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# The Fragmented Afterlives of Plants: Protecting Elm Trees from Disease in Brighton

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## ABSTRACT

The main contribution of this paper is to highlight the need for a conceptualisation of plant life that persists after the process of fragmentation, and therefore, is not restricted to the whole. I make this point through an examination of the ways fragments of elm trees lost to Dutch elm disease continue to circulate in Brighton, posing a threat to the management of the city's remaining elm. This fragmentation is caused by the coming together of the elm bark beetle (*Scolytus scolytus* and *Scolytus multistriatus*) and a fungus (*Ophiostoma novo ulmi*) that causes the death of elm trees. While Dutch elm disease killed most of the UK's elm, Brighton's remaining trees are protected as the most significant mature elm population in the UK. Following McFarlane's work attending to fragments as 'overlooked bits and pieces' (McFarlane 2021: 63), I highlight how fragments of once valued elm wholes are variously valued and unvalued, discarded and salvaged, ignored and attended to. Elm logs and regenerating elm suckers are a persistent presence in this urban space, both aiding the spread of disease and resulting in the need for continued protection of the city's elm. These fragments of elm illustrate how plants continue to shape urban space after the death of the whole. This persistence, resulting from the ways plant bodies are radically different from animal bodies, confuses neat binaries between part/whole and life/death.

## CONTRIBUTOR

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## CRYNODEB

*Mae'r papur hwn yn ymchwilio i natur dameidiog Gardd Diwedd—gardd guerrilla y mae'r awdur wedi'i meithrin o wastraff a deunyddiau sydd wedi cael eu tipio'n anghyfreithlon ar ddarn o dir sydd wedi mynd yn angof ac yn edrych dros Fae Abertawe. Ar lwybr ar ochr bryn, mae'r ymchwil hon sy'n seiliedig ar ddull cydosod yn mynd i'r afael â sut y gallai daearyddwyr fabwysiadu 'broken world thinking' (Jackson 2014: 221) i ymwneud yn greadigol ac yn feirniadol â chreu gofod trefol. Drwy drin darnau a luchiwyd yn weddillion ac yn ddeunydd crai adfywio, mae'r papur hwn yn ystyried sut y gall gweithredoedd adfer o'r fath ddychmygu gobaith ar ei newydd wedd. Dros gyfnod o flwyddyn, roedd yr awdur wedi helpu i gasglu ac ailddefnyddio'r hyn y mae Haraway (2016: 57) yn ei alw'n 'excrement of the Capitolocene,' gan ei gompostio—yn llythrennol—fel 'garddwr gwallgof'. Wrth wneud hynny, mae'r cyfraniad creadigol hwn yn myfyrio ar gynnig Latour (2004: 246) 'the critic is not the one who debunks, but the one who assembles,' gan awgrymu bod ymwneud yn greadigol ac yn faterol yn cynnig ffyrdd diriaethol a gwahanol o wybod a pherthnasu ym maes theori ofodol.*

## KEYWORDS

Elm trees; fragments; plants; tree diseases

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## INTRODUCTION

Prior to the outbreak of Dutch elm disease (DED) in the late 1960s, elm trees were a widespread part of the UK's landscapes. However, the majority of the UK's mature elm trees were lost when the fungal disease swept through the UK killing an estimated 28 million elms (Brasier 2008), causing one of the most significant changes to the landscape in living memory (Tomlinson & Potter 2010). The disease is spread by two species of elm bark beetle (*Scolytus scolytus* and *Scolytus multistriatus*) which carry the fungus (*Ophiostoma novo ulmi*) from tree to tree. Once a tree is infected it reacts by plugging its xylem, thereby preventing the movement of nutrients and water around the tree (Forest Research n.d.).

In contrast to most of the UK, Brighton and Hove (referred to as Brighton throughout the paper), a city on England's South coast in the county East Sussex, managed to escape the worst effects of DED due to a combination of the area's geography and a strategy of sanitation felling. The city sits between the South Downs hills to the north, which the beetle cannot fly over, and the sea to the south, thereby limiting the beetle's entry into the city (Tomlinson & Potter 2010). Additionally, the city effectively initiated a strategy of sanitation felling, a process involving the removal and destruction of any diseased trees or timber to prevent sources for beetle breeding (Tomlinson & Potter 2010). The ongoing management of disease in the city means its canopy is now dominated by around 17,000 elms (BHCC 2023). Throughout the area they tower along the sides of streets, populate parks and occupy other prominent positions in the city, an example of which can be seen in figure 1.

A similar approach to Brighton was adopted in Edinburgh, Scotland, when the disease was first recorded in the city in 1976 (Morrison 2021). Although the measures taken were less successful, numerous elms remain in the city. Additionally, some areas surrounding Brighton saved many of their elm trees through sanitation felling. Although, in recent years increased levels of disease have been poorly managed, something compounded by reductions in council funding. Elsewhere in the UK, failures of government agencies to recognise the severity of the issue, poor implementation of sanitation felling and ineffectual vaccination campaigns meant most mature elms were lost (Tomlinson & Potter 2010). Nevertheless, Brighton's unique geography means there are questions as to whether similar successes could have been replicated elsewhere (Tomlinson & Potter 2010). The result is that Brighton now has the most significant surviving mature elm population in the UK.

While there are numerous species and varieties within the elm genus, elm taxonomy is 'controversial and unresolved' (Eversham 2021: 3). There are long running debates about the number of distinct species and the status of the varieties within that species (e.g., Richens 1983; Stace 2019). For the sake of clarity, I use the term 'elm' to refer to the various varieties of field elm (*ulmus minor*) and its hybrids with wych elm (*ulmus galabra*) which make up the most iconic, widespread and badly affected of the UK's elm.

In this paper, I outline how managing Brighton's elm population requires negotiating the shifting relationships between elm wholes and fragments, and the beetle and fungus that threaten these elms.

After outlining the relevant literature on fragments and the active lives of plants, I illustrate how the continued circulation of elm fragments aids the spread of the disease and threatens Brighton's treescape. Following work that

Figure 1: An elm tree in a Brighton park. Photo: James Weldon.

focuses on fragments as an entrance point into urban life (McFarlane 2021), my analysis traces how the fragments of once valued wholes are variously valued and unvalued, discarded and salvaged, ignored and attended to. Using the example of how these fragments continue to materially shape urban space, I illustrate how the lives of these trees confuse neat binaries between parts/wholes (Deleuze & Guattari 1987) and life/death (Derrida 1994; 2020). I finish by making the case for a conceptualisation of plant life that exists beyond the whole and after fragmentation.

This paper primarily draws on interviews with three key informants: an arboriculturist; a tree consultant-cum-elm campaigner; and a city council environment manager, each of whom had long term experience in the management of the city's trees. These experts provided 'technical knowledge' about tree management and 'process knowledge' of the history of Brighton's elm (Bogner, Littig & Menz 2018: 9-10), as well as acting as 'spokespersons' (Latour 2004: 62) for elm trees.

## TREES AS FRAGMENTS AND WHOLES

In urban contexts trees are valued for the many challenges they address, from climate change to air pollution to urban heating (Phillips & Atchison 2020). In more abstract terms, Fitzgerald illustrates that trees 'are widely imagined as an ideal solution to the cultural, psychological and moral degeneracy of the city' (Fitzgerald 2024: 129). Fitzgerald takes a critical approach to this 'treeification' of culture, pointing out the lack of nuance in the framing of trees as a solution to a multitude of ills. However, the various benefits they bring to urban space results in a continued drive to plant urban trees in the UK, as illustrated by initiatives such as the UK government's Urban Tree Challenge Fund (Forestry Commission 2019), and the charity Trees for Cities and their Trees for Streets Scheme (Trees for Streets n.d.). The perceived value of urban trees is further highlighted by recent instances of their removal being met with public outrage and protest, for example in Sheffield (Woudstra & Allen 2022) and Plymouth (BBC 2023).

The lives of these valued urban trees are coming under increased threat from tree pests and diseases. With the increased movement of plants and plant products around the globe, more pathways are opened for the introduction of harmful pests and pathogens (Freer-Smith & Webber 2017). The UK has various phytosanitary measures that attempt to protect the nation's trees; however, many have questioned the effectiveness of these measures (Brasier 2008). The volume of plants and plant materials moved internationally has resulted in 'plant biosecurity protocols being overtaken by events' (Brasier 2008: 805). This is not a new issue, historically plant diseases have also impacted the UKs trees, although with a lower frequency. This paper focuses on one of these historic disease outbreaks which continues to have an impact on the treescape of Brighton.

While environmental management efforts in Brighton seek to protect elm trees from disease, this paper is not just concerned with trees in their complete form. I also attend to the fragments of elms that remain in the aftermath of disease. For Benjamin (1999), fragments are the discarded pieces of the past which continue to circulate in urban space in the present. More recent attention to fragments has highlighted how their materiality continues to shape our understanding of certain places (DeSilvey 2006; Edensor 2005). Similarly, McFarlane attends to material fragments as active, he frames them 'as verbs… not just things but potentials that can be put to different uses and given distinct meanings, for better or worse' (McFarlane 2021: 125). While in a very different context to McFarlane's 'fragment urbanism' which focuses on people living on the margins of urban life, I similarly use fragments as the entry point into my topic of study (McFarlane 2021: 3).

My analysis attends to fragments as the 'overlooked bits and pieces' (McFarlane 2021: 63) that remain after the destruction of the whole. While, as McFarlane notes, a 'part' is a division of a whole, a fragment has a more complex relationship to the whole. They cannot be reassembled to produce the whole that once was (McFarlane 2021: 68). However, this does not mean they cannot come together to produce a novel assemblage. In this way fragments reflect Deleuze and Guattari's (1987) thinking on the non-linear relationship between the part and the whole. Rather than centred, hierarchical arborescent systems, they propose the rhizome as a model for thinking about networks with no beginning or end. As arrangements that are fluid and constantly in the process of becoming, rhizomatic systems rupture and come together, they are 'a process that is perpetually prolonging itself, breaking off and starting up again' (Deleuze & Guattari 1987: 20).

While others have focused on the political lives of dead human bodies (Verdery 1999), and the omnipresence of animal remains (Bezan & McKay 2021), at the centre of my analysis are the fragmented afterlives of plants. Lorimer (2016) has highlighted how rotting plant bodies tend to be cleared in service of creating tidy, sanitised and 'green' conservation sites. He argues for a more considered approach to decomposing material which acknowledges that while 'rot is about death…it also speaks of life' (Lorimer 2016: 239), as many other species thrive within plant death. This paper similarly addresses the boundary between life and death, focusing on a context where the desire to sanitise has material conservation justifications rather than just being an attempt to conform to aesthetic norms. It draws on the work of Derrida (1994; 2020) and his efforts to deconstruct the binary of life and death. Rather than privileging life as the active side of this dichotomy, he argues for a conception that sees these states as intertwined - death is inseparable from life and continues to shape it (Derrida 2020). For Derrida (1994), the ghosts of that which is now absent continue to reappear in the present as a haunting which shapes contemporary life. As McCance states in summation of Derrida's work, 'rather than opposed to life, death inheres within living processes' (McCance 2020: 32). Death is not final; the dead can continue to influence the living.

Bringing Derrida's thinking into an analysis of de-extinction technologies Searle (2020) argues that in collapsing binaries such as absence/presence and living/non-living, animal subjects of de-extinction efforts exist in a liminal state between life/death. Marder proposes a similar conception of plant life, arguing that it sits at the 'zone of indeterminacy between the living and the dead' (Marder 2013: 53). Marder approaches vegetal life in the abstract sense, contrasting meanings of vegetation as both wild and untameable, and also the immobility and nearness to death associated with persistent vegetative states (Marder 2013). In a more concrete empirical context than Marder, and in a setting far more everyday than de-extinction, this paper uses Derrida's deconstructionist thinking to help theorise plant fragments and their relationship to life and death.

Part of the need to address plants' complicated relationship to life and death is driven by the radical difference of plants to other beings (Lawrence 2022; Head et al. 2015), particularly plants' abilities to fragment. As others have argued non-human 'difference matters' and geography needs to pay greater attention to the endless differences between organisms (Bear & Eden 2011: 349; see also Lulka 2009). In terms of plants, a key contribution of the edited collection The Work That Plants Do is to encourage scholars to recognise the ways that plants are irreducibly different from animals, and therefore theorising plants requires new concepts that take this difference seriously (Ernwein, Ginn & Palmer 2021). Much of this difference is down to their 'distinctive capacities', four of which Head et al have highlighted: 'distinctive materialities; moving independent of humans; sensing and communicating; and taking shape as flexible bodies' (Head et al. 2015: 399).

Through capacities such as these, plants have the agency to shape social situations. Following the theoretical efforts to highlight more-than-human agency (e.g., Latour 1993; Ogden, Hall & Tatina 2013; Whatmore 2002), research has begun to highlight how, whether in intimate or instrumental relationships, plants work with and against humans to shape situations 'both symbolically and materially' (Hitchings 2003: 102). In many overtly vegetal worlds such as agriculture (Argüelles & March 2022; Brice 2014; Krzywoszynska 2016) and gardening (Ginn 2017; Hitchings 2003) plants have been shown to have the ability to shape situations. Within more

human-centred realms, plant agency is also illustrated by their contributions to human health (Elton 2021) and their role as agents within economic systems (Ernwein, Ginn & Palmer 2021). In relation to trees, research has addressed how the uniquely 'planty' abilities of tree bodies, is co-opted in the process of value creation, in ways that both support (Legun 2015; Prudham 2003) and undermine (Fleming 2017) established hierarchies. As both individuals and collectives 'trees act upon as well as being acted upon' (Jones & Cloke 2002: 49). This paper similarly focuses on how trees have the ability to disrupt human intentions; however, it explores how tree fragments also have this ability, it is not just the reserve of the whole.

## PROTECTING BRIGHTON'S TREESCAPE

The destruction of elm trees across the UK is enabled by an assemblage of species from three different taxonomic kingdoms, plants (elm trees), fungi (*Ophiostoma novo ulmi*), and animals (two species of elm bark beetle *Scolytus scolytus* and *Scolytus multistriatus*). The death of elm trees is caused by the fungus, which attacks elm's vascular system disrupting the flow of water and nutrients, starving, and eventually killing, the tree (Forest Research n.d.). However, the fungus does not cause this devastation on its own. It travels from tree to tree in the mouth of two species of elm bark beetle. Beetles carrying the fungus feed on the thin bark around twig crotches (Bernier 2022), this infects the tree with the fungus leading to its gradual decline. Weakened or dead trees then contribute to the disease cycle, as they are attractive sites for beetles to reproduce in. The beetles burrow into the bark to lay their eggs which then develop into young beetles. The young beetles burrow out of the tree, becoming infected with spores on their way out. These infected beetles then fly off to feed on and infect other healthy trees.

As DED spread through the UK in the 1970s, elm trees were lost at an alarming rate due to both the pathology of the disease and failures in the response (Tomlinson & Potter 2010). As the disease approached Brighton, the assumption was that the area's elm would suffer the same fate. When telling the story of Brighton's elms, a tree consultant-cum-elm campaigner with decades-long involvement with the city's trees commented, 'the mood music, even in Brighton, was "well we better start planning for the next generation of trees in the area."' However, not everyone in the city was so defeatist. Led by the foreman responsible for managing the city's trees, an amorphous group of people banded together to try and save the areas elms. As a Brighton arboriculturist explained, while various techniques were failing in other cities, the foreman of the Brighton City Council (BHCC) 'tree gang':

> 'came up with the idea for sanitation felling, which has been improved and honed over the years, and still is the main tool for controlling elm disease. And so, it means basically removing the tree when you find they have been infected and taking it out and trying to prevent sources for the beetle to breed on.'

Through this method of sanitation felling, a group of dedicated locals were able to protect the majority of the city's elm trees. They removed any diseased trees which could become breeding sites for the beetle, thereby trying to break the fungus-plant-animal disease cycle. This work was aided by the geography of the area as the city is surrounded by the South Downs hills and the sea which both acted as a 'natural barrier' to some of the beetle's movement (Tomlinson & Potter 2010: 131). The work of volunteers allowed the majority of the elm to survive and has now developed into a coordinated

management scheme which comes into action every summer when the beetle is active. Working with local arboriculturists, the BHCC lead the annual effort to spot and fell any diseased elm, with BHCC also funding the cost of felling any trees on private land. More recently, they have also adopted new techniques, such as the annual inoculation of certain prominent elm (BHCC 2023) and the use of drones to spot diseased trees (Crabbe 2024).

The existence of this collection of elms has led to the tree being closely associated with the city, as one interviewee noted, Brighton gained 'this moniker of the elm centre, in England at least.' An arboriculturist explained that this close association is partly because 'it is an awful place to grow trees', with few other species able to survive the thin chalk soil and strong salty winds coming in from the sea. Therefore, the city has historically planted large numbers of elm, which have become the basis of the National Elm Collection, a status the city was awarded in 1998.

This need for active disease management has become more evident in recent years, as the BHCC environmental manager in charge of its trees explained, 'the levels of the disease have dipped and troughed over time,' however 'the last four or five years, the levels have been unprecedented'. He went on to explain that 'we're in a real situation with the levels of the disease each year,' with high numbers of elm trees dying. One reason interviewees gave for the higher levels of elm dying is climate change. They explained that warmer weather is allowing the beetles to have an extra breeding cycle over the summer and increasing the spread of the disease. However, a different threat that was more heavily emphasised by participants was the persistent presence of elm fragments within the city. The next two sections outline how the spread of the disease is being enabled by the circulation of elm logs and the regeneration of felled elm, two phenomena which have discarded fragments of once valued whole elms at their centre.

## DISCARDED AND SALVAGED ELM FRAGMENTS

One of the major threats to Brighton's treescape cited by those involved in protecting it are elm logs. As the council website states, 'one of the most common ways for a tree to become infected is via beetles breeding on elm logs stored in the area' (BHCC 2023). By approaching elm logs as fragments, this section illustrates how they are both discarded as waste and become associated with new forms of value. Through these processes 'overlooked bits and pieces' (McFarlane 2021: 63) continue to circulate in the city threatening the elm trees within it.

The issue posed by elm logs is two-fold and caused by both direct and indirect means. Firstly, the elm bark beetle breeds on elm timber which is infected with the fungus. They then carry the disease to any other elms they travel to, directly infecting the tree. Secondly, the general presence of uninfected elm timber provides a breeding site for the beetles, thereby increasing beetle numbers and the spread of the disease. As the BHCC environmental manager explained, 'it doesn't matter if it's infected or not, any elm log is a risk, because it's all habitat. And it'll either just boost beetle numbers, or if infected will actively spread the disease as well.' Therefore, if a felled elm is not discarded safely, then there is an increased chance of the timber contributing to the spread of the disease.

This was illustrated by a veteran arboriculturist as he drove me around the city explaining the process of combating DED. He pointed out of his car window at a school and explained:

> ‘That school had elm logs in it which bark beetles bred on. We didn't find it ‘till obviously too late. We lost 24 elms in this local area within about 300 metres of that school. There was about enough logs, probably just about fill a car boot, maybe two car boots full of logs. A contractor had cut down a tree and just left the logs.’

This illustrates how the discarded fragments of a once valued whole can become a driver of elm loss. Detritus from the management of the city’s trees, through sanitation felling, continues to put the trees that remain in the city at risk. In many cases leaving discarded plant material to rot supports a range of biodiversity goals promoting multispecies life from plant death (Lorimer 2016). However, in this context the abandonment of plant bodies also drives further plant fragmentation and death. Aided by the actions of some humans, the beetles capitalise on the presence of these fragments as a breeding site, resulting in the spread of the fungus and causing the treescape to further fragment. In this way we can see fragments as both a noun and a verb (McFarlane 2021), they are objects with active potentials which initiate further fragmentation.

The threat to elm trees does not just come from logs that are discarded, their potential for reuse and the corresponding movement into and around the city poses an additional issue. As the environment manager explained, ‘there's just so many instances of elm trees being cut up either in the city privately, and then just used as firewood, or infected elm from outside being brought in as firewood.’ He went on to explain that:

> ‘We've got instances where one small log store at the back of someone's house that's got an elm log in has led to, you know, five, six elm trees on that street being infected directly from the beetle from that little pile of logs. And they've all had to go because of that. So, it's quite a big problem.’

The movement of elm logs and their storage for future use provides another habitat for the elm bark beetle. Additionally, the arboriculturist explained that a lot of these logs were coming into the city from the surrounding area which also has a significant elm population. He explained that a lot of elms are being felled, and the logs are being sold commercially into Brighton through tree surgeons, gardeners, and landscapers. He was particularly angered by one story the arboriculture officer in a neighbouring town had told him:

> ‘The arb [arboriculture] officer there, he found two contractors employed by the council, who were cutting and selling elm logs cut in the surrounding area into the town. You know, it's just absolute madness, you know, that would drive me mad.’

This story further illustrates the continued risk posed by the fragments of elm that are not easily erased by the authorities in charge of environmental management. To further these issues, the arboriculturist explained that ‘there is a certain amount of foraging going on’, where ‘people go and walk the dog, or whatever, somewhere in East Sussex, and they pick up a couple of bits of wood and put it in the boot, they don't know what it is, whether it is elm or ash or sycamore or whatever.’ Again, this provides another route into and around the city for the fungus and a breeding site for the beetle, causing a problem for the ongoing management of the city’s treescape.


Figure 2: DED sign on main road entering city. Photo: James Weldon.

The tree consultant-cum-elm campaigner I interviewed explained that the movement of elm logs had been an issue throughout his 50-year involvement in the city's trees. However, it has become more prominent in recent years due to the rise in popularity of wood as a fuel for heating homes. This increased use of wood fuel is evident across the UK, with the Stove Industry Alliance reporting a 40% increase in wood burning stove sales on the previous year (Stove Industry Alliance 2022). The tree consultant put this rise in popularity down to wood fires becoming 'trendy' and the crisis caused by increasing energy costs, which started in the summer of 2021 (Bolton 2024), meaning people are looking for alternative ways to heat their homes. This mirrors a UK government-funded report which found that while 24% of indoor wood burners were doing so to save money and for reasons of self-sufficiency, a more significant number were doing so for lifestyle reasons (18% for reasons of tradition and 28% for aesthetic reasons) (Kantar 2020).

With the rising use of wood fuel, for reasons of fashion and cost, new forms of value are associated with elm timber thereby boosting its circulation

through the means outlined above. These fragments, which may previously have been thought of as waste, have become the object of salvage driven by this new market for firewood. Tsing defines salvage as 'taking advantage of value produced without capitalist control,' a process which occurs in 'pericapitalist spaces' both 'inside and outside capitalism' (Tsing 2015: 63). The salvage of elm timber exists on the edge of usual forms of capitalist value production but is still partly driven by the capitalist logics that have led to the fuel crisis and the fashion for wood burners. Through these processes fragments 'take on new lives' (McFarlane 2021: 10), a new market for salvaged timber arises providing further material for the beetle and its fungal hitchhiker to capitalise on. This increases beetle numbers and drives the further fragmentation of elm trees within the city.

The BHCC tries to limit the circulation of elm logs within the city with the signs shown in figure 2 and the offer to replace elm logs with other timber. Additionally, they take the timber of any trees they are involved in felling to a biomass facility outside the city where they are burnt. Despite the best efforts of those involved in this work, both waste and salvaged logs continue to be a persistent threat to the area's elm trees. However, it is not just these elm logs that need close attention, the next section illustrates how the regeneration of infected fragments of elm also poses a significant danger to the treescape.

## THE REGENERATION OF ELM FRAGMENTS

Alongside the elm timber circulating the city, the second way the afterlives of elm trees are a threat is through the regeneration of infected elm fragments (BHCC n.d.). The remains of felled elm show an impressive ability to survive years after the death of the original whole tree. Elms produce suckers, they send out new stems from the fragments of roots that remain after a tree is felled or has succumbed to the disease (Webber 2010). While the original tree may be lost, new stems appear and take its place. This ability allows elms to regenerate until they either succumb to the disease again or are felled, enabling them to exist in a cycle of life and death. As the environmental manager explained:

> 'Elm felling due to elm disease has gone on for a long time. And in areas where there's been a lot of elm disease trees felled the regen [regeneration] off that hasn't been managed, a lot of these areas have just been left to regenerate. And then the trees off the infected root stock will initially look fine for maybe 20-25 years, and then become, you know, they show symptoms, become infectious, beetles find them. And we're finding a lot of big areas of regeneration that are infected.'

In this way fragments of felled elm pose a threat a number of years after they are felled. This shows the need to attend to the 'distinctive materialities' that plants possess (Head et al. 2015: 399). These plant bodies act in ways unlike many animal beings. They have the ability to fragment and then regenerate, something which requires the close attention of environmental managers. Any assumption that they can be ignored after 'death' overlooks their ability to persist in a living and active form after the loss of the tree as a whole. Through these suckers, elm continue to live after the death of the whole, thereby confusing the dichotomy between life and death (Derrida 2020). These regenerating fragments lose their potential to become elm wholes as the beetle and the fungus keep them in a cycle of life and death, or what one interviewee described to me as a 'perpetual adolescence.' However, the

remnants of the dead are still able to influence the lives of the living. They continue to exist between life and death as a more rhizomatic system that is constantly in the process of becoming (Deleuze & Guattari 1987).

The remaining diseased fragments of street trees are usually removed. In the 'sanitized' street scene elm regeneration 'isn't really something that's acceptable,' the environment manager explained, 'it just gets in the way and causes problems.' Prominent and easily accessible stumps are de-barked and eco-plugged, a method of killing a tree by inserting herbicide plugs. This enables the herbicide to be targeted at the stump and minimizes the risk of wider contamination associated with spraying chemicals (Willoughby et al. 2019).

However, this is not always a suitable option. One of the other ways elm bodies are radically different from humans and animals is their ability to graft together. When elm grow near other elm their root systems can graft to each other forming a link between the two trees, a common occurrence with many tree species (Lev-Yadun 2011). If a stump is eco-plugged, the neighbouring trees can also be affected by the herbicide as the chemicals can be transmitted through the grafted root system. As the environment manager explained, 'in woodlands, you know, it's [eco-plugging] not really viable, you just end up poisoning other trees.' In the woodland sites throughout the city where trees are closer together, the risks associated with eco-plugging mean it is not an option.

It is helpful to think about these regenerating fragments of historic elm in relation to McFarlane's (2021) attention to fragments as both a noun and a verb. While previously I have highlighted how fragments play a role in the further fragmentation of the treescape, fragments do not just fragment, they also come together. This coming together produces something new, something ambivalent to the historic whole. This highlights the non-linear relationship between the part and the whole or the whole and the fragment (Deleuze & Guattari 1987). These arboreal fragments do not just divide, they also come together, a coming together that causes further issues for those managing the trees. The result is a need to approach the management of these trees as a rhizomatic system, rather than, as you may expect, an arborescent system (Deleuze & Guattari 1987).

To further complicate their efforts to manage these unruly fragments, the environment manager explained that BHCC lacks the resources to manage the land to a high level:

> 'So, say for example, if we went in to a sort of semi-woodland type area where there's a lot of elm that's just suckered and regenerated. You know, if that's been felled in the past, there just isn't the follow up resource to keep going back and managing any of the regeneration by cutting it down before it gets to any sort of significant size.'

The disease is able to capitalise on this lack of resources, further impacting the city's trees with the aid of elm regeneration.

In contrast to work which has outlined the role of the distinctive materialities of trees in value creation (Fleming 2017; Legun 2015; Prudham 2003), the threat posed by elm regeneration shows how the active abilities of tree fragments can also pose a threat to the city's valued elm. This creates the opportunity to closely attend to how plant lives and plant death are theorised. In particular, the example of elm regeneration initiates the need to consider the role of fragmentation in plant life, and how the lives of fragments relate to the death of the whole. While tree 'loss' may refer to the

loss of the whole, the 'distinctive materialities' of plants (Head et al. 2015: 399) allow fragments to continue to exist in a liminal state between life and death. Plant death is not final, plant fragments confuse binaries of life/death (Derrida 2020; Marder 2013) in the way they persist after the death of the whole. Furthermore, they come together through root grafting, producing a new assemblage of fragments. Through this process they produce something different to the now dead whole, highlighting McFarlane's (2021) point that fragments exist with an ambivalence to the whole.

This discussion has shown the benefits of conceptualising these trees as fragments, as it allows us to attend to the ways in which plant bodies are radically different from human and animal bodies (Head et al. 2015). These fragments confuse binaries between part/whole and life/death. As Ernwein, Ginn and Palmer have suggested plants' 'alterity…makes a difference. Plants require new concepts' (Ernwein, Ginn & Palmer 2021: 23). I similarly argue that plant life requires new conceptualisations, as it is not just restricted to the whole but persists after the process of fragmentation.

## CONCLUSION

While tree loss may refer to the loss of the whole, it is important to acknowledge how plant bodies persist after this loss. In this context living (elm regeneration) and dead (elm logs) fragments play an active role in the ordering of urban space. I have shown how the beetle and the fungus capitalise on the material presence of the discarded detritus of once valued elm wholes. Additionally, with the rising trend for burning wood fuel these fragments 'take on new lives' (McFarlane 2021: 10). They become associated with new forms of value which aids their circulation in urban space as well as the spread of the disease. Through these processes the dead fragments of elm trees play an active role in causing the city's treescape to further fragment. Additionally, the still living fragments of elm that regenerate in the city further enable the fungus-elm-beetle disease cycle. These regenerating fragments do not only cause the treescape to fragment, the fragments themselves also come together to produce new rhizomatic systems which differ from past wholes.

This description of the threats posed by elm logs and elm regeneration, further driven by wider socioeconomic pressures such as limited council budgets and the rise in wood fuel usage, illustrates the work that is needed to control the unruly remnants of diseased elm. Those managing these trees have to constantly negotiate the relationship between elm fragments and wholes, the fungus, the beetle, and some city residents that aid the spread of disease. In contribution to the body of work which highlights the role of plant wholes in the construction of social worlds (e.g., Brice 2014; Elton 2021; Hitchings 2003), I argue that the fragments of plant bodies also play very active roles. This shows the importance of attending to fragments (McFarlane 2021); the radical difference of plant bodies (Ernwien et al. 2021; Head et al. 2015); and the ways they disrupt the work of environmental managers. The persistence of regenerating elm fragments confuses binary oppositions between life/death (Derrida 2020) and parts/wholes (Deleuze & Guattari 1987). The liminal space that these elm fragments exist in highlights the central theoretical contribution of this paper: that plant life is not restricted to the whole; it persists after the process of fragmentation.

***Ethics and Consent***

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