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Scaling planetarity: *spacetime* in the new modernist studies – Virginia Woolf, H.D., Hilma af Klint, Alicja Kwade, Kathy Jetñil-Kijiner

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ABSTRACT

What might planetary modernisms mean if we incorporate non-human along with human dimensions of modernity? The essay challenges the prevailing anthropocentrism of modernist studies by focusing on the radical scaling of *spacetime* in selected women's writing and art as they engage with the new cosmology, quantum physics, materialism, ethics of their times. Spotlighting Woolf, H.D., and Hilma af Klint (early twentieth century), and Alicja Kwade and Kathy Jetñil-Kijiner (twenty-first century), the essay draws on the new time and archipelagic studies to examine the agencies of the non-human and human amidst war, colonialism, capitalism, militarism, and environmental destruction. Jetñil-Kijiner's Marshallese poems bring into sharp focus the ecologically inflected planetarity and politics of the other artists and writers.

KEYWORDS

Planetary modernism; feminism; new materialism; cosmology; archipelagic studies

I begin with the disjuncture of competing temporalities in the space I live. An oak tree, one block from my house, in Vilas Park. It's vast and old and creaky – thick-waisted and dwarfing

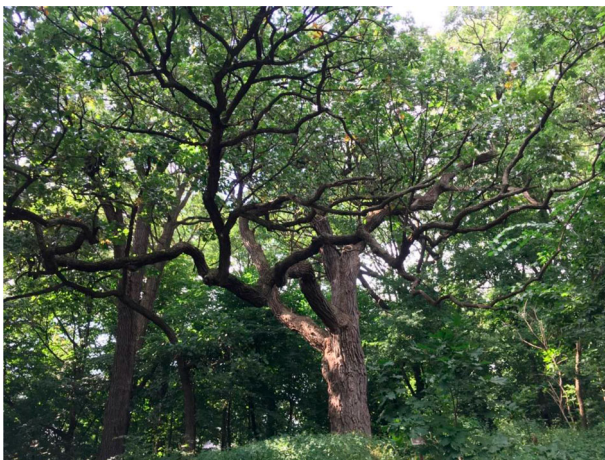


Figure 1. Oak Tree, Vilas Park, Madison, Wisconsin, identified as standing in 1787 at signing of U.S. Constitution. Photo: Susan Stanford Friedman, 2019.

the trees around it in their various stages of growth. A bronze historical marker notes that the old oak was already standing when the Constitution was signed in 1787 (Figure 1).

How much longer will it survive? But more to the point, what does it mean that the temporality of the tree co-exists so nearby the temporality of human life, of my life? We are neighbors in space, that tree and I, but not in time. At heart, this observation encompasses what I mean by *planetarity*. It participates in the act of scaling as a function of human perception that nonetheless resists anthropocentrism by juxtaposing the temporality of the non-human alongside the human.

In 2008, participating in what Douglas Mao and Rebecca L. Walkowitz called “the transitional turn” in modernist studies,¹ I chose the word *planetarity* for a Modernist Studies Association paper to advocate for a global approach to modernist studies, work that would eventually result in *Planetary Modernisms: Provocations on Modernity Across Time* in 2015.² Why *planetarity*? I found the term suggestive in ways that bypassed the debates about globalization and transnationalism, even the utopian gesture of alterity in Gayatri Chakravorty Spivak’s use of the term in *Death of a Discipline*.³ I thought that *planetarity*, like Edouard Glissant’s repeated invocation of *world-ness* in *Poetics of Relation*,⁴ would enable my ambition to rescale global modernities in the very *longue durée*, outside the prevailing Eurocentric periodization, an effort to which I remain committed. But I also anticipated that the term *planetarity* opened pathways into the growing environmentalist approaches to modernity. Since then, the explosion of work on ecological modernisms and the Anthropocene has broken new ground in modernist studies, impelled in particular by impending environmental catastrophe and precarious futurity.

Before considering this ecological imperative, I explore here a non-anthropocentric planetarity that draws upon the new physics of the early twentieth century and the new materialism of the early twenty-first century. Both exhibit a fluid scaling between the cosmic and the sub-atomic; both decenter the prevailing anthropocentric framework for concepts of modernity and its attendant modernisms; both have drawn women into their orbit, in part for potential ethical and political implications. The new materialism in particular has become fertile ground for a feminism based in ecological and interspecies frameworks.⁵

What, I ask, might it mean to see through the lens of the planet, especially for women who experience exclusions based on gender, race, or origin? How might planetary scales of non-human time and space alter our perceptions of human histories and creativities? What difference does it make who does the scaling, from what sociopolitical and cultural positions they occupy in time and space? How might scaling and rescaling of non-human and human contribute to a planetary modernist studies?⁶ What, in short, are the political stakes of such decentering of the human?

This essay is a collage of meditations on these questions, moving back and forth through time and across space with spotlighted examples drawn from women artists and writers in different global locations from the early twentieth to the early twenty-first centuries. As *spacetime* collage, I intentionally disrupt a conventional linear historical narrative, at the same time that I take into account the historical positioning of these women. In so doing I experiment with a new methodology of literary and art history that draws from non-linear notions of time and archipelagic concepts of relational space.⁷

Modernist *spacetime*: quantum ontology, new materialism, and new time studies

Elizabeth Sheehan has coined the wonderful term “colliding temporalities” to think about modernism.⁸ I wonder as well how to understand colliding spaces as they are mapped onto what Sarah Cole calls “clashing temporalities” in *Inventing Tomorrow: H.G. Wells and the Twentieth Century*. Cole importantly reminds us of the widespread influence of H. G. Wells’s *The Outline of History* (1920), including on writers like Virginia Woolf.⁹ Wells’s four-volume *Outline*, which went through multiple editions and translations, begins with an account of the Earth in deep time, moves through the ages before humans appeared, accounts for succeeding periods of human history through the Great War, and ends with a vision of the future, an Earth at peace under the governance of a League of Nations. The first volume, however, opens with a brief exercise in scaling, articulating the disconcerting instability of collapsing/expanding cosmic spaces: “The Earth on which we live is a spinning globe. Vast though it seems to us, it is a mere speck of matter in the greater vastness of space.”¹⁰ The planet Earth is both “vast” and “a mere speck of matter,” a conundrum in which non-human and human times and space collide.

Spacetime: the neologism coined to encapsulate Albert Einstein’s general theory of relativity (1916), which, building on his specific theory of relativity (1905), postulated that space and time are not distinct, fixed entities but exist relationally, fluidly entangled, and outside human consciousness. Einstein’s *spacetime*, theorized in mathematical formulae, fundamentally altered twentieth-century cosmology and the postulates about intergalactic phenomena. Quantum physics developed alongside this revolutionary cosmology at about the same time, likewise setting aside Newtonian principles by postulating subatomic matter as comprised of particles and waves in constant motion, each with the capacity to become its opposite – waves into particles; particles into waves – as they were being observed. In his overview of twentieth-century development in physics, *The Fabric of the Cosmos: Space, Time, and the Texture of Reality*, physicist Brian Greene notes that “most researchers used general relativity solely for analyzing large and massive objects, while researching quantum mechanics solely for analyzing small and light objects.”¹¹ But for both large and small objects, space and time were always relational, entangled: *spacetime*. As Gillian Beer, Adelaide Morris, Mark S. Morrisson, and Cassandra Laity (among others) have argued, the new physics, widely disseminated in readable form by physicists like Arthur Eddington and James Jeans, variously made its way into the work of many early twentieth-century modernists in Britain and the United States.

Initially distinct, cosmology and quantum mechanics developed separately, even at times oppositionally, Greene notes. But significantly, the popular disseminators like Eddington and Jeans produced book after book in the twenties and thirties that included illustrations of vast nebulae and tiny particles. Increasingly, physics sought (and still seeks) a “unified theory,” one that would connect large and small, the cosmos and the subatomic.¹² Combined with advances in biology, the new materialism of the twenty-first century draws especially on Einsteinian *spacetime* and quantum mechanics to challenge the poststructuralist discursive turn and to assert a materialist ontology and its attendant epistemology. While clock-time, as a form of measurement, is a product of human consciousness, *spacetime* exists outside human perceptions of it. Quantum matter – particles and waves – similarly exist as entangled and outside human thought, although human

attempts to measure them alter their behavior, interrupting linear or fixed notions of time and space upon which human thought so often depends.

Where early twentieth-century vitalism (with Henri Bergson as a prime proponent) maintained the dualism of inert matter and the *élan vital* embedded in human consciousness, the “new vitalism” of the twenty-first century rejects the older distinctions between physics and biology, between organic and inorganic, animate and inanimate.¹³ Andrew Pickering’s and Bruno Latour’s related concepts of non-human agency are foundational for this new materialism, including feminist materialism. As Diana Coole and Samantha Frost assert in *New Materialism: Ontology, Agency, and Politics*, “the whole edifice of modern ontology regarding notions of change, causality, agency, time, and space, needs rethinking.”¹⁴ Inspired by quantum physicist Niels Bohr in particular, Karan Barad (physicist, philosopher, feminist) argues that matter is not a “fixed substance,” but is itself performative, an “intra-active becoming, not a thing, but a doing, a congealing of agency.”¹⁵ For Barad and for the other contributors to Stacy Alaimo and Susan Hekman’s *Feminist Materialism*, this intra-active nature of matter opens the door to a political ethics centrally informed by feminism. Present, but understated in the new feminist materialism, is the irony of the enormous influence of physics at the same time that the evolving field has been a largely male domain, with a few important exceptions. Botany, in which women have a much longer visibility, is also central to the new feminist materialism, especially for those like Anna Tsing and Donna Haraway, who insist that a global approach to interspecies relationships shape our approach to the planet.¹⁶ As Haraway writes in *decentering the human*, “No species, not even our own arrogant one [...], acts alone; assemblages of organic species and abiotic actors make history, the evolutionary kind and other kinds as well.”¹⁷

Parallel to, but quite distinct from the new materialism, are the new approaches to time in studies of the contemporary arts, literatures, and media in the early twenty-first century. Above all, the new time studies attacks the linear concept of time, the arrow of time, and promotes a host of non-linear temporalities. The prevailing notion of time in books such as *Time: A Vocabulary of the Present*, edited by Joel Burges and Amy J. Elias, and *Time: Documents of Contemporary Art*, edited by Amelia Groom, reconceives time as multidimensional.¹⁸ Non-linear descriptions of time appear in these essays: for example (in alphabetical order), *coexisting*, *collapsing*, *colliding*, *conjoined*, *crisscrossing*, *crumbled*, *crumpled*, *deferred*, *discontinuous*, *disjunctive*, *disruptive*, *dissident*, *doubled*, *enmeshed*, *entangled*, *foreshortened*, *fractured*, *heterogeneous*, *interwoven*, *multiple*, *multi-dimensional*, *multi-directional*, *multiplanar*, *plural*, *simultaneous*, *stretched*, *thickened*, and so forth.¹⁹ For Elias, a founder of the Association for the Study of Arts of the Present, and her co-editor Joel Burges, “the present has emerged as an experience in the simultaneity in which temporalities multiply [... and] conjoin [... It] may be grasped as textured and stretched, latent and current – a mediation of presence and distance in time.”²⁰ For Groom, a new temporality of the present questions

the idea of time as an arrow propelling us in unison from the past into the future [...]. Once the twentieth century’s fetishization of teleological progress is abandoned, history’s time reveals itself as a concoction of chance encounters, arbitrary inclusions, systemic exclusions, parenthetical digressions, abrupt U-turns, inherited anecdotes, half-remembered facts, glossed-over uncertainties and forgotten back-stories.²¹

For Russell West-Pavlov in *Temporalities: The New Critical Idiom*, the “plural temporalities” of what he calls the “postmodern period” put in conflict Newtonian clock time that

still governs everyday lives with a “plurality of interacting temporal flows immanent to the world of organic and inorganic things.”²² Post-colonial time, he argues, is also plural, but differently, as it blends the time concepts of different cultures and histories in the context of colonialism and its legacies.²³ West-Pavlov draws on Dipesh Chakrabarty’s *Provincializing Europe*, in which Chakrabarty argues that “[t]he writing of history must implicitly assume a plurality of times existing together, a disjuncture of the present with itself.”²⁴ In *Slow Violence: Environmentalism of the Poor*, Rob Nixon examines those disjunctures, by looking at the imperceptibly slow temporality of the Anthropocene’s violence, felt especially by the subaltern.

Curiously, however, the new time studies focuses heavily on contemporaneity, that is, the present as the timesite in which all the disjunctive, conjoined pasts make up the present. Even though Groom’s collection includes excerpts from many earlier thinkers, the new time studies appears largely unaware of the debates about time in the new physics and attendant aesthetics of the early twentieth-century. In arguably his most influential book, *The Nature of the Physical World* (1928), Eddington promoted what he called the “space-time” in Einstein’s general theory of relativity and coined the term “time’s arrow” to designate the view that time is irreversible, flowing only in one direction, from past, to present, to future.²⁵ This view of time, widely dubbed “the arrow of time,” underlies Big Bang cosmology, the notion that the universe had an origin point and moves forward in a direction to some future time, entropy, an end of the universe. As Greene notes, a frequent explanation of time’s arrow in physics points to the irreversibility of a cracked egg; once broken, it cannot be made whole again.²⁶ But, as Eddington argues in the 1920s, physicists, especially in quantum mechanics, challenged arrow-of-time temporality and experimented with ideas of reversible time or multidirectional time, work that later in the twentieth century is variously associated with string theory and chaos theory.²⁷

Additionally, the new time studies gives little attention to the future – or, rather, to possible futures.²⁸ For all that Wells’s *Outline of History* is relentlessly unidirectional and linear, he was, as Cole establishes in *Inventing Tomorrow*, just as insistent upon positing possible futures of what might happen in many of his other works, especially his science fiction – uncannily forecasting such phenomena as aerial warfare, invasion from outer space, the atomic bomb, and even an encyclopedic internet, which he dubbed “the world brain.”²⁹

As richly suggestive as the new times studies, the new materialism, and the new physics have been for twenty-first century concepts of *spacetime*, they share the limitations of a largely post-Enlightenment but still Western framework of thought, frequently ignoring the relational, non-linear, and animist modes of thought that have existed for centuries both in the West and in other parts of the world. The emphasis on the non-linear as a feature of the contemporary in the new time studies in particular ignores the rejection of Newtonian time in much early twentieth-century Western modernism, as I discussed in “Alternatives to Periodization.” It also ignores concepts of time in cultures outside the West that often incorporate notions of repetition, cycle, palimpsest, discontinuity, utopia/dystopia, and other forms of non-linearity. Indigenous cultures in particular often retain strong elements of animist religions, with their practices relating to spirits animating all matter, continuous cycles of *spacetime*, ongoing presence of ancestors, and shamans with capacities to travel outside ordinary spaces and times.³⁰ The planetary thinking I am exploring here can fruitfully embrace the new approaches to space, time,

and matter developing for the past hundred years or so in the sciences and arts; but it must also go beyond them, as I will do in the final section of this essay.

Scaling *spacetime*: telescopes and microscopes

The conjuncture of the new physics, new materialism, and new time studies creates a *spacetime* that invites planetary scaling, by which I mean a decentering of the human and seeking a relational perspective on time and matter in both cosmological and quantum perspective in which the human is part of the story, but not the center of it. Scaling is a relational exercise of the human mind as it attempts to relate the big and the small, the near and the far. But paradoxically, the scaling of *spacetime* involves the attempt to represent the non-human in ways that humans can grasp. Let us return for a moment to Wells's opening sentences of *The Outline of History*: "The Earth on which we live is a spinning globe. Vast though it seems to us, it is a mere speck of matter in the greater vastness of space." Scaling the Earth makes it a vast globe at one moment, then a tiny speck at the next. Moreover, the laws of the intergalactic and the sub-atomic – discoverable through mathematical formulae – correspond, and thereby invite reading together as an act of scaling, moving back and forth between macro and micro.

The telescope and the microscope are human technologies that facilitate such acts of scaling. As scopic devices, they highlight the irony that an act of human perception – scaling – results in a recognition of the relative insignificance of the human in the face of the cosmological and the sub-atomic. The Zeiss glass to which Woolf alludes in her essay "Flying Over London" (discussed below) embodies this dual function of scaling.³¹ The Zeiss company, founded in 1846 by the optician Carl Zeiss, was famous for its lenses used for telescopes, microscopes, and binoculars. A recent innovation – the newly powerful Daniel K. Inouye Solar Telescope – has recently produced the first close-up images of the sun's boiling plasmic surface, images that are simultaneously macro-and microscopic (Figure 2).³²

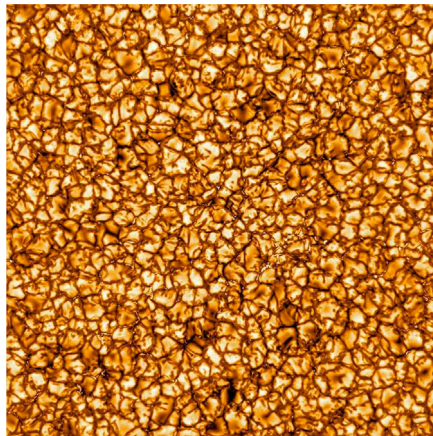


Figure 2. Solar Plasma. "Inouye Solar Telescope: First Light." National Solar Observatory. Accessed 5 June 2020. <https://www.nso.edu/inouye-solar-telescope-first-light>. Protected by Creative Commons International License 4.0: <https://www.nso.edu/inouye-solar-telescope-first-light>.

This telescopic image of far-away space looks like something we might see through a microscope, obscuring the fact that each kernel is about the size of Texas. And the flat image here – looking, as some on social media point out, like candy corn or sugar pop cereal – obscures that these bits of plasma are in constant motion – across the surface of the sun and deep into its interior and out again: not in a linear movement from past to present and future (time’s arrow) but rather in multidirectional and reversible temporalities. Scalar *spacetime* illuminates how the macroscopic and microscopic can become versions of each other.

H.D. grew up surrounded by microscopes and telescopes, manned by her botanist grandfather, Francis Wolle, and astronomer father and half-brother, Charles Leander Doolittle and Eric Doolittle. She was to become the new Marie Curie, her father urged, but in fact H.D. failed conic sections and flunked out of Bryn Mawr College, as Morris discusses in *How to Live, What to Do: H.D.’s Cultural Poetics*.³³ And yet she was fascinated by her father’s star charts and the massive telescope at Penn’s Flower Observatory that he directed, where she led tours on open nights. James Jeans’s *The Stars in Their Courses* later became an important resource. At the other end of the scaling spectrum, her grandfather’s hand-tinted photographs of the algae in his microscope underlay the poetics of *Sea Garden* (1916), according to Charlotte Mandel, in “Magical Lenses.” One of the best-known sequences of H.D.’s *The Walls Do Not Fall*, the first volume of *Trilogy* penned during the Blitz in 1941, engages in a micro/macro scaling of the non-human:

There is a spell, for instance,
in every sea-shell:

continuous, the sea-thrust
is powerless against coral,

bone, stone, marble
hewn from within by that craftsman,

the shell-fish:
[...]
yet that flabby, amorphous hermit
within, like the planet

senses the finite,
it limits its orbit

of being [...]³⁴

From flabby hermit to planet in orbit, the living world outside the human stands in for the poet, who switches in the next section into the first person: she becomes the sea-shell, while the Nazi bombs become forces of nature: “I sense my own limit,/ my shell-jaws snap shut// at invasion of the limitless,// ocean-weight; infinite water.” It “can not crack me, egg in egg-shell;// [...]// I know the pull/ of the tide, the lull// as well as the moon.”³⁵ This rapid scaling of the limited/limitless continues in subsequent sections where the poet is figured as a worm characterized by “persistence; I escaped spider-snare,/ bird-claw, scavenger bird-beak;// clung to grass-blade,/ the back of a leaf// when storm-wind/ tore it from its stem.”³⁶ “And anyhow,” the poet concludes the worm sequence, “we have not crawled so very far// up our individual grass-blade/ toward our individual star.”³⁷

In the full revisionist sweep of *Trilogy*, the poet forges a simultaneously androgynous and feminist quest for which “Psyche reborn” is embodied in the Lady (*Tribute to the Angels*) and Mary Magdalene (*Flowering of the Rod*). But these overtly feminist iterations of the poet follow from the “amorphous hermit” in a sea-shell, the egg in egg-shell, and the worm crawling up a leaf-blade in *The Walls Do Not Fall*. In contrast to the masculine epic figures of Ezra Pound’s *Cantos* and the damaged manhood of T. S. Eliot’s *The Waste Land*, the poet in *The Walls Do Not Fall* – the human sensibility caught up on the throes of war – disappears into a non-human cosmos of orbiting globes, tidal forces, tiny specks in the sea, and worms on grass-blades. These shifts of scale and from human to non-human in the vastness of *space-time* are reminiscent of Wells’s opening lines of his *Outline of History*. Their effect is to decenter human life, making resistance to anthropocentrism as the precondition for the more overtly feminist symbology of *Tribute to the Angels* and *The Flowering of the Rod*.

No one encouraged Virginia Woolf to model herself after Marie Curie. Like many girls of her class, she was tutored at home by her mother in her early years. She didn’t even have the opportunity to fail conic sections at school. She never attended school, and her understanding of mathematics was so limited that she famously added and subtracted on her fingers.³⁸ But she had a lifelong fascination with telescopes, as Holly Henry documents in *Virginia Woolf and the Discourse of Science*,³⁹ and she avidly read about the new physics of *space-time*, especially the books of Arthur Eddington and James Jeans, as Gillian Beer discusses at length in *Virginia Woolf: The Common Ground*.⁴⁰ Henry opens *Virginia Woolf and the Discourse of Science* with a quotation from Woolf’s diary, August 1907, in which looking at the nighttime sky through a telescope leads Virginia Stephen to reflect:

Tonight we speculated upon the stars, [...] & saw the Earth shrink to the size of a button, its rim just over there where the lighthouse marks the sea. The shrinkage was the result of seeing the moon close at the end of a telescope, like a globe of twisted silver.⁴¹

As itself an instrument of scaling, the telescope enables Woolf to experience a rapid change of scale that turns the Earth into the insignificant size of a button.

Colliding scales: non-human and human *spacetimes*

Microscopes and telescopes alter the scale of vision with a slight turn of the wheel. The lens shifts; the scale transforms, in movements that are typically linear: from big to little; from little to big. But changes of scale can be disjunctive, more like collisions than predictably smooth transitions, more like, in other words, the unexpected enfoldings of time in the new times studies rather than the predictabilities of time’s arrow. Drawing again on the telescope, Woolf experiments with colliding scales in “The Searchlight,” a story she completed during the Phony War period of 1939, after of the Nazis had swept through much of Europe and an air invasion of Britain was nervously anticipated, a story that Holly Henry relates to Woolf’s anti-fascist pacifism and reading in the new physics.⁴² At a London party, an older woman stands on a balcony, looking at the searchlights practicing their hunt for enemy aircraft, while she tells her companions the story of her grandfather as a boy looking through his telescope at the stars every night:

“There they were,” she went on. “The stars. And he asked himself, my grandfather—the boy, ‘What are they/ why are they/ And who am I?’” She was silent. They all looked at the stars that were coming out in the darkness over the trees. They seemed very permanent, very

unchanging. The roar of London sank away. A hundred years was nothing. They felt that the boy was looking at the stars with them. They seemed to be with him, in the tower, looking out over the moors at the stars.⁴³

The stars, the boy and his telescope on the moors, the hundred years, the roar of London, and the searchlights of a future air war all collapse, indeed, collide into a single, disjointed *spacetime* in which the scale zooms from the minute to the vast, from human life to the intergalactic and back again to a communal consciousness caught between multiple human pasts and the future war to come, signaled by the random beats of the searchlight.

In the *spacetime* of collage, I jump now from Woolf's telescopic scaling to the planetary scaling of Alicja Kwade, a contemporary sculptor born in Poland and working mainly in Berlin. Her recent work *ParaPivot* (2019), commissioned for the Roof Garden at New York's Metropolitan Museum of Art, dispenses with the telescope but nonetheless resonates with Woolf's collisions of human and non-human *spacetime*. Her earlier work had mostly focused on pure geometric forms in interior spaces,⁴⁴ but in 2018, she produced an installation entitled *SolidSky* (2018) in the Netherlands, for which she placed her shapes on paths through the forest. Then working in a cityscape, high up under the sky, with the Roof Garden's 360 degree horizon, she produced colliding scales of a planetary temporality and spatiality, both non-human and human. Echoing the shapes of *SolidSky*, she made large orbs of rock-hard matter whose surfaces float and shimmer in earth colors of red, gray, brown, and white (Figure 3).



Figure 3. Alicja Kwade. From *ParaPivot*. Metropolitan Museum of Art Roof Garden Commission. 2018–2019. Photo by Susan Stanford Friedman.

Then, constructing bars of intersecting planes, she put them into geometric orbits in relation to each other against the backdrop of Central Park's greenery in the foreground and Manhattan's Skyline in the distance (Figure 4).

The non-human time of planets float in geometric angles across a clouded blue sky of cosmic space through which we glimpse the very different *spacetime* of human modernity's urban history of commerce evident in Midtown's Manhattan skyscrapers. With viewers scattered inside and outside Kwade's planetary structure, temporalities and materialities collide: cosmic and human *spacetimes*; the clouds in the sky made blue by the Sun's energy dispersing particles of light; the material presences of the artist's planetary structures with Manhattan's buildings atop the green treetops in the distance. Like much formalist sculpture, the message is subtle, embedded in the angles of vision and the superposition of the non-human cosmos over the human, a reversal of the more common human foreground, natural background.

Kwade's startling conjunction of non-human and human *spacetime* calls to mind Woolf's essay "Flying over London," written in 1928 but not published until after her death in the collection Leonard Woolf put together in 1950: *The Captain's Death Bed and Other Essays*.⁴⁵ More speculative and politically satirical than Kwade's work, it narrates a wild ride up beyond the clouds and back down to Earth – a ride which we learn in the essay's last line is purely imaginary, since a mechanical problem prevented the plane from actually flying. The essay begins by comparing the height of modern human technology with a bug, a ludicrous image that hints at the ironies to come:



Figure 4. Alicja Kwade. From *ParaPivot*. Metropolitan Museum of Art Roof Garden Commission. 2018–2019. Photo by Susan Stanford Friedman.

Fifty or sixty aeroplanes were collected in the shed like a flock of grasshoppers. The grasshopper has the same enormous thighs, the same little boatshaped body resting between its thighs, and if touched with a blade of grass, he too springs high into the air.

As the plane soars up, the “sensation of leaving earth” was a moment when “the earth fell,” but even “stranger was the downfall of the sky.”⁴⁶ To feel “in the thick of it” changes entirely her perspective of the Earth and challenges what she calls the “inadvertently anthropocentric” human mind and body:

Habit has fixed the earth immovably in the centre of the imagination like a hard ball; everything is made to the scale of houses and streets. And as one rises up into the sky, as the sky pours down over one, this little hard granular knob, with its carvings and frettings, dissolves, crumbles, loses its domes, its pinnacles, its firesides, its habits, and one becomes conscious of being a little mammal, hot-blooded, hard boned, with a clot of red blood in one’s body, trespassing up here in a fine air, repugnant to it, unclear, anti-pathetic. Vertebrae, ribs, entrails, and red blood belong to the earth, to the world of brussels sprouts and sheep going awkwardly on four pointed legs [...]. Here are winds tapering, vanishing, and the untimed manoeuvre of clouds, and nothing permanent, but vanishing and melting [...].⁴⁷

In the course of the essay, the plane “soars into the ether,” through the clouds and above them to a state of “extinction,” then swoops down, only to soar again before returning to Earth. For the speaker, these movements are experiences of rapid scaling and rescaling. Space becomes time as human life disappears, then reappears, with time moving rapidly in reverse (present becomes past), then reversing itself once again (past becoming present):

Nothing more fantastic could be imagined. Houses, streets, banks, public buildings, and habits, and mutton and brussels sprouts had been swept into long spirals and curves of pink and purple [...]. One could see through the Bank of England; all the business houses were transparent, the River Thames was as the Romans saw it, as paleolithic man saw it, at dawn from a hill shaggy with wood, and the rhinoceros digging his horn into the roots of rhododendrons. So immortally fresh and virginal London looked and England was Earth merely, merely the world. Flight-Lieutenant Hopgood kept his finger still on the lever which turns the plane downwards. A spark glinted on a greenhouse. There rose a dome, a spire, a factory chimney, a gasometer. Civilization in short emerged; hands and minds worked again; and the centuries vanished and the wild rhinoceros was chased out of sight for ever.⁴⁸

Here, Woolf perhaps playfully alludes to Wells’s *Outline of History* as well as the opening of Joseph Conrad’s *Heart of Darkness*,⁴⁹ both of which assume the inexorable movement of linear time. But *spacetime* in “Flying Over London” moves back and forth as the plane repeatedly climbs through the clouds and dives down. On its final descent, as the Earth reappears and the human scale is gradually reestablished, Woolf increasingly characterizes modern life through metonyms of the industrial revolution, epitomized by the global centrality of London and its alliance with state religion.

Then the fairy earth appeared, lying far far below [...]. It rose towards us with extreme speed, broadening and lengthening; forests appeared on it and seas [...]. Nearer and nearer we came together and had again the whole of civilization spread beneath us [...]; the river with its steamers that bring coal and iron; the churches, the factories, the railways. Nothing moved, nobody worked the machine, until in some field on the outskirts of London one saw a dot actually and certainly move [...].⁵⁰

As the passage continues with the “dot” becoming the ever-increasing visibility of human life, Woolf ends the sequence satirically with the image of the City’s financial magnates caught in a traffic jam:

There were blocks in the city of traffic sometimes almost a foot long; these had to be translated into eleven or twelve Rolls Royces in a row with city magnates waiting furious, and one had to add up the fury of the magnates; and say—even though it was all silent and the block was only a few inches in length, how scandalous the control of the traffic is in the City of London.⁵¹

In the descent back into human *spacetime*, Woolf collides the scales – seeing the fury of the magnates at the same time that the block is only a few inches long from her site of observation high above the city. The disjuncture of scales suggests her feminist alienation from those magnates and the City of London, the world in which she, as a woman, even an upper-middle class woman, is a second class citizen. This collision of *spacetimes* anticipates the particular kind of feminism she would articulate more fully in *Three Guineas* some ten years later as the war H.D. wrote about in *Trilogy* shadowed Europe.

Abstracting scales: life matters

The extraordinary work by Swedish artist Hilma af Klint (1862–1944), recently featured at the Guggenheim Museum of Modern Art in an exhibit titled *Hilma af Klint: Paintings for the Future* (2018–2019), helps us consider abstraction as an element of planetary scaling, particularly the abstractions that deal with life forms and their potential relation to geometric shapes and color theory. Af Klint, trained at the Royal Academy of Art in Sweden, was an accomplished painter who supported herself by doing fairly conventional landscapes and portraits, as well as meticulous scientific illustrations of plants, insects, birds, and even horse surgery.⁵² She served as secretary of the Swedish Association of Women Artists, and as David Max Horowitz writes, she faced limitations from the male-dominated Swedish art world.⁵³ At the interface of science and theosophy, however, she found the inspiration to chart new pathways in her art. As Iris Muller-Wattermann notes, she was a committed Darwinian, equally fascinated by the new sciences of electromagnetic waves and particle physics.⁵⁴ As a theosophist, she found a place with other women who, like H.D., experienced heterodox spiritualities more open to women than male-dominated, orthodox religions. Convinced that the world was not ready to accept her esoteric work, she did not exhibit it in her lifetime, and her will specified that this *oeuvre* could not be shown until twenty years after her death.

The discovery of af Klint’s massive body of work – hundreds of paintings produced from 1906 through 1944 – is radically revising the history of modern art, especially abstract art, which was thought to begin in 1910 with Wassily Kandinsky’s *First Abstract Watercolour*.⁵⁵ Her abstract work was exhibited first in Los Angeles in 1986, then in the major show in Stockholm in 2013, and more recently in an extensive exhibition of her work at the Guggenheim, taking up the entire inner spiral of the museum and breaking all its attendance records with over 600,000 viewers.

My focus here, however, is not on art historical issues but rather on how af Klint’s abstract geoforms and bioforms engage in macro/micro scaling with their gender-inflected combination of science, geometry, color theory, spiritualism, and comparative religions. From 1905–1916, af Klint created *Paintings for the Temple*, composed of 193



Figure 5. Hilma af Klint. *Adulthood*. From *The Ten Largest* (1907), a series in *Paintings for the Temple* (1906–1915). Tempera on paper, mounted on canvas. 315 × 235 cm. Courtesy of the Hilma af Klint Foundation, Stockholm. Photo by Albin Dahlström, Moderna Museet, Stockholm, Sweden.

paintings organized and titled in series. Among the earliest of these is a series she called *The Ten Largest* (1907), huge paintings that dwarf viewers and abstract the human life cycle from childhood to old age with images that float in space – cosmic, evolutionary, botanical, sub-atomic – challenging the linearity of the titles even as they integrate Darwinian evolution and spiritualism (Figure 5).

Af Klint frequently clustered her abstractions in a series to which she gave a suggestive title, echoing her entwined interests in science and spirituality, titles like “Atom” (1917) or “Parsifal” (1916). Each series is scalar, but not from small to big / big to small, but rather in temporal movement based in increasing abstraction. “The Swan” (1915), for example, begins representationally, invoking the mystical dualism of black and white swans in alchemy. The series moves through 23 increasingly abstract forms experimenting with dualism, ending with pure geometric shapes and color wheels that invoke the heavens and the corresponding world within, embedded in pure geometric form (Figures 6–11).

Af Klint’s participation in the theosophical movement, like that of Annie Besant, linked the invisible world of forces and movement with another invisible world: that of the spirits. Her abstract art initially grew out of the séances she held with a circle of women who called themselves The Five. In addition to Christianity, she worked with spiritual concepts and images taken from Judaism, Islam, and Buddhism. For example, one series in *Paintings for the Temple* is entitled *Altarpiece* (1915), and combines the science of color theory with geometry, cosmological shapes, and religion (Figures 12 and 13).

Af Klint’s blend of science and the spiritual parallels the integrated interests of H.D. and Eddington, who remained attached to what he called in *The Nature of the Physical Universe* the mysticism of his Quaker heritage.⁵⁶ Much attracted to Rudolf Steiner’s anthroposophical blend of science and spiritualism, af Klint showed him one of her abstract paintings in 1908, but he was dismissive (paralleling Havelock Ellis’s hurtful response



Figure 6. Hilma af Klint. *The Swan*, No. 1 (1915), in *Paintings for the Temple* (1906–1915). Oil on canvas. 150 × 150 cm. Courtesy of the Hilma af Klint Foundation, Stockholm. Photo by Albin Dahlström, Moderna Museet, Stockholm, Sweden.

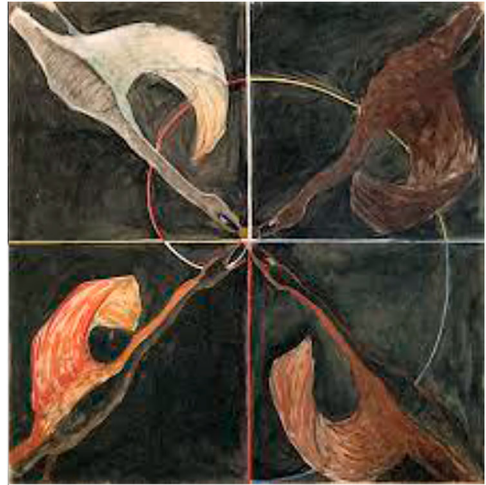


Figure 7. Hilma af Klint, *The Swan*, No. 7 (1915), in *Paintings for the Temple* (1906–1915). Oil on canvas. 148.5 × 149.6 cm. Courtesy of the Hilma af Klint Foundation, Stockholm. Photo by Albin Dahlström, Moderna Museet, Stockholm, Sweden.



Figure 8. Hilma af Klint. *The Swan*, No. 9 (1915), in *Paintings for the Temple* (1906–1915). Oil on canvas. 149.5 × 149 cm. Courtesy of the Hilma af Klint Foundation, Stockholm. Photo by Albin Dahlström, Moderna Museet, Stockholm, Sweden.



Figure 9. Hilma af Klint. *The Swan*, No. 12 (1915), in *Paintings for the Temple* (1906–1915). Oil on canvas. 151.5 × 151 cm. Courtesy of the Hilma af Klint Foundation, Stockholm. Photo by Albin Dahlström, Moderna Museet, Stockholm, Sweden.

when H.D. showed him her philosophical essay of a poetics based in the female body, *Notes on Thought and Vision*, in 1919).⁵⁷ Discouraged by his reaction, af Klint concluded that the world was not yet ready for her work. She nonetheless continued producing hundreds of abstract paintings, typically organized in series. From 1915 to 1944 she



Figure 10. Hilma af Klint. *The Swan*, No. 17 (1915), in *Paintings for the Temple* (1906–1915). Oil on canvas. 150.5 × 151 cm. Courtesy of the Hilma af Klint Foundation, Stockholm. Photo by Albin Dahlström, Moderna Museet, Stockholm, Sweden.



Figure 11. Hilma af Klint. *The Swan*, No. 23 (1915), in *Paintings for the Temple* (1906–1915). Oil on canvas. 152.5 × 150 cm. Courtesy of the Hilma af Klint Foundation, Stockholm. Photo by Albin Dahlström, Moderna Museet, Stockholm, Sweden.



Figure 12. Hilma af Klint. *Altarpiece*, No. 1 (1915), in *Paintings for the Temple* (1906–1915). Oil and metal leaf on canvas. 237.5 × 179.5 cm. Courtesy of the Hilma af Klint Foundation, Stockholm. Photo by Albin Dahlström, Moderna Museet, Stockholm, Sweden.



Figure 13. Hilma af Klint. *Altarpiece*, No. 2 (1915), in *Paintings for the Temple* (1906–1915). Oil on metal leaf on canvas. 238 × 179 cm. Courtesy of the Hilma af Klint Foundation, Stockholm. Photo by Albin Dahlström, Moderna Museet, Stockholm, Sweden.

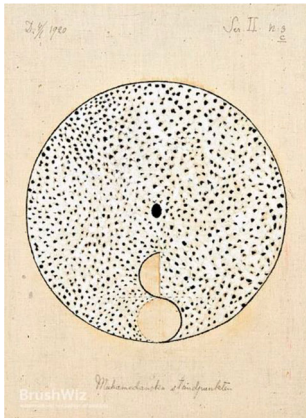


Figure 14. Hilma af Klint. *The Mohammedan Standpoint*, No. 3c (1920). Oil on canvas. 36.5 × 27 cm. Courtesy of the Hilma af Klint Foundation, Stockholm. Photo by Albin Dahlström, Moderna Museet, Stockholm, Sweden.



Figure 15. Hilma af Klint. *Primordial Chaos*, No. 6 (1906–1907) in *Paintings for the Temple* (1906–1915). Oil on Canvas. 52.5 × 37 cm. Courtesy of The Hilma af Klint Foundation, Stockholm. Photo by Albin Dahlström, Moderna Museet, Stockholm, Sweden.



Figure 16. Hilma af Klint. *The Dove*, No. 12 (1915), in *Paintings for the Temple* (1906–1915). Oil on canvas. 155 × 139 cm. Courtesy of the Hilma af Klint Foundation, Stockholm. Photo by Albin Dahlström, Moderna Museet, Stockholm, Sweden.

additionally created 126 notebooks, with reproductions in scale of her paintings and commentary on each one. These notebooks, available in Christine Burgin's edition, *Hilma af Klint: Notes and Methods*, are hybrid texts of their own, blending words, images, and charts of her evolving experimental forms.

Circles, spirals, ovals, cones, globes, lines, triangles, shades of color (dark, light, pastel): af Klint experimented with them all, playing with scalar space and time, collapsing the distinctions between the microscopic and macroscopic. Are they cosmic? Cellular? Microbic? (Figures 14–16)

Juxtapose af Klint's "paintings for the future," as the Guggenheim exhibition dubbed them, with present-day iconic images of Covid-19: the pernicious, capricious, and imperfectly understood coronavirus that appears to have originated in Wuhan, China sometime in the fall (or maybe even earlier) of 2019, now a global pandemic causing much suffering world-wide, impacting large populations, national and transnational politics, and global commerce (Figure 17).⁵⁸

Under an electron microscope, these Covid-19 microbes look planetary, orbs with non-human life forms glowing red emerging from its spherical body – that is, as some artist-scientist has added color and shading to the microscopic photos. The virus also looks like a painting that could grace the walls of avant-garde museums of modern art. It is simultaneously a real and dangerously powerful living speck and an abstraction of shape and color. It belongs to a life form – dubbed the microbe – of which there are countless trillions on Earth. The sheer number and significance of microbes overwhelm the human body, which is, according to the latest gut science, only 43% human.⁵⁹

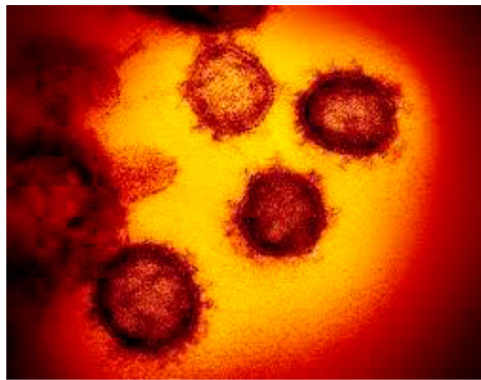


Figure 17. “Novel Coronavirus SARS-CoV-2.” NIAID. Accessed June 5, 2020. <https://www.flickr.com/photos/niaid/>. Protected by Creative Commons Generic License 2.0: <https://creativecommons.org/licenses/by/2.0/deed.en>.

The microbe is life matter, and it matters. Blown up, the Covid-19 virus looks like telescopic images of galaxies millions of light years away from Earth in recent photos by the Hubble Telescope, including this one located in the constellation Sagittarius (Figure 18). Now look at two of af Klint’s paintings from her 1922 series entitled *On the Viewing of Flowers and Trees*: (Figures 19 and 20). The telescopie and microscopic – the cosmic and sub-atomic – collide in the *spacetime* of af Klint’s paintings and contemporary images of outer space and inner particles. Art, quantum physics, and cosmology conjoin in these images.

Scaling agencies: the non-human and human

The vibrancy of af Klint’s abstract bio/geoforms recalls the non-human agency in some of Woolf’s complexly colliding explorations of *spacetime*. Essays like “Thunder at Wembley”



Figure 18. “The Archer.” ESA/Hubble and NASA. “Hubble Observes Glowing, Fiery Shells of Gas.” NASA. Accessed June 8, 2020. https://www.nasa.gov/multimedia/imagegallery/image_feature_2460.html. Protected by Creative Commons Attribution License 4.0 International: <https://creativecommons.org/licenses/by/4.0/deed.en>.

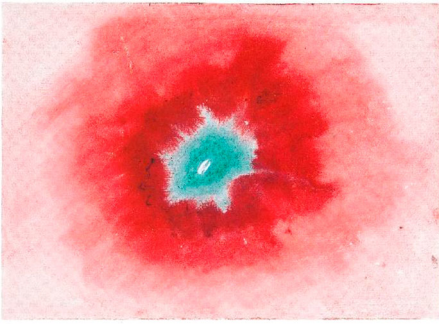


Figure 19. Hilma af Klint. Untitled, from *On the Viewing Flowers and Trees* (1922). Watercolor on paper. 18 × 25 cm. Courtesy of the Hilma af Klint Foundation, Stockholm. Photo by Albin Dahlström, Moderna Museet, Stockholm, Sweden.

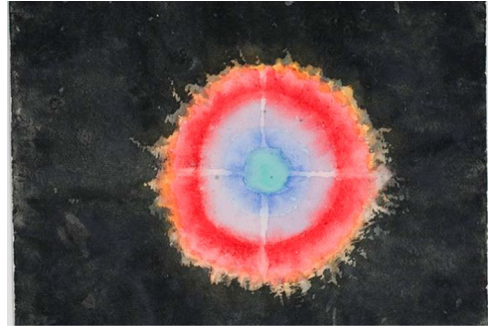


Figure 20. Hilma af Klint. Untitled, from *On the Viewing Flowers and Trees* (1922). Watercolor on paper. Courtesy of the Hilma af Klint Foundation, Stockholm. Photo by Albin Dahlström, Moderna Museet, Stockholm, Sweden.

(1924) and “Time Passes,” the middle section of *To the Lighthouse* (1927), anticipate concepts of the new materialism formulated later in the twentieth and early twenty-first centuries – including Karen Barad’s feminist/ethical particle physics, Bruno Latour’s Actor-Network-Theory (ANT), and the biologists affirming plant consciousness, communication, and agency.⁶⁰ In both the essay on the British Empire Exhibition of 1924–1925 and in the novel, Woolf sets up a collision between human and non-human agencies, suggesting ironically that what appears weaker is actually stronger, emerging out of an alternative *spacetime*. The Exhibition celebrated British industry and commerce, with contributions from its worldwide colonies and dominions, and drew enormous crowds. Woolf sets the pomp and circumstance of the Exhibition in ironic relation to the non-human forces of nature that subtly and imperceptibly attack it. “It is nature that is the ruin of Wembley,” the essay begins: nature in the form of the trees, the rhododendron, and the “resentment” of the “thrush singing.” “The wind is rising” as the “Massed Bands of Empire are assembling and marching to the Stadium.”⁶¹ Contrasted with “the Duke of Devonshire and his colleagues” along with the “clergymen, school children, invalids in bath-chairs,” is the sky:

The problem of the sky, however, remains [...]. The sky is livid, lurid, sulphurine. It is in violent commotion. It is whirling water-spouts of cloud into the air; of dust in the Exhibition. Dust swirls down the avenues, hisses, and hurries like erected cobras round the corners. Pagodas are dissolving in dust. Ferro-concrete is fallible. Colonies are perishing and dispersing in spray of inconceivable beauty and terror which some malignant power illuminates. Ash and violet are the colours of its decay.⁶²

The short, fantastical essay ends with the future enfolded into the present, in the Empire’s blindness to its own dissolution: “The Empire is perishing; the bands are playing; the Exhibition is in ruins. For that is what comes of letting in the sky.”⁶³

It is a mistake, I believe, to read Woolf’s use of “nature” in this essay as purely symbolic personification. Instead, I suggest that the wind, sky, dust, and protesting thrush exist at a different scale of existence than the human life on parade. Even the “ferro-concrete,” the new, modern building material of the 1920s proudly used throughout the Exhibition as a

sign of industrial modernity, will crumble in the face of the wind and sky's agency. Woolf's anti-imperial politics finds its expression in her planetary scaling of the human and non-human, one that radically decenters the human.

"Time Passes" is less evidently political than "Thunder at Wembley," in part because it is but one component of the novel's complex representation of different modes of time in human and non-human life: co-temporal forms of the linear, cyclical, spiral, wave-like.⁶⁴ Among the many contributions of "Time Passes" to the novel, its scalar experiments with non-human and human agencies are striking. The section covers ten years of chronological time, sandwiched between two days in the Ramsay's summer household in the Hebrides: "The Window" and "The Lighthouse." Human time takes much longer to narrate in these sections than during the ten years of non-human time in which the deaths of Mrs. Ramsay, Prue, and Andrew famously appear only in brackets and the devastations of World War I register as the cracking of tea cups and the loosening of the shawl covering the pig's skull.⁶⁵

The main actors of "Time Passes" are the non-human airs, winds, sun, darkness, heat, cold, and dampness of land, sea, and the cosmos: not, I stress, personifications, but rather forces of non-human nature that exist in a much vaster scale of being than human life. Even as time passes through ten years, time is cyclical: daily, seasonal, and yet ultimately directionless. The agency of the non-human collides with the agency of the human, at first destroying the house and then yielding temporarily to the efforts of the working class Mrs. McNab, who struggles against the ravages of cosmic time to prepare the house for the brief return of human life narrated in "The Lighthouse."

Like "Thunder at Wembley," the non-human in "Time Passes" operates at another scale of *spacetime*, indifferent to human life. As night comes to the day narrated in "The Lighthouse,"

the moon sunk, and a thick rain drumming on the roof a downpouring of immense darkness began [...] [T]he profusion of darkness which, creeping in at keyholes and crevices, stole round window blinds, came into bedrooms, swallowed up here a jug and basin, there a bowl of red and yellow dahlias [...].⁶⁶

As the matter of human life gets swallowed up, "certain airs, detached from the body of the wind [...] crept round corners and ventured indoors."⁶⁷ The very invisibility of the "clammy airs" heightens their power.

The scale of the non-human reaches a terrifying pitch in section VII of "Time Passes," where "it seemed as if the universe were battling and tumbling, in brute confusion and wanton lust aimlessly by itself." Even the wild flowers "standing there, looking before them, looking up, [are] yet beholding nothing, eyeless, and so terrible."⁶⁸ The existence of *spacetime* at this scale in which human life is insignificant leads to a series of five big questions that the non-human agents of the cosmos ask of human life: "How long would they endure?"; "what, and why, and wherefore"; "Will you fade? Will you perish?"; "How long shall it endure?"; "What am I?, 'What is this?'"⁶⁹ The final section of the novel, "The Lighthouse" attempts to answer these questions, but the vast scale of non-human *spacetime* and its agencies hovers over the fragile human relations of the novel.

Archipelagic scaling: islands in the rising seas

Archipelagoes and archipelagic thinking bring us squarely back to the issue of the planet – not only to the relationship between human and non-human life, but even more

specifically to the present and future of environmental crisis on the planet.⁷⁰ The *spacetime* of archipelagoes differs from the *spacetime* of continents because they are composed of land-and-sea while continents are large land masses, differences that alter the way they are experienced. The planet Earth is over 70% ocean – a single, interconnected body of water that has historically and conceptually been separated into the “seven seas” or five oceans. As geographical formations of land-and-sea, archipelagoes come in all sizes – Indonesia being the largest and places like Tuvalu with its eight islands among the smallest. In historical terms, archipelagoes can be the center of vast empires, like Britain and Japan. Or they can have histories of palimpsestic conquest by different empires, like the Caribbean and the Pacific Islands. They can encompass colonizers and colonized, slave owners and the enslaved, settlers and indigenous peoples. Archipelagoes, in other words, are not one; they are many, diverse, internally as well as externally. As Glissant notes in *Poetics of Relation*, the archipelagic signifies both real/material places on the planet and also a way of thinking relationally, an epistemology that rejects center/periphery modes of thought. Archipelagic *spacetime* also fosters scalar thinking, evident schematically in this Navigational Stick Chart from the Marshall Islands from the late nineteenth to early twentieth-century. Made of sticks and cowrie shells, the chart features the fluid movement of waves in its mapping of the Earth’s land-and-sea (Figure 21).⁷¹

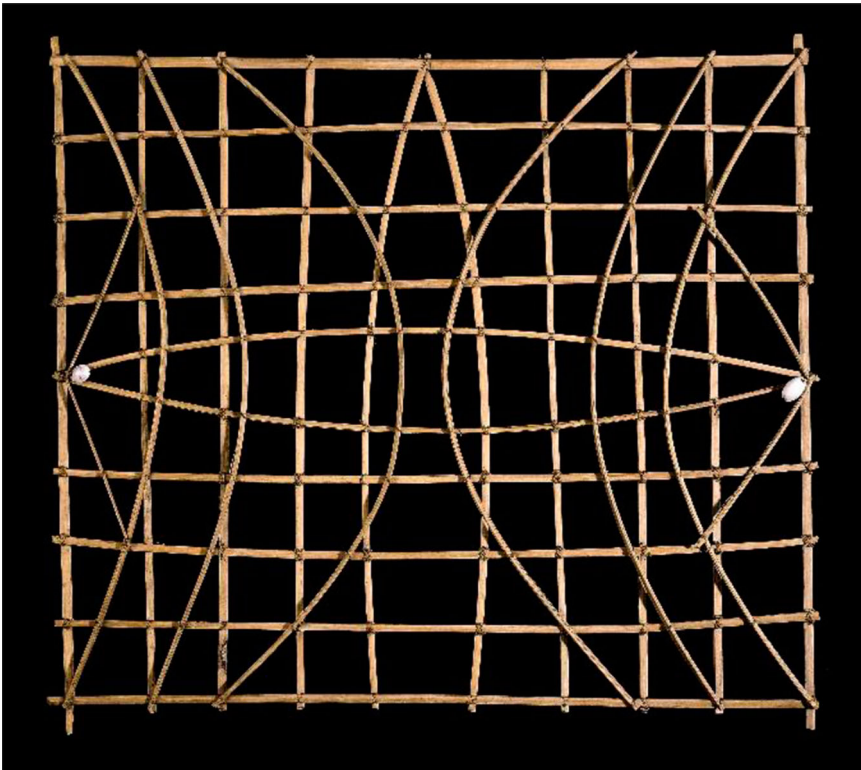


Figure 21. Marshall Islands Navigational Stick Map. Late nineteenth–early twentieth century. Wood and cowrie shell. 15.2' × 8'. © Trustees of the British Museum.

Materially speaking, archipelagoes form networks of stationary land across the moving seas. In this sense, archipelagoes are scaled up parallels of quantum materiality: they are particles and waves, under threat of becoming each other. Their volcanic origins speak to the fluid energies caught way below the Earth's surface, erupting upon occasion to form new land masses surrounded by water. The Earth's largest mountain rises up out of the Pacific Ocean; its ice caps, melting at an ever faster rate due to human consumption of fossil fuels, are causing the rising seas that threaten the Earth's particle-islands. In *spacetime*, the Earth is fluid, mobile: its land-and-sea parts colliding; its core and surface aroil, recalling the seething energies of the plasmic solar surface imaged by the Inouye solar telescope.

In *Iep Jāltok: Poems from a Marshallese Daughter* (2017), Kathy Jetñil-Kijiner adapts scalar thinking about human and non-human *spacetime* centered in the history and seascares of the Marshall Islands, a lengthy double band of five islands and 29 atolls just north of the Equator between Australia and Hawaii, settled by Micronesians millennia ago, sighted by the Spanish (1526) and the British (1788), colonized by the Spanish, the Germans, the Japanese (1914–1944), and the Americans from 1944 until independence in 1979. Their modernity is both distinct from and ultimately entangled with the modernities of European and Japanese colonialism, indigenous responses, the nuclear age with U.S. atomic bomb testing, diasporic migrations, and human-induced environmental crisis. Jetñil-Kijiner, born in the Marshall Islands and raised in Hawai'i, teaches at the College of the Marshall Islands. She is the co-founder and director of the non-profit organization *Jo-Jikum*, which works with Marshallese youth on environmental issues threatening the Marshall Islands.

As a volume of stand-alone poems clustered into four sections – Iep Jāltok; History Project; Lessons from Hawai'i; and Tell Them – *Iep Jāltok* does what many twentieth-century poetry books of discrete poems do: use the sectional ordering of poems to make the volume cohere: a conceptual, not a temporal, linearity. Archipelagic scaling across space and time creates the coherence of the volume. Its “outline of history” (to invoke Wells again) enfolds mythic, past, present, and future times across sea and island spaces. Its spatial leaps move from location to location, but also from the general to the particular and the intimate. Code-switching, with some translation, creates islands of Marshallese in a sea of English. Inflected by gender, each section of the volume weaves its archipelagic observations out of, though not limited to, a girl's and a woman's experience. Significantly, this gendered voice is mediated by the many factors that make up the poet's intersectional identity and experience – Marshallese culture and history; indigeneity; race; class; and diasporic refugee migrations. The section Iep Jāltok recounts mythic times in the islands when Mother gifts the Sail to the youngest of ten sons, when two sisters form out of one mother, birthed by sea and fire, when the missionaries came, including the poet's great-grandfather to make his home far from his homeland. The section History Project examines Japanese and American occupations, the U.S. atomic bomb testing after War II, the islands rendered uninhabitable, and the human cancers it produced. Lessons from Hawai'i narrates the poet's childhood migration to Honolulu and the racism she encountered. Tell Them examines the poet's drive to inform the world: the current environment crisis and the future engulfment of the islands by the rising seas: a disastrous futurity embedded in the present.

Jetñil-Kijiner's archipelagic scaling of planetary *spacetime* is evident in “Fishbone Hair,” the final poem of the History Project section. In the concluding section of this eight-part

poem, Jetñil-Kijiner spaces words on the page like the roughly parallel Marshall Islands in the sea to zoom in on the poet's beloved niece Bianca, as she lay dying from the cancers that are the fall-out from nuclear testing narrated in the poem "History Project."

Thin
 rootless
 fishbone hair
 black
 night
 sky
 catch
 ash
 catch
 moon
 catch
 star
 .
 for you Bianca
 for you⁷²

Jetñil-Kijiner performed "Tell Them," the fourth poem in the final section of the volume, at the United Nations Climate Summit in 2014. Future and past conjoin in the impending disaster of the watery present, as the message from the Marshallese "climate refugees" tells of the rising seas. To quote in part:

tell them about the water—how we have seen it rising
 flooding across our cemeteries
 gushing over the sea walls
 and crashing against our homes

 Tell them what it's like
 to see the entire ocean__level__with the land

 Tell them
 we are afraid⁷³

As in "Thunder at Wembley" and "Time Passes," the non-human agents of nature – in this case, the sea – threaten human life. But unlike Woolf, Jetñil-Kijiner circles back to the human agencies that have caused the rising seas, thereby embedding a directly political message. In "Two Degrees," times collide in the *spacetime* of the island, where the rising temperatures caused by human abuse of fossil fuels combine with the slow violence of nuclear fallout from the fifties to collapse the dangers of cancer and rising seas into a single human catastrophe:

On Kili island
 the rising tides were underestimated
 patients sleeping in a clinic with
 a nuclear history threaded
 into their bloodlines woke
 in a wild water world
 a rushing rapid of salt
 a sewage of syringes and gauze⁷⁴

and their modernisms proposed in *Planetary Modernisms*. In their sidestepping of time's arrow from past to present and future, they extend the resistance to conventional periodization in modernist studies that I further proposed in "Alternatives to Periodization." In that essay, I called for new literary histories consonant with non-linear concepts of time, refusing the simplicity of periodization but nonetheless accounting for the rich historical and cultural contextualization of a text's production and later receptions. This collage attempts to perform just such a new mode of reading based in the relational *spacetime* theorized by the new cosmologies, quantum physics, and materialisms of the twentieth and twenty-first centuries.

This non-linear mode of reading inspired by planetary scaling encourages us to think of the human *and* beyond the human – to see the *spacetime* of the planet's modernity in scalar terms, that is, relationally: from cosmic to subatomic, from macroscopic to microscopic; and in temporal frames that collide, entangle, and enfold times rather than redactively follow the linear arrow of time. Scaling planetarity decenters the human without erasing it. It can challenge anthropocentrism while integrating both human and non-human agencies. It embeds an ethics and politics that insists upon human culpability and responsibility without assuming that human agency controls the *spacetime* of all matter, all matters – from quantum to cosmological.

In drawing examples from H.D., Woolf, af Klint, Kwade, and Jetñil-Kijiner, I have created an archipelago of aesthetic agencies spanning a century – a relational *spacetime* of distinctive modernisms in which the human and the non-human co-exist and ask to be read in conjunction with each other, back and forth in a weaving of times and spaces. Not, I hasten to add, because they are the same; they are surely different. Each is gender-inflected in the context of intersectional mediations that encompass their specific embeddedness in *spacetime* and national/cultural origin, class, race, spiritual orientation, sexuality, mobility, and so forth. They vary in their political orientation from the overt feminism, anti-colonialism of Woolf, to the more coded, spiritually inflected feminism of af Klint and H.D., to the seemingly apolitical abstractions of Kwade, and finally to the explicitly political, decolonial, anti-militarist, and indigenous Micronesian activism of Jetñil-Kijiner. What this archipelago of different women shares over the long twentieth- into the twenty-first century is how they engage, as women, with the temporal and spatial scales of human and non-human existence: with the past and uncertain futurity of the planet.

Like me and the tree, co-existing nearby in our different planetary temporalities.

Notes

1. Mao and Walkowitz, "New Modernist Studies," 738–42.
2. The keynote for the 2008 Modernist Studies Association conference appeared as "Musing Planetarity" in the September 2010 issue of *Modernism/Modernity* and is included, in slightly modified form, as chapter two in Friedman, *Planetary Modernisms*, 47–80.
3. Spivak, *Death*, 72–102, esp. 93.
4. Glissant, *Poetics*, e.g. 71, 79; see also his "Unforeseeable Diversity of the World."
5. I am grateful to Cassandra Laity for her assistance and work on feminist new materialism; see her "H.D.'s *Sea Garden* and Elizabeth Bishop's Cold War Poetics." For the new materialism, I have drawn on Alaimo and Hekman; Coole and Frost; Barad, *Meeting the Universe Halfway* and "Posthumanist Performativity"; Oppermann. For Action-Network-Theory, see Latour.

6. Scale, a concept and methodology central to the discipline of geography, has been widely adapted in modernist studies to address historical questions of modernity (the *longue durée*) and the appropriate scale for literary history. See for example Sheppard and McMaster; Friedman, *Planetary Modernisms*, 93–119; Vadde; Davis and Hensley; Saint-Saint-Amour; Walkowitz; Macpherson and Martin.
7. See my “Alternatives to Periodization” for a critique of standard periodization of literary history and a call for new methods more in tune with non-linear concepts of time.
8. Sheehan, 167.
9. Cole, *Inventing Tomorrow*, 158–71, 20–1, 18–39, 20, 36–46, 178, 196–8. Cole frequently invokes the concept of scale in Wells’s work and argues for the cosmic and planetary scope of his work (e.g. 36–46).
10. Wells, *Outline*, 1.
11. Brian Greene, *The Fabric of the Cosmos*, 16. For an account of how Einstein’s concept of time overshadowed Bergson’s notion of *durée* in *Creative Evolution*, see Canales and my discussion in “Alternatives to Periodization,” 380–1, 390.
12. Greene, *Fabric*, 16.
13. For early twentieth-century vitalism, see Bergson, *Creative Evolution*. On the new vitalism, see, for example, Bennett, *Vibrant Matter*.
14. Coole and Frost, *New Materialism*, 9.
15. Barad, “Posthuman,” 139.
16. See for example, Tsing; Haraway, “Anthropocene”; Mittman.
17. Haraway, “Anthropocene,” 159.
18. See also Lupton and Williams; Newman, Clayton, and Hirsch.
19. I discuss the new time studies at greater length in the introduction to *Contemporary Revolutions*, 5–10 and “Approaches to Periodization,” 388–95. Queer Temporality is also an important dimension of new approaches to time; see especially Edelman; Freeman, *Time Binds* and “Theorizing Queer Temporalities: A Roundtable Discussion.”
20. Burges and Elias, *Time*, 3–4. See also Kwastek and Cour’s special issue of *ASAP*, “As Slowly as Possible.”
21. Groom, *Time*, 12–13.
22. West-Pavlov, *Temporalities*, 156–7.
23. *Ibid.*, 158–74.
24. Chakrabarty, *Provincializing Europe*, 109.
25. Eddington, *Nature*, 68–9.
26. *Ibid.*, 149–50.
27. *Ibid.*, 66. In *Time’s Arrow, Time’s Cycle*, Stephen Jay Gould identifies three moments in the history of European geology from the seventeenth through the nineteenth centuries to show the contrasting concepts of linear versus cyclical notions of time, the latter drawn especially from religion.
28. An exception is Ursula K. Heise, “Science Fiction and the Time Scales of the Anthropocene.”
29. Cole, *Inventing*, 2, 152–3.
30. Scholarship on indigenous modes of knowing, including concepts of place and time, is voluminous. See for example Kovach; Harvey. For discussion of indigenous concepts of space and time in women’s tribal poetry of Northeast India, see Sayantan Chakrabarty.
31. Woolf, “Flying,” 208.
32. For discussion of the solar plasma images, see Guarino, “Most Detailed Close-ups.”
33. Morris, *How to Live*, 149–80.
34. H.D. (Hilda Doolittle), “The Walls Do Not Fall,” from *Trilogy*, 512–13. Copyright ©1944 by Oxford University Press; copyright renewed 1972 by Norman Holmes Pearson. Reprinted by permission of New Directions Publishing Corp.
35. *Ibid.*, 513.
36. *Ibid.*, 515.
37. *Ibid.*, 522.
38. Bell, *Virginia Woolf*, 183–92.

39. I am indebted to Holly Henry's *Virginia Woolf and the Discourse of Science* for her invaluable discussion of Woolf's decades-long fascination with astronomy and sustained reading of scientists who wrote for the general public, like Arthur Eddington and James Jeans.
40. For Gillian Geer's extensive discussion of Woolf's engagement with both Darwin and the new physics, see especially "The Victorians in Virginia Woolf: 1882–1941" and "Physics, Sound, and Substance: Later Woolf," included in *Virginia Woolf* (92–124).
41. Henry, *Virginia Woolf*, 1.
42. Woolf, "The Searchlight," 51–70.
43. *Ibid.*, 66.
44. For discussion of Kwade's earlier work and *ParaPivot*, see Baum and Wagstaff. *The Roof Garden Commission: Alicja Kwade* was on exhibit at the Metropolitan Museum of Art, April 16–October 27, 2019.
45. Woolf, "Flying Over London," 203–10. The essay is also available, with annotations, in Stuart N. Clarke's edition of volume 6, *The Essays of Virginia Woolf* (445–50), with Clarke's note that the manuscript differs slightly from the version published in *The Captain's Death Bed* (450).
46. *Ibid.*, 203.
47. *Ibid.*, 204–5.
48. *Ibid.*
49. Conrad, *Heart of Darkness*, 3–7.
50. Woolf, "Flying," 208.
51. *Ibid.*, 208–9.
52. For biographical information about af Klint, see the six essays in Bashkoff; Muller-Westermann's introduction in Burgin, *Hilma af Klint*, 7–13.
53. Horowitz, in Bashkoff, 128–33.
54. Muller-Wassermann, "Introduction," 1.
55. For art historical discussions of af Klint's significance, see Bashkoff; Schwartz.
56. The final chapter of his most influential book, *The Nature of the Physical Universe* (1928) is entitled "Science and Mysticism," 316–42.
57. H.D.'s *Notes on Thought and Vision* was not published until 1982. See Friedman, *Analyzing Freud*, 4. H.D.'s and af Klint's gender-related suppression of their work in their lifetime is reminiscent of Emily Dickinson's self-publication of her unconventional poetry in hand-made fascicles.
58. Scores of images of SARS-CoV-2 (the scientific name for the coronavirus that causes the illness dubbed Covid-19) abound on the internet, typically featuring blown-up microscopic images that have been colored and/or artistically modified. [Figure 17](#) is one of the most common.
59. James Gallagher, "More Than Half Your Body."
60. Plant consciousness is hotly debated; see Wohlleben; Livni; Hou.
61. Woolf, "Flying," 223, 225, 226.
62. *Ibid.*, 226–7.
63. *Ibid.*, 227.
64. Woolf, "Time Passes," in *To the Lighthouse*, 125–45, is relatively short, sandwiched between the longer first and third parts of the novel, "The Window," 2–124, and "The Lighthouse," 145–209. For a brief overview of Woolf's novelistic experiments with time in relation to the new time studies, see Friedman, "Alternatives to Periodization," 391–5.
65. Woolf, "Time Passes," 133.
66. *Ibid.*, 125–6.
67. *Ibid.*, 126.
68. *Ibid.*, 135.
69. *Ibid.*, 126, 128, 129, 131, 131.
70. For discussions of archipelagos and archipelagic epistemologies, see Glissant, "The Unforeseeable Diversity of the World"; Roberts and Stephens; Hau'ofa; Stephens and Martínez- San Miguel.

71. For a discussion, see Brown, “Marshall Islands.”
72. Jetñil-Kijiner, *Iep Jāltok*, 31. I am grateful to Kathy Jetñil-Kijiner for allowing me to quote extensively from her poetry. See also her “Rise; From One Island to Another,” a video poem with Greenland poet Aka Aniviāna.
73. Jetñil-Kijiner, *Iep Jāltok*, 66.
74. Ibid., 78.
75. Ibid., 4–5.
76. Ibid., 80–1.
77. Ibid.

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