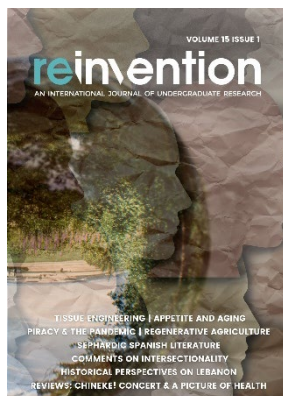


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# reinvention

AN INTERNATIONAL JOURNAL OF UNDERGRADUATE RESEARCH

TISSUE ENGINEERING | APPETITE AND AGING  
PIRACY & THE PANDEMIC | REGENERATIVE AGRICULTURE  
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COMMENTS ON INTERSECTIONALITY  
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# Editorial

## Reinvention: Innovation and Inclusion

Shreya Sridharan, University of Warwick

Welcome to the latest issue of *Reinvention: An International Journal of Undergraduate Research*, Volume 15, Issue 1 (15.1). This is the second edition of the year, following our special issue in February, and an aim that we are consistently pursuing this year is to foster innovation in our work and our publication. In that regard, we bring you a new feature this time, a music concert review, which I hope will be the first of many such pieces to come. We have also begun to publish more creative work, as seen in our special issue, and I hope that this brings forth a new perspective on creative practice as research.

As an interdisciplinary journal, we publish papers that examine many topics, and it is often difficult to see the threads that pull these papers together. In this issue, we feature papers from three key disciplines – biological sciences, history and law – and the underlying themes that connect these papers are innovation and inclusion. The scientific papers deal with new and innovative areas of research, such as tissue engineering and regenerative agriculture, while the papers from the humanities deal with themes of diversity, identity and inclusionary perspectives. At first, this seems dichotomous, but there are already links to be made: innovative medical practices such as tissue engineering improve accessibility to medicine, and the focus on sustainability in methods such as regenerative agriculture enables us as a society to be more inclusive of future generations. The humanities papers that we present advance new frameworks and reimagine existing systems through the lens of diversity, but what they offer is, in fact, innovation. Thus, I urge you to look for and make the connections between these two themes as you read this issue. I offer one way to do this later in this article.

Before I introduce the papers we present in this edition, I would like to take a moment to reflect on *Reinvention's* own identity and aims. We are first and foremost an undergraduate research journal, but the two pillars of our journal are interdisciplinarity and internationality. Our focus on publishing interdisciplinary research makes our journal both selective and accessible to students – we have no limits by subject, but we do encourage our authors to identify cross-disciplinary themes and the relevance of their research. I believe that this is in itself a form of innovation and something that I hope we can inspire other publications to follow. Further, as we accept submissions from students all around the world, we are taking steps forward in making academia more inclusive and accessible. While we admittedly work within constraints due to language, we strive to showcase student work from varied backgrounds, including students for whom English may be a second language. Inclusion and innovation are undoubtedly valued at *Reinvention* and, as I hope our readers can see, are reflected in our publications.

Edition 15.1 of *Reinvention* brings eight original research papers and two reviews – a review of the exhibition *A Picture of Health: Art, Medicine & the Body* and a review of the Chineke! Orchestra's recent concert at the Warwick Arts Centre.

To begin with, 'Appetite Control With Ageing: A Narrative Review Focused on the POMC and AgRP Neurons' by Adam Plotkin is an outstanding scientific review of the anorexia of ageing, which is a reduction in food intake with increased age. The author explores current research on appetite regulation and dysregulation

with age – specifically pharmacological agents that are currently used – and provides incisive insights on where future interventions might go.

Alisha Fulton's 'Efficacy of the Ecosystem Services Approach in Transitioning to Regenerative Agriculture in Australia' is a review examining the regenerative practice of crop diversification using an Ecosystem Services Approach. An ecosystems approach is a framework for looking at ecosystems as a whole and reconciling human and environmental needs. Fulton argues that crop diversification can be a useful tool to ensure food security in the face of further climate change and posits regenerative agriculture as the way forward.

In 'Biodegradable Synthetic Polymers for Tissue Engineering: A Mini-review', Harrison Moon, Emily Hartley and Ana Neves review the field of tissue engineering, an innovative area of medicine. They discuss the development of biodegradable scaffolds – including requirements, degradation factors and mechanisms – and explore different synthetic polymers and fabrication techniques used for tissue scaffolding. This extensive review of cutting-edge research shows that while tissue engineering using scaffolds is still in infancy, it has strong potential for clinical use, and the authors indicate that one way forward would be to create a comprehensive polymer database to enable further research and applications.

'The Fog that it has Drawn upon Itself': What Now for the ICC after failure in Darfur?' by Nicole Chiarion Casoni explores the perceptions and criticisms of the International Criminal Court (ICC) using its investigation of the conflict in Darfur, Sudan. Chiarion Casoni argues that although there are practical issues with enforcement and jurisdiction, the major systematic weakness of the ICC is its roots in the Global North, which harm its global legitimacy and position as a judiciary of international law. This paper moves us to critically reflect on the positions that international organisations operate from and how their operations can be made more inclusive and equal – something that is truly valuable across disciplines.

Helen Yesberg's 'Libraries, Piracy and the Grey Area In-Between: Free Digital Media during the COVID-19 Pandemic' discusses the impact of the COVID-19 pandemic on the consumption of free digital media and hones in on the effect this has on the authors and libraries that supply these media. The author's focus on consumption through piracy offers interesting insights into the (tense) relationship between publishers and libraries. The pandemic has brought challenges to maintaining a balance between protecting authors' rights and meeting consumer needs, and this paper provides an avenue to discuss how the digital accessibility of media can be made fair and sustainable.

Gervaise Alexis Savvias, in 'Comments on Intersectionality', explores the need for intersectionality in contemporary law. Intersectionality views issues from a multi-axis perspective and, in this context, refers to adapting legal structures to acknowledge people's diverse identities. This is a particularly relevant paper because intersectionality as a concept has come to the forefront as of late. Savvias convincingly argues that intersectionality as a framework shows how only when systems recognise discrimination across different dimensions can we truly progress to a more equal and inclusive society.

In 'Amid Rebellion, Invasion and Revolution: Ottoman Centralisation in Lebanon, 1861–1915', Charles Ough dissects historical perspectives on Lebanon in the reorganisation period after 1860 known as the *mutasarrifiyya*. The author contends that existing literature on this period has a nationalist bent, presenting the *mutasarrifiyya* as nurturing quests for an independent Lebanese nation. Using a new set of sources from The National Archives and Ottoman texts referenced in secondary sources, Ough posits a different view – that Istanbul's centralisation worked against European influence and made Lebanese secession less certain.

This paper, as in Chiarion Casoni's work, encourages us to contemplate how we develop perspectives on history and to ensure that we listen to all the relevant voices to paint a better picture of history.

Finally, 'From Baroque Spain to 1600s Amsterdam: Emergent Judaism in the Literary Works of Ex-New Christian Miguel de Barrios' is a student-staff collaboration, presenting an interesting amalgamative study of Spanish literature and history. Arielys Morffiz González, Fabi Zeller-Márquez and Matthew Warshawsky analyse sonnets and plays known as *autos sacramentales* by Miguel de Barrios. De Barrios was a Hispano-Portuguese Jewish author from Amsterdam, and the authors show that, at a time when non-Catholic practices were prosecuted, Barrios' work glorifies Judaism and expresses the identity of Hispano-Portuguese Jews. The authors also identify several factors that affected Barrios' expression, such as the importance of Amsterdam as a centre for Sephardic settlement. This paper presents a poignant portrait of how communities use various forms of expression to uphold their identities when faced with discrimination or oppression.

In the first of its kind, Curtis Leung reviews a concert by the Chineke! Orchestra, weaving together historical insights about the pieces and articulate appreciation of the performances. The concert featured *Petite Suite de Concert* by Samuel Coleridge-Taylor, *Piano Concerto in A Minor* by Edvard Grieg and *Symphony No. 6 in F*, *The Pastoral Symphony* by Ludwig van Beethoven. The Chineke! Orchestra aims to celebrate and promote diversity within classical music and offers opportunities for ethnically diverse classical musicians across Europe. We are immensely honoured and proud to feature a review of their performance, and Leung's impressive research demonstrates how the orchestra, the music they played and the contexts of the pieces themselves showcase and foster diversity and inclusion.

Lastly, Jess Adler reviews *A Picture of Health: Art, Medicine & the Body*, an exhibition at the Leamington Spa Art Gallery & Museum. The exhibition presents works addressing health and medicine across various media, such as marble statues, art prints, photographs and historical artefacts. This exhibition was very fitting for the journal, given its own interdisciplinary approach of combining art and medicine, and Adler provides an engaging review, bringing in her own knowledge as a medical student.

The papers in this issue embody both aforementioned themes; however, I now argue that they are not two themes but rather one. Inclusion has become a widely discussed topic of late, and diversity and inclusion as a concept is being applied across many contexts, from corporate organisations to academia to media. While it may seem as if innovation is a separate thread, I believe that to truly innovate, we must include. Innovation cannot come without considering different identities, needs and interests. It is often said that necessity is the mother of invention and, as valuing diversity becomes much more necessary, it brings with it the necessity for further invention and reinvention – an idea beautifully captured in our cover by Inés Robledo. Thus, when looking back on this issue, I hope our readers can reconcile how innovation and inclusion are mirrors of each other and promote each other, both in academia and elsewhere.

Before I conclude, I must thank Elle Pearson, one of our Assistant Editors, for initiating and managing both the reviews. She has consistently been a voice for innovating our journal, and I am deeply grateful for her efforts. I would also like to thank Inés Robledo for her work on our social media, as she continually creates new and engaging content. I congratulate and thank all our contributing authors. I hope this experience has been as rewarding and valuable as possible. Finally, to all our readers, thank you for your interest in our journal, and I hope our future issues can further push the limits of undergraduate research.

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# Appetite Control With Ageing: A Narrative Review Focused on the POMC and AgRP Neurons

Adam Paul Plotkin, Cornell College

## Abstract

The anorexia of ageing, a reduction in food intake with increased age, is associated with negative health outcomes such as sarcopenia frailty, cachexia morbidity and mortality. Pharmacological agents such as appetite stimulants have been a major focus to combat the anorexia of ageing; however, these medications are linked to various adverse side effects. Therefore, understanding the physiological causes of reduced appetite may lead to the creation of innovative intervention strategies in the ageing population. Current research has identified the pro-opiomelanocortin (POMC) and Agouti-related peptide (AgRP) neuronal subsets of the arcuate nucleus (ARC) as the centre of appetite regulation. This review investigates the current understanding of appetite regulation and subsequent dysregulation with age, and the age-associated changes in the anorectic (appetite-suppression) and orexigenic (appetite-stimulating) pathways, thereby implicating the POMC and AgRP neurons. It primarily investigates the physiological changes underlying appetite reduction with ageing to orient future interventions to combat the anorexia of ageing.

**Keywords:** Anorexia of ageing, appetite dysregulation with age, appetite regulation, biology of ageing

## Introduction

The dysregulation of appetite control is common during the natural ageing process, resulting in a reduction of food intake. This process is often called ‘[the anorexia of ageing](#)’ and is associated with [sarcopenia](#), frailty, [cachexia](#), [morbidity](#) and mortality (Simmons *et al.*, 2008). In the elderly population (defined as those 65+ years old), the anorexia of ageing impacts approximately 25 per cent of home-dwellers, 62 per cent in hospital settings and 82 per cent in nursing home populations (Roy *et al.*, 2016).

Several appetite stimulants have been tested for efficacy as a pharmacological intervention for combatting appetite reduction in older adults. The main stimulant studied in the malnourished elderly population since the early 2000s, megestrol acetate (Megace), has demonstrated mixed results in a few small and randomised trials (Persons and Nicholls, 2007). For instance, one study randomly assigned nursing home residents to receive placebo or Megace (800mg per day) for 12 weeks, followed by 13 weeks off treatment. There were no significant differences in weight gain and body composition between treatment groups at 12 weeks. However, improvements in appetite, quality of life and wellbeing were significantly greater in Megace-treated residents based on participant feedback. Last, at 25 weeks post-treatment initiation, 61.9 per cent of Megace-treated residents had gained greater than or equal to 1.82kg compared to 21.7 per cent of placebo residents (Yeh *et al.*, 2001). However, a later study reported no significant improvement in weight, functional status or health-related quality of life following a 63-day treatment period of varying doses of Megace (Reuben *et al.*, 2005). The three-week difference with regards to Megace administration between these two studies could explain the discrepancy in the results. Therefore, further clinical trials are necessary to discern the proper Megace dosing regimen in this population.

In addition, the administration of Megace has been linked to adverse side effects such as diarrhoea, cardiomyopathy, leukopenia, depression and pulmonary embolism (Gurvich and Cunningham, 2000; PDR Search, 2020). Due to the lack of weight-gain success in limited clinical trials, and several adverse side effects, Beers Criteria (standards for medication use for those over the age of 65; American Geriatrics Society, 2019) has labelled Megace as a potentially inappropriate medication to treat cachexia/poor appetite (AGS, 2022). These findings necessitate further comprehension of the biochemical and physiological basis for appetite regulation to implement novel intervention strategies (Table 1).

<b>Change with age</b>	<b>Impact on pathways</b>	<b>Interventions</b>	<b>Example of major ongoing research questions</b>
Decreased sense of taste	Blunts hedonistic pathway, favouring anorectic pathway	Sorbet Increases Salivation	Although successful in two small clinical trials, can this intervention elicit increased food intake on a larger scale and over a longer period of time?
Decreased sense of smell	Blunts hedonistic pathway, favouring anorectic pathway	Supplementation with zinc sulphates, Vitamin A, and Vitamin B <sub>3</sub> + the removal of sucralose	What is the relationship between common drugs/supplements taken by older adults and the pathophysiology of presbyosmia?
Decreased gastric motility	Blunts orexigenic pathway	Reduce dietary fat intake, anti-obesity medication (Orlistat), daily bouts of physical activity	What are the health implications of reducing/removing dietary fat from the diet of older adults? How safe is taking Orlistat over a continued period of time? What type of exercise, and undertaken for how long, demonstrates the greatest improvement in gastric motility in older adults?
Decreased NPY levels	Blunts orexigenic pathway	More structured mealtimes (similar time each day)	Several studies in non-human models demonstrate increases in NPY levels, but does the same occur in humans?
Decreased ORX and MCH levels	Blunts orexigenic pathway and favours anorectic pathway	Spread-out mealtimes	More spaced-out mealtimes allow more time for digestion, but what is the physiological impact on ORX and MCH levels?
Decreased AgRP levels	Blunts orexigenic pathway and favours anorectic pathway	Administration of glucocorticoids and/or CPT-1 inhibitors	What is the proper dosage of each medication, and are there any adverse effects in prolonged usage?
Hypoxia-induced weight loss potentially linked to ischaemic stroke	Blunts orexigenic pathway and favours anorectic pathway	Typical treatments for ischaemic stroke (aspirin, beta blockers, nitrates, surgery, etc.)	How do hypoxic conditions impact AgRP levels? Do typical ischaemic treatments help restore baseline levels of appetite-regulating metabolites?



Decreased ghrelin levels	Blunts orexigenic pathway	Ghrelin mimetics and liquified meals	How safe is ghrelin-agonist administration in older adults? How compliant are older adults with regards to maintaining a primarily liquid diet?
Increased leptin levels	Blunts orexigenic pathway and favours anorectic pathway	Avoid inflammatory foods, physical activity, proper sleep, alpha lipoic acid, fish oil	Are non-pharmaceutical approaches to decrease leptin levels effective, or should pharmaceutical approaches be pursued?

**Table 1:** Approaches to combat the anorexia of ageing.

**Note:** Hedonistic Pathway: reward and desire to consume palatable food; Anorectic Pathway: appetite suppression; Presbyosmia: the gradual loss of olfactory abilities that occurs in most people as they grow older; Orexigenic Pathway: appetite stimulation; NPY: Neuropeptide Y (an orexigenic neurotransmitter located in one of the neuronal subsets in the ARC); ORX (orexin neurons): ORX neuropeptides enhance gut motility, activated by NPY; orexigenic neurons; MCH (melanin-concentrating hormone) antagonist for  $\alpha$ -MSH, activated by ORX neuropeptides, orexigenic neurons; AgRP (agouti-related peptide): an orexigenic neurotransmitter located in the AgRP<sub>ARC</sub> neuronal subset, an inhibitor of  $\alpha$ -MSH; Ghrelin: hunger hormone released from endocrine cells, activates AgRP<sub>ARC</sub> neurons, main controller of orexigenic pathway; Leptin: satiation hormone released from white adipocytes, activates POMC<sub>ARC</sub> neurons, inhibits AgRP<sub>ARC</sub> neurons, main controller of anorectic pathway.

## Methods

To construct this narrative review, the author searched PubMed using the keywords ‘POMC and AgRP’ and the filter ‘review’. No time limits were used. One hundred and thirty-seven articles were found (September 2020). Several of these papers, plus additional publications found in the references, were used to construct a framework of POMC and AgRP action in the ARC and their downstream effects.

For a better understanding of the physiology of ageing and the pathophysiology of the anorexia of ageing, the phrase ‘anorexia of ageing’ was searched in PubMed. There was no time limit set. Inclusion criteria included ‘clinical trial’ and participants aged 65+. Twenty-four articles were found (February 2021). Additional clinical trials cited in the references of these studies were used to complete the narrative review. Clinical trials investigating pathological and social factors/interventions were excluded, as were studies regarding anorexia nervosa in elderly populations.

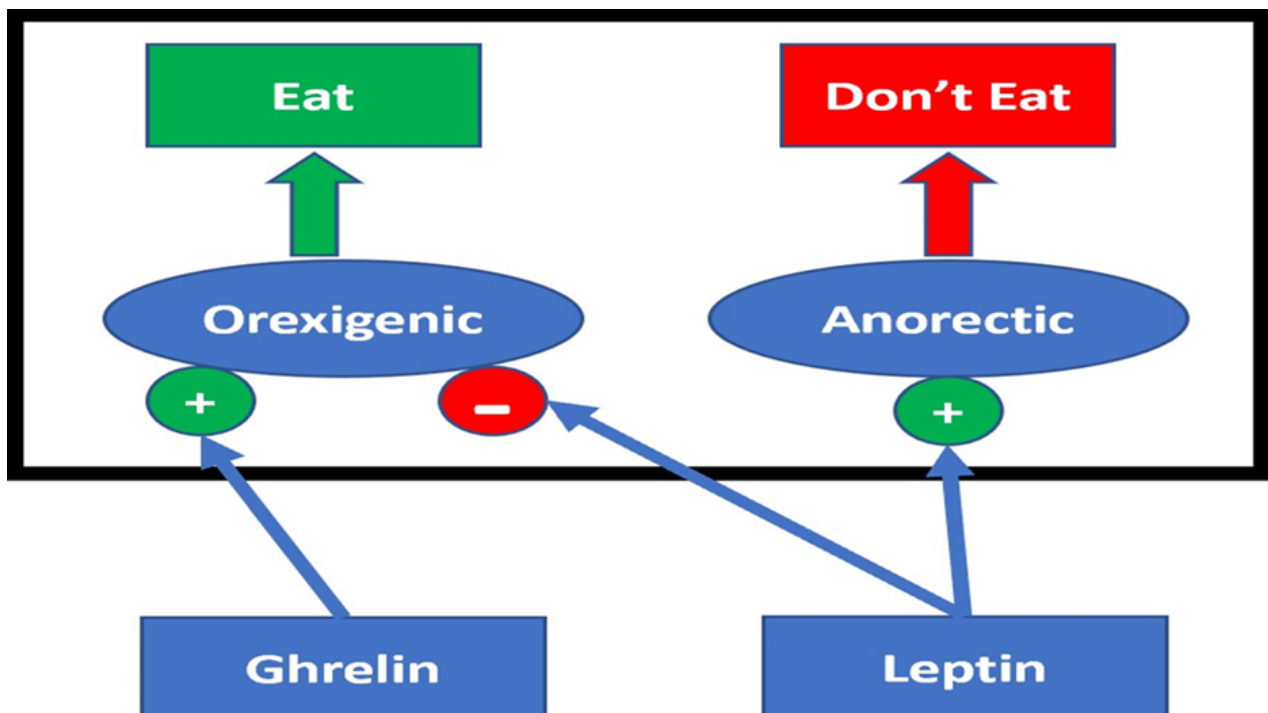
## Appetite

Appetite is a part of the energetic equilibrium required for weight regulation. Today, it is evident that appetite is part of a complex process in which a signalling pathway occurs between the digestive system, the endocrine system, the brain and sensory nerves to modulate hunger, satiation and satiety. However, this complex process can be more simplistically thought of as a system composed of two complementary pathways: the hedonistic pathway and the homeostatic pathway (Andermann and Lowell, 2017). The homeostatic pathway is driven by internal and metabolic signals (e.g. hormones) to maintain energy balance. In contrast, the hedonistic pathway is driven by environmental signals (such as food presentation) based on reward and desire to consume palatable food for pleasure (Berthoud, 2011; Lee and Dixon, 2017). The intricate nature of appetite regulation depends on the balance of the hedonistic and homeostatic pathways (Lee and Dixon, 2017). This review will primarily focus on the homeostatic pathway.

### Homeostatic appetite

Homeostatic appetite is divided into two general pathways. These pathways are thought of as the anorectic pathway, which functions by suppressing appetite, and the orexigenic pathway, which functions by ‘de-suppressing’ appetite. These pathways are centralised in the ARC of the hypothalamus and project to similar regions of the brain, such as the [lateral hypothalamus](#) and [paraventricular nucleus](#) (Cui *et al.*, 2017).

Within the ARC exists two distinct subsets of neurons implicated in energy balance. The first subset – referred to as  $AgRP_{ARC}$  neurons – express AgRP, neuropeptide Y (NPY), and GABA. This subset of neurons in the ARC modulates the orexigenic pathway and predominately functions through inhibiting the anorectic pathway, thereby ‘de-suppressing’ appetite (Paeger *et al.*, 2017). The second subset of neurons in the ARC, referred to as  $POMC_{ARC}$  neurons, express the peptide neurotransmitter POMC and cocaine-amphetamine-regulated transcript (CART). This subset of neurons in the ARC modulates the anorectic pathway and functions primarily by activating neuronal networks that suppress feeding (Cui *et al.*, 2017). The subsequent activation and inhibition of these distinct ARC neuronal populations are controlled by physiological signals that fluctuate with the body’s energy levels. The peptide hormone leptin is the main controller of the anorectic pathway, whereas ghrelin is the main controller of the orexigenic pathway (Cui *et al.*, 2017; Figure 1).



**Figure 1:** Basic overview of appetite regulation.

**Note:** Ghrelin and leptin serve as the main controllers of the orexigenic and anorectic pathways, respectively. The orexigenic pathway in the ARC ( $AgRP_{ARC}$  neurons) is stimulated by ghrelin. The anorectic pathway in the ARC ( $POMC_{ARC}$  neurons) is stimulated by leptin. Leptin also inhibits  $AgRP_{ARC}$  activity (see ‘Ghrelin and leptin changes with age’ below). Activation of the anorectic pathway suppresses appetite, whereas activation of the orexigenic pathway ‘de-suppresses’ appetite through second-order neurons.

## Changes with age

### Appetite regulation changes with age

Research demonstrates that the physiology of hedonistic and homeostatic appetite control changes with age, which may contribute to the onset of the anorexia of ageing (Atalayer and Astbury, 2013). A better

understanding of the biochemical and physiological changes in appetite regulation with age may potentially lead to the creation of new intervention strategies to combat the anorexia of ageing and its negative health outcomes.

For instance, alterations in [chemosensory](#) detection of food play a role in the suppression of appetite in the elderly population, thereby resulting in decreased food intake (Hays and Roberts, 2006). For example, a moderate loss of taste occurs during the normal course of ageing in a healthy adult (Schiffman, 1997). This is demonstrated in a recent cross-sectional analysis of 359 community-dwelling Dutch senior citizens (age 65–93), which established that 9.2 per cent of the sample had poor taste, and self-reported poor taste was associated with poor appetite (Fluitman *et al.*, 2021).

In response to this loss of taste with age, a novel pilot test referred to as ‘Sorbet Increase Salivation’ (SIS) was conducted in the last decade to combat xerostomia (dry mouth) and ultimately increase food intake. This study demonstrated that elderly subjects who consumed two ounces of lemon-lime sorbet prior to lunch/dinner ate a more significant amount of food and had significant increases in salivation when compared to those who consumed a non-citrus drink prior to lunch/dinner. On average, residents consumed  $208 \pm 98$  grams of food pre-sorbet compared to  $253 \pm 96$  grams of food post-sorbet (Crogan *et al.*, 2014). Hence, the SIS approach offers a novel method to increase food intake via salivation stimulation while offering the potential to entice older individuals to eat more. However, this study included a small sample size ( $n=22$ ), and demonstrates a need for further studies with larger sample sizes.

In addition, the sense of smell also deteriorates with the progression of ageing (presbyosmia), as older individuals demonstrate a higher odour detection and recognition threshold (the minimal concentration of an aroma necessary to be detected by the human nose; Doty, 1991). From 2011 to 2014, the National Health and Nutrition Examination Survey included a ‘Chemosensory’ component in which it was determined that about 12 per cent of individuals aged 40 or older experience alterations in their sense of smell, and this value increases to roughly 40 per cent in those aged 80 or older (NHANES, 2011–2012; NHANES, 2013–2014). Thus, a deterioration in smell as one ages may dampen the hedonistic pathway of appetite.

Various avenues have been tested to combat presbyosmia, such as the addition of zinc salts and vitamins A and B<sub>3</sub> to the diet, as well as the removal of the organochlorine sweetener sucralose. However, these approaches have been met with varying levels of success, most likely due to the unique biological effect of different drug types. Therefore, further research is needed to understand the pathophysiology underlying presbyosmia to formulate more targeted approaches to restore one’s sense of smell (Schiffman, 1983; Schiffman, 1997; Schiffman, 2007; Schiffman and Rother, 2013; Schiffman and Zervakis, 2002).

Modifications in the gastrointestinal tract also play a role in decreased food intake in the elderly population (Hays and Roberts, 2006). Elderly individuals require a longer period to digest the same nutrients when compared to younger individuals, in which the extra distension placed on the antral stomach (the portion of stomach that holds broken-down nutrients) is directly related to lower sensations of satiation (Clarkston *et al.*, 1997; Moriguti *et al.*, 2000; Rolls *et al.*, 1995; Soenen *et al.*, 2015). Sturm *et al.* (2004) showed that after pre-loading with a nutrient-rich liquid, the antral area of older individuals was greater than that of younger subjects who consumed the same nutrient-rich liquid. This extra distention placed on the antral stomach creates a longer digestion period, as demonstrated by both a slower gastric emptying time (time it takes for 50 per cent gastric emptying) and [post-prandial](#) hunger being inversely associated with gastric emptying in elderly individuals (Clarkston *et al.*, 1997).

One novel approach to improve gastric emptying in older adults has been the use of the obesity management drug, Orlistat (a pancreatic lipase inhibitor; Drug Bank, 2021). However, to date, there has only been one clinical trial using Orlistat specifically in older adults. This study, in which Orlistat administration inhibited the usual decrease in gastric emptying following dietary fat consumption, demonstrated promise. Yet only nine older adults were studied (Tai *et al.*, 2011), requiring further study to determine efficacy and safety of this drug.

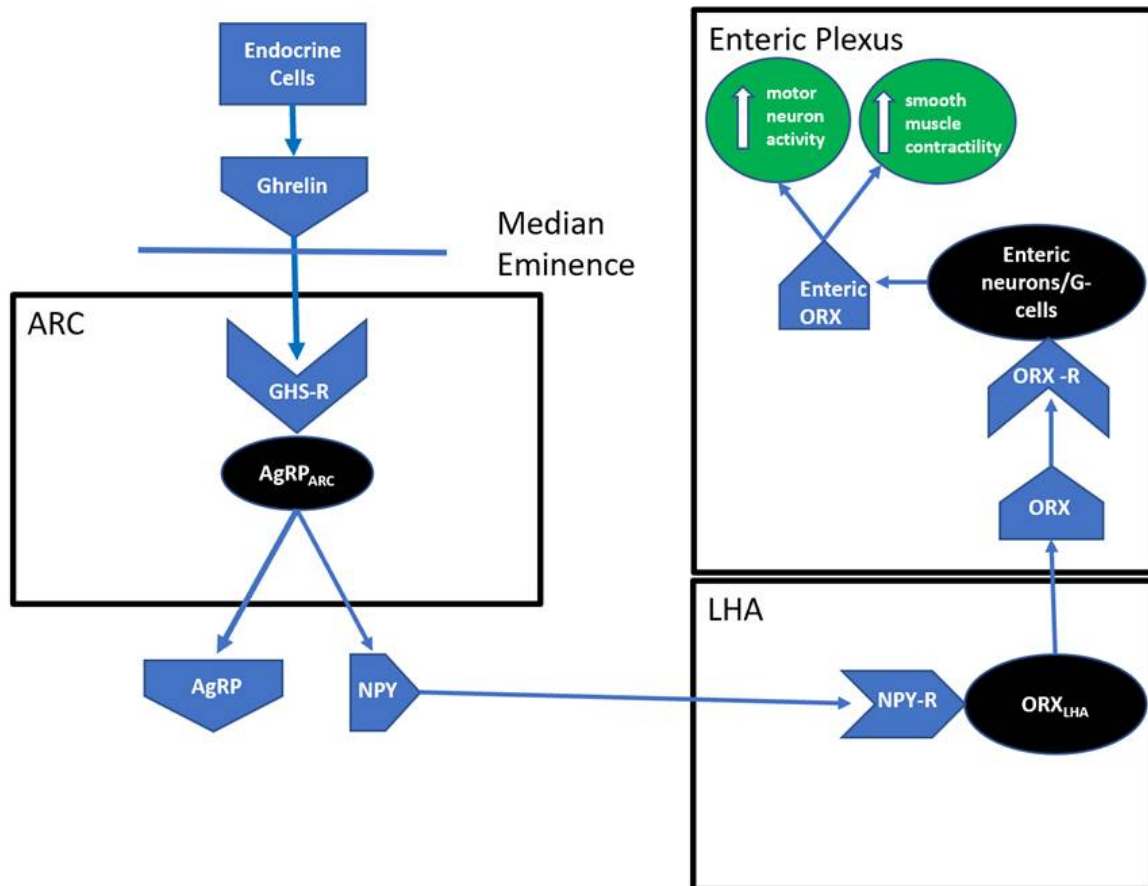
Therefore, a different approach, such as the participation in regular bouts of light to moderate physical activity prior to mealtime, may be of benefit to this population (Bi and Triadafilopoulos, 2003). However, more research is needed to determine the duration and type of physical activity that not only helps improve gastric emptying in older individuals but also is deemed safe and enjoyable.

### Orexigenic pathway changes with age

Orexigenic appetite is regulated by the peptide hormone ghrelin (Cui *et al.*, 2017). Ghrelin is synthesised by endocrine cells located in the gut and is the only known orexigenic gut peptide. Ghrelin concentrations increase **pre-prandially** in humans and during bouts of food deprivation in animals (Cui *et al.*, 2017; Mani *et al.*, 2019; Uchida *et al.*, 2020). Ghrelin can access the ARC through an incomplete blood–brain barrier adjacent to the median eminence (Cabral *et al.*, 2017; Uriarte *et al.*, 2018). Inside the ARC, ghrelin's main targets are AgRP<sub>ARC</sub> neurons (Méquinion *et al.*, 2020), where it binds the growth hormone secretagogue receptor (Cui *et al.*, 2017).

Activated AgRP<sub>ARC</sub> neurons directly innervate the lateral hypothalamus and release NPY neuropeptides into this brain region (Wasinski *et al.*, 2020). NPY neuropeptides bind to a Class-A G-protein coupled receptor expressed by orexin neurons found within the lateral hypothalamus (**ORX<sub>LHA</sub>**), triggering the release of an orexigenic **neuropeptide**, orexin (Gene Group, 2020; Guo *et al.*, 2018; Okumura and Nozu, 2011). ORX neuropeptides subsequently diffuse to various regions of the central nervous system, where they bind to ORX receptors and initiate further orexigenic actions (O'Leary, 2014).

ORX neuropeptides stimulate vagal and spinal nerves (as well as the **enteric plexus**), mucous and musculature of the gut (Guo *et al.*, 2018). These areas impact gut motility (Ahima and Antwi, 2008; Baccari, 2010; Bulbul *et al.*, 2010). ORX peptides increase **enteric** motor neuron activity and smooth muscle contractility within the **duodenum**, resulting in enhanced gastric emptying (Squecco, *et al.*, 2011; Figure 2). The enhanced rate of gastric emptying via enteric ORX peptide excitation thereby stimulates the orexigenic pathway.



**Figure 2:** ORX<sub>LHA</sub> impacts gastric motility.

**Note:** Following activation of ORX<sub>LHA</sub> neurons by the binding of NPY to its receptor, ORX neuropeptides are released and diffuse to the enteric plexus. Inside the enteric plexus, ORX binds its receptor expressed on enteric neurons and G cells. This results in the release of enteric ORX peptides, which function by increasing motor neuron activity and increasing smooth muscle contractility, thereby enhancing gastric emptying.

ARC: arcuate nucleus; GHS-R: growth hormone secretagogue receptor; AgRP<sub>ARC</sub>: agouti-related peptide neurons in the arcuate nucleus; AgRP: agouti-related peptide; NPY: neuropeptide Y; NPY-R: neuropeptide Y receptor; ORX<sub>LHA</sub>: orexin neurons in the lateral hypothalamus; ORX: orexin neuropeptides; ORX-R: orexin receptor; LHA: lateral hypothalamus.

The orexigenic effects initiated by activated ORX<sub>LHA</sub> neurons extend beyond enhancing gastric motility.

Within the lateral hypothalamus, ORX neuropeptides bind to ORX receptors expressed on melanin-concentrating hormone neurons (MCH<sub>LHA</sub>). This stimulates the release of MCH neuropeptides, an antagonist of  $\alpha$ -MSH, a key anorectic peptide hormone (see 'Anorectic pathway changes with age', below), thereby blunting the anorectic pathway (Barson *et al.*, 2013; Diniz *et al.*, 2019; Madelaine *et al.*, 2020).

However, changes in the gene expression of key orexigenic proteins throughout the ageing process result in the suppression of appetite in elderly individuals (Wernette *et al.*, 2011). For example, the gene expression and resulting protein content of NPY and its receptors decreases with age in rodents (Morley, 2001; Takeda *et al.*, 2010), resulting in a reduction of ORX<sub>LHA</sub> neuronal stimulation and the consequential blunting of the orexigenic pathway.

In addition, reduction in the gene expression of the orexigenic peptide hormones ORX and MCH, and a decrease in the prevalence of ORX receptors located throughout areas of the hypothalamus, are associated with the normal ageing process (Kappeler *et al.*, 2003; Porkka-Heiskanen *et al.*, 2004; Wernette *et al.*, 2011).

This results in less stimulation of the orexigenic pathway and a decreased ability to inhibit the anorectic pathway.

To combat these changes, one may alter the meal structure of elderly individuals to include more spread-out feedings, as this would allow more time for digestion and improve gastric emptying rate (Jackson *et al.*, 2007). Additionally, the introduction of a day-to-day meal plan may result in increased levels of NPY. Animals on a trained eating regimen demonstrate increased NPY levels prior to the normal mealtime (Campos *et al.*, 2012; Chen *et al.*, 2019; Kalra *et al.*, 1991; Yoshihara *et al.*, 1996). However, clinical trials are necessary to determine the impact of meal timing on NPY levels in humans.

### Anorectic pathway changes with age

Leptin is primarily secreted by white adipocytes, which are fat storage cells located in the subcutaneous layer of skin and between muscles and internal organs (Harris, 2014). Leptin accesses the ARC through the median eminence (Cui *et al.*, 2017; Scott *et al.*, 2009), and its main targets are POMC<sub>ARC</sub> neurons (Dodd *et al.*, 2015). There are at least six leptin receptor isoforms, the longest of which, **Ob-Rb**, is expressed on POMC<sub>ARC</sub> neurons (Harris, 2014; Wauman *et al.*, 2017). Leptin binds Ob-Rb located on POMC<sub>ARC</sub> neurons and activates the anorectic pathway (Dodd *et al.*, 2015).

Leptin-activated POMC<sub>ARC</sub> neurons induce synthesis of the polypeptide hormone precursor, POMC (Cui *et al.*, 2017; Morton *et al.*, 2006). Activated POMC peptide hormones are processed by several enzymes to form the small, biologically active peptide acetyl- $\alpha$ -melanocyte stimulating hormone ( $\alpha$ -MSH; D'Agostino and Diano, 2010; Morton *et al.*, 2006; Figure 3).

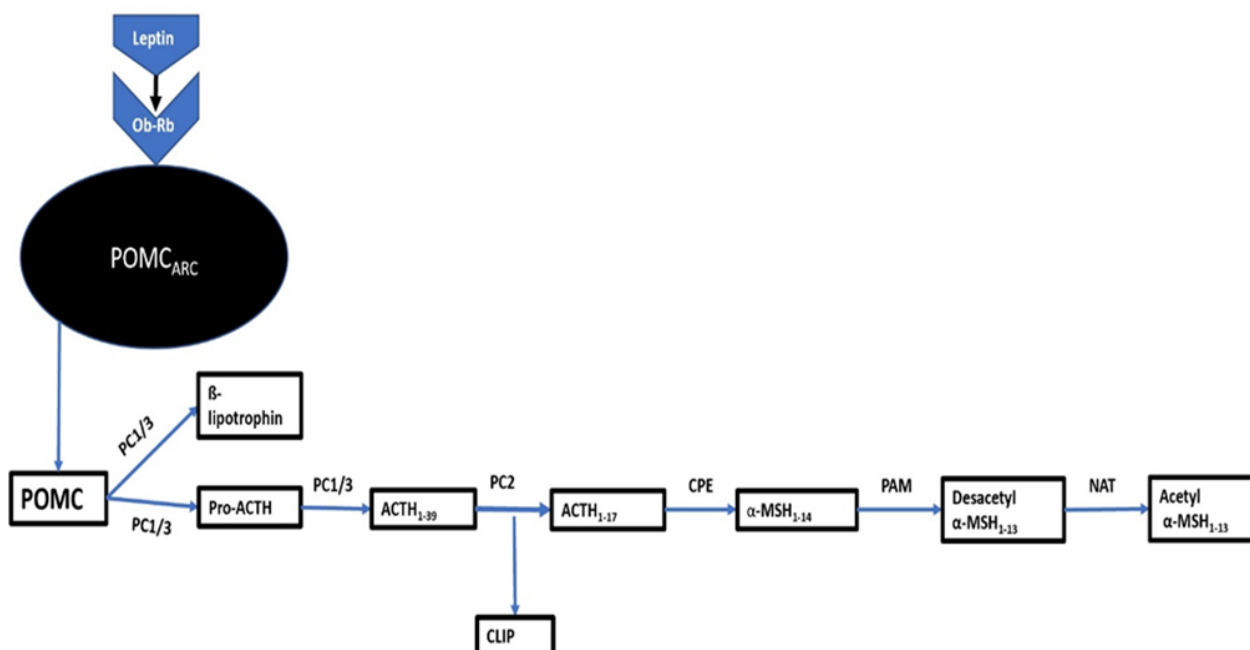
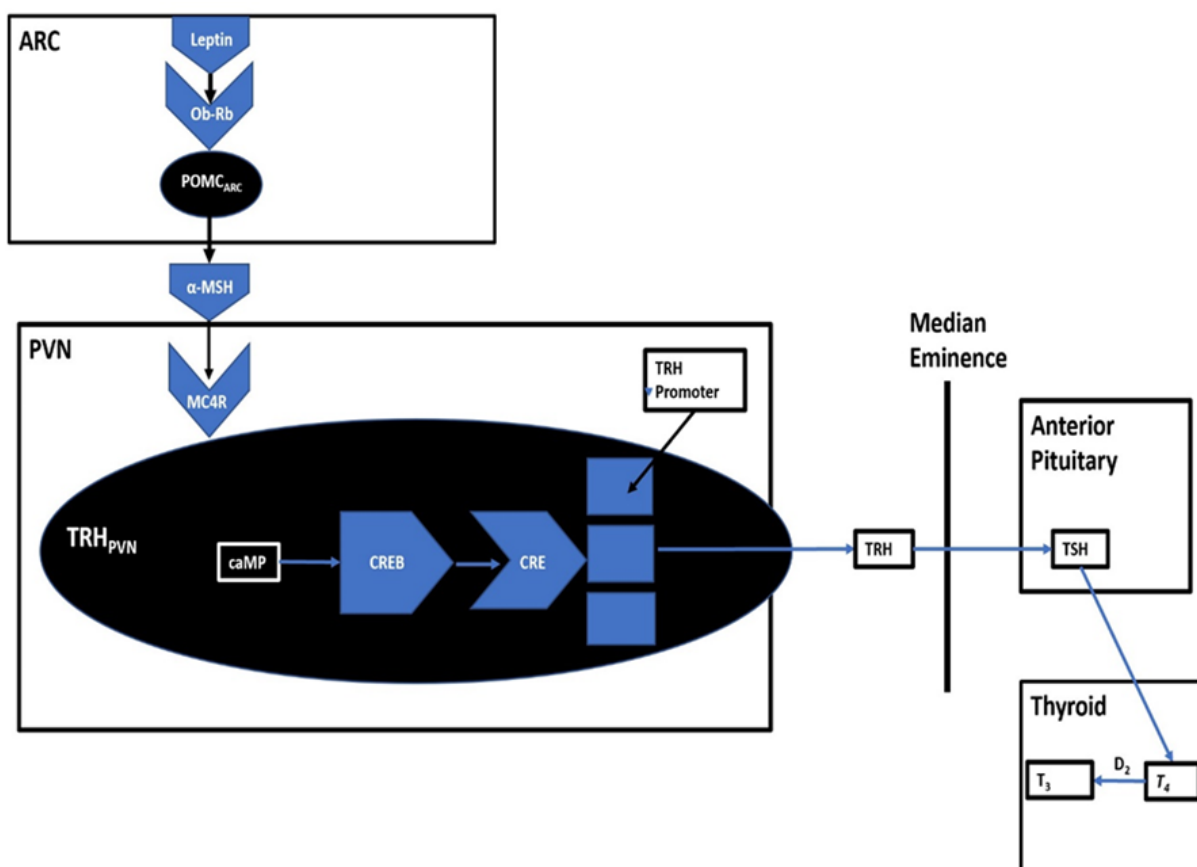


Figure 3:  $\alpha$ -MSH synthesis.

**Note:** Following activation of POMC<sub>ARC</sub> neurons, an enzymatic cascade occurs, culminating with the production of acetyl- $\alpha$ -melanocyte stimulating hormone. The subscripts indicate the number of amino acid residues composing each peptide. Ob-Rb: leptin receptor; POMC: pro-opiomelanocortin; PC1/3: pro-hormone convertase 1; Pro-ACTH: pro-adrenocorticotrophic hormone; PC2: pro-hormone convertase 2; CLIP: corticotropin-like intermediate peptide; CPE: carboxypeptidase E; PAM: peptidyl  $\alpha$ -amidating monooxygenase; NAT: n-acetyltransferase.

POMC<sub>ARC</sub> neurons directly innervate the paraventricular nucleus (Bell *et al.*, 2018; Cui *et al.*, 2017; Morton *et al.*, 2006). Following activation,  $\alpha$ -MSH enters the paraventricular nucleus and binds melanocortin receptors (MCR).  $\alpha$ -MSH is an agonist for the MCR system constituents, which are imperative for the continuation of the anorectic pathway (Bell *et al.*, 2018; Cui *et al.*, 2017; Morton *et al.*, 2006).

Within the paraventricular nucleus resides thyrotropin-releasing hormone neurons (TRH<sub>PVN</sub>), which express MCRs (Decherf *et al.*, 2010). The activation of MCRs expressed on TRH<sub>PVN</sub> neurons by  $\alpha$ -MSH results in a signalling cascade culminating in the production of triiodothyronine (T<sub>3</sub>), a regulator of the body's metabolic rate (Amin *et al.*, 2011; Campos *et al.*, 2020; Figure 4). T<sub>3</sub> administration upregulates mitochondrial uncoupling proteins (UCPs), resulting in increased internal thermogenesis (Barbe *et al.*, 2001; Bézaire *et al.*, 2007; Lanni *et al.*, 1999; Mullur *et al.*, 2014; Puigserver, 2005; Silva, 2011; Weitzel *et al.*, 2001). The increase in internal thermogenesis has been proposed to induce appetite suppression (Coppola *et al.*, 2004; Harris *et al.*, 2001; Josic *et al.*, 2010; Kong *et al.*, 2004; Perello *et al.*, 2006, Strominger and Brobeck, 1953).



**Figure 4:** ARC control of TRH levels.

**Note:**  $\alpha$ -MSH binds MC4R on TRH<sub>PVN</sub> neurons and initiates the production of cyclic adenosine monophosphate (cAMP). Following an enzymatic cascade, CREB binds to CRE on TRH promoters in the paraventricular nucleus, thereby increasing the transcription and translation of TRH neuropeptides. TRH neuropeptides move through the median eminence to the anterior pituitary and stimulate the production of TSH. TSH moves through the bloodstream to the thyroid resulting in the production of T<sub>4</sub>. T<sub>4</sub> is converted to the bioactive T<sub>3</sub> by the deiodinase enzyme, D<sub>2</sub>. Ob-Rb: long form of leptin receptor; POMC<sub>ARC</sub>: pro-opiomelanocortin neurons in the ARC;  $\alpha$ -MSH: alpha-melanocyte stimulating hormone; MC4R: melanocortin receptor 4; TRH<sub>PVN</sub>: thyrotropin releasing hormone neurons in the paraventricular nucleus; cAMP: cyclic adenosine monophosphate; CREB: cAMP response element binding protein; CRE: cAMP response element; TSH: thyroid-stimulating hormone; T<sub>4</sub>: thyroxine; T<sub>3</sub>: triiodothyronine; D<sub>2</sub>: deiodinase 2; ARC: arcuate nucleus; PVN: paraventricular nucleus.

Like the changes in gene expression in orexigenic signalling proteins, the ageing process has been linked to changes in anorectic signalling, thus amplifying appetite suppression as one ages (Wernette *et al.*, 2011). For instance, the ageing process results in reduced AgRP gene expression in rodents (Kmiec, 2006; Zhang *et al.*, 2004). The reduction in AgRP gene expression 'de-suppresses' the anorectic pathway. AgRP is also an **endogenous** antagonist for  $\alpha$ -MSH (Zhang *et al.*, 2017). Therefore, stimulated AgRP<sub>ARC</sub> neurons in elderly individuals are not able to suppress  $\alpha$ -MSH as effectively as a younger individual, resulting in an inability to suppress the anorectic pathway. Several avenues to increase AgRP gene expression have been demonstrated in rodent models, such as the administration of glucocorticoids (Shimizu *et al.*, 2008) and a reduction in long-chain acyl-CoA in the ARC via carnitine palmitoyltransferase-1 inhibition (**CPT-1**; Obici *et al.*, 2003). However, further research is needed not only to determine proper dosing but also to troubleshoot potential adverse effects of these pharmaceutical approaches.

Finally, research demonstrates that exposure to hypoxia (oxygen deprivation at the level of the tissue) stimulates weight loss (Kayser and Verges, 2013; Netzer *et al.*, 2008; Quintero *et al.*, 2010), most likely due to reduced appetite and subsequent decreased food intake (Benso *et al.*, 2007; Kalson *et al.*, 2010; Westerterp and Kayser, 2006). Interestingly, in hypoxic conditions, ghrelin levels decrease (Matu *et al.*, 2017; Wasse *et al.*, 2012). At the same time, both leptin (Lippl *et al.*, 2010; Mekjavic *et al.*, 2016; Shukla *et al.*, 2005; Snyder *et al.*, 2008) and POMC (Varela *et al.*, 2017; Zhang *et al.*, 2011) levels increase, and the effect on AgRP remains unknown (Kietzmann and Mäkelä, 2021). This is an intriguing connection, because roughly 800,000 strokes occur annually in the USA, and approximately 87 per cent of those are considered ischaemic (inadequate blood supply to an organ or part of the body). Additionally, approximately three-quarters of all strokes occur in individuals aged 65 years or older (Benjamin *et al.*, 2018). Thus, it appears that there could be a relationship between hypoxia-induced pathophysiology and the reduction and increase of orexigenic and anorectic metabolites, respectively. However, new research initiatives are needed to further elucidate this relationship and discover whether typical ischaemic treatments such as medication, surgery and lifestyle alterations also impact these metabolites (Mayo Clinic, 2021).

### Ghrelin and leptin changes with age

Plasma ghrelin levels decrease during the normal ageing process (Hays and Roberts, 2006). Rigamonti *et al.* (2002) showed that normal-weight older subjects exhibited 35 per cent lower ghrelin plasma concentrations when compared to normal-weight younger subjects. Additionally, in younger subjects, post-prandial ghrelin levels returned to fasting levels approximately two to four hours after meal completion, while elderly subjects did not exhibit return-to-fasting level ghrelin concentrations in a post-prandial setting (Di Francesco *et al.*, 2008).

In contrast to plasma ghrelin decreasing with age, plasma leptin concentrations increase with age (Atalayer and Astbury, 2013). This is evident by both pre- and post-prandial leptin levels in elderly individuals being higher than the leptin levels present in younger individuals (Di Francesco *et al.*, 2006; Zamboni *et al.*, 2004).

Therefore, rising leptin levels and falling ghrelin levels are potential targets to combat the anorexia of ageing. Accordingly, avoiding inflammatory foods (e.g. trans fats, refined sugars), consuming anti-inflammatory foods (e.g. fatty fish), participating in moderate physical activity, and supplementing with alpha lipoic acid and fish oil may all aid in leptin stabilisation (Abd El-Kader *et al.*, 2013; Ellulu *et al.*, 2016; Huerta *et al.*, 2015; Reseland *et al.*, 2001; Shapiro *et al.*, 2008; Spiegel *et al.*, 2004). Also, in the past decade, steps have been taken to develop ghrelin mimetics, such as macimorelin for the diagnosis of growth



hormone deficiency, anamorelin for the treatment of cancer cachexia, and relamorelin for the treatment of gastrointestinal disorders (Currow and Abernathy, 2014; Koch, 2013; Van der Ploeg *et al.*, 2014).

Furthermore, liquified meals offer promise of increased appetite in older adults. Elderly individuals who consume liquified meals exhibit higher post-prandial ghrelin composites when compared to those consuming isoenergetic solid meals (Tieken *et al.*, 2007). Nevertheless, despite the potential for liquid meals to increase appetite in older individuals, longer intervention trials are needed to determine compliance to a predominately liquid-based diet in this population.

## Conclusion

Appetite incorporates both hedonistic and homeostatic mechanisms, which are centred through the ARC and stem out to various regions of the body. Ghrelin and AgRP<sub>ARC</sub> neurons control the orexigenic pathway in which activation stimulates hunger. Leptin and POMC<sub>ARC</sub> neurons, on the other hand, control the anorectic pathway in which activation primarily suppresses hunger. Comprehension of appetite regulation and the subsequent biochemical and physiological modifications that occur during ageing allows for the implementation of intervention strategies to combat the anorexia of ageing. The AgRP<sub>ARC</sub> and POMC<sub>ARC</sub> neuronal subsets are prime targets for such interventions.

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## Conflict of Interest

The author declares no conflict of interest.

## Lists of figures

**Figure 1:** Basic overview of appetite regulation.

**Figure 2:** ORX<sub>LHA</sub> impacts gastric motility.

**Figure 3:**  $\alpha$ -MSH synthesis.

**Figure 4:** ARC control of TRH levels.

## List of tables

**Table 1:** Approaches to combat the anorexia of ageing.

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## Glossary

**$\alpha$ -MSH:** biologically active peptide of POMC; ligand for melanocortin receptors; inhibited by MCH and AgRP neuropeptides

**AgRP<sub>ARC</sub>:** refers to the orexigenic neuronal subset of the ARC which contains AgRP, NPY, and GABA neurotransmitters; green light

**AgRP:** an orexigenic neurotransmitter located in the AgRP<sub>ARC</sub> neuronal subset; an inhibitor of  $\alpha$ -MSH

**Anorexia of ageing:** declined food intake with age

**ARC:** located in the hypothalamus near the median eminence, this brain region contains two distinct neuronal subsets thought to control hunger and satiation

**Cachexia:** weakness and wasting of the body due to severe chronic illness

**CART:** an anorectic neurotransmitter located in one of the neuronal subsets of the ARC

**Chemosensory:** (of a sense organ or receptor) responsive to chemical stimuli

**CPT-1:** enzyme in the outer mitochondrial membrane that converts long-chain acyl-CoA species to their corresponding long-chain acyl-carnitines for transport into the mitochondria

**Duodenum:** the first part of the small intestine immediately beyond the stomach, leading to the jejunum

**Endogenous:** growing or originating from within an organism

**Enteric:** relating to intestines

**Enteric plexus:** a complex autonomic nerve plexus (bundle of nerves and vessels) inside the walls of the gastrointestinal tract, from oesophagus to anus

**GABA:** inhibitory neurotransmitter

**Ghrelin:** hunger hormone released from endocrine cells; activates AgRP<sub>ARC</sub> neurons; main controller of orexigenic pathway

**Lateral hypothalamus:** portion of the brain associated with the orexigenic pathway; contains ORX<sub>LHA</sub> and MCH<sub>LHA</sub>

**Leptin:** satiation hormone released from white adipocytes; activates POMC<sub>ARC</sub> neurons; inhibits AgRP<sub>ARC</sub> neurons' main controller of anorectic pathway

**MCH<sub>LHA</sub>:** melanin-concentrating hormone; antagonist for  $\alpha$ -MSH; activated by ORX neuropeptides; orexigenic neurons

**MCR:** main receptor utilised in the anorectic pathway;  $\alpha$ -MSH is the predominant ligand

**Morbidity:** the condition of being diseased

**Neuropeptide:** a compound containing two or more amino acids in which the carboxyl group of one acid is linked to the amino group of the other; a neuropeptide would be produced in the brain

**NPY:** an orexigenic neurotransmitter located in one of the neuronal subsets in the ARC

**Ob-Rb:** leptin receptor

**ORX<sub>LHA</sub>:** orexin neurons located in the lateral hypothalamus; ORX neuropeptides enhance gut motility; activated by NPY; orexigenic neurons

**Paraventricular nucleus:** portion of the brain that predominantly contains anorectic neuronal subsets such as TRH and CRH; innervated by POMC<sub>ARC</sub> neurons

**Peptide:** a compound containing two or more amino acids in which the carboxyl group of one acid is linked to the amino group of the other; a neuropeptide would be produced in the brain

**POMC:** an anorectic neurotransmitter located in the POMC<sub>ARC</sub> neuronal subset

**POMC<sub>ARC</sub>:** refers to the anorectic neuronal subset of the ARC which contains POMC and CART neurotransmitters: red light

**Post-prandial:** of or relating to a meal (before or after)

**Pre-prandial:** of or relating to a meal (before or after)

**Sarcopenia:** loss of muscle tissue as a natural part of the ageing process

**T<sub>3</sub>:** biologically active thyroid hormone; associated with the regulation of the body's metabolic rate

**TRH<sub>PVN</sub>:** activation results in a downstream signalling cascade culminating in the production of T<sub>3</sub>

**UCP:** proton channel found in inner mitochondrial membrane that uncouple oxidative phosphorylation from ATP, thereby generating heat as a byproduct

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# Efficacy of the Ecosystem Services Approach in Transitioning to Regenerative Agriculture in Australia

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## Abstract

Conventional agriculture is implemented across approximately 75 per cent of the world's agricultural land and has been linked to climate change and biodiversity loss. In contrast, regenerative agriculture focuses on practices that build soil fertility and improve ecosystem functioning to mitigate climate change and increase biodiversity. This review assesses how the regenerative practice of crop diversification influences soil fertility and crop productivity, pest control, water quality and climate-change mitigation. I take an Ecosystem Services Approach to assessing crop diversification, which is a form of natural resource management that considers the relationship between human and environmental needs. These ecosystem services are analysed within the Australian context to determine both current issues and potential opportunities in Australian agriculture. This review reveals that current methods of agriculture in Australia could be improved, and crop diversification offers a key opportunity for helping Australia ensure food security under future climate change. Further research on interspecies interactions is required to help classify the specific crops that provide beneficial ecosystem services in Australia.

**Keywords:** Crop diversification, soil fertility and climate-change mitigation, microbial diversity, ecosystem services in Australia, regenerative agriculture, Australian agriculture

## Introduction

Conventional agricultural practices include some of the most globally dominant methods of producing food, fuel and fibre (Lacanne and Lundgren, 2018). These practices include simple **monocultures**, soil tillage and artificial chemical use (Giller *et al.*, 1997; Lacanne and Lundgren, 2018; Tilman *et al.*, 2011). However, these practices have been linked to climate change, water pollution (Robertson *et al.*, 2014), soil loss (Tsiafouli *et al.*, 2015) and biodiversity loss (Newbold *et al.*, 2015). The following paragraphs highlight some of the key negative outcomes of conventional agriculture.

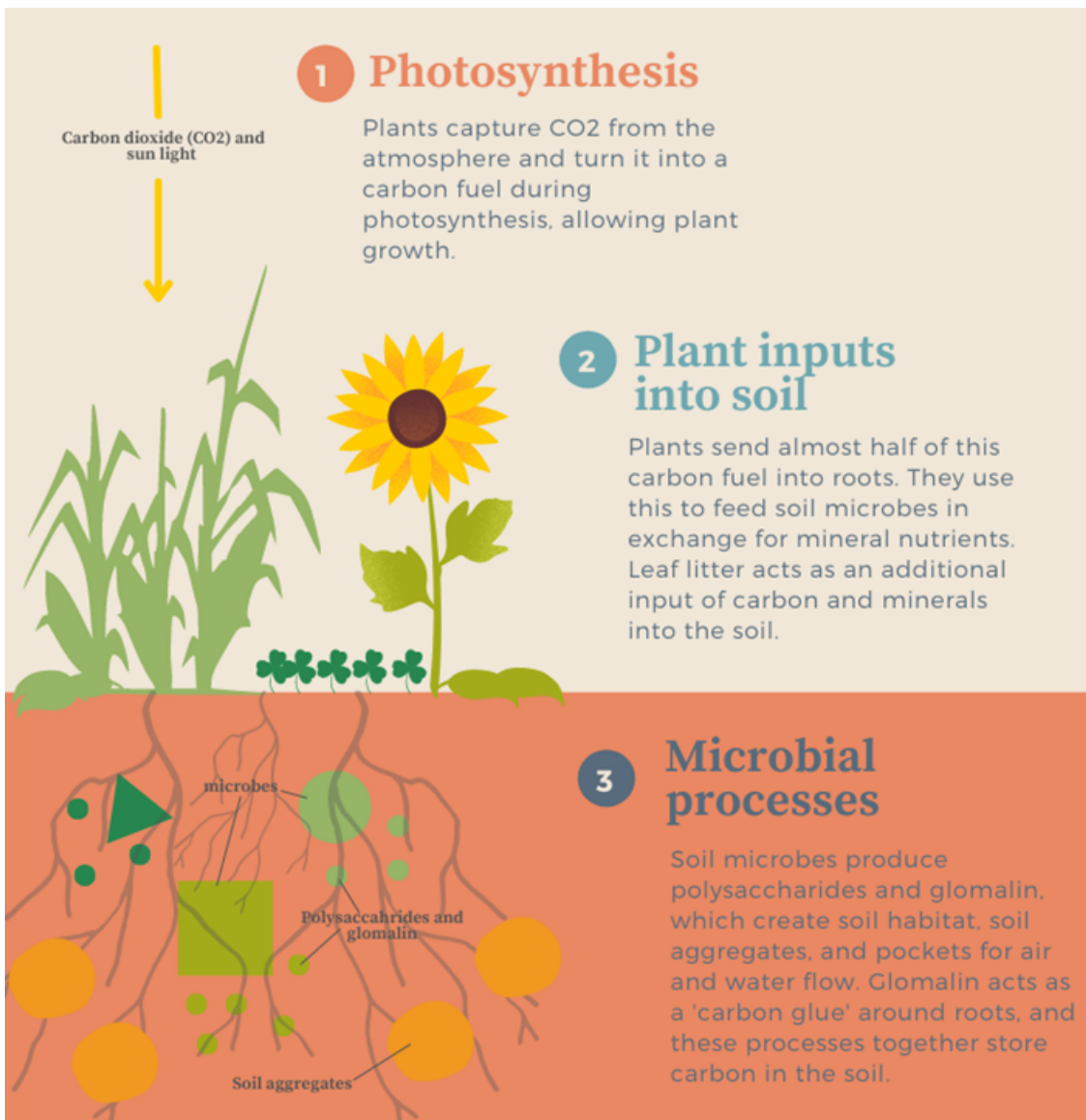
In conventional agriculture, a row crop system is used, which involves sowing fields with either just one species (the cash crop) or a simple two-crop rotation (Robertson *et al.*, 2014, Tiemann *et al.*, 2015). Because of the lack of plant diversity, root systems in these fields are simplified (Liang *et al.*, 2016). In addition, the nutrients available to microbes in these soils is significantly reduced in chemical complexity and available carbon, and this decreases microbial diversity and activity within the soils (Liang *et al.*, 2016, Rhodes, 2017). Because microbes are key in the formation and maintenance of fertile soils, conventional farms must rely on artificial fertilisers to maintain high yields when the soils' microbial diversity is depleted (Rhodes, 2017).

Farming with conventional agricultural methods requires an over-reliance on artificial chemicals (Rhodes, 2017). Because landscape diversity is often reduced in agricultural settings, natural predators of common agricultural pests are often absent due to the inability of these homogenous landscapes to support complex food webs (Gardiner *et al.*, 2009). For example, aphids are a common agricultural pest that can be naturally controlled by planting wildflowers that attract ladybirds, which are a natural predator of aphids (Ammann *et*

*al.*, 2020; Sutter *et al.*, 2018). In simplified agricultural landscapes, natural predators of pests become less abundant as the habitat provides fewer 'safe havens' or [refugia](#) for insect predators to evade predation from birds and other predators, and this results in decreased prey diversity (Robertson *et al.*, 2014; Rusch *et al.*, 2016). As a result, conventional farms must rely on pesticides and insecticides that not only kill the pests but also leach into the soil, killing soil microbes and further reducing the functioning of the soil (Rhodes, 2017).

Because the complexity of root systems in conventional agriculture is reduced, microbial activity within soils is diminished (Poeplau and Don, 2015). Decreased activity results in the creation of fewer air pockets through which water can flow ( Balota *et al.*, 2014; Poeplau and Don, 2015), which reduces the soils' capacity to hold water (Bodner *et al.*, 2015). This results in over-watering, which decreases the soils' stability and leads to high amounts of nutrient losses through run-off and evaporation (Bodner *et al.*, 2015). Because of an over-reliance on artificial chemicals, run-off from conventional fields is often toxic to nearby waterways and has been found to leach into groundwater supplies (Srivastav, 2020). This presents a critical issue for human health, with findings that artificial chemical run-off can result in the presence of chemicals in drinking water, which have the potential to cause cancer (Srivastav, 2020).

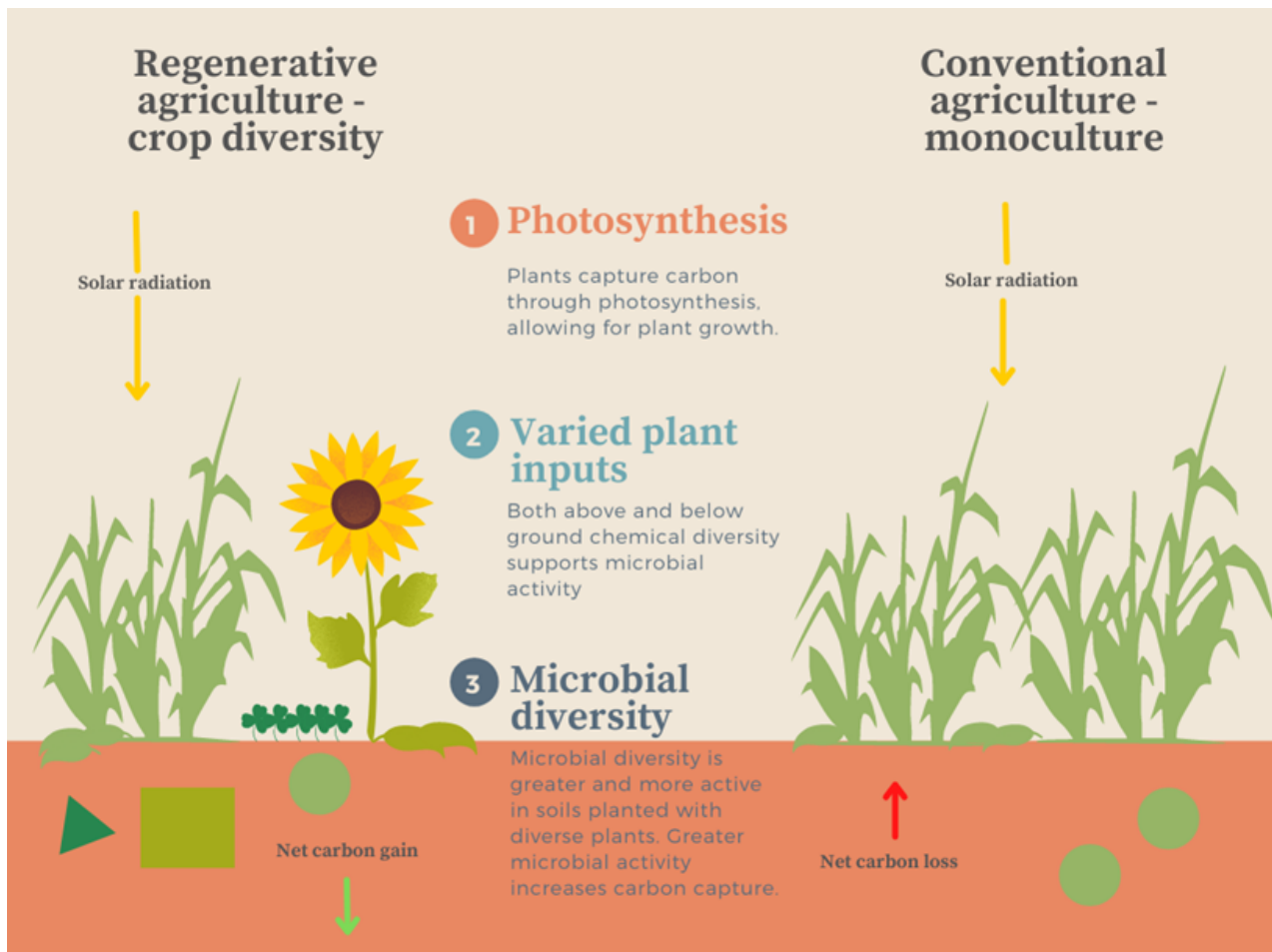
Methods employed under conventional agriculture drive greenhouse gas emissions (Rhodes, 2017). The conversion of natural land to land managed under conventional agriculture depletes the soil by between 60 to 75 per cent of soil organic carbon (Lal, 2004). This is because intensive agricultural practices decrease soil biodiversity (Giller *et al.*, 1997; McDaniel *et al.*, 2014; Tiemann *et al.*, 2015; Tsiafouli *et al.*, 2015). This loss of biodiversity impacts several functions, including nutrient cycling and [carbon sequestration](#) ( Tiemann *et al.*, 2015; Swift *et al.*, 2004; Tsiafouli *et al.*, 2015; Wagg *et al.*, 2014). Carbon sequestration, which is the removal of carbon from the atmospheric carbon pool and its subsequent incorporation into the soil carbon pool, is facilitated by microbial activity (Figure 1; Balota *et al.*, 2014). Soil microbes produce both [polysaccharides](#) and [glomalin](#) (Balota *et al.*, 2014). Together, these organic substances facilitate the formation of soil aggregates which drive soil stability; an important component in the ability of soils to hold carbon (Balota *et al.*, 2014). Because conventional agriculture depletes microbial diversity, its ability to sequester carbon is greatly reduced (Poeplau and Don, 2015).



**Figure 1:** Diagram illustrating a simplified explanation of carbon sequestration. Different shapes indicate different species of microbes and the organic substances they produce. Depictions are a symbolic representation of described processes.

As the global population grows, and climate change intensifies, techniques that feed the world sustainably will become increasingly important (Poeplau and Don, 2015). Regenerative agriculture is a method of food production that focuses on the promotion of soil fertility, biodiversity and climate-change mitigation without negatively impacting yields (Lacanne and Lundgren, 2018). Because regenerative agriculture includes such a broad array of farming methods, we will focus here on [crop diversification](#) as a method of regenerative agriculture (Figure 2).





**Figure 2:** Diagram illustrating a comparison of crop diversity in conventional and regenerative methods of agriculture. Different shapes indicate different species of microbes. Depictions are a symbolic representation of described processes.

Crop diversity in this paper refers to both [genotypic](#) and [phenotypic](#) variance within and between species in an agricultural ecosystem (Falco and Zoupanidou, 2017). The practice of crop diversification moves away from the simple one- or two-crop rotations of conventional agriculture (Robertson *et al.*, 2014). By doing so, crop diversification promotes the inclusion and close monitoring of functionally diverse crops, which provide a number of ecosystem services (Robertson *et al.*, 2014). The elements of crop diversification and the ecosystem services that they provide are explored in more detail in the following section.

Following the next section exploring crop diversification and ecosystem services, I will then assess the current state of agriculture in Australia. This assessment reveals some issues in Australia's current agricultural methods. I then suggest some solutions to these issues by highlighting how crop diversification will benefit Australia specifically. I conclude by identifying the roadblocks currently preventing a transition to regenerative agriculture and offer some solutions at both a local and a global scale.

Research on implementing crop diversification through an [Ecosystem Services Approach \(ESA\)](#) has been conducted (Robertson *et al.*, 2014; Swift *et al.*, 2004). However, an analysis of existing and potential implementation of such an approach in an Australian context is currently absent from the literature. The potential environmental and societal benefits of such implementation may be of vital importance to ensuring food production in Australia during future climate change.

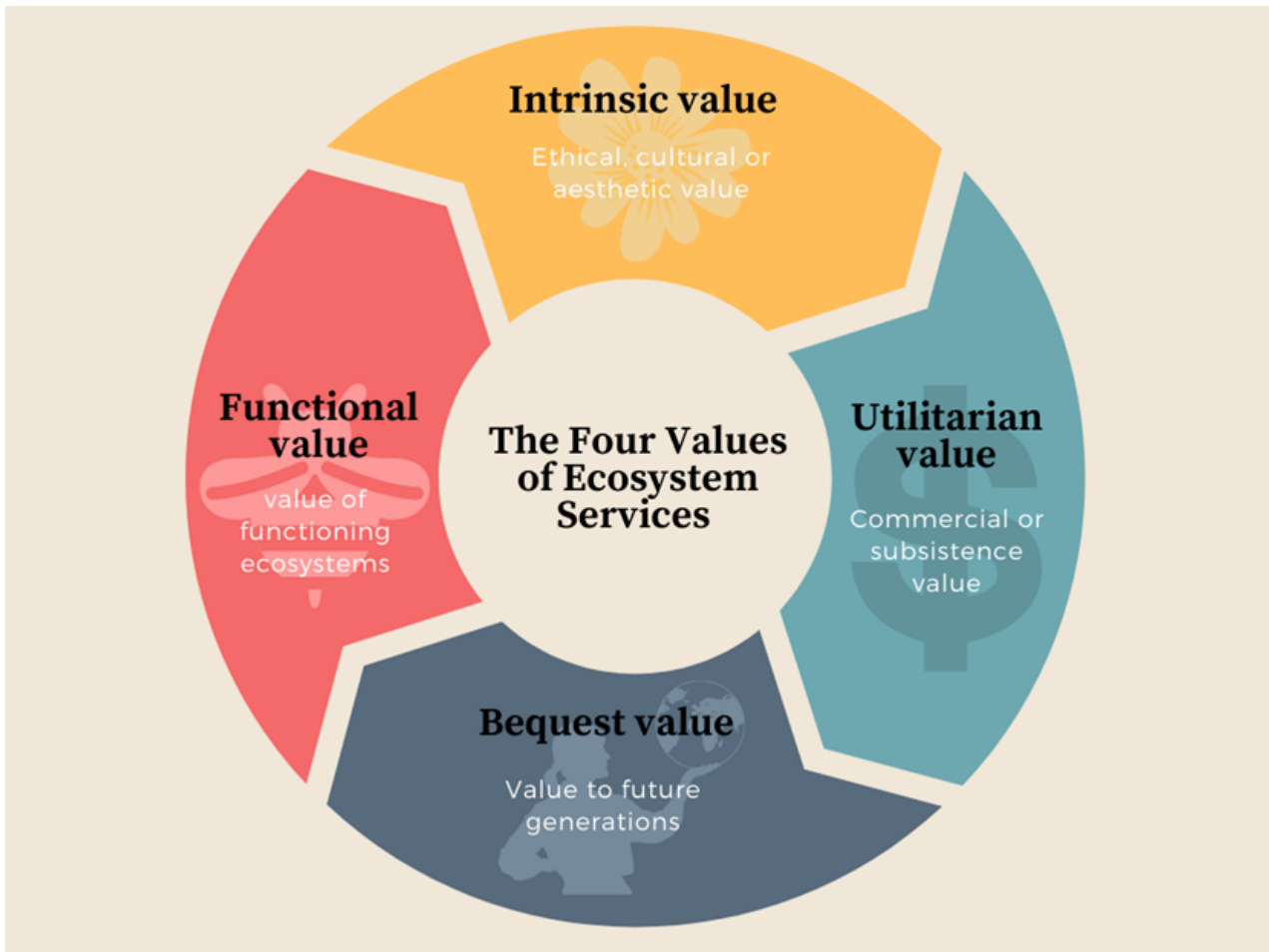
## An introduction to ecosystem services

An ESA is a form of management and decision making that considers both human and environmental needs, and the relationship between the two (Martin-Ortega *et al.*, 2015). This is achieved by assessing management options to determine the most sustainable ways to manage Earth's resources. Ecosystems provide society with four key ecosystem services (Matson *et al.*, 1997; Swift *et al.*, 2004). These include provisioning, cultural, regulating and supporting services (Figure 3).

<b>Ecosystem Services</b>	
<b>Regulating</b>	Services gained from functioning ecosystems, including the regulating of climate, water, food webs, etc. E.g., Functional plant-pollinator networks.
<b>Provisioning</b>	Material goods and services used directly by humans, including food, fiber, fuel, etc. E.g., High crop yields
<b>Cultural</b>	Non-material services, including spiritual, cognitive, and aesthetic services. E.g., A spiritually significant tree or site.
<b>Supporting</b>	
Services necessary for the provisioning of all other ecosystem services, including soil formation, ecosystem resilience, etc. E.g., Soil nutrient cycling.	

**Figure 3:** Definitions and examples of the four ecosystem services, as described in Abson and Termansen (2011).

Biodiversity plays a key role in facilitating these services because different species provide alternative functions (Swift *et al.*, 2004). In conventional agriculture, systems are simplified to enhance management efficiency and meet market demands (Swift *et al.*, 2004). This simplification reduces functional groups and overall ecosystem functionality (Wagg *et al.*, 2014). An ESA considers both environmental and societal demands in an economic framework (Martin-Ortega *et al.*, 2015). This involves the valuing of ecosystem services as 'natural capital' so that they can be considered along with other commodities in an economic market. The value that we put on these four ecosystem services can be defined in several ways, including intrinsic value, utilitarian value, bequest value and functional value (Figure 4) (Swift *et al.*, 2004). Intrinsic values are those that ecosystems give in and of themselves, whether that be an ethical, cultural or aesthetic value – such as the beauty of a clean river (Raymond *et al.*, 2009). Utilitarian value is the value that ecosystem services give in a commercial or subsistence sense, such as increased crop production (Lamarque *et al.*, 2011). Bequest value is the value that ecosystem services give to future human generations, such as climate-change mitigation (Raymond *et al.*, 2009). Intrinsic, utilitarian and bequest values can all be classified as **anthropocentric**, as they all focus on the benefits nature gives to humans (Swift *et al.*, 2004). Functional value, on the other hand, focuses on services that maintain the structure and integrity of ecological systems, such as the persistence of a pollinator species (Swift *et al.*, 2004).



**Figure 4:** Chart showing the four ways of valuing ecosystem services.

In the following paragraphs, we will explore the key aspects of crop diversification, the value they provide and how they relate to the four ecosystem services.

#### Increased soil fertility and crop yields

In contrast to the simple one- or two-species row crop rotations in conventional agriculture (Liang *et al.*, 2016), crop diversification involves the mindful coupling of a variety of plants in rotations to increase the complexity of the soil habitat. This improved soil habitat results from the presence of more diverse root systems, which increases the available niches in the [rhizosphere](#) (Tiemann *et al.*, 2015). Diverse crop rotations have been evidenced to increase the biomass of soil microbes by an average of 21 per cent (McDaniel *et al.*, 2014). Increased microbial activity drives the formation of soil aggregates, which promotes soil stability (Balota *et al.*, 2014). This in turn increases the ability of the soil to support crops (Tiemann *et al.*, 2015). Therefore, yields in regenerative fields tend to be either similar to or higher than in conventional row crop rotations (Drinkwater *et al.*, 1998). A 30-year comparative study comparing plots farmed with conventional methods with those farmed with regenerative agriculture found that, although yields were similar in both systems, regenerative farms outperformed conventional ones in times of drought (Rhodes, 2017). Regenerative systems also used 45 per cent less energy overall than conventional systems, making the profit per unit of crop greater in regenerative than in conventional agriculture (Rhodes, 2017).

Therefore, crop diversification offers provisioning services by increasing crop yields, which provides utilitarian value to humanity by increasing our ability to feed a growing population. In addition, crop diversification provides supporting services by increasing soil fertility naturally – rather than through the

use of artificial fertilisers – with soil fertility then providing a range of other benefits, including increased yields, increased soil stability, increased microbial activity, and so on. Crop diversification can, therefore, be valued for its bequest value, as fertile soils are vital to the survival of future generations.

### Biocontrol: a natural pest control method

The complex food webs needed to provide **biocontrol** depend greatly on habitat complexity, habitat quality and dispersal capabilities of resident **biota** (Gardiner *et al.*, 2009). **Habitat heterogeneity** is of vital importance to ecosystem functioning. It provides resident biota with key habitats and refugia that are essential to the **trophic functioning** of an ecosystem (Robertson *et al.*, 2014). In agricultural ecosystems, crop diversity provides a ‘biocontrol’ mechanism for unwanted pests, reducing the need for harmful chemicals such as pesticides and insecticides (Gardiner *et al.*, 2009). In contrast to conventional agriculture, crop diversification therefore provides a diverse range of habitats that can support natural pest predators and increase prey diversity, supporting a more complex food web which helps farmers naturally deal with pests (Robertson *et al.*, 2014). Increasing plant diversity is also positively associated with increased floral richness, which is key to supporting a diverse community of pollinator species (Orford *et al.*, 2016). For example, a study by Woodcock *et al.* (2014), investigating whether the addition of florally diverse seed mixtures to agricultural fields increased insect pollinator diversity over a four-year period, found that the abundance and species richness of pollinators correlated with increased flowering resources (Woodcock *et al.*, 2014). This highlights the importance of floral diversity in maintaining pollination services in agricultural fields. Pollinators tend to differ in their floral preferences, and so a diverse array of flowering plants will attract a variety of pollinator species with temporally different pollinating cycles (Kremen *et al.*, 2007). This may allow farmers to maintain pollination productivity year-round.

Both pollination and biocontrol can be considered provisioning services as they provide humans with a zero-cost method of controlling pests and weeds. They therefore provide utilitarian value as they reduce costs for farmers by decreasing their reliance on costly pesticides. They also provide regulating services through increasing the heterogeneity of a landscape that regulates food webs and trophic dynamics. This service can be valued as a functional value as it maintains ecosystem functioning.

### Improved water quality

Crop diversification promotes diverse microbial communities, which has been linked to increased levels of **soil organic matter** (Tiemann *et al.*, 2015). Soil organic matter plays a vital role in water storage (Hudson, 1994). In Rawls *et al.* (2003), the amount of water available to plants was positively associated with increases in organic matter content. This suggests a positive relationship between organic carbon content of soil and water retention (Rawls *et al.*, 2003). Having soils that can retain water is of vital importance in agricultural systems as, without this water retention capacity, crops will need significantly more irrigation to grow. Not only is this costly but it also puts future generations at risk by over-using current water supplies, as well as increasing top soil erosion, the contamination of nearby water bodies, and an increase in the risk of landslides (Datta *et al.*, 2017). In addition, deep-rooted crops improve the efficiency of water retention by improving both soil structure and increasing carbon retention (Kell, 2011). Therefore, having a diverse range of root types, including deep and shallow roots, decreases the need for over-irrigation in agricultural systems. Having a diverse range of root types will also be beneficial for taking advantage of varying levels of precipitation. This is because increasing crop diversity promotes a more diverse range of root types within

the soil profile, which may promote the temporal functionality of agricultural ecosystems (Bodner *et al.*, 2015). For example, plants with deep roots are effective under moderate temperatures and precipitation rates, whereas plants with shallow roots are more effective under limited precipitation (Srinivasarao *et al.*, 2016). Considering future climate variability, farmers must maintain diverse crops that can provide effective water retention under varying levels of temperature and precipitation.

The presence of 'blue spaces' (whether that be a lake, waterfall, stream, etc.) has been found to be beneficial to human health and emotional wellbeing (Völker and Kistemann, 2011). This makes the regulation of irrigation and run-off from agricultural fields a cultural service that provides intrinsic value. In addition, the lack of over-watering needed under crop diversification provides utilitarian and bequest value as not only does it currently save farmers expenses, but it also ensures fresh-water supply for future generations.

### Carbon sequestration

In contrast to conventional agriculture, which turns the soil into a carbon source, regenerative agriculture transforms the soil into a carbon sink, thus fully utilising the soil carbon pool (Liang *et al.*, 2016). This is important as the soil pool can hold double the amount of carbon than the atmospheric pool (Balsler, 2005). As discussed earlier, soil microbes are the key to driving carbon sequestration in soils. By having a diverse array of crops, farmers can increase soil microbial activity as these diverse crops provide an array of root types and chemical inputs that support more complex soil microbial communities (Liang *et al.*, 2016; Rhodes, 2017). In addition, high plant diversity increases soil organic matter accumulation over relatively short time frames (Fornara and Tilman, 2008). This is likely due to the increased production of root biomass and plant residue, which is then incorporated as soil organic matter and builds the soil carbon pool (Fornara and Tilman, 2008).

The maintenance of natural carbon cycles under regenerative agriculture is an example of a regulating service as it regulates the natural flow of nutrients in an ecosystem. Carbon sequestration provides a great deal of bequest value as it ensures that atmospheric carbon is maintained at healthy levels for future generations.

## Crop diversification in Australia: Applying an Ecosystem Services Approach

### The current state of agriculture in Australia

Despite the benefits of regenerative agriculture, a proportion of Australian farmers still manage their land with damaging conventional agricultural methods (Conacher and Conacher, 1998; Wood *et al.*, 2006). For instance, in north-east Victoria, 80 per cent of the farmed area is dominated by just one variety of canola (Agribusiness View, 2019). In addition, wheat crops occupied a harvesting area of approximately 13 million hectares in Australia in 2018, an increase of approximately 7.5 million hectares since 1940 (Kirkegaard and Rees, 2019). Australia is also reliant on artificial fertilisers and pesticides, with total agricultural chemical sales in Australia amounting to AU\$40 million a year (Nash *et al.*, 2019). This suggests that biological pest management and soil health are not always maintained. The current state of agriculture in Australia is also threatening future climate vulnerability, with an estimated 50 per cent of the original soil carbon stocks in Australia having been lost due to intensive agriculture practices (Richardson *et al.*, 2019).

Australia has, however, been working towards a more environmentally focused model of agriculture. The Carbon Farming Futures programme was implemented by the Australian Government between 2012 and 2017 (Department of Agriculture and Water Resources, 2016). It focused on adapting agricultural practices to climate change, while simultaneously improving farm profitability and productivity (Department of Agriculture and Water Resources, 2016). The project focused on research into livestock grazing, manure management and tillage techniques. Little focus was given to crop diversification, and there was no mention of ecosystem services. However, the report does identify that climate change will bring new opportunities for farmers, including 'new crop types and varieties' (Department of Agriculture and Water Resources, 2016). The Carbon Farming Futures programme was originally allocated \$348 million, but a change in government policy led to a 40 per cent reduction in funding (Grosvenor Management Consulting, 2017). This reduction prevented the gathering of detailed information regarding the adoption of identified beneficial practices by Australian farmers (Grosvenor Management Consulting, 2017). This is particularly concerning when considering that the success of the programme relies heavily on the adoption of these practices. Feedback surveys collected at the end of the Extension and Outreach project identified that many participants still felt there was a disconnect between policy, available technologies and research (Grosvenor Management Consulting, 2017). Participants noted that this disconnect limits the ability to change farmers' attitudes and decreases farmer participation in schemes (Grosvenor Management Consulting, 2017).

#### **How crop diversification will benefit Australia: Taking an Ecosystem Services Approach**

In relation to the previously mentioned example outlined in Rhodes (2017) regarding the ability of regenerative agriculture to maintain yields during periods of drought, diverse crop communities have also been evidenced to produce yields at a more stable rate over time (Prieto *et al.*, 2015). In addition, they have been found to show increased resilience to climate change compared to simplified agricultural communities (Isbell *et al.*, 2017). Therefore, crop diversification may help to guarantee yields in arid and extreme environments within Australia. This is particularly important given predictions that climate change will increase the intensiveness of drought and uncertainty within the Australian agricultural sector (Department of Agriculture, Water and the Environment, 2019a).

Pollinators have been evidenced to be in decline globally, which has significant implications for the pollination of agriculturally important crops (Ghazoul, 2005). This is also the case in Australia, with insect pollinators being crucial to the functioning of the Australian agricultural sector (Cunningham *et al.*, 2002). As discussed earlier, the application of pesticides is a key driver of insect pollinator declines (Cunningham *et al.*, 2002). Crop diversification, which involves a move away from these pesticides by enhancing plant-pollinator networks, offers a solution to this issue by providing an unpaid and reliable pollination service to Australian farmers.

Australia is known for its extremely variable climate and high drought risk. This makes the Australian agricultural industry particularly vulnerable to declines and high variability in yields and profit. For example, in a study of several shires in north-eastern Australia, it was found that many of the centrally located shires showed aggregated soil water recharge values as low as 10 per cent in 2006 during an El Niño year (Stone and Potgieter, 2008). Australian agricultural soils would therefore benefit greatly from crop diversification, which restores the soils' capacity to hold water.

Australia's greenhouse gas emissions are higher than the OECD average, with it seeming unlikely that they will meet the Paris Agreement reduction targets by 2030 (Ivanovski and Awaworyi Churchill, 2020). In

addition, most of Australia's nitrous oxide emissions, which is a potent greenhouse gas, are derived from the agricultural sector (Ivanovski and Awaworyi Churchill, 2020). Crop diversification, therefore, presents Australia with a key opportunity to reduce its emissions while simultaneously improving the health of ecosystems. For example, Australian pastures that are adopting techniques such as crop rotations are seeing a carbon accumulation rate of approximately 0.5mg carbon/ha/year (Richardson *et al.*, 2019). This highlights the climate-mitigation potential that crop diversification has in Australia.

### **How might Australia be able to transition to regenerative agriculture?**

Despite the variety of funding and awareness programmes that the Australian Government has implemented over the past few decades, a smooth transition to regenerative agriculture has been lacking. Changes in government policy and support have continually altered incentives for farmers and delayed the ability of farmers to undergo meaningful transitions (Kingwell *et al.*, 2019). This may suggest the need for a more consistent and well-rounded management scheme in the agricultural sector. In addition, the current budget allocation of \$1 billion to the National Landcare Program is insufficient when one considers the \$3 billion farmers invest annually in natural resource management (Williams, 2019). A transition to regenerative methods is also haltered by its controversial nature. Alannah MacTiernan, Western Australian Minister for Agriculture and Food, highlights this controversy when she talks about bringing prominent regenerative farmer David Marsh to talk at a 2018 meeting with the Department of Primary Industries and Regional Development:

I proposed to our agricultural people here, the Department of Primary Industry, that we bring him [David Marsh] over and we bring all our ag. [agricultural] people around and let him [...] talk [...] And there was deep concern about this, because this [...] was seen as something that would generate a lot of hostility from a lot of farmers.

– (ABC, 2020)

Others believe that regenerative agriculture is just another marketing scheme. For example, Victorian red meat producer Georgina Gubbins claims that regenerative agriculture is a term that has at times been used to capitalise on the vulnerable (Whetham, 2020). Issuing products, such as common organic fertilisers, under this term to vulnerable farmers may exploit them by providing an apparent solution with no scientific backing. Gubbins argues that studies on regenerative agriculture are not extensive enough in Australia, and predominately consist of interviews with graziers who had hit a crisis point and needed to adopt regenerative methods as a way out (Whetham, 2020). To overcome the barriers to regenerative agriculture, the following points should be considered, which will be outlined in further detail below:

Creating a platform across which farmers and governments can interact and develop a system of valuation for the various ecosystem services produced across differing spatial scales.

The development of agricultural policies that reduce incentives for monocultures and other conventional techniques, and promote funding for transitioning to regenerative methods.

The development of novel methods of valuing ecosystem services in the global market, which will require action at the international level.

The value of crop diversity will vary at different scales. At the plot level, farmers may maintain crop diversification only for those services that provide utilitarian value and maximise the profit of their farm. At the landscape level, having local farms that maintain diverse crops may decrease pollutant run-off into

government-managed waterways. Therefore, the local government may value crop diversification intrinsically for its aesthetic value and for keeping residents happy (Swift *et al.*, 2004). Providing advice to policymakers to help Australian farmers transition to regenerative agriculture must therefore look at multiple scales. It is vital to consider the farmers involved within landscapes, and how their management strategies may have a cumulative effect on landscape processes (Swift *et al.*, 2004). Crop diversity must be maintained not only within-farms but also between-farms in a landscape. This suggests the need for a platform so that farmers and governments can interact and develop a system of valuation and maintenance that is considerate of ecosystem services across spatial scales.

Agricultural policies that promote diversification by reducing incentives for monocultures will be crucial in transitioning away from conventional farming (Falco and Zoupanidou, 2017). Monocultures are only viable if farmers have access to risk-buffering mechanisms such as agricultural subsidies or insurance schemes. This is due to their degrading nature and inability to support ecosystem services (Swift *et al.*, 2004). Although it will be more economically viable in the long term, crop diversification will require substantial initial investment (Isbell *et al.*, 2017). This will include ensuring farmers have access to appropriate harvesting equipment, a diverse range of seeds, and the knowledge to implement these practices effectively (Swift *et al.*, 2004). The Australian Government's website on crops partitions the website into four key crops; cotton, rice, sugar and wheat (Department of Agriculture, Water and the Environment, 2019b). Based on the results of this literature review, which highlight the benefits of crop diversification, I recommend that each of these sections contain information on companion species that can be planted with each main crop, along with the ecosystem services associated with implementing these crop combinations. It is vital to make these recommendations region-specific (e.g., temperate, tropical, etc.), as different ecosystems will show varied responses to different crop combinations. Implementing an ESA when transitioning to practices of crop diversification will be costly. It is therefore important that several funding mechanisms be established. For example, Carbon Eight is a not-for-profit organisation whose goal is 'To transition Aussie farmers to regenerative agriculture and support them to rebuild the carbon in their soil from 1% to 8%' (Carbon Eight, 2020b). They use the profits from donations to educate farmers on how to increase soil carbon content and provide them with tools to transition to regenerative practices (Carbon Eight, 2020a; 2020b).

The above two points highlight action that can be taken at the local and national scale to increase the uptake of regenerative agriculture in Australia. However, to fully transition to regenerative methods, there must be a shift in the global economic market so that the value of ecosystem services can be suitably realised and valued appropriately. It has been suggested that placing monetary values on natural phenomena commodifies nature (Robertson *et al.*, 2014). In addition, a reliance on market-based instruments is the main driving factor explaining the current degraded state of the environment (Gómez-Baggethun and Ruiz-Pérez, 2011). This suggests that the commodification of ecosystem services may be counterproductive in a pursuit towards biodiversity conservation and ecosystem functioning (Gómez-Baggethun and Ruiz-Pérez, 2011). However, valuing something does not necessarily mean we are commodifying it (Robert, 2006). For instance, we may need to shift away from monetary methods of valuation to truly appreciate the benefits of crop diversification. For example, bequest value may be hard to measure in market terms due to its temporal nature and the vulnerability of the economic market to fluctuations over time. Therefore, novel methods of valuing must be developed and integrated into the global economic market to achieve a sustainable transition to regenerative agricultural practices.

## Conclusion



Crop diversification can provide the Australian agricultural sector with four key ecosystem services: increased soil fertility and crop yields, biocontrol, increased water quality and reduced greenhouse gas emissions. These services will increase Australia's ability to manage climate change and maintain secure food supplies into the future. [Interspecies interactions](#) should be further researched to develop a classification system that links specific crops with specific ecosystem services. To shift towards crop diversification practices in Australia, numerous economic and cultural challenges must be overcome. These include but are not limited to: How do we transition away from the low-cost, high-profit mentality of capitalism without completely changing how society operates? Who is responsible for funding the transition to sustainable methods of food production? How do we ensure that farmers understand their role as environmental stewards? And how do we effectively quantify which services and values correlate to which practices in a given context? These questions must be answered to ensure a sustainable and ethical transition to regenerative agriculture.

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## Glossary

**Anthropocentric**: A view that humans are of central importance.

**Biocontrol**: Controlling pests through the use of biological mechanisms.

**Biota**: The plant and animal life of a particular locality.

**Crop diversification**: The agriculture practice of increasing the biodiversity of a system of crops by including a variety of different species within an agricultural landscape..

**Carbon sequestration**: The removal of carbon from the atmospheric carbon pool and its subsequent incorporation into the soil carbon pool.

**Ecosystem Services Approach (ESA)**: An approach to environmental policy and management that considers the value of natural systems in an economic and social sense to drive decision making, rather than relying on any ethical debates around humanity's obligations to preserve the environment..

**Genotype/genotypic**: An organism's complete set of genes.

**Glomalin**: A glycoprotein (which is a carbohydrate linked to a protein) produced by arbuscular mycorrhizal fungi which are present in soil and in the roots of plants..

**Habitat heterogeneity**: Unevenness of features in a habitat.

**Interspecies interactions**: Interactions between individuals of different species.

**Monoculture**: A single crop cultivation.

**Phenotype/phenotypic**: An organism's expressible traits.

**Polysaccharide**: A carbohydrate.

**Refugia**: An area that provides refuge for individuals during unfavourable conditions.

**Rhizosphere**: The section of the soil that is in direct influence of plant roots.

**Soil organic matter**: The component of the soil consisting of biological matter.

**Trophic functioning**: The functioning of a food web.

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# Biodegradable Synthetic Polymers for Tissue Engineering: A Mini-review

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## Abstract

Tissue engineering is a revolutionary area of medicine, helping the body to heal large quantities of tissue loss that would otherwise require grafting procedures to promote recovery. Tissue engineering approaches reduce both donor site morbidity in graft procedures as well as the need for multiple surgeries. In this, biodegradable scaffolds are developed that hold cells; these scaffolds break down as new tissue forms and replaces the scaffold until full bodily function is regained. Synthetic polymers can offer tuneable mechanical and degradable characteristics alongside a low immunogenic response, which has made these materials a popular line of research as biodegradable scaffolds. This article seeks to summarise this field. Scaffold requirements, degradation factors and mechanisms, and common synthetic biodegradable polymers used in tissue scaffolding are covered, along with fabrication techniques. Specific examples of synthetic scaffolding polymers are explored for both bone and skeletal muscle to highlight the different desirable characteristics, hence the demands for each. Further research into new copolymer and scaffolding techniques will open new avenues to increased biocompatibility and clinical use, for which we recommend the creation of a comprehensive polymer database to store the vast library of synthetic polymer types and applications for future researchers.

**Keywords:** Tissue engineering, biodegradable polymers, synthetic biomaterials, bone and muscle regeneration, fabrication techniques of tissue scaffolds

## Introduction

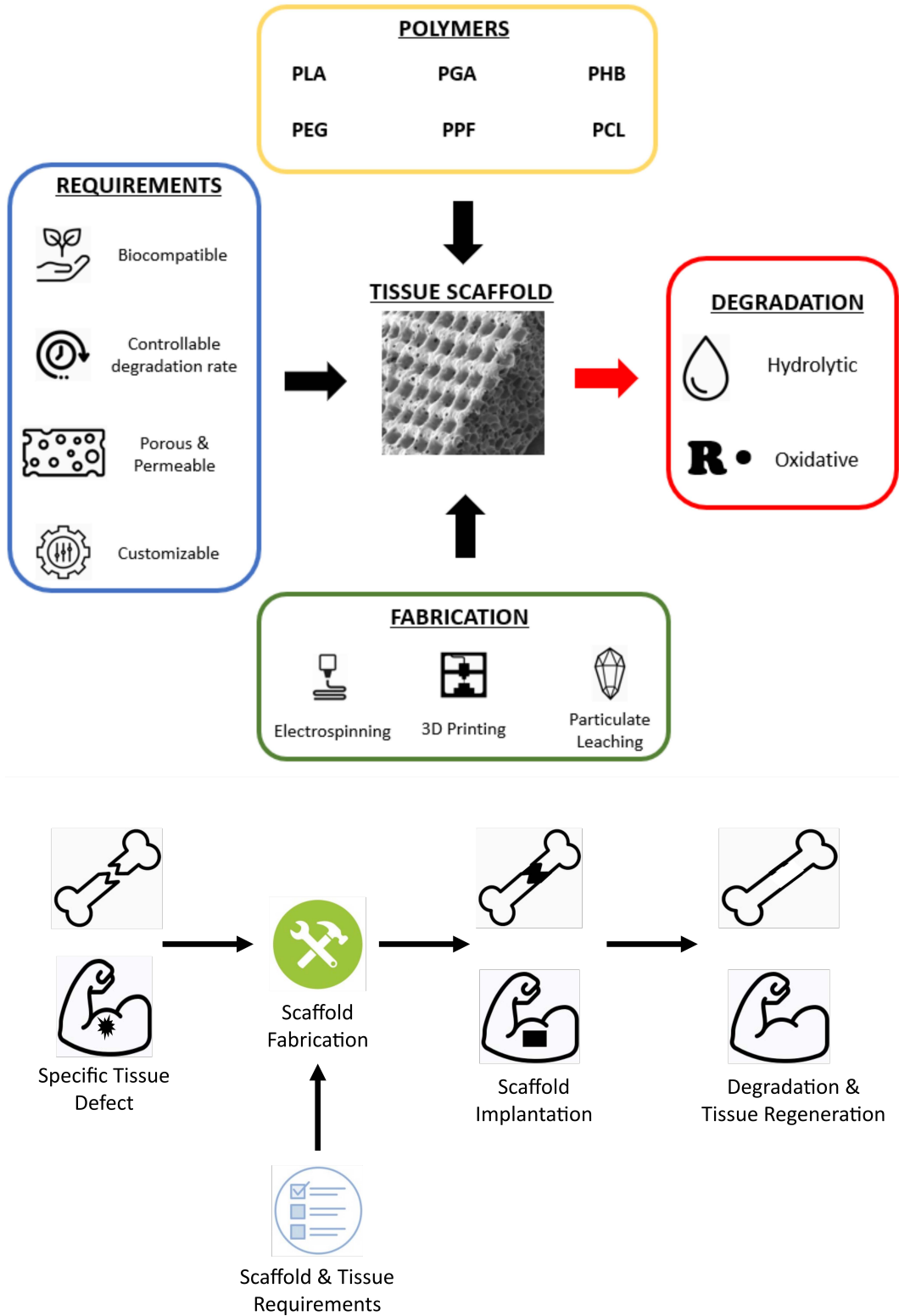
Powered by decades of invention and improvement, [synthetic](#) polymer chemistry has progressed significantly since its discovery; this has resulted in the wide range of plastics that humans utilise every day. These [polymers](#) have highly functional properties, such as durability, stability and strength, making them well suited for numerous applications. The [degradation](#) of certain polymers is an exciting property that has implications in global waste management as well as biomedicine. Biodegradable polymers, which are inherently vulnerable to attack and degradation from the natural environment, are therefore an important aspect of the future of polymer chemistry. This degradability is highly desirable in numerous industries and, as such, these polymers have sparked particular interest in [tissue engineering](#) and medicine. The benefits of tissue engineering over traditional grafting procedures include the lack of donor site morbidity in autologous grafts as well as eliminating the need for recurrent or follow-up surgeries to remove non-degraded material (O'Brien, 2011). This field relies on the use of a [scaffold](#), which aims to mimic the extracellular matrix (ECM), a structure that surrounds all cells, monitoring water and ion uptake, the diffusion of glucose and waste products, and protecting cells from external strain forces (Badylak, 2002; Flessner, 2001). Tissue engineering systems can be used *in vitro* – for example, in creating more accurate pathological models



(Caddeo *et al.*, 2017) – or they can be implanted into tissue defect sites as a treatment strategy. The biodegradable scaffold will hold cells in place and subsequently degrade at a controlled rate such that the cells replicate and create their own ECM to replace the scaffold, ultimately resulting in a fully functional regenerated tissue (Martina and Hutmacher, 2007). Biodegradable polymers show significant advantages over other materials used as tissue scaffolds primarily due to the reduced number of surgeries required for the removal of non-biodegradable scaffolds (Rezwan *et al.*, 2006) and the minimal use of long-term immunosuppressant drugs (Martina and Hutmacher, 2007). However, biodegradable scaffolds need to be fine-tuned to ensure the correct balance between functional properties and biodegradation.

Ideal tissue scaffolds should therefore be extremely biocompatible in both scaffold and degraded form while providing suitable mechanical properties to withstand stress and support cells *in vivo* (Yang *et al.*, 2001). Additionally, scaffolds should be highly porous and permeable, coupled with appropriate surface chemistry, to allow for the migration and attachment of cells into the scaffold while accommodating necessary nutrient exchange (Yang *et al.*, 2001). These properties ensure the optimal function of tissue scaffolds in providing a suitable environment for cells to form functional tissue-like structures (O'Brien, 2011). The degradation rate of scaffolds should also be fine-tuneable to their particular applications to provide adequate structural properties throughout degradation, and eventually be replaced by the regenerated tissues. Moreover, the specific mechanical and compositional properties and requirements of a scaffold varies significantly with the type of tissue in question as well as with differences in patients, such as gender and age (Ge *et al.*, 2008). A highly flexible and customisable design of scaffolds is therefore an important requirement when considering specific biodegradable polymers for implantation.

Although natural polymers such as collagen may provide superior **biocompatibility** while most closely resembling the *in vivo* environment, poor mechanical properties and difficulties with immunogenicity are still limitations (Alizadeh-Osgouei *et al.*, 2019; Yang *et al.*, 2001). However, natural polymers have the benefit of containing cell recognition and adhesion sites such as the arginine-glycine-aspartate (RGD) motif, which was initially recognised in natural polymers including fibrin and collagen (Kang *et al.*, 2018). This mini-review will therefore focus on synthetic biodegradable scaffolds, with the benefits of **composite** materials incorporating natural polymers discussed in terms of application. Initially, this review will investigate the mechanisms of biodegradation as well as the specific chemistry of biodegradable polymers, which makes this process both possible and controllable. Subsequently, fabrication techniques, as well as examples of the application of specific biodegradable polymers in the fields of bone and skeletal muscle tissue engineering, will be reviewed to highlight the relevance of such materials in medical procedures. Figure 1 depicts a summary of these topics.



**Figure 1:** Overview of synthetic biodegradable polymers and their application in tissue engineering.

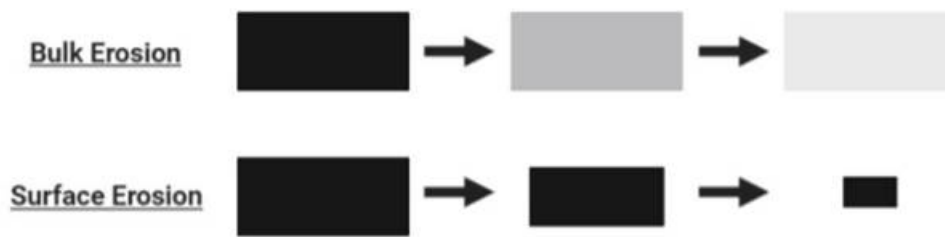
**Note:** The upper image summarises factors to be considered when building a scaffold. The lower image outlines the application of the manufactured scaffolds to restore bone and muscle where defects exist. The scaffold will eventually degrade, leaving behind regenerated tissues.

## Degradation mechanisms

Before highlighting the use of biodegradable polymers in tissue engineering, it is important to discuss the degradation characteristics that make them attractive as biodegradable scaffolds. The two major mechanisms through which polymers are degraded *in vivo* are oxidative and hydrolytic biodegradation (Cortizo and Belluzo, 2017). The former relies on reactive radical molecules that are produced *in vivo* by the active process of phagocytic attack (Cortizo and Belluzo, 2017). Hydrolytic degradation, conversely, is a passive process classified as the cleavage of chemical bonds that are vulnerable to reaction with water (Cortizo and Belluzo, 2017). The relative insensitivity of synthetic polymers to enzymatic activity highlights passive hydrolysis as the major route of degradation in biological environments (Göpferich, 1996).

Hydrolytic degradation of polymers may occur via surface or bulk erosion. As the name suggests, surface erosion takes place only at the polymer surface, meaning that the macroscale polymeric scaffold becomes smaller while maintaining its geometry at a linear degradation rate. In contrast, bulk erosion proceeds throughout the polymer so that its size is conserved throughout degradation, although the degradation rate is no longer linear (Göpferich, 1996) (as depicted in Figure 2). Understanding which erosion type is predominant has important implications for tissue scaffolds and their intended applications (Göpferich *et al.*, 1995; Göpferich, 1996; Pena *et al.*, 2021). The hydrophobicity of scaffolds influences the rate of hydrolytic attack through impacting the osmosis of water into and throughout the polymeric scaffold. The pore size of polymeric scaffolds plays into this as larger pore sizes accommodate the ease of osmosis into the scaffold, in turn favouring bulk erosion (Odelius *et al.*, 2011). Additionally, amorphous regions of polymers, being less densely packed and more accommodative of diffusion, are more vulnerable to passive hydrolysis by both surface and bulk erosion, and are thus eroded first in biological environments, resulting in the crystalline regions being intact for longer (Kroeze *et al.*, 2009). It can subsequently be generalised that higher polymer crystallinity results in increased strength and stiffness as well as a slower degradation rate. The glass transition temperature ( $T_g$ ) of polymers is another important aspect, especially when considering the mechanical requirements of scaffolds (Kroeze *et al.*, 2009). Bone scaffolds, for example, typically require long-lasting mechanical properties, meaning that their  $T_g$  should be greater than body temperature, ensuring adequate mechanical stiffness while also preventing premature degradation (Kroeze *et al.*, 2009).

Degradation [kinetics](#) are further significantly impacted by polymer molecular weight (Wuisman and Smit, 2006). Increasing molecular weight increases the formation of entanglements and secondary bonds between chains, which translates into increased binding forces between polymer chains, resulting in a decreased degradation rate (Wuisman and Smit, 2006). Dispersity, defined as the weight average molecular weight divided by the number average molecular weight ( $M_w/M_n$ ), is a characteristic of polymers that can capture this information. Larger dispersity values highlight a smaller  $M_n$  – indicating a large number of smaller molecules, which are more easily degraded, therefore reducing the degradation time. Biodegradable polymers, therefore, require a lower dispersity, indicating less variance in polymer chain length, allowing for better predictions of the degradation rate (Wuisman and Smit, 2006) within decreased timescales that subsequently forgo issues such as inflammation and infection (Revati *et al.*, 2015).



**Figure 2:** Schematic of surface and bulk erosion.

**Note:** Bulk erosion occurs evenly throughout the polymer while surface erosion only impacts at the surface. The route taken by a specific scaffold is influenced by numerous properties, including pore size, hydrophobicity, crystallinity and the  $T_g$ . Image created with BioRender.

An attractive aspect of synthetic polymers for use in tissue engineering is the ability to tailor the degradation rate to suit specific applications. An example of how to achieve this is copolymerisation, in which the final product comprises blocks of different degradable polymers. This technique has been employed to fine-tune the degradation of poly-L-lactide (PLLA) (Agatemor and Shaver, 2013; Målberg, Höglund and Albertsson, 2011; Wanamaker, Tolman and Hillmyer, 2009), poly ( $\epsilon$ -caprolactone) (PCL) (Xu *et al.*, 2019) and polyurethane (Hong *et al.*, 2010), to name a few. Other methods to tailor degradation rate include the addition of plasticisers (Burgos, Martino and Jiménez, 2013), surface modification (Cairns *et al.*, 2011) and blending (Arias *et al.*, 2014). Exploiting these techniques over the vast range of available polymers allows polymer degradation to be optimised to their function in tissue engineering.

## Frequently used polymers

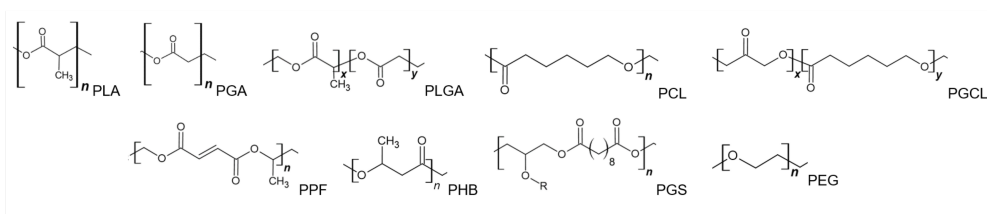
Numerous synthetic polymers possess the required properties of biodegradable scaffolds as outlined above, including polyurethanes, polyacetals and polyanhydrides (Rezwan *et al.*, 2006). The most frequently used polymers for biodegradable tissue engineering, however, are synthetic **aliphatic** polyesters (Cortizo and Belluzo, 2017; Ge *et al.*, 2008): predominantly poly ( $\epsilon$ -caprolactone) (PCL), polylactic acid (PLA) (which exists in two optically isomeric forms (D and L) and a racemic form (DL)), and polyglycolic acid (PGA), as well as their **copolymers** (Rezwan *et al.*, 2006). Coupled with their good biocompatibility and renewable production methods (Arora *et al.*, 2018), these polymers are susceptible to hydrolytic degradation via de-esterification, and the resulting monomers (such as lactic acid and glycolic acid) are easily removed from the body, making them highly attractive as tissue scaffold materials (Rezwan *et al.*, 2006). Their biodegradable and bioresorbable properties have been well researched and used successfully in clinical products (Martina and Hutmacher, 2007).

However, there are inherent disadvantages to pure forms of these polymers that should be considered. The relatively weak cytocompatibility and the biological inertness of PLA are major disadvantages of its use in biodegradable tissue scaffolds (Al Tawil *et al.*, 2018). Pure polymers often support decreased cellular interaction and tissue regeneration. To produce more biocompatible and **biomimetic** scaffolds, these polymers are often combined in block form with other polymers to customise their degradation and mechanical properties (Martina and Hutmacher, 2007). Other chemical modifications such as the addition of hyaluronan (Al Tawil *et al.*, 2018), metallic nanoparticles (Ma *et al.*, 2019) or ceramics (Göpferich *et al.*, 1995) – especially hydroxyapatite (Shebi and Lisa, 2018) – have proven to improve the bioactivity of numerous polymers, allowing for more effective use in tissue engineering.

Other modifications include the blending of synthetic polymers with materials such as the aliphatic polyester group polyhydroxyalkanoates (PHA), which include poly-3-hydroxybutyrate (PHB) and poly-3-hydroxyoctanoate (PHO) (Chen and Wu, 2005). These are predominantly produced by microorganisms under artificially unbalanced conditions (Han *et al.*, 2015), although it is possible to synthesise these polymers. PHB, in particular, can be built from various monomers, including BBL (Tschan *et al.*, 2021), and propylene oxide and carbon monoxide to produce syndiotactic PHB (Winnacker 2019), which has a higher transitional melting temperature and lower crystallinity than its isotactic bacterial form (Turco *et al.*, 2021). Unlike aliphatic polyesters, which are bulk-eroding, polyanhydrides and polyorthoesters are surface-eroding biomaterials. This allows them to keep their structural integrity for longer, and more steadily release drug payloads (Herwig and Dove, 2019). Polyanhydrides are the only FDA-approved surface-eroding biomaterial, although their complex synthesis and low mechanical strength have limited their wider use. Polyethylene glycol (PEG) is another more widely used polymer – a cross-linked [hydrogel](#) whose soft gel-like attribute gives it applications in drug delivery and wound repair; it degrades via different mechanisms depending on where on the body it is placed (Shi *et al.*, 2021).

As demonstrated, there are many possible polymers to choose from. The most common synthetic biodegradable polymers in tissue engineering, and the properties that make them attractive, are summarised in Table 1. However, it is important to note that these are often copolymerised or modified for particular uses, altering the tabled values. A table that highlights all the available polymers as well as copolymers, composites and otherwise modified polymers, coupled with their different fabrication methods, properties and applications, would be too large to be feasible. However, consolidating this information into a summarised and straightforward database would enable researchers and industrial actors to understand the state of the art of certain polymers and allow faster decision making for future studies and industry. This database could be linked to the original research articles as well as reviews such as this, allowing individuals to delve deeper into the specifics after certain polymers or materials have already been selected.

Polymer	Melting Point (°C)	Glass Transition Temperature (T <sub>g</sub> /°C)	Biodegradation Time (Months)	Tensile Strength (MPa)	Modulus (GPa)	Breaking Strain	Ref
PDLLA	Amorphous	55-60	12 to 16	29-150	1.9-2.4	-	(Rezwan <i>et al.</i> , 2006)
PLLA	173-178	60-65	>24	28-23000	1.2-16	6%	(Agrawal and Ray, 2001)
PGA	225-230	35-40	6 to 12	340-920	7.0-14.0	39.7%	(Rezwan <i>et al.</i> , 2006; Feng <i>et al.</i> , 2010)
PLGA	Amorphous	45-55	≤12	41.4-55.2	1.4-2.8	20%	(Rezwan <i>et al.</i> , 2006; Lee <i>et al.</i> , 2003)
PCL	58	-72	>24	16	0.4	80%	(Agrawal and Ray, 2001)
PGCL	53.8	-57.6	>4	-	-	>250%	(Martina and Hutmacher, 2007; Pamula and Dryzek, 2008)
PPF	180	38	24	-	0.35-1.02	-	(Martina and Hutmacher, 2007; Pouloupoulou <i>et al.</i> , 2020)
PEUU	39	-55	14	0.97-1.64	-	214%	(Martina and Hutmacher, 2007; Hong <i>et al.</i> , 2012; Guan <i>et al.</i> , 2005)
PHB	165-178	120	>9	37.6	3.0	3%-4%	(Meischel <i>et al.</i> , 2016; Owen <i>et al.</i> , 1992)
PGS	10	-30	4	0.056-1.200	0.0072	60%	(LeBlon <i>et al.</i> , 2013; Souza <i>et al.</i> , 2017)
PEG	-	-73-20	-	-	0.3	60%	(Myung <i>et al.</i> , 2007; Verhoeven <i>et al.</i> , 1989)



**Table 1:** Summary of commonly used synthetic polymers and a schematic depiction of their chemical structure. (Diagrams created using ChemSketch.)

## Fabrication

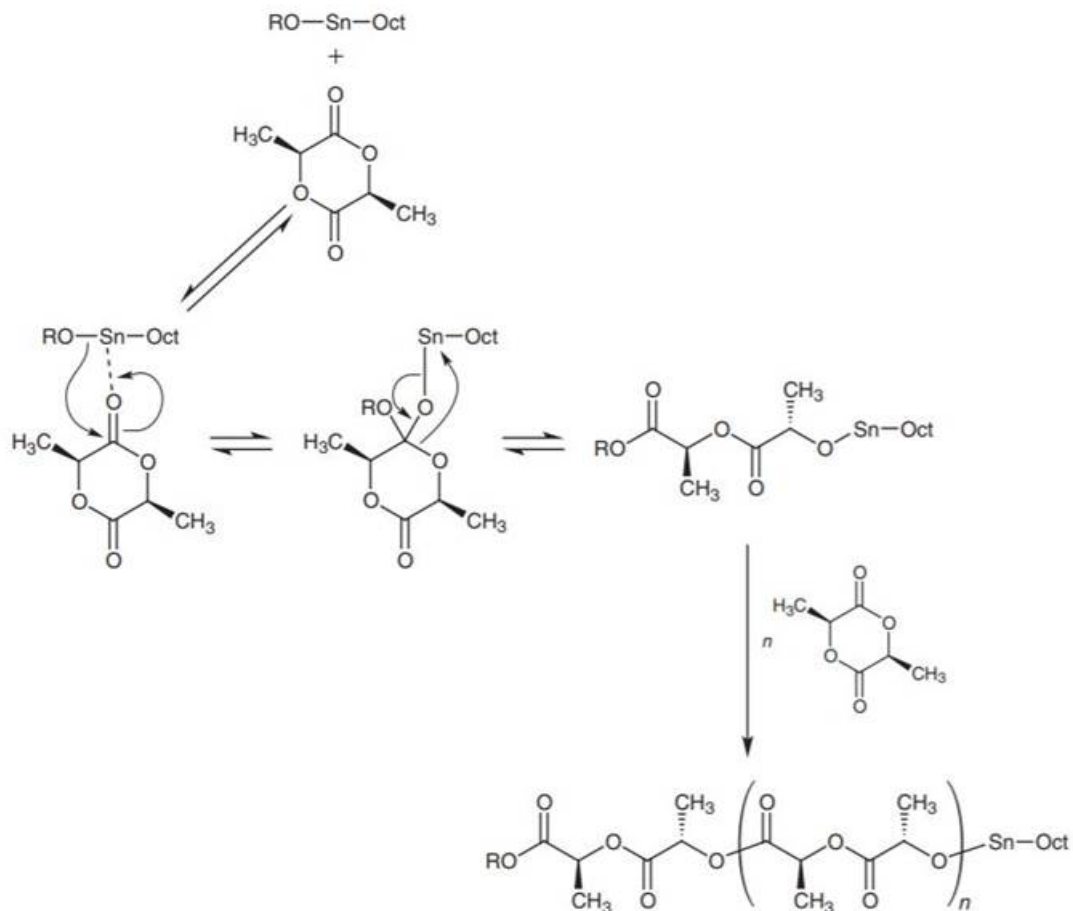
Before specific 3D scaffolds can be manufactured, the polymers themselves require production. Synthetic polymers can be produced via two mechanisms, (i) step-growth polymerisation of hydroxy-acid, or mixtures of diacid/diol monomers, or (ii) chain growth via ring-opening of cyclic monomers (Robert and Aubrecht, 2008). The former tends to be faster and produce more monomers of higher molecular weight (Billiet *et al.*, 2009). However, for aliphatic polyesters, this is not the case (Fukushima and Nozaki, 2020), and so the latter technique is often favoured. Other benefits to chain-growth polymerisation include the elimination of extreme reaction conditions, elimination of unwanted by-products, and greater control over stereochemistry and molecular weights, resulting in higher-quality polymers (Jérôme and Lecomte, 2008; Van *et al.*, 2016). It is therefore used widely for the production of PCL (Jérôme and Lecomte, 2008), PGA (Yamane *et al.*, 2014), and PLA. However, ring-opening requires catalyst-initiators, one common example being tin (II) bis (2-ethylhexanoate), generally named Sn (Oct)<sub>2</sub>, which is used in the production of PLA in the presence of an alcohol (ROH) (Jérôme and Lecomte, 2008; Robert and Aubrecht, 2008). The mechanism of this reaction is detailed in Figure 3. The addition of heavy metal catalysts such as Sn (Oct)<sub>2</sub> risks contamination during fabrication, increasing the costs and potential toxicity of the final product (Hu *et al.*, 2018), and there is significant research to find metal-free catalysts that achieve the same reaction rate (Fukushima and Nozaki, 2020; Pappuru and Chakraborty, 2019; Tschan *et al.*, 2021). Organocatalysts, in particular, have shown increasing promise for ring-opening polymerisation of racemic PLLA (Tschan *et al.*, 2021).

Other polymers such as polyurethane (PU) and polyurethaneurea (PEUU) are more suited to production by step-growth polymerisation (Billiet *et al.*, 2009), where it is cheaper and more efficient. They are mainly produced via reacting hexamethylene-diisocyanate (HMDI) with a diol, followed by subsequent reaction with other polymers such as PCL, resulting in a block polymer that can be degraded by de-esterification (Asefnejad *et al.*, 2011; Goyker *et al.*, 2021).

A third form of polymer synthesis is enzymatic polymerisation, which is under increasing study as a more environmentally friendly alternative to both step-growth and chain-growth methods (Douka *et al.*, 2016). Here, synthetic polymers such as PCL are mixed with immobilised enzymes such as ionic-liquid-coated lipases, which have been isolated from bacterial culture and placed in a solvent solution (Douka *et al.*, 2016). This technique can produce high molecular masses of polymers such as polyesters (Zhao, 2019), although reaction optimisation and commercial viability are still being explored.

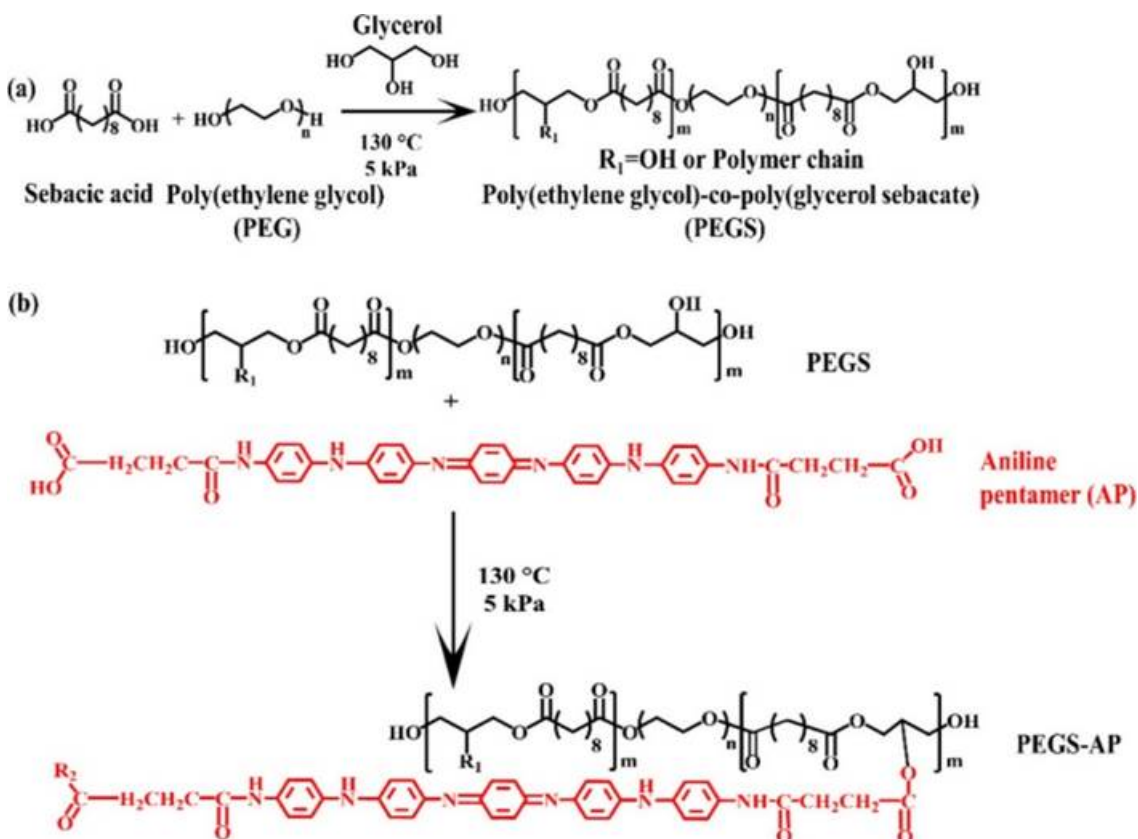
Multiple monomers are often incorporated into the fabrication process. Block polymerisation acts to combine the properties of its constituent homopolymer sections based on their mixture ratio (Dong *et al.*, 2017). In contrast, copolymerisation of multiple monomers is widely used to create materials with novel properties, with the potential for lower stiffness, increased crystallinity, or higher degradation than any one homopolymer (Middleton and Tipton, 2000).

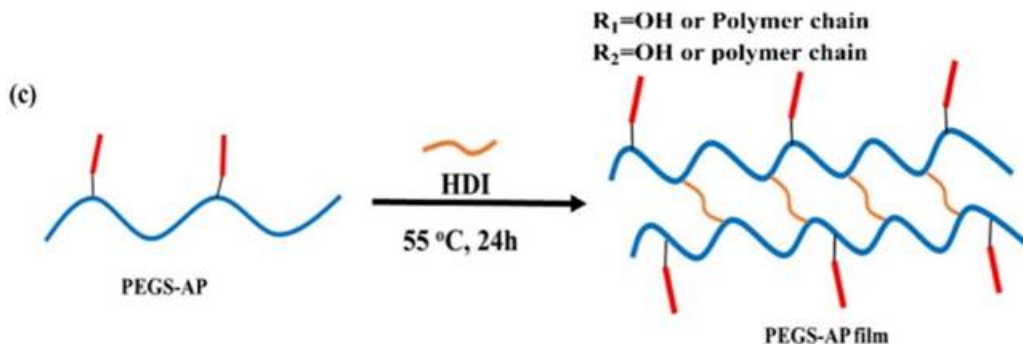
Often these production methods produce simple pre-polymer forms, and their final structure is reached with the addition of other polymer blocks and/or side chains, such as in Figure 4. These steps allow further modification and control of polymer properties at the atomic level (Dong *et al.*, 2017).



**Figure 3:** Ring-opening chain-growth polymerisation to produce PLA.

**Note:** This process commonly occurs in the presence of  $\text{Sn}(\text{Oct})_2$  catalyst-initiator and an alcohol. This mechanism allows increased control over the specific DL stereochemistry of the resulting polymer, impacting upon degradation rate and functionality. Other synthetic polymers follow a similar ring-opening polymerisation. Reprinted with permission from Robert and Aubrecht (2008).





**Figure 4:** Formation of a PEGS-AP polymer.

**Note:** Block polymerisation combines the properties of the polymers as per the law of mixtures. The addition of side chains adds further control over a polymer's properties. Reproduced from Dong *et al.* (2017) with permission from ACS Publications.

Once these polymers have been produced, they can be processed into scaffold structures to fulfil their function in tissue engineering. The technique used for scaffold production can significantly influence its structure and functionality *in vivo*. There are many methods, with the most common including solvent casting, gas foaming, electrospinning, particulate leaching as well as additive manufacturing, with each resulting in a unique architecture and functionality (Agrawal and Ray, 2001; Alizadeh-Osgouei *et al.*, 2019).

Particulate leaching involves the addition of soluble particles (often NaCl crystals) of a set size and adding them to the polymer during its formation. The particles are later dissolved in deionised water, leaving behind a network of porous holes (Haider *et al.*, 2020). A 3D scaffold can be formed by laminating layers of individually leached sheets (Agrawal and Ray, 2001). Particulate leaching is a relatively cheap and easy technique, but as pore interconnectivity is determined only by the size and quantity of the particles added, it lacks precise structural control (Deb *et al.*, 2018; Haider *et al.*, 2020). It is suited to scaffolding structures of extremely high porosity (and therefore lower load-bearing capabilities), such as endothelial tissue, as this guarantees good pore interconnectivity (Haider *et al.*, 2020).

Electrospinning is one of the most widely researched scaffold formation techniques (Haider *et al.*, 2020). It creates electrically active fibres by blending a biodegradable polymer such as PCL with a conductive polymer and ejecting the solution from a needle under high voltage. Electrospun nanofibrous materials have controllable porosities and large surface area-volume ratios, and the alignment of fibrils is tuneable with the addition of an external magnetic field (Chen *et al.*, 2013). This technique is highly successful, but requires the optimisation of many parameters, including applied voltage, solution concentration and humidity of the system (Haider *et al.*, 2020). Currently, the main challenge is that a significant component of the scaffold must be a conductive polymer, which can affect its mechanical properties (Chen *et al.*, 2013).

Advances in additive manufacturing technologies have also provided exciting avenues for scaffold production. Techniques such as stereolithography, fused-deposition modelling (FDM) and selective laser sintering allow size, porosity and geometry to be tightly controlled across the scaffold (Shick *et al.*, 2019). In FDM, thermoplastic polymers such as PCL and PLA are melted and extruded to produce layer-by-layer depositions from a computer-aided-design model. It enables the production of complex porous scaffolds of tuneable and accurate dimensions (Ogden *et al.*, 2014; Temple *et al.*, 2014; Wei *et al.*, 2012). Cross-linking polymers such as PPF have also been employed in 3D printing methods to similar success (Wei *et al.*, 2012). This method, guided by patient CT scans, can be used to create personalised scaffolds, and has proven to seed cells resulting in successful bone formation (Temple *et al.*, 2014). Its precision and patient-specific



potential make optimisation of additive manufacturing techniques highly desirable, and this research area is very active (Ahangar *et al.*, 2019; Shick *et al.*, 2019; Tan *et al.*, 2020). Finally, once the polymers have been formed and the scaffold has been built, the structure can then receive further biocompatibility modification by coating the fabricated scaffold with a thin layer of degradable bioactive material (such as hydroxyapatite or magnesium) via plasma spraying or bio-ink printing (Alizadeh-Osgouei *et al.*, 2019).

## Applications

Numerous tissue types exist in the body, each having specific structural properties and ECM composition. Customisation of scaffold properties is extremely useful when considering the tissue type needing to be replaced. Bones, which provide support and protection for the body (Su *et al.*, 2019), deliver increased mechanical support and have a larger ECM:cell ratio consisting of high quantities of collagen (Badylak, 2002). Conversely, skin and muscles do not require such mechanical strength, but instead need to stretch, resulting in an increased proportion of elastin in the ECM (Khalili *et al.*, 2019). Tendons and ligaments act as elastic springs to transmit forces between muscle and bone, stretching and recoiling to improve movement efficiency. These need both high mechanical and tensile strength, achieved with high levels of aligned collagen fibrils (Beldjilali-Labro *et al.*, 2018; Sensini *et al.*, 2021). It is evident from this small overview that the scaffolding requirements for each tissue type differ (Martina and Hutmacher, 2007), and these must be considered when selecting polymers and fabrication methods.

This section looks at the specific requirements and applications of biodegradable synthetic polymers in two tissue types chosen for their contrast: bone and skeletal muscle. Studies into bone biomaterials have had high success, with clinical trials and a range of products now commercially available (Alizadeh-Osgouei *et al.*, 2019; Pereira *et al.*, 2020; Zeng, *et al.*, 2018). Conversely, Skeletal muscle has, to the authors knowledge, no currently available scaffold that has passed clinical trials. These differences in patient availability have their roots in tissue complexity, but they are also linked to funding availability and the suitability of currently available approved polymers to their requirements (Freedman and Mooney, 2019; Williams, 2019). Here, we will focus on synthetic scaffolding techniques used or under research in the two sub-fields.

### Bone-tissue scaffolding

The unique mechanical requirements of bone-tissue scaffolds result in an intricate interplay between mechanical support and degradation time, and these must be controlled to allow for regenerated bone to replace the support lost from the scaffold. A porosity between 80 to 90 per cent (Roy *et al.*, 2003), as well as a pore size larger than 300  $\mu\text{m}$  (Ge *et al.*, 2008; Karageorgiou and Kaplan, 2005), are ideal for bone regeneration or osteoinductivity (Ge *et al.*, 2008). This may be enhanced by the incorporation of osteoinductive – or growth – factors that can be released upon degradation (Chen and Mooney, 2003; Ge *et al.*, 2008). Natural bone is a composite material composed primarily of collagen, a polymer, as well as the inorganic ceramic apatite (Yang *et al.*, 2018). Using composite scaffolds comprising both polymeric and inorganic phases therefore mimics this natural environment and may prove beneficial in achieving regeneration. The ideal properties for bone-tissue engineering scaffolds have been encompassed by numerous polymers and polymer composites to obtain clinical-grade scaffolds, which have proven successful in bone regeneration and have resulted in commercial products. Due to being granted US FDA approval, aliphatic polyesters such as PLA, PGA and PCL have been employed to the largest extent. Particular research papers that fast-tracked commercial development will be outlined below, followed by examples of some currently available products.

Yang *et al.* (2018) used a PLGA electrospun scaffold with incorporated silica nanoparticles, resulting in heightened bone nodule formation and collagen secretion, proving that this particular scaffold stimulates osteogenic differentiation *in vitro*. Another PLGA composite, functionalised with the osteoinductive bone morphogenetic protein 2 (BMP-2)-like peptide, has successfully been employed to repair a critical-sized cranial defect in a rat model (Zhang *et al.*, 2019). The mechanical similarities of the PLGA composite used in this study, coupled with the demonstration of inducing osteogenic differentiation as well as bone formation *in vivo*, highlight this as an attractive scaffold for use in human bone-tissue engineering. PLA, together with a metal core, has been used as a biodegradable bone graft for hip replacement surgery, proving to be mechanically stable and biocompatible for successful bone regeneration (Lagoa *et al.*, 2008).

Other research avenues have incorporated inorganic material into scaffolds to enhance biomimicry and improve bone-tissue regeneration. A PLA/hydroxyapatite composite has shown *in vivo* success as a bone-filling scaffold as far back as 1986 (Higashi *et al.*, 1986). More recently, a PCL/hydroxyapatite composite supported the growth and differentiation of bone marrow mesenchymal stem cells (Chen and Chang, 2011). Beyond biomimicry, the incorporation of hydroxyapatite in these studies eliminates the limitations of brittleness and low mechanical strength associated with pure hydroxyapatite (Zhang *et al.*, 2021). Research into polymeric composites containing hydroxyapatite is ongoing, and recent studies have been able to use 3D printing to increase the hydroxyapatite content in a PLA composite without significantly impacting the mechanical properties of the scaffold (Dubinenko *et al.*, 2020; Zhang *et al.*, 2021). Despite the benefit of this scaffold both *in vitro* and *in vivo* in the former study, issues remained with increased acidity during degradation of PLA, leading to potential inflammation. Although increased hydroxyapatite aided this, further research is still required before the large-scale clinical uptake of this scaffold.

Due to the benefit of containing cell-binding RGD sites, natural polymers may be incorporated into synthetic polymeric scaffolds or used as coatings with the goal of aiding cell adhesion. This benefit has been realised using a collagen coating, which positively influenced cellular attachment and differentiation in PLGA (Wu *et al.*, 2006) and PLLA (Zhang *et al.*, 2013). Another study used a small intestinal submucosa (SIS)/PLA scaffold together with the sustained release of a BMP2-related peptide, termed P28, to enhance bone regeneration (Xiong *et al.*, 2020). The combination of the collagen I and glycosaminoglycan containing SIS together with PLA achieved a highly biomimetic scaffold with tuneable degradation coupled with tuneable bone-tissue formation *in vivo*. Numerous additional studies involving many polymer types, fabrication methods, applications and degradation times have been demonstrated, the details of which can be found in review articles (Narayanan *et al.*, 2016; Prasad, 2021; Teoh *et al.*, 2019).

Studies like those mentioned above prove the potential use of specific polymers in bone regeneration. This has propelled numerous clinical trials and the creation of commercial products. LactoSorb® is a PLA-based product line of screws and implants from Zimmer Biomet, which have applications in craniofacial surgeries (Zimmer Biomet, 2019). These products have a predictable degradation of approximately 12 months (Eppley and Reilly, 1997), and show low inflammation and infection rates (Goldstein *et al.*, 1997). Many other PLA-based products, such as RapiSorb™ and Biocryl®, are commercially available and are summarised in Narayanan *et al.* (2016). The commercial success of other polymer types is less pronounced, although numerous clinical trials are currently underway, including the use of 3D-printed PCL scaffolds in dental surgery (ClinicalTrials.gov, 2019).

### Skeletal muscle tissue scaffolding

Muscle contains specific fibril lengths and alignments to allow muscle to effectively distribute force along the tissue (Corona and Greising, 2016). When building new tissue, the stem cells in skeletal muscle known as satellite cells (Wang and Rudnicki, 2012) proliferate and differentiate into multi-nucleated myoblasts (Rizzi *et al.*, 2012), which then meld together into myotubes. A skeletal muscle scaffold must be able to direct cell migration and growth effectively to create these parallel, highly organised fibres, and so encouragement of satellite cell migration into the scaffold is vitally important (Corona and Greising, 2016). Tissue scaffolding of skeletal muscle is made more complex by the fact that the architecture of functioning muscle is mainly controlled mechanically. A static scaffold is not able to give these physical growth cues, so the myotubes grow in a randomly-oriented way (Chen *et al.*, 2013). This makes cultivated skeletal muscle very poor at force bearing *in vivo* (Gentile *et al.*, 2014; Mase *et al.*, 2010). In order to avoid this random orientation of myoblast formation, the scaffold must be subjected to a rhythmic electrical/mechanical component to mimic actual muscle use (Rizzi *et al.*, 2012).

One major line of research has been looking into the incorporation of conductive polymers into the skeletal muscle scaffold (Dong *et al.*, 2020). As well as initiating muscle contraction, electrical stimulation has been shown to align myoblasts parallel to the direction of electric field vectors (Chen *et al.*, 2019), and may provide a simple and cost-effective method to ensure both alignment and contractile ability.

Electrospinning, which requires a conductive polymer component to function, is able to produce controlled alignment of polymer fibres, and is therefore highly suited to the task. Chen *et al.* (2013) used an electrospinning technique with a combination of PCL and polyaniline (PANi) to produce such an aligned fibrous polymer scaffold. They found increased cell proliferation and myotube fusion in *in vitro* mouse myoblasts compared to a non-aligned PCL/PANi mix. Jun *et al.* gained similar results using a blend of poly(L-lactide-co-epsilon-caprolactone) (PLCL) and PANi (Jun *et al.*, 2009), which combined the rigidity and brittle nature of PANi with the highly elastic PLCL, creating a more suitable scaffold than either pure polymer. A 3:7 PANi–PLCL ratio was able to achieve 170 per cent strain, greater than the strain exhibited by skeletal muscle. However, despite its biocompatibility, PANi does not degrade (Chen *et al.*, 2013; Dong *et al.*, 2017), and so more experimentation into its polymer structure is needed before it can give the properties a biodegradable scaffold requires.

Another route into skeletal muscle scaffolding is the use of hydrogels. PEG is a highly biocompatible hydrogel that has been approved by the FDA 'for internal consumption' (Choi *et al.*, 2019). Its properties are easily altered by changing its  $M_n$ , water:polymer ratio, and cross-linking density (Almany and Seliktar, 2005). Its derivative, PEGDA (produced by substituting its terminal hydroxyl groups with acrylate), is able to gelate from a liquid to a solid state under UV light after cells have been suspended within it (Choi *et al.*, 2019; Fuoco *et al.*, 2014). Its scaffold fabrication can therefore occur after myoblasts have grown into it, allowing mechanical signalling to define muscular tissue structure rather than a prefabricated scaffold shape. When combined with a biological cell-adhesive backbone such as fibrinogen, PEG creates a scaffold with both controllable physical characteristics and cell-signalling capabilities (Fuoco *et al.*, 2014; Rizzi *et al.*, 2012), promoting skeletal muscle regeneration and blood vessel growth *in vitro* (Fuoco *et al.*, 2014). PEG can also be functionalised with maleimide groups, which enable it to hold stem cells and bind to patient tissue, used by Han *et al.* (2015) *in vivo* as an injectable scaffolding cell-delivery system. Dong *et al.* (2017) were able to combine the benefits of hydrogels with the abilities of conductive polymers. They combined polyglycerol sebacate (PGS), a highly elastic but poorly hydrophilic polymer, with the highly hydrophilic PEG (Dong *et al.*, 2017). The resulting polymer PEGS had aniline pentamer (AP) side chains added via [esterification](#) for conductivity. PEGS films had fatigue-free mechanical properties, and promoted myoblast

proliferation. This conductive, flexible hydrogel has the potential to allow both electrical and mechanical stimulus to direct tissue formation, making it a good candidate for further study.

A more recent advance into biodegradable skeletal muscle is the combined use of aliphatic polyesters with polyurethanes. 'Thermoplastic PU and PEUU copolymers' (TPUs) (Daemi *et al.*, 2016; Goyker *et al.*, 2021) are prepared by combining hydrophobic PCL and hydrophilic PEG copolymerised 'soft' segments, and PU 'hard' segments. The tuneability of synthetic polymer production allows easy tailoring of the synthetic process to optimise the soft and hard segment ratios to suit TPU for skeletal muscle scaffolding. Goyker *et al.* (2021) described a 3D-printed scaffold of aligned TPU filaments 'soft yet durable, strong, elastic, and hydrophilic'. When tested *in vivo*, after four weeks of implantation, they found myoblast regeneration and some capillary formation in the implant site, with an 86 per cent recovery of function (Goyker *et al.*, 2021).

## Conclusion

The unique biocompatible and biodegradable requirements of tissue scaffolds and the complexity of their interactions within the human body gives this area of study distinct challenges. Not only must a scaffold function and degrade appropriately, but it must also do so for the right tissue type, each of which has its own mechanical and morphological requirements. Polymer degradation kinetics must be controlled to avoid voids and inflammation during healing, and although a low dispersity is optimal, other factors such as crystallinity,  $T_g$  and strain values are all dependent on tissue type. Well-researched polymers such as PLA and PCL are often used in conjunction with other less degradable but more tissue-compatible polymers, either in block form or as a modification to combine their properties into a scaffold more suitable for its function than either polymer in its pure state. This control over scaffold properties and mechanics is further enhanced via the multitude of fabrication techniques that a polymer may be formed by to create the 3D scaffold the body requires, altering porosity and fibre organisation to control cell migration and growth. Bone, with its requirement for high porosity and stress values, has produced PLA-based bone scaffolds that have been used successfully in clinical trials. Muscle, requiring a conductive and elastic scaffold able to experience mechanical loading, has only produced success *in vitro* so far with PCL and PEG-based polymer scaffolding.

The low number of FDA- and MHRA-approved biodegradable scaffolding polymers has limited clinical research to only a handful of polymers, and although their properties have been widely researched, they are not optimal in their pure states for scaffolding. Research into new polymer structures is limited to *in vitro* experimentation, and the rigorous testing required before clinical trials can be undergone means that even a perfect scaffold is still a decade away from use in the population. Despite this, great advances have been made in understanding how to control the growth of cells using fabricated polymer structures, and in providing optimum conditions for this process.

One great advantage of synthetic polymers is their tuneability – of both mechanical and degradation characteristics (Reddy *et al.*, 2021; Williams, 2019). However, this tuneability, alongside co- and block polymerisation and variations in scaffolding techniques, has produced a field with a vast number of potential polymer and scaffolding structures of which this review has only scratched the surface. The ideal next step for the field would be the creation of a publicly available database of known scaffolding polymers, with their properties and the effects of different fabrication techniques and copolymer additions available to potential researchers. Such a comprehensive comparison of these polymers would help refine and channel future study.

The field of tissue engineering using degradable scaffolds is still in its infancy. There are many hurdles to overcome before this technology is in regular clinical use. But further investigation into the role of the ECM in cell growth, alongside the testing of copolymers and novel fabrication techniques, will only further enhance the possibilities of this promising field of study.

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Figure 4: Formation of a PEGS-AP polymer. (Reprinted with permission from Dong, Zhao, Guo and Ma (2017), Copyright (2017) American Chemical Society.)

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**Table 1:** Summary of commonly used synthetic polymers and a schematic depiction of their chemical structure.

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## Glossary

**Aliphatic:** Relating to or denoting organic compounds in which carbon atoms form open chains (as in the alkanes), not aromatic rings.

**Biocompatibility:** The property of a material being compatible with living tissue by not producing toxic or immunological responses.

**Biomimetic:** Emulating natural structures or systems.

**Composite:** A material which is produced from the combination of two or more constituent materials resulting in properties which are superior to those of the original components for a specific application.

**Copolymer:** A polymer fabricated from more than one monomer species.

**Degradable:** Capable of being slowly broken down into simple parts.

**Esterification:** Chemical reaction where two reactants form an ester as the reaction product.

**Hydrogel:** A cross-linked hydrophilic polymeric gel in which the liquid component is water.

**Kinetics:** The rates of chemical or biochemical reactions.

**Polymer:** A substance which has a molecular structure built up chiefly or completely from a large number of similar units bonded together.

**Scaffold:** Materials that have been engineered to cause desirable cellular interactions to contribute to the formation of new functional tissues for medical purposes.

**Synthetic:** A substance made by chemical synthesis.

**Tissue engineering:** A field that blends engineering and biology to develop a means by which biological functionality can be restored, maintained or improved following major accidents, surgery or clinical treatments.

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# 'The Fog that it has Drawn upon Itself': Darfur and the future of the ICC

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## Abstract

This paper will explore widespread criticism of the International Criminal Court (ICC), through the lens of its long-running investigation in Darfur, Sudan. Analysis of the Prosecutor's reports on the Darfur investigation since 2005 reveals that the Court has often avoided engaging directly with its critics, and remains particularly reluctant to address accusations of internal structural bias. The ICC, in tandem with global media outlets, often characterises the Darfur conflict in simplistic terms, many of which originate in part from divisions that were introduced and sustained by colonial administrations. Although the ICC faces practical difficulties in enforcing its jurisdiction in Darfur, this paper argues that its problems of perception stem largely from the fact that it is the product of an international legal system whose normative home is the Global North. It is this systemic weakness that damages the ICC's global legitimacy and prevents the courts from functioning as an effective and progressive arbiter of international law. This paper seeks to suggest a way forwards for the ICC in the form of a reciprocal system of jurisdiction with an African International Criminal Court, such as the fledgling ACJHR. A partnership on equal footing, with a mutual basis for resource-sharing and legal expertise, may be the most promising avenue towards ending global impunity.

**Keywords:** International Criminal Court (ICC), Darfur crisis, Sudan's colonial past and post-colonial period, The prosecution of President Omar Al-Bashir, Structural bias in the International Criminal Court, African Union and UN Security Council.

## Introduction

Since its formation in 2002, the International Criminal Court (ICC, or 'the Court'), has declared itself to be 'participating in a global fight to end impunity', aiming 'to hold those responsible accountable for their crimes and to help prevent these crimes from happening again' (International Criminal Court, n.d.). As an international tribunal, the ICC was created to complement national governments in prosecuting individuals for crimes of [genocide](#), crimes of humanity, [war crimes](#) and the crime of aggression, where the relevant national government is 'unwilling or unable genuinely to carry out the investigation or prosecution' (Rome Statute of the International Criminal Court, Article 17.1(a); United Nations, 1998). Over the past 18 years, however, despite issuing arrest warrants for over 44 individuals, only 5 have undergone a full trial process. Most notably, the former President of Sudan, Omar al-Bashir, for whom the ICC issued an arrest warrant in 2009, was able to travel freely for several years subsequently; his eventual arrest in 2019 owed little to the Court's efforts. The Court's impotence in Darfur, Sudan, opened the door to wider criticism of the ICC, accompanied by accusations of 'neo-colonial' prejudice and racist attitudes towards Africa in particular (Allison, 2016). Many of these criticisms have at their core an accusation that the ICC is structurally biased. It cannot be denied that the African continent was historically an 'outsider' to international law, 'one of the originally subordinated continents in which international law was used as a means of ordering and organising the exploitation of the globe for the benefit of the North Atlantic communities' (Mutua, 2016:

49). Critics of the ICC argue that these long-standing structural inequalities are perpetuated today in the nature of the crimes that are subject to the jurisdiction of the Court, the mechanisms available for triggering investigations and a 'strong focus on individual culpability for crimes that are fundamentally collective' (Clarke, Knotterus and Volder, 2016: 12). Despite initial enthusiasm within Africa for the ICC and the fact that the mandate of the African Union (AU), remains consistent with that of the Rome Statute, support for the Court is now patchy among African states, and the relationship between the AU and ICC is strained. This paper will use the ongoing investigation in Darfur as a lens through which to explore the widespread criticism of the ICC's jurisdiction and to explore alternatives to the status quo in pursuit of more effective international justice.

Three questions will underpin my analysis: First, has the ICC demonstrated elements of prejudice that have compromised its judgements relating to Sudan? Second, how has the ICC responded to accusations of this prejudice? Third, can the ICC overcome such accusations and, if not, what possible alternatives would have greater potential to address inequalities in the international criminal justice system? In order to address these questions, the first section will briefly examine the trajectory of colonialism in Darfur over the past 70 years, exploring how the effects of the colonial period provide a vital context for the current conflict in Darfur, as well as contributing more broadly to the challenges that the ICC now faces in Africa. The second section will explore two legal issues that have contributed to the deterioration of the ICC's reputation, specifically the principle of complementarity as applied to the Darfur investigation, and the controversial issue of whether sitting heads of state should retain immunity when accused of international crimes. At the heart of this analysis will be the ICC's twice-yearly reports on the crisis to the UN Security Council, which summarise developments in Darfur from the ICC's perspective. These can be used to better understand the role that the ICC envisages for itself in Darfur, and to question whether its response reveals elements of structural bias. The final part of my analysis will consider whether it is possible for the ICC to reform from within, or whether its laudable aims of ending global impunity might be better served within a broader reorganisation of the international criminal justice system.

## The ICC in Darfur: Past and present

The Darfur crisis is the ICC's longest-running investigation, referred to the Court by the UNSC in March 2005 (United Nations Security Council, 2005). The prosecution of former President Omar al-Bashir was based on charges of numerous war crimes, [crimes against humanity](#) and genocide committed in Darfur since 2003; by 2015, the United Nations estimated the number of deaths during the genocide conflict to be between 100,000 and 400,000, with several million citizens displaced. However, despite the severity of the situation, the ICC failed to end impunity in Darfur over the past 17 years, and, despite a change of government in 2019, the conflict continues. In the global media, the Darfur conflict has been popularly characterised as a dispute between 'Arabs' and 'Africans', or between plucky 'rebels' and a corrupt 'enemy' government, masking a far more complex situation on the ground. Although it is beyond the scope of this paper to address the roots of the conflict fully, it is vital to briefly consider the historical background of the ICC's investigation. Willemsse argues that the First Prosecutor of the ICC took an 'historic and one-sided perspective of the conflict', which did not take into account political considerations borne out of British-Egyptian colonial rule (1898–1956), and its legacy (Willemsse, 2016: 326).

Under the colonial administration, inequalities were introduced, replicated and intensified, stemming in part from the unequal economic development: while the central region of Sudan benefitted from improved infrastructure, the rest of Sudan's territories 'have remained largely marginalized and neglected, including



Darfur' (United Nations Security Council, 2005). Mamdani argues that the colonial administration reinforced racial divisions by focusing on identity formation, reorganising populations around identities that suited the colonisers. Sometimes, 'this involved a benign acknowledgement of existing identities, but at other times, it involved a wholesale re-identification of peoples' (Mamdani, 2010: 145). These distinctions mattered in Darfur at an individual level, both economically and politically: particularly after the advent of indirect rule in the 1920s, tribes perceived as 'natives' were given greater political influence and land ownership rights than those who were perceived as 'outsiders'. As Mamdani argues, this 'retribalisation' 'purge[d] Darfuri society of the most dynamic part of its history', introducing artificial divisions that were then perpetuated by governments after Sudanese independence in 1956 (Mamdani, 2010; 168). Therefore, while the present conflict in Darfur has multi-faceted origins, the racialisation of identities and the discriminatory land system instituted under colonial rule played significant roles in the complex tensions of Sudan's post-colonial period. When, in 2003, the Sudan Liberation Movement and the Justice Equality Movement accused the sitting President Al-Bashir of segregating non-Arabs, and of creating ethnic segregation between the Arab and non-Arab community within the region, they were arguably protesting a policy that has its roots in Sudan's colonial past. The ICC, however, does not feel compelled to engage with the complex political history of the Darfur crisis; it declares quite simply that it cannot express an opinion on political matters without jeopardising the legitimacy of its jurisdiction. Such a stance is entirely understandable, yet it exculpates the Court from acknowledging that, in Darfur – and, more broadly, in Africa – its legitimacy is fundamentally undermined by its role as ideological inheritor of a colonial past. Arguably, it is partly the ICC's failure to acknowledge the complexities and historical trajectory of the conflict in Darfur that has led to its loss of legitimacy on the African continent. When combined with multiple failures to end impunity in Africa and elsewhere, this reticence has led to accusations that the Court is a 'Western, or imperialistic, initiative [...] some form of colonial throwback or the imposition of a developed world's form of justice on an unsuspecting and servile African people' (Du Plessis, 2008: 1). The ICC's response thus far to such accusation of anti-African bias and racism has so far been insufficient to placate its increasingly vocal enemies. This, argue DeFalco and Mégret, is because its principal line of defence has been to restate and reassert the purpose of the Court, rather than engaging directly with the specific content of the accusations against it (DeFalco and Mégret, 2019: 63). Generally, the ICC has attempted to overcome what it sees as a 'problem of perception' by using global media outlets as a tool to amplify its own purpose and values, unaware that it is this very approach that reveals and perpetuates its own structural bias (Du Plessis, 2013: 249). Indeed, the ICC arguably displays 'race-blindness': its refusal to 'see' race as a motivator of its activities may 'paradoxically and perversely contribute to reinforcing its status as a signifier of its activities' (DeFalco and Mégret, 2019: 78).

## The ICC in Darfur: The investigation

The first significant legal issue concerning the ICC's investigation in Darfur relates to the threshold for the [Principle of Complementarity](#) for the Court's involvement in the conflict. Under ordinary circumstances, as Sudan had not signed nor ratified the Rome Statute, it should not have been subject to the jurisdiction of the ICC, unless it was 'unwilling or unable genuinely to carry out the investigation or prosecution' (Rome Statute of the International Criminal Court, Article 17.1(a), 1998). Inevitably, this principle is subjective, particularly the term 'genuinely', over which the ICC, as the prosecuting body, retains full interpretative control. However, the ICC did not have to rely on Article 17 to proceed: instead, it was able to exercise unique jurisdiction in Darfur under Article 13(b), of the Rome Statute, following United Nations Security Council Resolutions (2005b). This resolution, under Chapter VII of the UN Charter, binds Sudan, as a

member of the United Nations, to 'cooperate fully with and provide any necessary assistance to the Court and the Prosecutor pursuant to this resolution' (United Nations Security Council Resolutions, 2005a). The special status of the referral under the UN Charter therefore provided the ICC with solid legal ground for its investigation in Darfur.

At the beginning of the Darfur investigation in 2005, the Court stated that it would provide a 'comprehensive response to the need for peace, justice and reconciliation' in Darfur through 'close partnership' with African countries (First report of the Prosecutor of the International Criminal Court, 2005). In June 2006, having received a statement expressing support and co-operation from the AU's Peace and Security Council in March, the ICC was hopeful that 'cooperation will now be forthcoming' and that it would be able to work effectively alongside the AU and the Sudanese criminal justice system to ensure justice was brought to the people of Sudan (International Criminal Court, The Office of the Prosecutor, 2006). However, this hoped-for co-operation did not last long. In June 2007, the Prosecutor identified two Sudanese individuals, Ahmad Harun and Ali Kushayb, as candidates for arrest, but the Government of Sudan (GoS), refused to grant the ICC's request to question them on the basis that the request was a violation of their rights under Sudanese law, and may also be 'construed as a waiver in respect of its right to challenge the issue of admissibility at a later date' (International Criminal Court, The Office of the Prosecutor, 2007a). The ICC stated in response that it could not be prevented from questioning or arresting the individuals on such grounds, and continued its investigation with reference to Article 55(2), of the Rome Statute. By December 2007, Sudan had instituted national proceedings against both men, but the Prosecutor declared that these proceedings did not satisfy the Court's legal standards. Sudan, for its part, declared that its courts were competent to carry out an investigation if required. In contrast, the ICC took into consideration criticisms of the Sudanese judicial system, specifically several statutory deficits, alongside evidence of failure to implement standards of fair trial. Most crucially, Sudanese laws 'provided for a wide range of immunities and a considerable influence of the executive during a criminal trial, both preventing effective prosecutions' (Pichon, 2008: 204).

Unsurprisingly, the ICC's explicit criticism of the competency of the Sudanese legal system led to a rapid deterioration in relations with the GoS. In June 2008, the GoS's ambassador added: 'If there are any accusations against our people, the Sudanese judiciary is more than capable of doing that [...] if we consider there have been crimes, we will put them on trial ourselves' (International Criminal Court, The Office of the Prosecutor, 2008). Naturally, statements from representatives of the GoS are largely self-interested, yet their language reveals a broader complaint – that the ICC's jurisdiction was 'foreign' and unjustly imposed. Therefore, while the ICC's reliance on Chapter VII of the UN Charter (United Nations, n.d.), to open its investigation in Darfur was entirely legal, the manner in which the Security Council referred some cases and not others 'revived concerns of African states about the political selectivity that is embedded in the Rome Statute through the Council's powerful role' (Clarke, Knotterus and Volder, 2016: 15). The Prosecutor's reports, however, displayed very little sensitivity to concerns relating to the principle of complementarity, declaring repeatedly that its decisions must be 'consistently and publicly presented as a non-negotiable, integral part of any comprehensive solution, a vital contribution to ending crimes and to achieving key political, security and humanitarian goals' (International Criminal Court, The Office of the Prosecutor, 2007). Therefore, while the ICC certainly had adequate legal basis to open its investigation in Darfur, its isolationist rhetorical strategy was arguably damaging to wider perceptions of the case, and formed the basis for later criticism of its legitimacy on the African continent.

In March 2009, under two years later, the situation worsened significantly upon the ICC's issue of an arrest warrant for the sitting President of Sudan, Omar al-Bashir, after which the AU's support for the ICC's investigation gradually dissipated. The arrest sparked controversy as to whether the Rome Statute could remove [head-of-state immunity](#) under international law. Several scholars have pointed to a contradiction between Article 27 and Article 98 of the Rome Statute regarding head-of-state immunity: while the former declares in no uncertain terms that, 'Official capacity as a Head of State or Government [...] shall in no case exempt a person from criminal responsibility', the latter appears to suggest that the Court must acquire a waiver before proceeding with an investigation in these circumstances (Rome Statute of the International Criminal Court, Article 27; United Nations, 1998). The legal inconsistencies identified here have remained at the core of much of the persistent ill-feeling between the ICC and the AU over the past decade, 'anticipating a situation of conflict between the provisions of the Rome Statute and existing international law norms' (Imoedemhe, 2015: 97).

Between 2008 and 2010, the AU requested on numerous occasions that the UN Security Council defer the proceedings initiated against President al-Bashir under Article 16 of the Rome Statute, but by January 2010, its request 'ha[d] not been acted upon' (Assembly of the African Union, 2010). In fact, the AU received no formal reply from the UNSC or the ICC on this matter. Shortly afterwards, in July 2010, the AU requested its members 'to balance, where applicable, their obligations to the AU with their obligations to the ICC' (Assembly of the African Union, 2010). Imoedemhe argues that this call for non-cooperation was a response to the Security Council's failure to respond: 'even among strong supporters of the ICC in Africa, the posture of the Security Council in failing to respond, either positively or negatively [...] was perceived as disrespectful' (Imoedemhe, 2015: 74). This powerful request led to significant tension between the Court and the AU, and the AU declared that 'the rest of the crimes committed in Darfur should be addressed by the Sudan domestically' (International Criminal Court, 2010). This, according to Bachmann and Nwibo, represents a 'watershed moment', when the ICC's 'fail[ed] to appreciate the effect that its interference in Africa's internal affairs was having on the peace building efforts in Sudan' (Bachmann and Nwibo, 2018: 457). The AU's perspective in the case of an ongoing conflict differs from that of the ICC and the UNSC, and its responses often express the opinion that the timing of the ICC's investigations is 'unsuitable in countries coming out of politically sensitive and highly complex conflict' and may prevent peace being achieved (Dersso, 2016: 65). Here, again, on this crucial issue of head-of-state immunity, the ICC has failed to respond effectively or respectfully to the complex priorities presented on multiple occasions by the AU. This repeated inflexibility has reinforced the broader perception that 'African states' views (as articulated within the AU framework), [are] not substantively engaged with and appropriately responded to' by the ICC (Dersso, 2016: 73).

Since 2010, rhetoric against the ICC has steadily grown within Africa, at points leading to a near-total breakdown in relations between the ICC and the AU. During this period, President al-Bashir was able to travel out of Sudan without arrest: first to Iran and China in June 2011, and then to Chad (party to the Rome Statute), in August 2011. Al-Bashir himself frequently attacked the ICC directly: in an interview with the *Guardian* in April 2011, declaring that 'the behaviour of the court was clearly the behaviour of a political activist', because 'obvious crimes like Palestine, Iraq and Afghanistan [...] have not found their way to the ICC' (Tisdall, 2011). Later, in 2014, declaring victory against the ICC, he appealed to African sovereignty, claiming that he had 'refused to hand over any Sudanese to the colonialist courts' (Abdelaziz, 2014). Among this display of rhetoric, the Assembly of State Parties of the ICC was convened in 2013 on the subject of the Court's relationship with Africa, and an amendment made to the Court's rules on presence at trial for those accused who fulfil extraordinary public duties at the highest level (Clarke, Knotterus and Volder, 2016: 2).

However, while the AU welcomed this amendment, it expressed 'deep disappointment' that the Security Council still had not responded to its deferral requests and requested that the Council act 'to avoid the sense of lack of consideration of a whole continent' (Assembly of the African Union, 2014). The response of both the ICC and the Security Council at this point was still non-committal, and the reports of the Prosecutor simply expressed repeated frustration at the UNSC's failure to implement its arrest warrants: 'whenever the Council, and the international community at large, have failed to integrate the peace and justice requirements, the Government of the Sudan has rejected cooperations' (International Criminal Court, The Office of the Prosecutor, 2012). In December 2014, the Court's Prosecutor finally announced that the Court was 'shelving the Darfur investigation for lack of support from the Security Council' (Abdelaziz, 2014). At the same time, the Prosecutor withdrew charges against the Kenyan Head Of State, Uhuru Kenyatta, due to lack of co-operation on the part of Kenya itself. The difficult operational relationship between the ICC and the UNSC may certainly be partly to blame for the failure of the investigation in Darfur. However, from a broader perspective, the mistake of both the ICC and the UNSC at this stage was to fail to recognise that at the heart of al-Bashir's insults was a growing unease – expressed explicitly by the AU over a period of several years – that the ICC was incapable of engaging respectfully with African concerns. Although undoubtedly a challenge, efforts to respond more directly to the perspective of the AU at this point may have delayed or prevented the premature failure of the ICC's investigation in Darfur in 2014.

The ICC's relationship with the African Union worsened in 2015 following South Africa's failure to arrest sitting President al-Bashir at the AU summit. A Host State Agreement, drawing both on customary international law and treaty law, was in place between South Africa and the African Union, under which al-Bashir possessed head-of-state immunity. The ICC immediately dismissed the Host Agreement, concluding that 'any possible immunity vis-à-vis the Court has been rendered inapplicable with the ratification of the Rome Statute' (Pre-Trial Chamber II, 2017). At this point, the legal positions and priorities of the ICC and AU became increasingly divergent, and, since 2015, the AU has continued to distance itself from the ICC, focusing primarily on 'African-led initiatives in the search for a lasting solution to the crisis in Sudan' (Peace and Security Council, 2019). In 2019, it requested that all partners should 'refrain from any action that could undermine African-led initiatives' (Peace and Security Council, 2019). The Court did not address this divergence of interests head-on; instead, it reverted to a focus on the Council's inaction, continuing to 'lament the Council's consistent failure' (International Criminal Court, The Office of the Prosecutor, 2017). In tandem, it sought to reinforce its identity as an independent and permanent judicial body, as distinct from the execution and enforcement pillar provided by State Parties and the UNSC (International Criminal Court, The Office of the Prosecutor, 2017). From 2017, the Prosecutor refers to the Security Council as the 'pillar of enforcement', absolving the ICC of further responsibility in the ICC investigation. In the face of a serious divergence between itself and the AU, however, this lack of direct engagement with its critics in the AU and elsewhere does not benefit the ICC. Seymour argues that 'instead of repeating the same staid defences of the Court's independence, the ICC might be more forthright about the political constraints under which it operates' (Seymour, 2016: 118).

## The way forwards

The foregoing analysis has revealed that, throughout the Darfur conflict, the ICC has shown a distinct reluctance to engage meaningfully with opposition, choosing instead to reframe its failures and, where possible, distance itself rhetorically from its critics. Tallgren argues that the ICC's rhetoric is part of the 'we-talk' of international legal discourse, which reinforces the 'defects and dissymmetry' present within the international legal community (Tallgren, 2015: 135). This 'we-talk' is particularly visible in the ICC's

communications with the Sudanese government, South Africa and the African Union, which reveal a tone of superiority, and an unwillingness to engage in productive dialogue. In its Strategic Plan of 2006, the Court acknowledges the need to ‘bridge the distance between the Court and these communities by establishing an effective system of two-way communication’ (International Criminal Court Assembly of States Parties, 2006). However, as Naldi and Magliveras argue, the ICC ‘has done very little to appease the AU, and has not been tactful vis-à-vis the AU’s fears and concerns’ (Naldi and Magliveras, cited in Jalloah and Bantekas, 2017: 113). It should be acknowledged that the ICC is not alone in Africa; there are still many states which express genuine support for its jurisdictions, and indeed ordinary Africans are often found to be more in favour of the ICC’s investigations than ruling parties. In addition, the Second Prosecutor, Fatou Bensouda, has made some attempt to engage in dialogue with AU and individual African states over her period in office, and the Court is currently examining allegations of US war crimes in Afghanistan and alleged Israeli atrocities in Palestine, although no investigations have been opened. In February 2022, the third Prosecutor, Karim Khan, in response to the expansion of the conflict in Ukraine, has decided to open an investigation there with respect to alleged war crimes and crimes against humanity committed between 2013 and 2014 (International Criminal Court, 2022).

Nevertheless, the overall rhetorical strategy of the Prosecutor’s office over the past ten years has not substantially changed, and it deliberately avoids engaging with charges of hypocrisy, bias against the weak, political interests and ‘institutionalised racism with neo-colonial resonances’ (Seymour, 2016: 120). Its reports on Darfur to date ‘reveal an institution which is held back primarily by its own refusal to self-examine’ (Rukooko and Silverman, 2019: 85). Yet, the ICC’s now widely-acknowledged ‘African problem’ is unlikely to be resolved without some self-reflection and recognition of the political issues at stake. DeFalco and Mégret argue that, because the ICC sees itself as an institution that exists to prosecute extreme racism, it views itself as ‘all the more innocent of racism because [it is] engaged in the prosecution of the worst and most pathological excesses of global racial politics’ (DeFalco and Mégret, 2019: 55). From the ICC’s own perspective, addressing criticisms that seem to emanate primarily from despotic individuals and governments – those whom it has already designated as ‘criminal’ – might run the risk of validating those criticisms. In an attempt to avoid this, as Schwöbel-Patel argues, the ICC has continued to market its jurisdiction to the ‘Western donor community’, painting a simplistic narrative ‘between the inhumane, non-white male perpetrator, the vulnerable, weak, and non-white victim, and the rational, assisting, mostly white, legal representative’ (Schwöbel-Patel, cited in May and Winchester, 2018: 16). In order to move forwards, therefore, the ICC must, like countless other organisations, acknowledge its historical roots, and the fact that it is itself the product of a system that relies heavily on a normative system of international justice whose principles inherently benefit parties in the Global North.

It may, however, be impossible for the ICC to achieve this level of self-reflection, partly because it is fundamentally unrealistic for it to become ‘political’ enough to engage fully with its critics in a meaningful way. Yet, as Menneke argues, ‘if *international* criminal law is not solely concerned with European practice, the analysis needs to include Africa as an actor, not merely a subject of universal jurisdiction’ (Menneke, cited in Jalloah and Bantekas, 2017: 11). The ICC may, in future, lessen its hold on the African contingent and allow African-led continental jurisdiction to develop along the rhetorical path of ‘African solutions to African problems’. In 2008, the AU adopted the Amendment Protocol, which proposes to endow the African Court of Justice and Human Rights (ACJHR), founded in 2004, with jurisdiction over international crimes. Although the Protocol has not yet been ratified, it does offer a positive vision for international justice in Africa, and ‘has expressive value as it articulates what African state leaders and consulted experts believe that the international criminal justice project should entail’ (Knotterus and Volder, 2016: 393). Crucially, the

Amendment Protocol offers a vastly different vision of international criminal justice to that offered by the ICC. Knotterus and Volder outline three main differences. First, in contrast to the ICC's limited mandate, the Protocol foresees prosecution of a wider range of crimes than the ICC, many of which are of 'an economic, political or resource-related nature', with the result that deeper structural problems are more likely to be addressed through jurisdiction (Knotterus and Volder, 2016: 388). Second, in contrast to the ICC's focus on individual criminal responsibility, the Protocol 'seeks a procurement of justice that includes those who are responsible for creating the conditions of conflict, and those who profit from the continuing instability of many African states' (Knotterus and Volder, 2016: 389–90). Notably, [corporate criminal liability](#) is foreseen – a concept rejected by the ICC during its formation. Last, the Protocol recommends the establishment of an independent Defence Office, guaranteeing 'equality of arms between the prosecution and the defence', which is arguably not present within the institutional structure of the ICC (Knotterus and Volder, 2016: 392). The Amendment Protocol does not address the issue of complementarity with the ICC, and therefore it is as yet unclear whether a fledgling ACJHR would operate productively alongside the ICC. Indeed, it may be some decades before such a court becomes operational, as the ACJHR is not as yet capable of exercising international jurisdiction with the limited resources it currently possesses (Udombana, 2013: 834). However, as the ICC currently runs the risk of becoming increasingly irrelevant beyond the Global North, the development of an international African court in the long term will 'ultimately strengthen rather than weaken the pursuit of international criminal justice' (Knotterus and Volder, 2016: 378)

## Conclusions

Overall, it has become evident that – both during its lengthy investigation in Darfur and more generally – the ICC, once an 'instrument extending African influence in international diplomacy', is now increasingly perceived as simply 'another instrument for western intervention on the continent' (Seymour, 2016: 112). As demonstrated above, the Court's conduct of the Darfur investigation since 2005 has revealed a reluctance to engage with criticism to the extent that its jurisdiction is now compromised, and the healthy progress of international law endangered. This is particularly evident in the ICC's heavy-handed approach to the principle of complementarity and, most crucially, in the tone of the Prosecutor's reports: in particular, the African Union and the individual African states are frequently treated with a level of condescension that would not be tolerated by Western states. As Abass notes, this attitude will gain the ICC no favours: 'The ICC prosecutor cannot afford to deal with ICC state parties as though s/he is a headmaster prevailing over a park of unruly pupils' (Abass, 2013: 933). Secondly, the ICC has failed to respond constructively to valid criticisms concerning its structural bias and racialised narrative, which arguably stems from the uncomfortable fact that international law is a product of a predominantly Western narrative. Scholars such as Mamdani have drawn attention to the superficiality of the West's approach to post-colonial regions, revealing attitudes that have persisted for centuries, in the case of Darfur. Attempting to tackle this thorny issue with a defensive rhetorical strategy has to date been unsuccessful because it avoids the uncomfortable but necessary task of self-reflection. Indeed, as Schwöbel-Patel notes, 'although [the ICC's] use of the rule of law as a branding tool may have enabled [its] initial flourishing [...] as a global justice project, it could also be its ultimate downfall' (Schwöbel-Patel, cited in May and Winchester, 2018: 17). The undeniable truth remains that, with a few exceptions, the vast majority of the ICC's investigations still focus on Africa, and the ICC therefore continues to be perceived as an institution that seeks to maintain (or, at best, does not challenge), political and economic structural inequalities across the African continent. Until this changes, the ICC's critics will continue to use this as grounds for opposition, and the ICC itself will remain lost in a fog of its own creation.

The ICC's path out of the fog into the sunlight is therefore not straightforward. Of course, criticism of the Court is by no means universal, and it must be recognised that there are multiple layers of perception both on and outside the African continent. In the long term, the Court should certainly aim to open and expand investigations outside the African continent where relevant crimes take place: this may be politically challenging, but could go some way to neutralising the criticisms of its opponents. The third Prosecutor, Karim Khan, has recently acted decisively in this direction, responding immediately to calls for an investigation into alleged war crimes and genocide in Ukraine, referred by 39 countries (Allegretti, 2022). This success, however, may be short-lived without additional self-examination on the part of the Court. The ICC must work towards recognising that its 'problem of perception' is at least partly the product of an international legal system developed and sustained in the Global North. It is highly unlikely that the ICC can preserve the support of those African countries, which were fundamental to its establishment without a significant adjustment of its priorities and principles. Specifically, the Court must engage more carefully with the principles of complementarity and immunity enshrined in customary international law, and prioritise a mutually respectful dialogue when engaging with institutions such as the African Union. In the medium to long term, the ICC must remain open to a reciprocal system of jurisdiction with an African International Criminal Court such as the ACJHR, when and if the Amendment Protocol is ratified. A partnership on equal footing, with a mutual basis for sharing resources and legal expertise, could, in the final analysis, achieve an end to global impunity.

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## Glossary

**Corporate criminal liability:** To hold a corporation vicariously liable for criminal acts done by its employees or agents.

**Crimes against humanity:** Acts that intentionally cause great suffering or serious injury to body or to mental or physical health committed as part of a widespread or systematic attack directed against any civilian population, with knowledge of the attack.

**Genocide:** Acts committed with the intent to destroy, in whole or in part, a national, ethnical radical or religious group.

**Head-of-state immunity:** The protection given to a head of state from being sued in the courts of other states.

**Principle of Complementarity:** Provides that a case is inadmissible before the International Criminal Court if it is currently under investigation by a state with jurisdiction over it.

**War crimes:** Atrocities or offences against persons or property, constituting violation so the laws or customs of war.

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# Libraries, Piracy and the Grey Area In-Between: Free Digital Media during the COVID-19 Pandemic

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## Abstract

This article examines the impact of the COVID-19 pandemic and lockdowns on the consumption of free digital books, paying particular consideration to the financial advantages and disadvantages for the authors of those books and the libraries supplying them. It investigates trends in the consumption of digital books through both library and piracy sites, sourcing information from librarian reports and the anti-piracy company MUSO, which tracks visits to piracy sites. This research demonstrates that the tense library–publisher relationship is not stable and does not hold up under stress, emphasising the need for an appropriate solution to be developed. It also spotlights the impacts of COVID-19 on authors, some of the most vulnerable members of the publishing community.

**Keywords:** Impact of COVID-19 on the digital publishing industry, digital book piracy, piracy during COVID-19 lockdowns, eBook restrictive licensing, Internet Archive, controlled digital lending

## Introduction: A shifting market

Over the last 20 years, the digital side of the publishing industry has gone through a rapid phase of development, particularly with respect to pricing, access and distribution of digital books (McKiel and Dooley, 2014; Whitney and de Castell, 2017: 6–22). While the commercial models for distributing traditionally published eBooks have become relatively stable (Herther, 2018), the models for distributing free digital media still remain in a phase of experimentation and innovation. The onset of COVID-19 has exacerbated these industry shifts. The lockdowns imposed across many nations changed the ways that people access free digital media, but the specifics of these changes and their consequences for the industry are not yet well-documented. Changes to both the accessibility and demand for free digital media potentially create significant consequences for all members of the publishing community, including authors, publishing companies, librarians and readers. An evaluation of these changes and consequences will allow us to identify vulnerable members of the community. It may also allow us to predict the direction of future changes within the industry.

## The situation pre-COVID: Setting the digital scene

To assess the impact of COVID-19 on the availability and consumption of free digital books, both legal and illegal, we must first examine the situation as it was prior to March 2020. Legal acquisition of free books – digital or otherwise – is most commonly mediated by libraries. A patron wishing to access an eBook for free can visit a library’s website and digitally check out the text or join the holds list if all available copies are already in use. This process can occur from home or anywhere else with an Internet connection. It gives the patron immediate access to the eBook once it has been returned by the previous user. The patron then has access to the digital file for the period of the loan, although the software typically prevents certain functions such as copying and pasting the text for piracy prevention reasons. Libraries [license](#), rather than purchase, eBooks from publishers at an inflated price compared to retail. This allows lending of the eBooks to patrons,

one reader at a time, often with limitations on how long the library may loan the eBook or how many times it may be loaned (Sang, 2017: 4). **Restrictive licensing** is justified by publishers to compensate for the easier access of eBooks by library patrons, which putatively causes library eBooks to pose a greater threat to retail sales than physical library resources (Richards, 2020: 2). The intention is to prevent library eBook lending from undermining or ‘cannibalising’ retail sales, and also to generate profit from library loans themselves (Richards, 2020: 3, Whitney and de Castell, 2017: 11). However, the terms make it difficult for libraries to acquire electronic resources (Sang, 2017: 4). A mid-2019 survey showed that 91 per cent of Australian libraries were discontent with the licensing conditions and cost of their eBook providers (ALIA, 2020b). The issue rose to prominence in late 2019, when major publishing house Macmillan imposed a controversial eight-week embargo on new titles in the USA, preventing libraries from licensing more than one electronic copy for two months after the release of a book in order to salvage commercial sales (Sargent, 2019). This was met with outrage and even boycotting from libraries (Albanese, 2019).

Due to the dissatisfaction on both sides, restrictive licensing models are a key aspect of the digital publishing industry requiring further development. Scholarship is divided on the value of restrictive models. Discussion is generally either in support of the librarian position (e.g. Enis, 2018; Giblin *et al.*, 2019; Jones, 2020) or the publisher position (e.g. Authors Guild, 2019b; Richards, 2020; Sargent, 2019). Librarian-favouring researchers offer a range of arguments for their position. Former librarian Kelly Jensen (2019) hypothesises that restrictions such as Macmillan’s eight-week embargo support only authors who are already bestsellers, suggesting that such licensing terms reflect corporate greed for profits rather than true empathy for struggling authors. Access to information, the Internet and eBooks can be considered a human right (Harpur and Suzor, 2014; Jones, 2020), and some argue that restrictive licensing models infringe thereupon by limiting accessibility across the community (Jones, 2020; Widdersheim, 2014). Critiquing the commercialisation of library eBooks by vendors, Widdersheim (2014) asserts that restriction of a digital resource to one patron at a time creates a ‘false scarcity of an abundant resource’, as digital file-sharing has the capacity to be effectively limitless. He views the one-copy, one-user model as an ethically indefensible ‘anachronism from the analog world’ (Widdersheim, 2014). Notably, these more radical anti-restrictive licensing opinions often fail to comment on the matter of author compensation for the hard work of writing a book.

Readers seeking free entertainment may not always choose to obtain that entertainment legally. Piracy is defined as the unauthorised use or reproduction of a copyrighted or patented work (HarperCollins, 2010, ‘Piracy’). Piracy of fiction usually occurs online, via sites such as *pdfdrive.com* and *epub.pub*. Illegally sourced content offers several advantages over libraries: no membership is required, there are no waitlists or borrowing limits, and access to the content can be permanent. Piracy of eBooks therefore serves readers’ immediate interests. As readers skirt the cost of legitimate book purchasing, however, authors and publishers miss out on what might have been profits from a legitimate sale. Therefore, it is commonly accepted that blatant digital piracy displaces eBook sales by reducing the incentive for readers to pay for content (Kukla-Gryz *et al.*, 2020; Reimers, 2016; Taylor and Taylor, 2006), although the putative effects of piracy are difficult to experimentally confirm (Smith and Telang, 2016: 85). Most researchers agree that file-sharing and digital piracy were almost certainly responsible for the music industry’s implosion in the early 2000s due to this displacement effect, since almost all incentive for listeners to pay for content was lost (Kurt, 2010; Whitney and de Castell, 2017: 9). Following this example, publishing houses were initially cautious about committing to the digital hemisphere of the industry.

Outside the academic forum, some argue that piracy in fact constitutes free advertising, and actually boosts sales (Grady, 2020; San Francisco Examiner, 2019). In theory, piracy increases accessibility for readers to discover a new favourite author whose books they will subsequently purchase. A 2020 consumer survey found that book pirates are ‘avid’ readers and are 40 per cent more likely than the general population to purchase books (Noorda and Berens, 2021), lending some credibility to this theory. However, even assuming the self-survey results to be accurate, this does not disprove the displacement effect, since it is entirely possible that pirates would purchase an even greater number of books if piracy were impossible. Commonly cited direct evidence (Grady, 2020) for the pro-piracy position includes an over-extrapolation of results from a 2014 study, which found a statistically insignificant increase in video game sales with piracy (van der Ende *et al.*, 2014: 149).

Most academic, peer-reviewed literature disagrees. Although randomised experiments are almost impossible to conduct, the majority of indirect and observational studies to date indicate a reduction in sales (Reimers, 2016; Smith and Telang, 2016: 85). In a Facebook post, prolific Young Adult author Maggie Stiefvater criticised the suggestion that piracy is helpful, describing her own experience with piracy hurting sales of the third novel in *The Raven Cycle* series that almost resulted in its cancellation (Stiefvater, 2017). She reported that a subsequent effort to keep illegitimate PDF versions of the fourth book at bay was successful at boosting eBook and print sales while it lasted, preventing her publishing house from cancelling the remainder of the series. As an informal experiment, Stiefvater’s experience provides compelling (if anecdotal) evidence that piracy can indeed displace book sales, with significant consequences for the author. It should be noted that for a front-list author with a new release such as Stiefvater, the theoretical ‘free publicity’ that piracy might provide is negligible. For authors in a different position, piracy may result in a different balance of benefit and harm, which cannot be interpreted from Stiefvater’s experience. Additionally, Stiefvater’s young, Internet-savvy reader-base may be more capable of piracy than readers of other genres; hence, this evidence is most applicable to the YA genre.

Occupying the grey area between legitimate libraries and blatant piracy, some organisations offer free access to digital books yet bypass restrictive licensing models. Of primary interest is the non-profit [Internet Archive](#), which offers digital access to books it owns physically via the Open Library endeavour using the controlled digital lending (CDL) framework (Adams, 2020). Essentially, this framework employed by the Internet Archive allows libraries that legally own the physical copy of a text to scan that text and then loan the digital scanned file to patrons in lieu of the physical copy, without the caveats and costs associated with an eBook licence (Adams, 2020). However, the legality of the CDL model is murky. Its legal and ethical basis hinges on the premise of a ‘loaned to owned’ ratio of one; the total number of loans (both physical and digital) can at most be equal to the number of legally owned print copies (Bailey *et al.*, 2018). For instance, if a library utilising CDL had purchased or been donated one physical copy of *A Game of Thrones*, which they then scanned to their digital collection, one patron could check out the digital copy of *A Game of Thrones*. Until that copy was returned, no patron could check out *A Game of Thrones* either physically or digitally, thus maintaining an appropriate ‘loaned to owned’ ratio. The Statement for CDL declares it a ‘good-faith interpretation of US copyright law’ (Bailey *et al.*, 2018).

Many authors and publishers consider this method of bypassing restrictive licensing terms to be piracy (International Publishers Association, 2019; Preston, 2020), labelling it ‘theft’ (McKay, cited in Flood, 2019) and ‘neither controlled nor legal’ (Authors Guild, 2019a); however, librarians’ opinions often differ. Professor Michelle Wu of Georgetown University Law Library frames CDL as simply an effort to ensure libraries can continue to offer ‘legitimately acquired material’ in a relevant format (Wu, 2019). Because the usage of CDL

is restricted to non-profit libraries, and because the author of CDL-loaned books receives compensation for the initial hard-copy sale, she argues that CDL is valid under copyright law and that it does not disrupt the market (Wu, 2019). In opposition, Douglas Preston of the Author's Guild declared the Internet Archive to be piracy in disguise, and that CDL '[is] called 'stealing' (Preston, 2020). The Association of American Publishers echoed this sentiment, criticising the Internet Archive for distributing 'bootleg' copies and accusing them of harming author and publisher royalties (AAP, 2019). The Internet Archive's use of CDL is an interesting case study in comparing the interests of readers – the noble goal of making all knowledge available to everyone in the world, considered by some a human right (Jones, 2020) – and the interests of authors and publishers, who deserve to be compensated in full for their work. Neither CDL nor the Internet Archive has yet been officially classified as legal or illegal.

## COVID-19: A catalyst for change

As lockdowns were imposed across the globe, requirements for social distancing created a massive demand for digital entertainment. Public libraries adapted quickly to the new COVID-19 requirements by improving access to e-resources (ALIA, 2020a; ALA, 2020). Closures of library spaces were accompanied by a major increase in eBook borrowing. Australian libraries reported increases of up to 300 per cent of the usual monthly eBook borrowing rate (ALIA, 2020c). Since the shutdown on 23 March, as of October 2020, websites of public libraries in New South Wales had been visited over a million times, double their usual traffic (ALIA, 2020c). The surge in popularity of eBook borrowing can be attributed both to existing library patrons migrating to the digital format, and to new patrons joining a library for the first time to cope with the lockdown. Many libraries streamlined their registration protocols to avoid face-to-face security requirements. Ipswich Libraries reported a 'notable bump' in library registrations between February and April, and Libraries South Australia welcomed 70 new members a day after the lockdown started (ALIA, 2020a). This trend was not limited to Australia; libraries in Washington, USA saw more than quadruple the rate of new electronic memberships being added upon closure of the libraries in March (Wilburn, 2020), and New York Public Library reported an impressive 864 per cent increase in digital library card applications (Marx, 2020).

By removing the burden of cost from readers, libraries shoulder a significant financial burden themselves. Readers flocking to e-resources placed libraries under increasing pressure during lockdown. Given that libraries cannot loan more copies of an eBook than the number of licences they paid for, the increased demand for popular titles caused waitlists to back up and placed library budgets under 'severe strain' (Melady cited in Zeidler, 2020). Children's books in particular, especially children's fiction, grew significantly in popularity (ALIA, 2020a; Wilburn, 2020). At a time when a turbulent economy permitted limited increases in government funding at best, and relatively cheap print books were harder both to acquire and to loan, the high price of library eBook licences made it difficult for them to provide services (Sang, 2017: 4). The increased demand for eBook loans prompted many libraries to reallocate funds away from print purchases towards expanding their e-resource collections (ALIA, 2020c; Wilburn, 2020; Zeidler, 2020). This allowed authors and publishers to maintain some profit, even as bookshop closure caused print sales to dwindle early in the lockdown phase (Italie, 2020). However, library budgets were significantly strained.

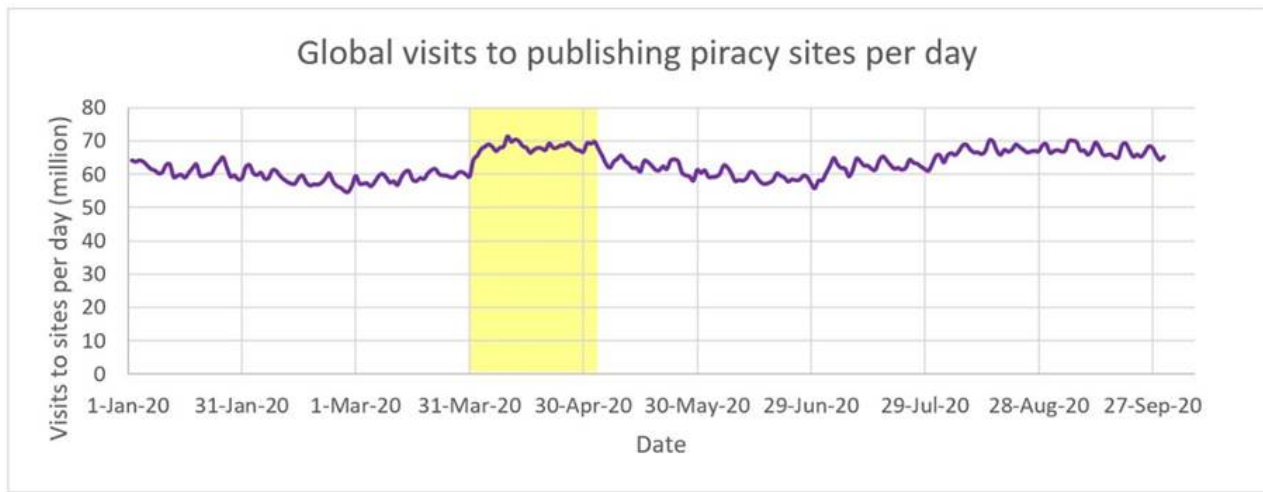
In response to the pandemic, therefore, major publishing houses – including Macmillan and Penguin Random House – altered the terms of their eBook licensing agreements in libraries' favour. This often involved cancelling recent fee increases. Macmillan's controversial eight-week embargo on new releases for library eLoans is a primary example. Following much backlash and even boycotting from libraries (Coan and

Parker, 2020), Macmillan abandoned the embargo in mid-March of 2020, and also temporarily reduced some eBook licensing prices to support the expansion of library collections (Sargent, 2020). Penguin Random House and HarperCollins also softened the terms of their eBook licence agreements (Zeidler, 2020). The senior director of public policy of the American Library Association (ALA) lauded the changes, saying that the more flexible terms offered by Penguin Random House allowed libraries to 'support [their] communities in a period of unprecedented need' (Inouye cited in ALA, 2020). Individual librarians echoed the sentiment (ALIA, 2020a; Zeidler, 2020). Although readers may not be aware of the fluxing costs of library eBooks, these changes certainly benefitted them, as libraries were better able to cater to their needs. Some benefit likely carried over to authors and publishers, given that libraries were able to purchase more eBooks.

However, the previous high costs and restrictive licensing models were not imposed solely to satisfy corporate greed, contrary to what librarians may suggest. Justifying the implementation of the eight-week embargo in October of 2019, Macmillan CEO John Sargent asserted that almost half of eBook reads in the USA are mediated via libraries, and that for each circulation of a digital library book, Macmillan earns 'well under two dollars and dropping' (Sargent, 2019). This reflects a very low rate of compensation for authors. Indeed, at the time the embargo was implemented, libraries were responsible for only 15 per cent of Macmillan's eBook revenue, despite mediating 45 per cent of eBook reads (Trachtenburg, 2019). The price hikes and tighter restrictions imposed by publishers attempted to improve these conditions for authors, as well as for publishing houses themselves. However, COVID-19 all but required publishers to loosen restrictions and provide eBooks to libraries at lower costs again. This reinstated the initial problem of low compensation per copy, even as libraries licensed more eBooks (ALIA, 2020a). On balance, given the surge in popularity of digital media, the alteration to library licences was quite possibly disadvantageous for publishers and authors, at least in the short term. Admittedly, this is merely an informed guess; gathering data on this phenomenon is difficult, and it remains possible that increased borrowing of eBooks led (or will later lead) to subsequent purchasing of those books by library patrons.

COVID-19 also appears to have increased the incidence of piracy, particularly eBook piracy. In 2020, online piracy spiked in late March, remained high throughout April, and declined again in May (MUSO, 2020), which corresponds with the initial lockdown periods that many countries implemented in the face of COVID-19. Daily visits to piracy sites increased from 350 million (350M) globally in February to 410M in early April, an increase of 17 per cent (see Figure 1). This data, collected from the anti-piracy technology company MUSO, includes visits to piracy sites for film and television, music, games and publishing. Visits to publishing industry-specific piracy sites (primarily sites offering Manga and eBook downloads) also increased by approximately 17 per cent, from 60M between January and March to 70M in early April. Interestingly, the percentage increase in piracy of eBooks was much greater than that for piracy in general. Traffic to the popular eBook piracy site *pdfdrive.com* spiked by 36 per cent in early April, increasing from 7.5M to 10.2M. This is more than double the increase for piracy across all media formats, which suggests that eBooks became particularly popular for pirating during the lockdown.





**Figure 1:** Number of visits to publishing piracy sites in all recorded countries per day, from January to September 2020. Yellow indicates the major lockdown period imposed by COVID-19 (March 31–April 30). Data obtained from MUSO.com.

What is responsible for the upturn in the relative popularity of eBook piracy? Unlike legal access to free digital media, accessibility of piracy and torrenting sites did not significantly increase during the lockdown. Therefore, the increase in piracy across all media predominantly reflects an increased demand for free digital entertainment. Similarly, the relative popularity of eBook piracy reflects greater demand for free eBooks, either because more people pirated books during the pandemic or because the same population of people visited piracy sites more frequently, or some combination thereof. But why would this occur to a greater extent with books than other media? The answer may relate to lockdowns changing the availability of various book formats. Movies, television and music have all been predominantly digital since long before COVID-19 arose. Books, however, remain popular in print format, and COVID-19 reduced the accessibility of print books. Selective paperback readers – comprising over 70 per cent of the reading population (Watson, 2018) – were confined to exploring new titles digitally thanks to lengthy shipping times (Australia Post, 2020) and the closure of bookstores and libraries. It is reasonable to conclude that some of these readers may have been unwilling to pay for a format they consider ‘substandard’, and therefore turned to libraries and piracy to obtain the content for free rather than purchasing their own eBooks. This could explain the disproportionate increase in piracy of books compared to other media, since their digital-only nature protects music, film and television from this effect.

In response to the pandemic and lockdown, as well as other 2020 events, waitlists were suspended for some digital content. Across the USA in June and July, many anti-racism books were offered as ‘no-hold’ eBooks and audiobooks, donated by Overdrive in support of the Black Lives Matter movement that was greatly active at the time (Grunenwald, 2020). Many of these books proved highly popular; library circulation of anti-racism books spiked by almost 300 per cent in June (Freeman, 2020). In particular, *How To Be An Antiracist* by Ibram X. Kendi circulated on bestseller lists for 18 weeks (*New York Times*, 2020). Librarians and associated parties have cited Kendi’s commercial success as evidence that access to free library eBooks does not hurt sales, even with concurrent accessibility (Albanese, 2020). This suggestion supports their argument that publishers’ licensing models, which intend to compensate for reduced sales due to library accesses, are unfounded and unfair. It is interesting to consider whether the success of *How To Be An Antiracist* occurred because of or in spite of its no-hold library availability across the USA. Certainly, the prominence of the Black Lives Matter movement at the time was a major driving factor. It is difficult to assess whether sales would have been impacted (and if so, in which direction) had the book not been donated by Overdrive.

The Internet Archive also chose to suspend waitlists throughout the lockdown, launching the National Emergency Library (NEL) in March. Over 1.4 million books were made available for concurrent access for patrons across the world until the end of June 2020 (Freeland, 2020a). This was intended to address an ‘unprecedented global and immediate need’ for access to digital resources during the pandemic for research and entertainment purposes (Freeland, 2020a). The Internet Archive created the NEL on behalf of disadvantaged students and readers. Accordingly, they reported ‘elation’ (Kahle, 2020) and ‘delight’ (Freeland, 2020b) from teachers, librarians and parents in response. However, authors and publishers were generally much less appreciative. Representatives of the Internet Archive asserted that they ‘made it easy’ for authors to opt-out and withdraw their books from the NEL (Freeland, 2020a); nonetheless, the Author’s Guild called the NEL ‘appalling’ and accused it of ‘hurting authors [...] at a time they [could] least bear it’ (Preston cited in Flood, 2020). Nicola Solomon of the UK’s Society of Authors labelled it ‘piracy, pure and simple’ (cited in Flood, 2020). Indeed, the Internet Archive was on shaky legal ground even before launching the NEL, given their use of CDL as a distribution model rather than eBook licensing. The NEL violated CDL’s ‘loaned to owned’ ratio, weakening their legal position further.

Author Barbara Fister supported the Internet Archive’s actions, tweeting that she ‘couldn’t be happier’ about discovering her own books in the NEL (@bfister, 2020). Fister asserted that the Internet Archive has the ‘moral high ground’ for ‘consider[ing] the public good in this crisis’ (Fister cited in Hanamura, 2020). Notably, Fister’s twenty-year-old novels are no longer offered by most public libraries, meaning that their availability in the NEL conferred more advantage (through increased accessibility, which may recruit new readers) than disadvantage (through lost sales that were relatively infrequent regardless in Fister’s case). Fister is therefore in a different position to many front-list authors who protested the NEL, including Pulitzer prize-winner Colson Whitehead (Flood, 2020). Authors who currently stand to profit from retail sales were theoretically more threatened by the NEL. Evidence is conflicting about how much the NEL, legitimate or not, might have damaged sales. As previously discussed, there is some evidence that piracy displaces sales (e.g. Stiefvater, 2017), at least for front-list authors, and Macmillan’s CEO claimed that even legitimate library eBook loans ‘cannibalise’ sales (Sargent, 2019). Conversely, Ibram X. Kendi’s success proves that free, unlimited digital access does not preclude a book from selling well. Additionally, a 2019 study using Google Books data found that digitisation of public domain books increased sales by 5–8 per cent on average, with a much sharper increase of up to 35 per cent for more obscure works (Nagaraj and Reimers, 2019). Other studies (Eelco *et al.*, 2018; Snijder, 2010) suggest that Open Access scholarly manuscripts sell just as well as their paywalled counterparts. This evidence offers some support to the Internet Archive’s argument that their work is not harmful (Hanamura, 2020), especially to back-list authors like Fister. However, significant differences between the NEL and these studies – Google Books only grants access to out-of-copyright works, and academic monographs are inherently accessible only to a tiny minority of the population – mean these conclusions are far from directly transferrable.

In her support of the NEL, Fister is an outlier among authors and publishers. Indeed, the NEL was cancelled two weeks ahead of schedule due to a lawsuit jointly filed by Penguin Random House, HarperCollins, Hachette, and John Wiley and Sons (Harris, 2020). The lawsuit accuses the Internet Archive of piracy, declaring not just the NEL but also the Internet Archive’s entire mode of operation (including CDL) to be ‘mass copyright infringement’ (Harris, 2020). Fister acknowledged the dubious legality of the NEL but argued that ‘copyright isn’t working as it should’ (Fister cited in Hanamura, 2020), suggesting sub-optimal legal systems are to blame for any conflicts rather than the Internet Archive and its actions. The legal and ethical debate around the Internet Archive and NEL is a manifestation of the conflict between author’s rights to be paid for their work and the public interest – the rights for all people to have equitable access to information.

**Fair Use** is somewhat ambiguous as it applies to CDL, and ethical justifications are reasonable enough on both sides that it is hard to predict the outcome of the court case, which is ongoing at the time of writing (Albanese, 2021; Richards, 2020: 4).

## Conclusion

The digital aspect of the publishing industry is changing and developing, and the COVID-19 pandemic induced further changes by increasing demand for free information and entertainment. Visits to both piracy and library sites – with the Internet Archive and its National Emergency Library occupying the grey area in between – spiked during the lockdown months. Overall, the recent changes to free digital media distribution generally seem to disadvantage authors, with increased piracy and lower library licensing costs. Changes brought on by the pandemic have disrupted the balance between protecting the rights of authors and serving the interests of the public. This balance may settle at a new equilibrium as the digital publishing ecosystem adapts. In particular, publishers will need to reassess their eBook licensing terms to maintain a fair and sustainable system for all parties. Additionally, the outcome of the lawsuit filed against the Internet Archive will either confirm or disprove the legality of CDL, potentially changing the digital playing field for book lending permanently.

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## List of illustrations

**Figure 1:** Number of visits to publishing piracy sites in all recorded countries per day, from January to September 2020. Yellow indicates the major lockdown period imposed by COVID-19 (March 30–April 31). Data obtained from MUSO.com.

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## Glossary

**eBook licensing:** Libraries pay publishing companies for licences that allow them to hold and lend eBooks under certain conditions as dictated by the publisher. This is in contrast to purchasing ownership of a book, in which case the owner may do what they like with the book.

**Restrictive licensing:** Publishing companies impose certain restrictions on what the library or the reader may do with the eBook; for instance, readers are typically prevented from copying the text, saving the file to their device, or sharing the file. Restrictions for libraries may include an upper limit on how many times the eBook may be lent to readers before the licence expires and must be repurchased, or a length of time before the licence expires, or both.

**Internet Archive:** An archiving organisation based in the USA that, among other things, digitises physical works for the purpose of preservation. These digitised works are made available for free access to online patrons via the Open Library. Their major focus is on digitising historic works, which are in the public domain; however, more recent publications are also collected.

**Fair Use:** An 'exception' of sorts to copyright law. Copyright law prohibits copying or reproducing of works for a certain period of time after its first publication. Fair Use applies in certain circumstances, usually for criticism, commentary or mockery of a copyrighted work.

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# Comments on Intersectionality

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## Abstract

*[The] struggle for liberation has significance only if it takes place within a feminist movement that has as its fundamental goal the liberation of all people.*

*(hooks, 1981: 13)*

In the words of Audre Lorde, 'there is no such thing as a single-issue life' (Black Past, 2012). Radical Black feminist literature has discussed the legal or otherwise non-legal disadvantages of living multiple-issue lives. Discrimination can no longer be considered from a single-axis view. Intersectionality, as a key concept, appreciates and discusses the very intersecting axes of discrimination. This contribution would argue that the contemporary rule of law, and otherwise non-legal structures, still fail to adequately recognise an intersectional approach. In so failing to apply the theorem in a systemic approach, there has been an obstruction of the encasement and appreciation of a diverse world population. This article addresses the growing lacuna of society in moving towards true freedom and equality.

**Keywords:** Black feminism, intersection of identities, intersectionality in multiple frameworks, limitations of legal analysis, radical Black feminist ideologies

## Introduction

Although a key tool of analysis (Mattsson, 2014) in academic feminism and legal discussion, it has become patently evident that contemporary legal and non-legal frameworks manifestly fail to recognise and subsequently *apply* an [intersectional approach](#). Through this article, I aim to assess, understand, and discuss Kimberlé Crenshaw's intended assertion found through her paper: 'Demarginalizing the Intersection of Race and Sex' (Crenshaw, 1989). Crenshaw (re)introduces and critically contemplates the modern distortion of Black women, either due to the (continued) emergence of white feminism or a misunderstanding of the foundational importance of intersectionality. An epistemic approach demonstrates that Western nations continue to be plagued by emphatic racial and gendered injustices. While Crenshaw's decompartmentalisation of intersectionality pertains to the United States of America, this article – if not a legalised analysis – aims to address that, as a standalone idea, intersectionality is microcosmic in nature as some academics have suggested (Williams, 2009: 93), with relevant paradigms to reiterate this view.

Crenshaw's article (1989) has reignited academic (or otherwise) thought around the importance of considering the multiplicities in our livelihood, due to frameworks that seek to compartmentalise, if not individualise, us. Her discussion is a useful (starting) point in the furthered exploration of [critical race theory](#) and Black feminism. To effectively address and discuss her ideas, there must initially be a discussion of what *intersectionality*, in and of itself means. From the offset, Crenshaw establishes herself as a contemporary of existing [Black feminist theory](#), outlining that there is often a 'tendency to treat race and gender as mutually exclusive categories of experience and analysis' (Crenshaw, 1989: 139). Audre Lorde, a quintessential Black feminist, outlined that there is 'no such thing as a single-issue struggle because we do not live single-issue lives' (Black Past, 2012). Echoing these very same sentiments in a USA that was in the

midst of its post-enactment of the Civil Rights Act of 1964, Crenshaw aims to shine a light on what it means to be not only Black, but also a woman, and what this *intersection* of distinct identities realistically means. Reiterating Lorde's sentiments, Crenshaw insists that a focus on 'singular issues', especially through a [single-axis analysis](#), manifestly fails to recognise and leads to the marginalisation and isolation of 'those who are multiply burdened' (Crenshaw, 1989: 140). Furthermore, considering Crenshaw's concepts more intrinsically, she makes a distinct clarification in which she outlines how traditional (if not first wave) feminist theory has 'created a distorted analysis of race and sex' (Crenshaw, 1989: 140) solely on the basis of compartmentalising 'Black men and all women' or 'Blacks and white women'. (Crenshaw, 1989: 140) This conscious distinction proliferated by a system of racial capitalism (Robinson, 1983), in vitro our socio-economic frameworks, has barred a basic comprehension that (more often than not) these elements *coincide* organically. This contribution would argue that various structures of the law, education, healthcare, and so on *consciously* ignore this organic coinciding. Perhaps more important to note is the inherent individualisation of the ordinary person in our current system and metrics. Capitalism individualises all of us (Bromley, 2019) – specifically those that are relegated to the margins of society. White feminism operates through the lens of individualised lifestyle choices and discourse. Women are incessantly reminded of the need to be resilient, and operate with a (n unending) positive attitude in order to deal with a long history of inequalities – but I argue that this is simply not enough. An acute distance is established if we follow this train of thought – for the betterment of all cannot come with the acute dismantling of systems, which sees each of us pushed into the periphery *due to* our multiplicities. Important to note, in due continuation, is the basis for much of Crenshaw's paper: the struggle of Black women, especially with regards to feminist theory, critical race theory and political discourse.

## Ain't I a woman?: The USA and white feminism

Crenshaw outlines the marginalisation of Black women in various areas of life, with a larger discussion on what Asafa Jalata refers to as 'the Black Struggle' (Jalata, 2002). The Black liberation movement found in vitro of the Civil Rights Movement effectively and 'legally dismantled institutional racism [but] it failed to eliminate *indirect* institutional racism' (Jalata, 2002: 86). Crenshaw's considerations concur with the propositions Jalata has introduced. The 'problems of exclusion cannot be solved by simply including Black [women or men] within an already established [...] structure' (Crenshaw, 1989: 140). In the eyes of academia, Crenshaw's thoughts serve as a fascinating tool. For contextualisation, Crenshaw's analogy of discrimination is akin to that of traffic in an intersection flowing in 'all four directions' (Crenshaw, 1989: 149). The metaphorical reference is insightful as well as comprehensible. For the sake of her analogy, if an accident were to occur, it cannot only occur from traffic oncoming from one direction, but perhaps from *all* or, at least, *various* directions. In a similar way, discrimination must be considered from more than just a single-axis system or approach. Discrimination remains multi-faceted. If not for the aforementioned reasons, then because 'any analysis that does not take intersectionality into account cannot sufficiently address the particular manner in which [Black women or men] are subordinated' (Crenshaw, 1989: 140).

Undoubtedly, a modern reception of Crenshaw's ideas cogitates that [marginalisation](#) is rife in a disproportionate majority of communities around the world. While critics have challenged Crenshaw's proliferation of intersectionality as an effort to thwart and invert the progress of our collective betterment in a contemporary world, this argument, alongside Crenshaw herself, would refute this debasement of her theory. Rather, the basis of intersectionality is to 'make room for more advocacy and remedial practices' (Coaston, 2019). To truly enact *change* is to introduce collective thinking, governance and systems that encourage nothing *but* [egalitarianism](#). In continuation, this article takes on an epistemic approach in order

to address the lack of attention intersectionality as a theorem receives when white feminism makes (obtuse) use of the term, and the subsequent impact this has on the systemic marginalisation of non-white bodies. (Frankenberg, 1993: 51–84) These pertinent examples are taken from Crenshaw’s original paper, as well as various twenty-first century implications of the failure of (legal, or otherwise non-legal) structures and entities in adequately recognising the *intersection* of various characteristics. This conscious dismissal has left a plethora of non-white bodies relegated to the sidelines of society.

In the case of *DeGraffenreid v General Motors Assembly Div*, a suit was brought forwards against General Motors. The five plaintiffs, all Black women, argued that the employment seniority system ‘perpetuated past discrimination against Black women’. Due to the fact that the suit was not brought on behalf of just ‘women’ or ‘Blacks’, having considered these ‘characteristics’ as ‘singular issues’, but instead on behalf of Black women, the court was ardent in its ruling. It stated:

[The plaintiffs] should not be allowed to combine statutory remedies to create a new ‘super-remedy’. [...] Thus, this lawsuit must be examined to see if it states a cause of action for race discrimination, sex discrimination, or alternatively either, but not a combination of both.

– *DeGraffenreid v General Motors Assembly Div*

Similarly, *Moore v Hughes Helicopter Inc.* presents a canonically similar marginalisation of Black women. It illuminates how courts, in Crenshaw’s words, ‘fail to understand or recognise Black women’s claims’.

It comes as no surprise that Malcolm X also once stated that ‘the most unprotected woman in America is the Black woman’ (Malcolm X, 1962). On a differing note, there is particular issue to be had with the idea of ‘whiteness’ as an overhead concept. In *Moore v. Hughes Helicopters, Inc.*, the court outlined that ‘Moore has never claimed [...] that she was discriminated against as a female, *but only* as a Black female’ (*Moore v. Hughes Helicopters, Inc.*: at 480). In essence, the court raised the question as to how the complaints brought through via the suit itself were ‘adequately represent[ative] of white female employees’ (*Moore v. Hughes Helicopters, Inc.*: at 480), highlighting the failure to embrace intersectionality as a form of analysis while simultaneously contouring and proliferating racist undertones. Instead, the Ninth Circuit centralised white female experiences as the groundwork for gender discrimination on the whole, consolidating the narrow scope of the law to accredit and make note of marginalised peoples: a phenomenon still seen in a modern-day setting.

Furthermore, Crenshaw goes on to argue that *Moore* remains a representative illustration and prime example of ‘the limitations of antidiscrimination law’s [...] normative vision’ (Crenshaw, 1989: 145). In line with this argument, Crenshaw continues to expand on what much of her paper aims to address and tackle: a conscious refusal stemming from a system of law in recognising a multiple-disadvantaged class of people, *such as* Black women. Essentially, this refusal defeats the overhead effort to sincerely restructure an already established hierarchy that places privileged classes, such as white women, on the top in civil lawsuits. The court would not entertain the possibility that discrimination faced by Black women could also be combined, *per se*, with sex discrimination, manifestly dismissing the notion and reality of intersectionality.

In 1851, Sojourner Truth declared ‘Ain’t I a Woman?’, directly challenging the sexist imagery imposed and introduced by white males at a Women’s Rights Conference in Akron, Ohio, who deemed women weak in attempting to permeate the responsibilities of political activity and inclusion. Even in the midst of startling urgency to silence Truth emerging from surrounding white women, she recounted her experiences as a Black woman during the horrors of slavery:

Look at my arm! I have ploughed and planted and gathered into barns, and no man could head me, and ain't I a woman? I could work as much and eat as much as a man, when I could get it, and bear the lash as well! And ain't I a woman? I have born thirteen children, and seen most of 'em sold into slavery, and when I cried out with my mother's grief, none but Jesus heard me, and ain't I a woman?  
– (Flexner, 1975)

As aforementioned, Crenshaw predominantly, if not entirely, focuses on the experiences of Black women in her paper. On enacting her critique of various frameworks that manifestly fail at recognising the intersection of various identities that make up an individual, she glaringly critiques white feminism at its core: what it has achieved, or lack thereof, for *women* on a wider scale. Whiteness, in of itself, can be – and has been – considered hegemonic (Hughey, 2010). Amos and Parmar's argument that white feminism's concern over 'short term gains such as equal opportunities and job sharing' (Amos and Parmar, 1984) aptly and succinctly illustrates how the goals of white feminism have clouded true, long-lasting progress. As Françoise Vergès has argued, 'capitalism has no hesitation in taking up corporate feminism' as the inequality perpetuated by legal and non-legal frameworks has become a larger question based around 'mindset or lack of education rather than of oppressive structures' (Vergès, 2021). Using the election of Margaret Thatcher as a key example – where a conscious acceptance of her virtues and morals are lauded under the guise of a strong female leader – Amos and Parmar argue that these very virtues continue to 'further alienate Black women whose experience at the hands of the British state demands a more responsible political response' (Amos and Parmar, 1984: 4). Gender in relation to class and race *cannot* be separated. The 'cultural and racial myopia of white feminism' (Amos and Parmar, 1984: 5) that imagines women as universal is inherently flawed, ultimately having led to misconceptions of gender relations. Black feminists, such as Crenshaw and Lorde, consistently and artistically defend this notion.

## Intersectionality in the United Kingdom

In exporting the theory of intersectionality and considering it from a globalised point of view, contemporary examples can be found in all corners of the world. The intersections of discrimination remain a phenomenon that an international world has manifested through no effort of its own. Methodically, in a manner akin to Crenshaw, this article continues in employing and exploring other present-day examples with the end goal of further illustrating a series of methodical failures in apt implementation of an intersectional approach. The next critical juncture which this article turns to aims to comment on and analyse the matrix framework of intersectionality within the UK. That there is still issue with the ways the concept translates and interacts with the law cannot be ignored. The category of provisions of discrimination law is exhaustive and enumerated in the UK.<sup>[1]</sup> In light of political and social campaigns for the introduction of various anti-discrimination doctrines and policies, this phenomenon cannot be considered in isolation. Nonetheless, the introduction of anti-discrimination law was inevitable as much as it can be analysed as worthwhile. In lieu of Acts enacted by Parliament to remedy the issues of a non-intersectional approach, there remain fundamental issues perpetuated by the courts that stagnate and stunt advances in a *legal* environment.

Taking, for example, the Equality Act 2010 ('EA 2010'), there is a particular issue to be had with regards to UK legislation on the protection of worker's rights and its continued interaction with a theory such as intersectionality. Under the EA 2010, 'a protected characteristic' (Equality Act, 2010: Pt. 2, Chapter 1; emphasis added) can include race, sexual orientation and religion, (Equality Act, 2010: Pt. 2, Ss 4–12) to name a few. While Section 14 outlines provision to address direct discrimination on 'a combination of two relevant protected characteristics' (Equality Act, 2010: S.14.1), it has never been brought into effect. Instead,

government has deemed it too ‘complicated and burdensome for business’ (Wren, 2018). Furthermore, while the section considers a combination as aforementioned, it can be argued that the reduction to only ‘two relevant characteristics’ (Equality Act, 2010: S.14.1) by nature of ‘dual discrimination’ is lacklustre in and of itself. While identifiable individualities are important to note, it cannot be denied that socio-economic considerations must *also* be made in a holistic effort to enact equality in civil case law. In retrospect, UK discrimination law takes on a distinct approach; allowance solely for a single characteristic to be considered treats identity characteristics as ‘discrete, homogenous groups’ (Smith, 2016: 88). While the limitation was introduced, as the Government Equalities Office states, as a modicum to alleviate ‘unnecessary complicating’ of the law (Government Equalities Office, 2009: Para. 4.6), this does not seem entirely convincing. Although it may be harder for ‘a claimant to provide evidence of [intersectional discrimination], it does not translate into complexity for a court’ (Smith, 2016).

Turning to UK case law, while there is evidence that lower tribunals are considerate of claims that raise intersectional discrimination, they are far and wide apart. In the case of *Nwoke v Government Legal Service*, there exists indicatory endorsement of additive discrimination: categorised as ‘discrimination occurring in relation to more than one ground’ (Solanke, 2009: 728). The claimant, a Nigerian-born woman, found herself in the application process for a job with the Government Legal Service. On further examination of the rankings by the court, it became apparent that the claimant had the lowest ranking out of all her peers, regardless of *race*. All white applicants, regardless of *gender*, ultimately ranked higher than her, even in the case that they had lower degree classifications. As such, Ms Nwoke successfully alleged that she suffered double or additive discrimination. The tribunal found that the single identifiable factor that ranked Ms Nwoke so low on the ranking scale was her race and, therefore, there was unlawful racial discrimination at play. Furthermore, it was also found that white women were not only less likely to be hired in comparison to men, but in the case that they *were* hired, they were paid lower salaries, too. On this illustrative evidence, the tribunal also found discrimination based on sex, placing women at a disadvantage when compared to men (Solanke, 2009: 428). The claimant had proved that both facets of discrimination were not independent of each other, but instead, she was subject to discrimination because she was Black *and* she was a woman. In lieu of this, emphatic opposition can be observed in the higher courts within the UK, such as the Court of Appeal (‘CA’). In the case of *Bahl v Law Society*, Ms Bahl resigned her high-ranking position within the Society on account of ‘race and sex discrimination’ (*Bahl v Law Society*, 2004: para. 4). Ms. Bahl lost her case in the CA, with Peter Gibson LJ holding that:

it is not open to a tribunal to find either claim [race or sex discrimination] satisfied on the basis that there is nonetheless discrimination on grounds of race or sex when both are taken together.

– (*Bahl v Law Society*, 2004: para. 157)

UK courts have been shown to be confined by legislation, by no fault of their own. ‘Discrimination is confined to the single-axis mode’ (Smith, 2016: 91), reiterating Crenshaw’s attitudes, and a systemic failure to consciously enact intersectional approaches leaves many civil cases at the behest of bigotry and non-representative policy. Once again, those that find themselves already on the periphery are pushed to the margins of livelihood.

## Non-legal frameworks and Intersectionality

Non-legal frameworks of society have been shown to be dismissive of intersectionality and its intricately entwined function. Statistics have shown that non-white women experience differential (if not inhumane) treatment in various sectors of healthcare – a key framework that impacts a society’s collective livelihood. A

key example can be found in the USA after the tragedy of 11 September 2001 ('September 11', or '9/11'). It has often been discussed, through statistical data (Cainkar, 2009), that persons perceived to be of Arab descent experienced an increase in harassment, violence and ill workplace treatment in the months and years following September 11 (Lauderdale, 2006). Through her investigation, Diane Lauderdale directly analyses the State of California's relative risk of poor birth outcome in comparison to an exact calendar year following the events of 9/11. Concurring with social epidemiologists who have studied the effects of racial or ethnic discrimination on health consequences and complications (Williams *et al.*, 2003), her data reflects a startling reality: 'ethnicity-related stress or discrimination during pregnancy increases the risk of preterm birth or low birth weight' (Lauderdale, 2006: 197). An entire ethnic community, Arab and Muslim Americans, were subject to a barrage of extreme bigotry. While Lauderdale's results support her hypothesis, they underpin an irrefutably saddening aspect. The misgivings of an already underfunded and troubled healthcare system, fuelled by prejudiced undertones, essentially failed to cogitate the effects of multiple facets of discrimination in an already tense environment for Arab and Muslim women.

In a categorically similar case, the outbreak of the 2019–20 SARS-CoV-2 pandemic has infected and killed Black people in the USA and the UK at excessively high rates. In the case of the former, the Centre for Disease Control and Prevention ('the CDC') has gathered state-wide figures that emphasise a depressive reality: 'Black people overall have disproportionately contracted and (emphasis added) died from the coronavirus' (Rios and Rangarajan, 2020). To illustrate this phenomenon, the cultivation of the following graph (Figure 1) depicts how the state of the current public healthcare system emphasises 'entrenched inequalities in resources, health and access to care' (Eligon *et al.* 2020).

### Fatalities in the Black community due to COVID-19

Data collected from state websites as of April 13, 2020

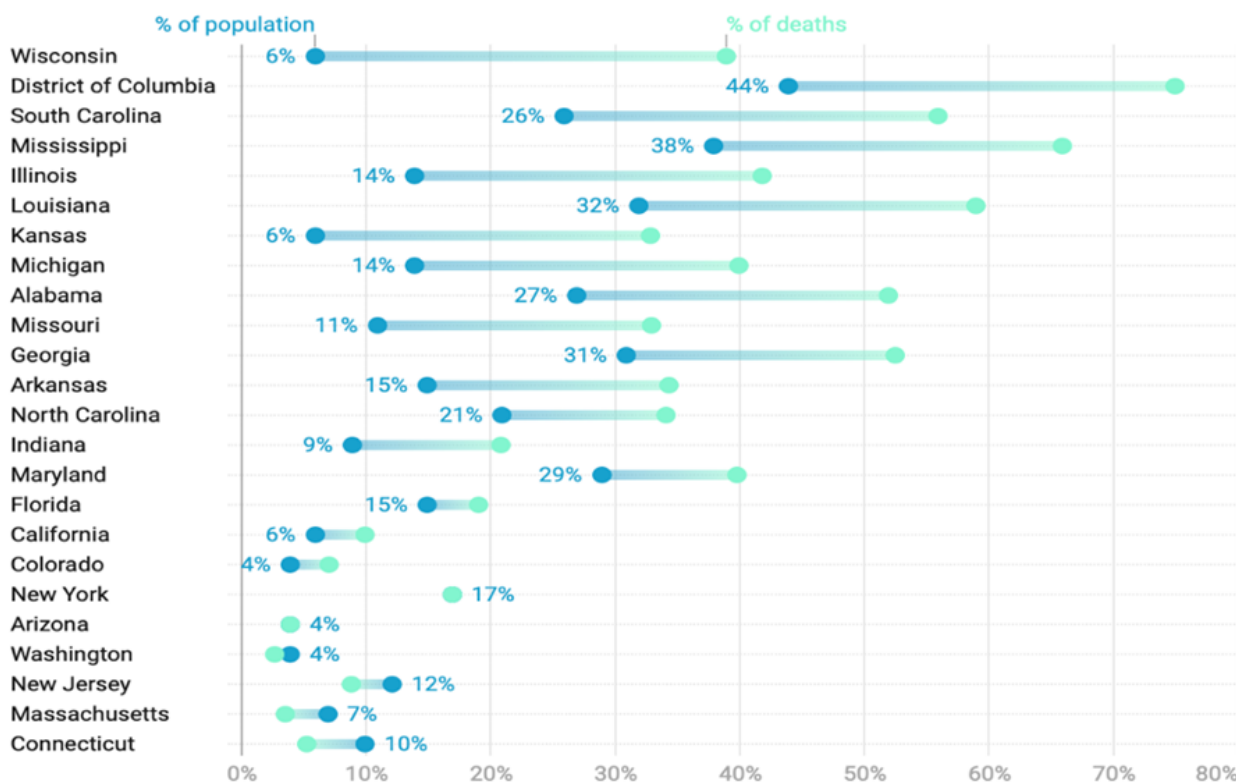


Figure 1: Fatalities in the Black community due to COVID-19.

In the case of the latter, the UK has equally reported chilling statistics around the death of Black British people due to the pandemic. The Office for Statistics (2021) has highlighted the inherent danger of the (ongoing) pandemic on non-white bodies. The list of possible reasons for the unprecedented death toll for non-white bodies is long, as there is no one cause for the racial disparities. (Laveist *et al.*, 2011) Black people are more likely (Gamio, 2020) to work jobs that are considered essential – such as grocers, cleaners, transit workers – putting them at a direct risk of infection and, more morbidly, death. Clyde Yancy insists that ‘a 6-fold increase in the rate of death for African Americans due to a now ubiquitous virus should be deemed unconscionable’ (Yancy, 2020), as well as an indication that a post-racial world is simply a myopic distortion of the realities that we continue to face. While the deadly impact of the virus has subsided due to remarkable breakthroughs in vaccine technology, ‘health care disparities will persist’ (Yancy, 2020: 2). The systemic failures of public healthcare, such as the aforementioned, are simply microcosmic examples of the ineptitude to interact with intersectionality on a wider scope and truly account for the intersection of multiple identities, and how to subsequently *deal* with these multiple identities on a basis of wanting to see the betterment of us all.

## Conclusion

In conclusion, when we ‘fail to acknowledge [intersections of discrimination], much less address these issues, we are failing at diversity’ (Pao, 2016). When applied steadfastly, such as through policy considerations, intersectionality recognises the complexities in an individual’s identity – an occurrence that might not otherwise be accessible through a single-axis method or a one minority marker system. This article has aimed at depicting that intersectionality as a framework, while emerging from a primary legal analysis, also extends to various other socio-economic aspects of our livelihood. An initial analysis of case law in both the USA and the UK depicts a chilling image: a denial by the courts to recognise inextricable entwinement of our various (sociological) identities. In tandem to this, this contribution has articulated that the lack of an intersectional approach is not an isolated phenomenon restricted to the legal stratosphere: it is an extensive, conscious and ubiquitous denial to cogitate the multiplicities in our identities within (virtually) all systems in which we (co)exist. To that end, this contribution would note that as a collective (populace), we can no longer rely on mechanisms and systems that are not built to house an increasingly diverse world population. The interplay, if not mixing, of identities has illustrated the gravitational effect this can have on one’s livelihood. If systems slowly begin incorporating an intersectional approach, the world comes one step closer to a modicum of egalitarianism, akin to what a plethora of Black feminists (or otherwise marginalised peoples and theorists) originally envisioned. On average, intersectionality provides an acute insight as to how the promotion of diversity can ‘prevent and remedy inequalities’ (Truscan and Bourke-Martignoni, 2016: 131), with a holistic end goal of ‘identifying, addressing, and reinforcing universal [...] human rights guarantee’ (Truscan and Bourke-Martignoni: 131). By recognising intersectional discrimination, and continuing to do so, we can truly make progress on achieving meaningful and substantial equality. Or, as Crenshaw puts it: ‘When they enter, we *all* enter’ (Crenshaw, 1989: 167; emphasis added).

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## Notes

[1] The Sex Discrimination Act 1975, The Race Relations Act 1976, The Disability Discrimination Act 1995, The Employment (Sexual Orientation) Regulations 2003, The Employment (Religion/Belief) Regulations 2003, The Employment (Age) Regulation (2006)



## List of figures

**Figure 1:** Figure 1: Fatalities in the Black community due to COVID-19 (Rios, E. and S. Rangarajan (2020). Reprinted with permission from [Mother Jones](#), copyright (2020) Mother Jones).

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## Glossary

**Black Feminist theory:** A philosophical approach that centres on the experiences of Black women and their relation to feminism. This lens emerged out of critiques that mainstream feminism does not acutely analyse the interaction of white supremacy and the patriarchy.

**Critical race theory:** A interdisciplinary intellectual and social approach which seeks to examine the intersections of race, gender, sexuality, society and law in academic (or otherwise) analyses.

**Egalitarianism:** The doctrine that all people (regardless of manufactured differentiating factors) deserve equal rights, opportunities and freedom to live as autonomous individuals.

**Intersectional approach:** Sociolegal analysis encompassing the analysis of gender, class and race.

**Marginalisation:** The treatment of a person, group as peripheral. In the context of this body of work, the process of marginalisation is institutionalised and actioned by the State apparatus.

**Single-axis analysis:** A single-axis analysis treats race and gender as mutually exclusive categories of experience, rather than their inherent symbiotism.

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# Amid Rebellion, Invasion and Revolution: Ottoman Centralisation in Lebanon, 1861-1915

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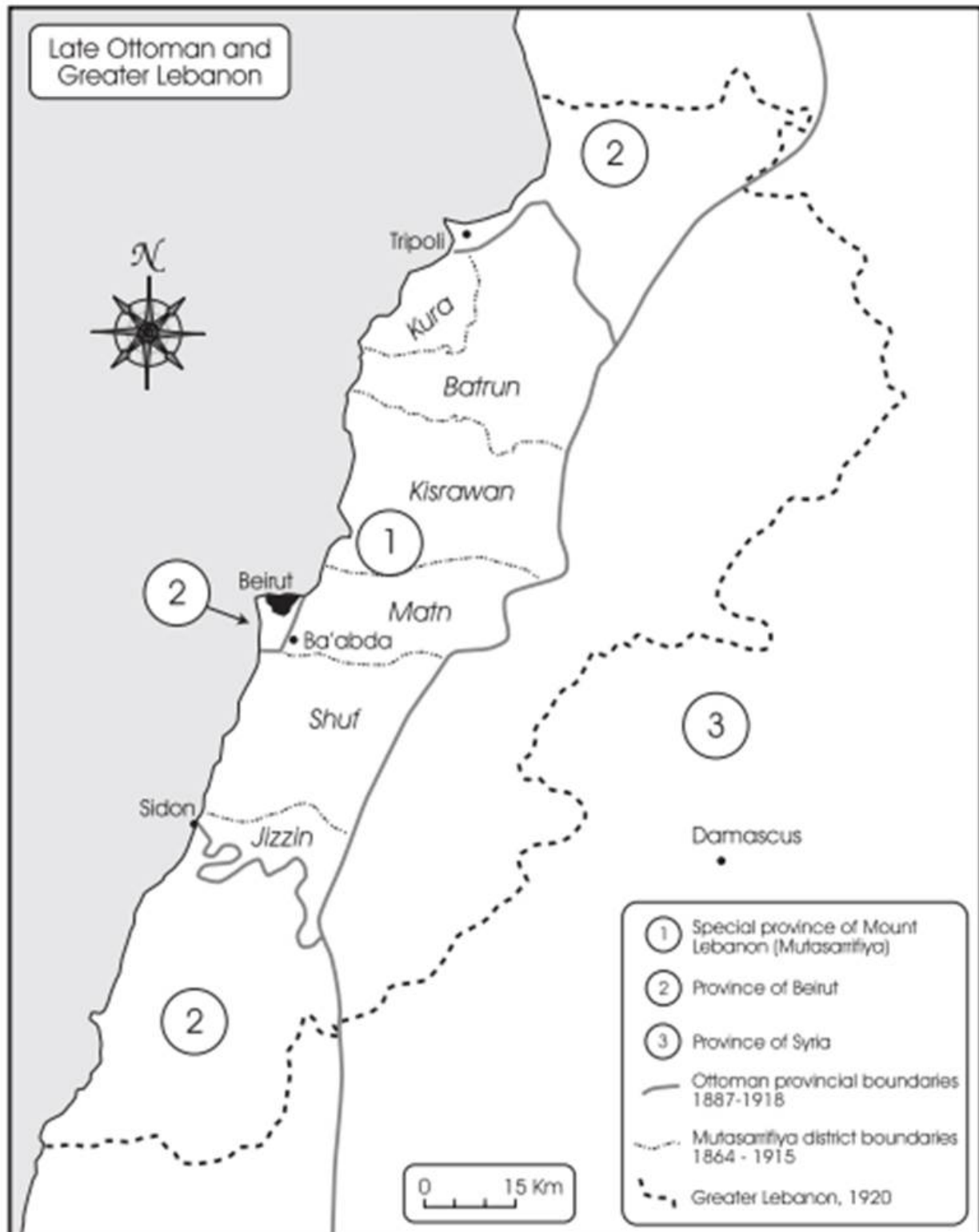


Figure 1: Late Ottoman and Greater Lebanon. Source: Harris, W. (2012)

## Abstract

Times of strife dominate discussion on Lebanon, with the 2019 ‘revolution’ the latest to headline after the civil wars of 1860 and 1975–90. The reorganisation period after 1860, known as the *mutasarrifiyya*, was, however, remarkably peaceful under the Ottomans – although now mainly a forgotten time with scholars neglecting the sources and perspective of the Sultan’s reformers. Instead, nationalist historians used local chronicles and European records to present the *mutasarrifiyya* as nurturing a Lebanese nation. Likewise, later Western accounts, utilising similar material, argued that European contact prepared the Lebanese for independence. Therefore, the existing historiography follows a teleological bent in unearthing supposed signs for the eventual end of Ottoman hegemony.

To counter this approach, I conducted research in the National Archives, supplemented with Ottoman sources referenced in secondary works and guided by theories on colonial centralisation to combat Orientalist narratives. I also looked for evidence of the antagonistic factors of foreign interference, nationalism and internal divides. As a result, I opine that Istanbul’s centralisation was effective to a great extent in precluding European influence and rendering Lebanon’s secession by no means certain. This paper should help reshape our understanding of Lebanese history by accentuating longer peaceful periods over sectarianism and foreign collusion.

**Keywords:** *Mutasarrifiyya*, *tanzimat*, Ottoman ‘borrowed colonialism’, sectarianism in Lebanon, France and Lebanon, elite politics in Lebanon

## Introduction: A land of ‘maladministration, murders and counter-murders’

A century after reforms were begun under Sultan Selim III, the above quote was how the British Foreign Office described the Ottoman Empire (Foreign Office, 1985, vol. 19: 57). While demonstrating the contemporary European presentation of the Middle East as plagued by despotism and violence (Churchill, 1994: 134), this statement further reveals Western accentuation of instability – such as the 1860 Mount Lebanon civil war, the [Maronite](#) rebellions of the 1860s, the Russian invasion of the Balkans in 1877–78 and the 1908 ‘[Young Turk](#)’ revolution – to legitimate and facilitate intervention, defend their interests from these apparent threats and extend their influence. In the 1860 case, massacres of Christians by [Druze](#) forces under the British-backed [Jumblatt family](#) (Khalaf, c.1979: 89–92) were used to legitimate French occupation in 1860–61, despite the Ottoman Government, or Porte, having already restored order under their emissary, the prominent reformist minister Fuad Pasha. This French intervention resulted in the codifying, with the Ottomans, of the *Règlement Organique* as the government statute for [the Mountain](#) from 1861 until 1915, when military rule was established during World War I.

As a result of the voicing of nationalistic opposition to Ottoman repression during the War (Harris, 2012: 173–74) and the subsequent granting of the League of Nations Mandate for a ‘Greater Lebanon’ to France in 1920, the 1861–1915 *mutasarrifiyya* has been overlooked in the historiography as a period of peaceful European influence over a growing secessionist trend. Even when studied in works like Spagnolo’s 1977 *France and Ottoman Lebanon, 1861–1914* – the first to use some Ottoman sources – the West’s documents and interference are accentuated over the perspective of the centralising Ottoman state (Cronin, 1995: 137). Later, the Lebanese scholar Zamir obscures the agency of the Porte too and does not use any Ottoman sources at all. Although contrasting with Spagnolo in stressing France’s role in nurturing a Christian proto-

state (Zamir, 1985: 7–9), both foreground French schemes (Zamir, 1985: 22) and present the *Règlement as de facto*, imposed by the Powers (Spagnolo, 1977: 93).

Similarly, many works exhibit teleological tendencies by accentuating the imminent demise of Ottoman rule and the presence of *antebellum* Lebanese nationalism, even though World War I was needed for these developments. The mid-twentieth century nationalist historiographies of Hitti and Salibi, in particular, present the period as one of ‘tranquillity’ and prosperity needed to form a bureaucracy-in-waiting for a Lebanese nation-state (Salibi, 1965: 116), protected by the governors from Istanbul’s designs (Hitti, 1951: 694–96). In the last 30 years, however, Akarli’s *The Long Peace* was the first to utilise the correspondence between the *mutasarrifs* and the Porte (Akarli, 1993: 1) and emphasised Ottoman officials’ studious concern for the Mountain’s stability to prevent Western intervention (1993: 3, 34, 111 and 189). However, he remains fixated with Lebanon’s eventual secession, concluding that it was ‘quite well prepared’ for independence by 1914 (1993: 184–87). This is despite the fact that the Porte was reforming in the bureaucratic 1839–76 era known as the *tanzimat* (“*Reorganisation*”) and under the authoritarian Sultan Abdulhamid II to centralise control against separatism and foreign intervention.

Therefore, I aim to shift the emphasis towards studying the actions of the Ottoman Government to ascertain how far the *Règlement* system constituted, in practice, a successful example of centralisation by the Porte. However, while I outline a different approach in analysing the primary material, a trip to the Ottoman Archives in Istanbul was unfeasible. Therefore, I rely on the sources used by Spagnolo, namely the documents of the British Istanbul Embassy and Beirut Consulate catalogued as the FO series 195 (Embassy and Consulates, Turkey: General Correspondence) and 371 (Political Departments: General Correspondence from 1906–66),<sup>[1]</sup> in the National Archives in London together with the papers in the British Library of Sir Austen Henry Layard, Ambassador to the Ottoman Empire 1877–80 to provide detail on the concerns of Her Majesty’s government, including for its allies in the Druze Jumblatt family, as well as the perceived influence of France over her Maronite protégées.

To compensate for not being able to access the Istanbul archives, and to check British claims of French interference, I make use of the Ottoman records referenced in Akarli’s *The Long Peace*. This should make an important contribution, as Akarli argues that relying on foreign reports presents Lebanese history as ‘the creation of an outpost of intrinsically progressive Western civilisation in an essentially stagnant, and hence history-less, environment’. Instead, Ottoman sources illustrate the Porte’s agency and success in forming a reliable government and public order (Akarli, 1993: 2–3) against opposition from foreign governments and Lebanese actors. This brings my study closer to works on European empires, such as Cohn’s chapter on post-1857 reconstruction in India in *The Invention of Tradition* (2010: 192), which uses the colonial power’s own documents.

In fact, employing both the British and Ottoman records brings a new dual perspective to studying the *mutasarrifiyya* as, before Akarli, European documents were foregrounded while *The Long Peace* itself used only three direct citations to British Foreign Office sources to supplement the Porte’s material (Akarli, 1993: 43, 45, 51). Therefore, this combination should be sufficient to assess how far centralisation was successful against the first antagonistic factor of foreign interference. The two other factors, however, concern the motivations of Lebanese actors, including the land-owning, religious and nationalist elites. As this article is concerned only with how these actors interacted with the initiatives of the central government, writings by Lebanese themselves are not included in the research. Although I argue that most people in the Mountain expressed their opposition while still respecting Ottoman suzerainty, nationalist or separatist sentiments are

separate topics that I plan to study in future work utilising Arabic-language sources. Rather, this paper assesses whether centralisation from the Porte and their subordinates, the *mutasarrifs*, was strong enough to enforce acceptance from Lebanese. This approach counters the argument of Zamir and the nationalists who use the records of the Ottoman's internal and external enemies to present the *mutasarrifiyya* as an experiment in soft European tutelage and/or local autonomy.

Moreover, to counter contemporary Orientalism, I will employ Deringil's ideas on Ottoman 'borrowed colonialism' outlined in his article on 'The Late Ottoman Empire and the Post-Colonial Debate' (2003: 311). Based on Europeans' colonial 'civilising mission', this concept holds that Istanbul's reformers viewed the provinces as a colonial 'periphery', fusing traditional and European views of these regions as plagued by internecine feuding and therefore, believing that they could only be governed through local intermediaries to prevent conflict and foreign intervention (2003: 316–23). Although this approach would suggest that the elites preserved their autonomy from the Porte after 1860, comparing the Mountain with Cohn's presentation of Victorian India in his chapter in *The Invention of Tradition* provides another perspective. He assesses that the British administration's invention of traditional elites as part of the post-Rebellion restructuring of India was successful in bringing stability until World War I (Cohn, 2010: 208–09). Similarly, the governance of the Mountain was reorganised following a period of conflict and heralded an approximate half-century of comparative peace. The co-opting of many of the old 'feudal' elites – despite that system's abolition by the *Règlement* – into the *mutasarrifiyya* alongside newly emboldened Church leaders possesses striking resemblance to Cohn's understanding of Indian restructuring. Differing approaches by British administrators resulted in the integration of both 'feudal' princes and rising-star region- and sect-based leaders into the ruling hierarchy (2010: 190), drawing both closer to the centre as in the Lebanese case. Furthermore, it can be evinced that, after 1860, opposition by traditional leaders was expressed within the new system. Cohn likewise demonstrated that Indian nationalists formulated their political idiom based on imperial precedent (2010: 208–09).

Most recently, Lebanese journalist Habib Battah's paper 'Structures of Change in Post-War Lebanon' asserts that the success of non-sectarian 'Arab Spring' protest groups in Lebanon challenges 'exotified' expectations for reform in the Middle East that foreground coups over more subtle, peaceful changes (Battah, 2016: 2). With reference to the 2019 protests, he has further identified that in a, supposedly, sectarian state, a cross-sectarian elite are the real decision makers and not the sects themselves (Battah, 2020). Similarly, the 1861–1915 period has been characterised as a system based around sectarian allegiance, although the sects themselves were not directly represented at the top but, rather, by the traditional land-owning elites. In the words of the historian Ussama Makdisi in his study of the production of the discourse of sectarianism in nineteenth-century Lebanon, the *Règlement* created an 'elitist sectarian system' based on the old notables who 'developed a new and modernised form which still dominates Lebanon today' (2000: 161–162) in the way Battah describes. Therefore, the theory outlined above presents the *mutasarrifiyya* as a peaceful centralisation process to Istanbul using a hierarchical, cross-sectarian social system emboldened by the Porte.

However, to reach a conclusion on whether this initiative was strong enough, I study the relative weight of the antagonistic factors to centralisation, namely European influence and the Mountain's two centrifugal tendencies beginning with Lebanese particularism defined as the Maronites' separatism (Akarli, 1993: 173) rather than wider Arab or Syrian nationalism. This choice has been made using Anderson's definition of 'nationalism' as the striving by an imagined political community united by a shared print language to achieve independence within defined boundaries (Anderson, 2016: 6–7). Therefore, late nineteenth-century

Mount Lebanon's hierarchical social structure and fluid geographical boundaries suggest that the region fits more closely to Anderson's presentation of pre-nationalist orders organised vertically, rather than horizontally (2016: 13), with an elite Maronite separatism more potent pre-1915 than Lebanese nationalism. Following that, the divides in the Mountain's society, including sectarianism and class splits, are studied against the Ottoman policies used to increase ties to Istanbul.

## Keeping the peace amid rebellion, invasion and revolution

The findings of my archival research illustrate a studious concern for the maintenance of peace in the Mountain on the part of the Ottoman administrators. This was especially true during the three times of crisis alluded to in the title of this article: the 1860s' Maronite rebellions led by Yusuf Karam; the 1876–78 period witnessing the Russian invasion of the Balkans and Sultan Abdulhamid II's suspension of the constitution; and the 1908 'Young Turk' revolution, which restored the constitution and elections but, subsequently, aimed for a Turkified administration free of peculiarities such as the *mutasarrifiyya* (Harris, 2012: 149). Prior to the direct rule implemented under the cloak of war in 1915, however, policy emanated from both the *mutasarrif* and the Porte, and so my analysis of the sources referencing centralisation must also be divided into two sections. Firstly, it is evident that Istanbul endeavoured to achieve more oversight over the Mountain's governance. While the 1861 *Règlement* stipulated that the new governor be 'directly responsible' to the Porte (Hurewitz, 1956, Vol. 1: 165), what is important is how effectively this worked in practice, beginning with the first *mutasarrif*, Daud Pasha, who was appointed by Fuad Pasha and confirmed in his position by the Ambassadors of the [Great Powers](#) in 1864 (Akarli, 1993: 34–35). One of the earliest challenges to his authority was the rebellion of the minor Maronite sheikh Yusuf Karam who had been emboldened by the sectarian violence of 1860. However, Daud subsequently deposed this parvenu leader as local governor, or *qaymaqam*, of the Christian Kisrawan district in favour of a member of the established Shihab elite family (Tarabulsi, 2007: 39). Daud attempted to resolve this challenge peacefully, per the Porte's instruction, and even allowed Yusuf 'Bey' to return in 1864 as a conciliatory measure to the Christians, according to Tarabulsi (2007: 44). After Karam restarted his rebellion in January 1866, however, the skirmishes he initiated failed to impede the advance of Ottoman troops<sup>[2]</sup> who encircled and exiled him (2007: 45). Istanbul's correspondence thus demonstrates its effective backing of Daud to nullify the damage wrought by Karam's return, which the British Consul Eldridge claimed had been the 'underhand work of persons at the Porte' (1864e). Opposition allegedly instigated by the scion of the Druze Arslan family was also dealt with centrally when he was exiled to the Istanbul Council of State (Eldridge, 1868).

The Porte's next major tests arrived with the 1876 constitution and the 1877–78 Russo-Turkish War. Previously, the Lebanon Government's budget deficit had been made up from the Beirut Port Customs House to safeguard salaries and maintain effective administration. However, the 1876–78 crisis resulted in the Ottoman Government requisitioning all funds for the war (Eldridge, 1877a), which Eldridge believed could lead to 'serious consequences' arising from this failure of centralised government to pay soldiers and administrators (1877b). He believed that the local volunteer militia could mutiny over their wage arrears if the Mountain's other force, the Christian Dragoons, left due to their desire for frontline service – a striking show, as Eldridge admitted, of patriotism perhaps inspired by good government (1877e). The Dragoons themselves did, indeed, perform well later that year against 'brigands', although Eldridge complained that their commander from Damascus freed the robbers in return for bribes (1877g).

The 1877–78 crisis, however, legitimated Sultan Abdulhamid II's turn to authoritarianism by concentrating power away from the bureaucracy, suspending the constitution and instituting a centralised secular



judiciary, including in the *mutasarrifiyya* where then governor Rustem Pasha's refusal to execute certain rulings triggered a secret investigation. Rustem was exonerated though, and praised for combatting sectarian biases and the Maronite Church's influence.<sup>[3]</sup> The judicial centralisation also extended the Istanbul High Court's oversight over all cases in the Mountain<sup>[4]</sup> in violation of the *Règlement* to standardise law throughout the Ottoman lands. Despite repeated protest, the Great Powers, eventually, acquiesced to the innovation.<sup>[5]</sup> The policy of subordinating the Maronite Church to the Porte also culminated in 1905 when the Patriarch expressed his allegiance personally to Abdulhamid.<sup>[6]</sup>

Following its leading role in restoring the constitution in the 1908 'Young Turk' revolution, the [Committee of Union and Progress](#) (CUP) also sought to increase Istanbul's control. British Consul Cumberbatch reported that a member of the Arslan family, Emin, had been elected MP for Latakia 'entirely under the auspices' of the CUP who induced the popular candidate to withdraw (Cumberbatch, 1909a). Moreover, the Consul later attributed the Mountain's peace, contrasted with an attempted counter-revolution in Istanbul, to the CUP and their significant 'activity and influence' (1909b). They were also, apparently, instrumental in the unilateral prohibition of a Lebanese port, despite Cumberbatch's belief that the *Règlement* was too equivocal on the subject to merit their interference (1909d). Overall, however, a tour of the Mountain left the impression that the constitution had given the inhabitants a greater sense of freedom. Cumberbatch also noted, though, that a CUP official had reminded the neighbouring governors to keep an eye on the *mutasarrif* (1909d).

Often in a dialectical relationship with Istanbul, the governor sought to extend his power within the Mountain. Unfortunately, the article of the *Règlement* abolishing the feudal privileges of elite families was never fully implemented (Hurewitz, 1956, Vol. 1: 166). Still, Consul Drummond-Hay's 1900 complaint that the Arslans remained especially strong was clearly a reflection of the British partisanship towards their rivals, the Jumblatts (Foreign Office, 1985, vol. 19: 155). In fact, Daud's appointment of notables to the district headships was commended by Grand Vizier Ali Pasha.<sup>[7]</sup> The *mutasarrif's* use of imperial troops to destroy a robbers' hideout was further, to Eldridge's surprise, lauded in the Mountain despite memories of soldiers' complicity in the 1860 events and the Great Powers' opposition (Eldridge, 1864b). Daud's superiors also enabled him to purchase the Beit ed-Dine palace over the French bid to secure it as a symbol of their influence (Eldridge, 1864c). Daud then began the management of the Jumblatt estate, which Eldridge appreciated, despite it being an intrusion into the affairs of an erstwhile autonomous family (1864d). He further believed Daud 'produced order and security formerly unknown in the mixed districts' (Eldridge, 1865).

Even after Maronite petitions ended Daud's governorship, Eldridge reported that, by the 1876 'atrocities' against Bulgarian Christians, their co-religionists in the Mountain felt protected by the Lebanon Administration (Eldridge, 1876c). *Mutasarrif* Rustem also managed to diffuse Druze-Christian tensions the next spring despite disturbances elsewhere in Syria (Eldridge, 1877d). Perhaps the most striking of Rustem's successes during the 1877-78 crisis, though, occurred when he used troops to arrest a group of rebellious monks appearing at Beit ed-Dine bearing 'stout cudgels'. The Patriarch's request for aid ensured Rustem's action was well-received and Eldridge, delighted, believed Karam's party extinguished as 'monkish intrigues' had been his primary support (1877i). Further actions, such as the precluding of Druze support for Syrian rebels (Eldridge, 1878b) and the troublemaker Bishop Bustani's surprise exile (1878c), ensured calm amid the general cataclysm.

Crisis averted, Rustem's successor, Vasa, focused on French influence on the *mutasarrifiyya's* Administrative Council, which consisted of 12 members elected to represent the different sects and regions of the Mountain and had the responsibility to 'apportion taxation, supervise the administration of revenue and expenditure, and give an advisory opinion on questions submitted to it by the governor', according to the *Règlement* (Akarli, 1993: 83–84). With influential Maronites' backing, Vasa called elections in 1885, which weakened France's position (Eldridge, 1885). Despite this, he complained to the Imperial Government that more roads were required to bring the Kisrawani Maronites into 'the orbit of civilization'.<sup>[8]</sup> By 1900, however, the British Consul Drummond-Hay believed that road construction was the signal achievement of the *mutasarrifiyya*, with 414km built and 261.5km under construction (Foreign Office, 1985, Vol. 19: 152). Still, Cumberbatch reported after his 1909 tour of the Mountain that its peoples deemed foreign intervention inevitable and desirable (Cumberbatch, 1909d). The following year, relations between the *mutasarrif*, Yusuf, and the Administrative Council also reached a nadir when the former refused to implement the councillors' decisions (1910a). On the eve of World War I, new regulations also, apparently, failed to reform the council's corrupt elections (Cumberbatch, 1913).

Unsurprisingly, the most prevalent antagonistic factor to centralisation in the documents is the foreign interference that had earlier played a crucial role in the creation of the *mutasarrifiyya* itself through British and French support for the Druzes and Maronites, respectively, in the 1860 events and the subsequent compromise agreement between Napoleon III's plans for a Christian emirate under the former Shihab ruling family and the interests of the Porte and Her Majesty's Government (Tarabulsi, 2007: 41). However, Consul-General Moore soon reported supposed evidence of agitation by the French Consul, Bentivoglio, with Kisrawani Maronites to replace the statute with a Shihabi emirate (Moore, 1861b). Although this plan failed, due partly to Moore's reciprocal meddling to alert the reformist Fuad Pasha, French influence was soon weighing upon Daud's appointments. The Kisrawan *mudir*, Emir Mejid Shihab, admitted to Moore that the 'intervention' of Napoleon III's government had secured him his position (Moore, 1861c). Still, the Patriarch later confided to Her Majesty's Consul, Eldridge, that Bentivoglio advised him to accept the *mutasarrifiyya* as it enjoyed the support of the other sects, the Great Powers and the Ottoman Government (1864a).

Despite the substitution of the [Second Empire](#) for the [Third Republic](#), Bentivoglio's successor Tricou opposed any new freedoms for the Lebanese and united with Eldridge against an 1875 decree implying a 'direct administrative link between the Empire and Lebanon'. Eldridge informed Ambassador Elliot on 15 January 1876 of his opposition; by 17 January, Istanbul had instructed Rustem that the decree was merely for his own information (Eldridge, 1876a). The British Consul also acquiesced to Tricou's intervention to exclude the Mountain from elections many Maronites believed contravened the *Règlement* (Eldridge, 1876c). Although the French Consul then incited Maronites to arm against a supposed Druze attack, this effort failed after the intervention of Eldridge and Rustem (Eldridge, 1876b). Following the Russian invasion, though, Eldridge asserted that the schemes involving rebellious monks and Bishop Bustani were only thwarted with the French Consul's backing (Eldridge, 1877h and 1878c).

Once the situation had calmed, the British returned to the problem of their Jumblatt protégés' exclusion from government, although Eldridge held off from intervening unless 'force' was used by Rustem and the Arslans (1879: 161). The new French Consul, Patrimonio, was also, apparently, disgruntled at Vasa's refusal to follow his advice, despite his role in the *mutasarrif's* appointment while his attempt to secure a Francophile on the Administrative Council also failed in favour of Vasa's nominee (Eldridge, 1885). Although triumphant here, Vasa's correspondence with the Porte reveals that he believed that the French were determined to interfere in his appointments and the elections to scupper sound administration and prove

the Ottomans' inadequacy to rule.<sup>[9]</sup> The primary cause of concern for Eldridge at this time, however, was Kupelyan Effendi, Vasa's son-in-law and 'executive secretary', who was widely believed to be behind the proliferation of bribery in the administration (Akarli, 1993: 54). Failing to persuade the Istanbul Embassy to act, he relied on his friendship with the Anglophile Grand Vizier, Kamil Pasha, to have Kupelyan exiled.<sup>[10]</sup>

Eldridge's death in 1890 after over a quarter of a century as Consul resulted, eventually, in increased policy agreement with the French and Maronites under the Catholic Drummond-Hay (Drummond-Hay, 1895). However, during the 1902 Ambassadorial conference on revisions to the *Règlement*, the Powers were too divided to implement any new measures to increase their respective spheres.<sup>[11]</sup> On the eve of World War I, France even refused the Ottoman's suggestion for a Lebanese Catholic *mutasarrif* as they feared his popularity 'might be too easily placed in the service of the Porte', according to Spagnolo (1977: 280). Economically too, French influence was patchy. While most silk was exported to the Third Republic, Lebanese olive oil and cotton were mainly consumed within the Ottoman Empire. Moreover, approximately a third of Lebanese migrants chose other Ottoman vilayets over European colonies (Foreign Office, 1985, vol. 19: 148–50).

The last two antagonistic factors of Lebanese particularism and internal splits are the scarcest in the documents. Relating to the motivations of the Lebanese themselves, neither the British Consuls-General nor the Porte were concerned unless they presented a serious threat or advantage to their interests. The first motivation to be analysed is the growing sense of a Lebanese particularism often corroborated using the recurrent rumours of Karam's return, including in 1868 (Rogers, 1868a). In 1876, Eldridge also reported that the constitution produced little excitement among the populace, who were more concerned about whether the new status quo would affect their privileges (Eldridge, 1876d). Furthermore, the following year, he commented that the Lebanese were uninterested in the war and contrasted 'their happy position with the state of anarchy' and 'fanaticism' elsewhere (Eldridge, 1877f). Although Eldridge also defended Rustem against claims by the Istanbul Press that he was unpatriotic, the Consul admitted that efforts to raise Lebanese recruits in 1877 had failed miserably (1878a).

Likewise, Abdulhamid's April 1909 counter-coup attempt against the 'Young Turk' revolution did not, according to Cumberbatch, interest the people of the Mountain (Cumberbatch, 1909b), who were desirous of a European mandate. Cumberbatch also opined that opposition to the Porte's prohibition on the Jounieh dock was inspired by 'racial animosity' towards the Beirut Muslim merchants who they believed blocked the project (1909d). He did earlier state, however, that this issue was not a *cause célèbre*, but the work of a small group agitating to alienate the province from the Ottoman reformers (1909c). Likewise, Cumberbatch dismissed press attacks against *mutasarrif* Yusuf as the work of disgruntled former officials (1910b).

Counterpoised with the examples of embryonic Lebanese nationalism are the divisions between the Mountain's different demographics. In contrast to scholarship accentuating the sectarian animosities, the Foreign Office despatches detail the political and class cleavages within the sects, dominated by the former 'feudal' elites. During his time as Kisrawan *qaymaqam*, the legendary Karam was not supported by either the bishops or the French desiring a Shihabi government (Moore, 1861a). By 1864, years into Daud's administration, the Patriarch still wanted a native governor or an electoral system abandoning sect-based representation. As the Maronites constituted a demographic majority, Eldridge's assumption that this system was desired to increase their power appears vindicated (1864a). The Catholics, however, were still not united in 1868 when Acting-Consul Rogers reported that the Khazin shaykhs had forced downtrodden

peasants to sign petitions against Daud. The mixed districts' Christians were also 'indignant' at their co-religionists' agitation against Daud, who they credited for providing security (Rogers, 1868b).

The crises of 1876–78 also threatened to disturb the peace between Maronites and Druze. Whereas those opposing Lebanese participation in the 1876 Ottoman elections were mainly Christian, Eldridge believed that most Druzes agreed with him that not cooperating would be viewed as 'insubordination' by the Porte (Eldridge, 1876d). The uncertainty caused by the Russian invasion then triggered both sects to arm in case of 'future eventualities'. Unsurprisingly, Eldridge did not question the Druzes' claims to self-defence and opined that the Maronite Bishop at Beit ed-Dine was behind the agitation to discredit Rustem (1877c). Indeed, the Maronite Patriarch's delegation was absent when the *mutasarrif* was cheered on his return from Istanbul by the other sects' representatives (Eldridge, 1878d). In contrast to British and French sponsorship for them, Vasa complained about the *de facto* survival of the abolished tax-farming elites as they had continued their exploitation of the commoners, or *ahali*, meaning that the benefits of the Mountain's prosperity were not felt by all classes. [\[12\]](#)

## Centralising amid rebellion, invasion and revolution

It is evident that European interference was rife in this period. Indeed, Zamir argued that France's intervention created the *mutasarrifiyya* to undermine Ottoman sovereignty until conditions were right for Lebanon's independence under French tutelage (Zamir, 1985: 9–16). The French further prevented the Porte from extending the elections to the Mountain while Vasa's belief that Paris desired to expose the inadequacy of local rule does not appear unfounded in light of Consul Bentivoglio's repeated meddling. Fear of interference also restricted the Ottomans to pursuing peaceful resolutions by exiling rebels like Karam and co-opting old elites.

However, a need to avoid hostilities did not stop the Porte and the *mutasarrifs* from centralising control into their own hands at the Great Powers' expense. France's refusal to use 'force' stifled their plans for a Shihabi emirate and fitted with the Ottomans' 'borrowed colonialism' to 'civilise' leaders and preclude a need for foreign aid by instituting sectarian representation (Deringil, 2003: 316–18). Therefore, Vasa had enough influence to marginalise Francophiles of the Administrative Council and influence France's decision to reject a Lebanese Catholic governor, one of their main avowed goals. Constant competition between the Powers, especially at the 1902 Ambassadorial conference, also reduced their influence in the Mountain. Exploiting this, the Porte prevented the Jounieh scheme, extended judicial control and ensured that Lebanon did not distract them from constitutional crises and invasions. Evidently, as Battah opined, reform could be successful and peaceful, not fitting with the Western expectation of Middle Eastern change as resulting from regime overthrow (2016: 2).

Despite this, elevating the Mountain's elite groups could have engendered a unique identity among Lebanese. Akarli argued that Lebanese nationalism was developed by 50 years' experience of 'modern government' separate from the other Ottoman provinces (1993: 184–87). For example, it has been detailed that Lebanese gained experience in the militia and the Administrative Council while roads also brought remote villages in communication with the rest of Lebanon. Reports abound that the Mountain's inhabitants grew increasingly unconcerned or self-interested when it came to developments in neighbouring provinces and the 1876/1908 Constitution. By the latter date, the CUP were wary of the increasing independence of the *mutasarrif*.

Still, it is clear that none of the separatist movements possessed large appeal across Lebanon as they remained wedded to certain constituencies, vertical hierarchies and differing conceptions of Lebanon to adhere to Anderson's definition of 'nationalism'. Thus, grievances presented by Akarli as engendering nationalism widely, such as the Porte's prohibition on the Jounieh dock (1993: 75), were restricted to a small, literate elite venting their anger not towards Istanbul but to the hoped-for capital of the supposed Lebanese nation: Beirut. Many leading politicians, such as those from the Arslan family, also remained tied to affairs outside of the *mutasarrifiyya* and the initiatives of the centralising state, while Lebanese appreciated the use of government troops against agitators such as Yusuf Karam and Bishop Bustani.

Another task for the Ottoman state post-1860 was combatting the vested interests and divisions that had caused the conflict. Hitti opined that a policy of divide-and-rule was to blame (1951: 694), and we have seen that certain bureaucrats wished to weaken the *mutasarrifiyya* and benefit themselves by instigating Karam's return or taking bribes. However, the Porte later ensured Karam's defeat while the *mutasarrifs* precluded the growth of opposition by co-opting the feudal classes, similarly to how Indian leaders, according to Cohn, were subordinated (2010: 165–66). Likewise, Istanbul now wielded enough control to appoint Ottoman bureaucrats in place of indigenous emirs, exile meddling leaders like Arslan and restrain the Maronite Church through interventions to expel troublemakers and provide representation for the other groups. Although the Church was not incorporated into the official *millet* system, support for separatist leaders was restricted, with the mixed districts' Christians repelled by the agitation of their Kisrawani co-religionists. Most strikingly, the Ottomans' work against divisions prevented any major outbreaks of Lebanon's sectarian violence, even as the 1876–78 crises led to massacres elsewhere. As Battah noted in his appraisal of the current crisis in Lebanon, it is a cross-sectarian elite who make the decisions (2020), and they had now been subordinated to Istanbul's project of reform.

## Conclusion

Therefore, we have seen throughout that the maintenance of Ottoman suzerainty, let alone initiatives to centralise their rule, faced significant challenges with foreign interference rife in the *mutasarrifiyya*. Vasa was convinced that France wished to end Ottoman rule altogether through meddling in sectarian and intra-elite conflicts, especially during the crises of 1876–78 and 1908. A feeling of separateness from the rest of the empire was also growing among some Lebanese when they refused to shoulder the collective burden of defence and reform. The policies of the *mutasarrifs* and the Porte, however, demonstrate that both were aware of these challenges and the strategies to thwart them without triggering further conflict. As Cohn argued with regards to British invention of Indian elites, the Ottomans institutionalised sect-based representation under religious and former 'feudal' leaders, which endures to this day. Opposition also came to be expressed peacefully, while Istanbul was able to exile leaders like Arslan without recourse to violence or European aid. Thus, it is, surely, not certain that the British Raj was stronger in imposing its rule on local leaders, whereas the Ottomans had to rely on intermediaries to prop-up their suzerainty.

The co-opting of Lebanese leaders also reveals the quasi-Orientalism of Ottoman statesmen like Fuad Pasha, who believed that sectarian and feudal representation was the only way of pacifying tribes known for their 'age-old' feuds and 'ignorance' (Makdisi, 2000: 3–5). The efficacy of this policy also shows the continued strength of pre-national hierarchies, per Anderson, and, therefore, the restriction of nationalism to small groups. The rare yet decisive use of imperial troops too ensured that rivalries and sectarianism did not cause widespread violence or prompt further Western intervention. Thus, it can be seen that Ottoman centralisation, from the Porte and Beit ed-Dine alike, was successful to a great extent in the period 1861–

1915, bringing the Mountain closer than ever to Istanbul, with secession less likely than in 1860 when European influence and social tensions had been more potent. This then undermines the teleological viewpoint of 1915 Mount Lebanon as, merely, a proto-state waiting for French occupation to deliver the *coup de grâce* for Ottoman suzerainty.

Still, not having access to the Istanbul archives does make it difficult to see how far the co-opting of elites and maintenance of peace were part of a sustained colonial mission or merely reactive measures to remain in control. Even Deringil concluded that 'borrowed colonialism was fated to remain an art of the possible' and too reliant on intermediaries' goodwill (2003: 339). Although the exile of rebels in Lebanon suggests otherwise, further study of Ottoman sources would be required to ascertain how far these actions relied on the co-operation of local powerbrokers. Two areas for future research are the documents in Abdulhamid's Yildiz palace and the *mutasarrifiyya* records held in the National Museum of Beirut, both of which Akarli did not exhaust (1993: 203–04). These could illuminate whether Istanbul could impose its will on distant subjects as the British could in Cohn's presentation of India.

It is evident that my research could have significant implications for our understanding of Lebanon and its history, and that of the wider Middle East, if further study is conducted of Ottoman sources. Referenced in Deringil's article is Hopkins' call, over 20 years ago, to study 'the interaction of several types of empire at various stages of development and decay' over the history of nation states to show 'that imperial history does not have to be Western history' (Hopkins, 1999: 203). This paper, through a study of both Western and Ottoman sources, has, indeed, moved the focus away from a nationalist reading of Lebanese history and demonstrated that colonialism is not restricted to European empires. However, it is evident from media representation of Lebanon and the Middle East today, as noted by Battah (2020), that corruption and sectarianism are still viewed as endemic to the region without proper analysis of these narratives' causes. Further study would illuminate the interaction of Ottoman and European influence in producing this discourse.

Moreover, research could also highlight how times of war, seemingly corroborating the above narratives, are not the rule in Lebanon. Akarli noted how a deeper understanding of change and continuity can only be reached if longer, relatively peaceful periods are studied (1993: 2). Indeed, my research has demonstrated that, despite being an era of Western European domination, the Ottomans' exploiting of internecine Great Power rivalries rendered ineffective schemes often seen as extending European power, such as the *Règlement*. This helps to explain why an empire, supposedly in decline for centuries, was able to centralise successfully to pursue post-war reconstruction and smooth divisions. As a result, perhaps the influence of the sectarianism and foreign interference of the 1975–90 Lebanese Civil War over current discourse could be reduced just as this study has countered the dominance of the religious feuding and Western meddling of the 1860 events over discussion on the *mutasarrifiyya*.

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## Notes

[1] Comprised of letters by the British Consuls-General in Beirut: Niven Moore, 1853–1862; Noel Moore, 1862–3; G. J. Eldridge, 1863–1890; Colonel Trotter, 1890–1894; Sir Robert Drummond-Hay, 1894–1908; Henry Cumberbatch 1908–1914.

[2] Istanbul Prime Ministry Archives, Gelen-Giden Defterleri (GG) 1013, February 1865, letters from Porte to Daud, 38. See, *The Long Peace*, 38.

- [3] Yildiz Palace Archives, Yildiz Esâs Evrâki (YEE) 18/417/3/40, November 1882, report of Hamdi Pasha. See Akarli, *The Long Peace*, 141.
- [4] Istanbul Prime Ministry Archives, YEE 35/439//122/105, March 1887, defters 2, 22–23. See Akarli, *The Long Peace*, 139.
- [5] Istanbul Prime Ministry Archives, GG 1013, August 15, 1892, 105–06, 153–54, 160–1 and 165–67. See Akarli, *The Long Peace*, 140.
- [6] Istanbul Prime Ministry Archives, Mümtâze: Cebel-i Lübnân Dosyaları (CL) 3/144, September 1905 – January 1906, nos. 1–35. See Akarli, *The Long Peace*, 171.
- [7] Istanbul Prime Ministry Archives, GG 1013, October 1861, 44, Ali to Daud. See Akarli, *The Long Peace*, 149.
- [8] Yildiz Palace Archives, YEE 35/439/122/105, June 1886, defter 1, 13. See Akarli, *The Long Peace*, 52.
- [9] Yildiz Palace Archives, YEE 35/439/122/105, defters 1 and 2. See Akarli, *The Long Peace*, 49.
- [10] National Archives, FO 424/145, March 18, 1888, White to Salisbury. See Spagnolo, *France*, 184.
- [11] National Archives, FO 78/5311, September 20 1902 O’Connor to Lansdowne. See Spagnolo, *France*, 222.
- [12] Yildiz Palace Archives, YEE 35/439/122/105, June 1884, defter 2, Vasa to Interior Ministry, 9 and YEE 34/439/122/105, August 1887, defter 1, 36–38. See Akarli, *The Long Peace*, 155–56.
- [13] The series of archival sources is given first in italics, followed by the underlined reference for the bound volume before the details of each individual letter is given indented afterwards.

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## Glossary

**Committee of Union and Progress (CUP):** One of the secret Ottoman reformist organisations in the late-nineteenth and early-twentieth centuries involved in the 1908 'Young Turk' revolution. The party later took sole control of the state in 1913 under the triumvirate of Talât Pasha, Enver Pasha and Cemal (Jemal) Pasha initiating more overt 'Turkification' policies, especially after the Ottoman Empire joined World War I on the side of the Central Powers. Responsible during the conflict for the Armenian genocide and the alienation of much of the empire's Arab population due to Turkification and Cemal Pasha's draconian rule in Syria (inc. Mount Lebanon) from 1915.

**Druze:** A syncretic religious group originating in tenth-century Shi-ism but incorporating elements from neo-Platonism and the other monotheistic religions and residing mainly in the Lebanon, northern Israel and the Hawran in Syria. One of their adherents, Fakhr ed-Din II, ruled much of the Levant largely autonomously from the Ottomans in the early seventeenth century and their temporal leaders continued their hegemony over the other sects until the nineteenth century. Split between the followers of the Arslan emirs and the British-backed Jumblatt family.

**Great Powers:** The five most powerful European states in the nineteenth century that had emerged from the Napoleonic Wars, namely Austria, Great Britain, France, Prussia and Russia. These countries engaged in various conferences and interventions to limit any one power from taking a dominant role and threatening the peace of Europe. The comparative weakening of the Porte by this time led to numerous actions by the Great Powers, including in Mount Lebanon in 1861, to ensure that none of them could take an ascendant position through exploiting this weakness or invading the Ottoman territories.

**Jumblatt family:** One of the historic elite families of the Druze of Mount Lebanon ascendant above all others by the first half of the nineteenth century. Though this position allowed the unity of their sect in 1860, their prominent role led to their subsequent exclusion from power for many years in favour of their rival family of the Arslans. Still active in Lebanese politics today as the hereditary leaders of the Progressive Socialist Party (PSP).

**Maronites:** Christians belonging to the autonomous Maronite Church recognising the Pope, although possessing their own Patriarch and named after the fourth-century Saint Maron. Since the seventeenth century, the Catholic countries of Europe, and especially France, have seen themselves as the Maronites' protectors. Long confined to the Mountain, a substantial population increase during the eighteenth century led to migration first to coastal cities such as Beirut and then to South America, Africa and Australia.

**Mount Lebanon/ "The Mountain":** Synecdoche for the Lebanon mountain range and the surrounding districts and valleys. The region's steep slopes and cold winters for centuries made it quite inaccessible for Muslim rulers encouraging the settlement of Christian communities and heterodox groups like the Druze, who lived together in relative autonomy from Ottoman rule.

**Règlement Organique:** The "Organic Statute" agreed between the Ottomans and the five Great European powers in 1861 after the 1860 civil war and French occupation. Revised in 1864, this document outlines the new *mutasarrifiyya* system of government for Mount Lebanon.

**Second Empire:** The authoritarian regime of Napoleon Bonaparte's nephew, Napoleon III, which ruled France from 1852 to 1870 until defeat in the 1870-1 Franco-Prussian War.

**Tanzimat ("Reorganisation"):** The period of Ottoman state-led modernisation and reform beginning with the 1839 Hatt-ı Şerif of Gülhane decree and culminating with the declaration of the first Constitution in 1876. The suspension of this document by Sultan Abdulhamid II is then seen as the end of the tanzimat and the beginning of the authoritarian 'Hamidian' era. The reform decrees are often presented as influenced by contemporary European ideas of modernity in promising religious freedom, equality, a parliament and state and military restructuring, although each was also consciously rooted in the language of a return to the more centralised rule of the sixteenth-century "Golden Age". The period is also characterised by the influence and power of the bureaucracy and reformist statesmen such as Fuad, Ali and Reshid Pashas, over that of the Sultan.

**Third Republic:** The third republican form of government instituted in France after the French Revolution and adopted after the fall of the Second Empire in 1870 until the Fall of France to Nazi Germany in 1940 during the Second World War. Oversaw much of France's overseas colonial expansion in Africa and Asia.

**'Young Turk' Revolution:** The name given to the revolution started by members of the Ottoman army in July 1908 which succeeded in forcing Sultan Abdulhamid II to restore the 1876 constitution, recall parliament and usher in an era of multi-party politics.

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# From Baroque Spain to 1600s Amsterdam: Emergent Judaism in the Literary Works of Ex-New Christian Miguel de Barrios

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## Abstract

Writing from the Hispano-Portuguese Jewish community of Amsterdam, Miguel de Barrios (1635–1701) used literary forms of Catholic Spain to resist the erasure of Jewish identity in Iberian lands by Inquisition tribunals that prosecuted non-Catholic practices as heretical. Our analysis of sonnets and allegorical plays by Barrios shows how, through them, this converso, or New Christian, of Jewish lineage openly exalts Judaism as a divinely chosen faith. We also argue that, by writing diasporic texts firmly adherent to Baroque Spanish literary trends, Barrios broadens the reach of this literature to include the hybrid identity of former conversos living as Jews. We demonstrate how the poet expresses this identity by examining elements that influenced its expression, including his biography and the importance of Amsterdam as a centre of Sephardic, or Iberian Jewish, settlement, and how he reworks canonical genres of Spanish literature to privilege Judaism and Hispano-Portuguese conversos returned to Judaism.

**Keywords:** *Autos sacramentales* (sacramental plays), Hispano-Portuguese Jews in Amsterdam, Miguel de Barrios, New Christians (conversos), Martyrs of the Iberian Inquisition, Crypto-Jews

## Introduction

This article studies sonnets and *autos alegóricos*, or allegorical plays, of Miguel (Daniel Levi) de Barrios as a way of understanding how this prolific author of 1600s Jewish Amsterdam uses literary forms of Baroque Catholic Spain to represent the worldview of a converso (New Christian) who returned to Judaism outside the Iberian Peninsula (Spain and Portugal). Our analysis of his sonnets praising Inquisitorial victims and of his allegorical theatre can increase awareness of the hybrid nature of this worldview. We thus show how Barrios writes as a Spanish poet to express a Jewish identity that would have been considered heretical in the Spain of his time. In the sonnets, Barrios represents flames that consumed crypto-Jewish martyrs as a figurative light illuminating their faith. Likewise, in plays such as *Jonen Dalim*, *Maskil el Dal*, *Torá Hor* and *Meirat Henayim*, all found in *Triumpho del gobierno popular y de la antigüedad holandesa* (*Triumph of Popular Government and of Dutch Antiquity*; Barrios, 1683),<sup>[1]</sup> he reworks the genre of sacramental *autos*, especially as expressed by canonical playwright Pedro Calderón de la Barca, to show the elect status of the Jewish people and the Hebrew Bible. As part of this reworking, he incorporates references to classical mythology, the [Holy Office of the Inquisition](#) (the Inquisition) in Iberian lands and contemporary Amsterdam. To situate our investigation of these texts in a hybrid context and show how Barrios uses them to privilege Judaism, we also discuss elements that influenced their production, including his biography, the importance of Amsterdam in the diaspora of Hispano-Portuguese [conversos](#) able to live as Jews and characteristics of *autos* as Spanish literature.

## Biographical information

Barrios was born in Montilla, a town near the city of Córdoba in southern Spain, towards the end of 1635 (Oelman, 1982: 219). His family were conversos of Jewish origin and baptised Barrios to attest to their Christianity, even though they may have professed Judaism secretly. Evidence of this crypto-Judaism is the fact that his parents and siblings had Hebrew and Christian names. Thus, his mother, Sebastiana Valle, and father, Simón de Barrios, were also known as Sara Levi and Jacob Levi, respectively (Lieberman, 1996: 19). Conversos who took Hebrew first names and surnames did so at great risk, since doing so could call attention to their crypto-Judaism. After the expulsion of Spanish Jews in 1492, such naming practices occurred in at least two circumstances: when conversos left Iberian lands for places where they could live as Jews, or if they became martyrs for their crypto-Jewish faith while remaining in Hispano-Portuguese territories. Even if they had Hebrew names, conversos also had names indistinguishable from those of people without Jewish background, as the following examples of [New Christians](#) ‘reconciled’ (‘reconciliados’) for Jewish heresy by the Inquisition of Santiago de Compostela, Spain, in 1722 demonstrate: Fernando Álvarez de Castro, Leonor de Marto y Silva, and Gerónimo de Paz Salcedo (‘Relación de los autos particulares de fee’, 1722).<sup>[2]</sup>

In 1650, two members of Barrios’s family were detained by Spanish Inquisitorial authorities for Jewish heresy. Perhaps fearful that these individuals would implicate relatives, the Barrios family was forced to flee from Spain. They went their separate ways in a migration that showed the breadth of the diaspora of New Christians. His parents, sisters and brother Diego settled in Algiers. Meanwhile, Barrios left the Iberian Peninsula on a journey similar to that of Jews in 1492 who, refusing to convert, had to leave Spain, resulting in the Sephardic diaspora (Lieberman, 1996: 19–21).

After initially residing in Nice, France, the poet took refuge in Livorno, Italy, where he was circumcised and openly practised Judaism. In Italy, Barrios married fellow former conversa Débora Vaez, and they journeyed to the Caribbean Island of Tobago, then a Dutch colony. The death of his wife led to his return to Europe, specifically, the ‘Portuguese’ community of Amsterdam composed of former New Christians living as Jews. Undoubtedly Barrios chose this community because of the opportunity there to be faithful to his true religious identity. In so doing, he was ‘drawn [...] by the legacy of [Saul Levi] Morteira’ (Kaplan, 2019: 61) and other luminaries whom he praises in *Triumpho del gobierno popular*. Originally from Venice, Morteira founded a yeshiva, or academy for religious instruction, in Amsterdam called Keter Torah (Crown of the Law). In 1639 he became the first rabbi of Talmud Torah Synagogue, the Sephardic congregation formed by the joining of three smaller ones, a position he held up to his death in 1660.

In 1662, shortly after arriving in this community, Barrios married Abigail de Pina and subsequently had three children with her. Embracing fully his Jewish faith as Daniel Levi, he actively contributed to the religious literature of the Sephardic community as its most productive author during the last third of the 1600s.

Despite having this literary success in Amsterdam, however, Barrios still faced censorship from the *Mahamad*, or governing board, whose seven members had the authority to approve works for publication by fellow community members. As a prose writer, poet and dramatist, he wrote several plays and works of mystical character that were considered a threat to the teachings of the Jewish community, so they were not originally allowed to be published in Amsterdam because the religious authorities considered them a violation of the Divine Law. Because of this restriction, Barrios was forced to go to Brussels, where his non-religious works were more likely to be well received. As part of the Netherlands still under Spanish control then, Brussels provided a more favourable audience for works of Spanish Baroque literary culture. However, the Hispano-Portuguese Jews in Amsterdam considered Brussels a ‘*tierra de idolatría*’ (‘land of idolatry’)

because it was ruled by Spanish Catholics, so they forced Barrios to apologise publicly for works he had written there (Lieberman, 1996: 22–25).

While in Amsterdam, Barrios dedicated much time to the study of the Torah. He also became one of the most recognised scholars and a leading chronicler of events in the Sephardic community of Amsterdam through works such as the aforementioned *Triumpho del gobierno popular*. This miscellany of over 700 pages includes – besides the short allegorical plays – descriptions of academies for religious studies and charitable works, the community’s burial society, and the people who composed these groups, among other texts. Dependent on financial support from many of these individuals, Barrios was never economically secure. The combination of this material poverty and the premature deaths of both his wives and two of his children may help explain the frequent presence within his poetry of Spanish Baroque literary *desengaño*, a process not strictly of disillusionment, but rather of enlightenment that consists of, among other characteristics, a ‘waking to true awareness [...] to see things as they are’ and hence to arrive at ‘wisdom’ (Green, 1966, vol. 4: 44). The poet demonstrates this ‘wisdom’ in texts treating the ephemerality of human capabilities and life itself, especially one neglectful of God. Thus, for example, in the sonnet ‘A la cortedad de la vida’ (‘To the Brevity of Life’), the poetic speaker urges humanity, ‘Hombre que buscas en tu error tu daño, / olvidado de Dios con alma ingrata, / vuelve en tu acuerdo, anhela el desengaño’ (Scholberg, 1962a: 226; ‘Man, you who look for your ruin in your error, / forgetful of God with an ungrateful soul / return to your agreement, long for an awakening’).

Barrios never returned to Spain. He died in Amsterdam in 1701 as a faithful Jew. For a brief period, he appeared to have been part of the Sabbatian movement, which during the 1660s believed that Shabbetai Zevi, a Jew from Izmir in present-day Turkey, was the messiah – the one who would redeem Sephardic Jews and lead them back to their ancestral motherland of Israel. After Zevi was detained by the authorities of the Ottoman Empire in 1666, he converted to Islam on pain of death, and died as an [apostate](#). Despite this outcome, for a time, Barrios continued to believe in the authenticity of Zevi as the messiah. The belief in the Sephardic world that the messiah would arrive imminently followed by the apostasy of Zevi caused upheaval in many communities. These events may have impacted Barrios negatively, given that he was susceptible to depression and the fact that his ‘mental equilibrium was delicately balanced’ (Scholberg, 1962b: 147).

## Amsterdam as a centre of rejudaisation of former conversos

During the 1600s, Amsterdam became a magnet for conversos, many of whom had suffered greatly at the hands of the Inquisition for secretly practising Jewish rites in Spain and Portugal. Protestant Amsterdam allowed them to create their own pocket of society where they could practise Judaism, and they quickly took advantage of this opportunity. One of the reasons the city was so attractive to immigrants was due to its strong mercantile economy as a large port with popular items to trade, such as sugar, spices, coffee and tobacco. The ability of ex-conversos to communicate with Portugal also meant that they were able to stay connected with family members still living in Iberian lands and diversify the trading options in a thriving economy. However, despite these positive features, members of this community faced restrictions on expressing their Jewish identity in the Netherlands. For example, Protestant leaders did not allow Jews to practise openly, and when they received permission to build their first synagogue in 1612, it had to be owned by a Christian in order to appease Protestants who were opposed to such a public place of worship for Jews (Bodian, 1997: 59).



The origins of the Iberian Jewish settlement in Amsterdam are partly unclear, although Uri Halevi, an Ashkenazic rabbi from Emden, Germany, and hence not a Sephardic Jew, appears to have played an early role for conversos returning to Judaism. In *Maskil el Dal* (*The One Who Enlightens the Poor*), Barrios narrates an important episode of this history, about the opposition that Halevi and these former New Christians faced during their celebration of Yom Kippur in 1603:

Inquieren severas vigilancias,  
de aquel albergue todas las estancias  
[...]  
en busca de los ídolos romanos.  
Uri y Aaron Levi, son los primeros,  
que en manos dan de los Ministros fieros,  
Que a la cárcel les llevan maniatados.  
– (Lieberman, 1996: 145)

The stern watchfulness [of the officials of justice]  
investigates all the rooms of that refuge  
[...]  
Uri and Aaron Levi are the first [members of this community]  
whom [these officials] turn over to the hands of the fierce ministers of justice,  
Whom they [the ministers] bring to jail with their hands tied.<sup>[3]</sup>

In the account of this event by Barrios, city officials discovered a group of individuals wearing prayer shawls and observing a clandestine Yom Kippur service in a synagogue in the home of Jacob Tirado. When the officials realised they were among Jews, the lead officer ‘ask[ed] them to pray to the God of Israel for the government of Amsterdam’ (‘les pide que ruegen al Dios de Israel, por el Gobierno Amstelodamo’; Barrios, 1683: 412). Notwithstanding inaccuracies in his retelling of this foundational event, Barrios conveys the challenges that Portuguese converso immigrants faced establishing a Jewish presence. Once released, Halevi continued to serve the community, teaching the laws of Judaism and performing circumcisions (Lieberman, 1996: 47). Within a few years, a number of merchant converso families planted roots as openly practising Jews, and some grew in wealth and size during the 1600s, focusing on growing the community through education, charitable works and commerce.<sup>[4]</sup>

Religious organisations dedicated to charity and study began to appear. These organisations were a key foundation of Hispano-Portuguese Jewish life because of the support they offered to the community financially, religiously and intellectually. Beneficent organisations cared for orphans, widows and unmarried young women, and maintained the cemetery established in nearby Ouderkerk. Another role of these brotherhoods was to provide groups of men an academic setting for discussing religion and philosophy, such as the most suitable epithets for the Law of Moses, or Judaism, which Barrios recounts in his allegorical play *Torá Hor* (*The Law is Light*). A key function of these societies was to reinforce Jewish teachings for former conversos who were still influenced by the Catholicism they grew up in, despite now being able to openly practise Judaism.

## Inquisitorial influence on Jewish Amsterdam and the sonnets of Barrios

This pocket of hope in Amsterdam contrasted with the situation of conversos in Spain and Portugal, and their colonies in Mexico and South America still subject to Inquisitorial persecution, including death, for the

heresy of being Judaizers (judaizantes), or secret Jews. In his letter to the Galatians, the apostle Paul had used this term to accuse Jewish Christians of being ‘false brothers’ (*NIV Study Bible*, Gal. 2:4) who preached a ‘perversion’ of the gospel (Hunter, 1959, vol. 22: 14–15) – for example, by insisting on the ritual of circumcision among converts to Christianity.<sup>[5]</sup> Similarly, the Inquisition used the term Judaizer as a pejorative to accuse New Christians in the Iberian world of secretly practising Judaism. As scholars such as Gitlitz, Kamen and others have shown that, in the most extreme cases of this persecution, the Inquisition would sentence to death, among other victims, New Christians whom it deemed *negativos*, or unrepentant of their Jewish beliefs, and/or *relapsos* – that is, those judged guilty of recidivism after having been convicted and reconciled before for practising Judaism in secret. Upon announcing these sentences at a public spectacle called an *auto de fe* (or act of faith), the court frequently would then hand over these prisoners to secular authorities for burning at the stake afterwards to set an emphatic example for the population on the consequences of heresy. Paintings by contemporary artists depicting *autos de fe*, such as ‘Saint Dominic Presiding over an Auto-da-fe’ by Pedro Berruguete (Berruguete, 1491–99), visually dramatised these consequences while also communicating the didactic impact of these performative ceremonies. The condemned did have an option for mercy in being strangled with a garrote before being burnt at a separate location, but they had to renounce Judaism and declare that Catholicism was the one true faith.<sup>[6]</sup> The Inquisition often hired clergymen to prepare *relaciones*, or accounts, of *autos de fe* – such as, for example, the ones describing that of Córdoba, Spain, of 29 June 1665 by friars Pedro de Herrera and Pedro Mateo de Lara (Gracia Boix, 1983: 446–94), which mentions three victims whom Barrios exalts in a sonnet discussed in this article.

Stories spread throughout the Iberian converso diaspora of the suffering of these victims, especially those who rejected mercy and died proclaiming themselves proudly Jewish, an outcome that created powerful martyrs. Their sacrifice was deeply moving and affected the people who had escaped it, as Barrios makes evident in many poems. In one, he describes the death of Friar Diogo de Asumpção (Diego de la Ascensión), a Portuguese monk who, despite little or no Jewish background, became a crypto-Jew who refused to renounce this heresy and whom the Inquisition condemned as an unrepentant Judaizer. Barrios dramatises his martyrdom in the following way:

Rompe los yerros de opresión violenta  
y arrojado al suplicio que lo enciende  
muere y renace Fénix de su lumbre.  
– (Scholberg, 1962a: 241)

He breaks the chains of violent oppression,  
and having been thrown into the pyre that sets him aflame,  
he dies and is reborn as a phoenix from his own light.

The image of a phoenix is prominent in the writings of Barrios about martyrs for the ability of this mythical bird to be eternally reborn from the ashes of its death. Hispano-Portuguese Jews of Amsterdam also adopted the phoenix as a symbol to represent the rebirth of their community as a place where they could live their Judaism freely. This potent image also exemplifies how the Sephardic population in its diaspora connected with *crypto-Jews* in Iberian lands, which were under Inquisitorial laws. Additionally, the phoenix as a symbol of resistance to the Inquisition appears in the poetry of Antonio Enríquez Gómez (c.1600–63; Brown, 2007), a contemporary of Barrios and fellow converso (and possible secret Jew). For example, in ‘Romance a Lope de Vera’ (‘Ballad to Lope de Vera’, 1644–45), Enríquez Gómez glorifies the martyrdom of Lope de Vera y

Alarcón, a Spanish Old Christian of the 1600s who, refuses to repent of his conversion to Judaism and declares to inquisitors, ‘pero yo seré en el fuego / el ave que simple sabe / morir y vivir a un tiempo’ (Brown, 2007: 170;<sup>[7]</sup> ‘but in the flames I will be / the simple bird that knows how / to die and live at the same time’).

Barrios also compares crypto-Jewish martyrs of his era with biblical figures, showing how the Hispano-Portuguese diaspora glorified these individuals who sacrificed themselves for their Jewish beliefs. In his sonnet about Tomás Treviño (or Tremiño) de Sobremonte, ‘Años catorce en cárcel rigurosa’ (‘Fourteen Years in Severe Prison’, 1683; Scholberg, 1962a), he dramatises the fiery death of this prosperous Spanish converso merchant and unrepentant crypto-Jew in colonial Mexico by comparing him to the prophet Elijah:

Y el indiano Elías por subir al cielo en  
el carro voraz que lo levanta  
deja la capa de su polvo al suelo.  
– (Scholberg, 1962a: 242)

Now Elijah of the Indies by rising to the sky  
in the fierce chariot that lifts him up,  
leaves the cape of his dust on the ground.

Barrios asserts that Treviño becomes a new Elijah being swept to heaven in a chariot of fire; just as Elijah’s cloak fell from him in 2 Kings: 11–13, Treviño leaves behind his ashes. In the biblical story, after Elijah’s student Elisha picks up the cloak, he strikes the Jordan River, declaring, ‘Where is the Lord, the God of Elijah?’ As a result, when the river parts, allowing Elisha to cross, ‘the disciples of the prophets at Jericho [...] exclaimed, “The spirit of Elijah has settled on Elisha”’ (Berlin and Brettler, 2014; *Jewish Study Bible*, 2 Kings 2:14–15). By rewriting this transfer of spirit from Elijah to Elisha through the martyrdom of Treviño, Barrios shows how Hispano-Portuguese Jewish communities carried on the legacy of their brethren who died because of the Inquisition. His elevation of Treviño to the level of biblical prophets also emphasises the privileged status of martyrdom, with ‘the cape of his [Treviño’s] dust’ serving as a remembrance of Treviño’s faith.<sup>[8]</sup>

Many Jews who remained in Spain as New Christians after the expulsion of 1492, as well as those who went to Portugal and were forcibly converted five years later, experienced discrimination and, in some cases, Inquisitorial persecution. Barrios depicts these experiences in sonnets extolling crypto-Jew martyrs who reject Christianity at the cost of their lives. For example, the following citation to the sonnet ‘Los rayos del amor tanto cegaron’ (‘Beams of Love Dazzled So Much’) shows how Barrios celebrates the willingness of these individuals to die for their unbreakable faithfulness to their Jewish beliefs:

Tanta voracidad los tres burlaron  
porque al tiempo que el fuego les pusieron  
se interpuso el amor y no sintieron  
lo vivo de las llamas que tocaron.  
[...]  
Mas amor por burlar como valiente  
llevando los espíritus divinos  
sola dejó al tirano la ceniza.  
– (Scholberg, 1962a: 243)

So much voracity the three of them overcame  
 because at the time that they [secular authorities] put the fire to them  
 love intercepted and they did not feel  
 the intensity of the flames they had touched.  
 [...]
   
 But love by outwitting as a brave one,  
 carrying away their divine spirits  
 only left their ashes to the tyrant.

In this sonnet, Barrios glorifies Jorge Méndez de Castro (Abraham Atías), Domingo (Jacob) Rodríguez de Cáceres, and Beatriz (Raquel) Núñez Fernández, the three aforementioned crypto-Jews from Córdoba whom the Inquisition sentenced to the stake as relapsed Judaizers after the *auto de fe* of 1665 (Bodian, 1997: 83; Gracia Boix, 1983: 463–64, 493–94). Mentioning ‘flames’, ‘fire’, and ‘ashes’, the poet unflinchingly describes the literal suffering that these and other victims of Inquisitorial burnings had to endure. However, he does not present these experiences as negative; on the contrary, the text suggests that the three martyrs overcome their unimaginably painful death to attain the salvation of their souls, which was an important component of Iberian crypto-Judaism. Many secret Jews, especially those few who refused to repent their forbidden beliefs, believed that such salvation could only be accomplished through the Mosaic Law, which they considered true and absolute and for which they willingly died (Gitlitz, 2002: 110). Barrios communicates the idea that God’s love is so powerful, that no threat or torture is strong enough to impede divine protection for those who die faithful to their belief in the perfection of the Law of Moses.

## Context and analysis of sacramental plays

Although Barrios lived as a Jew in Amsterdam, his literary works were written from a Spanish-Christian viewpoint. He reclaimed Spanish as a Jewish language to extol the Jewish community of Amsterdam for the suffering that many members endured during the Inquisition. Elements of Baroque Spanish that characterise his works include affected language, hyperbaton, wordplays and constructions rarely used today, such as the future subjunctive. As well, Barrios used allegorical representations of, for example, the (Catholic) Church, Judaism, Israel and Wealth, as well as biblical and mythological references, to add complexity to his works.

By using the *auto sacramental* (sacramental play) in his allegorical theatre, Barrios inverts a canonical genre of Spanish Catholic identity to assert a Jewish one. In so doing, he shows the hybridity of his literary formation, even as he inhabited a milieu of New Christians who may have identified as secret Jews. An *auto sacramental* of the Middle Ages or Renaissance was a ‘short dramatic work based on religious or secular themes’ (Real Academia Española, 2021; ‘Auto sacramental’) that during the Baroque era had the purpose of ‘teaching the most crucial points of the faith to its adherents’ (Thornton Spinnenweber, 2021: 13). The plays were typically performed during Corpus Christi, the Roman Catholic feast that celebrates the Eucharist, or transubstantiation, ‘the supernatural transformation of the elements of bread and wine into the body and blood of Christ’ (Thornton Spinnenweber, 2021: 12). *Autos* spread their message of divine grace through allegory, or language in which ‘the author uses elements that are familiar to the public in order to express abstract theological ideas’ (Arellano, 2015: 19). For example, in *Maskil el Dal*, Barrios uses the characters Religión (Religion) to represent Judaism and Aumento (Increase) to represent someone who shuns this faith until convinced to believe sincerely (Lieberman, 1996: 138, 164).

The sacramental plays in *Triumpho del gobierno popular* (1683) contain much historical context about Iberian Jews in Amsterdam and the life of Barrios himself. In these plays, he praises the study of the Law of Moses and the brotherhoods that supported his work. Although some of his colleagues may have contributed money, they also likely commented on his writings at their meetings and, for these reasons, Barrios lists many names within his plays. These lists often extend for several pages, and include a short compliment, offering insight into the makeup and activities of these groups. For example, in *Maskil el Dal*, he notes that the founder of the brotherhood of the same name was Abraham de Fonseca and that it met for one hour on religious holidays (*días de fiesta*) and 30 minutes on Sundays (Lieberman, 1996: 152–53). Likewise, in *Meirat Henayim* (*Light to the Eyes*), he acclaims the four founders and ten notable ‘brothers’ of this society with specific details of their lives. By mentioning here that Jacob de Castro de Paz was the brother of a crypto-Jewish martyr in Lisbon, Isaac de Castro Tartas, and the great-grandson of another, he again connects the Amsterdam community with the Iberian Jewish diaspora (Lieberman, 1996: 201–02). Given that this community consisted of about 2500 individuals at its peak, such lists provide much detail about those who lived there and the roles they filled (Bodian, 1997: 54).

Barrios includes his own ancestry in a poem within *Maskil el Dal* titled ‘Lamentación Fúnebre’ (‘Funeral Lamentation’; Lieberman, 1996), which he wrote while still lamenting the loss of his mother and father ten years prior. He grapples with the suddenness of death, describing it as an overpowering and unforgiving occurrence, emphasising how deeply his father’s passing affected him:

¡Ah muerte! Como rayo fulminado aun antes que sentida, ejecutada.

¿Quién fía de la Vida si es mudable?

¿Quién no espera la Muerte si es forzosa?

— (Lieberman, 1996: 156)

Oh death! Like a lightning bolt, before even felt, already determined.

Who can trust life if it is so mutable?

Who can ignore death when it is inevitable?

Here Barrios testifies to the inexorability of death, and also does so a few lines later when he calls Atropos, one of the three Fates from Greek mythology, a tyrant (Lieberman, 1996: 156). Invoking Atropos, Barrios communicates the figurative importance of her and her sisters determining human destiny: Clotho weaves the string of life; Lachesis measures it to the length allotted for each person; and Atropos cuts it, ending life (March, 2014: 197, 2018). The Fates represent the belief that the string of life can be cut at any moment and that the circumstances of death are beyond human control.

Finally, Barrios presents more historical context when confirming that his parents, Sara Levi and Jacob Levi (Simón de Barrios), died only a few months apart, in 1670 and 1671. He also informs readers that his grandfathers were named Abraham Levi Castro and Ishac Cohen de Sosa, and that Levi Castro lived in the Portuguese town of Marialva. Given the location of Marialva in the northeast part of the country, a region where many Spanish Jews settled post-1492, and the fact that Barrios was born in Spain, his ancestors likely immigrated to Portugal in 1492 because of the expulsion, but eventually returned to Spain to live as New Christians.

While *Maskil el Dal* shows the importance of Barrios’s writing as a source of biographical information, *Jonen Dalim* (*The One Who Pities the Poor*) is one of Barrios’s most recognised literary works that elevates Jewish people of Iberian origin. To approach this allegorical play, it is essential to understand first that Barrios was

a member of several religious and literary academies in Amsterdam. Such academies were founded following both Jewish and Spanish literary traditions. These *hermandades* (brotherhoods) served as sites for Barrios and his contemporaries to discuss and interpret the Torah, to evaluate each other's literary works, and to share and recite their own poems. Individual brotherhoods also had a *yeshiva*, or academy for religious instruction, as well as means for distributing charitable support to those within the community who needed it. In this way, the academies had the goal of providing justice and compassion, especially towards the poor. Many of Barrios's allegorical plays, such as *Jonen Dalim*, bear the names of these academies because, besides being works dedicated directly to these brotherhoods, they were also the places where the protagonist – in this case, Israel or the Jewish community, would study and honour the Divine Law closely – as well as question its conflicts and refuse the Christian faith. *Jonen Dalim* includes multiple biblical references, specifically verses from the book of Proverbs. This play focuses on the idea of having mercy on those in need, and Proverbs reflects this same notion in many of its passages. Thus, the verse, 'He who despises his fellow is wrong; / He who shows pity for the lowly is happy' (Prov. 14:21), inspired Barrios when he wrote this play since it emphasises the importance of showing charity and compassion towards those in need.

In this work, there are four main allegorical characters: the Law, Israel, Edom, which symbolises Rome or the Catholic Church, and Jonen, which represents the academy that shows solicitude for the Israelites. This play revolves around the exile of the Jewish people that God imposed as punishment for their idolatry and disobedience (Lieberman, 1996: 68). Edom, as the antagonist, represents the rich and the enemy of Judaism, the one who does not pity anyone. This allegorical character desires abundance and the suffering of Israel, whereas Israel seeks redemption for its acts of rebellion. The Jewish people want to be faithful followers of the Mosaic Law and to be enlightened and guided by it. The Israelites recognise their greatest sin of idolatry, so Barrios portrays Israel as a reflective character who regrets betraying its promise to God and hopes for long-awaited divine forgiveness:

JONEN. Yo soy Jonen Dalim que a tu bien corro,  
por la Piedad que a los desnudos viste.

EDOM. Yo, Edom, que en molestarte no me canso.

LEY. Yo, te daré consuelo. a Israel.

[...]

ISRAEL. El susto que Edom me ofrece,  
creer me hace en toda instancia

que la Inquisición me coge,

y que me arroja a la llama.

– (Lieberman, 1996: 126–27)

JONEN. I am Jonen Dalim, who runs to your well-being,  
for the piety that clothes the naked.

EDOM. I, Edom, do not tire of bothering you.

LEY. I will give you [Israel] solace.

[...]

ISRAEL. The fright that Edom offers me,  
makes me believe in every instance

that the Inquisition seizes me,

and that it throws me to the flames.

On the one hand, this dialogue demonstrates how both Jonen Dalim and the Law help Israel achieve its redemption. First, Jonen gives the Jewish people compassion and justice. Second, the Law gives Israel hope and guides it to attain consolation from God. On the other hand, Edom, the Catholic Church, continues battling against Judaism, which fears Edom's Inquisitorial flames. Barrios's references to the Inquisition remind the audience of horrors suffered by crypto-Jews at the hand of the tribunal for asserting their secret Jewish faith despite being New Christians.

## Conclusion

Through the sonnets and allegorical plays discussed in this article, Miguel Barrios broadens the canon of Baroque Spanish literature to include works written by a New Christian returned to Judaism who closely followed Spanish literary customs. His texts show that, beyond the Iberian Peninsula nearly 200 years after the expulsion, one could be a fully Jewish and a Spanish writer despite the contradictions these identities might otherwise have suggested. At the same time, our analysis has shown the lasting influence of Inquisitorial pursuit on the worldview of the poet, given that his sonnets glorify victims of the tribunal, and the plays represent Catholic Christianity as the antagonist of Judaism, both in ways that resonated throughout the Sephardic world. These texts bring readers today closer to the bifurcated worldview of a writer who expresses his Jewish identity using the language and literary forms of his education in a Catholic milieu. Finally, they show how Amsterdam provided a setting for Iberian conversos to embrace the faith formerly denied them. As chronicler of this transformation, Barrios testifies to the depth of this faith while also showing the influence of the society that had forbidden its expression.

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## Notes

[1] All citations in the essay to these allegorical plays of Barrios are from the edition of them prepared by Lieberman, 1996.

[2] Gitlitz confirms the absence of surnames that would have identified the converso identity of their bearers: 'I know of no surnames used exclusively or even preponderantly by conversos. The Inquisition, always vigilant to identify New Christians so as to scrutinise them for crypto-Judaism, never used surnames as a guide' (2002: 211n11).

[3] Unless otherwise indicated, all translations are our own. We have maintained the initial capitalisation of certain words as Barrios wrote them in the original Spanish.

[4] For further information about the possible role of Halevi in this history, see Bodian, 1997: 20–22 and 43–46.

[5] This citation to Galatians is taken from the NIV Study Bible (Barker, 1995).

[6] For further description of Inquisitorial prosecution of heresy, see Gitlitz, 2002: 18–25 and Kamen, 2014: 226–60.

[7] Our citation to the “Romance al divín mártir” by Enríquez Gómez is from the edition and study of this poem prepared by Brown, 2007.

[8] For further analysis of this sonnet, see Leibman, 2014: 45–50. Barrios included the sonnet in *Triumpho del gobierno popular*, 1683: 561.

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## Glossary

**Auto de fe (act of faith)**: Public sentencing of individuals deemed heretics by Inquisition tribunals of Spain, Portugal and their overseas territories.

**Apostate**: A person who renounces a religious or political belief or principle.

**Auto sacramental**: Spanish term for a play that, using allegorical characters, focuses on the sacrament of the Eucharist.

**Conversos (cristianos nuevos in Spanish, cristãos novos in Portuguese) or New Christians**: Converts from Judaism to Catholicism in the Iberian world. Significantly, these terms also applied to descendants of

converts over multiple generations, hence becoming markers of ethnic differentiation. Muslim converts to Catholicism were also conversos but were more typically called Moriscos.

**Crypto-Jews:** Conversos who secretly maintained Jewish practices; in Inquisition parlance, they were called Judaizers (*judaizantes*). They might also be called Marranos, a pejorative word of unclear origin that frequently became associated with swine.

**Holy Office of the Inquisition (Inquisition for short):** Court in Spanish and Portuguese lands, originally under monarchical control but staffed by members of religious orders, that attempted to maintain Catholic orthodoxy by prosecuting individuals suspected of heretical beliefs and practices.

**New Christians (*cristianos nuevos* in Spanish, *cristãos novos* in Portuguese) or conversos:** Converts from Judaism to Catholicism in the Iberian world. Significantly, these terms also applied to descendants of converts over multiple generations, hence becoming markers of ethnic differentiation. Muslim converts to Catholicism were also conversos but were more typically called Moriscos.

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# Coleridge-Taylor, Grieg and Beethoven – Chineke! Orchestra Concert, Warwick Arts Centre

Curtis Leung, University of Warwick

**Keywords:** Chineke!, Coleridge-Taylor's *Petite Suite de Concert*, Grieg's *Piano Concerto in A Minor*, Beethoven's *Symphony No. 6 in F*, decolonising classical music, interpreting Beethoven

The much-anticipated return of Chineke! to the Warwick Arts Centre after two years certainly lived up to expectations. The repertoire for the first half of the concert was Coleridge-Taylor's *Petite Suite de Concert*, followed by Grieg's *Piano Concerto in A Minor*. In conventional concert tradition, the symphony – Beethoven's *Symphony No. 6 (Pastoral)* – was played by itself after the interval.

Warwick Arts Centre's location on the University of Warwick campus meant the concert attracted an audience of a diverse age range, with a notable number of students attending. While the hall was not quite full, this was easily disguised by the rapturous applause the orchestra received when entering the stage with conductor Anthony Parther.

The performance started with a bang, both literally and figuratively, as the orchestra delivered an energetic interpretation of Coleridge-Taylor's *Petite Suite de Concert*. The opening [capriccio](#) was particularly engaging and set the scene for the rest of the piece. Equally enjoyable were the [sonnet](#) and [tarantella](#). While the sonnet was light, chirpy and loose, the tarantella danced ahead, matching the energy of the opening caprice due to the 6/8 feel of the movement and Parther's [dynamic](#) conducting, which pushed the orchestra in a race-like manner that was sufficiently disciplined yet fittingly whimsical. A central aspect of the *Suite* is its easily memorable themes, all of which were executed engagingly by different sections of the orchestra throughout the piece.

Coleridge-Taylor's light music was juxtaposed with Grieg's *Piano Concerto in A Minor*. The musical contrast between the pieces was vast with their similarities ending after their introductory orchestral hits. The *Concerto* is structured in traditional form, with two fast [allegro](#) movements sandwiching the slower [adagio](#) movement. The opening of the first allegro was superb – performances of iconic themes can sometimes disappoint, but this was no such time. The balcony seats offered a complete view facing the young, up-and-coming soloist, Amiri Harewood (piano), whose poise and command were palpable from the opening timpani roll. My vantage point did not come without its disadvantages, however, as the sound of the piano sometimes blended in too much with the texture, such as in the closing sequence of the piece as the piano was lost amid the percussion and strings. Other than this minute criticism, the *Concerto* was a huge success, justifying the standing ovation that Harewood and the orchestra received.

The orchestra played Beethoven's sixth to end the show. The symphony was an interesting choice given its straightforward harmonies, which contrasted with the complex *Concerto*. Named 'Pastoral', the symphony represents nature; this was fitting considering the orchestra's name: Chineke! derives from the [Igbo](#) word 'Chi', which means 'the spirit of creation' (Church, 2015). The dainty opening allegro entitled 'Erwachen heiterer Empfindungen bei der Ankunft auf dem Lande' ['Awakening of cheerful feelings on arrival in the countryside'] was followed by a lyrical cover of the [andante](#). It was in the andante that the woodwind soloists

came into their own, delivering characteristic performances as the nightingale (flute), quail (oboe) and cuckoo (clarinet) (Barbour-Condini, 2022). The final three movements of the symphony were played *attacca*, although changes in expression kept them relatively distinct. One point to note was that the fourth movement, 'Gewitter, Sturm' ['Thunder, Storm'], was less abrupt than other interpretations. Perhaps this was done to keep a level of consistency through the movements, as a foreshadowing that the storm would eventually blow over, with the 'Shepherd's Song' ['Hirtengesang'] prevailing.

Chineke!'s mission is to celebrate and promote diversity within classical music and provide opportunities for ethnically diverse classical musicians within Europe. Sometimes this is done through performances of music from lesser-known, ethnically diverse composers. In the first Chineke! concert I attended (in Salisbury, 2017), the orchestra performed a piece by Chevalier de Saint-Georges – one of the first-known classical composers of African ancestry. This time, the audience was treated to Coleridge-Taylor, who was born to an 'African man and Englishwoman' (Green, 2001). Coleridge-Taylor's unique identity in the world of classical music was well-documented in the programme notes, which also mentioned that he was a crucial part of England's cultural landscape in the late nineteenth and early twentieth centuries (Barbour-Condini, 2022). However, as English light music fell out of fashion during the twentieth century, so did Coleridge-Taylor's work. The *Petite Suite de Concert* was certainly the least-known piece of the concert but was an enjoyable and fitting start. The piece followed from Chineke!'s previous performance at the Arts Centre when they played Coleridge-Taylor's *Othello Suite* in 2020. The consistent performance of important, ethnically diverse classical composers is part of Chineke!'s method of raising awareness of the problematic mainstream historical narratives of classical music.

The influence of Coleridge-Taylor's mixed-race identity can be found within his work too. His fascination with his father's heritage when initially touring the United States in the late nineteenth century led to him meeting leading Americans, such as Paul Laurence Dunbar and W. E. B. Du Bois, at the first Pan-African Conference in London in 1900 (Green, 2009). These connections, especially with poets, inspired some of his music. Although the *Petite Suite de Concert* is not the clearest example of this, pieces such as *African Romances*, *African Suite* for piano, *Four African Dances* and *Symphonic Variations on an African Air* have African roots in name, style and performance techniques (Richards, 1987).

While not so overtly a statement about diversity, the selection of Beethoven's sixth symphony had scope to be interpreted politically on several levels. The performance comes amid a revision of Ludwig van Beethoven's heritage – specifically that his identity has been whitewashed in classical music history, and he had a significantly darker complexion than is portrayed. This was originally noted during the 1930s by African American journalists before the matter was reignited by civil rights activists such as Malcolm X and Stokely Carmichael (Broyles, 2011: 267–91). Beethoven's popularity has never been questioned, yet there was something particularly apt and symbolic about an ethnically diverse orchestra playing his music.

Regarding his sixth symphony, Beethoven claimed that 'the hearers should be allowed to discover the situations freely', allowing room for multiple interpretations of the piece and its performance (Barbour-Condini, 2022). In a literal sense, the fourth and fifth movements of the symphony could be interpreted as a violent storm, followed by jubilation after the storm's end. This is merely one interpretation, though. Entitled 'Gewitter, Sturm' ['Thunder, Storm'] in German, the word *Gewitter* translates as storm or thunderstorm, but the word *Sturm* bears a more abstract meaning that can also imply emotion. The *Sturm und Drang* movement influenced elements of Beethoven's music, and so it would make sense to interpret the fourth movement of the symphony in this more conceptual manner. The music of the movement is

characterised by suddenness in **tempo** and dynamic and unpredictable melodies, all of which can be found within the fourth movement of Beethoven's sixth, to convey emotional turmoil (Rudolf, 1994).

Chineke!'s previous outing at the Warwick Arts Centre represented a simpler, pre-pandemic time. The fourth movement's storm could be interpreted as the austerity of the pandemic, with the fifth movement representing the post-pandemic society that we are slowly rebuilding into. For Beethoven's own contemporary audiences, the symphony was an escape from the political chaos in Vienna during the early nineteenth century when Napoleon invaded in 1805 and 1809. Perhaps the performance of the symphony serves a similar purpose over 200 years later as the listener could relate the abstract storm to the international tensions over the Russia–Ukraine affair, which have resulted in deeply unsettling scenes coming out of Ukraine.

Chineke!'s concert successfully started Warwick Arts Centre's 2021–22 Orchestral Series, and the three following orchestras will need to match its strong interpretations of Coleridge-Taylor's *Petite Suite de Concert*, Grieg's *Piano Concerto* and Beethoven's *Symphony No. 6 in F*. While the *Concerto* was arguably the spectacle of the evening, with pianist Harewood delivering an impressive performance, the Coleridge-Taylor and Beethoven pieces provided more food for thought on a political level, and furthered Chineke!'s mission of diversifying classical music.

**Coleridge-Taylor: *Petite Suite de Concert***

**Grieg: *Piano Concerto in A Minor***

**Beethoven: *Symphony No. 6 in F, The Pastoral Symphony***

Chineke! Orchestra – Anthony Parnter, Conductor

Amiri Harewood – Piano

Wednesday 23 February 2022, Warwick Arts Centre

Warwick Arts Centre Orchestral Series 2021–22

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## Glossary

**Adagio:** At a slow speed.

**Allegro:** A brisk pace, fast and lively.

**Andante:** Walking pace.

**Attacca:** When movements are played without a break between them.

**Caprice/Capriccio:** Lively music, often loosely structured and humorous.

**Dynamic:** The scale of loudness and quietness.

**Igbo:** Language spoken by an ethnic group in the south-east Nigeria.

**Sonnet:** Poetic form for expressing love (of the courtship kind).

**Sturm und Drang:** Early Romantic movement in German literature and music (c.1760s–1800s).

**Tarantella:** fast music in a 6/8 time signature. Originally a dance from southern Italy.

**Tempo:** Speed of the music.

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# Exhibition Review: *A Picture of Health: Art, Medicine & the Body* – Needs More Room to Breathe

Jess Adler, University of Warwick, UK

*A Picture of Health: Art, Medicine & the Body* addresses the concept of health in 2021 – but not all is well. The exhibition is a rehang of over 20 years of accumulated works relating to medicine, with several pieces reflecting the location of the exhibition at the Leamington Spa Art Gallery & Museum, Royal Pump Rooms in Leamington Spa – historically, a site for drinking and bathing in natural saline waters, and later a hydrotherapy centre, which closed in 1999.

Occupying a single room with a high arched ceiling, the walls of the exhibition are a combination of exposed brickwork alcoves and pale clinically green walls reminiscent of hospital wards; cool, calming and non-intrusive.

You would be forgiven for thinking only one disease existed in the last two years; the world has been fixated on Covid. It is all-pervading, even within this exhibition, where floor markers guide you through the space and box you in around pieces. The art is a tonic to this obsession and provides a holistic view of other causes of illness and disease that are being overlooked, as well as the experiences of those who live them. It asks the viewer to consider: What does it mean to be healthy in 2021?

Not an easy question to answer. The rehang features a plethora of contemporary works, with a few historical pieces and artefacts added in. The collection is eclectic, covering multiple themes, from The Royal Pump Room's history to explorations of addiction, psychological illness and physical disease. It continues the trend that has endured in contemporary medical art since the 1960s, where health and sickness are viewed from perspectives outside of mainstream medicine and works are as much an exploration of identity in the context of illness as a representation of disease itself.

Among the works is Marc Quinn's marble statue of *Catherine Long* (2002), which is a study of unconventional physicality. In one corner, two oversized brightly coloured prints of altered pharmaceutical packaging from Damien Hirst's *The Last Supper Series* (1991) are hidden behind a pillar, dissected away from another four of Hirst's prints inexplicably located on the far side of the room. In a group of pieces comprising resin-set plants, ceramic bottles and pictures of hydrotherapy spas sits Lyndall Phelps' *Silence* (2001). A series of four knitted surgical masks created long before the pandemic, this piece has taken on new meaning, now a reminder of the initial fear of Covid and the loss that came with it. The exhibition ends on pieces specific to the spa town, including a set of hydrotherapy slings and electrodes reimagined by Phelps as luxury items and displayed against their historical counterparts. They do not quite feel like they fit within the discourse, just adjacent to the topic at hand.

Felicity Boardman's *I:DNA* (2019) is listed as a separate installation yet occupies a significant portion of the space. Brightly coloured bags hang on spikes of sculpturally reimagined DNA with a permeating soundscape looping endlessly. It disturbs the tranquil feel of the exhibition and makes it impossible to view the delicate photographic prints and pencil mappings of Jacqueline Donachie's *Weight* (2008) and *Susan's Eyes* (2008), and the four stranded Hirst prints at the necessary distance. It all feels cramped, compounded by permanent displays of china and a children's play area. Necessary, perhaps, but a downfall of The Pump Room's layout.

Sometimes the groupings of work make sense: a collection of historical portraits of physicians, a cluster of pieces around Leamington Spa's history, a meditation on genetics. At other times it feels confused; exploration of addiction alongside a reflection on dysmorphia directly next to a cryogenic memento mori. I am left with the impression that everything from the archive has been thrown into this exhibition, and that a pared-down selection would have provided more space to meditate on the pieces included.

It is a shame, as the works within *A Picture of Health* are a compelling combination of pieces addressing health and medicine. There is little to be gained by striving towards a singular definition of health; such varied experiences cannot be packaged up so neatly. The choice of pieces successfully convey that what it means to be healthy is multifaceted and tied to personal identity, even if they could use more room to breathe.

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