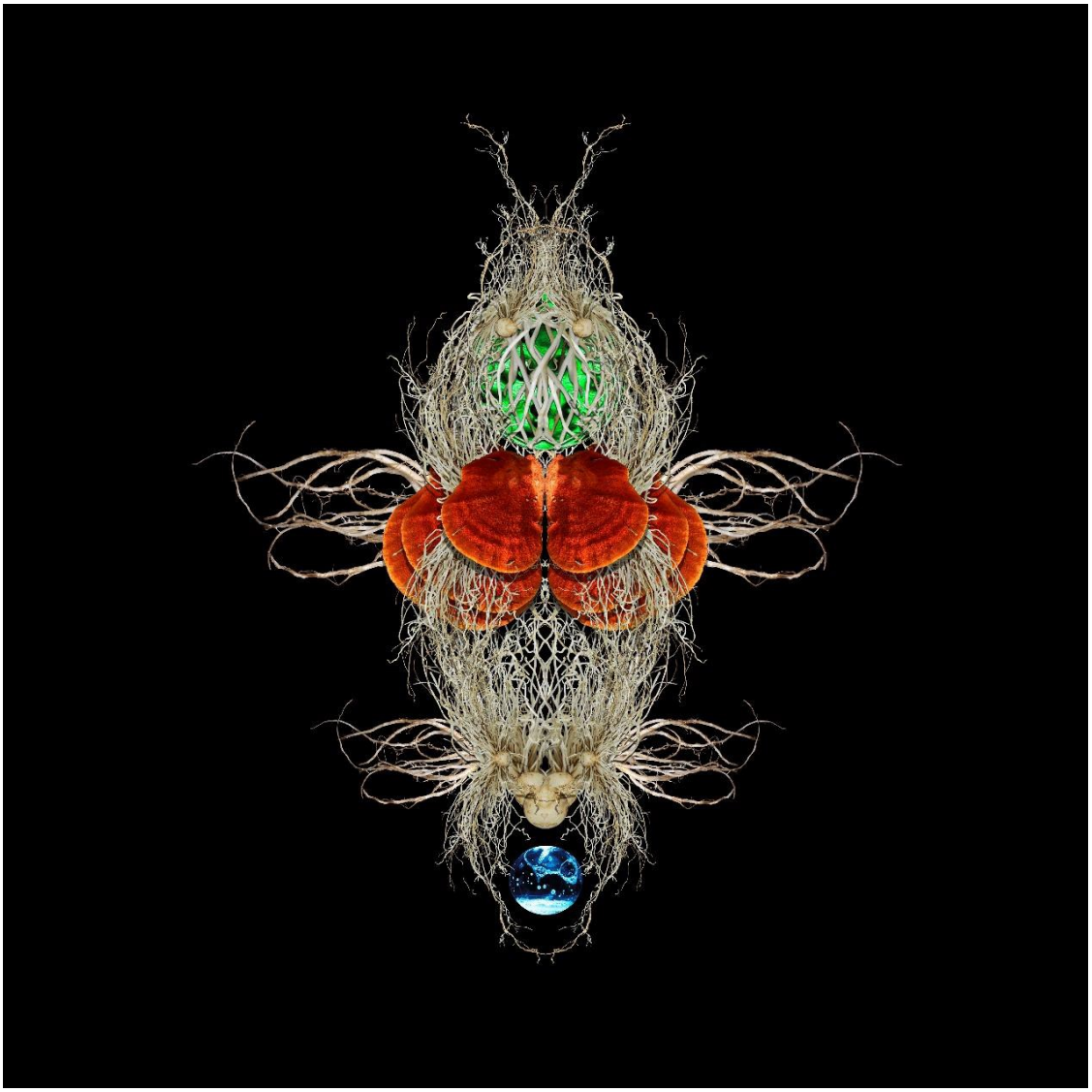
As she grew older, Alice began to seek out remnant habitat where she was both surprised and delighted to find fungi –vivid orange plate-like organisms arcing around disintegrating tree stumps and various other alien-like forms that would silently appear overnight – hinting at mysterious unseen worlds where dynamic processes of growth and decay unfolded in the damp soil according to their own interconnected rhythms. When she later went on to a career researching fungi, her youthful sense of wonder morphed into an intense scientific curiosity as she sought to uncover some of the many ways that fungi contribute to the dynamics of wider ecosystems. She developed an appreciation for how human activity has been interwoven with these diverse organisms for thousands of years.

As she continues to look intently into the microscope, Alice muses on how this relationship has never been more important and is essential to her work as part of GTI – the joint government and industry funded Global Transgenics Institute. Often she has felt daunted by the complex challenges she and her colleagues face in their current project. The ever-increasing problem of nutrient-depleted and contaminated soils has meant that fresh food has become even scarcer. There is a general sense that the resulting public unrest will lead to more food riots or worse, another Global Resources War. Nevertheless, she has a quiet sense of confidence that fungi will be central to the solution. She pauses from her inspection to stretch her back, and walks briskly to her adjacent office to check some notes on her computer. She looks up from the screen, caught up in thought, when her eye is distracted by a small framed drawing of delicate fairies dancing within a ring of conical spotted mushrooms. It was drawn by her daughter Lily, when she was still a child, inspired by the magical folktales told to Alice by her grandmother, which she in turn had passed on to her own daughter. She smiles briefly and turns back to her computer.

Alice is a member of the multi-disciplinary team working on the Toxin Removal and Nutrient Supplementation or TRANS project tasked with turning depleted dirt into

nutrient rich soil. The project has been well-funded by government in partnership with the GMO-Grow corporation, in an anxious effort to revive tracts of unproductive soils adversely affected by extremes of drought and flood, the overuse of fertilisers and pesticides, and decades of mono-cropping practices. The TRANS team's goal has been to develop a hybrid robotic-organic machine, with a fungus as its living core, to facilitate soil replenishing processes in the hope that crop production might once again become plentiful. Alice is aware that there has been some uneasiness and apprehension within the general public about previous experiments at GTI involving animal-human and animal-machine hybrids, but she feels that there will be less concern about an entity that fuses fungus, genetically modified tree roots and machine components. People overlook fungi, she thinks ruefully, so there is less likely to be a fuss this time. Besides, something urgently needs to be done to solve the need for fresh food.

Strangely, it appears that it is not only humans who have been active in countering the many environmental crises that have arisen from anthropogenic causes over the past decades. For some time, fungi have been rapidly adapting themselves to remedy some of the planet's human-generated problems. This has occurred in ways that have proved mutually beneficial, as the fungi have been able to garnish nutrients to sustain themselves in the process. Alice has devoted considerable time studying these mystifying adaptations in order to inform the design of the organic-robotic soil remediator. She peers again through the microscope to study the Aquatic Acidity Neutraliser or AAN, marvelling at its efficient design. She has a comprehensive knowledge of mycorrhizal fungi, which form a symbiotic relationship with a plant host, infiltrating the plant's vascular root system to support a mutually beneficial nutrient exchange in most instances. The AAN possesses similar characteristics, yet what is truly baffling is that this fungus-based creature appears to have rapidly evolved in response to rising sea levels and high ocean acidity. While some have argued that chemical weapons from the Global Resources War have triggered the fungi mutations there appears to be no clear evidence of this. Rather, the fungi, through their own restorative capacity, seem to have naturally adapted.

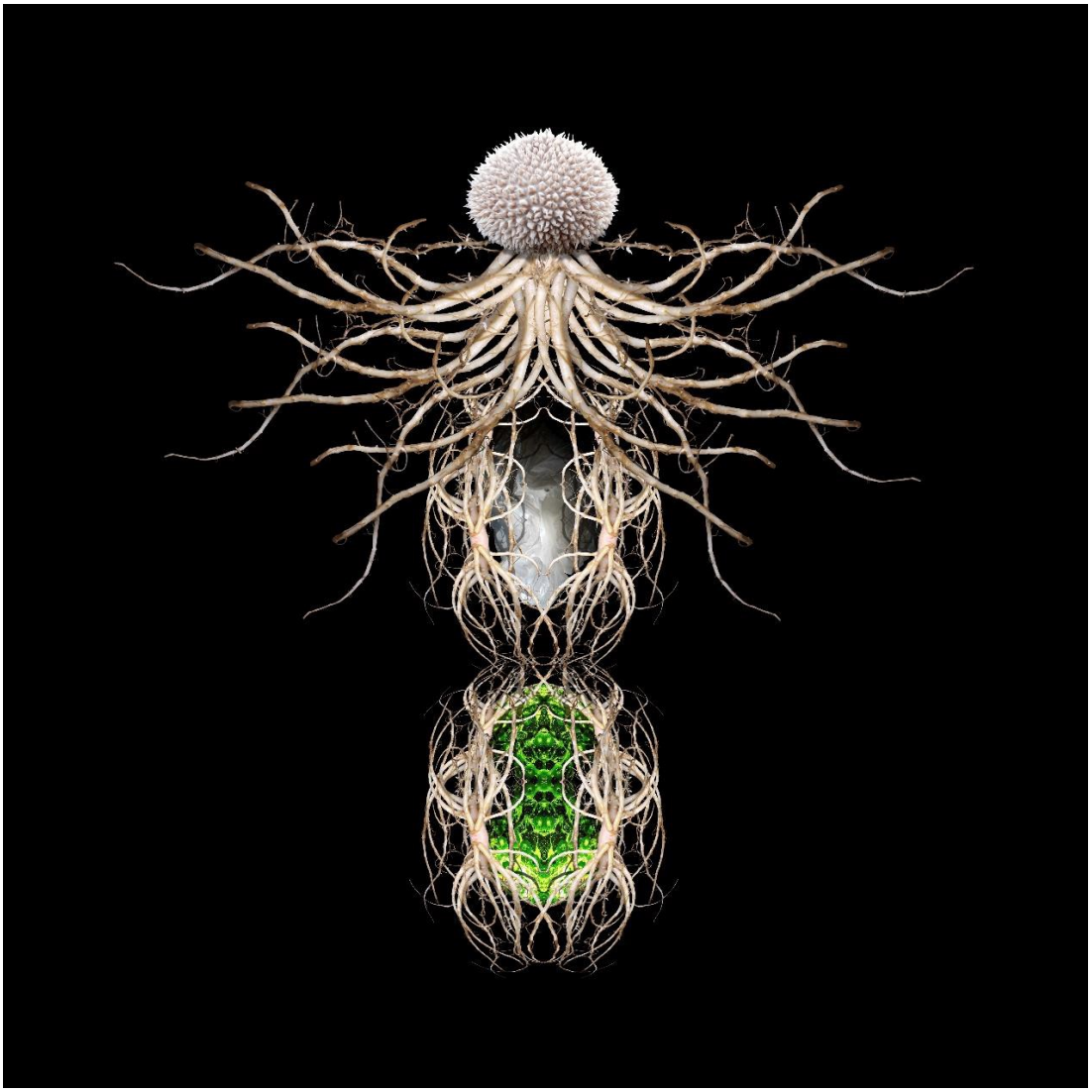


Donna Davis, Tolleraceae Aquatilis acida (AAN: Aquatic Acidity Neutraliser), 2017. Pigment print on fine art rag, 60 x 60 cm.

Alice examines the hybrid form. A group of vibrant orange fungi form the lungs of this insect-like mycorrhizal organism. Emanating from these ribbed plate-shaped organs is a network of filaments constructed from plant roots fused with fungal hyphae. These constitute the creature's flexible exoskeleton, while the outer feelers facilitate movement through toxic ocean waters. Rather than being adversely affected by the polluted aquatic environment, the AAN is actively remediating it. The organism takes in acidic water through its mouth and as the glowing green liquid passes through its system it undergoes three stages of filtration until clean blue neutralised water is eventually dispersed as a waste product. Alice contemplates the beautiful symmetry of the creature, the contrasts between its intricate lacelike body and robust lung structure, the looping organic webs and the fleshy fungal forms at the heart of this extraordinary organism. However, what is most satisfying to Alice is the system design of this remarkable creature which, while nourishing itself, is alleviating a global problem that humans have been unable to solve. Curiously, this is not the only fungi that has ecologically adapted in a way that has been invaluable to humans. Amongst the

mountainous piles of plastic and contaminated industry waste that are ever-increasing, another fungus-based creature has been identified.

The Waste Remediator has also been the subject of Alice's study in informing the design of the TRANS hybrid prototype. This natural mutation is a land-based organism that uses its dual stomachs to digest plastics and industry refuse, producing a waste product that has beneficial nutrients. The creature has a near-spherical fungus at its crown, its rounded form covered in pale pinkish triangular peaks that jut outwards in multiple directions. Arcing outwards and downwards from the organism's head, entwined tentacle-like arrangements form the Waste Remediator's body while also supporting mobility. Like the AAN, this organic skeletal structure is an intriguing mutation of plant roots and the filamentous configurations of fungi – a variant on their more common symbiotic relationships. The near-transparent structure reveals the organism's digestive processes. The first stomach processes materials such as plastic which, in a decomposed form, moves into the second one. Here, further refinement of the discarded material takes place, in a leaf-like patterned chamber glowing green from the dynamic processes of absorption and transformation. The process is completed with the eventual discharge of a waste product with nutrient rich properties.



Donna Davis, Tolleraceae Terra pervertere (Land Waste Remediator), 2017. Pigment print on fine art rag, 60 x 60 cm.

Alice pauses from her work when she hears a low buzzing. She presses a touchscreen to allow access, and a hologram of Lily appears before her. Lily works in the company's PR department and Alice's senior role at GTI has been influential in securing employment for her daughter. Nevertheless, Lily feels somewhat conflicted in this role. Despite her awareness that her mother's intentions are 'for the greater good', she has niggling concerns about Alice's work with genetically modified organisms, and the unknown long-term impacts of GTI's many hybrid creations. But what can she do? Few people have jobs and they provide money to pay for the fresh food and water which is only available to those who can afford it. The unemployed have to be content with a mix of bio-pills and bio-injections – a bland and unsatisfying alternative. Lily observes her mother's tired and distracted face.

'Working more long hours?' she asks.

'Well, you know there's the endless pressure of deadlines', responds Alice, 'and I think we're just about there with it, so I feel I have to keep going, and so do the other team members.'

‘So where are you at? You know I have to do another media release.’

‘Come and I’ll show you. I’ll meet you in Lab 12B. I think even you will be impressed.’

Alice presses the touch screen again and the vision of her daughter fades. She moves down a series of corridors and, once in the lab, reactivates Lily in holographic form. There is a dull hum in the enclosed clinical space, all white walls, banks of screens and polished metal surfaces. Alice points out a glass case and there, in this sealed environmentally controlled enclosure is TRANSO – the Toxin Removal and Nutrient Supplementation Organism – that has been the focus of Alice and the team’s work. The two stare quietly at the hybrid fungus-plant-machine, delicately poised on thin tubular legs ending in flexible footings fitted with suction mechanisms. These translucent tubes, part synthetic and part organic, rise up behind a central cylinder encased in gleaming metal but with a transparent core. This central section emits a phosphorescent green glow that reflects off the nearby steel benches. The tubes travel up outside this luminous cylinder to an elliptical brain-like fungus, pockmarked with pores, secured at the top of the organism. Another set of tubes flows down from the front of the fungus and into the cylinder and from this central chamber of dynamic activity, one more set of tubes emerges, containing clear blue liquid which flows to a tap at the side.

‘What do you think?’ enquires Alice.

‘I think it looks kind of creepy.’

‘Oh come on, it’s extraordinarily elegant.’

‘Well, you would say that, seeing that you had a hand in creating it.’

‘Yes, but you have to admit that it’s a beautiful piece of design. Would it help if I explain a bit more how it works? Can you recall what I told you before?’

‘Sort of … but now that it’s almost finished, maybe you can go through it again and that’ll help me get my head around it for the media release.’

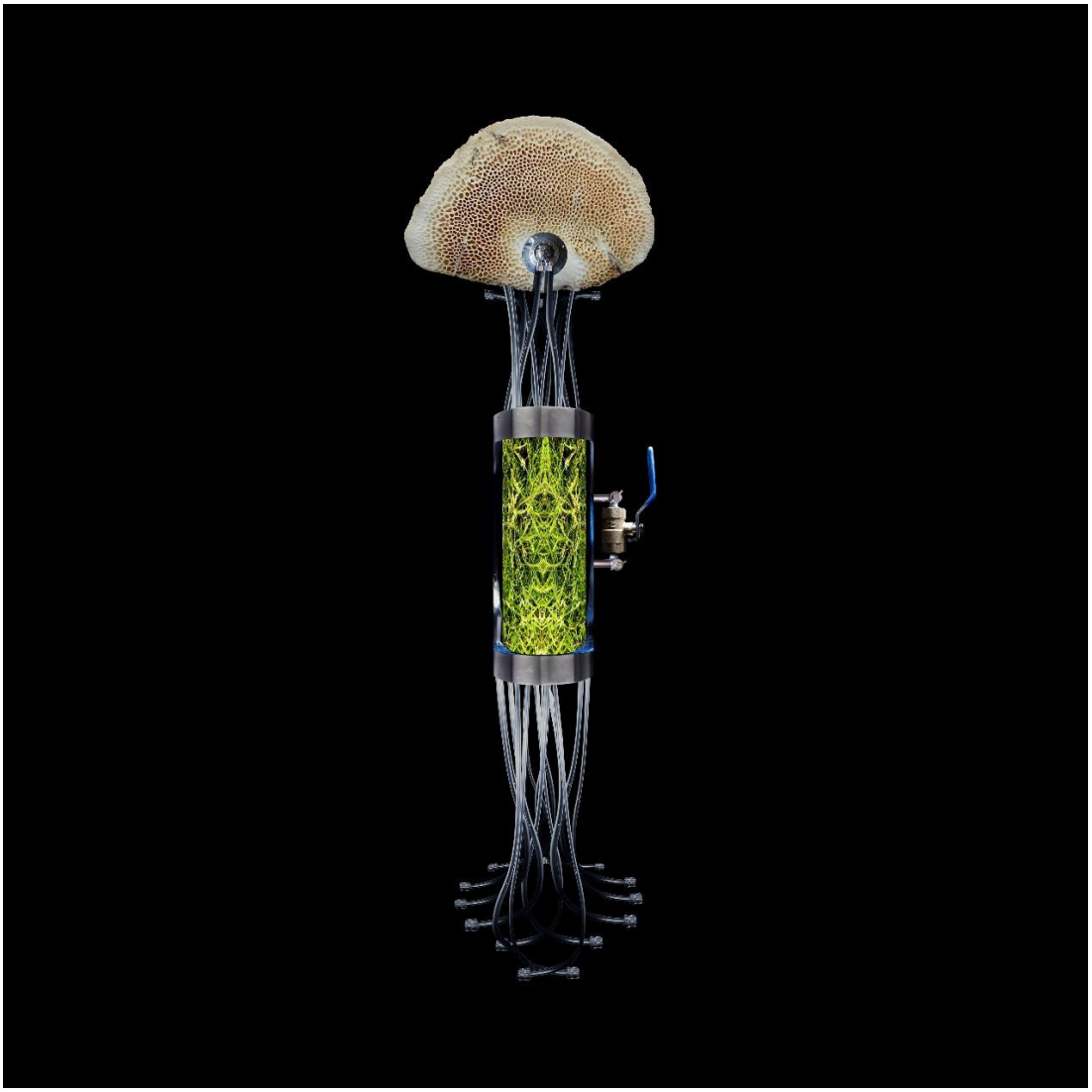
Alice, having often explained the organism to higher management at GTI, moves purposefully towards the case, systematically pointing out the hybrid’s functions.

‘Okay, so you understand that these thin tube-feet are designed so that TRANSO, or rather many TRANSOs once we start manufacturing, can be remotely controlled to move between agricultural planting rows? Right?’

‘Yeah, yeah. And they suction up dirt to the fungus at the top.’

‘Correct. Can you see the leaf-like grid pattern at the base of the tubes? We’ve recently modified it so that it not only operates as a suction mechanism but also allows for remote control of the hybrid’s movement. It can also feed statistics back to the controller if excessively high levels of toxins are found.’

‘Okay, got it. So tell me about the fungus. I know that’s the part you like to talk about the most.’



Donna Davis, Toxin Removal and Nutrient Supplementation Organism: Mark I (TRANSO), 2017. Pigment print on fine art rag, 60 x 60 cm.

Alice turns to her daughter to see if she is being serious or ironic. She can never quite tell. She returns to her explanation. ‘The fungus is where the first level of processing occurs. The pores operate as a kind of natural filter system removing particles and some toxic matter, decomposing the material before the second stage. That involves the treated soil travelling into the central chamber for final processing from toxins to nutrients. We’ve added another adjustment at the top so that we can easily remove and replace the fungus when required.’

‘What about the central section? That’s like a kind of stomach isn’t it? It looks like there’s a lot of activity going on.’

‘Well that’s one way to think about it. There’re all sorts of dynamic processes occurring here but in simple terms, a chemical reaction is taking place: the fungi enzymes that we’ve been able to synthetically enhance are breaking down the toxins into a nutrient rich fluid.’

‘It looks like a sort of strange enchanted forest in there. Reminds me of those fairy stories you told me when I was a kid.’

Alice smiles at her daughter as she remembers those times when they would conjure up imaginary worlds together. She turns back to the hybrid. ‘Can you see how it’s turned blue? That enriched liquid is then transported to the tap and can be pumped back out into the soil to make it nutrient rich again, ready for planting.’

She pauses, visualising lines of hybrids moving along neat agricultural rows, and an abundance of seedlings sprouting from the nurtured earth.

Lily’s voice interrupts her thoughts. ‘Mum, I think it’s amazing but it’s also kind of disturbing.’

‘Disturbing! This could help replenish crops and mean that everyone can have fresh food. There’ll be no more haves and have-nots. Well, at least in regards to food.’

‘Yes, but it’s not really natural. Tampering with living organisms, adding synthetic elements, creating weird robot-plant-fungus entities. Where will it end?’

But Lily, it is natural. It’s already happening in nature and with fungi foremost! You’ve seen the AAN and the Waste Remediator. They’re natural ecological adaptations and they’re helping to alleviate some of the problems we face.’

‘But that’s my point. They’re naturally occurring. No one can patent them. But what about the TRANSO? Who is going to own it and who will have access to its benefits? That’s another thing that worries me.’

‘Well the company that’s employing you owns it Lily. So you will likely be one of those people who benefit.’

Lily looks away, annoyed. ‘I still don’t think you fully know what you’re doing. What about the mutant maize and then the GM pig-droid disaster? They didn’t exactly turn out how their “creators” intended.’

‘Yes well, I don’t think those sort of things are likely to happen again. There are a lot more regulations around GMO now.’

‘Mum I love your optimism but isn’t it about valuing all forms of life? About allowing them to be as they are without trying to control and manipulate them? Humans have caused these problems – maybe we should leave it to the non-human to solve things. You’re always telling me how amazing the fungi adaptations are. They seem to be solving things of their own accord.’

Alice sighs. ‘I do value life, Lily. Deeply. Unlike you, I still just recall a time when the world was quite different. That’s why I’ve worked so hard on this project. I don’t want to see the planet die. I think these sorts of actions are one of the few solutions. And I believe that I am working with other organisms to support a healthier ecology and a better future for all living beings.’

Lily screws up her face. ‘I guess we’ve been over this ground before. I’m going to leave you to it mum. I’ve got to get back to work.’

Alice stares at the TRANSO. Its green core churns with dynamic activity. She turns and walks down the empty corridors and returns to her small office. In the enclosed space a slice of afternoon light from the only window angles across the floor and illuminates the wall opposite, falling on Lily’s fanciful childhood drawing of tiny fairies encircling a huddle of mushrooms. She pauses. Takes a deep breath. Returns to her computer. After all, what choice does she have?

Exegesis

Nigel Fechner

For humanity, in fact for most life on Earth, the future hangs in the balance. Whilst it is contestable that the extremes in evolutionary redesign depicted in Donna's artwork are not commensurate with the timescale delineated by Lisa, the concepts Donna conveys are not so implausible as to be dismissed out of hand, particularly if the alternative scenario of protracted evolution is proposed. Conversely, recruitment of oft-maligned organisms such as fungi for purposes of planetary revivification, as elucidated by Lisa, is a proposition enjoying mushrooming accedence.

Application of restorative measures, however, is confounded by the interplay of biological, chemical and physical elements characteristic to both pristine and compromised environments. Additionally, some scientific methodologies are not generally approved by the wider public on the basis of cultural, racial, religious or moral grounds. Genetically modified foods and organisms are the quintessential embodiment of such objections. Deference to moralistic piety or political correctness, however, may not be an affordable luxury in a depredated world. Lisa's assertion that humanity will not only adopt currently deprecated technologies but will go further and actually mechanise life itself propounds an hypothesis which promotes expediency above morality, but which is plausible nonetheless. We are compelled to ponder the ramifications of such abstractions. Will we prosper from adopting such technologies? Will we really have learnt from our previous mistakes?

Donna's portrayal of fungi's potential evolutionary magnitude insinuates that their prospective continuity is fundamentally unconstrained by the denouement of human indiscretion. Per contra, Lisa's narrative is dependent, at least partially, on the presupposition that Homo sapiens secures a serendipitous future. The author presumes that accessibility to technology will remain unaltered and that operability of technologies, with respect to both resource availability and expertise, is still a tangible proposition. It assumes that we will still cohabit within cohesive communities, and that there will be a qualified, capable proletariat to undertake the research. Here's hoping.

Obviously, from the outset, this dalliance between art, literature and science is guilty of simplistic inference. Holistic appraisal of the current dissolution of the biota and the conceivable accompanying repercussions demands the scrutiny of a plethora of factors precluded from this exposition. Deforestation, salinisation, eutrophication, desertification, erosion, siltation, acidification, sea level rise, air and water pollution, subsidence, plagues, pests, diseases, extinctions, temperature, intensity and frequency of cataclysmic conflagrations and storm activity, geothermal activity, flood, drought, anthropic population trends, fracking, farming and mining practices – rarely, if ever, appraised concurrently – commingle with devastating synergistic efficacy.

Regardless of whether we acquiesce to the tenets of climatology or espouse a utilitarian perspective on resource exploitation is fundamentally irrelevant. For future generations to be bequeathed a certitude of prosperity, it is a requisite that we become more responsible custodians of our environment by embracing sustainable industrial dogma.

> 'If future generations are to remember us more with gratitude than sorrow, we must achieve more than just the miracles of technology. We must also leave them a glimpse of the world as it was created, not just as it looked when we got through with it.'
>
> Lyndon B. Johnson