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Pollination and the Horrors of the Yield: Scarcity and Survival in the *Glasshouse*

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Abstract

Pollination is a lynchpin anchoring multispecies survival, but in the racial capitalist configurations of condensed environment agriculture, pollination politics are informed by life-depleting and carceral logics, as well as imaginaries steeped in racial hierarchies and sex binaries that ground future survival in colonial, heteropatriarchal, and normative terms. This article argues that pollination politics are focused on intensifying agriculture and increasing yield within carceral infrastructures, and that the orchestration of pollination is governed by socio-sexual schemas about fitness and fecundity that are governed by a normative reproductive futurism. Joining feminist STS and queer theory, the article traces how forms of life in greenhouses and other agricultural infrastructures are "gardened" in the interests of modes of sustainability that are fundamentally exploitative. Biodiversity is domesticated and depoliticized, and all forms of human and non-human vitality are directed towards increased yield. The naturalization of sexual difference influences how plant life is managed, but also how temporary foreign labor is biopolitically managed in controlled environment agricultural infrastructures. The article reads the perverse politics of scarcity through the South African film *Glasshouse* 2021) and ends by speculating on how "wild pollination" might present more decolonial, anti-racist, queer, and liberatory sustainable futures.

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pollination politics; reproductive futurism; feminist STS; queer theory; condensed environment agriculture; migration; wild pollination

Introduction
Pollination is a lynchpin anchoring multispecies survival. Wind, water, birds, insects, butterflies, bats, and other animals move pollen, and all disrupted by intensifying resource extraction and ecosystem degradation. In 2006, the calamitous prospect of bee colony collapse among *Apis mellifera* (the European honeybee) indexed the broad disruptions to pollination caused by anthropogenic climate change, pesticide use, and industrial agriculture. It was thought that bees would disappear, and with them the end of cross-pollinating plant species (Ragsdale, Hackett, and Kaplan 2007, 280).[1] Speculations on the multiple potential causes of mass bee death included cellphone waves, co-infections, nutritional deficits, chemical pesticide and insecticide use, viruses and infectious mites, and migratory stress resulting from repeatedly moving colonies to farms and industrial greenhouses. While the threat of colony collapse has since receded from the headlines, concerns persist about the capacity of pollinators to sustain current agricultural systems, particularly as climate change threatens food production worldwide.

In the condensed spaces of so-called Agriculture 4.0,[2] greenhouses and other controlled environment agriculture infrastructures (CEAs) have come to play an important role in articulating naturecultural relations of pollination, alongside hydration, light, temperature control, and optimized species development. They do so specifically by controlling interior atmospheres and by orchestrating relations among plants, pollinators, people, and technology within the condensed spaces of growing. How commercial greenhouses shape growing conditions, inform multispecies interactions, and fine-tune yield matter, not just for food security but also for the modes of kinship and flourishing that will sustain us going forward. Greenhouses are one form in a larger infrastructure of late capitalist agribusiness, but given their rapid growth in the last decade (spurred in part by the drop in prices of LED lighting), their capacity to enclose and enfold a set of controlled multispecies interactions, and their modeling of food security in an era of increased climate crisis, they provide a privileged epistemic angle for thinking about questions of liveliness, flourishing, yield, and energy. I see greenhouses as important forms for thinking about how sustainable food production is put into practice (or not) in complex assemblages of plants, temporary foreign laborers, bees, AI technologies, sensors, and mechanical pollinating technologies (Bell, Spooner-Hart, and Haigh 2006, 437).[3] Greenhouses are also compelling settings for staging the utopic and dystopic imaginaries of future survival because they enclose and orchestrate a web of cross-species relations in a structural form. They

thus continually metaphorize and demetaphorize food politics and multispecies entanglement.

While contemporary commercial greenhouses are frequently governed by ongoing and persistent racial capitalist logics (and specifically what Katherine McKittrick [2013] calls "plantation futures"), our collective future nevertheless depends on innovations in food security, on shoring up spaces of flourishing and nourishment around the world in the face of desertification, flooding, heat waves, fires, and other increasing environmental catastrophes. The capitalist configurations of Agriculture 4.0, however, put pressure on plants to increase yield through genetic alteration and control of growing atmospheres; pressure on precaritized foreign labor to work without security, residency, or rest through the terms of temporary labor contract; pressure on bee colonies to service the condensed agricultural landscapes that are still the rule through enforced detention of bee populations and controlled commercial breeding; and pressure on energy infrastructures to provide CEAs with water, electricity, and light.

I argue that pollination politics are informed by the life-depleting and carceral logics of global capitalism, as well as by imaginaries steeped in racial hierarchies and sex binaries that ground future survival in colonial, heteropatriarchal, and normative terms. First, such politics materially enable an intensified agriculture within the confines of new greenhouse structures (partially through the breeding of *A. mellifera* and *B. bombus*) and a multiplication of borders in the global system. Through bordering regimes, commercial agribusiness infrastructures put plant species, pollinators, and pollination technologies on the move, alongside racialized temporary migrant labor, and expropriate vital energy from the Global South to "insourced" agricultural infrastructures in North America, Europe, and East Asia, among others. Second, epistemologically and politico-aesthetically, these controlled environment atmospheres of growing are shaped by socio-sexual schemas that mediate and mobilize pollination, breed and control bee species, and generate produce through potent fictions about fitness and fecundity. Such fictions maintain the hegemonic priority of certain subjects over others and the structures of reproductive normativity along sexual and racial lines.

Thus, while we need new solutions to ensure our future survival, we also need better kinship relations to ensure that our visions of flourishing are more evenly distributed (among humans and nonhumans alike), and that our multispecies entanglements do not in fact serve expropriative aims. We must imagine at once better laboring relations, better growing relations, better pollinating relations, and better kinship ties to build futures that are less normatively coercive and less exploitative for people, plants, and pollinators. We need more "wild" forms of pollination, literally and metaphorically. Only then can we imagine the shelters of greenhouses as real forms of flourishing and refuge in the face of temperature changes, drought, desertification, ongoing imperial exploitation, and other crises.

I examine the material force of multispecies entanglement in intensive agricultural infrastructures, particularly circling around the politics of pollination. While many of these scenes take place in greenhouse enclosures, I argue that the greenhouse is also an epistemic angle for understanding the systems thinking in which pollination comes to be controlled. I join this analysis with an account of the imaginaries of reproductive futurism that inform visions of sustainability, well beyond the figures of the child or the family to which this critique is frequently bound in queer theory. Next, through a reading of the South African film *Glasshouse*, I draw out the implications of such imaginaries on green politics such as "reduce, reuse, and recycle." I end by thinking speculatively about what a politics of "wild pollination" might bring to imagine more just, antiracist, feminist, and queer ecological politics.

The Politics of Pollination

A. mellifera (the European honey bee) is a key pollinator, reared and commercialized alongside intensive agricultural systems around the world. Its natural range originally extended from northern Europe to southern Africa, and from Britain to the Ural Mountains, western Iran and the Arabian Peninsula. It includes more than twenty-five subspecies, with four lineages that were allopatric until large-scale transportation and mixing of *A. mellifera* populations occurred alongside imperial expeditions (Carreck 2008, 319). *A. mellifera*'s introduction to the North American continent dates to imperial forays from Italy, Spain, Portugal, and elsewhere in the 1600s, where honey became a common food in the settler colonies. Their continued breeding and trade traces the global routes of transnational capital, as well as the accidental forces of hurricane winds, and their own wayward movement across the North American continent (Crosby 2004, 189). Most importations of honey bees into North America and Australia took place from the early seventeenth century to the twentieth century. The development of steamship services in the mid-nineteenth century between Europe and the United States reduced the time required to cross the Atlantic Ocean and enabled the shipment of bees (largely Italian honey bees) from apiaries in Germany and Italy (Cobey, Sheppard, and Tarpy 2012, 27). The species has a complex history, entangled in imperial worldmaking, plantation economies, and racial capitalism.

Scientific literature on pollination ecosystems has argued that *A. mellifera* was a perfect complement to intensive agricultural systems—in other words, to "relatively large crop areas with little or no natural vegetation within the agricultural matrix as well as a short time period for pollination as a result of the deliberately high level of flowering synchrony within a crop field" (Melin et al. 2014, 1). This argument ignores how transformation of the bee species—its exoskeleton, nervous system, digestive tract, and collective social behavior—have been remade by federal laboratories, backyard beekeepers, industrial agriculture,

and global climate change (Kosek 2010, 651). Jake Kosek (2010) notes how beehives have been reconstructed to allow easy observation and manipulation by beekeepers, as well as transportation on the back of semitrucks to serve as pollinators at sites separated by thousands of miles. These beehive transformationshave also led to the transformation of bee colonies' social organization (Kosek 2010, 651).

For Kosek (2010), the history of beekeeping and beehives are entwined with bioengineers at national laboratories, military strategists, mathematicians, military contractors, and others. His rich multisited and multispecies ethnography is worth considering on its own terms, particularly insofar as beekeeping is part of the history of imperial expansion and military applications. Of particular interest here, however, is how ecological practices are entwined with broader questions of cultural politics of nature and difference, and the political economy of the production of living organisms, which he also follows (Reade et al. 2015, 440). Dependence on the high yield of certain crops, and the extended growing cycles greenhouses enable, accompanies the global logistics of the commercial bee trade. The commercial bumble bee industry breeds and supplies bees year round and worldwide for pollination in greenhouse and other condensed agricultural crops, particularly tomatoes, cucumbers, peppers, and herbs. This global movement of commercially bred bees has an impact on the pollinating relations among insects, plants, and humans in local ecosystems around the world (Reade et al. 2015, 437).

Bees are thus instrumentalized within coercive pollination politics to serve the interests of monocrop agriculture and its productivity metrics. These politics rely on technologies such as LED lighting to surpass and exceed diurnal cycles, which have effects on the labor time required in CEAs and thus solicit the turn to historical founts of racialized labor from the Global South to meet the needs of fourteen-hour growth cycles. Bees are at once commodities, inputs, laborers, and nonhuman species life in CEA systems. The infrastructures of greenhouse—because of the technical extension of growing time—coerce labor not only from temporary foreign workers but from bee species and from the plants themselves to maximize yield and respond to just-in-time production schedules. In this sense, they constitute a particularly interesting conceptual category for thinking how human-nonhuman entanglements are constituted within the agrilogistics of contemporary life. They point to an orchestration of plant-bee relations that is profoundly coerced and carceral, enclosed within the technological system of the greenhouse infrastructure.

In examining the pollination politics of greenhouse enclosures, I ally with Sarah Ives's point that multispecies ethnography seeks to blur the boundaries of human and nonhuman not only to move beyond a human-centric analysis, but to disrupt hierarchies of power, to understand how blurring the lines of the human and

nonhuman was distinctly violent, justifying land dispossession and genocide (Ives 2019, 2). Patent regimes, the appropriation of botanical knowledge, and of plant specimens also form part of the histories of transplantation, colonialism, and displacement that feed into contemporary agricultural emplotments (Foster 2019, 2). Pollination politics have been central to the organizational infrastructures of the plantation, the monocrop field, and the CEA, demanding modalities of fertilization to compensate for soils, bodies, and biodiverse assemblages rendered depleted and destitute.

Some of the literature—in its attempts to blur boundaries and disrupt hierarchies—has effected compelling reversals around questions of pollination, positing playfully that plants themselves may "use humans as pollinators to colonize new territories" (Szczygielska & Cielemęcka, 4). Catriona Sandilands argues that, if the flower is the plant's sex organ, it signifies an invitation to pollinate, in the interests of the sexual reproduction of the plant species. In this sense, in organizing pollination, we are "servicing plant desire" (Cielemęcka, Szczygielska, and Sandilands 2019, 6). This reversal is compelling, particularly in restituting forms of plant agency within the carceral space of commercial agriculture. In CEAs, however, the practices informing a sense of what plants *want* seems entirely predetermined by questions of yield. The infrastructures of greenhouses and vertical gardens coerce human and nonhuman labor towards a libidinal monotony—for the plants, who cross pollinate only among themselves, for the laborers who toil among endless rows of a single crop, as well as for the bees who, given the chance, escape the greenhouse through airshafts or ventilation channels to pollinate more diverse fields outside the prison house of the greenhouse plot.[4]

If vegetal agency is thought to explain the reciprocal capture of humans and nonhumans in and through industrial agriculture and its alternatives, the concept must also point to the carceral arc of pollination practices across industrial and infrastructural channels in the global system. This expansion of vegetal agency helps understand how, in Sandilands terms, all forms of life are being "gardened," emploted, trained, directed, and harvested, in complex relation to growing processes (Cielemęcka, Szczygielska, and Sandilands 2019, 6). Such "gardening" practices are pivotal to the languages of "greening economies." Vegetal agency is also instrumentalized through profoundly racialized and sexed categories of fitness, fecundity, and variability, which shape the nature of greenhouse inputs, the practices of pollination, and their interrelation in food production globally, as well as the ties that bind the varied laborers and labor practices the greenhouse encloses. It's to these categories and imaginaries that I now turn.

Pollination Futures

As the previous section makes clear, questions of kinship matter, even and especially within the agrilogistics of food and farm infrastructures. Pollination is

not only a story of food security and ecological survival; it is also steeped in imaginaries of reproduction and persistence, contamination and toxicity, sex binaries and racial frameworks.[5] Through bees—but also in their entanglement with the biology of plants themselves—pollination is a site where fantasies of reproduction cross species lines, and where survival is understood through the careful orchestration of plant reproduction, productivity and yield, and labor exploitation. I am interested in what kinds of interspecies intimacies or repressive norms are raised by the question of pollination and food security, and what modes of flourishing might be imagined in visions of pollination not bound by reproductive normativity or capitalist rationality.

Matters of kinship lead me to the question, If pollinating relations are coerced by the monologics of intensive controlled environment agriculture, how do they condense not only capitalist logics but also sex binary and heteropatriarchal ones? What sorts of normative coercions are embedded in plant lives that might be fruitfully unpacked through feminist STS's critique of evolutionary biology and attention to multispecies entanglement, on the one hand, and queer theory's suspicion about reproductive futurity, on the other? Alternately, how might wild pollination teach feminist and queer theory something about multispecies intimacy on deeper terms, pointing the ways towards modes of flourishing, intimacy, kinship, and obligation that are more broadly liberatory, aligned with the goals of antiracism, gender, and sexual non-normativity, No Borders politics, and environmental justice.

Greenhouses and vertical gardens are bound up in discourses of sustainability. These environmental discourses (particularly as they circle around species loss and colony collapse) implicitly value a "balance framework" that prioritizes a very particular kind of diversity, which becomes an input in the larger metrics of survival, profit, and yield. Pollination, a fundamentally social process of lived relationality, is then reshaped by the pressures of fitness, adaptability, and variation into a coercive norm for crop yield, which affects larger social visions of sustainability, and the reproductive futurism that plays out in regulating different bodies biopolitically. Diversity is not a neutral category. In this respect, Banu Subramaniam interrogates how questions of variation, diversity, and difference get framed in evolutionary biology's account of the reproductive life of plants (2014, 30). In studying morning glory flower color variation, she argues, the question of variation is always framed in invisible political terms bound to questions of heredity, differential fitness, adaptation, and natural selection, questions that are steeped in racial and sexual categories. Plant reproduction is grounded in categories of human difference, and in ideological commitments to reproductive futurity. Pollination and sexual reproduction thus inform each other in the discipline and the field, embedded in ideologies of race, nation, and sex.

The language of (species) diversity within climate modeling, crop health, and food sustainability frequently mirrors and reinforces understandings of difference that are grounded in political (eugenicist) imaginaries. Subramanian argues that "diversity in its recent institutional incarnation has been utterly domesticated and depoliticized" as a public good precisely because it has buried its roots in sexism and racism (2014, 15). In the Theodosius Dobzhansky vein of eugenic thought (the vein that prioritizes diversity as a "supreme value"), it was good for individuals to be genetically diverse, and for populations to be polymorphic (Subramaniam 2014, 35). The language of species diversity that informs agribusiness and the greenhouse infrastructures of growing, however, are not truly polymorphic in any case; rather, they encapsulate diversity within a monomorphic frame. Yet food-system-based survival will depend on thinking pollination beyond the diversity of bee species, and beyond the imperatives of the commercial hive and the crops they service.

These distinctions bleed from evolutionary biology to commercial agriculture, where taxonomic classification of crops rely on technologies of race used to order and regulate human diversity. These taxonomies, Helen Anne Curry argues, translate into contemporary agricultural relations (2021, 5). Curry argues that the taxonomic project was coextensive with the transformations in US agriculture from open-pollinated hybrid maize to the controlled crossing of multiple inbred lines, and thus to a more controlled, evolutionary, taxonomic structure, one that was indispensable to the new social relations of Agriculture 2.0, 3.0, and 4.0.[6] Pollination, then, is not only about crop health and species diversity, but about which bodies will be resources or inputs to increase yield, and which will be nourished and protected by those agricultural practices and knowledges.

Even the metaphors that govern "seeding" carry with them profoundly gendered ideas of reproduction. Susannah Chapman and Xan Sarah Chacko trace the masculinist and virile discourses that are invoked by seed banking and farming, seeking instead to complicate vernacular understandings of the term seed to reflect "queer and matrilineal possibilities" (2021, 1). They argue that seeds are overdetermined by a definition grounded in male reproduction (sperm, semen), and thus overemphasize patrilineal genealogical filiation; this overdetermination masks the fact that male sperm might be more biologically equivalent to pollen than seed, even though pollinators are female. Even this adaptive schema, though, covers over the queerness of seeds (a point this article aligns itself with wholly): that genres of "being seed" are "world-building projects," because they a carried by the wind, in the guts of animals, are shared between human hands (Chapman and Chacko 2021, 2, 6).

In this sense, pollination politics are exceptionally biopolitically informed, subject to regimes of governmentality that cross ecological, agricultural, capitalist, preservationist, and other modalities. Unless pollination politics are properly

understood in their (hetero)normative, specist, and frequently carceral dimensions (embedded in the hive politics of maintaining *A. mellifera* colonies and in the enclosed crop space of the greenhouse), a politics of "saving the bees" may simply reaffirm normative pressures on ecological systems, even in the name of "species diversity."[7] Biopolitics' seizing of inanimate objects and nonhuman animals are fundamental to the "regimes of life" that constitute even ecological sensibilities (Chen 2012, 6).

Queer theory becomes an important method through which to critique the hierarchies at play in environmental discourses, in and through the theoretical exploration of questions of intimacy, sexuality, and connectivity. Pollination points to the naturecultural spheres within which vitality is the engine of exchange between human and nonhuman worlds (as nourishment, cultivation, social bond, and sustenance). Pollination is a "vital matter" shaped by and in race and sex difference. My point in turning to multispecies ethnography and queer theory is to argue for how our structures of survival and flourishing need unloosing from reproductive heteronormativity, nation-state formations, capitalist capture and carceral agrilogistics. The point is not, as Timothy Morton elegantly argues, that "biodiversity and gender diversity are deeply intertwined," but rather that the very concept of "biodiversity" must be decolonized and queered, to undo its mooring in discourses of difference and the pressures of reproductive normativity (2020, 276). As such, I align with Morton's point that environmentalism may extend "phobias of psychic, sexual, and social intimacy," particularly in its prioritizing of organicist and teleological ideologies (278).

I see pollination as a central discourse in and through which categories of sexuality are also profoundly racialized, and thus in need of queer of color critique. Such queer of color critique goes beyond the racialization of animals (though the language of Africanized "killer bees" is a paradigmatic case in point), but extends to the normative and necropolitical management of reproductive life under climate catastrophe. Queer theory has effectively taken up the reproductive heteronormativity embedded in the figure of the child (Edelman 2004). The emergent field of "queer ecologies" has, for its part, taken up the critique of futurity through the concept of "feminist composting." Composting stands as a potent alternative to giving the earth to "our" children to inherit (Cielemęcka, Szczygielska, and Sandilands 2019, 12). I'm interested in extending the critique of reproductive futurity to plants and pollinators. It is not only that reproductive futurity acts as an ideological anchor point for the family (and thus for the repression of queer and gender non-conforming folks in ecological visions of the future), but that the logics of reproductive futurity extend beyond the human to the conditions of multispecies reproduction, including the reproduction of plant species, bred pollinators, temporary foreign labor pools, and even energy infrastructures. All of this matters to our broad naturecultural arrangements.

The border between human and nonhuman animals remains politically charged and intensely policed, but the naturalization of sexual difference across multispecies categories has been instrumental to the carceral function of the greenhouse as an agricultural enclosure, and indeed to the "plantation futures" that characterize global agricultural life. This policing, I argue, happens not only epistemologically but in and through the multiplication of borders between insides and outsides (of the greenhouse, of the nation-state, of the detention center or quarantine quarters, of native and invasive species, of good and bad refugees, of male/female functions, of productive and killer bees). Similarly, temporary foreign labor is also secured by the family to which the worker must return, which consolidates the turnstile of temporariness and forbids that workers take root in the spaces in which they labor. Stories of future survival, then, are steeped in reproductive fantasies that cross multispecies lines and coerce the libidinal exchanges and reciprocal capture between plants, people, and pollinators. Queer theory's valorization of the force of negativity might be helpful, I argue, in thinking pollination that allows for time off, spoil, ingestion, self-pollinating and other plant rhythms, other embodied forms, and bees' variable libidinal desires.

The Horror of Yield

As my focus on storytelling indicates, imaginaries for future survival matter. Some are bound to the utopic technological efficiency of a fully enclosed and automated vertical garden; others seek to integrate food production into other commercial and industrial urban infrastructure; and some seek to cordon off a space for the preservation of ways of life under threat. As such, I want to read the repressive normativity of pollination in the Capitalocene through forms of mediation that expose the perverse logics of food security. I'm particularly drawn to the form of "ecological horror" (and horror affects more broadly) as sites of potent critique of our pollination politics and the costs of scarcity. The South African horror film *Glasshouse* (Egan 2021) provides a rich site for thinking about interspecies intimacy, and about the greenhouse as a medium for the reproductive politics of survival. The film serves as a lens for focusing on imaginaries of food security and their normative ideals. Such ideals—the film reveals—might both come at too high a cost for the flourishing of those depleted by the current agricultural-ecological system, and occlude other forms of flourishing that coexist (sometimes barely) alongside the governing logics of contemporary agriculture.

Filmed on location in the Pearson Conservatory in Port Elizabeth (which is the last standing Victorian greenhouse in South Africa), the film is set in a dystopian future where a virus—"the shred"—has decimated social life. The shred is an airborne virus (like COVID-19, which is referenced in the film as one of several prior plagues) that strips away the memories of all who inhale it. Sheltered in a glasshouse, a family of five bear the responsibility of maintaining a lush garden to sustain them, and to filter the air to keep their memory intact. To do so, they

orchestrate a very controlled pollination politics, which is one of the sites of horror in the film.

The film's aesthetics are lush and tropical: a wild green space on the perimeter, a carefully tended garden enclosed in it, and the sanctuary of the greenhouse in the center where, under the guiding rituals of "Mother," four children (three girls—Evie, Bee, and Daisy—and a boy who's lost his memory to the shred—Gabe) work to survive the shred's ravages. The camera is confined to this tended perimeter, and we never leave the threshold of the sanctuary space. The film opens on a sentry duty scene, where the youngest child, Daisy, kills a trespasser.[8] As the body is dragged into the sanctuary, the rituals begin. The body is dissected, the organs ground to feed the plants, cartilage boiled down into glue, hair cut into small bundles for pollination. Their rites might be read as a practice and politics of coerced composting, putting the outsider's body to use as resource. Reduce, reuse, recycle.

The foreign body that crosses the border perimeter is taken up as a resource for the crop yield of the greenhouse, and its enclosed pollination politics.[9] The family join around a long table to recite the verses that accompany the killing of a "fresh one." Bee then winds a red thread around a tuft of hair that serves as a tool for pollinating the plants in the greenhouse. Pollination is performed by Evie and Bee (she is called the "last pollinator" in the film), who sing verses to remember their gardening rituals (Figure 1).

So it goes in the film's setting shots: the horror of the trespassers' dismembered bodies feeding into the delicate harmony of survival in the glasshouse; bedtime stories of the "monstrous" outside where the "beasts" who have no family and no longer remember their names roam; and the litanies of origin and survival that bind the family in a remembrance of their names and their roles in the cycles of life and death, and of a distinctly necropolitical politics of survival. The film's portrayal of the violent consumption of life outside the threshold for the survival of the inner sanctuary metaphorizes the differential exhaustion and depletion (on the one hand) and flourishing and nourishment (on the other) put into motion by racial capitalism, extractive economies, and the nation-state border regime.

Figure 1. Caption. Alt-textPollination rites in the glasshouse. Film still from *Glasshouse* (2021).

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The narrative engine of the film is put into motion, though, when Bee fails to kill a wounded trespasser. The outsider is allowed into the sanctuary to be cared for by the glasshouse dwellers. The trespasser begins as an ambiguous figure: he doesn't know if he ever had a name—he "forgets when it suits him," according to Mother. Little by little, however, he assumes the role of the lost brother Luca (who had left some time ago to see if there were other survivors outside). The moment the trespasser assumes this role is an induction into the social and sexual life of the glasshouse: In this scene, the trespasser reaches out to stroke Bee's cheek. She brushes his hand away, saying "Stop it, Luca!" He responds, "I'm not; I can't be." "Why not?" Bee asks. He responds, "Because I don't feel for you the way a brother should." Bee smiles and says, "Then you are Luca!"

In the closed space of the sanctuary, the problem of the family's survival is bound not only to the orchestration of pollination by Evie and Bee, but also to the capacity of the matriarchal family to reproduce itself. The not-quite-brother's entry into the sanctuary presents a threat to the family's unity, but also an opportunity for (hetero)sexual difference to be an engine for the family's survival. As the film progresses, the audience come to realize that "Luca" is not only *not* the lost brother Luca (the only one who believes in Luca is Bee), but is a revolving stand in, a repeated incursion of the outsider (and thus introduction of difference) into the space of the family in the interests of their reproductive future.

The outsider's threat and necessity highlight the toxic contradictions of border mechanisms in protecting spaces of survival. For the glasshouse to be a sanctuary—a space where the air is clean, the shred does not seep in, and where there is food to feed the mouths within it—it must establish a threshold and kill those who trespass. But for it to survive over time, it needs to control the introduction of difference into its confines. This is always a risk, and must be carefully controlled in order for the orchestration of survival with scarce resources and toxic threats to be successful. The glasshouse acts as both a sanctuary (on the model of citizen-belonging) and a border (where the regulation of outsiders is violent and almost absolute). The glasshouse is the scene and threshold of scarcity's horror. This point is driven home by Mother, who explains to "Luca," "Everything in this house is given a purpose. The seeds are here to be planted. The fruit to ripen and be plucked. You know what your purpose is." Luca responds, "I think you have one mind."

Scarcity becomes the governing principle for the greenhouse's delicate balance. The glasshouse doesn't seek to expand or to increase yield. It doesn't want to increase its population. Desire is paid back in the coin of exile and death. When Luca has performed his purpose and Bee is pregnant, Mother breaks the news to her: "Our sanctuary has its limits. Our leaves work very hard to keep us safe. They can only provide so many clean breaths." "Well then plant more!" Bee objects. Mother responds, "There's a balance. Balance requires sacrifice…You wanted him; you had him; and there are consequences!" Mother's politics are incapsulated in her lesson to Evie: "Trust Mother to take care of this family. Once there is a child, Luca will be gone. Luca always leaves."

This murderous sustainability keeps the balance of reproduction and crop yield, but at a cost: a new child means that someone will have to leave. And the affective attachments of the family prevent them from instrumentalizing each other in the interests of this delicate ecology. Daisy screams to her sister Evie, "I don't want Mother to become glue…or a pumpkin!" The mutuality they impose on the nonhuman species in the glasshouse cannot apply to them.

The family's survival is also a "survival of the fittest": "Luca," it turns out, is immune to the shred. Evie hopes that he will pass on his immunity to Bee's child, that their evolution in and through their delicate ecology becomes adaptive and progressive. Bee blows on a dried dandelion flower, spreading the seeds through her breath, a fertile disperser in the fields surrounding the sanctuary. Evie narrates the final scene: "Bee has chosen oblivion…We must let go of past seasons to clear space for new seeds. It's the natural rhythm of things."

The glasshouse is then both refuge and monstrous enclosure. It filters the shred even as it is held together with glue made from the corpses of trespassers.

Outsiders are monsters, beasts who are claimed by no one and who don't know their names. Scarcity is built in to the sanctuary's ecosystem, and because of it no one passes the threshold into the space of survival and remembrance. The ritual refrain—"So long as we remember, we remain"—is steeped in sexualized and racialized resonances of survival. Remembering is also a dismembering, a putting to use of the outsider's body for one's survival. Remaining is reconfiguring, avoiding becoming compost, becoming remains. The mantra to reduce, reuse, and recycle—seen in this light—points to the potential horror of scarcity ecologies. Reduction as exile; reuse as appropriation of the bodily ("I don't want Mother to become glue"); recycling as pollination and filtration through the erotics of familial belonging.[10]

The acts of remembrance and remaining are also steeped in the historical context of post-Apartheid South Africa. One of the film's writers notes that the Pearson Conservatory was a significant site for the film:

> My classmates and I went to schools named after monarchs and murderers…I'm interested in interrogating how we process these narratives—what we overwrite, what we leave out, how we remember, how we're complicit in them or traumatised by them…Our monuments are far from neutral. This conservatory was brought out from Victorian England to cultivate exotic plants not indigenous to African soil. It's a relic of British rule, stranded in a vibrant, but unequal African metropolis. Colonialism left behind relics on every continent—language, monuments. So it's how we negotiate with those memories—physically embodied in our architecture, and held in our personal and national histories. (Dercksen 2022)

The language of survival and scarcity, of remembrance and remaining, of pollination and reproductive futurity are bound to the aftermath of colonial violence and the segregationist logics of the Apartheid regime.

The film can be located in South Africa's post-1994 cultural texts that rewrite histories and "redefine the master narrative" (Ebrahim and Ellapen 2022, 170). As such the horror of the shred, and the entangled hopes of survival are exposed as bound to a reproductive futurism that is both heterosexual and profoundly white. The film's disquieting separation of insides and outsides, of sheltered membranes and ravages of forgetting, of the monstrous and the family are all coded within the afterlives of the Apartheid regime, and the settler colonial work on the land that constituted narratives of belonging for both British and Afrikaaner populations. Screenwriter Emma Lungiswa de Wet notes, "A dystopian tale allows us to look at the underbelly of the dream—what's at the end of the Rainbow Nation? We have a long brutal history that we're only beginning to come to terms with. We're a newish democracy, a developing nation with a young population, so

there's mixed energy and frustration. Sci-fi and Afrofuturism offer a path of imagining alternate futures" (Vourlias 2021).

It should be emphasized that South African environmentalism, also, was frequently a tool of racial oppression, a justification for the forcible removal of Black South Africans to "preserve and protect wildlife" (Hacker 2017, 301; Dlamini 2020). Birds' eye perspectives of African wildlife, and the focus on rich landscapes or mega-fauna contributed to South Africa's legacy of environmental racism and injustice, and has made unity under environmental concerns impossible. Notions of "pristine environments" in such environmental movements frequently occlude Black labor, displacement, and Apartheid-capitalist practices (Hacker 2017, 303). Further, naturalized ideas about race and of plant life intersected with the classification of ethnic groups in South Africa, which in turn justified land seizures and facilitated colonial settlement, symbolized by the Pretoria greenhouse (Ives 2019, 2). Ives further argues that the transplantation of plants such as eucalyptus disrupted relations between local people, plants, insects, and soils, and lay the foundation for the dispossession of the Khoi and San peoples (Ives 2019, 3).

South Africa is also a site for contemporary bioprospecting and plant patenting (Laura Foster [2017] details the complex assemblage of actors and social forces that constituted the site of hoodia cultivation and export in South Africa.) The greenhouse in the film *Glasshouse* thus becomes a powerful metaphor for the infrastructural arrangements, agricultural practices, and gendered and racialized social arrangements that govern the control of plant species, knowledge, and profit in the current moment. The garden in *Glasshouse* demonstrates how "nature is actively being made" (Friese in Foster 2017, 25) on a substrate of racial, sexual, and reproductive imaginaries. Foster also points to how plant materialities alternately refuse or align with the forces that seek to shape their growth and organization, and thus the complex and multiple modalities of materiality that constitute emplotments around the world (Foster 2017, 35).

It's in this sense also that the entanglement of the environmental slogan "Reduce, reuse, recycle" can become a site of horror. Under the sign of scarcity, within the circuits of post-Apartheid capitalist extraction, labor exploitation, contractual benefit sharing arrangements, segregationist border politics, such politics can only be about differential extractive operations. *Glasshouse* thus situates its horror affects within the sexual and racial politics of post-Apartheid South Africa, with pollination as the key site of the orchestration of socio-sexual relations in the interests of a particular vision of survival. It makes clear that the normative frameworks through which pollination is understood have profound effects on the shape of social life in a future imaginary, and that we may need other schemas to think survival and flourishing than those on offer within certain forms of environmentalism and sustainability discourses.

The "Uncontrollable Lives of Pollinators"

Pollination need not be bound to epistemologies of scarcity and fitness. It might rather point in the direction of new modalities of lived relationality, and new practices of interdisciplinary knowledge. Witness Deborah Bird Rose's vivid account of the Australian flying fox, which pollinates myrtaceous trees and shrubs. Her story is one of energy flowing across species and systems, a set of "embodied time knots" in which foxes move from the hillsides to the riverbanks and channels, as the trees flower sequentially, bringing in the rains that will nourish the drier country (Rose 2012, 133). Pollination might summon up queer interspecies intimacies, if only we can unseat it from languages of scarcity, reproduction, fitness, and survival. Hence the importance Donna Haraway places in speculative fabulation to summon new imaginaries and vocabularies for thinking entanglement and flourishing. The metaphors and imaginaries by and through which pollination take place shape how we understand survival, transmission, erotic life, toxicity, and nourishment, for better or for worse. Yet pollination is currently ensnared in reproductive futurism's broad net, particularly under the agricultural conditions of climate catastrophe and the exponential growth of greenhouses and other infrastructures of controlled environment agriculture in the last decade as sites for intensifying the space and time of crop production, and thus increasing yield. The greenhouse—as an ideological container and an epistemic lens—influences how we understand the crisis of pollination, the collapse of bee colonies, the strain on plant and crop life, and the solutions that agricultural infrastructures propose. Part of the way in which we conceive of pollination under ecological duress is through the same "ecosystem simplification" that is enacted by monocrop agribusiness, increased greenhouse yield, and food security regimes. The structures of pollination (like the larger infrastructures of greenhouses and Agriculture 4.0) are governed by considerations of scale, rate, speed, synchronicity, and managing complexity (Haraway 2015, 99).

We need stories to tell of the costs of pollination as it is currently practiced—under the sign of scarcity and increased yield; and we need stories to tell of the possibilities of multispecies knots as central to our collective survival. What kinship ties emerge from different pollination politics and different stories, the racialized and gendered dynamics they embody, and the conditions of exhaustion or exhilaration that might accompany them? In Subramanian's analysis, she explains that the greenhouse was a site where genetic crosses could be carried out in plants "away from the uncontrollable lives of pollinators" (2014, 43). I am compelled to think what happens when we focus on these uncontrollable lives, and posit a social, political, and aesthetic form from them. What might an "uncontrollable life" look like for growing food in the future? For imagining kinship and intimacy and mutuality?

To queer pollination politics requires a different figure than attempting to recuperate vexed categories of pollinators, such as "killer bees." A reliance on the negativity of "killer bees" would constrain pollination to a narrow anti-social queer politics (Lee Edelman's [2004] "synthomosexual" in apian form), difficult to square with a focus on decolonial and ecological survival. But what about a politics of wild pollination? "Wild pollinators" and "diverse pollinator assemblages" provide better pollination to crops, even though they cannot sustain intensive agricultural landscapes. For the most part, studies of so-called "wild pollinators" have been bound within a monomorphic frame, as complements to crop productivity on intensely managed landscapes (Nicholson and Ricketts 2019, 29). On its own terms, though, wild pollination might engage different multispecies cooperative networks for food security going forward.

To find instances of wild pollination we might draw from Robin Kimmerer's notion of "energetic reciprocity." Through her return to Indigenous knowledges, she learned to learn "where plants bloomed, whom they cohabitated with, for whom they were food, which animals lined their nests with its fibers, what medicine it offered, how they got their names" (Kimmerer 2013, 44). In and through this knowledge, she returned to the question of asters and goldenrods' riveting companionship: through human color perception, and the eye's particular receptivity to purple and yellow; through artmaking and the complementarity of colors in reciprocal pairs; and through the nonhuman sensorial field of the bee driven to pollinate (46). What Kimmerer identifies is not a phenotype, nor a binary structure of reproduction; rather, Kimmerer sees an "architecture of relationships," built in and across scientific modes of training and traditional knowledge, and a "grammar of animacy," a mode of "listening in wild places" (46–48).

Wildness has been taken up in queer theory, too. Jack Halberstam and Tavia Nyong'o affirm that, while *wildness* is a term with a history as the "dumping ground for all that white settler colonialism has wanted to declare expired, unmanageble, undomesticated, and politically unruly," they nevertheless see in wildness a capacity to see "what an idea has always gathered in its wake" (2018, 453). Halberstam cautions against investing in a wildness from the past, or a future restored wilderness; instead, he sees the "wild" as a "terrain of alternative formulations that resist the orderly impulses of modernity," and thus works to actively resist (rather than conform to) colonial, capitalist, and normative epistemologies (Halberstam 2020, 2). This form of wildness works towards a "disorder of things" rather than an "order of things" (Halberstam and Nyong'o 2018, 454), and thus towards undoing the coercive categories by and through which modes of flourishing are shaped.

Wild pollination thus doesn't belong in a time or place that's outside the contemporary spaces of urban and rural plant life; it might, though, undo its

monologics. While many species of bees (who are categorized as "wild pollinators") are captured by the carceral control of survival, in and through greenhouse enclosures, nation-state borders, agribusiness farm plots, and the commodification of precarious labor, there might yet be possibilities for a different politics of survival if we take seriously what "wild pollination" might mean for our social, sexual, and cultural lives. In this sense, we might dwell with the idea that "colony collapse" is an indicator not of a failure to "save the bees," but of the unsustainability of settler food practices for our multispecies survival. Wild pollination's refusal to support intensified agriculture could point the way to food politics that rely on an entirely different disorder of things (decolonial, feminist, antiracist, and queer/trans*), and to new sites of critique for the racialized and sexualized categories in and through which we think sustainability and survival. It also moves us beyond a conservation politics that is largely based in settler colonial understandings of taxonomic orders, local knowledges, "native" species, and the preserved order of things (Curry 2021, 14).

How then might we complexify our ecosystems thinking, and think the politics of pollination and the reproduction of life outside the normative frameworks that become sites of horror in *Glasshouse*? I believe that feminist, queer and trans*, and decolonial perspectives offer a unique ground from and through which to critique notions of adaptability, survival, fitness, and futurity, particularly insofar as they understand the differential, sex and gender normative, and regulative function of these terms within evolutionary biology, biopolitics, and carceral nation-state formations.

A figure Haraway works with in telling the story of the Chthulucene is not only Gaia and Medusa, but also Potnia Melissa, Mistress of the Bees, "draped with all their buzzing-stinging-honeyed gifts," who stands in opposition to the technohumanist figurations of the "forward-looking, sky-gazing Anthropos" (2016, 52–53). A proper devotion to Potnia Melissa might work to counter the sites of horror in the film *Glasshouse* because of the figure's lateral, tentacular, alinear, agendered embodiment. Living and dying well, according to Haraway, involves "join[ing] forces to reconstitute refuges, to make possible partial and robust biological-cultural-political-technological recuperation and recomposition, which must include mourning irreversible losses" (101). What *Glasshouse* opens us onto is the possibility of thinking pollination as a process—like compost—that can model lived relationality, precarity and survival on different, queerer, antiracist terms.

Wild pollinators force us to focus on complex and less-intensified landscapes, and to adjust our epistemologies and politics to them. Looked at through Kimmerer's lens of lived relationality, the unsustainability of wild pollinators is perhaps a gift. Unmanaged, species-differentiated, less "efficient," more robust, Indigenous, and migratory at once in a non-carceral field. Note that sometimes wild pollinators are

the same species of bee (*A. mellifera*); sometimes not. This is not a taxonomic distinction. Curry stresses (in her analysis of maize taxonomies) that "indigenous" corn varieties were a slippery object, an "ostensible botanical category" that was inflected by ideas about Indigenous Peoples (2021, 12). What makes some pollinators "wild" is, as Karen Barad argues, "that their very species 'being', as it were, makes explicit the queering of 'identity' and relationality" (2022, 126). They do so because they have no identity that precedes their relation to other critters, plant life, and humans. Pollinating is a practice or task, not a taxonomy.

Rose, cited above, reconstructs the sense of inheritance and entanglement I take Barad to mean by thinking what she calls "temporal diversity" across sequential and synchronous timeframes (Rose 2012, 128). The connections across generations of species (as well as between and among currently living beings) offers the basis for what Rose calls "the life-giving and life-affirming qualities of ethical time," embedded in nourishing relations between non-biological kin such as flying foxes, myrtaceous trees, and rain seasons (2012, 128). Central to her careful study is what she calls an "interface"—a site of encounter and nourishment—that is at once embodied, temporally criss-crossed, and knotted. Failure to honor this ethical time leads to a "double death"—the death of the generation, and the death of the species, an "aenocide" that violates the mutualism at the heart of multispecies knots (137). Central to my argument here, this intersection is not only ethical but libidinal, a "story of desire: of how flying foxes and trees want to live" (134). What could be more liberatory and queer than her image of flying foxes carrying "eucalyptus futures on their furry little faces" (135)?

This wildness might also be found in seeds themselves. As Chapman and Chacko argue, seeds don't follow the patrilineal imaginaries imposed on them. They derive from "self-pollination, polyamorous cross-pollination, and multispecies orgies of flowers and pollinators" (Chapman and Chacko 2021, 6). They don't conform to any particular gender identity and practice forms of sexuality—vegetative propagation, asexual growth, multiple reproductive organs—that defy binary thinking (6–7). Seeding in multispecies collaboration can defy the logics of monocrop repetition that govern greenhouse growing, on the clock, enclosed in controlled atmospheres, orchestrated to just-in-time markets.

We have at hand social justice frameworks for imagining wild pollination within and without the spaces of greenhouses: mutual aid frameworks might help collectively articulate new frameworks to meet each others' survival needs (across species lines) (Spade 2020). Examples exist in community gardens, food distribution programs, and histories of illicit and resistant garden plots; No Borders politics might liberate the capacity for more just, less surveilled, regulated, and exploited movement of workers, plants and pollinators, creating more variegated knowledge bases, species interminglings, and pollinating

practices, in greenhouse enclosures and outside of them. New rights regimes might even emerge from the work of tending, from the vital labor contributed to spaces of flourishing worldwide (Azoulay 2019).[11] We see these instances in attempts at urban and rooftop gardens in food deserts and other areas subject to the violence of redlining. We also see this in Indigenous projects such as Digital Mi'kmaq's Ugpi'ganjig Community Garden (Ugpi'ganjig, n.d.).

Queer and trans* commitments to thinking futurity on non-heteropatriarchal terms—or terms which resist or seek to abolish sex binaries altogether—might present new relations to plants and pollination, and to the intimacies made possible by dreaming up new spaces of flourishing and embodied life (Halberstam 2020; Keegan 2020). In return, wild pollination might instruct feminist, queer and trans* theory about the diversity of forms of embodied living and libidinal practices across an unclassifiable variation of species and pollinating relations. These practices might move us out of the retrenchments in naturalizing categories that have produced racist or anti-trans* politics within feminist or queer theories of multiplicity, for instance. Wild pollination might summon up a more expansive vision of a world without borders than those posited within justice frameworks focused solely on the human toll exacted by bordering regimes. The multiplicity of pollinators, gardeners, and plant species might join together in a reciprocal capture that points towards queer futures rather than reproductive heteronormativity. Thus, wild pollinators present a material, aesthetic, and epistemic promiscuity we might learn from if we want to think other models of sustainability and survival, ones that redefine our very conditions of flourishing.

Notes

[1] In the early 2000s, beekeepers reported losing 30 percent to 90 percent of the hives, without a recognizable cause.

[2] Agriculture 4.0 refers to an agricultural system that harnesses the energy of the cloud—the internet of things, precision agriculture, and artificial intelligence—to manage its inputs and outputs for optimal growth. I argue elsewhere that the narratives of sequential operating system updates (Agriculture 1.0, 2.0, 3.0, 4.0) are stories about energy, about the movement from animal force to combustion engines; from machinery to GPS systems and guide systems, and from these to cloud computing. A privileged site for Agriculture 4.0 is condensed environment agriculture, largely within commercial greenhouse infrastructures around the world (Escamilla-García et al. 2020).

[3] This article is part of a larger project that considers greenhouses as media insofar as they orchestrate and put pressure on spatial and temporal relations. See Lynes, "How Like a Leaf: The Vital Energy in Greenhouse Infrastructures" (forthcoming).

[4] This libidinal monotony is characteristic of what Anna Tsing calls the "long-distance simplification of landscapes all over the world," which was accompanied by the wiping out of places of refuge for diverse human and non-human species assemblages (2015, ##). At the same time, as Natasha Myers makes clear, "we do not yet know what is proper to a plant " (2017,298).The monocrop logics that undergird controlled environment agriculture may service the plants they enclose, and yet CEAs set in motion a set of human/plant relations that have fragilized ecosystems and local economies and centralized profit on imperial and racial capitalist terms. Myers notes Donna Haraway's reminder that we continue to ask "for whom and at what cost?" when we try to think about what plants may want (2017, 298).

[5] "Killer bees" animated highly racialized cultural imaginaries with the introduction of "Africanized" strains of bees (*A. mellifera scutellata*) to Brazil in the mid-twentieth century. Their gradual spread northward through the US southern states was seen as dangerous and invasive, and efforts at control were highly coded by anti-miscegenistic population control measures. These "killer bees" were the object of the widely panned horror film *The Swarm* (1978). They are considered more dangerous because they attack intruders in greater numbers than *A. mellifera* and react to disturbances more quickly. It is impossible not to see in the imaginaries of "Africanized" and "European" honey bees the playing out of racial capitalism on a global scale, and to see the "killer bee" as an overdetermined racialized object.

[6] Elaine Gan (2019) also focuses on the racialized trajectories of rice (Oryza) in tracing the co-evolution of people and plants through mutual selection and propagation. The use of categories such as "modern," "elite," "improved hybrids," "native," or "wild" are all bound to genealogies with specific naturecultural and social consequences.

[7] Again, the overdetermined echoes between xenophobic and anti-immigration policies and the fear over "Africanized bees" is indicative of how an over-"animacy" (the hyper-responsiveness—and thus "aggressivity"—of killer bees) is steeped in racial and sexual categories and fears over miscegenation.

[8] It should be noted that the trespassers are all bedraggled white men, typified as "beasts" who do not remember their names. In the context of the film's setting in South Africa, the fact that the acts of survival, forgetting, and exclusion all play out among white characters is poignant, and demonstrates how these phobias and boundaries play out not only around questions of miscegenation and difference, but also importantly within sites of hegemonic belonging.

[9] The instrumentalization of the foreigner's body may be read also in the light of the historical and global reliance around the world for "temporary foreign

workers" from the Global South to work in the agricultural sectors of North American and European cities. See my article, "How Like a Leaf" (forthcoming).

[10] A beautiful account of the dangers of individual (and often heroic and self-aggrandizing) efforts at reducing one's environmental impact is Elizabeth Kolbert's "Green Like Me: Living without a Fridge, and Other Experiments in Environmentalism," *The New Yorker*, August 31, 2009. Central to her account of misplaced efforts at reducing waste is the failure of efforts by those living in the most privileged structural centers of widespread waste to see the larger entanglements of their way of life with the destitution and poverty that exists where others are instrumentalized to serve one's "lifestyle."

[11] Ariella Aïsha Azoulay (2019) makes this argument in relation to the right for people on the move to come live near their confiscated objects in European and American museums, overturning the language of "migrant caravans" or "illegal migration."

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